

**Board of Trustees Committee Meeting
Tuesday, April 02, 2019 6:00 PM
District Office, Board Room, 3801 Market Street
Riverside CA 92501**

ORDER OF BUSINESS**Pledge of Allegiance**

Anyone who wishes to make a presentation to the Board on an agenda item is requested to please fill out a "REQUEST TO ADDRESS THE BOARD OF TRUSTEES" card, available from the Public Affairs Officer. However, the Board Chairperson will invite comments on specific agenda items during the meeting before final votes are taken. Please make sure that the Secretary of the Board has the correct spelling of your name and address to maintain proper records. Comments should be limited to five (5) minutes or less. (This time limit will be doubled for members of the public utilizing a translator to ensure the non-English speaker receives the same opportunity to directly address the Board, unless simultaneous translation equipment is used.)

Anyone who requires a disability-related modification or accommodation in order to participate in any meeting should contact the Chancellor's Office at (951) 222-8801 and speak to an Executive Administrative Assistant as far in advance of the meeting as possible.

Any public records relating to an open session agenda item that is distributed within 72 hours prior to the meeting is available for public inspection at the Riverside Community College District Chancellor's Office, 3rd Floor, 3801 Market Street, Riverside, California, 92501 or online at www.rccd.edu/administration/board.

I. COMMENTS FROM THE PUBLIC**II. PUBLIC HEARING****III. CHANCELLOR'S REPORT****III.A. [Chancellor's Communications](#)
*Information Only*****IV. BOARD COMMITTEE REPORTS****IV.A. [Teaching and Learning](#)
[EduNav Online Student Planner & Registration Tool](#)
Information Only
[EduNav RCCD Board Presentation - April 2, 2019](#)**

- IV.B. [Teaching and Learning](#)
[Inland Empire Guided Pathways Planning Summit](#)
Information only
[Inland Empire Guided Pathways Planning Summit Presentation](#)

- IV.C. [Teaching and Learning](#)
[Proposed Curricular Changes](#)
The Committee to review the proposed curricular changes for inclusion in the college catalogs and in the schedule of class offerings.
[030519 Proposed Curricular Changes](#)
[031919 Proposed Curricular Changes](#)

- IV.D. [Planning and Operations](#)
[Economic Impact Study](#)
Information Only
[04022019 RCCD - Presentation](#)
[04022019 RCCD - Executive Summary](#)
[04022019 RCCD - Main Report](#)
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[04022019 MVC - Presentation](#)
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[04022019 RCC - Fact Sheet](#)
[04022019 EIS - Methodology](#)
[04022019 EIS - Takeaways](#)
[04022019 EIS - Marketing](#)

- IV.E. [Planning and Operations](#)
[Future General Obligation Bond Planning Update](#)
Information Only
[04022019 RCCD Bond Feasibility Survey Presentation](#)
[04022019 TBWB Strategies and True North Research Planning Presentation](#)
[04022019 RCCD Fact Sheet](#)
[04022019 RCCD Bond Feasibility Survey Report](#)

IV.F. [Planning and Operations](#)
[Proposed Child Care Center Fee Increase](#)
The Committee to review a proposed increase in child care fees at Riverside City College.
[Child Care Fee Increase](#)

IV.G. [Planning and Operations](#)
[RCCD Foundation Strategic Plan](#)
The Committee to review the RCCD Foundation Strategic Plan.
[RCCD Foundation Strategic Plan](#)

V. OTHER BUSINESS

VI. CLOSED SESSION

VII. ADJOURNMENT

Board of Trustees Committee Meeting (III.A)

Meeting	April 2, 2019
Agenda Item	Other Items (III.A)
Subject	Chancellor's Communications
College/District	District
Funding	N/A
Recommended Action	Information Only

Background Narrative:

Chancellor will share general information to the Board of Trustees, including federal, state and local interests and District information.

Prepared By: Wolde-Ab Isaac, Chancellor

Board of Trustees Committee Meeting (IV.A)

Meeting	April 2, 2019
Agenda Item	Teaching and Learning (IV.A)
Subject	Teaching and Learning EduNav Online Student Planner & Registration Tool
College/District	District
Funding	N/A
Recommended Action	Information Only

Background Narrative:

Provide a brief presentation on EduNav Online Student Planner and Registration Tool.

Prepared By: Gregory Anderson, President, Riverside City College
Monica Green, Vice President, Planning & Development, Riverside City College

EduNav

Online Student Planner & Registration Tool

Board of Trustees Teaching and Learning Committee
April 2, 2019

RCCD

RIVERSIDE COMMUNITY
COLLEGE DISTRICT

MORENO VALLEY COLLEGE | NORCO COLLEGE | RIVERSIDE CITY COLLEGE

EduNav Features

- Automatically recalculates and revises student's plan as conditions change
- Programmed to keep the student on the most optimal path to completion
- Real-time recalculation of academic plans
- Uses existing degree requirements in district degree audit system
- Alerts students when conditions cause increase length of plan
- Registration features embedded in the student's plan
- Directly supports districtwide Guided Pathways efforts

Four Pillars of Pathways

CLARIFY THE PATH

ENTER THE PATH

STAY ON THE PATH

ENSURE LEARNING

Equity, Social Mobility, Economic Health for All Students

Support for RCCD's Strategic Goals

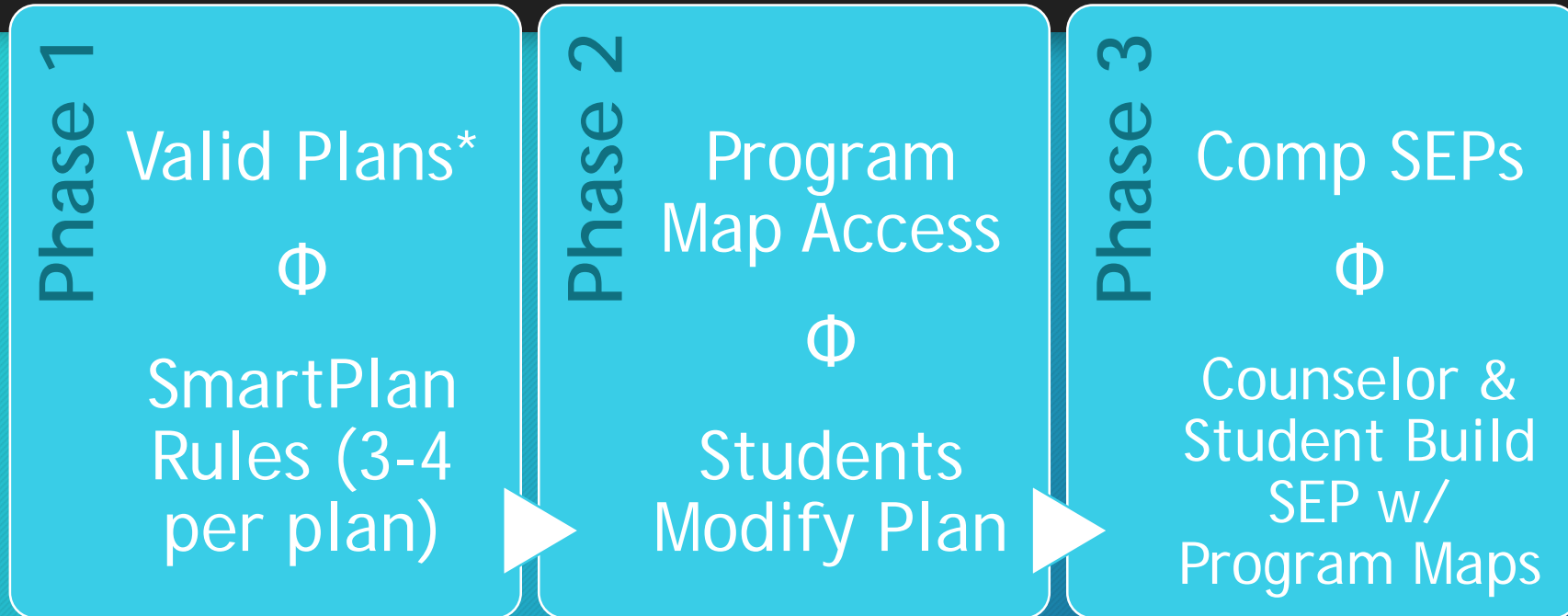
Student Success

- Support District/College Goals
 - Increase degree/certification completion
 - Increase transfer volume
 - Decrease time to completion
 - Decrease unit accumulation

Institutional Benefits

- Enrollment management
 - Project course demands
 - Enhance course scheduling
 - Promote correct course taking patterns
 - Encourage full time enrollment

EduNav in a Guided Pathways Model



Goal: 100% Valid
80% Counselor Recommended

EduNav Registration Available for Developed Program Plans

*ADTs
AA/AS
AOEs
Certificates

Guided Pathways for All Students

RCCD EduNav Steering Committee*

- Scott Brown (RCC)
- Ellen Brown-Drinkwater (RCC)
- Patti Brusca (NC)
- Allison Douglas-Chicoye (RCC lead)
- Dyrell Foster (MVC)
- Monica Green (RCC/D Project lead)
- Jeanne Howard (MVC)
- Wolde-Ab Isaac (RCCD Champion)
- Tenisha James (NC lead)
- Carlos Lopez (MVC)
- Jethro Midgett (NC)
- Regina Miller (RCC)
- Susan Mills (RCCD Administrative lead)
- Kyla O'Connor (RCC)
- Jason Parks (NC)
- Garth Schultz (RCC)
- Erin Spurbeck (NC)
- Scott Tracy (RCCD Technology lead)
- Silvia Trejo (MVC)
- Beth Watts (RCCD)
- Michael Paul Wong (MVC lead)

*Weekly standing meetings - Tuesday at noon

Implementation Timeline

Fall 2017	Spring 2018	Summer 2018	November 2018	May 2019	November 2019
Free pilot	3-year contract *	Product update *	Program launch *	Planned launch *	Planned launch *
	program planning	program planning	3,125 students in 7 programs	15,000 students districtwide	ALL students districtwide



Early results of EduNav potential impact study

Winter/Spring 2019 Registration Cycle



Objective

- Evaluate how EduNav could potentially impact student completion timelines
- Provide the core team with an understanding of the potential impacts to inform project decision making

Approach

Plan 1

Ed plan with students' current
winter and spring registrations

Plan 2

Ed plan with EduNav-selected
classes for winter and spring
registrations
(includes all current advising rules)

Constraints

- We never registered the student for more credits than they registered themselves for in winter or spring terms
- We only allowed the planner to register for winter and spring term classes with current seats available
- We only allowed the planner to select winter and spring term classes from the student's home college

Potential impact of 1 registration event

23%

could potentially reduce the number of units taken to achieve their degree by
AT LEAST 3

13%

could graduate at least a term earlier

27%

could potentially graduate a term earlier
AND take at least 3 less units

1.4

number of average units reduced in average educational plan from just this registration cycle

In about 5% of cases, current advising rules make student plans longer

Plan 1

201803 (Winter 2019) 7		201804 (Spring 2019) 7	
4516_PSY_9 Developmental Psychology	3	5685_PSY_2 Biological Psychology	3
8096_MAT_12 Statistics	4	7421_PSY_50 Research Methods in Psychology	4

Plan 2

201803 (Winter 2019) 4		201804 (Spring 2019) 3		201901 (Summer 2019) 3		201902 (Fall 2019) 4	
8096_MAT_12 Statistics	4	5685_PSY_2 Biological Psychology	3	17700_PSY_9 Developmental Psychology	3	7421_PSY_50 Research Methods in Psychology	4

Next steps

- Provide plans where advising rules are making plans longer for RCCD evaluation study
- Student satisfaction survey
- Rerun analysis on larger subset of students at the close of next registration cycle
 - Enable breakdown of impact by term
 - Analyze FT/PT distinctions
- Embed regular assessment cycles

Summer/Fall Registration – 15,000 Students

- Administration of Justice (CSUGE)
- Business Admin (CSUGE*/ IGETC)
- Communication Studies (CSUGE*)
- Computer Science (IGETC)
- Early Childhood Studies (CSUGE/IGETC)
- English (CSUGE/IGETC)
- History (CSUGE/IGETC)
- Mathematics (CSUGE/IGETC)
- Physics (CSUGE/IGETC)
- Political Science (CSUGE/IGETC)
- Psychology (CSUGE*/IGETC)
- Sociology (CSUGE/IGETC)

*Programs launched in fall 2018

Four Pillars of Pathways

CLARIFY THE
PATH

ENTER THE
PATH

STAY ON THE
PATH

ENSURE
LEARNING

Equity, Social Mobility, Economic Health for All Students

Thank you

For your support in the districtwide efforts to engage all students in a pathway.

Board of Trustees Committee Meeting (IV.B)

Meeting	April 2, 2019
Agenda Item	Teaching and Learning (IV.B)
Subject	Teaching and Learning Inland Empire Guided Pathways Planning Summit
College/District	District
Funding	N/A
Recommended Action	Information only

Background Narrative:

A summary report on the Inland Empire Guided Pathways Planning Summit that occurred March 4-5, 2019.

Prepared By: Jeannie Kim, Associate Vice Chancellor, Grants & Economic Development

Inland Empire Guided Pathways Planning Summit (March 4-5, 2019) Summary Report

Presented by:

Jeannie G. Kim, PhD

Associate Vice Chancellor, Grants & Economic Development

On behalf of the IEGP Planning Team

Overview of Planning Summit Goals

- Establish common understanding of guided pathways so we can move forward together
- Make the case for guided pathways
- Learn about strategies for implementation and partnerships



Guiding Principles

- Importance of seeing ourselves and our work in the Guided Pathways framework
- Make our needs and interests known so we can create a regional plan that addresses them
- We cannot do this work alone, we must take this opportunity to do things differently, equitably, collectively, and with our students at the center

List of Participating Campuses

- Antelope Valley College
- Barstow College
- Cerra Coso College
- Chaffey College*
- College of the Desert
- Crafton Hills College
- Moreno Valley College
- Mt. San Jacinto College
- Norco College*
- Palo Verde College
- Riverside City College*
- San Bernardino Valley College
- Victor Valley College

Planning Summit Development

- Team of faculty and administrators from RCC, Norco and Chaffey served as core planning team
- National Team
 - Dr. Rob Johnstone, NCII
 - Dr. Kay McClenney, NCII
 - Ms. Kathy Booth, NCII
 - Dr. Davis Jenkins, NCII
 - Ms. Laura Hope, Chaffey College
- Growing Inland Achievement
- CCCCO Guided Pathways Regional Leads



Opening Plenary

- 13 Campuses
- 180 Participants
- Teams of 10 - 14 per campus
- Led by campus presidents



Student Panel

Panelists:

Autumn Parra, Norco College

Torah Nance, Norco College

Tomiko Dor, Chaffey College

Fatima Alfaro, Chaffey College

George NZE, Riverside City College

Noemi Medel, Riverside City College

Moderators: Dr. Kay McClenney, NCII
and Dr. Eric Bishop, VPSS Chaffey
College



Faculty Panel

- Moderator: Dr. Davis Jenkins, NCII
- Faculty Panelists:
 - Dr. Kathleen Sell, RCC
 - Dr. Mark Sellick, RCC
 - Ms. Melissa Bader, Norco College
 - Mr. Quinton Bemiller, Norco College
 - Ms. Misty Burruel, Chaffey College
 - Dr. Angela Burk-Herrick, Chaffey College



Fireside Chat

- Dr. Casey Sacks, Deputy Assistant Secretary for Community Colleges, Office of Career, Technical, and Adult Education, US Department of Education
- Dr. Wolde-Ab Isaac, Chancellor, Riverside Community College District
- Dr. Henry Shannon, Superintendent & President, Chaffey College
- Dr. Judith White, Superintendent, Riverside County Office of Education
- Dr. Carol Tsushima, Chief of Operations for the Alliance for Education, San Bernardino County Schools
- Dr. Kim Wilcox, Chancellor, UC Riverside
- Dr. Tomas Morales, President, CSU San Bernardino
- Dr. Ron Ellis, President, California Baptist University
- Moderator: Rob Johnstone



COLLEGE TEAM STRATEGY SESSIONS













Evaluation Summary



- Excitement
- Anticipation of what's to come
- Desire to work together as a region
- Learn from one another – especially those campuses that are further along on the path
- Well-organized

Planning Summit Outcomes

- Better understanding of where each campus is currently at in their GP journey
- Understanding of need for change and creating an ecosystem in which this can occur
- Desire for regional engagement; pooling of resources and supports
- Agreement on the destination – eradicating generational poverty through higher education access and attainment

Next Steps

- Implementation Proposal Development Task Force
- College Futures Foundation Funder's Meeting
- Implementation Proposal Submission Target Due Date = August 2019

Questions?

Board of Trustees Committee Meeting (IV.C)

Meeting	April 2, 2019
Agenda Item	Teaching and Learning (IV.C)
Subject	Teaching and Learning Proposed Curricular Changes
College/District	District
Funding	N/A
Recommended Action	The Committee to review the proposed curricular changes for inclusion in the college catalogs and in the schedule of class offerings.

Background Narrative:

Presented for the Board's review and consideration are proposed curricular changes. The District Curriculum Committee and the administration have reviewed the attached proposed curricular changes and recommend their adoption by the Board of Trustees.

Prepared By: Susan Mills, Vice Chancellor Educational Services and Strategic Planning

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Deletion					
Course Deletion	Norco	MAN	38	General Machine Shop	MAN-38 and MAN-39 will be replaced by MAN-36
Course Deletion	Norco	MAN	39	Machine Shop Theory	MAN-38 and MAN-39 will be replaced by MAN-36
Course Exclusion					
Course Exclusion	Norco	EAR	EXCL35	NOR Exclude EAR-35	EAR-35 was part of the Infant/Toddler program at Norco College, which has been discontinued.
Course Major Modification					
Course Major Modification	Moreno Valley	ANT	1L	Physical Anthropology Laboratory	This course is being proposed as extensive lab.
Course Major Modification	Norco	ANT	1L	Physical Anthropology Laboratory	This course is being proposed as extensive lab.
Course Major Modification	Riverside City	ANT	1L	Physical Anthropology Laboratory	This course is being proposed as extensive lab.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Moreno Valley	ASL	1	American Sign Language 1	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	1	American Sign Language 1	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	10	Introduction to Sign Language Interpreting	Updating CORs and SLOs, added course objectives.
Course Major Modification	Riverside City	ASL	11	American Sign Language Interpreting I	As part of program review, all ASL courses are being updated. In addition, the ASL discipline is proposing to switch its name to ASL (American Sign Language), which would change discipline affiliation for all courses in its inventory.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Riverside City	ASL	12	American Sign Language Interpreting II	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	13	American Sign Language Interpreting III	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	14	American Sign Language Interpreting IV/Practicum	As part of program review, all ASL courses are being updated. In addition, the ASL discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Moreno Valley	ASL	2	American Sign Language 2	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	2	American Sign Language 2	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	20	Ethical and Professional Standards of Interpreting	As part of program review, updated COR and added objectives.
Course Major Modification	Riverside City	ASL	22	American Deaf Culture	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Riverside City	ASL	3	American Sign Language 3	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	4	American Sign Language 4	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Riverside City	ASL	5	American Sign Language for Interpreters	As part of program review, all AML courses are being updated. In addition, the AML discipline is proposing to switch its name to ASL (American Sign Language) which would change discipline affiliation for all courses in its inventory.
Course Major Modification	Norco	ELE	61	Robotics for Manufacturing	This course is being updated to keep pace with the industry. Note: ELE-61 is cross-listed with MAN-61 which is listed below.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Moreno Valley	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Norco	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Riverside City	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Riverside City	KIN	V20	Basketball, Varsity, Women	Add course learning objectives, update SLO's, update course materials.
Course Major Modification	Riverside City	KIN	V82	Speed, Agility, and Quickness Training	Change from an "A" - Activity to a "V" - Varsity course. Update the course description. Add course learning objectives, update SLO's, update course content, and update course materials.
Course Major Modification	Norco	MAN	56	CNC Machine Set-Up and Operation	Change one of the SLOs Change the textbooks
Course Major Modification	Norco	MAN	57	CNC Program Writing	In order to add transferability with San Bernardino Valley College
Course Major Modification	Norco	MAN	61	Robotics for Manufacturing	This course is being updated to keep pace with the industry. Note: MAN-61 is cross-listed with ELE-61 which is listed above.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Moreno Valley	MAT	5	Calculus for Business and Life Science	Update of COR, creating new SLOs and Course Objectives
Course Major Modification	Norco	MAT	5	Calculus for Business and Life Science	Update of COR, creating new SLOs and Course Objectives
Course Major Modification	Riverside City	MAT	5	Calculus for Business and Life Science	Update of COR, creating new SLOs and Course Objectives
Course Major Modification	Moreno Valley	MAT	52	Elementary Algebra	Unit change.
Course Major Modification	Norco	MAT	52	Elementary Algebra	Unit change.
Course Major Modification	Riverside City	MAT	52	Elementary Algebra	Unit change.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
New Course					
New Course	Riverside City	ACC	819	VITA Certification – Volunteer Income Tax Assistance Training & Certification	<p>The course will serve as a non-credit offering with real-world application to assist the economically disadvantaged in our community. Students will recognize the benefit of knowledge and skills gained in the classroom and its usage as a step toward a future career opportunity.</p> <p>Working in conjunction with the Internal Revenue Service, this course will prepare students to apply for certification. This is not a certification course.</p>
New Course	Moreno Valley	EMS	200	EMS Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	GAM	1	Business of Video Games	replaces GAM-35 and adds emphasis on business aspects of game development
New Course	Norco	GAM	2	History of Video Games	Curriculum restructure to streamline the program.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
New Course	Norco	GAM	3A	Game Design	Curriculum restructure to streamline the program.
New Course	Norco	GAM	3B	Advanced Game Design	Curriculum restructure to streamline the program.
New Course	Norco	GAM	4A	Game Scripting	Curriculum restructure to streamline the program.
New Course	Norco	GAM	4B	Advanced Game Scripting	Curriculum restructure to streamline the program.
New Course	Norco	GAM	5A	Concept Art	Curriculum restructure to streamline the program.
New Course	Norco	GAM	5B	Advanced Concept Art	Curriculum restructure to streamline the program. This particular course would thoroughly strengthen our fundamentals offerings in game art and improve curricular alignment with the schools our programs feed into.
New Course	Norco	GAM	6A	3D Digital Modeling	Curriculum restructure to streamline the program.
New Course	Norco	GAM	6B	3D Animation	Curriculum restructure to streamline the program.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
Course Inclusion					
Course Inclusion	Norco	ADJ	INCL 12	NOR Inclusion ADJ-12	Our crime scene investigations certificate currently has a class that is offered only once every two years which does not meet the perimeters of our certificate. Our industry advisory board recommended that we include ADJ-12 as an optional course for the certificate. We recommend that it also be added to the ADT.
Program Inculsion					
Program Inculsion	Moreno Valley	CIS	CERT	Business Information Worker	<p>The Certificate of Achievement is often used by students who already have Associate or Bachelor's Degrees and want to change careers or enhance their skills. The Business Information Worker Certificate of Achievement is ideal for students seeking to be trained in a field different from their previous work experience, and offers an affordable alternative to more costly private college and university programs in this field of study.</p> <p>See attachment 1</p>

PROGRAM OUTLINE OF RECORD
NEW CERTIFICATE OF ACHIEVEMENT

BUSINESS INFORMATION WORKER I

COLLEGE: MORENO VALLEY COLLEGE

TOP CODE: 0514

The Business Information Worker Certificate of Achievement is designed to prepare students for entry-level and administrative support in a variety of fields and businesses.

Program Learning Outcomes

Upon successful completion of this program, students should be able to:

- Demonstrate computer literacy with respect to computer hardware and software applications.
- Apply standard rules of business conduct and customer service.
- Develop specialized keyboarding skills at an employable level of accuracy and speed.
- Use word processing, spreadsheet, presentation graphics, and scheduling software to perform business and office tasks.
- Apply oral and written communication skills in various business and office environments.
- Design, modify, query, and manipulate lists (database and information in workbooks using common formulas, data and what if scenario tools to organize and convey information.

Required Courses (19 units)		Units
CAT-1A	Business Etiquette	1
CAT/CIS/BUS-3	Computer Applications for Business	3
CAT-31	Business Communications	3
CAT-51	Intermediate Keyboarding/Document Formatting	3
CAT/CIS-90	Microsoft Outlook	3
CAT/CIS 93	Computers for Beginners	3
CAT/CIS-98A	Introduction to Excel	1.5
CAT/CIS-98B	Advanced Excel	1.5

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Exclusion					
Course Exclusion	Moreno Valley	MAT	15	Statway II	This course was created before AB705 was implemented, but because of changes in the law with AB705, we have created other support courses that are compliant. This course will not be taught since it would take two semesters instead of just one to complete statistics.
Course Exclusion	Moreno Valley	MAT	23	Trigonometry and Precalculus	This course was created before AB705 was implemented, but because of changes in the law with AB705, we have created other support courses that are compliant. This course will not be taught since it would take two semesters instead of just one to complete statistics.
Course Exclusion	Moreno Valley	MAT	45	Statway I	This course was created before AB705 was implemented, but because of changes in the law with AB705, we have created other support courses that are compliant. This course will not be taught since it would take two semesters instead of just one to complete statistics.
Course Major Modification					
Course Major Modification	Moreno Valley	ADJ	13	Criminal Investigation	Need to update the wording and phrasing in the course description and short description, as well as updating the textbook and reviewing the COR. Remove cross-listing with JUS 13 (deletion proposal launched).
Course Major Modification	Norco	ADJ	13	Criminal Investigation	Need to update the wording and phrasing in the course description and short description, as well as updating the textbook and reviewing the COR. Remove cross-listing with JUS 13 (deletion proposal launched).
Course Major Modification	Riverside City	ADJ	13	Criminal Investigation	Need to update the wording and phrasing in the course description and short description, as well as updating the textbook and reviewing the COR. Remove cross-listing with JUS 13 (deletion proposal launched).
Course Major Modification	Moreno Valley	ADJ	19	Introduction to Policing	To create and maintain a policing class to remain both academically competitive and rigorous with similar administration of justice and criminal justice programs at the undergraduate level, as well as to address the dearth of policing courses in the existing program in comparison to classes about law and corrections.

Proposed Curricular Changes

Course_Proposal Type	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
Course Major Modification	Riverside City	ADJ	19	Introduction to Policing	To create and maintain a policing class to remain both academically competitive and rigorous with similar administration of justice and criminal justice programs at the undergraduate level, as well as to address the dearth of policing courses in the existing program in comparison to classes about law and corrections.
Course Major Modification	Moreno Valley	ADJ	200	Administration of Justice Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Norco	ADJ	200	Administration of Justice Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Riverside City	ADJ	200	Administration of Justice Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Moreno Valley	ART	6	Art Appreciation	Addition of assignments and update for program review
Course Major Modification	Norco	ART	6	Art Appreciation	Addition of assignments and update for program review
Course Major Modification	Riverside City	ART	6	Art Appreciation	Addition of assignments and update for program review
Course Major Modification	Moreno Valley	ART	6H	Honors Art Appreciation	Adding assignments and updating for proigram review
Course Major Modification	Norco	ART	6H	Honors Art Appreciation	Adding assignments and updating for proigram review
Course Major Modification	Riverside City	ART	6H	Honors Art Appreciation	Adding assignments and updating for proigram review
Course Major Modification	Moreno Valley	ART	200	Art Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Norco	ART	200	Art Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.

Proposed Curricular Changes

Course_Proposal Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Course Major Modification	Riverside City	ART	200	Art Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Moreno Valley	BUS	200	Business Administration Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Norco	BUS	200	Business Administration Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Riverside City	BUS	200	Business Administration Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Moreno Valley	CAT	200	Computer Applications and Office Technology Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
Course Major Modification	Riverside City	CAT	200	Computer Applications and Office Technology Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Number	Course Title	Course Rationale
Course Major Modification	Norco	BUS	14	Social Media and Online Digital Media Promotions for Entrepreneurs	Increasing number of small business and entrepreneurs are relying on social media and online media to build their businesses. This course is geared towards those business owners to help understand the process and the effective usage of those media platforms.
Course Major Modification	Riverside City	BUS	14	Social Media and Online Digital Media Promotions for Entrepreneurs	Increasing number of small business and entrepreneurs are relying on social media and online media to build their businesses. This course is geared towards those business owners to help understand the process and the effective usage of those media platforms.
Course Major Modification	Norco	ELE	25	Digital Techniques	This course is the CORE of our Digital Electronics program. It has been cancelled for low enrollment because of competition with our very popular Electrician courses, and due to competition for students by a robust economy. In order to save the Digital Electronics program, we need to delete all prerequisites, even though that will mean the instructor will need to cover some basics of Electronics before launching into the Digital instruction. Accompanying this deletion of prerequisites is an update of textbooks, and the addition of course objectives.
Course Major Modification	Moreno Valley	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Norco	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Riverside City	GEG	1H	Honors Physical Geography	link SLOs to GE outcomes. Add assignments. Update textbooks. Align SLOs to GEG-1 SLOs.
Course Major Modification	Moreno Valley	SOC	12	Marriage and Family Relations	Updated as part of program review.
Course Major Modification	Norco	SOC	12	Marriage and Family Relations	Updated as part of program review.
Course Major Modification	Riverside City	SOC	12	Marriage and Family Relations	Updated as part of program review.
New Course					
New Course	Moreno Valley	ACC	200	Accounting Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.

Proposed Curricular Changes

Course_Proposal Type	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
New Course	Norco	ACC	200	Accounting Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	ACC	200	Accounting Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	ADJ	19	Introduction to Policing	To create and maintain a policing class to remain both academically competitive and rigorous with similar administration of justice and criminal justice programs at the undergraduate level, as well as to address the dearth of policing courses in the existing program in comparison to classes about law and corrections
New Course	Norco	ADJ	19	Introduction to Policing	To create and maintain a policing class to remain both academically competitive and rigorous with similar administration of justice and criminal justice programs at the undergraduate level, as well as to address the dearth of policing courses in the existing program in comparison to classes about law and corrections
New Course	Riverside City	ADJ	19	Introduction to Policing	To create and maintain a policing class to remain both academically competitive and rigorous with similar administration of justice and criminal justice programs at the undergraduate level, as well as to address the dearth of policing courses in the existing program in comparison to classes about law and corrections
New Course	Moreno Valley	CIS	200	Computer Information Systems Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	CIS	200	Computer Information Systems Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	CIS	200	Computer Information Systems Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	EAR	200	Early Childhood Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.

Proposed Curricular Changes

Course_Proposal Type	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
New Course	Norco	EAR	200	Early Childhood Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	EAR	200	Early Childhood Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	EDU	200	Education Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	EDU	200	Education Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	JOU	200	Journalism Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	JOU	200	Journalism Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	JOU	200	Journalism Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	KIN	200	Kinesiology Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	KIN	200	Kinesiology Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	LOT	15	Fundamentals of Photonics	This is one of four courses in the LOT program, Laser and Optical Technology: Optoelectronics
New Course	Norco	LOT	25	Quality Assurance for Precision Optics	This is one of four courses in the LOT program.
New Course	Norco	LOT	35	Optical Metrology and Interferometry	This is one of four courses in the LOT program.

Proposed Curricular Changes

Course_Proposal Type	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
New Course	Moreno Valley	MAG	200	Management Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	MAG	200	Management Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	MAG	200	Management Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	MAN	856	CNC Machine Set-Up and Operation	This course is part of two courses in a non-credit certificate designed to assist students in learning CNC operations and programming.
New Course	Norco	MKT	200	Marketing Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	MKT	200	Marketing Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	MUS	200	Music Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	MUS	200	Music Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	MUS	200	Music Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	PHO	200	Photography Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	RLE	200	Real Estate Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.

Proposed Curricular Changes

Course_Proposal Type	Course_Campus (Multi) Title	Course_Subject Code	Course_Course Number	Course Title	Course Rationale
New Course	Riverside City	RLE	200	Real Estate Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Moreno Valley	THE	200	Theatre Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Norco	THE	200	Theatre Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Course	Riverside City	THE	200	Theatre Work Experience	To change the course description to be compliant with the State Chancellor's office recommendation. COR has not been updated since 2008.
New Program					
Certificate and Degree	Moreno Valley			Social Work Administration Studies	The entry-level wage for each of the occupations in the social work occupational group is above the MIT Living Wage estimate of \$12.30 per hour for a single adult living in the Inland Empire/Desert Region.
Non-credit Certificate	Moreno Valley			Computer Maintenance and Security	The goal of this program is to provide training to a diverse population of adult learners to support Adult Education and Community Initiatives and drive awareness of technical skills and security practices in the community. The program intends to improve diversity in the population of learners while positively build student interests in education options and promote career growth district-wide. Students will gain soft and technical skills necessary to troubleshoot and improve security in systems and network for individual or small business environment.
Program Inclusion					

Proposed Curricular Changes

Course_Proposal Type Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
Program Inclusion	Moreno Valley			Business Information Worker	<p>The Business Information Worker Certificate of Achievement is designed to provide students with practical, career-oriented skills for professional office environments using current industry technologies.</p> <p>The Certificate of Achievement is often used by students who already have Associate or Bachelor's Degrees and want to change careers or enhance their skills. The Business Information Worker Certificate of Achievement is ideal for students seeking to be trained in a field different from their previous work experience, and offers an affordable alternative to more costly private college and university programs in this field of study.</p>
Program Modification					
Program Modification				Administration of Justice	To remove the JUS course cross-listings . JUS was recently deleted as a discipline.

Proposed Curricular Changes

Course_Proposal Type Proposal Title	Course_Campus (Multi) Title	Course_Subject Code	Course Course Number	Course Title	Course Rationale
New Discipline					
New Discipline	Norco	PDS		Professional Development Studies	To increase non-credit offerings
Discipline Inclusion					
New Discipline	Norco			SCE - Senior Citizen Education/Older Adults	To increase non-credit offerings

**RIVERSIDE COMMUNITY COLLEGE DISTRICT
PROGRAM OUTLINE of RECORD**

NEW CERTIFICATE OF ACHIEVEMENT

College: R___ M_X_ N___

TOP Code: 2104.00: Human Services

Social Work Administration Studies

PROGRAM PREREQUISITE:

None.

SHORT DESCRIPTION of PROGRAM

This program prepares students with an academic foundation along the career pathway of social work administration. Training is provided in the area of management, conflict-resolution, human resources, policy development and analysis, needs assessment, grant writing, non-profit operations, and employment support strategies. Students will develop an understanding of the knowledge, skills, and attitudes necessary to transition into entry-level employment in social work administration and transfer opportunities in the practice area. Emphasis is on an understanding and development of macro practice skills.

PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students should be able to:

- Demonstrate knowledge, skills and attitudes essential to administration in social work.
- Recognize and demonstrate respect for diversity and ethical standards in administration in social work practices.
- Complete and reflect upon service-based learning experience.
- Practice strategies and techniques used in successful grant writing.
- Practice strategies and techniques used in successful social welfare policy development.
- Demonstrate an understanding of social work theory and its applications to social work administration practices.

Required Courses (17 – 20 units)

	<u>Units</u>
HMS-16 Public Assistance and Benefits	1
HMS-70 Non-profit Organizations – Social Work Administration Studies	3
HMS-71 Grant Writing – Social Work Administration Studies	3
HMS-72 Social Welfare Policies – Social Work Administration Studies	3
HMS-73 Administration in Social Work – Social Work Administration Studies	3
HMS-74 Social Work Theory – Social Work Administration Studies	3
WKX HMS 200 Human Services Work Experience	1-2-3-4

Elective Courses (6 units)

	<u>Units</u>
HMS-4 Introduction to Human Services	3
HMS-13 Employment Support Strategies	3
HMS-18 Introduction to Social Work	3
HMS-19 Generalist Practices of Social Work	3
HMS-29 Careers in Social Work - Intro to Careers in Social Work	3

Total Units:

23 – 26

MORENO VALLEY COLLEGE

PROGRAM: Certificate in Administration in Social Work Studies

Criteria A. Appropriateness to Mission

1. Statement of Program Goals and Objectives

Mission of Moreno Valley College: *Responsive to the educational needs of its region, Moreno Valley College offers academic programs and student support services which include baccalaureate transfer, professional, pre-professional, and pre-collegiate curricula for all who can benefit from them. Lifelong learning opportunities are provided, especially, in health and public service preparation.*

The goal of the Social Work Administration Studies Certificate is to pave a pathway to prepare students for management and administrative positions in social work. The program aims to develop training of helping professionals in grant writing, operations of non-profit organizations, needs assessment, policy development and analysis, and employment support strategies. Graduates will have developed knowledge, skills and attitudes necessary to help clients emphasizing a macro practice approach.

2. Catalog Description

This program prepares students with an academic foundation along the career pathway of social work administration. Training is provided in the area of management, conflict-resolution, human resources, policy development and analysis, needs assessment, grant writing, non-profit operations, and employment support strategies. Students will develop an understanding of the knowledge, skills, and attitudes necessary to transition into entry-level employment in social work administration and transfer opportunities in the practice area. Emphasis is on an understanding and development of macro practice skills.

The Certificate Program Learning Outcomes are:

- Demonstrate knowledge, skills and attitudes essential to administration in social work.
- Recognize and demonstrate respect for diversity and ethical standards in administration in social work practices.
- Complete and reflect upon service-based learning experience.
- Practice strategies and techniques used in successful grant writing.
- Practice strategies and techniques used in successful social welfare policy development.
- Demonstrate an understanding of social work theory and its applications to social work administration practices.

3. Program Requirements

The certificate program requires the completion of 6 core classes, for a total of 17 – 20 units.

HMS-16	Public Assistance and Benefits	1 Unit
HMS-70	Non-profit Organizations – Social Work Administration Studies	3 Units
HMS-71	Grant Writing – Social Work Administration Studies	3 Units
HMS-72	Social Welfare Policies – Social Work Administration Studies	3 Units
HMS-73	Administration in Social Work – Social Work Administration Studies	3 Units
HMS-74	Social Work Theory – Social Work Administration Studies	3 Units
WKX HMS 200	Human Services Work Experience	1-2-3-4 Units

In addition, the certificate program requires the completion of 6 elective units from the options listed below:

HMS-4	Introduction to Human Services	3 Units
HMS-13	Employment Support Strategies	3 Units
HMS-18	Introduction to Social Work	3 Units
HMS-19	Generalist Practices of Social Work	3 Units
HMS-29	Careers in Social Work – Intro to Careers in Social Work	3 Units

4. Background and Rationale

The Social Work Administration Studies Certificate paves a pathway for students interested in pursuing an educational foundation in the area of supervision, upper level management and administrative services in social work. This certificate promotes social work, human services, and counseling practices career growth and educational advancement in the Inland Empire/Desert Region. It provides an educational platform for students to expand skillsets through training that can potentially improve their opportunities for career, pursuing certifications, and impact on the regional and national workforce.

Service-based learning is integral to the program which will allow for continued and active community service in the Inland/Empire Desert Region.

Criteria B. Need

5. Enrollment and Completer Projections

Enrollment projections for courses are as followed:

Required Courses:

HMS-16: 32 students
HMS-70: new course; no enrollment data available
HMS-71: new course; no enrollment data available
HMS-72: new course; no enrollment data available
HMS-73: new course; no enrollment data available
HMS-74: new course; no enrollment data available
WKX HMS 200: 30 students

Elective Courses:

HMS-4: 32 students
HMS-13: 49 students
HMS-18: 52 students
HMS-19: 32 students
HMS-29: 32 students

HMS-4, HMS-13, HMS-16, HMS-18, HMS-19, HMS-29, HMS-70, HMS-71, HMS-72, HMS-73, HMS-74, and WKX HMS 200 are actively available in Moreno Valley College inventory. All courses are approved for transfer to the CSU.

The certificate program expects to have 15 – 20 students completing this certificate annually beginning in September 2020.

6. Place of Program in Curriculum/Similar Programs

The college has no similar certificate within the college district; this is a unique and new certificate available to our students.

7. Similar Programs at Other Colleges in Service Area

Within the Riverside Community College district, Moreno Valley College is the only college in the district that is currently offering all of these courses within the certificate program. No college in the area has a like or similar program.

8. Labor Market

Employment for the social work occupational group is expected to increase 17% between 2017 and 2022 in the Inland Empire/Desert Region. A total of 6,783 job openings or 1,357 annual openings will be available over the five-year timeframe. The entry-level wage for each occupation in the social work occupational group is above the MIT Living Wage estimate of \$12.30 per hour for a single adult living in the Inland Empire/Desert Region. There appears to be an opportunity for program growth based on the average annual number of program completions for the selected community college program in the region (279 annual average regional credentials), and the annual openings for middle-skill social work occupations in the local region (654 average annual openings).

In 2018, Social and Community Service Managers were reported to have a median hourly wage of \$29.84. This market category is inclusive of social work, human services, and counseling practice professionals.

9. Employer Survey

Post general Advisory Committee survey was conducted. The process utilized Advisory Committee members' recommendations. Advisory Board supported the development of the credit certificate related to administration in social work studies.

10. Explanation of Employer Relationship

Employers provide guidance for future student employment, internship and mentorship. They also provide feedback on curriculum, certificate update to parallel with industry certification and workforce demands. Service-based learning is an integral part of the program and new internships will be continually explored.

11. List Members of Advisory Committee

- James Banks – MVC – Professor, Human Services
- Rachel Dyer – MVC – Assistant Professor, Human Services
- Asia Williamson – San Bernardino County Worker – Social Services Consultant – Adjunct Professor
- Jill Rasmussen – LCSW; La Sierra University – MSW Program, Chair and Professor
- Gene Tripp – West Coast Treatment – Treasurer
- Scott Hoage – San Bernardino Valley College – Faculty Human Services Department
- Dr. Stephen Brown – California Baptist University – Associate Dean
- Priscilla Grijalva – Norte Vista High School – School Counselor
- Michele Gardner – MVC Student, Human Services Club President
- Corey Jackson – Sigma Beta Xi – CEO

12. Recommendations of Advisory Committee

During the break-out session for HMS – Human Services, Professor Banks and Professor Dyer introduced the new course proposals and certificate proposals to the members present at the advisory committee. The desire to continue to have service-based learning as an integral part of each certificate was discussed. The plan to have the newly proposed certificates be state-approved was established. Jill Rasmussen, Chair of the Social Work Program at La Sierra University, discussed the relevance the new certificates have in responding to the needs of the community. Scott Hoage confirmed and expressed an interest to teach in the Drug and Alcohol Studies program as he discussed his experience teaching in this services category at San Bernardino Valley College. Hoage verified the course outlines as essential to student success in the service area. A unanimous vote was received in support of all newly proposed certificates. A unanimous vote was also received to change the name of the discipline from Human Services to Social Work, Human Services, and Counseling Practices. It was discussed that this discipline name change would assist the students with identifying the discipline as a pathway to social work and counseling practices in addition to human services.

The vote regarding the new certificates was moved by Priscilla Grijalva, seconded by Rachel Dyer, and unanimously approved. (Votes: Yes = 10; No = 0; Abstentions = 0)

The vote regarding changing the name of the discipline was moved by Priscilla Grijalva, seconded by Michele Gardner, and unanimously approved. (Votes: Yes = 10; No = 0; Abstentions = 0)

C. Curriculum Standards

13. Display of Proposed Sequence

The sequence of courses presented here for the certificate program:

Semester 1

HMS-70
HMS-71
HMS-72
HMS-Elective

Semester 2 (Winter/Summer)

HMS-16

Semester 2

HMS-73
HMS-74
WKX HMS 200
HMS-Elective

15. Library and/or Learning Resources Plan

The Library and/or Learning Resources are adequate to support this program.

16. Facilities and Equipment Plan

The facilities and equipment are adequate to support this program.

17. Financial Support Plan

Resources are adequate to support this program.

18. Faculty Qualifications and Availability

Moreno Valley College has one full-time Professor, one full-time Assistant Professor, and three Adjunct Instructors that may teach the HMS courses:

- BANKS, JAMES; Professor; B.S., University of Wisconsin, Whitewater; MSW, University of Wisconsin, Madison. At Riverside Community College District since 2002.
- DYER, RACHEL; Assistant Professor; B.S., California Baptist University; MSW, California State University, San Bernardino. At Riverside Community College District since 2014 as an Adjunct Instructor and since 2017 as a full-time Assistant Professor.
- HOLLOWAY, WILLIAM; Adjunct Instructor; BSW, California State University, San Bernardino; MSW, University of Maryland. At Riverside Community College District since 2015.
- OUTLEY-JONES, DONNA; Adjunct Instructor; BSW, La Sierra University; MSW, University of Southern California. At Riverside Community College District since 2018.
- SULLIVAN, LYNNETTE; Adjunct Instructor; B.A., Psychology; M.S. Counseling Psychology, California Baptist University; Licensed Marriage and Family Therapist; At Riverside Community College District since 2018.

19. Based on Model Curriculum

This is based on the model curriculum.

20. Licensing or Accreditation Standards

N/A

21. Student Selection and Fees

Students will be allowed to self-select for the program. Moreno Valley College is an open access institution. There are no additional requirements for entrance into this program or additional fees other than textbook requirements.

RIVERSIDE COMMUNITY COLLEGE DISTRICT
PROGRAM OUTLINE OF RECORD

College R__M✓N__
TOP's Code: 0708.20

Noncredit Certificate in Computer Maintenance and Security

PROGRAM PREREQUISITE:

None

SHORT DESCRIPTION OF PROGRAM:

The Computer Maintenance and Security certificate will provide students with proficiency in the areas of computer hardware and software troubleshooting, system configuration, practical networking and security for personal and business environment.

PROGRAM LEARNING OUTCOMES:

Upon successful completion of this program, students should be able to:

- 1) Troubleshoot computer hardware and software issues.
- 2) Derive a plan for system and small network upgrade.
- 3) Configure home and small business networking and security settings.
- 4) Identify threats, risks and vulnerabilities that impact individual or organizations.
- 5) Assess the impact of regulatory on individual privacy and organization data protection practices.

The certificate program requires the completion of 3 core classes, for a total of 48 hours.

<u>Required Courses</u>	<u>Hours</u>
CIS-824A Computer Repairs for Beginners	16
CIS-824B Networking for Home and Small Businesses	16
CIS-824C Cybersecurity for Beginners	16
<hr/>	
Total Hours:	48

MORENO VALLEY COLLEGE

PROGRAM: Certificate in Computer Maintenance and Cybersecurity

Criteria A. Appropriateness to Mission

1. Statement of Program Goals and Objectives

Mission of Moreno Valley College: *Responsive to the educational needs of its region, Moreno Valley College offers academic programs and student support services which include baccalaureate transfer, professional, pre-professional, and pre-collegiate curricula for all who can benefit from them. Lifelong learning opportunities are provided, especially, in health and public service preparation.*

The goal of this program is to provide training to a diverse population of adult learners to support Adult Education and Community Initiatives and drive awareness of technical skills and security practices in the community. The program intends to improve diversity in the population of learners while positively build student interests in education options and promote career growth district-wide.

Students will gain soft and technical skills necessary to troubleshoot and improve security in systems and network for individual or small business environment.

2. Catalog description

The Computer Maintenance and Cybersecurity Certificate Program will provide students with proficiency in the areas computer hardware and software troubleshooting, operating systems configuration, practical networking and security, threat detection and regulatory compliance.

The Certificate Program Learning Outcomes are:

- Troubleshoot computer hardware and software issues.
- Derive a plan for system and small network upgrade.
- Configure home and small business networking and security settings.
- Identify threats, risks and vulnerabilities that impact individual or organizations.
- Assess the impact of regulatory on individual privacy and organization data protection practices.

3. Program Requirements

The certificate program requires the completion of 3 noncredit classes, 16 hours in each course, for a total of 48 hours.

CIS-824A	Computer Repairs for Beginners	16 hours
CIS-824B	Networking for Home and Small Businesses	16 hours
CIS-824C	Cybersecurity for Beginners	16 hours

4. Background and Rationale

This certificate is constructed to support Adult Education and Community Initiatives while promoting awareness of technical career growth and technical education advancement. It provide an education platform for adult learners to expand skillsets through training that can potentially improve their opportunities for career, pursuing CompTIA certifications, while drawing interests in education pathways to impact regional and national workforce.

Criteria B. Need

5. Enrollment and Completer Projections

Enrollment projections for courses are as followed:

CIS-824A: 40 - 49 students per session.

CIS-824B: 40 – 49 students per session.

CIS-824C: 40 - 49 students per session.

The certificate program expects to have 30 - 100 students completing this certificate annually beginning in September 2019.

6. Place of Program in Curriculum/Similar Programs

The college has no similar certificate within the college district; this is a unique and new certificate available to our students.

7. Similar Programs at Other Colleges in Service Area

Within the Riverside Community College district, Moreno Valley College is the only college in the district that is currently offering all of these courses within the certificate program. No college in the area has a like or similar program.

8. Labor Market-

Computer user support specialists' occupation is expected to increase employment by 15 percent by 2024, adding almost 77,500 new jobs in California. This occupation is projected to have 2,330 annual job openings due to growth in this occupation and replacement need within California. In Inland Empire and Desert Region, Computer Network Support Specialists annual employment growth is 15 percent, with median wage of \$29.83 per hour.

9. Employer Survey

Post general Advisory Committee survey was conducted. The process utilized Advisory Committee members' recommendations. Advisory Board supported the development of noncredit certificate related to system maintenance and cybersecurity.

10. Explanation of Employer relationship.

Employers provide employment guidance for future student employment, internship and mentorship. They also provide feedback on curriculum and certificate update to parallel with industry certifications. Some of the current employers are supportive of covering some costs for CompTIA certification within their internship programs.

11. List members of Advisory committee

- **Wissam Al-Sayed** – Founder/CEO at Blink IT Solutions
- **Katia Al-Sayed** – National Account Manager at Blink IT Solutions
- **Steve Coelho** – Principle Development Specialist at Val Verde High School
- **Steve Collier** – Mathematics & Computer Science Instructor at Moreno Valley Unified School District
- **Robert Davis** – IT Lifecycle Service Director at Blink IT Solutions
- **Lea Deesing** – CIO & Executive Director of SmartRiverside at City of Riverside
- **Claire Jefferson-Glipa** – IT Education Account Manager at ConvergeOne
- **Cheryl Honore** – Professor of Accounting at Moreno Valley College
- **Donnell Layne** – Maker Space STEM Project Director at Moreno Valley College
- **Chris Lorenz** – Cybersecurity and EaglePro Instructor at Valley View High School
- **Robert Loya** – Asst. Chair/ Business Faculty at Moreno Valley College
- **Tura Morice** – Chief Information Officer at Riverside University Health Systems
- **Dr. Kasey Nguyen** – Computer Information Systems Faculty – Cybersecurity at Moreno Valley College
- **Nicole Shadowen** – Independent Cybersecurity Digital Forensics Specialist
- **Shirly Tai** – Marketing Manager at Blink IT Solutions
- **Dr. Keri Then** – Business and Administration, Info Systems Core Adjunct Faculty at University of Redlands
- **Donna Woods** – Instructor at Canyon Springs High School, Educator/Community Manager at Cyberhub

12. Recommendations of Advisory Committee

During the break-out session for CIS- Programming and Cybersecurity, Dr. Keri Then recommends that the certificate emphasizes industry standard and practices, because companies are looking for industry level certification; combines coursework with certification work. Donna Woods verified that her students at her high school (Canyon Springs HS) are working with MVC and have been certified at the industry level (IT Essentials). Lea Deesing- Seconded Dr. Keri Then regarding certificate should incorporate hands-on and actual physical access to system hardware, which will extremely valuable experiences to students.

It was moved by Keri Then, seconded by Claire Jefferson-Glipa, and approved to create a Noncredit Certificate in Computer Maintenance and Security.

(Votes: Yes = 17; No = 0; Abstentions = 0)

C. Curriculum Standards

13. Display of Proposed Sequence

The sequence of courses presented here for the certificate program:

Semester

CIS 24 – 8 weeks (week 1 – 8)

CIS 29 – 8 weeks (week 9 – 16)

CIS 31 – 8 weeks (week 9 – 16)

15. Library and/or Learning Resources Plan

The Library and/or Learning Resources are adequate to support this program.

16. Facilities and Equipment Plan

The facilities and equipment are adequate to support this program.

17. Financial Support Plan

Resources are adequate to support this program.

18. Faculty Qualifications and Availability

Moreno Valley College has 2 full-time Associate Professors and one Adjunct Instructor that will teach the CIS courses:

- LOYA, ROBERT Assistant Professor Computer Information Systems/Business B.S., M.I.S., University of Phoenix. At Riverside Community College District since 2013.
- NGUYEN, KASEY Assistant Professor Computer Information Systems, PhD, Capella University. At Riverside Community College District since 2018.
- ALMEIDA, FRANK Assistant Professor Computer Information Systems. MBA with concentration in Entrepreneurship. At Riverside Community College District since 2001.

19. Based on model curriculum

This is based on the model curriculum.

20. Licensing or Accreditation Standards

N/A

21. Student Selection and Fees

Students will be allowed to self-select for the program. Moreno Valley College is an open access institution. There are no additional requirements for entrance into this program or additional fees other than textbook requirements.

PROGRAM OUTLINE OF RECORD
NEW CERTIFICATE OF ACHIEVEMENT

BUSINESS INFORMATION WORKER I

COLLEGE: MORENO VALLEY COLLEGE

TOP CODE: 0514

The Business Information Worker Certificate of Achievement is designed to prepare students for entry-level and administrative support in a variety of fields and businesses.

Program Learning Outcomes

Upon successful completion of this program, students should be able to:

- Demonstrate computer literacy with respect to computer hardware and software applications.
- Apply standard rules of business conduct and customer service.
- Develop specialized keyboarding skills at an employable level of accuracy and speed.
- Use word processing, spreadsheet, presentation graphics, and scheduling software to perform business and office tasks.
- Apply oral and written communication skills in various business and office environments.
- Design, modify, query, and manipulate lists (database and information in workbooks using common formulas, data and what if scenario tools to organize and convey information.

Required Courses (19 units)		Units
CAT-1A	Business Etiquette	1
CAT/CIS/BUS-3	Computer Applications for Business	3
CAT-31	Business Communications	3
CAT-51	Intermediate Keyboarding/Document Formatting	3
CAT/CIS-90	Microsoft Outlook	3
CAT/CIS 93	Computers for Beginners	3
CAT/CIS-98A	Introduction to Excel	1.5
CAT/CIS-98B	Advanced Excel	1.5

RIVERSIDE COMMUNITY COLLEGE DISTRICT PROGRAM OUTLINE of RECORD

College: R___ M_X N___

TOPs Code: 2105.00
MCE504

Administration of Justice

Program Modification

This program focuses on the criminal justice system, its organizational components and processes, as well as its legal and public policy contexts. This includes instruction in criminal law and policy, police and correction systems organization, the administration of justice and the judiciary, and public attitudes regarding the criminal justice issues.

Certificate Program

Program Learning Outcomes

Upon successful completion of this program, students should be able to:

- Demonstrate knowledge of the breadth, scope and interconnectivity of the criminal justice system.
- Demonstrate an understanding of the theories and research in the areas of crime, criminality and criminal justice.
- Demonstrate a basic knowledge of criminal law.
- Demonstrate a knowledge of the implications of legal evidence in the processing of criminal cases.
- Demonstrate a knowledge of the role of policing and the maintenance of favorable community relations.

Required Courses (15 units):

	Units
ADJ/ JUS -1 introduction to the Administration of Justice	3
ADJ/ JUS -2 Principles and Procedures of the Justice System	3
ADJ/ JUS -3 Concepts of Criminal Law	3
ADJ/ JUS -4 Legal Aspects of Evidence	3
ADJ/ JUS -5 Community Relations	3

Electives (12 units):

Choose elective courses from Administration of Justice	12
--	----

Total Units:

27

Board of Trustees Committee Meeting (IV.D)

Meeting	April 2, 2019
Agenda Item	Planning and Operations (IV.D)
Subject	Planning and Operations Economic Impact Study
College/District	District
Funding	N/A
Recommended Action	Information Only

Background Narrative:

EMSI, a provider of economic impact studies and labor market data to educational planners, was engaged in September 2018 to perform economic impact studies and issue reports for the District's three colleges and the District as a whole. The results of the Economic Impact Study will be used to inform: District and College strategic planning efforts; educational and facilities master plan development and revision; and future general obligation bond planning efforts.

EMSI has issued separate reports for each College and the District as a whole, as shown below. They are attached for the Board's review and consideration.

- Power Point Presentation
- Executive Summary
- Main Report
- Fact Sheet
- Methodology
- Takeaways
- Marketing

The economic impact study reports were presented to the Chancellor's Cabinet on January 14, 2019 and the District Strategic Planning Council on March 15, 2019. A representative from EMSI will be in attendance to share the results of the economic impact study.

Prepared By: Aaron S. Brown, Vice Chancellor, Business and Financial Services

RCCD

**RIVERSIDE COMMUNITY
COLLEGE DISTRICT**

MORENO VALLEY COLLEGE | NORCO COLLEGE | RIVERSIDE CITY COLLEGE

The economic value of Riverside Community College District

ANALYSIS OF THE ECONOMIC IMPACT
AND RETURN ON INVESTMENT OF EDUCATION

Emsi & Community Colleges

15+ years working with higher education institutions

1,800+ economic impact studies completed

1.2M students used Emsi's career pathways tool last year

9 of 10 2019 Aspen Prize finalists are Emsi customers



What is an
ECONOMIC IMPACT ANALYSIS?

Measures how an event or institution affects the local economy



What is an
INVESTMENT ANALYSIS?

A comparison of the costs and benefits to determine the return on investment **80**

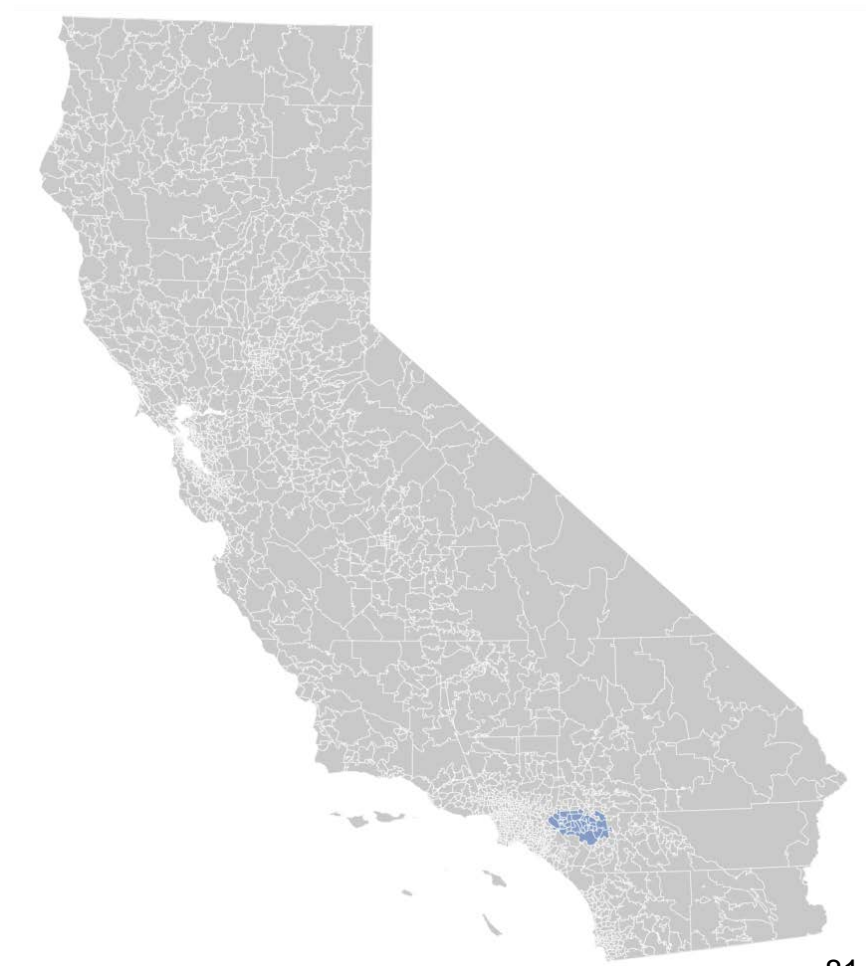
About the RCCD Service Area

\$66.8 billion

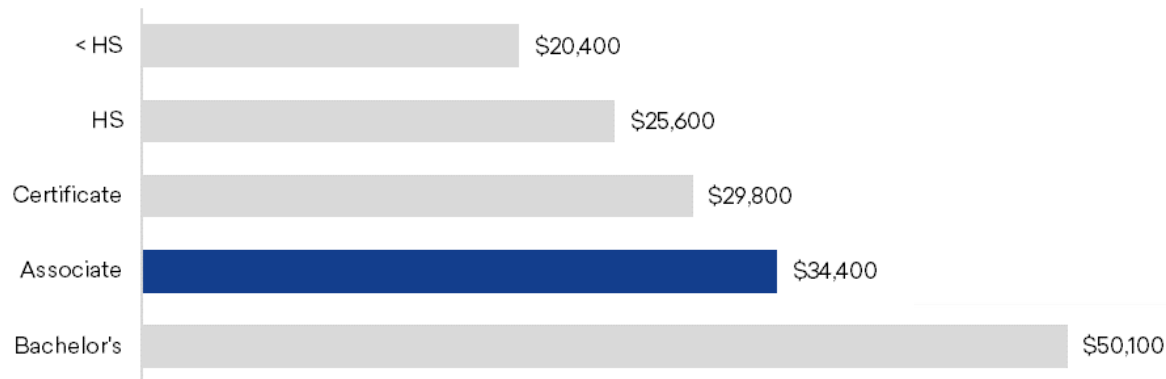
Total Gross Regional
Product (GRP)

780,526

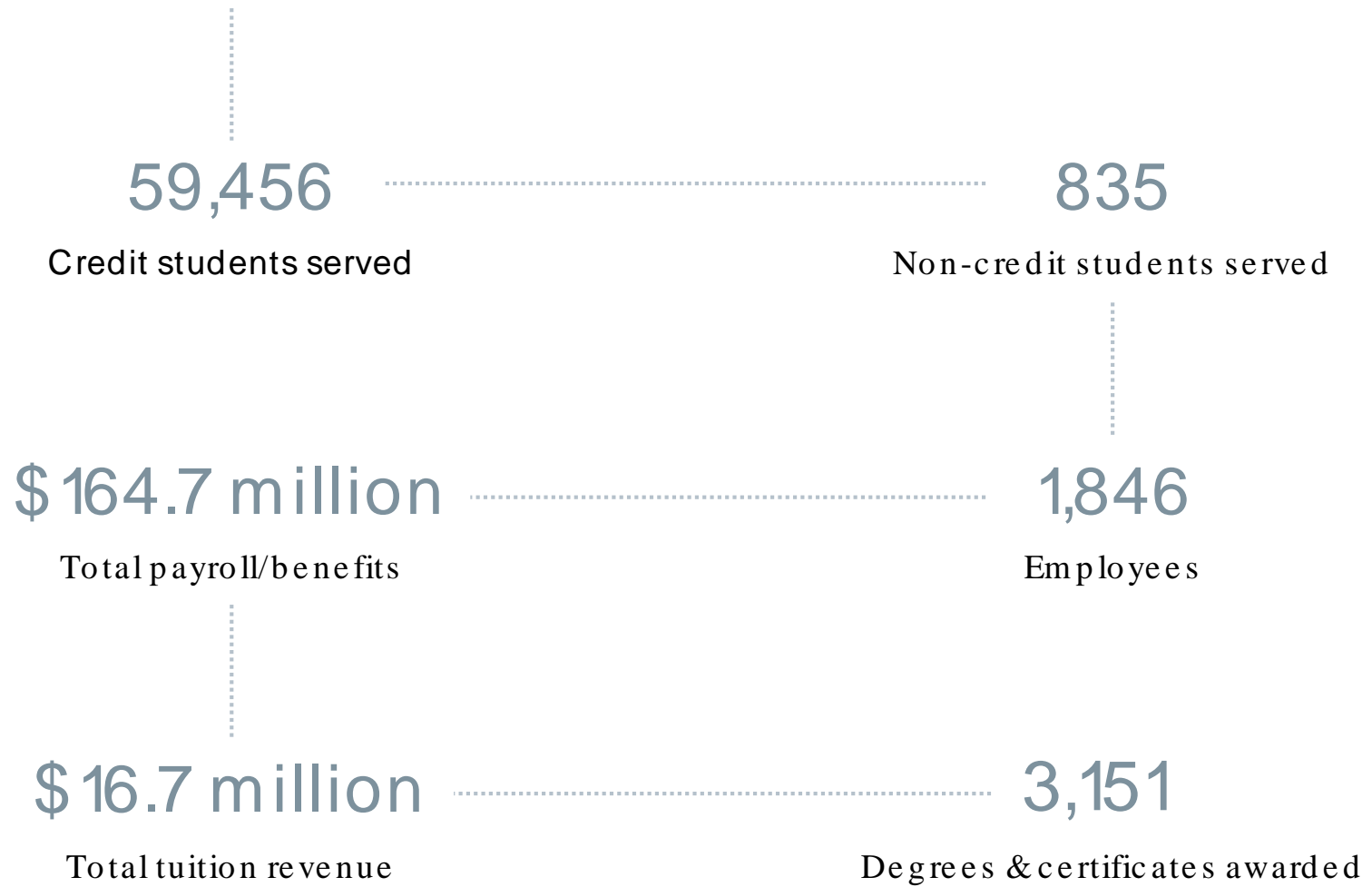
Total Jobs



AVERAGE EARNINGS BY EDUCATION LEVEL



RCCD in FY 20 16-17



Overview of results



\$873.5 million

Total income added to the region

1.3%

Of region's GRP

12,898

Total jobs supported in the region



6.8

Benefit-cost ratio for students

2.4

Benefit-cost ratio for taxpayers

14.8

Benefit-cost ratio for society



ECONOMIC IMPACT ANALYSIS



Operations Spending Impact

*College's payroll and
other spending + ripple effects*

\$201.3 million

Added regional income

OR

2,318

Jobs supported in the region



Student Spending Impact

*Retained student
spending + ripple effects*

\$70.2 million

Added regional income

OR

1,395

Jobs supported in the region



Alumni Impact

*Higher alumni earnings and increased
business profit + ripple effects*

\$602 million

Added regional income

OR

9,185

Jobs supported in the region



Total Impact

\$873.5 million

Total income added
in the region

OR

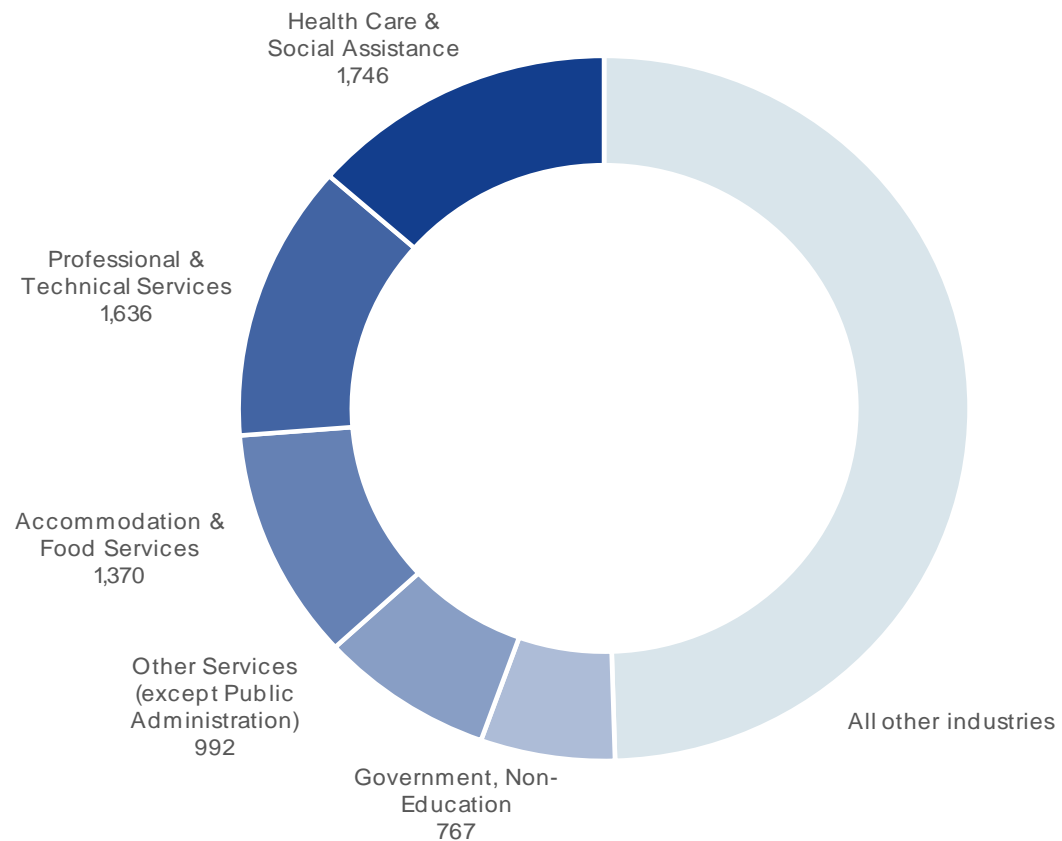
1.3%

Of region's GRP

12,898

Total jobs supported
in the region

Top industries impacted by RCCD (jobs supported)





INVESTMENT ANALYSIS



Student Perspective

\$1 billion

Benefit: Higher future earnings

\$148.9 million

Cost: Tuition, supplies, opportunity cost

6.8

Benefit/cost ratio

21.4%

Rate of return



Taxpayer Perspective

\$489.6 million

Benefit: Future tax revenue, government savings

\$203.2 million

Cost: State and local funding

2.4

Benefit/cost ratio

5.9%

Rate of return



Social Perspective

\$6.3 billion

Benefit: Future earnings, tax revenue, private savings

\$424.6 million

Cost: All college and student costs

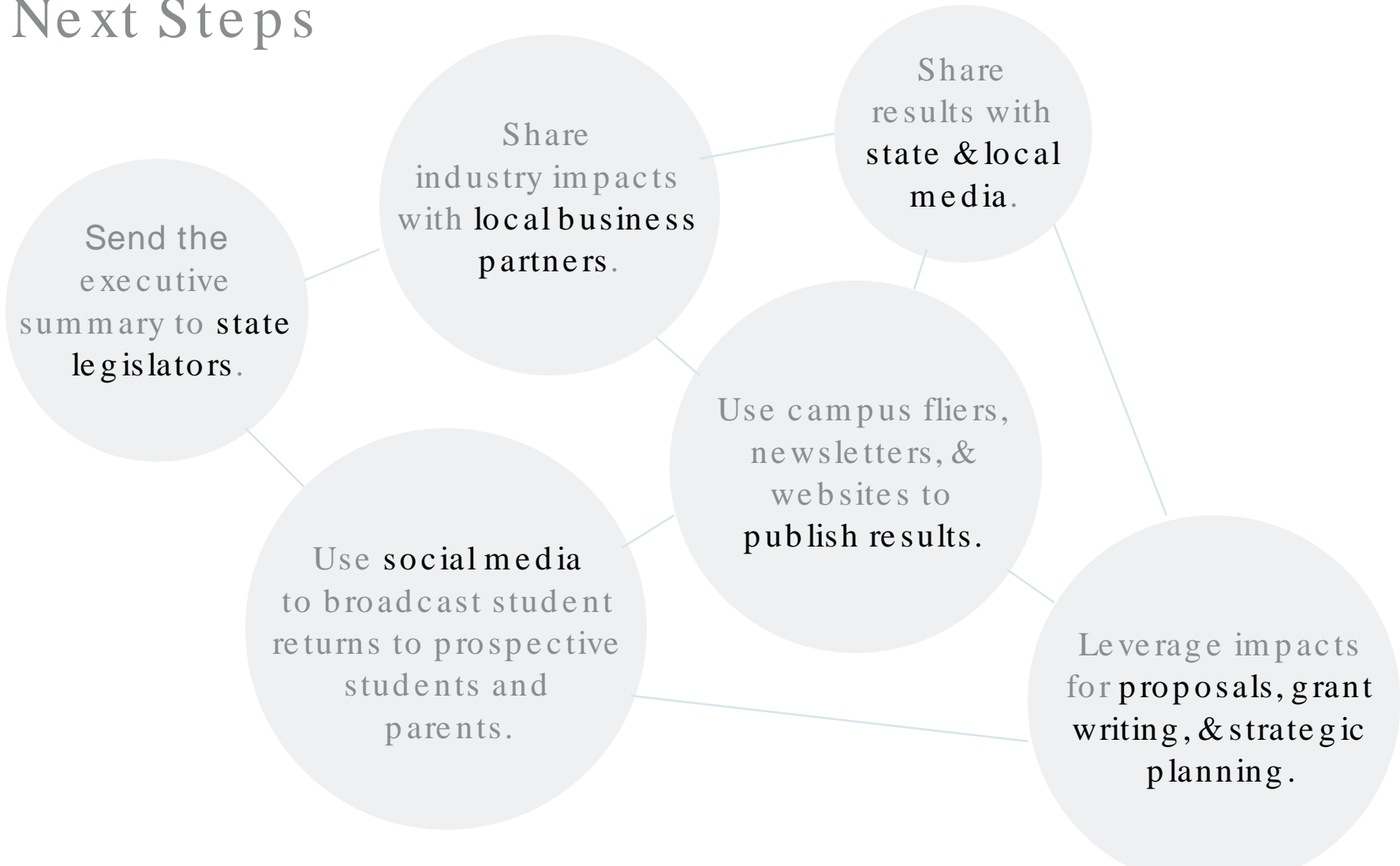
14.8

Benefit/cost ratio

n/a

Rate of return

Next Steps



**HOW CAN
EMSI HELP?**

Emsi's press
packet

Ongoing presentations
from your Emsi economist

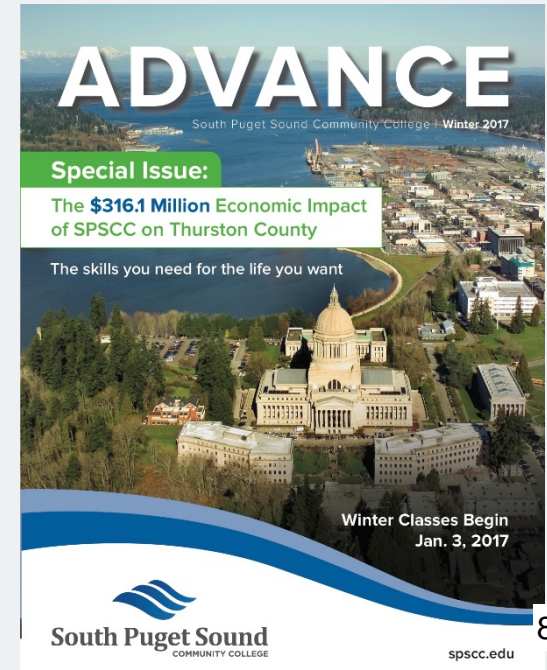
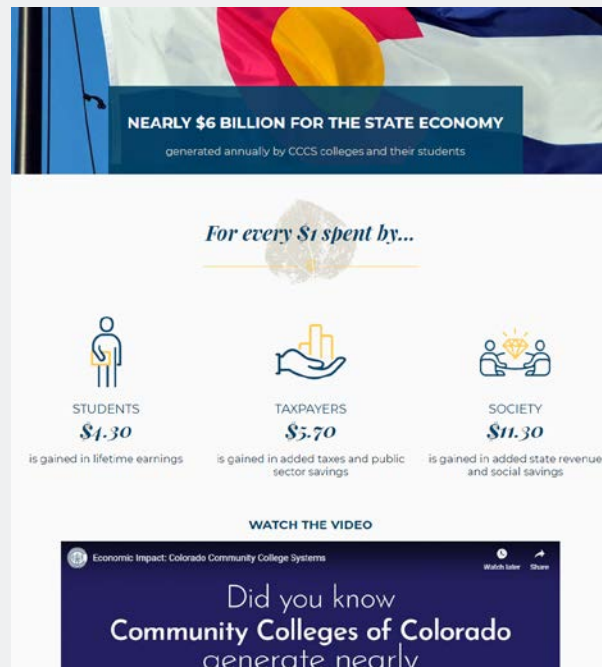
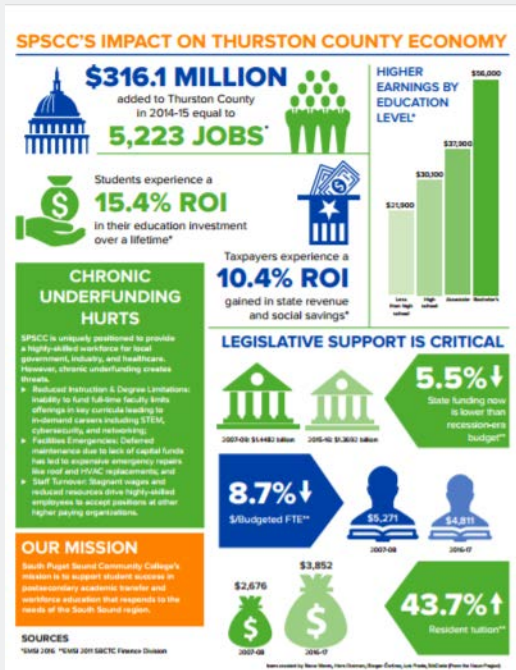
Email/call
us anytime

Share your results

Combine your results with other institutional highlights to create a fact sheet.

Create a web page that includes written highlights, animations, and videos.

Include your results in your periodic publications.



Share your results

Create a press release or hold a press conference to share results with your state and local media.

GRCC @grcc Follow

Students, employers tell how @grcc noncredit workforce programs change lives and build a talented workforce to fill great jobs. New study shows the economic impact of such programs is hundreds of millions of dollars on West MI economy grcc.edu/communications ...

1:58 PM - 13 Nov 2018

Use social media to share your investment results with prospective students.

Did you know that learners will receive £6.20 in future earnings for every £1 invested in the region's colleges?

Social & Economic Impact

- 4,522 Full-Time Staff
- £3.7b: The amount society will receive over the course of learners' working lives
- £1.8b: Contribution of colleges to local business each year
- £1.6b: Increased earnings for learners throughout their working lives
- £1.6b: Added income in the region's economy each year from former learners
- £3.7b: Learners will receive £6.20 in future earnings for every £1 invested in the region's colleges
- £226.2m: Added income to regional
- 11.8%: Taxpayers' annual

RETWEETS 5

Use your study to help secure additional funding.

Emsi's Capital Analysis Justifies Funding for New UT Martin STEM Facility

OCTOBER 24, 2016 BY MATTHEW HYNDMAN

Summary:

In a time of serious need, the University of Tennessee at Martin (UT Martin) used Emsi's Economic Impact and Capital Analysis studies to demonstrate the ROI that would come from building a proposed STEM facility. The results, in part, led to a boost in state funding—reducing the university's share of facility construction costs from 25% to 10%.

Key takeaways:

- UT Martin leveraged Emsi's Economic Impact and Capital Analysis studies to communicate the institution's value and make the case for additional state funding to build a new STEM facility—now known as the Latimer Engineering and Science Building.
- Among other things, the study found that building the new facility would generate 900-plus jobs.
- The Capital Analysis helped justify a state budget amendment increasing state funding of the \$65 million project.

Led by its current Interim Chancellor, Dr. Robert Smith—a longtime acquaintance of Emsi from his time at Slippery Rock University in Pennsylvania—UT Martin came to Emsi last year needing support for a critical project. Limited by inadequate space and antiquated laboratory facilities, UT Martin needed to prove that the proposed construction of a new STEM facility would be a smart and profitable investment for the state.

After working with Emsi several years ago, Smith knew that Emsi could provide him with the analysis he needed to advance UT Martin's cause. Emsi consultants worked closely with the UT Martin team to develop a customized report based on the Economic Impact Study and the Capital Analysis. The report would show the broad-reaching value of UT Martin and detail the potential ROI of building the new STEM facility.

The results of this study
were prepared by



For a copy of the report, please contact RCCD.



RCCD | RIVERSIDE COMMUNITY
COLLEGE DISTRICT

The Economic Value of
Riverside Community College District

EXECUTIVE SUMMARY



RIVERSIDE Community College District (RCCD) creates value in many ways. The colleges play a key role in helping students increase their employability and achieve their individual potential. The colleges draw students to the region, generating new dollars and opportunities for the RCCD Service Area. The colleges provide students with the education, training, and skills they need to have fulfilling and prosperous careers. Furthermore, the colleges are places for students to meet new people, increase their self-confidence, and promote their overall health and well-being.

RCCD influences both the lives of students and the regional economy. The colleges support a variety of industries in the RCCD Service Area,¹ serve regional businesses, and benefit society as a whole in California from an expanded economy and improved quality of life. The benefits created by RCCD even extend to the state and local government through increased tax revenues and public sector savings.

This study measures the economic impacts created by RCCD on the business community and the benefits the colleges generate in return for the investments made by their key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:



Economic impact analysis



Investment analysis

All results reflect employee, student, and financial data, provided by the district, for fiscal year (FY) 2016-17. Impacts on the RCCD Service Area economy are reported under the economic impact analysis and are measured in terms of added income. The returns on investment to students, taxpayers, and society in California are reported under the investment analysis.

¹ For the purposes of this analysis, the RCCD Service Area is comprised of 47 ZIP codes primarily located in the northwest corner of Riverside County in California.

*The value of RCCD influences both the **lives of its students** and the **regional economy**.*



Economic impact analysis

RCCD promotes economic growth in the RCCD Service Area through its direct expenditures and the resulting expenditures of students and regional businesses. The colleges serve as employers and buyers of goods and services for their day-to-day operations. The colleges' activities attract students from outside the RCCD Service Area, whose expenditures benefit regional vendors. In addition, the colleges are primary sources of higher education to the RCCD Service Area residents and suppliers of trained workers to regional industries, enhancing overall productivity in the regional workforce.

Operations Spending Impact



RCCD adds economic value to the RCCD Service Area as an employer of regional residents and a large-scale buyer of goods and services.

In FY 2016-17, the colleges employed 1,846 full-time and part-time faculty and staff, 73% of whom lived in the RCCD Service Area. Total payroll at RCCD was \$164.7 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. In addition, the colleges spent \$95 million on day-to-day expenses related to facilities, supplies, and professional services.

RCCD's day-to-day operations spending added \$201.3 million in income to the region during the analysis year. This figure represents the colleges' payroll, the multiplier effects generated by the in-region spending of the colleges and their employees, and a downward adjustment to account for funding that the colleges received from regional sources. The \$201.3 million in added income is equivalent to supporting 2,318 jobs in the region.

Student Spending Impact



Some in-region students, referred to as retained students, would have left the RCCD Service Area if not for the existence of RCCD.

While attending the colleges, these retained students spent money on groceries, accommodation, transportation, and other household expenses. This spending generated \$70.2 million in added income for the regional economy in FY 2016-17, which supported 1,395 jobs in the RCCD Service Area.

Alumni Impact



The education and training the colleges provide for regional residents has the greatest impact. Since the colleges were established,

IMPACTS CREATED BY RCCD
IN FY 2016-17



\$201.3 million
Operations Spending Impact



\$70.2 million
Student Spending Impact



\$602 million
Alumni Impact



\$873.5 million
TOTAL IMPACT

- OR -

12,898
JOBS SUPPORTED

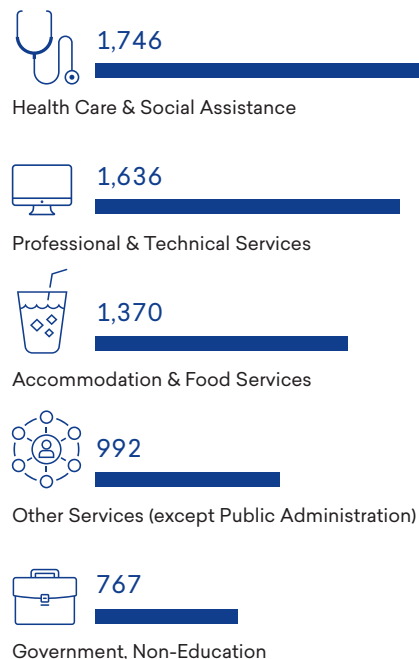
students have studied at RCCD and entered the regional workforce with greater knowledge and new skills. Today, hundreds of thousands of former RCCD students are employed in the RCCD Service Area. As a result of their RCCD educations, the students receive higher earnings and increase the productivity of the businesses that employ them. In FY 2016-17, RCCD alumni generated \$602 million in added income for the regional economy, which is equivalent to supporting 9,185 jobs.

Total Impact

RCCD added \$873.5 million in income to the RCCD Service Area economy during the analysis year, equal to the sum of operations spending impact, the student spending impact, and the alumni impact. For context, the \$873.5 million impact was equal to approximately 1.3% of the total gross regional product (GRP) of the RCCD Service Area. This contribution that the colleges provided on their own was over half the size of the entire Accommodation & Food Services industry in the region.

RCCD's total impact can also be expressed in terms of jobs supported. The \$873.5 million impact supported 12,898 regional jobs, using the jobs-to-sales ratios specific to each industry in the region. This means that one out of every 61 jobs in the RCCD Service Area is supported by the activities of the colleges and their students. In addition, the \$873.5 million, or 12,898 supported jobs, impacted regional industries in different ways. Among non-education industry sectors, RCCD supported the most jobs in the Health Care & Social Assistance industry sector – supporting 1,746 jobs in FY 2016-17. These are impacts that would not have been generated without the colleges' presence in the RCCD Service Area.

TOP INDUSTRIES IMPACTED BY RCCD (JOBS SUPPORTED)





Investment analysis

An investment analysis evaluates the costs associated with a proposed venture against its expected benefits. If the benefits outweigh the costs, then the investment is financially worthwhile. The analysis presented here considers RCCD as an investment from the perspectives of students, taxpayers, and society in California.

Student perspective



In FY 2016-17, RCCD served 59,456 credit and 835 non-credit students. In order to attend the colleges, the students paid for tuition, fees, books, and supplies. They also took out loans and will incur interest on those loans. Additionally, students gave up money they would have otherwise earned had they been working instead of attending college. The total investment made by RCCD students in FY 2016-17 amounted to a present value of \$148.9 million, equal to \$55.1 million in out-of-pocket expenses (including future principal and interest on student loans) and \$93.9 million in forgone time and money.

In return for their investment, RCCD's students will receive a stream of higher future earnings that will continue to grow throughout their working lives. For example, the average RCCD associate degree graduate from FY 2016-17 will see an increase in earnings of \$9,200 each year compared to a person with a high school diploma or equivalent working in California. Over a working lifetime, the benefits of the associate degree over a high school diploma will amount to an undiscounted value of \$386.4 thousand in higher earnings per graduate. Altogether, RCCD's FY 2016-17 students will receive \$1 billion in higher future earnings over their working lives, as a result of their education and training at RCCD.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN RCCD



21.4%

Average annual return for RCCD students



10.1%

Stock market 30-year average annual return

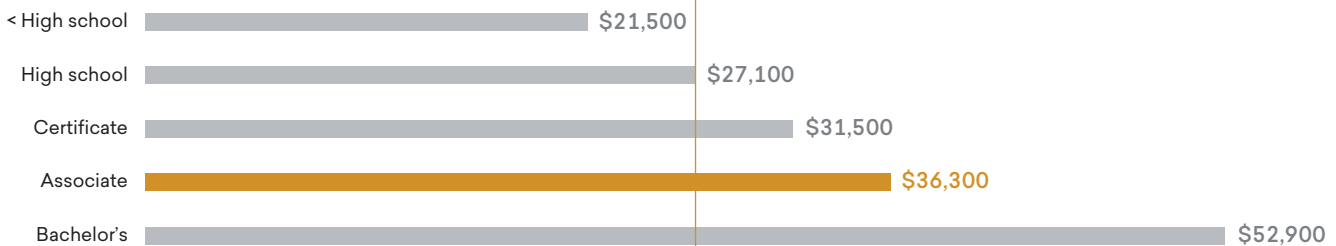


0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.

The average associate degree graduate from RCCD will see an increase in earnings of **\$9,200** each year compared to a person with a high school diploma or equivalent working in California.



Source: Emsi complete employment data.

The students' benefit-cost ratio is 6.8. In other words, for every dollar students invest in an education at RCCD, in the form of out-of-pocket expenses and forgone time and money, they will receive a cumulative value of \$6.80 in higher future earnings. Annually, the students' investment in RCCD has an average annual internal rate of return of 21.4%, which is impressive compared to the U.S. stock market's 30-year average rate of return of 10.1%.

Taxpayer perspective



RCCD generates more in tax revenue than it takes. These benefits to taxpayers consist primarily of taxes that the state and local government will collect from the added revenue created in the state. As RCCD students will earn more, they will make higher tax payments throughout their working lives. Students' employers will also make higher tax payments as they increase their output and purchases of goods and services. By the end of the FY 2016-17 students' working lives, the state and local government will have collected a present value of \$424.6 million in added taxes.

Benefits to taxpayers will also consist of savings generated by the improved lifestyles of RCCD students and the corresponding reduced government services. Education is statistically correlated with a variety of lifestyle changes.

Students' RCCD educations will generate savings in three main categories: 1) healthcare, 2) crime, and 3) income assistance. Improved health will lower students' demand for national health care services. In addition, students will be less likely to interact with the criminal justice system, resulting in a reduced demand for law enforcement and victim costs. RCCD students will be more employable, so their reduced demand for income assistance such as welfare and unemployment benefits will benefit taxpayers. For a list of study references, contact RCCD for a copy of the main report. Altogether, the present value of the benefits associated with an RCCD education will generate \$65 million in savings to state and local taxpayers.

Total taxpayer benefits amount to \$489.6 million, the present value sum of the added taxes and public sector savings. Taxpayer costs are \$203.2 million, equal to the amount of state and local government funding RCCD received in FY 2016-17. These benefits and costs yield a benefit-cost ratio of 2.4. This means that for every dollar of public money invested in RCCD in FY 2016-17,

*For every dollar of public money invested in RCCD, taxpayers will receive a cumulative value of **\$2.40** over the course of the students' working lives.*



STUDENT PERSPECTIVE

\$1 billion

Present value benefits

\$148.9 million

Present value costs

\$865.1 million

Net present value

Benefit-cost Ratio	Rate of Return
6.8	21.4%



TAXPAYER PERSPECTIVE

\$489.6 million

Present value benefits

\$203.2 million

Present value costs

\$286.4 million

Net present value

Benefit-cost Ratio	Rate of Return
2.4	5.9%



SOCIAL PERSPECTIVE

\$6.3 billion

Present value benefits

\$424.6 million

Present value costs

\$5.8 billion

Net present value

Benefit-cost Ratio	Rate of Return
14.8	n/a*

* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.

taxpayers will receive a cumulative value of \$2.40 over the course of the students' working lives. The average annual internal rate of return for taxpayers is 5.9%, which compares favorably to other long-term investments in the public and private sectors.

Social perspective



Society as a whole in California benefits from the presence of RCCD in two major ways. Primarily, society benefits from an increased economic base in the state. This is attributed to higher student earnings and increased business output, which raise economic prosperity in California.

Benefits to society also consist of the savings generated by the improved lifestyles of RCCD students. As discussed in the previous section, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers but are distinct from the costs avoided by the taxpayers outlined above. Healthcare savings include avoided medical costs associated with smoking, alcohol dependence, obesity, drug abuse, and depression. Savings related to crime include reduced security expenditures and insurance administration, lower victim costs, and reduced expenditures by the criminal justice system. Income assistance savings include reduced welfare and unemployment claims. For a list of study references, contact RCCD for a copy of the main report.

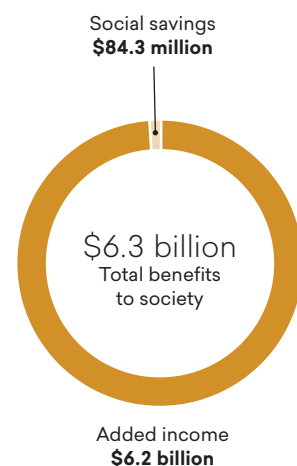
Altogether, the social benefits of RCCD equal a present value of \$6.3 billion. These benefits include \$6.2 billion in added income through students' increased lifetime earnings and increased business output, as well as \$84.3 million in social savings related to health, crime, and income assistance in California. People in California invested a present value total of \$424.6 million in RCCD in FY 2016-17. The cost includes all the colleges' expenditures and student costs.

The benefit-cost ratio for society is 14.8, equal to the \$6.3 billion in benefits divided by the \$424.6 million in costs. In other words, for every dollar invested in RCCD, people in California will receive a cumulative value of \$14.80 in benefits. The benefits of this investment will occur for as long as RCCD's FY 2016-17 students remain employed in the state workforce.

Summary of investment analysis results

The results of the analysis demonstrate that RCCD is a strong investment for all three major stakeholder groups—students, taxpayers, and society. As shown, students receive a great return for their investments in an RCCD education. At the same time, taxpayers' investment in RCCD returns more to government budgets than it costs and creates a wide range of social benefits throughout California.

SOCIAL BENEFITS IN CALIFORNIA FROM RCCD



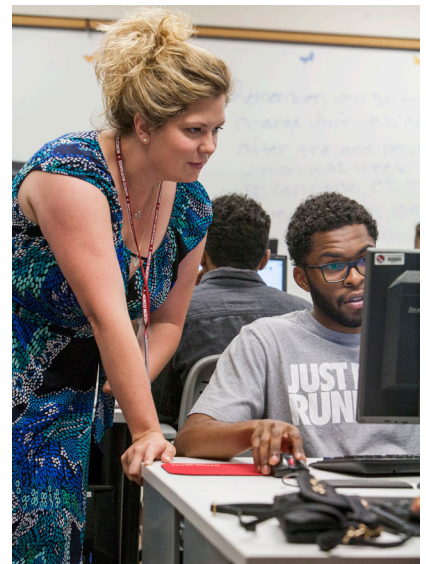
Conclusion

The results of this study demonstrate that RCCD creates value from multiple perspectives. The colleges benefit regional businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers to the workforce. RCCD enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. The colleges benefit state and local taxpayers through increased tax receipts and a reduced demand for government-supported social services. Finally, RCCD benefits society as a whole in California by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students.

About the Study

Data and assumptions used in the study are based on several sources, including the FY 2016-17 academic and financial reports from RCCD, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Emsi's Multi-Regional Social Accounting Matrix model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach used in the study, please contact the district for a copy of the main report.

The results of this study demonstrate that RCCD creates value from
multiple perspectives.



Emsi is a leading provider of economic impact studies and labor market data to educational institutions, workforce planners, and regional developers in the U.S. and internationally. Since 2000, Emsi has completed over 1,800 economic impact studies for educational institutions in four countries. Visit www.economicmodeling.com for more information about Emsi's products and services.



RCCD | RIVERSIDE COMMUNITY
COLLEGE DISTRICT

The Economic Value of
Riverside Community College District

MAIN REPORT

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- 6 Investment Analysis
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Executive Summary

This report assesses the impact of Riverside Community College District¹ (RCCD) on the regional economy and the benefits generated by the colleges for students, taxpayers, and society. The results of this study show that RCCD creates a positive net impact on the regional economy and generates a positive return on investment for students, taxpayers, and society.

¹ Riverside Community College District consists of Moreno Valley College, Norco College, and Riverside City College.





Economic Impact Analysis



During the analysis year, RCCD spent \$164.7 million on payroll and benefits for 1,846 full-time and part-time employees, and spent another \$95 million on goods and services to carry out the colleges' day-to-day operations. This initial round of spending creates more spending across other businesses throughout the regional economy, resulting in the commonly referred to multiplier effects. This analysis estimates the net economic impact of RCCD that directly takes into account the fact that state and local dollars spent on RCCD could have been spent elsewhere in the region if not directed towards the colleges. This spending would have created impacts regardless. We account for this by estimating the impacts that would have been created from the alternative spending and subtracting the alternative impacts from the spending impacts of RCCD.

This analysis shows that in fiscal year (FY) 2016-17, operations and student spending of the colleges, together with the enhanced productivity of their alumni, generated **\$873.5 million** in added income for the RCCD Service Area economy. The additional income of **\$873.5 million** created by RCCD is equal to approximately **1.3%** of the total gross regional product (GRP) of the RCCD

*The additional income of **\$873.5 million** created by RCCD is equal to approximately **1.3%** of the total gross regional product of the RCCD Service Area.*

Service Area. For perspective, this impact from the colleges was over half the size of the entire Accommodation & Food Services industry in the region. The impact of **\$873.5 million** is equivalent to supporting **12,898** jobs. For further perspective, this means that one out of every **61** jobs in the RCCD Service Area is supported by the activities of the colleges and their students. These economic impacts break down as follows:

Operations spending impact



Payroll and benefits to support the colleges' day-to-day operations amounted to \$164.7 million. The colleges' non-pay expenditures amounted to \$95 million. The net impact of operations spending by the colleges in the RCCD Service Area during the analysis year was approximately **\$201.3 million** in added income, which is equivalent to supporting **2,318** jobs.

Student spending impact



Some students are residents of the RCCD Service Area who would have left the region if not for the existence of RCCD. The money that these students spent toward living expenses in the RCCD Service Area is attributable to the colleges.

The expenditures of retained students in the region during the analysis year added approximately **\$70.2 million** in income for the RCCD Service Area economy, which is equivalent to supporting **1,395** jobs.

Alumni impact



Over the years, students gained new skills, making them more productive workers, by studying at the colleges. Today, hundreds of thousands of these former students are employed in the RCCD Service Area.

The accumulated impact of former students currently employed in the RCCD Service Area workforce amounted to **\$602 million** in added income for the RCCD Service Area economy, which is equivalent to supporting **9,185** jobs.

Important Note

When reviewing the impacts estimated in this study, it's important to note that it reports impacts in the form of added income rather than sales. Sales includes all of the intermediary costs associated with producing goods and services, as well as money that leaks out of the region as it is spent at out-of-region businesses. Income, on the other hand, is a net measure that excludes these intermediary costs and leakages, and is synonymous with gross regional product (GRP) and value added. For this reason, it is a more meaningful measure of new economic activity than sales.



Investment Analysis



Investment analysis is the practice of comparing the costs and benefits of an investment to determine whether or not it is profitable. This study considers RCCD as an investment from the perspectives of students, taxpayers, and society.

Student perspective



Students invest their own money and time in their education to pay for tuition, books, and supplies. Many take out student loans to attend the colleges, which they will pay back over time. While some students were employed while attending the colleges, students overall forewent earnings that they would have generated had they been in full employment instead of learning. Summing these direct outlays, opportunity costs, and future student loan costs yields a total of **\$148.9 million** in present value student costs.

In return, students will receive a present value of **\$1 billion** in increased earnings over their working lives. This translates to a return of **\$6.80** in higher future earnings for every \$1 that students pay for their education at the colleges. The corresponding annual rate of return is **21.4%**.

Taxpayer perspective



Taxpayers provided **\$203.2 million** of state and local funding to RCCD in FY 2016-17. In return, taxpayers will receive an estimated present value of **\$424.6 million** in added tax revenue stemming

from the students' higher lifetime earnings and the increased output of businesses. Savings to the public sector add another estimated **\$65 million** in benefits due to a reduced demand for government-funded social services in California. For every tax dollar spent educating students attending the colleges, taxpayers will receive an average of **\$2.40** in return over the course of the students' working lives. In other words, taxpayers enjoy an annual rate of return of **5.9%**.

*For every tax dollar spent educating students attending RCCD, taxpayers will receive an average of **\$2.40** in return over the course of the students' working lives.*

Social perspective



California as a whole spent an estimated **\$424.6 million** on educations obtained at RCCD in FY 2016-17. This includes the colleges' expenditures, student expenses, and student opportunity costs. In return, the state of California will receive an estimated present value of **\$6.2 billion** in added state revenue over the course of the students' working lives. California will also benefit from an estimated **\$84.3 million** in present value social savings related to reduced crime, lower welfare and unemployment, and increased health and well-being across the state. For every dollar society invests in educations from RCCD, an average of **\$14.80** in benefits will accrue to California over the course of the students' careers.

Acknowledgments

Emsi gratefully acknowledges the excellent support of the staff at Riverside Community College District in making this study possible. Special thanks go to Wolde-Ab Isaac, Ph.D., Chancellor, who approved the study, and to David Torres, Dean, Institutional Research & Strategic Planning, who collected much of the data and information requested. Any errors in the report are the responsibility of Emsi and not of any of the above-mentioned individuals.

Introduction

Riverside Community College District (RCCD), established in 1916, has today grown to serve 59,456 credit and 835 non-credit students. The district is led by Wolde-Ab Isaac, Ph.D., Chancellor. The colleges' service region, for the purpose of this report, is referred to as the RCCD Service Area and consists of 47 ZIP codes primarily located in the north-west corner of Riverside County in California (see figure).

While RCCD affects the region in a variety of ways, many of them difficult to quantify, this study is concerned with considering its economic benefits. The colleges naturally help students achieve their individual potential and develop the knowledge, skills, and abilities they need to have fulfilling and prosperous careers. However, RCCD impacts the RCCD Service Area beyond influencing the lives of students. The colleges' program offerings supply employers with workers to make their businesses more productive. The colleges, their day-to-day operations, and the expenditures of their students support the regional economy through the output and employment generated by regional vendors. The benefits created by the colleges extend as far as the state treasury in terms of the increased tax receipts and decreased public sector costs generated by students across the state.

This report assesses the impact of RCCD as a whole on the regional economy and the benefits generated by the colleges for students, taxpayers, and society. The approach is twofold. We begin with an economic impact analysis of the colleges on the RCCD Service Area economy. To derive results, we rely on a specialized Multi-Regional Social Accounting Matrix (MR-SAM) model to calculate the added income created in the RCCD Service Area economy as a result of increased consumer spending and the added knowledge, skills, and abilities of students. Results of the economic impact analysis are broken out according to the following impacts: 1) impact of the colleges' day-to-day operations, 2) impact of student spending, and 3) impact of alumni who are still employed in the RCCD Service Area workforce.

THE RCCD SERVICE AREA



The second component of the study measures the benefits generated by RCCD for the following stakeholder groups: students, taxpayers, and society. For students, we perform an investment analysis to determine how the money spent by students on their education performs as an investment over time. The students' investment in this case consists of their out-of-pocket expenses, the cost of interest incurred on student loans, and the opportunity cost of attending the colleges as opposed to working. In return for these investments, students receive a lifetime of higher earnings. For taxpayers, the study measures the benefits to state taxpayers in the form of increased tax revenues and public sector savings stemming from a reduced demand for social services. Finally, for society, the study assesses how the students' higher earnings and improved quality of life create benefits throughout California as a whole.

The study uses a wide array of data that are based on several sources, including the FY 2016-17 academic and financial reports from RCCD; industry and employment data from the Bureau of Labor Statistics and Census Bureau; outputs of Emsi's impact model and MR-SAM model; and a variety of published materials relating education to social behavior.



CHAPTER 1:

Profile of Riverside Community College District and the Economy

Higher education is a crucial part of supporting the economic success of any region.

The Riverside Community College District (RCCD) is one of the most important providers of higher education in Riverside County, California; its three institutions give the county's residents access to affordable education programs that provide them with the skills that they and their employers need to succeed.



RCCD encompasses three separate colleges:

- Riverside City College, in Riverside, Norco, and Moreno Valley, is the oldest institution in the district, established in 1916. It has approximately 30,000 students and offers more than 70 programs.
- Moreno Valley College was established in 1991 and has been fully accredited since 2010. It provides 54 programs to its 15,000 students and is RCCD's designated center for health sciences and public safety programs.
- Norco College, with locations in Corona, Eastvale, and Norco, also opened in 1991 and was accredited in 2010. Its 65 programs provide an emphasis in technology.

In total, RCCD's three colleges offer more than a hundred different programs. As part of the California higher education system, they offer students easy transfer arrangements to the state's universities, as well as a variety of career-oriented degrees and certificates tailored to the needs of specific occupations and industries. They are also home to a wide range of economic and workforce development organizations and services, providing personal enrichment and basic education programs and ensuring that they have something to offer to everyone in Riverside County.

The Riverside Community College District (RCCD) is one of the most important providers of higher education in Riverside County, California.



RCCD employee and finance data

The study uses two general types of information: 1) data collected from the district and 2) regional economic data obtained from various public sources and Emsi’s proprietary data modeling tools.² This chapter presents the basic underlying information from RCCD used in this analysis and provides an overview of the RCCD Service Area economy.

Employee data

Data provided by RCCD include information on faculty and staff by place of work and by place of residence. These data appear in Table 1.1. As shown, RCCD employed 854 full-time and 992 part-time faculty and staff in FY 2016-17 (including student workers). Of these, 100% worked in the region and 73% lived in the region. These data are used to isolate the portion of the employees’ payroll and household expenses that remains in the regional economy.

Revenues

Figure 1.1 shows RCCD’s annual revenues by funding source – a total of \$294.6 million in FY 2016-17. As indicated, tuition and fees comprised 6% of total revenue, and revenues from local, state, and federal government sources comprised another 88%. All other revenue (i.e., auxiliary revenue, sales and services, interest, and donations) comprised the remaining 6%. These data are critical in identifying the annual costs of educating the student body from the perspectives of students, taxpayers, and society.

Expenditures

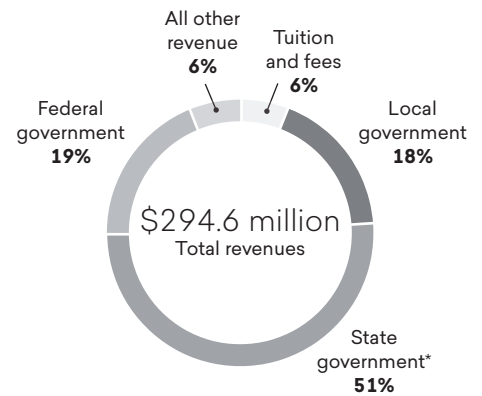
Figure 1.2 displays RCCD’s expense data. The combined payroll at RCCD, including student salaries and wages, amounted to \$164.7 million. This was equal to 57% of the colleges’ total expenses for FY 2016-17. Other expenditures, including operation and maintenance of plant, depreciation, and purchases of supplies and services, made up \$126.6 million. When we calculate the impact of these expenditures in Chapter 2, we exclude expenses for depreciation and interest, as they represent a devaluing of the colleges’ assets rather than an outflow of expenditures.

TABLE 1.1: EMPLOYEE DATA, FY 2016-17

Full-time faculty and staff	854
Part-time faculty and staff	992
Total faculty and staff	1,846
% of employees who work in the region	100%
% of employees who live in the region	73%

Source: Data provided by RCCD.

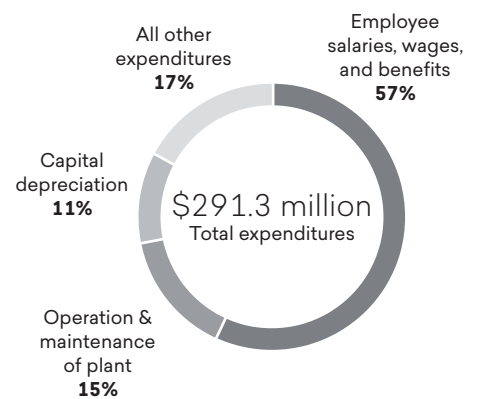
FIGURE 1.1: RCCD REVENUES BY SOURCE, FY 2016-17



*Revenue from state and local government includes capital appropriations.

Source: Data provided by RCCD.

FIGURE 1.2: RCCD EXPENSES BY FUNCTION, FY 2016-17



Source: Data provided by RCCD.

Percentages may not add due to rounding.

2 See Appendix 6 for a detailed description of the data sources used in the Emsi modeling tools.



Students

The colleges served 59,456 students taking courses for credit and 835 non-credit students in FY 2016-17. These numbers represent unduplicated student headcounts. The breakdown of the student body by gender was 43% male and 57% female. The breakdown by ethnicity was 20% white and 80% minority. The students' overall average age was 25 years old.³ An estimated 82% of students remain in the RCCD Service Area after finishing their time at RCCD, another 16% settle outside the region but in the state, and the remaining 2% settle outside the state.⁴

Table 1.2 summarizes the breakdown of the student population and their corresponding awards and credits by education level. In FY 2016-17, the colleges served 2,308 associate degree graduates and 843 certificate graduates. Another 52,809 students enrolled in courses for credit but did not complete a degree during the reporting year. The colleges offered dual credit courses to high schools, serving a total of 1,785 students over the course of the year. The colleges also served 1,733 basic education students and 813 personal enrichment students enrolled in non-credit courses.

We use credit hour equivalents (CHEs) to track the educational workload of the students. One CHE is equal to 15 contact hours of classroom instruction per semester. In the analysis, we exclude the CHE production of personal enrichment students under the assumption that they do not attain knowledge, skills, and abilities that will increase their earnings. The average number of CHEs per student (excluding personal enrichment students) was 8.8.

TABLE 1.2: BREAKDOWN OF STUDENT HEADCOUNT AND CHE PRODUCTION BY EDUCATION LEVEL, FY 2016-17

Category	Headcount	Total CHEs	Average CHEs
Associate degree graduates	2,308	37,466	16.2
Certificate graduates	843	13,785	16.4
Continuing students	52,809	454,368	8.6
Dual credit students	1,785	15,288	8.6
Basic education students	1,733	5,205	3.0
Personal enrichment students	813	1,301	1.6
Total, all students	60,291	527,412	8.7
Total, less personal enrichment students	59,478	526,111	8.8

Source: Data provided by RCCD.

3 Unduplicated headcount, gender, ethnicity, and age data provided by RCCD.

4 For colleges that were unable to provide settlement data, Emsi used estimates based on student origin.



The RCCD Service Area economy

RCCD serves a region referred to as the RCCD Service Area in California.⁵ Since the colleges were first established, they have been serving the RCCD Service Area by enhancing the workforce, providing local residents with easy access to higher education opportunities, and preparing students for highly-skilled, technical professions. Table 1.3 summarizes the breakdown of the regional economy by major industrial sector, with details on labor and non-labor income. Labor income refers to wages, salaries, and proprietors' income. Non-labor income

TABLE 1.3: LABOR AND NON-LABOR INCOME BY MAJOR INDUSTRY SECTOR IN THE RCCD SERVICE AREA, 2017*

Industry sector	Labor income (millions)	Non-labor income (millions)	Total income (millions)**	% of total income	Sales (millions)
Other Services (except Public Administration)	\$1,162	\$7,656	\$8,818	13%	\$10,793
Manufacturing	\$4,113	\$4,275	\$8,388	13%	\$22,233
Wholesale Trade	\$3,618	\$3,995	\$7,614	11%	\$10,610
Construction	\$3,753	\$1,778	\$5,531	8%	\$9,817
Transportation & Warehousing	\$3,833	\$1,365	\$5,198	8%	\$9,550
Health Care & Social Assistance	\$4,200	\$563	\$4,762	7%	\$8,126
Government, Non-Education	\$4,017	\$724	\$4,741	7%	\$20,598
Retail Trade	\$2,643	\$1,973	\$4,615	7%	\$7,123
Government, Education	\$3,597	\$0	\$3,597	5%	\$4,023
Administrative & Waste Services	\$1,890	\$523	\$2,413	4%	\$3,831
Finance & Insurance	\$1,257	\$1,094	\$2,351	4%	\$3,840
Professional & Technical Services	\$1,827	\$443	\$2,271	3%	\$3,398
Real Estate & Rental & Leasing	\$860	\$952	\$1,811	3%	\$3,808
Accommodation & Food Services	\$1,013	\$636	\$1,648	2%	\$3,203
Information	\$405	\$954	\$1,359	2%	\$2,506
Educational Services	\$409	\$40	\$449	1%	\$712
Management of Companies & Enterprises	\$362	\$36	\$397	1%	\$708
Utilities	\$94	\$249	\$344	1%	\$450
Arts, Entertainment, & Recreation	\$252	\$63	\$315	0%	\$568
Agriculture, Forestry, Fishing & Hunting	\$77	\$33	\$109	0%	\$245
Mining, Quarrying, & Oil and Gas Extraction	\$29	\$38	\$67	<0.1%	\$99
Total	\$39,411	\$27,389	\$66,799	100%	\$126,241

* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.

** Numbers may not add due to rounding.

Source: Emsi industry data.

5 The following ZIP codes comprise the RCCD Service Area: 92551, 92553, 92571, 92518, 92555, 92508, 92557, 92572, 92599, 92567, 92556, 92552, 92373, 92507, 92506, 92554, 92521, 92860, 92880, 92878, 92877, 92879, 92505, 91708, 91752, 92882, 92503, 91761, 92881, 91710, 91762, 92509, 91709, 92887, 92504, 92519, 92522, 92517, 92516, 92514, 92513, 92502, 92501, 92337, 92331, 92313, and 92316.

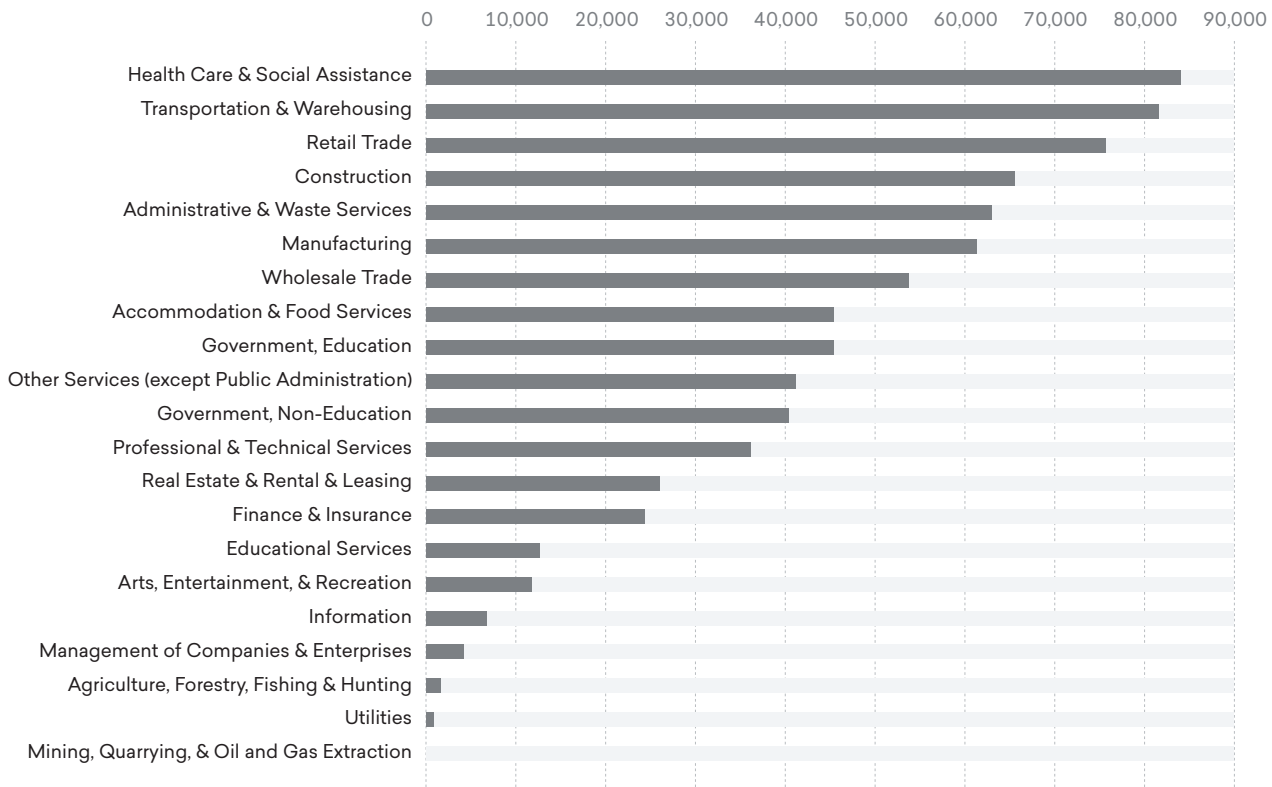


refers to profits, rents, and other forms of investment income. Together, labor and non-labor income comprise the region's total income, which can also be considered as the region's gross regional product (GRP).

As shown in Table 1.3, the total income, or GRP, of the RCCD Service Area is approximately \$66.8 billion, equal to the sum of labor income (\$39.4 billion) and non-labor income (\$27.4 billion). In Chapter 2, we use the total added income as the measure of the relative impacts of the colleges on the regional economy.

Figure 1.3 provides the breakdown of jobs by industry in the RCCD Service Area. The Health Care & Social Assistance sector is the largest employer, supporting 83,834 jobs or 10.7% of total employment in the region. The second largest employer is the Transportation & Warehousing sector, supporting 81,515 jobs or 10.4% of the region's total employment. Altogether, the region supports 780,526 jobs.⁶

FIGURE 1.3: JOBS BY MAJOR INDUSTRY SECTOR IN THE RCCD SERVICE AREA, 2017*



* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.
Source: Emsi complete employment data.

⁶ Job numbers reflect Emsi's complete employment data, which includes the following four job classes: 1) employees that are counted in the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW), 2) employees that are not covered by the federal or state unemployment insurance (UI) system and are thus excluded from QCEW, 3) self-employed workers, and 4) extended proprietors.



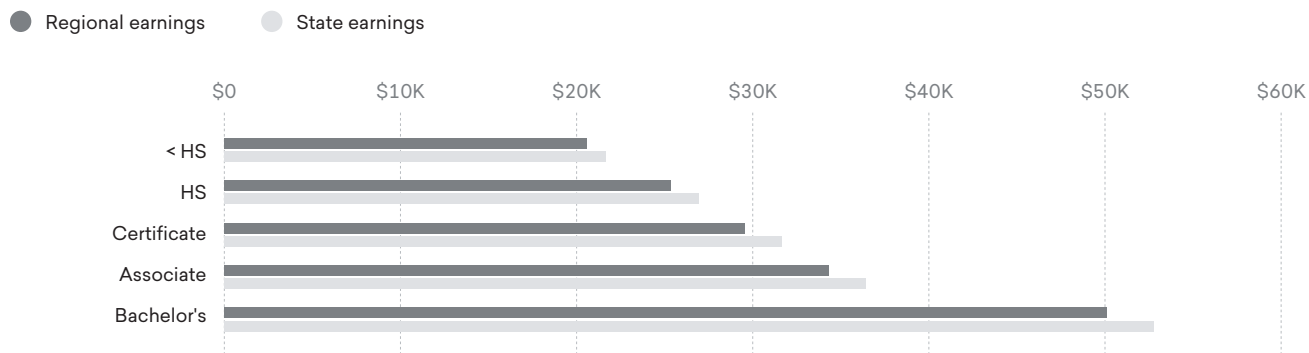
Table 1.4 and Figure 1.4 present the mean earnings by education level in the RCCD Service Area and the state of California at the midpoint of the average-aged worker's career. These numbers are derived from Emsi's complete employment data on average earnings per worker in the region and the state.⁷ The numbers are then weighted by the colleges' demographic profiles. As shown, students have the potential to earn more as they achieve higher levels of education compared to maintaining a high school diploma. Students who earn an associate degree from the colleges can expect approximate wages of \$34,400 per year within the RCCD Service Area, approximately \$8,800 more than someone with a high school diploma.

TABLE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN RCCD STUDENT'S CAREER MIDPOINT

Education level	Regional earnings	Difference from next lowest degree	State earnings	Difference from next lowest degree
Less than high school	\$20,400	n/a	\$21,500	n/a
High school or equivalent	\$25,600	\$5,200	\$27,100	\$5,600
Certificate	\$29,800	\$4,200	\$31,500	\$4,400
Associate degree	\$34,400	\$4,600	\$36,300	\$4,800
Bachelor's degree	\$50,100	\$15,700	\$52,900	\$16,600

Source: Emsi complete employment data.

FIGURE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN RCCD STUDENT'S CAREER MIDPOINT



Source: Emsi complete employment data.

⁷ Wage rates in the Emsi MR-SAM model combine state and federal sources to provide earnings that reflect complete employment in the region, including proprietors, self-employed workers, and others not typically included in regional or state data, as well as benefits and all forms of employer contributions. As such, Emsi industry earnings-per-worker numbers are generally higher than those reported by other sources.



CHAPTER 2:

About RCCD Alumni and Former Students



Alumni Insight

Emsi's Alumni Insight identify alumni by employment outcomes by producing a database of more than 106 million professional profiles filterable by job titles, employers, occupations, locations, and more. The database contains an aggregate set of profiles from the open web, which includes all the major professional profile sites. In this section, we: 1) report the number of RCCD alumni found in our database across the nation; 2) provide a summary of the notable employers RCCD alumni are working for; and 3) show the occupations most common among them.

As shown in Table 2.1, the majority – 79.2% of RCCD alumni, or 12,476 of the alumni profiles – reside in California. This is followed by 2.6% (406) of alumni who currently reside in Texas, and 1.7% (272) who reside in Arizona.

TABLE 2.2: TOP 20 EMPLOYERS FOR RCCD ALUMNI AND FORMER STUDENTS

Company	Profiles	Percent
Amazon.com, Inc.	96	0.61%
County of Riverside	96	0.61%
Kaiser Permanente	90	0.57%
Riverside Community College District	76	0.48%
United States Department of the Army	57	0.36%
Loma Linda University	55	0.35%
Wells Fargo & Company	55	0.35%
University of California	54	0.34%
Wal-Mart Stores, Inc.	46	0.29%
Target Corporation	44	0.28%
Norco, Inc.	43	0.27%
Riverside Unified School District	38	0.24%
Best Buy Co., Inc.	37	0.23%
The Walt Disney Company	34	0.22%
Riverside Community Health Systems	33	0.21%
United Parcel Service, Inc.	33	0.21%
Moreno Valley College	32	0.20%
Kohl's Corporation	31	0.20%
Disneyland Resort	29	0.18%
Lowe's Companies, Inc.	29	0.18%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni. Source: Emsi Alumni Insight data.

TABLE 2.1: TOP 10 STATES OF RESIDENCE FOR RCCD ALUMNI AND FORMER STUDENTS

State	Profiles	Percent
California	12,476	79.2%
Texas	406	2.6%
Arizona	272	1.7%
Nevada	261	1.7%
Washington	194	1.2%
Florida	183	1.2%
Virginia	172	1.1%
Colorado	157	1.0%
Oregon	119	0.8%
New York	114	0.7%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni.

Source: Emsi Alumni Insight data.



The information provided in Table 2.2 shows a selection of the top employers hiring RCCD alumni. Note that the table shows employers who employ a higher concentration of RCCD alumni. Of those that are listed, the top employers include Amazon.com, Inc.; the County of Riverside; and Kaiser Permanente. This data shows that many RCCD alumni are employed in a broad range of industry sectors and for some of the nation's notable employers. The list has several retail institutions, such as Wal-Mart Stores, Inc.; and Target Corporation. In addition, several educational institutions are present on the list, such as University of California and Moreno Valley College. Two health care institutions appear on the list, Kaiser Permanente and Riverside Community Health Systems.

Table 2.3 identifies the most common occupations of RCCD alumni. The occupations most concentrated with RCCD alumni are predominantly business-related. Table 2.4 shows the most common job titles of RCCD alumni.

TABLE 2.3: TOP 20 OCCUPATIONS FOR RCCD ALUMNI AND FORMER STUDENTS

Occupation (SOC)	Profiles	Percent
General and Operations Managers	609	3.86%
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	459	2.91%
Customer Service Representatives	434	2.75%
Retail Salespersons	423	2.68%
First-Line Supervisors of Office and Administrative Support Workers	356	2.26%
Chief Executives	327	2.07%
Registered Nurses	319	2.02%
Sales Managers	250	1.59%
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	227	1.44%
Cashiers	224	1.42%
First-Line Supervisors of Retail Sales Workers	217	1.38%
Managers, All Other	198	1.26%
Real Estate Sales Agents	193	1.22%
Computer User Support Specialists	188	1.19%
Stock Clerks and Order Fillers	170	1.08%
Marketing Managers	168	1.07%
Postsecondary Teachers	152	0.96%
Financial Managers	147	0.93%
Bookkeeping, Accounting, and Auditing Clerks	145	0.92%
Executive Secretaries and Executive Administrative Assistants	138	0.88%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni.

Source: Emsi Alumni Insight data.



Occupations are defined by the standard occupational classification, while job titles provide deeper insight into the exact jobs that RCCD alumni and former students may hold.

Table 2.5 displays the top 20 program areas that RCCD alumni and former students studied. As seen in the table, Business Administration, Management & Operations was the top program area. Business occupations were common among RCCD alumni and former students so there appears to be a clear connection between the profile program data and occupation data. Table 2.6 shows the top other institutions that RCCD alumni and former students attended. California State University, San Bernardino was the top other institution listed and could appear on this table due to students transferring from one of the RCCD colleges to the university.

TABLE 2.5: TOP 20 PROGRAM AREAS FOR RCCD ALUMNI & FORMER STUDENTS

Program	Profiles	Percent
Business Administration, Management and Operations	3,168	20.10%
Education, General	946	6.00%
Liberal Arts and Sciences, General Studies and Humanities	555	3.52%
Accounting and Related Services	507	3.22%
Psychology, General	342	2.17%
Computer Science	290	1.84%
Engineering, General	276	1.75%
Communication and Media Studies	226	1.43%
Computer Engineering	191	1.21%
Design and Applied Arts	185	1.17%
Biology, General	161	1.02%
Law	152	0.96%
Sociology	136	0.86%
Mathematics	110	0.70%
Legal Support Services	108	0.69%
Real Estate	98	0.62%
Computer and Information Sciences, General	97	0.62%
History	97	0.62%
Film/Video and Photographic Arts	92	0.58%
Music	92	0.58%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni.

Source: Emsi Alumni Insight data.

TABLE 2.4: TOP 20 JOB TITLES FOR RCCD ALUMNI AND FORMER STUDENTS

Job Title	Profiles	Percent
Customer Service Representative	344	2.18%
Administrative Assistant	298	1.89%
Sales Manager	244	1.55%
Retail Sales Associate	222	1.41%
President	189	1.20%
Cashier	164	1.04%
Registered Nurse	161	1.02%
Office Manager	160	1.02%
Project Manager	147	0.93%
Business Owner	142	0.90%
Sales Representative	132	0.84%
Warehouse Worker	120	0.76%
Account Manager	118	0.75%
Operations Manager	97	0.62%
General Manager	96	0.61%
Office Assistant	94	0.60%
Realtor	87	0.55%
Assistant Manager	81	0.51%
Receptionist	79	0.50%
Medical Assistant	76	0.48%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni.

Source: Emsi Alumni Insight data.



TABLE 2.6: TOP OTHER INSTITUTIONS FOR RCCD ALUMNI & FORMER STUDENTS

School	Profiles	Percent
California State University, San Bernardino	749	4.75%
University of California, Riverside	621	3.94%
California State Polytechnic University, Pomona	394	2.50%
California State University, Fullerton	350	2.22%
California Baptist University	321	2.04%
University of Phoenix	275	1.74%
Chaffey College	191	1.21%
California State University	189	1.20%
San Bernardino Valley College	180	1.14%
California State University, Long Beach	141	0.89%
University of Redlands	138	0.88%
Fullerton College	129	0.82%
University of California	118	0.75%
Mt San Antonio College	113	0.72%
Crafton Hills College	102	0.65%
University of California, Los Angeles	97	0.62%
San Diego State University	96	0.61%
Orange Coast College	86	0.55%

Alumni information refers solely to current and former RCCD students whose information is available from January 2000 to October 2017. The information should only be considered a representative sample of RCCD's student body and alumni.

Source: Emsi Alumni Insight data.



CHAPTER 3:

Economic Impacts on the RCCD Service Area Economy

RCCD impacts the RCCD Service Area economy in a variety of ways. The colleges are employers and buyers of goods and services. They attract monies that otherwise would not have entered the regional economy through their day-to-day operations and the expenditures of their students. Further, they provide students with the knowledge, skills, and abilities they need to become productive citizens and add to the overall output of the region.



In this chapter, we estimate the following economic impacts of RCCD: 1) the operations spending impact, 2) the student spending impact, and 3) the alumni impact, measuring the income added in the region as former students expand the regional economy's stock of human capital.

When exploring each of these economic impacts, we consider the following hypothetical question:

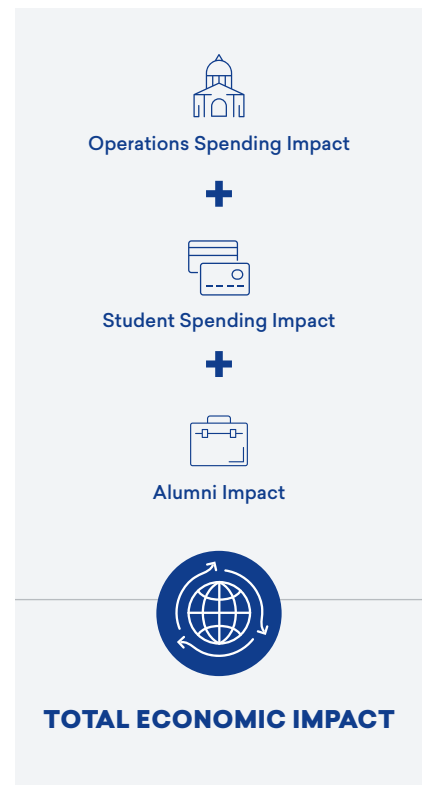
How would economic activity change in the RCCD Service Area if RCCD and all the colleges' alumni did not exist in FY 2016-17?

Each of the economic impacts should be interpreted according to this hypothetical question. Another way to think about the question is to realize that we measure net impacts, not gross impacts. Gross impacts represent an upper-bound estimate in terms of capturing all activity stemming from the colleges; however, net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the colleges.

Economic impact analyses use different types of impacts to estimate the results. The impact focused on in this study assesses the change in income. This measure is similar to the commonly used gross regional product (GRP). Income may be further broken out into the **labor income impact**, also known as earnings, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in business profits. Together, labor income and non-labor income sum to total income.

Another way to state the impact is in terms of **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. Finally, a frequently used measure is the **sales impact**, which comprises the change in business sales revenue in the economy as a result of increased economic activity. It is important to bear in mind, however, that much of this sales revenue leaves the regional economy through intermediary transactions and costs.⁸ All of these measures – added labor and non-labor income, total income, jobs, and sales – are used to estimate the economic impact results presented in this chapter. The analysis breaks out the impact measures into different components, each based on the economic effect that caused the impact. The following is a list of each type of effect presented in this analysis:

⁸ See Appendix 5 for an example of the intermediary costs included in the sales impact but not in the income impact.



Net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the colleges.



- The **initial effect** is the exogenous shock to the economy caused by the initial spending of money, whether to pay for salaries and wages, purchase goods or services, or cover operating expenses.
- The initial round of spending creates more spending in the economy, resulting in what is commonly known as the **multiplier effect**. The multiplier effect comprises the additional activity that occurs across all industries in the economy and may be further decomposed into the following three types of effects:
 - The **direct effect** refers to the additional economic activity that occurs as the industries affected by the initial effect spend money to purchase goods and services from their supply chain industries.
 - The **indirect effect** occurs as the supply chain of the initial industries creates even more activity in the economy through their own inter-industry spending.
 - The **induced effect** refers to the economic activity created by the household sector as the businesses affected by the initial, direct, and indirect effects raise salaries or hire more people.

The terminology used to describe the economic effects listed above differs slightly from that of other commonly used input-output models, such as IMPLAN. For example, the initial effect in this study is called the “direct effect” by IMPLAN, as shown in the table below. Further, the term “indirect effect” as used by IMPLAN refers to the combined direct and indirect effects defined in this study. To avoid confusion, readers are encouraged to interpret the results presented in this chapter in the context of the terms and definitions listed above. Note that, regardless of the effects used to decompose the results, the total impact measures are analogous.

Emsi	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

Multiplier effects in this analysis are derived using Emsi’s MR-SAM input-output model that captures the interconnection of industries, government, and households in the region. The Emsi MR-SAM contains approximately 1,000 industry sectors at the highest level of detail available in the North American Industry Classification System (NAICS) and supplies the industry-specific multipliers required to determine the impacts associated with increased activity within a given economy. For more information on the Emsi MR-SAM model and its data sources, see Appendix 6.





Operations spending impact

Faculty and staff payroll is part of the region’s total earnings, and the spending of employees for groceries, apparel, and other household expenditures helps support regional businesses. The colleges themselves purchase supplies and services, and many of their vendors are located in the RCCD Service Area. These expenditures create a ripple effect that generates still more jobs and higher wages throughout the economy.

Table 3.1 presents the colleges’ expenditures for the following three categories: 1) salaries, wages, and benefits, 2) operation and maintenance of plant, and 3) all other expenditures (including purchases for supplies and services). In this analysis, we exclude expenses for depreciation and interest due to the way those measures are calculated in the national input-output accounts, and because depreciation represents the devaluing of the colleges’ assets rather than an outflow of expenditures.⁹ The first step in estimating the multiplier effects of the colleges’ operational expenditures is to map these categories of expenditures to the approximately 1,000 industries of the Emsi MR-SAM model. Assuming that the spending patterns of the colleges’ personnel approximately match those of the average consumer, we map salaries, wages, and benefits to spending on industry outputs using national household expenditure coefficients provided by Emsi’s national SAM. All RCCD employees work in the RCCD Service Area (see Table 1.1), and therefore we consider 100% of the salaries, wages, and benefits. For the other two expenditure categories (i.e., operation and maintenance of plant and all other expenditures), we assume the colleges’ spending patterns approximately match national averages and apply the national spending coefficients for NAICS 611210 (Junior Colleges).¹⁰

TABLE 3.1: RCCD EXPENSES BY FUNCTION (EXCLUDING DEPRECIATION & INTEREST), FY 2016-17

Expense category	In-region expenditures (thousands)	Out-of-region expenditures (thousands)	Total expenditures (thousands)
Employee salaries, wages, and benefits	\$164,685	\$0	\$164,685
Operation and maintenance of plant	\$17,875	\$26,295	\$44,170
All other expenditures	\$14,332	\$36,528	\$50,860
Total	\$196,892	\$62,823	\$259,714

Source: Data provided by RCCD and the Emsi impact model.

9 This aligns with the economic impact guidelines set by the Association of Public and Land-Grant Universities. Ultimately, excluding these measures results in more conservative and defensible estimates.

10 See Appendix 3 for a definition of NAICS.



Operation and maintenance of plant expenditures are mapped to the industries that relate to capital construction, maintenance, and support, while the colleges' remaining expenditures are mapped to the remaining industries.

We now have three vectors of expenditures for RCCD: one for salaries, wages, and benefits; another for operation and maintenance of plant; and a third for the colleges' purchases of supplies and services. The next step is to estimate the portion of these expenditures that occurs inside the region. The expenditures occurring outside the region are known as leakages. We estimate in-region expenditures using regional purchase coefficients (RPCs), a measure of the overall demand for the commodities produced by each sector that is satisfied by regional suppliers, for each of the approximately 1,000 industries in the MR-SAM model.¹¹ For example, if 40% of the demand for NAICS 541211 (Offices of Certified Public Accountants) is satisfied by regional suppliers, the RPC for that industry is 40%. The remaining 60% of the demand for NAICS 541211 is provided by suppliers located outside the region. The three vectors of expenditures are multiplied, industry by industry, by the corresponding RPC to arrive at the in-region expenditures associated with the colleges. See Table 3.1 for a break-out of the expenditures that occur in-region. Finally, in-region spending is entered, industry by industry, into the MR-SAM model's multiplier matrix, which in turn provides an estimate of the associated multiplier effects on regional labor income, non-labor income, total income, sales, and jobs.

Table 3.2 presents the economic impact of the colleges' operations spending. The people employed by RCCD and their salaries, wages, and benefits comprise the initial effect, shown in the top row of the table in terms of labor income, non-labor income, total added income, sales, and jobs. The additional impacts created by the initial effect appear in the next four rows under the



TABLE 3.2: OPERATIONS SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$164,685	\$0	\$164,685	\$259,714	1,846
Multiplier effect					
Direct effect	\$10,380	\$8,078	\$18,458	\$32,207	260
Indirect effect	\$1,842	\$1,155	\$2,997	\$5,904	49
Induced effect	\$15,229	\$19,240	\$34,469	\$53,049	368
Total multiplier effect	\$27,451	\$28,473	\$55,924	\$91,160	677
Gross impact (initial + multiplier)	\$192,135	\$28,473	\$220,609	\$350,874	2,523
Less alternative uses of funds	-\$8,421	-\$10,931	-\$19,352	-\$29,464	-205
Net impact	\$183,715	\$17,542	\$201,256	\$321,410	2,318

Source: Emsi impact model.

¹¹ See Appendix 6 for a description of Emsi's MR-SAM model.



section labeled *multiplier effect*. Summing the initial and multiplier effects, the gross impacts are \$192.1 million in labor income and \$28.5 million in non-labor income. This comes to a total impact of \$220.6 million in total added income associated with the spending of the colleges and their employees in the region. This is equivalent to supporting 2,523 jobs.

The \$220.6 million in gross impact is often reported by researchers as the total impact. We go a step further to arrive at a net impact by applying a counterfactual scenario, i.e., what would have happened if a given event – in this case, the expenditure of in-region funds on RCCD – had not occurred. RCCD received an estimated 27% of its funding from sources within the RCCD Service Area. These monies came from the tuition and fees paid by resident students, from the auxiliary revenue and donations from private sources located within the region, from state and local taxes, and from the financial aid issued to students by state and local government. We must account for the opportunity cost of this in-region funding. Had other industries received these monies rather than RCCD, income impacts would have still been created in the economy. In economic analysis, impacts that occur under counterfactual conditions are used to offset the impacts that actually occur in order to derive the true impact of the event under analysis.

We estimate this counterfactual by simulating a scenario where in-region monies spent on the colleges are instead spent on consumer goods and savings. This simulates the in-region monies being returned to the taxpayers and being spent by the household sector. Our approach is to establish the total amount spent by in-region students and taxpayers on RCCD, map this to the detailed industries of the MR-SAM model using national household expenditure coefficients, use the industry RPCs to estimate in-region spending, and run the in-region spending through the MR-SAM model's multiplier matrix to derive multiplier effects. The results of this exercise are shown as negative values in the row labeled *less alternative uses of funds* in Table 3.2.

The total net impact of the colleges' operations is equal to the gross impact less the impact of the alternative use of funds – the opportunity cost of the regional money.

As shown in the last row of Table 3.2, the total net impact is approximately \$183.7 million in labor income and \$17.5 million in non-labor income. This sums together to \$201.3 million in total added income and is equivalent to supporting 2,318 jobs. These impacts represent new economic activity created in the regional economy solely attributable to the operations of RCCD.

*The total net impact of the colleges' operations is **\$201.3 million** in total added income, which is equivalent to supporting **2,318 jobs**.*





Student spending impact



In-region students contribute to the student spending impact of RCCD; however, not all of these students can be counted towards the impact. Only those students who were retained, or who would have left the region to seek education elsewhere had they not attended the colleges, are measured. Students who would have stayed in the region anyway are not counted towards the impact since their monies would have been added to the RCCD Service Area economy regardless of the colleges.

While there were 46,840 students attending the colleges who originated from the RCCD Service Area (not including personal enrichment students and dual credit high school students), not all of them would have remained in the region if not for the existence of RCCD. We apply a conservative assumption that 10% of these students would have left the RCCD Service Area for other education opportunities if the colleges did not exist.¹² Therefore, we recognize that the in-region spending of 4,684 students retained in the region is attributable to the colleges. These students, called retained students, spent money at businesses in the region for everyday needs such as groceries, accommodation, and transportation.

The average costs for students appear in the first section of Table 3.3, equal to \$19,818 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations

¹² See Appendix 2 for a sensitivity analysis of the retained student variable.

impact discussed in the previous section. We multiply the \$19,818 in annual costs by the 4,684 students who were retained because of RCCD and lived in-region but off campus. This provides us with an estimate of their total spending. The off-campus spending of retained students generated gross sales of \$92.8 million. This figure, once net of the monies paid to student workers, yields net off-campus sales of \$92.7 million, as shown in the bottom row of Table 3.3.

TABLE 3.3: AVERAGE STUDENT COSTS AND TOTAL SALES GENERATED BY RETAINED STUDENTS IN THE RCCD SERVICE AREA, FY 2016-17

Room and board	\$15,660
Personal expenses	\$2,363
Transportation	\$1,795
Total expenses per student	\$19,818
Number of students that were retained	4,684
Total gross off-campus sales	\$92,827,512
Wages and salaries paid to student workers*	\$116,940
Net off-campus sales	\$92,710,572

* This figure reflects only the portion of payroll that was used to cover the living expenses of retained student workers who lived in the region.

Source: Student costs and wages provided by RCCD. Emsi provided estimates of the monies paid to student workers for colleges that were unable to provide data. The number of retained students who lived in the region off campus while attending is derived by Emsi from the student origin data and in-term residence data provided by RCCD. The data is based on all students.

Estimating the impacts generated by the \$92.7 million in student spending follows a procedure similar to that of the operations impact described above. We distribute the \$92.7 million in sales to the industry sectors of the MR-SAM model, apply RPCs to reflect in-region spending, and run the net sales figures through the MR-SAM model to derive multiplier effects.

Table 3.4 presents the results. The initial effect is purely sales-oriented and there is no change in labor or non-labor income. The impact of retained student spending thus falls entirely under the multiplier effect. The total impact of student spending is \$35.2 million in labor income and \$35.1 million in non-labor income. This sums together to \$70.2 million in total added income and is equivalent to supporting 1,395 jobs. These values represent the direct effects created at the businesses patronized by the students, the indirect effects created by the supply chain of those businesses, and the effects of the increased spending of the household sector throughout the regional economy as a result of the direct and indirect effects.

*The total impact of student spending is **\$70.2 million** in total added income and is equivalent to supporting **1,395 jobs**.*



TABLE 3.4: STUDENT SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$0	\$0	\$0	\$92,711	0
Multiplier effect					
Direct effect	\$25,359	\$25,170	\$50,529	\$80,188	1,004
Indirect effect	\$2,998	\$2,942	\$5,940	\$9,466	118
Induced effect	\$6,813	\$6,960	\$13,773	\$21,766	273
Total multiplier effect	\$35,170	\$35,072	\$70,243	\$111,420	1,395
Total impact (initial + multiplier)	\$35,170	\$35,072	\$70,243	\$204,131	1,395

Source: Emsi impact model.





Alumni impact



In this section, we estimate the economic impacts stemming from the added labor income of alumni in combination with their employers' added non-labor income. This impact is based on the number of students who have attended the colleges *throughout their history*. We then use this total number to consider the impact of those students in the single FY 2016-17. Former students who earned a degree as well as those who may not have finished their degree or did not take courses for credit are considered alumni.

While RCCD creates an economic impact through its operations and student spending, the greatest economic impact of RCCD stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in the colleges' alumni. While attending the colleges, students gain experience, education, and the knowledge, skills, and abilities that increase their productivity and allow them to command a higher wage once they enter the workforce. But the reward of increased productivity does not stop there. Talented professionals make capital more productive too (e.g., buildings, production facilities, equipment). The employers of the colleges' alumni enjoy the fruits of this increased productivity in the form of additional non-labor income (i.e., higher profits).

The methodology here differs from the previous impacts in one fundamental way. Whereas the previous spending impacts depend on an annually renewed injection of new sales into the regional economy, the alumni impact is the result

The greatest economic impact of RCCD stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni.



of years of past instruction and the associated accumulation of human capital. The initial effect of alumni is comprised of two main components. The first and largest of these is the added labor income of the colleges' former students. The second component of the initial effect is comprised of the added non-labor income of the businesses that employ former students of RCCD.

We begin by estimating the portion of alumni who are employed in the workforce. To estimate the historical employment patterns of alumni in the region, we use the following sets of data or assumptions: 1) settling-in factors to determine how long it takes the average student to settle into a career;¹³ 2) death, retirement, and unemployment rates from the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics; and 3) state migration data from the Census Bureau. The result is the estimated portion of alumni from each previous year who were still actively employed in the region as of FY 2016-17.

The next step is to quantify the skills and human capital that alumni acquired from the colleges. We use the students' production of CHEs as a proxy for accumulated human capital. The average number of CHEs completed per student in FY 2016-17 was 8.8. To estimate the number of CHEs present in the workforce during the analysis year, we use the colleges' historical student headcount over the past 30 years, from FY 1987-88 to FY 2016-17.¹⁴ We multiply the 8.8 average CHEs per student by the headcounts that we estimate are still actively employed from each of the previous years.¹⁵ Students who enroll at the colleges more than one year are counted at least twice in the historical enrollment data. However, CHEs remain distinct regardless of when and by whom they were earned, so there is no duplication in the CHE counts. We estimate there are approximately 6.8 million CHEs from alumni active in the workforce.

Next, we estimate the value of the CHEs, or the skills and human capital acquired by the colleges' alumni. This is done using the *incremental* added labor income stemming from the students' higher wages. The incremental added labor income is the difference between the wage earned by the colleges' alumni and the alternative wage they would have earned had they not attended the colleges. Using the regional incremental earnings, credits required, and distribution of credits at each level of study, we estimate the average value per CHE to equal \$116. This value represents the regional average incremental increase

13 Settling-in factors are used to delay the onset of the benefits to students in order to allow time for them to find employment and settle into their careers. In the absence of hard data, we assume a range between one and three years for students who graduate with a certificate or a degree, and between one and five years for returning students.

14 We apply a 30-year time horizon because the data on students who attended RCCD prior to FY 1987-88 is less reliable, and because most of the students served more than 30 years ago had left the regional workforce by FY 2016-17.

15 This assumes the average level of study from past years is equal to the level of study of students today. Emsi used data provided by some colleges for previous studies to estimate students' credit load in prior years.



in wages that the colleges' alumni received during the analysis year for every CHE they completed.

Because workforce experience leads to increased productivity and higher wages, the value per CHE varies depending on the students' workforce experience, with the highest value applied to the CHEs of students who had been employed the longest by FY 2016-17, and the lowest value per CHE applied to students who were just entering the workforce. More information on the theory and calculations behind the value per CHE appears in Appendix 7. In determining the amount of added labor income attributable to alumni, we multiply the CHEs of former students in each year of the historical time horizon by the corresponding average value per CHE for that year, and then sum the products together. This calculation yields approximately \$788.5 million in gross labor income from increased wages received by former students in FY 2016-17 (as shown in Table 3.5).

TABLE 3.5: NUMBER OF CHES IN WORKFORCE AND INITIAL LABOR INCOME CREATED IN THE RCCD SERVICE AREA, FY 2016-17

Number of CHEs in workforce	6,783,417
Average value per CHE	\$116
Initial labor income, gross	\$788,493,017
Counterfactuals	
Percent reduction for alternative education opportunities	15%
Percent reduction for adjustment for labor import effects	50%
Initial labor income, net	\$335,109,532

Source: Emsi impact model.

The next two rows in Table 3.5 show two adjustments used to account for counterfactual outcomes. As discussed above, counterfactual outcomes in economic analysis represent what would have happened if a given event had not occurred. The event in question is the education and training provided by RCCD and subsequent influx of skilled labor into the regional economy. The first counterfactual scenario that we address is the adjustment for alternative education opportunities. In the counterfactual scenario where RCCD does not exist, we assume a portion of the colleges' alumni would have received a comparable education elsewhere in the region or would have left the region and received a comparable education and then returned to the region. The incremental added labor income that accrues to those students cannot be counted towards the added labor income from the colleges' alumni. The adjustment for alternative education opportunities amounts to a 15% reduction of the \$788.5 million in added labor income. This means that 15% of the added labor income from the colleges' alumni would have been generated in the region anyway, even if the colleges did not exist. For more information on the alternative education adjustment, see Appendix 8.



The other adjustment in Table 3.5 accounts for the importation of labor. Suppose RCCD did not exist and in consequence there were fewer skilled workers in the region. Businesses could still satisfy some of their need for skilled labor by recruiting from outside the RCCD Service Area. We refer to this as the labor import effect. Lacking information on its possible magnitude, we assume 50% of the jobs that students fill at regional businesses could have been filled by workers recruited from outside the region if the colleges did not exist.¹⁶ Consequently, the gross labor income must be adjusted to account for the importation of this labor, since it would have happened regardless of the presence of the colleges. We conduct a sensitivity analysis for this assumption in Appendix 2. With the 50% adjustment, the net added labor income added to the economy comes to \$335.1 million, as shown in Table 3.5.

The \$335.1 million in added labor income appears under the initial effect in the labor income column of Table 3.6. To this we add an estimate for initial non-labor income. As discussed earlier in this section, businesses that employ former students of RCCD see higher profits as a result of the increased productivity of their capital assets. To estimate this additional income, we allocate the initial increase in labor income (\$335.1 million) to the six-digit NAICS industry sectors where students are most likely to be employed. This allocation entails a process that maps completers in the region to the detailed occupations for which those completers have been trained, and then maps the detailed occupations to the six-digit industry sectors in the MR-SAM model.¹⁷ Using a crosswalk created by National Center for Education Statistics (NCES) and the Bureau of Labor Statistics, we map the breakdown of the colleges' completers to the approximately 700 detailed occupations in the Standard Occupational Classification (SOC) system. Finally, we apply a matrix of wages by industry and by occupation from the MR-SAM model to map the occupational distribution of the \$335.1 million in initial labor income effects to the detailed industry sectors in the MR-SAM model.¹⁸

Once these allocations are complete, we apply the ratio of non-labor to labor income provided by the MR-SAM model for each sector to our estimate of initial labor income. This computation yields an estimated \$111.1 million in added non-labor income attributable to the colleges' alumni. Summing initial labor and non-labor income together provides the total initial effect of alumni productivity in the RCCD Service Area economy, equal to approximately \$446.3 million. To estimate multiplier effects, we convert the industry-specific income



16 A similar assumption is used by Walden (2014) in his analysis of the Cooperating Raleigh Colleges.
 17 Completer data comes from the Integrated Postsecondary Education Data System (IPEDS), which organizes program completions according to the Classification of Instructional Programs (CIP) developed by the National Center for Education Statistics (NCES).
 18 For example, if the MR-SAM model indicates that 20% of wages paid to workers in SOC 51-4121 (Welders) occur in NAICS 332313 (Plate Work Manufacturing), then we allocate 20% of the initial labor income effect under SOC 51-4121 to NAICS 332313.



figures generated through the initial effect to sales using sales-to-income ratios from the MR-SAM model. We then run the values through the MR-SAM's multiplier matrix.

TABLE 3.6: ALUMNI IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$335,110	\$111,148	\$446,258	\$992,244	6,901
Multiplier effect					
Direct effect	\$35,418	\$12,494	\$47,912	\$97,853	772
Indirect effect	\$6,311	\$2,184	\$8,496	\$17,296	145
Induced effect	\$72,920	\$26,374	\$99,294	\$214,735	1,367
Total multiplier effect	\$114,649	\$41,053	\$155,702	\$329,884	2,284
Total impact (initial + multiplier)	\$449,759	\$152,201	\$601,960	\$1,322,128	9,185

Source: Emsi impact model.

Table 3.6 shows the multiplier effects of alumni. Multiplier effects occur as alumni generate an increased demand for consumer goods and services through the expenditure of their higher wages. Further, as the industries where alumni are employed increase their output, there is a corresponding increase in the demand for input from the industries in the employers' supply chain. Together, the incomes generated by the expansions in business input purchases and household spending constitute the multiplier effect of the increased productivity of the colleges' alumni. The final results are \$114.6 million in added labor income and \$41.1 million in added non-labor income, for an overall total of \$155.7 million in multiplier effects. The grand total of the alumni impact thus comes to \$602 million in total added income, the sum of all initial and multiplier labor and non-labor income effects. This is equivalent to supporting 9,185 jobs.





Total RCCD impact

The total economic impact of RCCD on the RCCD Service Area can be generalized into two broad types of impacts. First, on an annual basis, RCCD generates a flow of spending that has a significant impact on the RCCD Service Area economy. The impacts of this spending are captured by the operations and student spending impacts. While not insignificant, these impacts do not capture the true purpose of RCCD. The basic mission of RCCD is to foster human capital. Every year, a new cohort of the colleges' former students adds to the stock of human capital in the RCCD Service Area, and a portion of alumni continues to add to the RCCD Service Area economy. Table 3.7 displays the grand total impacts of RCCD on the RCCD Service Area economy in FY 2016-17. For context, the percentages of RCCD compared to the total labor income, total non-labor income, combined total income, sales, and jobs in the RCCD Service Area, as presented in Table 1.3 and Figure 1.3, are included. The total added value of RCCD is **\$873.5 million**, equivalent to **1.3%** of the GRP of the RCCD Service Area. By comparison, this contribution that the colleges provide on their own was over half the size of the entire Accommodation & Food Services industry in the region. RCCD's total impact supported **12,898** jobs in FY 2016-17. For perspective, this means that one out of every **61** jobs in the RCCD Service Area is supported by the activities of the colleges and their students.

TABLE 3.7: TOTAL RCCD IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Operations spending	\$183,715	\$17,542	\$201,256	\$321,410	2,318
Student spending	\$35,170	\$35,072	\$70,243	\$204,131	1,395
Alumni	\$449,759	\$152,201	\$601,960	\$1,322,128	9,185
Total impact	\$668,644	\$204,815	\$873,459	\$1,847,669	12,898
% of the RCCD Service Area economy	1.7%	0.7%	1.3%	1.5%	1.7%

Source: Emsi impact model.



These impacts, stemming from spending related to the colleges and their students, spread throughout the regional economy and affect individual industry sectors. Table 3.8 displays the total impact of RCCD on industry sectors based on their two-digit NAICS code. The table shows the total impact of operations, students, and alumni as shown in Table 3.7, broken down by industry sector using processes outlined earlier in this chapter. By showing the impact on individual industry sectors, it is possible to see in finer detail where RCCD has the greatest impact. For example, RCCD's impact for the Health Care & Social Assistance industry sector was 1,746 jobs in FY 2016-17.

TABLE 3.8: TOTAL RCCD IMPACT BY INDUSTRY, FY 2016-17

Industry sector	Total income (thousands)	Jobs supported
Government, Education	\$241,708	2,856
Manufacturing	\$105,192	611
Government, Non-Education	\$92,111	767
Health Care & Social Assistance	\$72,827	1,746
Accommodation & Food Services	\$66,436	1,370
Professional & Technical Services	\$62,561	1,636
Other Services (except Public Administration)	\$29,607	992
Wholesale Trade	\$29,282	204
Management of Companies & Enterprises	\$26,513	281
Construction	\$20,538	241
Retail Trade	\$19,324	290
Educational Services	\$16,782	454
Administrative & Waste Services	\$16,038	409
Utilities	\$14,257	40
Information	\$14,049	87
Real Estate & Rental & Leasing	\$13,921	203
Arts, Entertainment, & Recreation	\$13,789	511
Transportation & Warehousing	\$9,540	142
Finance & Insurance	\$8,513	53
Mining, Quarrying, & Oil and Gas Extraction	\$271	1
Agriculture, Forestry, Fishing, & Hunting	\$201	4
Total impact	\$873,459	12,898

Source: Emsi impact model.



CHAPTER 4:

Investment Analysis

The benefits generated by RCCD affect the lives of many people. The most obvious beneficiaries are the colleges' students; they give up time and money to go to the colleges in return for a lifetime of higher wages and improved quality of life. But the benefits do not stop there. As students earn more, communities and citizens throughout California benefit from an enlarged economy and a reduced demand for social services. In the form of increased tax revenues and public sector savings, the benefits of education extend as far as the state and local government.

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered infeasible. In this chapter, we consider RCCD as a worthwhile investment from the perspectives of students, taxpayers, and society.





Student perspective

To enroll in postsecondary education, students pay money for tuition and forego monies that otherwise they would have earned had they chosen to work instead of attend college. From the perspective of students, education is the same as an investment; i.e., they incur a cost, or put up a certain amount of money, with the expectation of receiving benefits in return. The total costs consist of the monies that students pay in the form of tuition and fees and the opportunity costs of foregone time and money. The benefits are the higher earnings that students receive as a result of their education.

Calculating student costs

Student costs consist of three main items: direct outlays, opportunity costs, and future principal and interest costs incurred from student loans. Direct outlays include tuition and fees, equal to \$16.7 million from Figure 1.1. Direct outlays also include the cost of books and supplies. On average, full-time students spent \$1,792 each on books and supplies during the reporting year.¹⁹ Multiplying this figure by the number of full-time equivalents (FTEs) produced by RCCD in FY 2016-17²⁰ generates a total cost of \$38.5 million for books and supplies.

In order to pay the cost of tuition, many students had to take out loans. These students not only incur the cost of tuition from the colleges but also incur the interest cost of taking out loans. In FY 2016-17, students received a total of \$3.2 million in federal loans to attend the colleges.²¹ Students pay back these loans along with interest over the span of several years in the future. Since students pay off these loans over time, they accrue no initial cost during the analysis year. Hence, to avoid double counting, the \$3.2 million in federal loans is subtracted from the costs incurred by students in FY 2016-17.

In addition to the cost of tuition, books, and supplies, students also experience an opportunity cost of attending college during the analysis year. Opportunity cost is the most difficult component of student costs to estimate. It measures the value of time and earnings foregone by students who go to the colleges rather than work. To calculate it, we need to know the difference between the students' full earning potential and what they actually earn while attending the colleges.

¹⁹ Based on the data provided by RCCD.

²⁰ A single FTE is equal to 30 CHEs, so there were 17,537 FTEs produced by students in FY 2016-17, equal to 527,412 CHEs divided by 30 (excluding personal enrichment students).

²¹ Due to data limitations, only federal loans are considered in this analysis.



STUDENT COSTS



Out-of-Pocket Expenses



Opportunity Costs

STUDENT BENEFITS



Higher Earnings from Education



We derive the students' full earning potential by weighting the average annual earnings levels in Table 1.4 according to the education level breakdown of the student population when they first enrolled.²² However, the earnings levels in Table 1.4 reflect what average workers earn at the midpoint of their careers, not while attending the colleges. Because of this, we adjust the earnings levels to the average age of the student population (25) to better reflect their wages at their current age.²³ This calculation yields an average full earning potential of \$16,106 per student.

In determining how much students earn while enrolled in postsecondary education, an important factor to consider is the time that they actually spend on postsecondary education, since this is the only time that they are required to give up a portion of their earnings. We use the students' CHE production as a proxy for time, under the assumption that the more CHEs students earn, the less time they have to work, and, consequently, the greater their foregone earnings. Overall, students attending RCCD earned an average of 8.9 CHEs per student (excluding personal enrichment students and dual credit high school students), which is approximately equal to 30% of a full academic year.²⁴ We thus include no more than \$4,753 (or 30%) of the students' full earning potential in the opportunity cost calculations.

Another factor to consider is the students' employment status while enrolled in postsecondary education. It is estimated that 75% of students are employed.²⁵ For the remainder of students, we assume that they are either seeking work or planning to seek work once they complete their educational goals (with the exception of personal enrichment students, who are not included in this calculation). By choosing to enroll, therefore, non-working students give up everything that they can potentially earn during the academic year (i.e., the \$4,753). The total value of their foregone earnings thus comes to \$67.6 million.

Working students are able to maintain all or part of their earnings while enrolled. However, many of them hold jobs that pay less than statistical averages, usually because those are the only jobs they can find that accommodate their course schedule. These jobs tend to be at entry level, such as restaurant servers or cashiers. To account for this, we assume that working students hold jobs that pay 69% of what they would have earned had they chosen to work full-time rather than go to college.²⁶ The remaining 31% comprises the percentage of

22 This is based on students who reported their prior level of education to RCCD. The prior level of education data was then adjusted to exclude dual credit high school students.

23 Further discussion on this adjustment appears in Appendix 7.

24 Equal to 8.9 CHEs divided by \$30, the assumed number of CHEs in a full-time academic year.

25 Emsi provided estimates of the percentage of students employed for colleges that were unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

26 The 69% assumption is based on the average hourly wage of jobs commonly held by working students divided by the national average hourly wage. Occupational wage estimates are published by the Bureau of Labor Statistics (see http://www.bls.gov/oes/current/oes_nat.htm).

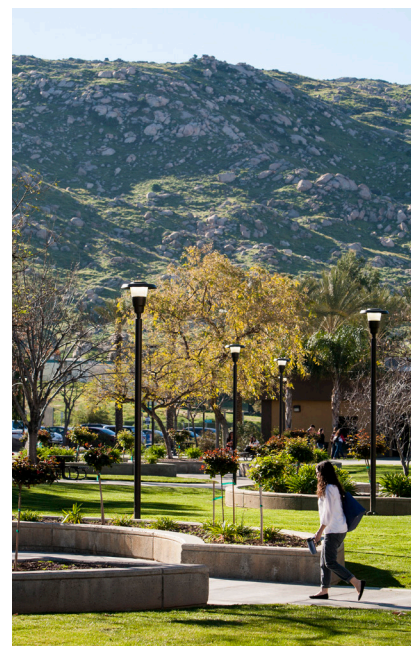


their full earning potential that they forego. Obviously this assumption varies by person; some students forego more and others less. Since we do not know the actual jobs that students hold while attending, the 31% in foregone earnings serves as a reasonable average.

Working students also give up a portion of their leisure time in order to attend higher education institutions. According to the Bureau of Labor Statistics American Time Use Survey, students forego up to 0.5 hours of leisure time per day.²⁷ Assuming that an hour of leisure is equal in value to an hour of work, we derive the total cost of leisure by multiplying the number of leisure hours foregone during the academic year by the average hourly pay of the students' full earning potential. For working students, therefore, their total opportunity cost comes to \$77.1 million, equal to the sum of their foregone earnings (\$63.7 million) and foregone leisure time (\$13.4 million).

Thus far we have discussed student costs during the analysis year. However, recall that students take out student loans to attend college during the year, which they will have to pay back over time. The amount they will be paying in the future must be a part of their decision to attend the colleges today. Students who take out loans are not only required to pay back the principal of the loan but to also pay back a certain amount in interest. The first step in calculating students' loan interest cost is to determine the payback time for the loans. The \$3.2 million in loans was awarded to 574 students, averaging \$5,603 per student in the analysis year. However, this figure represents only one year of loans. Because loan payback time is determined by total indebtedness, we make an assumption that since the colleges are two-year colleges, students will be indebted twice that amount, or \$11,206 on average. According to the U.S. Department of Education, this level of indebtedness will take 15 years to pay back under the standard repayment plan.²⁸

This indebtedness calculation is used solely to estimate the loan payback period. Students will be paying back the principal amount of \$3.2 million over time. After taking into consideration the time value of money, this means that students will pay off a discounted present value of \$2.2 million in principal over the 15 years. In order to calculate interest, we only consider interest on the federal loans awarded to students in FY 2016-17. Using the student discount rate of 4.5%²⁹ as our interest rate, we calculate that students will pay a total discounted present value of \$942.1 thousand in interest on student loans throughout the



27 "Charts by Topic: Leisure and Sports Activities," American Time Use Survey, Last modified December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

28 Repayment period based on total education loan indebtedness, U.S. Department of Education, 2017. <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>.

29 The student discount rate is derived from the baseline forecasts for the 10-year discount rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



first 15 years of their working lifetime. The stream of these future interest costs together with the stream of loan payments is included in the costs of Column 5 of Table 4.2.

The steps leading up to the calculation of student costs appear in Table 4.1. Direct outlays amount to \$51.9 million, the sum of tuition and fees (\$16.7 million) and books and supplies (\$38.5 million), less federal loans received (\$3.2 million) and \$42.8 thousand in direct outlays of personal enrichment students (those students are excluded from the cost calculations). Opportunity costs for working and non-working students amount to \$93.9 million, excluding \$50.9 million in offsetting residual aid that is paid directly to students.³⁰ Finally, we have the present value of future student loan costs, amounting to \$3.2 million between principal and interest. Summing direct outlays, opportunity costs, and future student loan costs together yields a total of \$148.9 million in present value student costs.

TABLE 4.1: PRESENT VALUE OF STUDENT COSTS, FY 2016-17 (THOUSANDS)

Direct outlays in FY 2016-17	
Tuition and fees	\$16,706
Less federal loans received	-\$3,216
Books and supplies	\$38,453
Less direct outlays of personal enrichment students	-\$43
Total direct outlays	\$51,900
Opportunity costs in FY 2016-17	
Earnings foregone by non-working students	\$67,597
Earnings foregone by working students	\$63,691
Value of leisure time foregone by working students	\$13,450
Less residual aid	-\$50,860
Total opportunity costs	\$93,878
Future student loan costs (present value)	
Student loan principal	\$2,229
Student loan interest	\$942
Total present value student loan costs	\$3,171
Total present value student costs	\$148,949

Source: Based on data provided by RCCD and outputs of the Emsi impact model.

³⁰ Residual aid is the remaining portion of scholarship or grant aid distributed directly to a student after the colleges apply tuition and fees.



Linking education to earnings

Having estimated the costs of education to students, we weigh these costs against the benefits that students receive in return. The relationship between education and earnings is well documented and forms the basis for determining student benefits. As shown in Table 1.4, state mean earnings levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of education. The differences between state earnings levels define the incremental benefits of moving from one education level to the next.

A key component in determining the students' return on investment is the value of their future benefits stream; i.e., what they can expect to earn in return for the investment they make in education. We calculate the future benefits stream to the colleges' FY 2016-17 students first by determining their average annual increase in earnings, equal to \$68.8 million. This value represents the higher wages that accrue to students at the midpoint of their careers and is calculated based on the marginal wage increases of the CHEs that students complete while attending the colleges. Using the state of California earnings, the marginal wage increase per CHE is \$131. For a full description of the methodology used to derive the \$68.8 million, see Appendix 7.

The second step is to project the \$68.8 million annual increase in earnings into the future, for as long as students remain in the workforce. We do this using the Mincer function to predict the change in earnings at each point in an individual's working career.³¹ The Mincer function originated from Mincer's seminal work on human capital (1958). The function estimates earnings using an individual's years of education and post-schooling experience. While some have criticized Mincer's earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Card (1999 and 2001) addresses a number of these criticisms using U.S. based research over the last three decades and concludes that any upward bias in the Mincer parameters is on the order of 10% or less. We use state-specific and education level-specific Mincer coefficients. To account for any upward bias, we incorporate a 10% reduction in our projected earnings, otherwise known as the ability bias. With the \$68.8 million representing the students' higher earnings at the midpoint of their careers, we apply scalars from the Mincer function to yield a stream of projected future benefits that gradually increase from the time students enter the workforce, peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 67. This earnings stream appears in Column 2 of Table 4.2.

³¹ Appendix 7 provides more information on the Mincer function and how it is used to predict future earnings growth.



TABLE 4.2: PROJECTED BENEFITS AND COSTS, STUDENT PERSPECTIVE

1	2	3	4	5	6
Year	Gross higher earnings to students (millions)	% active in workforce*	Net higher earnings to students (millions)	Student costs (millions)	Net cash flow (millions)
0	\$36.6	2%	\$0.9	\$145.8	-\$144.9
1	\$38.8	7%	\$2.9	\$0.3	\$2.6
2	\$41.1	17%	\$6.9	\$0.3	\$6.6
3	\$43.4	34%	\$14.9	\$0.3	\$14.6
4	\$45.8	61%	\$27.8	\$0.3	\$27.5
5	\$48.2	95%	\$45.6	\$0.3	\$45.3
6	\$50.5	95%	\$47.9	\$0.3	\$47.6
7	\$52.9	95%	\$50.1	\$0.3	\$49.9
8	\$55.3	95%	\$52.4	\$0.3	\$52.1
9	\$57.6	95%	\$54.7	\$0.3	\$54.4
10	\$59.9	95%	\$56.9	\$0.3	\$56.6
11	\$62.2	95%	\$59.0	\$0.3	\$58.7
12	\$64.4	95%	\$61.1	\$0.3	\$60.8
13	\$66.6	95%	\$63.1	\$0.3	\$62.8
14	\$68.6	95%	\$65.0	\$0.3	\$64.7
15	\$70.6	95%	\$66.8	\$0.3	\$66.5
16	\$72.4	95%	\$68.5	\$0.0	\$68.5
17	\$74.2	94%	\$70.0	\$0.0	\$70.0
18	\$75.8	94%	\$71.5	\$0.0	\$71.5
19	\$77.3	94%	\$72.7	\$0.0	\$72.7
20	\$78.6	94%	\$73.8	\$0.0	\$73.8
21	\$79.8	94%	\$74.8	\$0.0	\$74.8
22	\$80.8	93%	\$75.5	\$0.0	\$75.5
23	\$81.6	93%	\$76.1	\$0.0	\$76.1
24	\$82.3	93%	\$76.5	\$0.0	\$76.5
25	\$82.8	93%	\$76.6	\$0.0	\$76.6
26	\$83.1	92%	\$76.6	\$0.0	\$76.6
27	\$83.3	92%	\$76.4	\$0.0	\$76.4
28	\$83.2	91%	\$76.0	\$0.0	\$76.0
29	\$83.0	91%	\$75.4	\$0.0	\$75.4
30	\$82.6	90%	\$74.5	\$0.0	\$74.5
31	\$82.0	90%	\$73.5	\$0.0	\$73.5
32	\$81.2	89%	\$72.4	\$0.0	\$72.4
33	\$80.3	88%	\$71.0	\$0.0	\$71.0
34	\$79.2	88%	\$69.5	\$0.0	\$69.5
35	\$77.9	87%	\$67.8	\$0.0	\$67.8
36	\$76.5	86%	\$65.9	\$0.0	\$65.9
37	\$74.9	85%	\$63.9	\$0.0	\$63.9
38	\$73.3	84%	\$61.8	\$0.0	\$61.8
39	\$71.5	83%	\$59.6	\$0.0	\$59.6
40	\$69.6	82%	\$57.2	\$0.0	\$57.2
41	\$51.3	81%	\$41.8	\$0.0	\$41.8
42	\$16.9	81%	\$13.7	\$0.0	\$13.7
Present value			\$1,014.0	\$148.9	\$865.1
Internal rate of return		Benefit-cost ratio		Payback period (no. of years)	
21.4%		6.8		6.0	

* Includes the "settling-in" factors and attrition.

Percentages reflect aggregate values for all colleges and are subject to fluctuations due to the colleges' varying time horizons. Source: Emsi impact model.



As shown in Table 4.2, the \$68.8 million in gross higher earnings occurs between Year 14 and Year 15, which is the approximate midpoint of the students' future working careers given the average age of the student population and an assumed retirement age of 67. In accordance with the Mincer function, the gross higher earnings that accrue to students in the years leading up to the midpoint are less than \$68.8 million and the gross higher earnings in the years after the midpoint are greater than \$68.8 million.

The final step in calculating the students' future benefits stream is to net out the potential benefits generated by students who are either not yet active in the workforce or who leave the workforce over time. This adjustment appears in Column 3 of Table 4.2 and represents the percentage of the FY 2016-17 student population that will be employed in the workforce in a given year. Note that the percentages in the first five years of the time horizon are relatively lower than those in subsequent years. This is because many students delay their entry into the workforce, either because they are still enrolled at the colleges or because they are unable to find a job immediately upon graduation. Accordingly, we apply a set of "settling-in" factors to account for the time needed by students to find employment and settle into their careers. As discussed in Chapter 2, settling-in factors delay the onset of the benefits by one to three years for students who graduate with a certificate or a degree and by one to five years for degree-seeking students who do not complete during the analysis year.

Beyond the first five years of the time horizon, students will leave the workforce for any number of reasons, whether death, retirement, or unemployment. We estimate the rate of attrition using the same data and assumptions applied in the calculation of the attrition rate in the economic impact analysis of Chapter 2.³² The likelihood of leaving the workforce increases as students age, so the attrition rate is more aggressive near the end of the time horizon than in the beginning. Column 4 of Table 4.2 shows the net higher earnings to students after accounting for both the settling-in patterns and attrition.

Return on investment to students

Having estimated the students' costs and their future benefits stream, the next step is to discount the results to the present to reflect the time value of money. For the student perspective we assume a discount rate of 4.5% (see below). Because students tend to rely upon debt to pay for their educations – i.e. they are negative savers – their discount rate is based upon student loan interest



Discount Rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, \$1,000 in higher earnings realized 30 years in the future is worth much less than \$1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes. In this study we assume a 4.5% discount rate from the student perspective and a 0.6% discount rate from the perspectives of taxpayers and society.

³² See the discussion of the alumni impact in Chapter 2. The main sources for deriving the attrition rate are the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics. Note that we do not account for migration patterns in the student investment analysis because the higher earnings that students receive as a result of their education will accrue to them regardless of where they find employment.



rates.³³ In Appendix 2, we conduct a sensitivity analysis of this discount rate. The present value of the benefits is then compared to student costs to derive the investment analysis results, expressed in terms of a benefit-cost ratio, rate of return, and payback period. The investment is feasible if returns match or exceed the minimum threshold values; i.e., a benefit-cost ratio greater than 1, a rate of return that exceeds the discount rate, and a reasonably short payback period.

In Table 4.2, the net higher earnings of students yield a cumulative discounted sum of approximately \$1 billion, the present value of all of the future earnings increments (see the bottom section of Column 4). This may also be interpreted as the gross capital asset value of the students' higher earnings stream. In effect, the aggregate FY 2016-17 student body is rewarded for its investment in RCCD with a capital asset valued at \$1 billion.

The students' cost of attending the colleges is shown in Column 5 of Table 4.2, equal to a present value of \$148.9 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 6.8 (equal to \$1 billion in benefits divided by \$148.9 million in costs).

Another way to compare the same benefits stream and associated cost is to compute the rate of return. The rate of return indicates the interest rate that a bank would have to pay a depositor to yield an equally attractive stream of future payments.³⁴ Table 4.2 shows students of RCCD earning average returns of 21.4% on their investment of time and money. This is a favorable return compared, for example, to approximately 1% on a standard bank savings account, or 10% on stocks and bonds (30-year average return).

*RCCD students earn an average rate of return of **21.4%** for their investment of time and money.*

Note that returns reported in this study are real returns, not nominal. When a bank promises to pay a certain rate of interest on a savings account, it employs an implicitly nominal rate. Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the stated rate of return, then money is lost in real terms. In contrast, a real rate of return is on top of inflation. For example, if inflation is running at 3% and a nominal percentage of 5% is paid, then the real

33 The student discount rate is derived from the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.

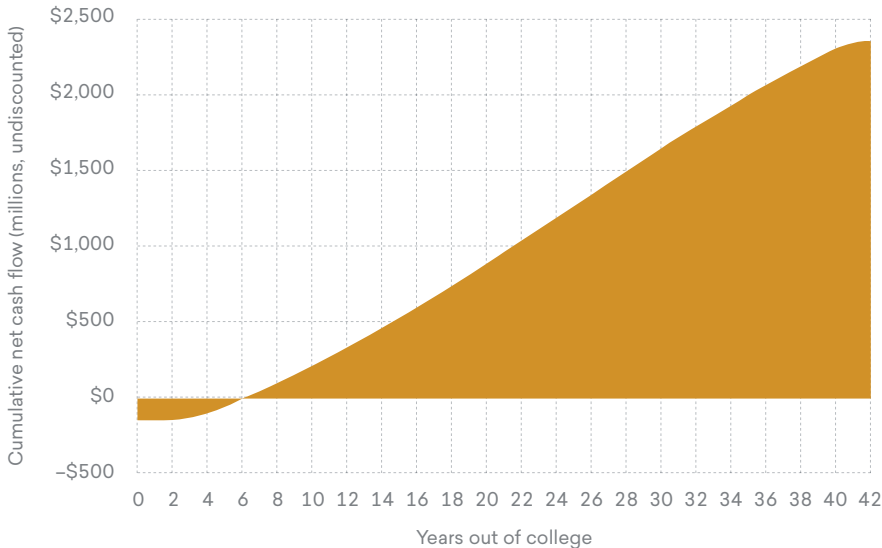
34 Rates of return are computed using the familiar internal rate-of-return calculation. Note that, with a bank deposit or stock market investment, the depositor puts up a principal, receives in return a stream of periodic payments, and then recovers the principal at the end. Someone who invests in education, on the other hand, receives a stream of periodic payments that include the recovery of the principal as part of the periodic payments, but there is no principal recovery at the end. These differences notwithstanding comparable cash flows for both bank and education investors yield the same internal rate of return.



rate of return on the investment is only 2%. In Table 4.2, the 21.4% student rate of return is a real rate. With an inflation rate of 2.1% (the average rate reported over the past 20 years as per the U.S. Department of Commerce, Consumer Price Index), the corresponding nominal rate of return is 23.6%, higher than what is reported in Table 4.2.

The payback period is defined as the length of time it takes to entirely recoup the initial investment.³⁵ Beyond that point, returns are what economists would call pure costless rent. As indicated in Table 4.2, students at RCCD see, on average, a payback period of 6.0 years, meaning 6.0 years after their initial investment of foregone earnings and out-of-pocket costs, they will have received enough higher future earnings to fully recover those costs (Figure 4.1).

FIGURE 4.1: STUDENT PAYBACK PERIOD



Source: Emsi impact model.

³⁵ Payback analysis is generally used by the business community to rank alternative investments when safety of investments is an issue. Its greatest drawback is it does not take into account the time value of money. The payback period is calculated by dividing the cost of the investment by the net return per period. In this study, the cost of the investment includes tuition and fees plus the opportunity cost of time; it does not take into account student living expenses.





Taxpayer perspective

From the taxpayer perspective, the pivotal step here is to home in on the public benefits that specifically accrue to state and local government. For example, benefits resulting from earnings growth are limited to increased state and local tax payments. Similarly, savings related to improved health, reduced crime, and fewer welfare and unemployment claims, discussed below, are limited to those received strictly by state and local government. In all instances, benefits to private residents, local businesses, or the federal government are excluded.

Growth in state tax revenues

As a result of their time at RCCD, students earn more because of the skills they learned while attending the colleges, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce. These in turn increase tax revenues since state and local government is able to apply tax rates to higher earnings.

Estimating the effect of RCCD on increased tax revenues begins with the present value of the students' future earnings stream, which is displayed in Column 4 of Table 4.2. To this, we apply a multiplier derived from Emsi's MR-SAM model to estimate the added labor income created in the state as students and businesses spend their higher earnings.³⁶ As labor income increases, so does non-labor income, which consists of monies gained through investments. To calculate the growth in non-labor income, we multiply the increase in labor income by a ratio of the California gross state product to total labor income in the state. We also include the spending impacts discussed in Chapter 2 that were created in FY 2016-17 from operations and student spending. To each of these, we apply the prevailing tax rates so we capture only the tax revenues attributable to state and local government from this additional revenue.

Not all of these tax revenues may be counted as benefits to the state, however. Some students leave the state during the course of their careers, and the higher earnings they receive as a result of their education leaves the state with them. To account for this dynamic, we combine student settlement data from the colleges with data on migration patterns from the Census Bureau to estimate the number of students who will leave the state workforce over time.

³⁶ For a full description of the Emsi MR-SAM model, see Appendix 6.



TAXPAYER COSTS



State/Local Funding

TAXPAYER BENEFITS



Increased Tax Revenue



Avoided Costs to State/Local Government



We apply another reduction factor to account for the students' alternative education opportunities. This is the same adjustment that we use in the calculation of the alumni impact in Chapter 2 and is designed to account for the counterfactual scenario where the colleges do not exist. The assumption in this case is that any benefits generated by students who could have received an education even without the colleges cannot be counted as new benefits to society. For this analysis, we assume an alternative education variable of 15%, meaning that 15% of the student population at the colleges would have generated benefits anyway even without the colleges. For more information on the alternative education variable, see Appendix 8.

We apply a final adjustment factor to account for the “shutdown point” that nets out benefits that are not directly linked to the state and local government costs of supporting the colleges. As with the alternative education variable discussed under the alumni impact, the purpose of this adjustment is to account for counterfactual scenarios. In this case, the counterfactual scenario is where state and local government funding for RCCD did not exist and the colleges had to derive the revenue elsewhere. To estimate this shutdown point, we apply a sub-model that simulates the students' demand curve for education by reducing state and local support to zero and progressively increasing student tuition and fees. As student tuition and fees increase, enrollment declines. For RCCD, the shutdown point adjustment is 0%, meaning that the colleges could not operate without taxpayer support. As such, no reduction applies. For more information on the theory and methodology behind the estimation of the shutdown point, see Appendix 10.

After adjusting for attrition, alternative education opportunities, and the shutdown point, we calculate the present value of the future added tax revenues that occur in the state, equal to \$424.6 million. Recall from the discussion of the student return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%. This is the real treasury interest rate recommended by the Office of Management and Budget (OMB) for 30-year investments, and in Appendix 2, we conduct a sensitivity analysis of this discount rate.³⁷

Government savings

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes



³⁷ Office of Management and Budget. “Discount Rates for Cost-Effectiveness Analysis of Federal Programs.” *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



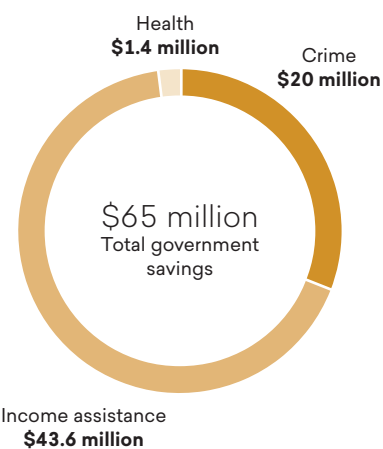
that generate social savings, also known as external or incidental benefits of education. These represent the avoided costs to the government that otherwise would have been drawn from public resources absent the education provided by RCCD. Government savings appear in Figure 4.2 and Table 4.3 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. Health savings include avoided medical costs that would have otherwise been covered by state and local government. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections). Income assistance benefits comprise avoided costs due to the reduced number of welfare and unemployment insurance claims.

The model quantifies government savings by calculating the probability at each education level that individuals will have poor health, commit crimes, or claim welfare and unemployment benefits. Deriving the probabilities involves assembling data from a variety of studies and surveys analyzing the correlation between education and health, crime, and income assistance at the national and state level. We spread the probabilities across the education ladder and multiply the marginal differences by the number of students who achieved CHEs at each step. The sum of these marginal differences counts as the upper bound measure of the number of students who, due to the education they received at the colleges, will not have poor health, commit crimes, or demand income assistance. We dampen these results by the ability bias adjustment discussed earlier in the student perspective section and in Appendix 7 to account for factors (besides education) that influence individual behavior. We then multiply the marginal effects of education times the associated costs of health, crime, and income assistance.³⁸ Finally, we apply the same adjustments for attrition, alternative education, and the shutdown point to derive the net savings to the government. Total government savings appear in Figure 4.2 and sum to \$65 million.

Table 4.3 displays all benefits to taxpayers. The first row shows the added tax revenues created in the state, equal to \$424.6 million, from students' higher earnings, increases in non-labor income, and spending impacts. The sum of the government savings and the added income in the state is \$489.6 million, as shown in the bottom row of Table 4.3. These savings continue to accrue in the future as long as the FY 2016-17 student population of the colleges remains in the workforce.

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes that generate social savings.

FIGURE 4.2: PRESENT VALUE OF GOVERNMENT SAVINGS



Source: Emsi impact model.

³⁸ For a full list of the data sources used to calculate the social externalities, see the Resources and References section. See also Appendix 11 for a more in-depth description of the methodology.



TABLE 4.3: PRESENT VALUE OF ADDED TAX REVENUE AND GOVERNMENT SAVINGS (THOUSANDS)

Added tax revenue	\$424,571
Government savings	
Health-related savings	\$1,401
Crime-related savings	\$20,020
Income assistance savings	\$43,616
Total government savings	\$65,037
Total taxpayer benefits	\$489,608

Source: Emsi impact model.

Return on investment to taxpayers

Taxpayer costs are reported in Table 4.4 and come to \$203.2 million, equal to the contribution of state and local government to RCCD. In return for their public support, taxpayers are rewarded with an investment benefit-cost ratio of 2.4 (= \$489.6 million ÷ \$203.2 million), indicating a profitable investment.

At 5.9%, the rate of return to state and local taxpayers is favorable. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%, the real treasury interest rate recommended by the Office of Management and Budget for 30-year investments.³⁹ This is the return governments are assumed to be able to earn on generally safe investments of unused funds, or alternatively, the interest rate for which governments, as relatively safe borrowers, can obtain funds. A rate of return of 0.6% would mean that the colleges just pay their own way. In principle, governments could borrow monies used to support RCCD and repay the loans out of the resulting added taxes and reduced government expenditures. A rate of return of 5.9%, on the other hand, means that RCCD not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs. It is unlikely that other government programs could make such a claim.

*A rate of return of **5.9%** means that RCCD not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.*

³⁹ Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent). Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



TABLE 4.4: PROJECTED BENEFITS AND COSTS, TAXPAYER PERSPECTIVE

1	2	3	4
Year	Benefits to taxpayers (millions)	State and local gov't costs (millions)	Net cash flow (millions)
0	\$36.6	\$203.2	-\$166.6
1	\$0.7	\$0.0	\$0.7
2	\$1.6	\$0.0	\$1.6
3	\$3.4	\$0.0	\$3.4
4	\$6.2	\$0.0	\$6.2
5	\$10.1	\$0.0	\$10.1
6	\$10.5	\$0.0	\$10.5
7	\$10.9	\$0.0	\$10.9
8	\$11.4	\$0.0	\$11.4
9	\$11.8	\$0.0	\$11.8
10	\$12.2	\$0.0	\$12.2
11	\$12.6	\$0.0	\$12.6
12	\$13.0	\$0.0	\$13.0
13	\$13.3	\$0.0	\$13.3
14	\$13.7	\$0.0	\$13.7
15	\$14.0	\$0.0	\$14.0
16	\$14.4	\$0.0	\$14.4
17	\$14.7	\$0.0	\$14.7
18	\$14.9	\$0.0	\$14.9
19	\$15.2	\$0.0	\$15.2
20	\$15.4	\$0.0	\$15.4
21	\$15.5	\$0.0	\$15.5
22	\$15.6	\$0.0	\$15.6
23	\$15.7	\$0.0	\$15.7
24	\$15.8	\$0.0	\$15.8
25	\$15.8	\$0.0	\$15.8
26	\$15.7	\$0.0	\$15.7
27	\$15.6	\$0.0	\$15.6
28	\$15.5	\$0.0	\$15.5
29	\$15.3	\$0.0	\$15.3
30	\$15.1	\$0.0	\$15.1
31	\$14.9	\$0.0	\$14.9
32	\$14.6	\$0.0	\$14.6
33	\$14.3	\$0.0	\$14.3
34	\$13.9	\$0.0	\$13.9
35	\$13.5	\$0.0	\$13.5
36	\$13.1	\$0.0	\$13.1
37	\$12.6	\$0.0	\$12.6
38	\$12.2	\$0.0	\$12.2
39	\$11.7	\$0.0	\$11.7
40	\$11.2	\$0.0	\$11.2
41	\$8.1	\$0.0	\$8.1
42	\$2.6	\$0.0	\$2.6
Present value	\$489.6	\$203.2	\$286.4

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
5.9%	2.4	16.5

Source: Emsi impact model.





Social perspective

California benefits from the education that RCCD provides through the earnings that students create in the state and through the savings that they generate through their improved lifestyles. To receive these benefits, however, members of society must pay money and forego services that they otherwise would have enjoyed if RCCD did not exist. Society's investment in RCCD stretches across a number of investor groups, from students to employers to taxpayers. We weigh the benefits generated by RCCD to these investor groups against the total social costs of generating those benefits. The total social costs include all RCCD expenditures, all student expenditures (including interest on student loans) less tuition and fees, and all student opportunity costs, totaling a present value of \$424.6 million.

On the benefits side, any benefits that accrue to California as a whole – including students, employers, taxpayers, and anyone else who stands to benefit from the activities of RCCD – are counted as benefits under the social perspective. We group these benefits under the following broad headings: 1) increased earnings in the state, and 2) social externalities stemming from improved health, reduced crime, and reduced unemployment in the state (see the Beekeeper Analogy box for a discussion of externalities). Both of these benefits components are described more fully in the following sections.

Growth in state economic base

In the process of absorbing the newly-acquired skills of students who attend the colleges, not only does the productivity of the California workforce increase, but so does the productivity of its physical capital and assorted infrastructure. Students earn more because of the skills they learned while attending the colleges, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce.

Estimating the effect of RCCD on the state's economic base follows the same process used when calculating increased tax revenues in the taxpayer perspective. However, instead of looking at just the tax revenue portion, we include all of the added earnings and business output. We again factor in student attrition and alternative education opportunities. The shutdown point does not apply to the growth of the economic base because the social perspective captures not only the state and local taxpayer support to the colleges, but also the support from the students and other non-governmental sources.



SOCIAL COSTS



RCCD Expenditures



Student Out-of-Pocket Expenses



Student Opportunity Costs

SOCIAL BENEFITS



Increased State Earnings



Avoided Costs to Society



After adjusting for attrition and alternative education opportunities, we calculate the present value of the future added income that occurs in the state, equal to \$6.2 billion. Recall from the discussion of the student and taxpayer return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. As stated in the taxpayer perspective, given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%.

Social savings

Similar to the government savings discussed above, society as a whole sees savings due to external or incidental benefits of education. These represent the avoided costs that otherwise would have been drawn from private and public resources absent the education provided by the colleges. Social benefits appear in Table 4.5 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. These are similar to the categories from the taxpayer perspective above, although health savings now also include lost productivity and other effects associated with smoking, alcohol dependence, obesity, depression, and drug abuse. In addition to avoided costs to the justice system, crime savings also consist of avoided victim costs and benefits stemming from the added productivity of individuals who otherwise would have been incarcerated. Income assistance savings are comprised of the avoided government costs due to the reduced number of welfare and unemployment insurance claims.

Table 4.5 displays the results of the analysis. The first row shows the increased economic base in the state, equal to \$6.2 billion, from students' higher earnings and their multiplier effects, increases in non-labor income, and spending impacts. Social savings appear next, beginning with a breakdown of savings related to health. These include savings due to a reduced demand for medical treatment and social services, improved worker productivity and reduced absenteeism, and a reduced number of vehicle crashes and fires induced by alcohol or smoking-related incidents. Although the prevalence of these health conditions generally declines as individuals attain higher levels of education, prevalence rates are sometimes higher for individuals with certain levels of education. For example, adults with college degrees may be more likely to spend more on alcohol and become dependent on alcohol. Thus, in some cases the social savings associated with a health factor can be negative. Nevertheless, the overall health savings for society are positive, amounting to \$19.6 million. Crime savings amount to \$21.1 million, including savings associated with a reduced number of crime victims, added worker productivity, and reduced expenditures for police and law enforcement, courts and administration of jus-



Beekeeper Analogy

Beekeepers provide a classic example of positive externalities (sometimes called “neighborhood effects”). The beekeeper’s intention is to make money selling honey. Like any other business, receipts must at least cover operating costs. If they don’t, the business shuts down.

But from society’s standpoint there is more. Flowers provide the nectar that bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognized that society might actually do well to subsidize activities that produce positive externalities, such as beekeeping.

Educational institutions are like beekeepers. While their principal aim is to provide education and raise people’s earnings, in the process an array of external benefits is created. Students’ health and lifestyles are improved, and society indirectly benefits just as orchard owners indirectly benefit from beekeepers. Aiming at a more complete accounting of the benefits generated by education, the model tracks and accounts for many of these external social benefits.



tice, and corrective services. Finally, the present value of the savings related to income assistance amount to \$43.6 million, stemming from a reduced number of persons in need of welfare or unemployment benefits. All told, social savings amounted to \$84.3 million in benefits to communities and citizens in California.

TABLE 4.5: PRESENT VALUE OF THE FUTURE INCREASED ECONOMIC BASE AND SOCIAL SAVINGS IN THE STATE (THOUSANDS)

Increased economic base	\$6,180,169
Social Savings	
Health	
Smoking	\$40,324
Alcohol dependence	-\$21,141
Obesity	\$17,028
Depression	-\$15,720
Drug abuse	-\$904
Total health savings*	\$19,585
Crime	
Criminal justice system savings	\$19,875
Crime victim savings	\$242
Added productivity	\$990
Total crime savings	\$21,107
Income assistance	
Welfare savings	\$35,420
Unemployment savings	\$8,196
Total income assistance savings	\$43,616
Total social savings	\$84,308
Total, increased economic base + social savings	\$6,264,478

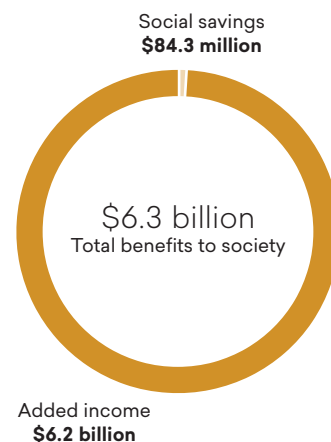
* In some cases, health savings may be negative. This is due to increased prevalence rates at certain education levels. Source: Emsi impact model.

The sum of the social savings and the increased state economic base is \$6.3 billion, as shown in the bottom row of Table 4.5 and in Figure 4.3. These savings accrue in the future as long as the FY 2016-17 student population of RCCD remains in the workforce.

Return on investment to society

Table 4.6 presents the stream of benefits accruing to the California society and the total social costs of generating those benefits. Comparing the present value of the benefits and the social costs, we have a benefit-cost ratio of 14.8. This means that for every dollar invested in an education from RCCD, whether it is the money spent on operations of the colleges or money spent

FIGURE 4.3: PRESENT VALUE OF BENEFITS TO SOCIETY



Source: Emsi impact model.



TABLE 4.6: PROJECTED BENEFITS AND COSTS, SOCIAL PERSPECTIVE

1	2	3	4
Year	Benefits to society (millions)	Social costs (millions)	Net cash flow (millions)
0	\$599.4	\$420.4	\$179.0
1	\$8.3	\$0.3	\$8.0
2	\$19.7	\$0.3	\$19.4
3	\$42.5	\$0.3	\$42.2
4	\$79.1	\$0.3	\$78.8
5	\$128.9	\$0.3	\$128.6
6	\$134.3	\$0.3	\$134.0
7	\$139.6	\$0.3	\$139.3
8	\$144.9	\$0.3	\$144.6
9	\$150.0	\$0.3	\$149.7
10	\$155.0	\$0.3	\$154.7
11	\$159.8	\$0.3	\$159.5
12	\$164.4	\$0.3	\$164.1
13	\$168.8	\$0.3	\$168.5
14	\$172.9	\$0.3	\$172.6
15	\$176.8	\$0.3	\$176.5
16	\$180.3	\$0.0	\$180.3
17	\$183.5	\$0.0	\$183.5
18	\$186.3	\$0.0	\$186.3
19	\$188.8	\$0.0	\$188.8
20	\$190.8	\$0.0	\$190.8
21	\$192.5	\$0.0	\$192.5
22	\$193.7	\$0.0	\$193.7
23	\$194.4	\$0.0	\$194.4
24	\$194.7	\$0.0	\$194.7
25	\$194.6	\$0.0	\$194.6
26	\$193.9	\$0.0	\$193.9
27	\$192.8	\$0.0	\$192.8
28	\$191.2	\$0.0	\$191.2
29	\$189.2	\$0.0	\$189.2
30	\$186.8	\$0.0	\$186.8
31	\$183.8	\$0.0	\$183.8
32	\$180.5	\$0.0	\$180.5
33	\$176.8	\$0.0	\$176.8
34	\$172.6	\$0.0	\$172.6
35	\$168.1	\$0.0	\$168.1
36	\$163.2	\$0.0	\$163.2
37	\$158.0	\$0.0	\$158.0
38	\$152.5	\$0.0	\$152.5
39	\$146.7	\$0.0	\$146.7
40	\$140.7	\$0.0	\$140.7
41	\$102.4	\$0.0	\$102.4
42	\$34.1	\$0.0	\$34.1
Present value	\$6,264.5	\$424.6	\$5,839.9

Benefit-cost ratio

14.8

Numbers reflect aggregate values for all colleges and are subject to fluctuations due to the colleges' varying time horizons. Source: Emsi impact model.



by students on tuition and fees, an average of \$14.80 in benefits will accrue to society in California.⁴⁰

With and without social savings

Earlier in this chapter, social benefits attributable to education (improved health, reduced crime, and reduced demand for income assistance) were defined as externalities that are incidental to the operations of RCCD. Some would question the legitimacy of including these benefits in the calculation of rates of return to education, arguing that only the tangible benefits (higher earnings) should be counted. Table 4.4 and Table 4.6 are inclusive of social benefits reported as attributable to RCCD. Recognizing the other point of view, Table 4.7 shows rates of return for both the taxpayer and social perspectives exclusive of social benefits. As indicated, returns are still above threshold values (a benefit-cost ratio greater than 1.0 and a rate of return greater than 0.6%), confirming that taxpayers receive value from investing in RCCD.

TABLE 4.7: TAXPAYER AND SOCIAL PERSPECTIVES WITH AND WITHOUT SOCIAL SAVINGS

	Including social savings	Excluding social savings
Taxpayer perspective		
Net present value (millions)	\$286.4	\$221.3
Benefit-cost ratio	2.4	2.1
Internal rate of return	5.9%	4.9%
Payback period (no. of years)	16.5	19.7
Social perspective		
Net present value (millions)	\$5,839.9	\$5,755.6
Benefit-cost ratio	14.8	14.6

Source: Emsi impact model.

40 The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.



CHAPTER 5:
Conclusion



WHILE RCCD's value to the RCCD Service Area is larger than simply its economic impact, understanding the dollars and cents value is an important asset to understanding the colleges' value as a whole. In order to fully assess RCCD's value to the regional economy, this report has evaluated the colleges from the perspectives of economic impact analysis and investment analysis.

From an economic impact perspective, we calculated that RCCD generates a total economic impact of **\$873.5 million** in total added income for the regional economy. This represents the sum of several different impacts, including the colleges':

- Operations spending impact (**\$201.3 million**);
- Student spending impact (**\$70.2 million**); and
- Alumni impact (**\$602 million**).

The total impact of \$873.5 million is equivalent to approximately **1.3%** of the total GRP of the RCCD Service Area and is equivalent to supporting **12,898** jobs. For perspective, this means that one out of every **61** jobs in the RCCD Service Area is supported by the activities of the colleges and their students.

Since RCCD's activity represents an investment by various parties, including students, taxpayers, and society as a whole, we also considered the colleges as an investment to see the value they provide to these investors. For each dollar invested by students, taxpayers, and society, RCCD offers a benefit of **\$6.80**, **\$2.40**, and **\$14.80**, respectively. These results indicate that RCCD is an attractive investment to students with rates of return that exceed alternative investment opportunities. At the same time, the presence of the colleges expands the state economy and creates a wide range of positive social benefits that accrue to taxpayers and society in general within California.

Modeling the impact of the colleges is subject to many factors, the variability of which we considered in our sensitivity analysis (Appendix 2). With this variability accounted for, we present the findings of this study as a robust picture of the economic value of RCCD.



One out of every 61 jobs in the RCCD Service Area is supported by the activities of RCCD and its students.



Resources and References

Administration for Children and Families. "Fiscal Year 2016 TANF Financial Data." *Office of Family Assistance, TANF Financial Data*. 2018. <https://www.acf.hhs.gov/ofa/resource/tanf-financial-data-fy-2016>.

Arias, Elizabeth. "United States Life Tables, 2008." *National Vital Statistics Reports* 61, no. 3 (September 24, 2012). Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf.

Baryla, Edward and Douglas Dotterweich. "Student Migration: Do Significant Factors Vary by Region?" *Education Economics* 9, no. 3 (2001).

Becker, Gary S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia College Press for NBER, 1964.

Bilkic, Natasa, Thomas Gries, and Margarethe Pilichowski. "Stay in School or Start Working? The Human Capital Investment Decision under Uncertainty and Irreversibility." *Labour Economics* 19, no. 5 (October 2012): 706-717.

Bureau of Economic Analysis. "Table 1.1.6. Real Gross Domestic Product, Chained Dollars." *GDP and Personal Income*. Last modified January 27, 2017. <http://www.bea.gov/iTable/iTableHtml.cfm?reqid=9&step=3&isuri=1&903=6>.

Bureau of Justice Statistics. "Table 2: Prisoners under the Jurisdiction of State or Federal Correctional Authorities, by Jurisdiction, December 31, 2015 and 2016." *Prisoners in 2016, NCJ 251149, 2018*. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Bureau of Labor Statistics. "Charts by Topic: Leisure and Sports Activities." *American Time Use Survey*. December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

Bureau of Labor Statistics. "Charts by Topic: Students." *American Time Use Survey*. December 2016. <https://www.bls.gov/TUS/CHARTS/STUDENTS.HTM>.

Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." *Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017*. <http://www.bls.gov/cps/cpsaat07.pdf>.

Bureau of Labor Statistics. "Table 24: Historical Consumer Price Index for all Urban Consumers (CPI-U): U.S. City Average, All Items." 2018. <https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-201801.pdf>.



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- Buss, Christian, Jeffrey Parker, and Jon Rivenburg. "Cost, Quality and Enrollment Demand at Liberal Arts Colleges." *Economics of Education Review* 23, no. 1 (February 2004): 57-65.
- Card, David. "The Causal Effect of Education on Earnings." *Handbook of Labor Economics* 3 (1999): 1801-1863.
- Card, David. "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems." *Econometrica* 69, no. 5 (September 2001): 1127-1160.
- Center on Budget and Policy Priorities. "Policy Basics - How Many Weeks of Unemployment are Available?" April 2018. <https://www.cbpp.org/sites/default/files/atoms/files/policybasics-uiweeks.pdf>.
- Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data* [Data set]. <https://www.cdc.gov/statesystem/cigaretteuseadult.html>.
- Centers for Disease Control and Prevention. "Heavy Drinkers (Adult Men Having More Than Two Drinks per Day and Adult Women Having More Than One Drink per Day)." *Alcohol Consumption - 2016 Behavioral Risk Factor Surveillance System Prevalence and Trends Data*. https://nccd.cdc.gov/BRFSSPrevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByTopic&irbLocationType=StatesAndMMSA&islClass=CLASS01&islTopic=TOPIC30&islYear=2016&islLocation=
- Centers for Disease Control and Prevention. "Table. Characteristics of Current Adult Cigarette Smokers." *National Health Interview Survey, United States, 2016*. https://www.cdc.gov/mmwr/volumes/67/wr/mm6702a1.htm#T1_down.
- Centers for Medicare and Medicaid Services. "Table 16: National Health Expenditures, Amounts and Average Annual Growth from Previous Year Shown, by Type of Sponsor, Selected Calendar Years 2009-2025." *NHE Projections 2015-2025 - Tables*. February 2016. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
- College Board. "Figure 1: Average Estimated Full-Time Undergraduate Budgets, 2018-19 (Enrollment-Weighted)." *The College Board, Annual Survey of Colleges, Average Estimated Undergraduate Budgets, 2018-19*. <https://trends.collegeboard.org/college-pricing/figures-tables/average-estimated-undergraduate-budgets-2018-19>.
- Congressional Budget Office. "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline." *Congressional Budget Office Publications CBO's April 2018 Baseline Projections for the Student Loan Program*. Last

modified April 2018. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.

Criminal Justice Expenditure and Employment Extracts Program. "Table 4. Justice System Expenditure by Character, State and Type of Government, Fiscal Year 2015" *Justice Expenditure and Employment Extracts 2015 (preliminary) NCJ 251780*. <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=286>.

Dickerson, Andy, and Steven McIntosh. "The Impact of Distance to Nearest Education Institution on the Post Compulsory Education Participation Decision." *Urban Studies* 50, no. 4 (2013): 742-758.

Dynarski, Susan M. "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *American Economic Review* 93, no. 1 (2003): 279-288.

Emsi Labor Market Data and Software. www.economicmodeling.com.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 1: Crime in the United States." Crime in the United States 2016, Offenses Known to Law Enforcement. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-1>.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 18: Estimated Number of Arrests, United States, 2016" in "Uniform Crime Reports." Crime in the United States, 2016, Persons Arrested. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-18>.

Finkelstein, Eric A., Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale. "The Costs of Obesity in the Workplace." *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" *Journal of Clinical Psychiatry* 76:2, 2015.

Guerino, Paul, Paige M. Harrison, and William J. Sabol. "Prisoners in 2016." *Bureau of Justice Statistics NCJ 236096*, January 2018. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Hamadeh, Mohamad and Roy Khoueiri. "Demand Elasticities for Higher Education in the United States." *International Journal of Business and Economic Perspectives* 5, no. 2 (2010): 60-67.

Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach*. New York: McGraw-Hill Book Company, 1971.

Hernández-Murillo, Rubén, Lesli S. Ott, Michael T. Owyang, and Denise Whalen. "Patterns of Interstate Migration in the United States from the Sur-

- vey of Income and Program Participation.” *Federal Reserve Bank of St. Louis Review* 93, no. 3 (May/June 2011): 169-186. <https://files.stlouisfed.org/files/htdocs/publications/review/11/05/169-186Hernandez.pdf>.
- Jaeger, David A. and Marianne E. Page. “New Evidence on Sheepskin Effects in the Returns to Education.” *The Review of Economics and Statistics* 78, no. 4 (November 1996): 733-740.
- Jamal Ahmed, Elyse Phillips, Andrea S. Gentzke, David M. Homa, Stephen D. Babb, Brian A. King, and Linda J. Neff. “Current Cigarette Smoking Among Adults – United States, 2016.” *Morbidity and Mortality Weekly Report* 2018 67:53-59. DOI: <http://dx.doi.org/10.15585/mmwr.mm6702a1>.
- Kaeding, Nicole. “State Individual Income Tax Rates and Brackets for 2016.” *Tax Foundation Fiscal Fact* no. 500 (February 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF500.pdf.
- Kelchtermans, Stijn and Frank Verboven. “Participation and Study Decisions in a Public System of Higher Education.” *Journal of Applied Econometrics* 25, no. 3 (2010): 355-391.
- Leigh, Andrew and Chris Ryan. “Estimating Returns to Education Using Different Natural Experiments Techniques.” *Economics of Education Review* 27 (2008): 149-160.
- Leonesio, Michael V. “The Economics of Retirement: A Nontechnical Guide.” *Social Security Bulletin* 59, no. 4 (Winter 1996): 29-50.
- McCollister, Kathryn E., Michael T. French, and Hai Fang. “The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.” *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835847>.
- Mincer, Jacob. “Investment in Human Capital and Personal Income Distribution.” *Journal of Political Economy* 66, no. 4 (August 1958): 281-302.
- Mincer, Jacob. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research, 1974.
- Morgan, James N. and Edward H. Robb. “The Impact of Age Upon Interregional Migration.” *The Annals of Regional Science* 15, no. 3 (November 1981): 31-45.
- National Center for Education Statistics. Integrated Post-secondary Education Data System (IPEDS). <http://nces.ed.gov/ipeds>.
- National Center for Education Statistics. “Table 219.60 Number of People Taking the GED Test and Percentage Distribution of Those who Passed, by Age Group: 1971 through 2013.” *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_219.60.asp?current=yes.

- National Center for Education Statistics. "Table 507.20 Participants in State-Administered Adult Basic Education, Secondary Education, and English as a Second Language Programs, by Type of Program and State or Jurisdiction: Selected Fiscal Years, 2000 through 2014." *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_507.20.asp?current=yes.
- National Center for Health Statistics. "Table 58. Normal Weight, Overweight, and Obesity Among Persons 20 Years of Age and Over, by Selected Characteristics: United States, Selected Years 1988-1994 through 2011-2014." *Centers for Disease Control and Prevention, Health, United States, 2015*. <https://www.cdc.gov/nchs/data/hus/2015/058.pdf>.
- National Employment Law Project. "Unemployment Insurance: An Overview of the Challenges and Strengths of Today's System". 2016. <https://waysandmeans.house.gov/wp-content/uploads/2016/09/20160907HR-Testimony-Conti.pdf>.
- National Survey on Drug Use and Health. "Table 19. Illicit Drug Use Disorder in the Past Year, by Age Group and State: Percentages, Annual Averages Based on 2015 and 2016 NSDUHs." *National Survey on Drug Use and Health: Model-Based Prevalence Estimates (50 States and the District of Columbia)*. <https://www.samhsa.gov/data/sites/default/files/NSDUHsaePercents2016/NSDUHsaePercents2016.pdf>
- National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016." <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf>.
- National Survey on Drug Use and Health. "Table 15: Major Depressive Episode in the Past Year, by age group and state: Percentages, annual averages, and P values from tests of differences between percentages, 2008-2009 and 2015-2016." <https://www.samhsa.gov/data/sites/default/files/NSDUHsae-ShortTermCHG2016/NSDUHsaeShortTermCHG2016.htm>.
- Nowotny, Kathryn, Ryan Masters, and Jason Boardman, 2016. "The relationship between education and health among incarcerated man and women in the United States" *BMC Public Health*. September 2016. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5009667/>.

- OECD. "Household Net Saving Rates: As a Percentage of Household Disposable Income." *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics* (2016). <http://dx.doi.org/10.1787/factbook-2015-19-en>.
- Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.
- Ogden, Cynthia L., Molly M. Lamb, Margaret D. Carroll, and Katherine M. Flegal. "Figure 3. Prevalence of Obesity among Adults Aged 20 Years and Over, by Education, Sex, and Race and Ethnicity: United States 2005-2008." *Obesity and Socioeconomic Status in Adults: United States 2005-2008*, National Center for Health Statistics no. 50. (2010).
- Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017). https://www.cdc.gov/mmwr/volumes/66/wr/mm6650a1.htm?s_cid=mm6650a1_w#suggestedcitation.
- Polachek, Solomon W. "Earnings Over the Lifecycle: The Mincer Earnings Function and its Applications." *Foundations and Trends in Microeconomics* 4, no. 3 (2008): 165-272.
- Polachek, Solomon W. "Mincer's Overtaking Point and the Lifecycle Earnings Distribution." *Review of the Economics of the Household* 1, no. 4 (December 2003): 273-304.
- Ramey, Valerie and Neville Francis. "A Century of Work and Leisure." *American Economic Journal: Macroeconomics* 1, no. 2 (2009): 189-224.
- Sacks, Gonzales, Bouchery, Tomedi, & Brewer (2015). 2010 National and State Costs of Excessive Alcohol Consumption. *American Journal of Preventive Medicine*, 49(5), E73-E79. [https://www.ajpmonline.org/article/S0749-3797\(15\)00354-2/pdf/](https://www.ajpmonline.org/article/S0749-3797(15)00354-2/pdf/).
- Sevilla, Almudena, Jose Ignacio Gimenez-Nadal, and Jonathan I. Gershuny. "Leisure Inequality in the United States: 1965-2003." IZA Discussion Paper no. 6708 (July 2012).
- Social Security Administration. "Retirement Benefits." *Full Retirement Age*. May 2016. <https://www.ssa.gov/pubs/EN-05-10035.pdf>.
- State of Obesity. "Adult Obesity in the United States." Adult Obesity Rate by State, 2016. <https://stateofobesity.org/adult-obesity/>.

- Substance Abuse and Mental Health Services Administration. “Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014.” *Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.* <https://store.samhsa.gov/shin/content/SMA16-4975/SMA16-4975.pdf>.
- Substance Abuse and Mental Health Services Administration. “Table 5.4B - Illicit Drug Use Disorder in Past Year among Persons Aged 12 or Older, by Age Group and Demographic Characteristics: Percentages, 2015 and 2016” SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-4B>.
- Substance Abuse and Mental Health Services Administration. “Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016.” SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-6A>.
- Supplemental Nutrition Assistance Program. “State Activity Report Fiscal Year 2016.” *Food and Nutrition Service, Supplemental Nutrition Assistance Program, Program Accountability and Administration Division* (September 2017). <https://fns-prod.azureedge.net/sites/default/files/snap/FY16-State-Activity-Report.pdf>.
- U.S. Census Bureau. “Annual Estimates of the Resident Population for Selected Age Groups by Sex: April 1, 2010 to July 1, 2015.” *National Population by Characteristics Tables: 2010-2015*. December 2016. <http://www.census.gov/data/tables/2015/demo/popest/nation-detail.html>.
- U.S. Census Bureau. “Educational Characteristics of Prisoners: Data from the ACS.” 2011. <https://www.census.gov/library/working-papers/2011/demo/SEHSD-WP2011-08.html>.
- U.S. Census Bureau. “Social Insurance and Human Services.” *The 2012 Statistical Abstract*. http://www.census.gov/compendia/statab/cats/social_insurance_human_services.html.
- U.S. Department of Agriculture, Office of Policy Support. Supplemental Nutrition Assistance Program Nutrition Assistance Program Report Series. “Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2016.” <https://fns-prod.azureedge.net/sites/default/files/ops/Characteristics2016.pdf>.

- U.S. Department of Education, Federal Student Aid Office. “The Standard Repayment Plan.” <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>
- U.S. Department of Health and Human Services. “2016 Welfare Indicators and Risk Factors: Fifteenth Report to Congress” Annual Report to Congress, 2016. <https://aspe.hhs.gov/system/files/pdf/206736/WelfareIndicators15thReport.pdf>.
- U.S. Department of Health and Human Services, Office of Family Assistance. “Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016.” <https://www.acf.hhs.gov/ofa/resource/characteristics-and-financial-circumstances-of-tanf-recipients-fiscal-year-2016-0>.
- U.S. Department of Health & Human Services. “The Health Consequences of Smoking—50 Years of Progress.” A Report of the Surgeon General, 2014. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/50-years-of-progress-by-section.html>.
- U.S. Department of Labor. “Unemployment Insurance Data Summary, 4th Quarter 2017.” https://workforcesecurity.doleta.gov/unemploy/content/data_stats/datasum17/DataSum_2017_4.pdf.
- Walczak, Jared, Scott Drenkard. “State and Local Sales Tax Rates, Midyear 2016.” *Tax Foundation Fiscal Fact* no. 515 (July 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF515.pdf.
- Walden, Michael, “The Local Economic Impact of the Cooperating Raleigh Colleges: Update 2013.” March 2014. <http://crcraleighcolleges.org/files/crcimpact2013-final.pdf>.

Appendix 1: Riverside Community College District

Institution	Establishment Year	Headcount in FY 2016-17
Moreno Valley College	1991, Accredited 2010	14,779
Norco College	1991, Accredited 2010	14,935
Riverside City College	1916	30,577

Appendix 2: Sensitivity Analysis

Sensitivity analysis measures the extent to which a model's outputs are affected by hypothetical changes in the background data and assumptions. This is especially important when those variables are inherently uncertain. This analysis allows us to identify a plausible range of potential results that would occur if the value of any of the variables is in fact different from what was expected. In this chapter we test the sensitivity of the model to the following input factors: 1) the alternative education variable, 2) the labor import effect variable, 3) the student employment variables, 4) the discount rate, and 5) the retained student variable.

Alternative education variable

The alternative education variable (15%) accounts for the counterfactual scenario where students would have to seek a similar education elsewhere absent the publicly-funded colleges in the region. Given the difficulty in accurately specifying the alternative education variable, we test the sensitivity of the taxpayer and social investment analysis results to its magnitude. Variations in the alternative education assumption are calculated around base case results listed in the middle column of Table A2.1. Next, the model brackets the base case assumption on either side with a plus or minus 10%, 25%, and 50% variation in assumptions. Analyses are then repeated introducing one change at a time, holding all other variables constant. For example, an increase of 10% in the alternative education assumption (from 15% to 17%) reduces the taxpayer perspective rate of return from 5.9% to 5.8%. Likewise, a decrease of 10% (from 15% to 14%) in the assumption increases the rate of return from 5.9% to 6.0%.

TABLE A2.1 SENSITIVITY ANALYSIS OF ALTERNATIVE EDUCATION VARIABLE, TAXPAYER AND SOCIAL PERSPECTIVES

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Alternative education variable	8%	11%	14%	15%	17%	19%	23%
Taxpayer perspective							
Net present value (millions)	\$330	\$308	\$295	\$286	\$278	\$265	\$243
Rate of return	6.6%	6.2%	6.0%	5.9%	5.8%	5.6%	5.2%
Benefit-cost ratio	2.6	2.5	2.5	2.4	2.4	2.3	2.2
Social perspective							
Net present value (millions)	\$6,358	\$6,083	\$5,918	\$5,840	\$5,698	\$5,533	\$5,258
Benefit-cost ratio	16.0	15.3	14.9	14.8	14.4	14.0	13.4

Based on this sensitivity analysis, the conclusion can be drawn that RCCD investment analysis results from the taxpayer and social perspectives are not very sensitive to relatively large variations in the alternative education variable. As indicated, results are still above their threshold levels (net present value greater than 0, benefit-cost ratio greater than 1, and rate of return greater than the discount rate of 0.6%), even when the alternative education assumption is increased by as much as 50% (from 15% to 23%). The conclusion is that although the assumption is difficult to specify, its impact on overall investment analysis results for the taxpayer and social perspectives is not very sensitive.

Labor import effect variable

The labor import effect variable only affects the alumni impact calculation in Table 3.6. In the model we assume a labor import effect variable of 50%, which means that 50% of the region’s labor demands would have been satisfied without the presence of RCCD. In other words, businesses that hired the colleges’ students could have substituted some of these workers with equally-qualified people from outside the region had there been no RCCD students to hire. Therefore, we attribute only the remaining 50% of the initial labor income generated by increased alumni productivity to the colleges.

Table A2.2 presents the results of the sensitivity analysis for the labor import effect variable. As explained earlier, the assumption increases and decreases relative to the base case of 50% by the increments indicated in the table. Alumni productivity impacts attributable to RCCD, for example, range from a high of \$902.9 million at a -50% variation to a low of \$301 million at a +50% variation from the base case assumption. This means that if the labor import effect variable increases, the impact that we claim as attributable to alumni decreases. Even under the most conservative assumptions, the alumni impact on the RCCD Service Area economy still remains sizeable.

TABLE A2.2: SENSITIVITY ANALYSIS OF LABOR IMPORT EFFECT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Labor import effect variable	25%	38%	45%	50%	55%	63%	75%
Alumni impact (millions)	\$903	\$752	\$662	\$602	\$542	\$451	\$301

Student employment variables

Student employment variables are difficult to estimate because many students do not report their employment status or because colleges generally do not collect this kind of information. Employment variables include the following: 1) the percentage of students who are employed while attending the colleges and 2) the percentage of earnings that working students receive relative to

the earnings they would have received had they not chosen to attend the colleges. Both employment variables affect the investment analysis results from the student perspective.

Students incur substantial expense by attending the colleges because of the time they spend not gainfully employed. Some of that cost is recaptured if students remain partially (or fully) employed while attending. It is estimated that 75% of students are employed.⁴¹ This variable is tested in the sensitivity analysis by changing it first to 100% and then to 0%.

The second student employment variable is more difficult to estimate. In this study we estimate that students who are working while attending the colleges earn only 69%, on average, of the earnings that they statistically would have received if not attending the colleges. This suggests that many students hold part-time jobs that accommodate their attendance at the colleges, though it is at an additional cost in terms of receiving a wage that is less than what they otherwise might make. The 69% variable is an estimation based on the average hourly wages of the most common jobs held by students while attending college relative to the average hourly wages of all occupations in the U.S. The model captures this difference in wages and counts it as part of the opportunity cost of time. As above, the 69% estimate is tested in the sensitivity analysis by changing it to 100% and then to 0%.

The changes generate results summarized in Table A2.3, with A defined as the percent of students employed and B defined as the percent that students earn relative to their full earning potential. Base case results appear in the shaded row; here the assumptions remain unchanged, with A equal to 75% and B equal to 69%. Sensitivity analysis results are shown in non-shaded rows. Scenario 1 increases A to 100% while holding B constant, Scenario 2 increases B to 100% while holding A constant, Scenario 3 increases both A and B to 100%, and Scenario 4 decreases both A and B to 0%.

TABLE A2.3: SENSITIVITY ANALYSIS OF STUDENT EMPLOYMENT VARIABLES

Variations in assumptions	Net present value (millions)	Internal rate of return	Benefit-cost ratio
Base case: A = 75%, B = 69%	\$865.1	21.4%	6.8
Scenario 1: A = 100%, B = 69%	\$907.0	26.4%	9.5
Scenario 2: A = 75%, B = 100%	\$928.8	30.5%	11.9
Scenario 3: A = 100%, B = 100%	\$991.9	70.7%	45.8
Scenario 4: A = 0%, B = 0%	\$739.4	14.2%	3.7

Note: A = percent of students employed; B = percent earned relative to statistical averages

⁴¹ Emsi provided estimates of the percentage of students employed for colleges that were unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

- **Scenario 1:** Increasing the percentage of students employed (A) from 75% to 100%, the net present value, internal rate of return, and benefit-cost ratio improve to \$907 million, 26.4%, and 9.5, respectively, relative to base case results. Improved results are attributable to a lower opportunity cost of time; all students are employed in this case.
- **Scenario 2:** Increasing earnings relative to statistical averages (B) from 69% to 100%, the net present value, internal rate of return, and benefit-cost ratio results improve to \$928.8 million, 30.5%, and 11.9, respectively, relative to base case results; a strong improvement, again attributable to a lower opportunity cost of time.
- **Scenario 3:** Increasing both assumptions A and B to 100% simultaneously, the net present value, internal rate of return, and benefit-cost ratio improve yet further to \$991.9 million, 70.7%, and 45.8, respectively, relative to base case results. This scenario assumes that all students are fully employed and earning full salaries (equal to statistical averages) while attending classes.
- **Scenario 4:** Finally, decreasing both A and B to 0% reduces the net present value, internal rate of return, and benefit-cost ratio to \$739.4 million, 14.2%, and 3.7, respectively, relative to base case results. These results are reflective of an increased opportunity cost; none of the students are employed in this case.⁴²

It is strongly emphasized in this section that base case results are very attractive in that results are all above their threshold levels. As is clearly demonstrated here, results of the first three alternative scenarios appear much more attractive, although they overstate benefits. Results presented in Chapter 3 are realistic, indicating that investments in RCCD generate excellent returns, well above the long-term average percent rates of return in stock and bond markets.

Discount rate

The discount rate is a rate of interest that converts future monies to their present value. In investment analysis, the discount rate accounts for two fundamental principles: 1) the time value of money, and 2) the level of risk that an investor is willing to accept. Time value of money refers to the value of money after interest or inflation has accrued over a given length of time. An investor must be willing to forego the use of money in the present to receive compensation for it in the future. The discount rate also addresses the investors' risk preferences by serving as a proxy for the minimum rate of return that the proposed risky asset must be expected to yield before the investors will be persuaded to invest in it. Typically, this minimum rate of return is determined by the known

⁴² Note that reducing the percent of students employed to 0% automatically negates the percent they earn relative to full earning potential, since none of the students receive any earnings in this case.

returns of less risky assets where the investors might alternatively consider placing their money.

In this study, we assume a 4.5% discount rate for students and a 0.6% discount rate for society and taxpayers.⁴³ Similar to the sensitivity analysis of the alternative education variable, we vary the base case discount rates for students, taxpayers, and society on either side by increasing the discount rate by 10%, 25%, and 50%, and then reducing it by 10%, 25%, and 50%. Note that, because the rate of return and the payback period are both based on the undiscounted cash flows, they are unaffected by changes in the discount rate. As such, only variations in the net present value and the benefit-cost ratio are shown for students, taxpayers, and society in Table A2.4.

TABLE A2.4: SENSITIVITY ANALYSIS OF DISCOUNT RATE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Student perspective							
Discount rate	2.2%	3.3%	4.0%	4.5%	4.9%	5.6%	6.7%
Net present value (millions)	\$1,398	\$1,095	\$949	\$865	\$789	\$689	\$668
Benefit-cost ratio	10.4	8.3	7.4	6.8	6.3	5.6	5.5
Taxpayer perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$318	\$302	\$292	\$286	\$280	\$272	\$258
Benefit-cost ratio	2.6	2.5	2.4	2.4	2.4	2.3	2.3
Social perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$6,229	\$6,030	\$5,915	\$5,840	\$5,766	\$5,657	\$5,482
Benefit-cost ratio	15.7	15.2	14.9	14.8	14.6	14.3	13.9

As demonstrated in the table, an increase in the discount rate leads to a corresponding decrease in the expected returns, and vice versa. For example, increasing the student discount rate by 50% (from 4.5% to 6.7%) reduces the students' benefit-cost ratio from 6.8 to 5.5. Conversely, reducing the discount rate for students by 50% (from 4.5% to 2.2%) increases the benefit-cost ratio from 6.8 to 10.4. The sensitivity analysis results for society and taxpayers show the same inverse relationship between the discount rate and the benefit-cost ratio, with the variance in results being the greatest under the social perspective (from a 15.7 benefit-cost ratio at a -50% variation from the base case, to a 13.9 benefit-cost ratio at a 50% variation from the base case).

43 These values are based on the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office and the real treasury interest rates recommended by the Office of Management and Budget for 30-year investments. See the Congressional Budget Office "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline" and the Office of Management and Budget "Discount Rates for Cost-Effectiveness of Federal Programs."

Retained student variable

The retained student variable only affects the student spending impact calculation in Table 3.4. For this analysis, we assume a retained student variable of 10%, which means that 10% of the colleges' students who originated from the RCCD Service Area would have left the region for other opportunities, whether that be education or employment, if RCCD did not exist. The money these retained students spent in the region for accommodation and other personal and household expenses is attributable to RCCD.

Table A2.5 presents the results of the sensitivity analysis for the retained student variable. The assumption increases and decreases relative to the base case of 10% by the increments indicated in the table. The student spending impact is recalculated at each value of the assumption, holding all else constant. Student spending impacts attributable to RCCD range from a high of \$105.4 million when the retained student variable is 15% to a low of \$35.1 million when the retained student variable is 5%. This means as the retained student variable decreases, the student spending attributable to RCCD decreases. Even under the most conservative assumptions, the student spending impact on the RCCD Service Area economy remains substantial.

TABLE A2.5: SENSITIVITY ANALYSIS OF RETAINED STUDENT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Retained student variable	5%	8%	9%	10%	11%	13%	15%
Student spending impact (thousands)	\$35,121	\$52,682	\$63,218	\$70,243	\$77,267	\$87,803	\$105,364

Appendix 3: Glossary of Terms

Alternative education A “with” and “without” measure of the percent of students who would still be able to avail themselves of education if the colleges under analysis did not exist. An estimate of 10%, for example, means that 10% of students do not depend directly on the existence of the colleges in order to obtain their education.

Alternative use of funds A measure of how monies that are currently used to fund the colleges might otherwise have been used if the colleges did not exist.

Asset value Capitalized value of a stream of future returns. Asset value measures what someone would have to pay today for an instrument that provides the same stream of future revenues.

Attrition rate Rate at which students leave the workforce due to out-migration, unemployment, retirement, or death.

Benefit-cost ratio Present value of benefits divided by present value of costs. If the benefit-cost ratio is greater than 1, then benefits exceed costs, and the investment is feasible.

Credit hour equivalent Credit hour equivalent, or CHE, is defined as 15 contact hours of education if on a semester system, and 10 contact hours if on a quarter system. In general, it requires 450 contact hours to complete one full-time equivalent, or FTE.

Demand Relationship between the market price of education and the volume of education demanded (expressed in terms of enrollment). The law of the downward-sloping demand curve is related to the fact that enrollment increases only if the price (tuition and fees) is lowered, or conversely, enrollment decreases if price increases.

Discounting Expressing future revenues and costs in present value terms.

Earnings (labor income) Income that is received as a result of labor; i.e., wages.

Economics Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Elasticity of demand Degree of responsiveness of the quantity of education demanded (enrollment) to changes in market prices (tuition and fees). If a

decrease in fees increases or decreases total enrollment by a significant amount, demand is elastic. If enrollment remains the same or changes only slightly, demand is inelastic.

Externalities Impacts (positive and negative) for which there is no compensation. Positive externalities of education include improved social behaviors such as improved health, lower crime, and reduced demand for income assistance. Educational institutions do not receive compensation for these benefits, but benefits still occur because education is statistically proven to lead to improved social behaviors.

Gross regional product Measure of the final value of all goods and services produced in a region after netting out the cost of goods used in production. Alternatively, gross regional product (GRP) equals the combined incomes of all factors of production; i.e., labor, land and capital. These include wages, salaries, proprietors' incomes, profits, rents, and other. Gross regional product is also sometimes called value added or added income.

Initial effect Income generated by the initial injection of monies into the economy through the payroll of the colleges and the higher earnings of their students.

Input-output analysis Relationship between a given set of demands for final goods and services and the implied amounts of manufactured inputs, raw materials, and labor that this requires. When educational institutions pay wages and salaries and spend money for supplies in the region, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods and services and jobs. Moreover, as students enter or rejoin the workforce with higher skills, they earn higher salaries and wages. In turn, this generates more consumption and spending in other sectors of the economy.

Internal rate of return Rate of interest that, when used to discount cash flows associated with investing in education, reduces its net present value to zero (i.e., where the present value of revenues accruing from the investment are just equal to the present value of costs incurred). This, in effect, is the breakeven rate of return on investment since it shows the highest rate of interest at which the investment makes neither a profit nor a loss.

Multiplier effect Additional income created in the economy as the colleges and their students spend money in the region. It consists of the income created by the supply chain of the industries initially affected by the spending of the colleges and their students (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

Net cash flow Benefits minus costs, i.e., the sum of revenues accruing from an investment minus costs incurred.

Net present value Net cash flow discounted to the present. All future cash flows are collapsed into one number, which, if positive, indicates feasibility. The result is expressed as a monetary measure.

Non-labor income Income received from investments, such as rent, interest, and dividends.

Opportunity cost Benefits foregone from alternative B once a decision is made to allocate resources to alternative A. Or, if individuals choose to attend college, they forego earnings that they would have received had they chose instead to work full-time. Foregone earnings, therefore, are the “price tag” of choosing to attend college.

Payback period Length of time required to recover an investment. The shorter the period, the more attractive the investment. The formula for computing payback period is:

$$\text{Payback period} = \text{cost of investment} / \text{net return per period}$$

Appendix 4: Frequently Asked Questions (FAQs)

This appendix provides answers to some frequently asked questions about the results.

What is economic impact analysis?

Economic impact analysis quantifies the impact from a given economic event – in this case, the presence of the colleges – on the economy of a specified region.

What is investment analysis?

Investment analysis is a standard method for determining whether or not an existing or proposed investment is economically viable. This methodology is appropriate in situations where a stakeholder puts up a certain amount of money with the expectation of receiving benefits in return, where the benefits that the stakeholder receives are distributed over time, and where a discount rate must be applied in order to account for the time value of money.

Do the results differ by region, and if so, why?

Yes. Regional economic data are drawn from Emsi's proprietary MR-SAM model, the Census Bureau, and other sources to reflect the specific earnings levels, jobs numbers, unemployment rates, population demographics, and other key characteristics of the region served by the colleges. Therefore, model results for the colleges are specific to the given region.

Are the funds transferred to the colleges increasing in value, or simply being re-directed?

Emsi's approach is not a simple "rearranging of the furniture" where the impact of operations spending is essentially a restatement of the level of funding received by the colleges. Rather, it is an impact assessment of the additional income created in the region as a result of the colleges' spending on payroll and other non-pay expenditures, net of any impacts that would have occurred anyway if the colleges did not exist.

How does my district's rates of return compare to that of other districts?

In general, Emsi discourages comparisons between systems or institutions since many factors, such as regional economic conditions, institutional differences, and student demographics are outside of the colleges' control. It is best to compare the rate of return to the discount rates of 4.5% (for students) and 0.6% (for society and taxpayers), which can also be seen as the opportunity cost of the investment (since these stakeholder groups could be spending their time and money in other investment schemes besides education). If the rate of return is higher than the discount rate, the stakeholder groups can expect to receive a positive return on their educational investment.

Emsi recognizes that some institutions may want to make comparisons. As a word of caution, if comparing to an institution that had a study commissioned by a firm other than Emsi, then differences in methodology will create an "apples to oranges" comparison and will therefore be difficult. The study results should be seen as unique to each institution.

Emsi conducted an economic impact study for my district a few years ago. Why have results changed?

Emsi is a leading provider of economic impact studies and labor market data to educational institutions, workforce planners, and regional developers in the U.S. and internationally. Since 2000, Emsi has completed over 1,800 economic impact studies for educational institutions in four countries. Along the way we have worked to continuously update and improve our methodologies to ensure that they conform to best practices and stay relevant in today's economy. The present study reflects the latest version of our model, representing the most up-to-date theory, practices, and data for conducting economic impact and investment analyses. Many of our former assumptions have been replaced with observed data, and we have researched the latest sources in order to update the background data used in our model. Additionally, changes in the data the colleges provide to Emsi can influence the results of the study.

Net Present Value (NPV): How do I communicate this in laymen's terms?

Which would you rather have: a dollar right now or a dollar 30 years from now? That most people will choose a dollar now is the crux of net present value. The preference for a dollar today means today's dollar is therefore worth more than it would be in the future (in most people's opinion). Because the dollar today is worth more than a dollar in 30 years, the dollar 30 years from now needs to be adjusted to express its worth today. Adjusting the values for this "time value of money" is called discounting and the result of adding them all up after discounting each value is called net present value.

Internal Rate of Return (IRR): How do I communicate this in laymen's terms?

Using the bank as an example, an individual needs to decide between spending all of their paycheck today and putting it into savings. If they spend it today, they know what it is worth: \$1 = \$1. If they put it into savings, they need to know that there will be some sort of return to them for spending those dollars in the future rather than now. This is why banks offer interest rates and deposit interest earnings. This makes it so an individual can expect, for example, a 3% return in the future for money that they put into savings now.

Total Economic Impact: How do I communicate this in laymen's terms?

Big numbers are great, but putting them into perspective can be a challenge. To add perspective, find an industry with roughly the same "% of GRP" as your district (Table 1.3). This percentage represents its portion of the total gross regional product in the region (similar to the nationally recognized gross domestic product but at a regional level). This allows the district to say that the colleges' brick and mortar campuses do just as much for the RCCD Service Area as the entire Utilities *industry*, for example. This powerful statement can help put the large total impact number into perspective.

Appendix 5: Example of Sales versus Income

Emsi's economic impact study differs from many other studies because we prefer to report the impacts in terms of income rather than sales (or output). Income is synonymous with value added or gross regional product (GRP). Sales include all the intermediary costs associated with producing goods and services. Income is a net measure that excludes these intermediary costs:

$$\text{Income} = \text{Sales} - \text{Intermediary Costs}$$

For this reason, income is a more meaningful measure of new economic activity than reporting sales. This is evidenced by the use of gross domestic product (GDP) – a measure of income – by economists when considering the economic growth or size of a country. The difference is GRP reflects a region and GDP a country.

To demonstrate the difference between income and sales, let us consider an example of a baker's production of a loaf of bread. The baker buys the ingredients such as eggs, flour, and yeast for \$2.00. He uses capital such as a mixer to combine the ingredients and an oven to bake the bread and convert it into a final product. Overhead costs for these steps are \$1.00. Total intermediary costs are \$3.00. The baker then sells the loaf of bread for \$5.00.

The sales amount of the loaf of bread is \$5.00. The income from the loaf of bread is equal to the sales amount less the intermediary costs:

$$\text{Income} = \$5.00 - \$3.00 = \$2.00$$

In our analysis, we provide context behind the income figures by also reporting the associated number of jobs. The impacts are also reported in sales and earnings terms for reference.

Appendix 6: Emsi MR-SAM

Emsi's MR-SAM represents the flow of all economic transactions in a given region. It replaces Emsi's previous input-output (IO) model, which operated with some 1,000 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (*i.e.*, multipliers) in the regional economy as a result of industries entering or exiting the region. The MR-SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,000 industries, government, household and investment sectors embedded in the old IO tool, the MR-SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

This appendix presents a high-level overview of the MR-SAM. Additional documentation on the technical aspects of the model is available upon request.

Data sources for the model

The Emsi MR-SAM model relies on a number of internal and external data sources, mostly compiled by the federal government. What follows is a listing and short explanation of our sources. The use of these data will be covered in more detail later in this appendix.

Emsi Data are produced from many data sources to produce detailed industry, occupation, and demographic jobs and earnings data at the local level. This information (especially sales-to-jobs ratios derived from jobs and earnings-to-sales ratios) is used to help regionalize the national matrices as well as to disaggregate them into more detailed industries than are normally available.

BEA Make and Use Tables (MUT) are the basis for input-output models in the U.S. The *make* table is a matrix that describes the amount of each commodity made by each industry in a given year. Industries are placed in the rows and commodities in the columns. The *use* table is a matrix that describes the amount of each commodity used by each industry in a given year. In the use table, commodities are placed in the rows and industries in the columns. The BEA produces two different sets of MUTs, the benchmark and the summary. The benchmark set contains about 500 sectors and is released every five years, with a five-year lag time (e.g., 2002 benchmark MUTs were released in 2007). The summary set contains about 80 sectors and is released every year, with a two-year lag (e.g., 2010 summary MUTs were released in late 2011/early 2012).

The MUTs are used in the Emsi MR-SAM model to produce an industry-by-industry matrix describing all industry purchases from all industries.

BEA Gross Domestic Product by State (GSP) describes gross domestic product from the value added (also known as added income) perspective. Value added is equal to employee compensation, gross operating surplus, and taxes on production and imports, less subsidies. Each of these components is reported for each state and an aggregate group of industries. This dataset is updated once per year, with a one-year lag. The Emsi MR-SAM model makes use of this data as a control and pegs certain pieces of the model to values from this dataset.

BEA National Income and Product Accounts (NIPA) cover a wide variety of economic measures for the nation, including gross domestic product (GDP), sources of output, and distribution of income. This dataset is updated periodically throughout the year and can be between a month and several years old depending on the specific account. NIPA data are used in many of the Emsi MR-SAM processes as both controls and seeds.

BEA Local Area Income (LPI) encapsulates multiple tables with geographies down to the county level. The following two tables are specifically used: CA05 (Personal income and earnings by industry) and CA91 (Gross flow of earnings). CA91 is used when creating the commuting submodel and CA05 is used in several processes to help with place-of-work and place-of-residence differences, as well as to calculate personal income, transfers, dividends, interest, and rent.

Bureau of Labor Statistics Consumer Expenditure Survey (CEX) reports on the buying habits of consumers along with some information as to their income, consumer unit, and demographics. Emsi utilizes this data heavily in the creation of the national demographic by income type consumption on industries.

Census of Government's (CoG) state and local government finance dataset is used specifically to aid breaking out state and local data that is reported in the MUTs. This allows Emsi to have unique production functions for each of its state and local government sectors.

Census' OnTheMap (OTM) is a collection of three datasets for the census block level for multiple years. **Origin-Destination (OD)** offers job totals associated with both home census blocks and a work census block. **Residence Area Characteristics (RAC)** offers jobs totaled by home census block. **Workplace Area Characteristics (WAC)** offers jobs totaled by work census block. All three of these are used in the commuting submodel to gain better estimates of earnings by industry that may be counted as commuting. This dataset has holes for specific years and regions. These holes are filled with Census' Journey-to-Work described later.

Census' Current Population Survey (CPS) is used as the basis for the demographic breakout data of the MR-SAM model. This set is used to estimate the ratios of demographic cohorts and their income for the three different income categories (i.e., wages, property income, and transfers).

Census' Journey-to-Work (JtW) is part of the 2000 Census and describes the amount of commuting jobs between counties. This set is used to fill in the areas where OTM does not have data.

Census' American Community Survey (ACS) Public Use Microdata Sample (PUMS) is the replacement for Census' long form and is used by Emsi to fill the holes in the CPS data.

Oak Ridge National Lab (ORNL) County-to-County Distance Matrix (Skim Tree) contains a matrix of distances and network impedances between each county via various modes of transportation such as highway, railroad, water, and combined highway-rail. Also included in this set are minimum impedances utilizing the best combination of paths. The ORNL distance matrix is used in Emsi's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Emsi's MR-SAM modeling system is a comparative static model in the same general class as RIMS II (Bureau of Economic Analysis) and IMPLAN (Minnesota Implan Group). The MR-SAM model is thus not an econometric model, the primary example of which is PolicyInsight by REMI. It relies on a matrix representation of industry-to-industry purchasing patterns originally based on national data which are regionalized with the use of local data and mathematical manipulation (i.e., non-survey methods). Models of this type estimate the ripple effects of changes in jobs, earnings, or sales in one or more industries upon other industries in a region.

The Emsi MR-SAM model shows final equilibrium impacts – that is, the user enters a change that perturbs the economy and the model shows the changes required to establish a new equilibrium. As such, it is not a dynamic model that shows year-by-year changes over time (as REMI's does).

NATIONAL SAM

Following standard practice, the SAM model appears as a square matrix, with each row sum exactly equaling the corresponding column sum. Reflecting its kinship with the standard Leontief input-output framework, individual SAM elements show accounting flows between row and column sectors during a chosen base year. Read across rows, SAM entries show the flow of funds into column accounts (also known as receipts or the appropriation of funds by

those column accounts). Read down columns, SAM entries show the flow of funds into row accounts (also known as expenditures or the dispersal of funds to those row accounts).

The SAM may be broken into three different aggregation layers: broad accounts, sub-accounts, and detailed accounts. The broad layer is the most aggregate and will be covered first. Broad accounts cover between one and four sub-accounts, which in turn cover many detailed accounts. This appendix will not discuss detailed accounts directly because of their number. For example, in the industry broad account, there are two sub-accounts and over 1,000 detailed accounts.

MULTI-REGIONAL ASPECT OF THE MR-SAM

Multi-regional (MR) describes a non-survey model that has the ability to analyze the transactions and ripple effects (i.e., multipliers) of not just a single region, but multiple regions interacting with each other. Regions in this case are made up of a collection of counties.

Emsi's multi-regional model is built off of gravitational flows, assuming that the larger a county's economy, the more influence it will have on the surrounding counties' purchases and sales. The equation behind this model is essentially the same that Isaac Newton used to calculate the gravitational pull between planets and stars. In Newton's equation, the masses of both objects are multiplied, then divided by the distance separating them and multiplied by a constant. In Emsi's model, the masses are replaced with the supply of a sector for one county and the demand for that same sector from another county. The distance is replaced with an impedance value that takes into account the distance, type of roads, rail lines, and other modes of transportation. Once this is calculated for every county-to-county pair, a set of mathematical operations is performed to make sure all counties absorb the correct amount of supply from every county and the correct amount of demand from every county. These operations produce more than 200 million data points.

Components of the Emsi MR-SAM model

The Emsi MR-SAM is built from a number of different components that are gathered together to display information whenever a user selects a region. What follows is a description of each of these components and how each is created. Emsi's internally created data are used to a great extent throughout the processes described below, but its creation is not described in this appendix.

COUNTY EARNINGS DISTRIBUTION MATRIX

The county earnings distribution matrices describe the earnings spent by every industry on every occupation for a year – i.e., earnings by occupation.

The matrices are built utilizing Emsi's industry earnings, occupational average earnings, and staffing patterns.

Each matrix starts with a region's staffing pattern matrix which is multiplied by the industry jobs vector. This produces the number of occupational jobs in each industry for the region. Next, the occupational average hourly earnings per job are multiplied by 2,080 hours, which converts the average hourly earnings into a yearly estimate. Then the matrix of occupational jobs is multiplied by the occupational annual earnings per job, converting it into earnings values. Last, all earnings are adjusted to match the known industry totals. This is a fairly simple process, but one that is very important. These matrices describe the place-of-work earnings used by the MR-SAM.

COMMUTING MODEL

The commuting sub-model is an integral part of Emsi's MR-SAM model. It allows the regional and multi-regional models to know what amount of the earnings can be attributed to place-of-residence vs. place-of-work. The commuting data describe the flow of earnings from any county to any other county (including within the counties themselves). For this situation, the commuted earnings are not just a single value describing total earnings flows over a complete year, but are broken out by occupation and demographic. Breaking out the earnings allows for analysis of place-of-residence and place-of-work earnings. These data are created using Bureau of Labor Statistics' OnTheMap dataset, Census' Journey-to-Work, BEA's LPI CA91 and CA05 tables, and some of Emsi's data. The process incorporates the cleanup and disaggregation of the OnTheMap data, the estimation of a closed system of county inflows and outflows of earnings, and the creation of finalized commuting data.

NATIONAL SAM

The national SAM as described above is made up of several different components. Many of the elements discussed are filled in with values from the national Z matrix – or industry-to-industry transaction matrix. This matrix is built from BEA data that describe which industries make and use what commodities at the national level. These data are manipulated with some industry standard equations to produce the national Z matrix. The data in the Z matrix act as the basis for the majority of the data in the national SAM. The rest of the values are filled in with data from the county earnings distribution matrices, the commuting data, and the BEA's National Income and Product Accounts.

One of the major issues that affect any SAM project is the combination of data from multiple sources that may not be consistent with one another. Matrix balancing is the broad name for the techniques used to correct this problem.

Emsi uses a modification of the “diagonal similarity scaling” algorithm to balance the national SAM.

GRAVITATIONAL FLOWS MODEL

The most important piece of the Emsi MR-SAM model is the gravitational flows model that produces county-by-county regional purchasing coefficients (RPCs). RPCs estimate how much an industry purchases from other industries inside and outside of the defined region. This information is critical for calculating all IO models.

Gravity modeling starts with the creation of an impedance matrix that values the difficulty of moving a product from county to county. For each sector, an impedance matrix is created based on a set of distance impedance methods for that sector. A distance impedance method is one of the measurements reported in the Oak Ridge National Laboratory’s County-to-County Distance Matrix. In this matrix, every county-to-county relationship is accounted for in six measures: great-circle distance, highway impedance, rail miles, rail impedance, water impedance, and highway-rail-highway impedance. Next, using the impedance information, the trade flows for each industry in every county are solved for. The result is an estimate of multi-regional flows from every county to every county. These flows are divided by each respective county’s demand to produce multi-regional RPCs.

Appendix 7: Value per Credit Hour Equivalent and the Mincer Function

Two key components in the analysis are 1) the value of the students' educational achievements, and 2) the change in that value over the students' working careers. Both of these components are described in detail in this appendix.

Value per CHE

Typically, the educational achievements of students are marked by the credentials they earn. However, not all students who attended the colleges in the 2016-17 analysis year obtained a degree or certificate. Some returned the following year to complete their education goals, while others took a few courses and entered the workforce without graduating. As such, the only way to measure the value of the students' achievement is through their credit hour equivalents, or CHEs. This approach allows us to see the benefits to all students who attended the colleges, not just those who earned a credential.

To calculate the value per CHE, we first determine how many CHEs are required to complete each education level. For example, assuming that there are 30 CHEs in an academic year, a student generally completes 120 CHEs in order to move from a high school diploma to a bachelor's degree, another 60 CHEs to move from a bachelor's degree to a master's degree, and so on. This progression of CHEs generates an education ladder beginning at the less than high school level and ending with the completion of a doctoral degree, with each level of education representing a separate stage in the progression.

The second step is to assign a unique value to the CHEs in the education ladder based on the wage differentials presented in Table 1.4.⁴⁴ For example, the difference in regional earnings between a high school diploma and an associate degree is \$8,800. We spread this \$8,800 wage differential across the 60 CHEs that occur between a high school diploma and an associate degree, applying a ceremonial "boost" to the last CHE in the stage to mark the achievement of the degree.⁴⁵ We repeat this process for each education level in the ladder.

44 The value per CHE is different between the economic impact analysis and the investment analysis. The economic impact analysis uses the region as its background and, therefore, uses regional earnings to calculate value per CHE, while the investment analysis uses the state as its backdrop and, therefore, uses state earnings. The methodology outlined in this appendix will use regional earnings; however, the same methodology is followed for the investment analysis when state earnings are used.

45 Economic theory holds that workers that acquire education credentials send a signal to employers about their ability level. This phenomenon is commonly known as the sheepskin effect or signaling effect. The ceremonial boosts applied to the achievement of degrees in the Emsi impact model are derived from Jaeger and Page (1996).

Next we map the CHE production of the FY 2016-17 student population to the education ladder. Table 1.2 provides information on the CHE production of students attending RCCD, broken out by educational achievement. In total, students completed 526,111 CHEs during the analysis year, excluding personal enrichment students. We map each of these CHEs to the education ladder depending on the students' education level and the average number of CHEs they completed during the year. For example, bachelor's degree graduates are allocated to the stage between the associate degree and the bachelor's degree, and the average number of CHEs they completed informs the shape of the distribution curve used to spread out their total CHE production within that stage of the progression.

The sum product of the CHEs earned at each step within the education ladder and their corresponding value yields the students' aggregate annual increase in income (ΔE), as shown in the following equation:

$$\Delta E = \sum_{i=1}^n e_i h_i \text{ where } i \in 1, 2, \dots, n$$

and n is the number of steps in the education ladder, e_i is the marginal earnings gain at step i , and h_i is the number of CHEs completed at step i .

Table A7.1 displays the result for the students' aggregate annual increase in income (ΔE), a total of \$68.8 million. By dividing this value by the students' total production of 526,111 CHEs during the analysis year, we derive an overall value of \$131 per CHE.

TABLE A7.1: AGGREGATE ANNUAL INCREASE IN INCOME OF STUDENTS AND VALUE PER CHE

Aggregate annual increase in income	\$68,846,286
Total credit hour equivalents (CHEs) in FY 2016-17*	526,111
Value per CHE	\$131

* Excludes the CHE production of personal enrichment students.
Source: Emsi impact model.

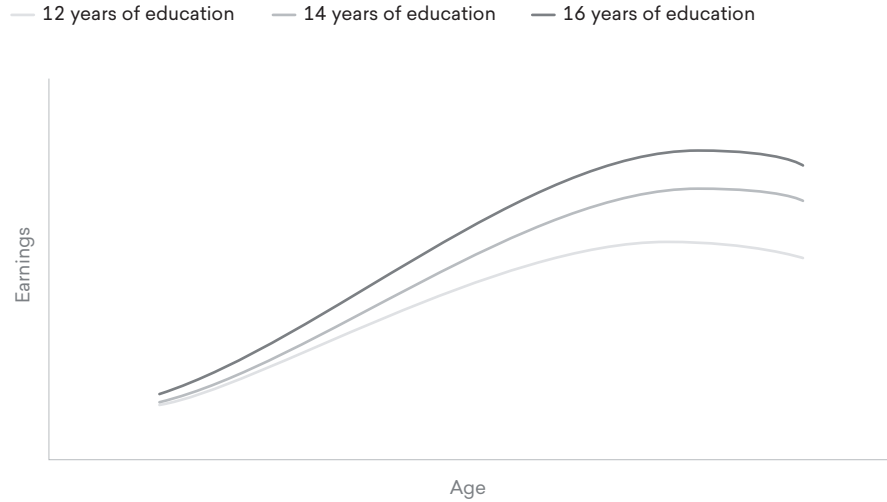
Mincer Function

The \$131 value per CHE in Table A7.1 only tells part of the story, however. Human capital theory holds that earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also shows that the earnings increment between educated and non-educated workers grows through time. These basic patterns in earnings over time were originally identified by Jacob Mincer, who viewed the lifecycle earnings distribution as a function with the key elements being earnings, years of

education, and work experience, with age serving as a proxy for experience.⁴⁶ While some have criticized Mincer’s earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Those critical of the Mincer function point to several unobserved factors such as ability, socioeconomic status, and family background that also help explain higher earnings. Failure to account for these factors results in what is known as an “ability bias.” Research by Card (1999 and 2001) suggests that the benefits estimated using Mincer’s function are biased upwards by 10% or less. As such, we reduce the estimated benefits by 10%. We use state-specific and education level-specific Mincer coefficients.

Figure A7.1 illustrates several important points about the Mincer function. First, as demonstrated by the shape of the curves, an individual’s earnings initially increase at an increasing rate, then increase at a decreasing rate, reach a maximum somewhere well after the midpoint of the working career, and then decline in later years. Second, individuals with higher levels of education reach their maximum earnings at an older age compared to individuals with lower levels of education (recall that age serves as a proxy for years of experience). And third, the benefits of education, as measured by the difference in earnings between education levels, increase with age.

FIGURE A7.1: LIFECYCLE CHANGE IN EARNINGS



In calculating the alumni impact in Chapter 2, we use the slope of the curve in Mincer’s earnings function to condition the \$131 value per CHE to the students’ age and work experience. To the students just starting their career during the analysis year, we apply a lower value per CHE; to the students in the latter half or approaching the end of their careers we apply a higher value per CHE. The

46 See Mincer (1958 and 1974).

original \$131 value per CHE applies only to the CHE production of students precisely at the midpoint of their careers during the analysis year.

In Chapter 3 we again apply the Mincer function, this time to project the benefits stream of the FY 2016-17 student population into the future. Here too the value per CHE is lower for students at the start of their career and higher near the end of it, in accordance with the scalars derived from the slope of the Mincer curve illustrated in Figure A7.1.

Appendix 8: Alternative Education Variable

In a scenario where the colleges did not exist, some of their students would still be able to avail themselves of an alternative comparable education. These students create benefits in the region even in the absence of the colleges. The alternative education variable accounts for these students and is used to discount the benefits we attribute to the colleges.

Recall this analysis considers only relevant economic information regarding the colleges. Considering the existence of various other academic institutions surrounding the colleges, we have to assume that a portion of the students could find alternative educations and either remain in or return to the region. For example, some students may participate in online programs while remaining in the region. Others may attend an out-of-region institution and return to the region upon completing their studies. For these students – who would have found an alternative education and produced benefits in the region regardless of the presence of the colleges – we discount the benefits attributed to the colleges. An important distinction must be made here: the benefits from students who would find alternative educations outside the region and not return to the region are *not* discounted. Because these benefits would not occur in the region without the presence of the colleges, they must be included.

In the absence of the colleges, we assume 15% of the colleges' students would find alternative education opportunities and remain in or return to the region. We account for this by discounting the alumni impact, the benefits to taxpayers, and the benefits to society in the region in Chapters 2 and 3 by 15%. In other words, we assume 15% of the benefits created by the colleges' students would have occurred anyways in the counterfactual scenario where the colleges did not exist. A sensitivity analysis of this adjustment is presented in Appendix 2.

Appendix 9: Overview of Investment Analysis Measures

The appendix provides context to the investment analysis results using the simple hypothetical example summarized in Table A9.1 below. The table shows the projected benefits and costs for a single student over time and associated investment analysis results.⁴⁷

TABLE A9.1: EXAMPLE OF THE BENEFITS AND COSTS OF EDUCATION FOR A SINGLE STUDENT

1	2	3	4	5	6
Year	Tuition	Opportunity cost	Total cost	Higher earnings	Net cash flow
1	\$1,500	\$20,000	\$21,500	\$0	-\$21,500
2	\$0	\$0	\$0	\$5,000	\$5,000
3	\$0	\$0	\$0	\$5,000	\$5,000
4	\$0	\$0	\$0	\$5,000	\$5,000
5	\$0	\$0	\$0	\$5,000	\$5,000
6	\$0	\$0	\$0	\$5,000	\$5,000
7	\$0	\$0	\$0	\$5,000	\$5,000
8	\$0	\$0	\$0	\$5,000	\$5,000
9	\$0	\$0	\$0	\$5,000	\$5,000
10	\$0	\$0	\$0	\$5,000	\$5,000
Net present value			\$21,500	\$35,753	\$14,253

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
18.0%	1.7	4.2

Assumptions are as follows:

- Benefits and costs are projected out 10 years into the future (Column 1).
- The student attends the colleges for one year, and the cost of tuition is \$1,500 (Column 2).
- Earnings foregone while attending the colleges for one year (opportunity cost) come to \$20,000 (Column 3).

⁴⁷ Note that this is a hypothetical example. The numbers used are not based on data collected from an existing institution.

- Together, tuition and earnings foregone cost sum to \$21,500. This represents the out-of-pocket investment made by the student (Column 4).
- In return, the student earns \$5,000 more per year than he otherwise would have earned without the education (Column 5).
- The net cash flow (NCF) in Column 6 shows higher earnings (Column 5) less the total cost (Column 4).
- The assumed going rate of interest is 4%, the rate of return from alternative investment schemes for the use of the \$21,500.

Results are expressed in standard investment analysis terms, which are as follows: the net present value, the internal rate of return, the benefit-cost ratio, and the payback period. Each of these is briefly explained below in the context of the cash flow numbers presented in Table A9.1.

Net present value

The student in Table A9.1 can choose either to attend college or to forego post-secondary education and maintain his present employment. If he decides to enroll, certain economic implications unfold. Tuition and fees must be paid, and earnings will cease for one year. In exchange, the student calculates that with post-secondary education, his earnings will increase by at least the \$5,000 per year, as indicated in the table.

The question is simple: Will the prospective student be economically better off by choosing to enroll? If he adds up higher earnings of \$5,000 per year for the remaining nine years in Table A9.1, the total will be \$45,000. Compared to a total investment of \$21,500, this appears to be a very solid investment. The reality, however, is different. Benefits are far lower than \$45,000 because future money is worth less than present money. Costs (tuition plus earnings foregone) are felt immediately because they are incurred today, in the present. Benefits, on the other hand, occur in the future. They are not yet available. All future benefits must be discounted by the going rate of interest (referred to as the discount rate) to be able to express them in present value terms.⁴⁸

Let us take a brief example. At 4%, the present value of \$5,000 to be received one year from today is \$4,807. If the \$5,000 were to be received in year 10, the present value would reduce to \$3,377. Put another way, \$4,807 deposited in the bank today earning 4% interest will grow to \$5,000 in one year; and \$3,377 deposited today would grow to \$5,000 in 10 years. An “economically rational” person would, therefore, be equally satisfied receiving \$3,377 today or \$5,000

48 Technically, the interest rate is applied to compounding – the process of looking at deposits today and determining how much they will be worth in the future. The same interest rate is called a discount rate when the process is reversed – determining the present value of future earnings.

10 years from today given the going rate of interest of 4%. The process of discounting – finding the present value of future higher earnings – allows the model to express values on an equal basis in future or present value terms.

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today (in this example, tuition plus earnings foregone). As indicated in Table A9.1 the cumulative present value of \$5,000 worth of higher earnings between years 2 and 10 is \$35,753 given the 4% interest rate, far lower than the undiscounted \$45,000 discussed above.

The net present value of the investment is \$14,253. This is simply the present value of the benefits less the present value of the costs, or $\$35,753 - \$21,500 = \$14,253$. In other words, the present value of benefits exceeds the present value of costs by as much as \$14,253. The criterion for an economically worthwhile investment is that the net present value is equal to or greater than zero. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment in education is very strong.

Internal rate of return

The internal rate of return is another way of measuring the worth of investing in education using the same cash flows shown in Table A9.1. In technical terms, the internal rate of return is a measure of the average earning power of money used over the life of the investment. It is simply the interest rate that makes the net present value equal to zero. In the discussion of the net present value above, the model applies the going rate of interest of 4% and computes a positive net present value of \$14,253. The question now is what the interest rate would have to be in order to reduce the net present value to zero. Obviously it would have to be higher – 18.0% in fact, as indicated in Table A9.1. Or, if a discount rate of 18.0% were applied to the net present value calculations instead of the 4%, then the net present value would reduce to zero.

What does this mean? The internal rate of return of 18.0% defines a breakeven solution – the point where the present value of benefits just equals the present value of costs, or where the net present value equals zero. Or, at 18.0%, higher earnings of \$5,000 per year for the next nine years will earn back all investments of \$21,500 made plus pay 18.0% for the use of that money (\$21,500) in the meantime. Is this a good return? Indeed, it is. If it is compared to the 4% going rate of interest applied to the net present value calculations, 18.0% is far higher than 4%. It may be concluded, therefore, that the investment in this case is solid. Alternatively, comparing the 18.0% rate of return to the long-term 10% rate or so obtained from investments in stocks and bonds also indicates that the investment in education is strong relative to the stock market returns (on average).

Benefit-cost ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or $\$35,753 \div \$21,500 = 1.7$ (based on the 4% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 18.0% internal rate of return discussed above would reduce the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than the 18.0% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 1.7 ratio means that a dollar invested today will return a cumulative \$1.70 over the ten-year time period.

Payback period

This is the length of time from the beginning of the investment (consisting of tuition and earnings foregone) until higher future earnings give a return on the investment made. For the student in Table A9.1, it will take roughly 4.2 years of \$5,000 worth of higher earnings to recapture his investment of \$1,500 in tuition and the \$20,000 in earnings foregone while attending the colleges. Higher earnings that occur beyond 4.2 years are the returns that make the investment in education in this example economically worthwhile. The payback period is a fairly rough, albeit common, means of choosing between investments. The shorter the payback period, the stronger the investment.

Appendix 10: Shutdown Point

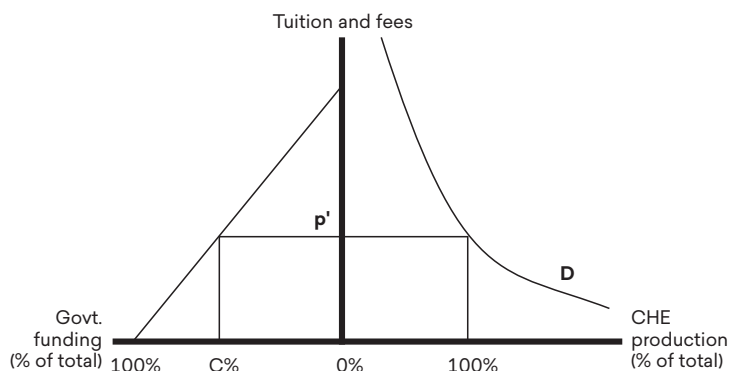
The investment analysis in Chapter 3 weighs the benefits generated by the colleges against the state and local taxpayer funding that the colleges receive to support their operations. An important part of this analysis is factoring out the benefits that the colleges would have been able to generate anyway, even without state and local taxpayer support. This adjustment is used to establish a direct link between what taxpayers pay and what they receive in return. If the colleges are able to generate benefits without taxpayer support, then it would not be a true investment.⁴⁹

The overall approach includes a sub-model that simulates the effect on student enrollment if the colleges lose their state and local funding and have to raise student tuition and fees in order to stay open. If the colleges can still operate without state and local support, then any benefits they generate at that level are discounted from total benefit estimates. If the simulation indicates that the colleges cannot stay open, however, then benefits are directly linked to costs, and no discounting applies. This appendix documents the underlying theory behind these adjustments.

State and local government support versus student demand for education

Figure A10.1 presents a simple model of student demand and state and local government support. The right side of the graph is a standard demand curve (*D*) showing student enrollment as a function of student tuition and fees. Enrollment

FIGURE A10.1: STUDENT DEMAND AND GOVERNMENT FUNDING BY TUITION AND FEES

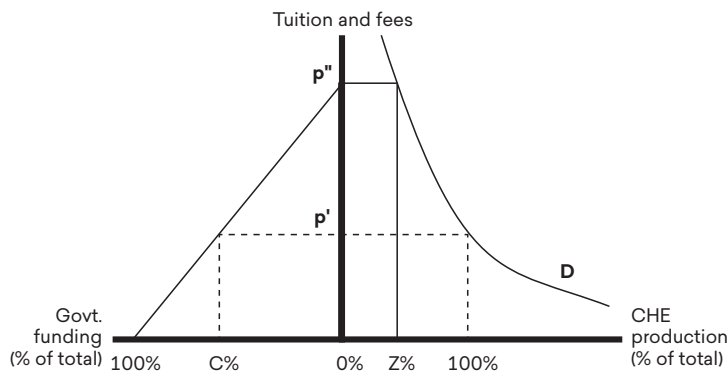


49 Of course, as public training providers, the colleges would not be permitted to continue without public funding, so the situation in which they would lose all state support is entirely hypothetical. The purpose of the adjustment factor is to examine the colleges in standard investment analysis terms by netting out any benefits they may be able to generate that are not directly linked to the costs of supporting them.

is measured in terms of total credit hour equivalents (CHEs) and expressed as a percentage of the colleges' current CHE production. Current student tuition and fees are represented by p' , and state and local government support covers $C\%$ of all costs. At this point in the analysis, it is assumed that the colleges have only two sources of revenues: 1) student tuition and fees and 2) state and local government support.

Figure A10.2 shows another important reference point in the model – where state and local government support is 0% , student tuition and fees are increased to p'' , and CHE production is at $Z\%$ (less than 100%). The reduction in CHEs reflects the price elasticity of the students' demand for education, *i.e.*, the extent to which the students' decision to attend the colleges is affected by the change in tuition and fees. Ignoring for the moment those issues concerning the colleges' minimum operating scale (considered below in the section called "Calculating benefits at the shutdown point"), the implication for the investment analysis is that benefits to state and local government must be adjusted to net out the benefits that the colleges can provide absent state and local government support, represented as $Z\%$ of the colleges' current CHE production in Figure A10.2.

FIGURE A10.2: CHE PRODUCTION AND GOVERNMENT FUNDING BY TUITION AND FEES



To clarify the argument, it is useful to consider the role of enrollment in the larger benefit-cost model. Let B equal the benefits attributable to state and local government support. The analysis derives all benefits as a function of student enrollment, measured in terms of CHEs produced. For consistency with the graphs in this appendix, B is expressed as a function of the percent of the colleges' current CHE production. Equation 1 is thus as follows:

$$1) B = B(100\%)$$

This reflects the total benefits generated by enrollments at their current levels.

Consider benefits now with reference to Z. The point at which state and local government support is zero nonetheless provides for Z% (less than 100%) of the current enrollment, and benefits are symbolically indicated by the following equation:

$$2) B = B(Z\%)$$

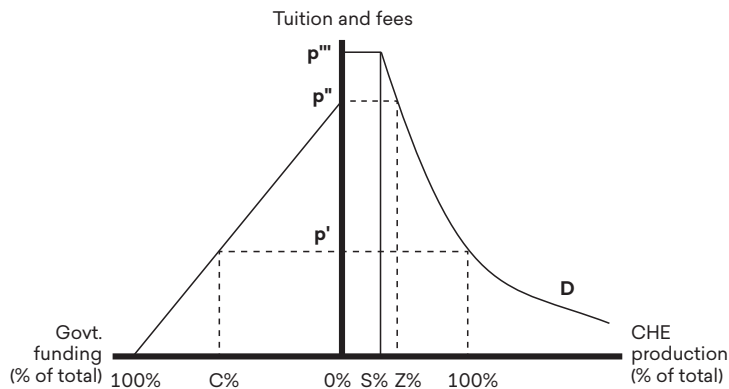
Inasmuch as the benefits in equation 2 occur with or without state and local government support, the benefits appropriately attributed to state and local government support are given by equation 3 as follows:

$$3) B = B(100\%) - B(Z\%)$$

Calculating benefits at the shutdown point

Colleges and universities cease to operate when the revenue they receive from the quantity of education demanded is insufficient to justify their continued operations. This is commonly known in economics as the shutdown point.⁵⁰ The shutdown point is introduced graphically in Figure A10.3 as S%. The location of point S% indicates that the colleges can operate at an even lower enrollment level than Z% (the point at which the colleges receive zero state and local government funding). State and local government support at point S% is still zero, and student tuition and fees have been raised to p'''. State and local government support is thus credited with the benefits given by equation 3, or $B = B(100\%) - B(Z\%)$. With student tuition and fees still higher than p'', the colleges would no longer be able to attract enough students to keep their doors open, and they would shut down.

FIGURE A10.3: SHUTDOWN POINT AFTER ZERO GOVERNMENT FUNDING



⁵⁰ In the traditional sense, the shutdown point applies to firms seeking to maximize profits and minimize losses. Although profit maximization is not the primary aim of colleges and universities, the principle remains the same, *i.e.*, that there is a minimum scale of operation required in order for colleges and universities to stay open.

Appendix 11: Social Externalities

Education has a predictable and positive effect on a diverse array of social benefits. These, when quantified in dollar terms, represent significant social savings that directly benefit society communities and citizens throughout the region, including taxpayers. In this appendix we discuss the following three main benefit categories: 1) improved health, 2) reductions in crime, and 3) reduced demand for government-funded income assistance.

It is important to note that the data and estimates presented here should not be viewed as exact, but rather as indicative of the positive impacts of education on an individual's quality of life. The process of quantifying these impacts requires a number of assumptions to be made, creating a level of uncertainty that should be borne in mind when reviewing the results.

Health

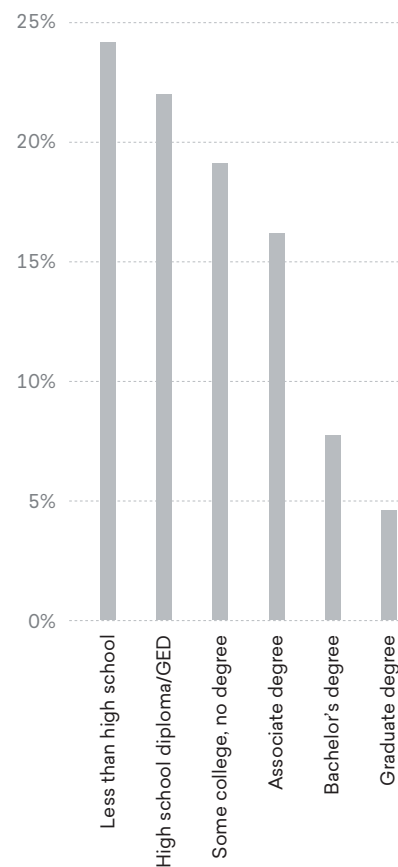
Statistics show a correlation between increased education and improved health. The manifestations of this are found in five health-related variables: smoking, alcohol dependence, obesity, depression, and drug abuse. There are other health-related areas that link to educational attainment, but these are omitted from the analysis until we can invoke adequate (and mutually exclusive) databases and are able to fully develop the functional relationships between them.

SMOKING

Despite a marked decline over the last several decades in the percentage of U.S. residents who smoke, a sizeable percentage of the U.S. population still smokes. The negative health effects of smoking are well documented in the literature, which identifies smoking as one of the most serious health issues in the U.S.

Figure A11.1 shows the prevalence of cigarette smoking among adults, 25 years and over, based on data provided by the National Health Interview Survey.⁵¹ The data include adults who reported smoking more than 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. As indicated, the percent of who smoke begins to decline beyond the level of high school education.

FIGURE A11.1: PREVALENCE OF SMOKING AMONG U.S. ADULTS BY EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

51 Centers for Disease Control and Prevention. "Table. Characteristics of current adult cigarette smokers," National Health Interview Survey, United States, 2016.

The Centers for Disease Control and Prevention (CDC) reports the percentage of adults who are current smokers by state.⁵² We use this information to create an index value by which we adjust the national prevalence data on smoking to each state. For example, 11.0% of California adults were smokers in 2016, relative to 15.5% for the nation. We thus apply a scalar of 0.71 to the national probabilities of smoking in order to adjust them to the state of California.

ALCOHOL DEPENDENCE

Although alcohol dependence has large public and private costs, it is difficult to measure and define. There are many patterns of drinking, ranging from abstinence to heavy drinking. Alcohol abuse is riddled with social costs, including health care expenditures for treatment, prevention, and support; workplace losses due to reduced worker productivity; and other effects.

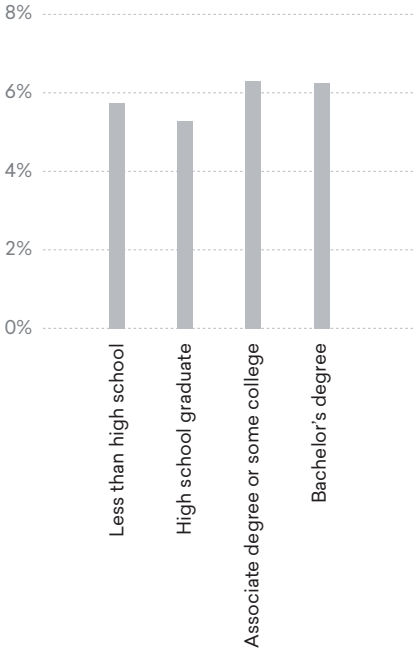
Figure A11.2 compares the percentage of adults, 18 and older, that abuse or depend on alcohol by education level, based on data from the Substance Abuse and Mental Health Services Administration (SAMHSA).⁵³ These statistics give an indication of the correlation between education and the reduced probability of alcohol dependence. Adults with an associate degree or some college have higher rates of alcohol dependence than adults with a high school diploma or lower. Prevalence rates are lower for adults with a bachelor’s degree or higher than those with an associate degree or some college. Although the data do not maintain a pattern of decreased alcohol dependence at every level of increased education, we include these rates in our model to ensure we provide a comprehensive view of the social benefits and costs correlated with education.

OBESITY

The rise in obesity and diet-related chronic diseases has led to increased attention on how expenditures relating to obesity have increased in recent years. The average cost of obesity-related medical conditions is calculated using information from the *Journal of Occupational and Environmental Medicine*, which reports incremental medical expenditures and productivity losses due to excess weight.⁵⁴

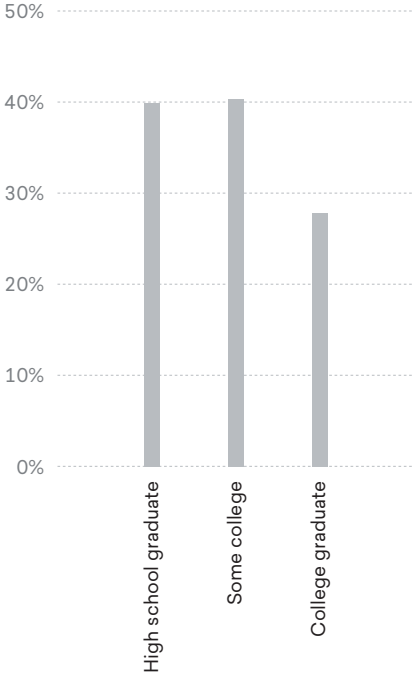
Data for Figure A11.3 is derived from the National Center for Health Statistics which shows the prevalence of obesity among adults aged 20 years and over

FIGURE A11.2: PREVALENCE OF ALCOHOL DEPENDENCE OR ABUSE BY SEX AND EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

FIGURE A11.3: PREVALENCE OF OBESITY BY EDUCATION LEVEL



Source: Derived from data provided by the National Center for Health Statistics.

52 Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data*, 2016.

53 Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016.

54 Eric A. Finkelstein, Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale, "The Costs of Obesity in the Workplace," *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

by education, gender, and ethnicity.⁵⁵ As indicated, college graduates are less likely to be obese than individuals with a high school diploma. However, the prevalence of obesity among adults with some college is actually greater than those with just a high school diploma. In general, though, obesity tends to decline with increasing levels of education.

DEPRESSION

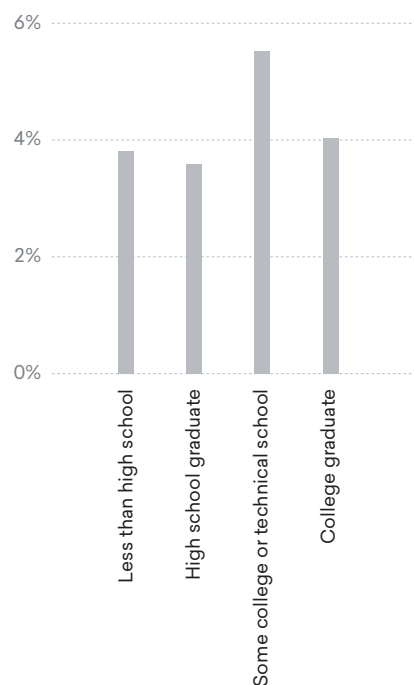
Capturing the full economic cost of mental illness is difficult because not all mental disorders have a correlation with education. For this reason, we only examine the economic costs associated with major depressive disorder (MDD), which are comprised of medical and pharmaceutical costs, workplace costs such as absenteeism, and suicide-related costs.⁵⁶

Figure A11.4 summarizes the prevalence of MDD among adults by education level, based on data provided by the CDC.⁵⁷ As shown, people with some college are most likely to have MDD compared to those with other levels of educational attainment. People with a high school diploma or less, along with college graduates, are all fairly similar in the prevalence rates.

DRUG ABUSE

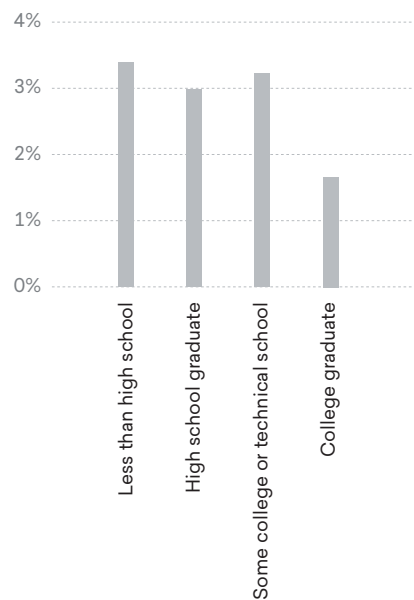
The burden and cost of illicit drug abuse is enormous in the U.S., but little is known about the magnitude of costs and effects at a national level. What is known is that the rate of people abusing drugs is inversely proportional to their education level. The higher the education level, the less likely a person is to abuse or depend on illicit drugs. The probability that a person with less than a high school diploma will abuse drugs is 3.4%, twice as large as the probability of drug abuse for college graduates (1.7%). This relationship is presented in Figure A11.5 based on data supplied by SAMHSA.⁵⁸ Similar to alcohol abuse, prevalence does not strictly decline at every education level. Health costs associated with illegal drug use are also available from SAMSHA, with costs to state and local government representing 40% of the total cost related to illegal drug use.⁵⁹

FIGURE A11.4: PREVALENCE OF MAJOR DEPRESSIVE EPISODE BY EDUCATION LEVEL



Source: National Survey on Drug Use and Health.

FIGURE A11.5: PREVALENCE OF ILLICIT DRUG DEPENDENCE OR ABUSE BY EDUCATION LEVEL



Source: Substance Abuse and Mental Health Services Administration.

55 Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017).

56 Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" Journal of Clinical Psychiatry 76:2, 2015.

57 National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016."

58 Substance Abuse and Mental Health Services Administration, National Survey on Drug Use and Health, 2010 and 2011.

59 Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.

Crime

As people achieve higher education levels, they are statistically less likely to commit crimes. The analysis identifies the following three types of crime-related expenses: 1) criminal justice expenditures, including police protection, judicial and legal, and corrections, 2) victim costs, and 3) productivity lost as a result of time spent in jail or prison rather than working.

Figure A11.6 displays the educational attainment of the incarcerated population in the U.S. Data are derived from the breakdown of the inmate population by education level in federal, state, and local prisons as provided by the U.S. Census Bureau.⁶⁰

Victim costs comprise material, medical, physical, and emotional losses suffered by crime victims. Some of these costs are hidden, while others are available in various databases. Estimates of victim costs vary widely, attributable to differences in how the costs are measured. The lower end of the scale includes only tangible out-of-pocket costs, while the higher end includes intangible costs related to pain and suffering.⁶¹

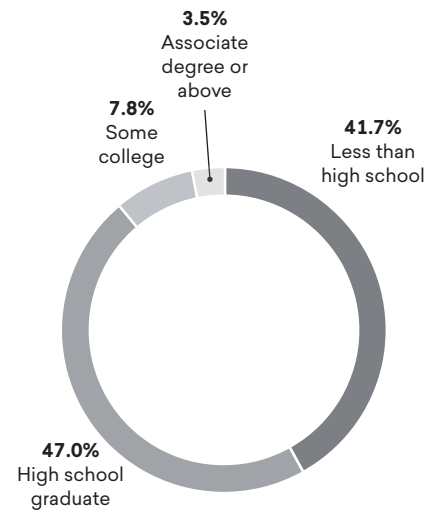
Yet another measurable cost is the economic productivity of people who are incarcerated and are thus not employed. The measurable productivity cost is simply the number of additional incarcerated people, who could have been in the labor force, multiplied by the average income of their corresponding education levels.

Income Assistance

Statistics show that as education levels increase, the number of applicants for government-funded income assistance such as welfare and unemployment benefits declines. Welfare and unemployment claimants can receive assistance from a variety of different sources, including Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), and unemployment insurance.⁶²

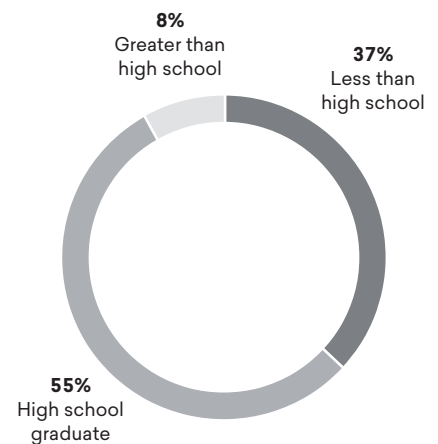
Figure A11.7 relates the breakdown of TANF recipients by education level, derived from data provided by the U.S. Department of Health and Human Services.⁶³ As shown, the demographic characteristics of TANF recipients are weighted heav-

FIGURE A11.6: EDUCATIONAL ATTAINMENT OF THE INCARCERATED POPULATION



Source: Derived from data provided by the U.S. Census Bureau.

FIGURE A11.7: BREAKDOWN OF TANF RECIPIENTS BY EDUCATION LEVEL



Source: U.S. Department of Health and Human Services, Office of Family Assistance.

60 U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011.

61 McCollister, Kathryn E., Michael T. French, and Hai Fang. "The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation." *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109.

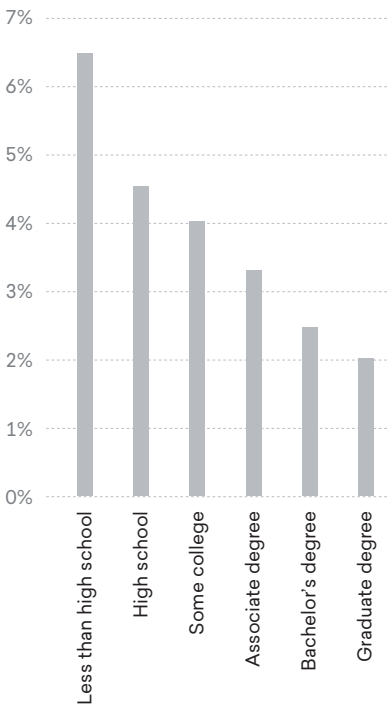
62 Medicaid is not considered in this analysis because it overlaps with the medical expenses in the analyses for smoking, alcohol dependence, obesity, depression, and drug abuse. We also exclude any welfare benefits associated with disability and age.

63 U.S. Department of Health and Human Services, Office of Family Assistance. "Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016."

ily towards the less than high school and high school categories, with a much smaller representation of individuals with greater than a high school education.

Unemployment rates also decline with increasing levels of education, as illustrated in Figure A11.8. These data are provided by the Bureau of Labor Statistics.⁶⁴ As shown, unemployment rates range from 6.5% for those with less than a high school diploma to 2.0% for those at the graduate degree level or higher.

FIGURE A11.8: UNEMPLOYMENT BY EDUCATION LEVEL



Source: Bureau of Labor Statistics.

64 Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017.

The Economic Value of Riverside Community College District **FACT SHEET**

RIVERSIDE Community College District (RCCD) creates a significant positive impact on the business community and generates a return on investment to its major stakeholder groups—students, taxpayers, and society. Using a two-pronged approach that involves an economic impact analysis and an investment analysis, this study calculates the benefits received by each of these groups. Results of the analysis reflect fiscal year (FY) 2016-17.

Economic impact analysis

In FY 2016-17, RCCD added **\$873.5 million** in income to the RCCD Service Area¹ economy, a value approximately equal to **1.3%** of the region's total gross regional product (GRP). Expressed in terms of jobs, RCCD's impact supported **12,898** regional jobs. For perspective, the activities of the colleges and their students support one out of every **61** jobs in the RCCD Service Area.

OPERATIONS SPENDING IMPACT

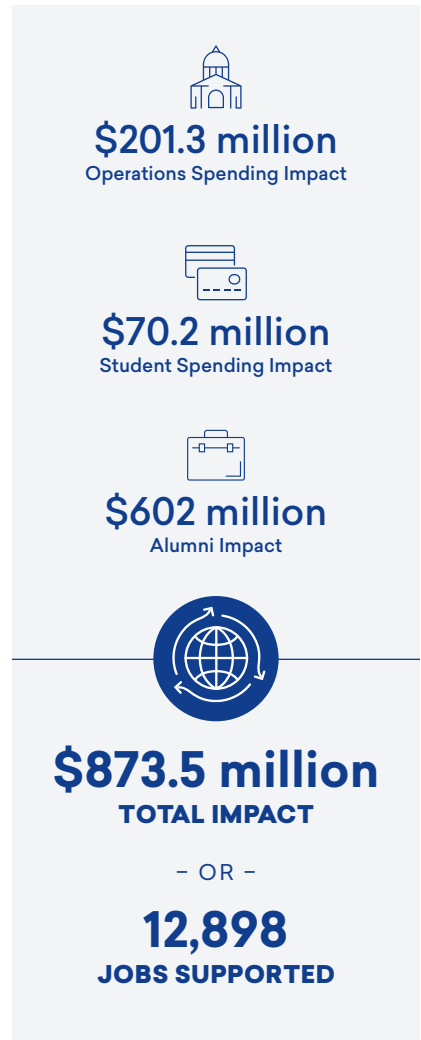
- RCCD employed 1,846 full-time and part-time faculty and staff. Payroll amounted to \$164.7 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. The colleges spent another \$95 million on day-to-day expenses related to facilities, supplies, and professional services.
- The net impact of the colleges' operations spending in FY 2016-17 added **\$201.3 million** in income to the regional economy.

STUDENT SPENDING IMPACT

- Some in-region students would have left the RCCD Service Area for other educational opportunities if not for RCCD. These students spent money on groceries, mortgage and rent payments, and so on at regional businesses.
- The expenditures of retained students in FY 2016-17 added **\$70.2 million** in income to the RCCD Service Area economy.

¹ For the purposes of this analysis, the RCCD Service Area is comprised of 47 ZIP codes primarily located in the northwest corner of Riverside County in California.

IMPACTS CREATED BY RCCD
IN FY 2016-17



ALUMNI IMPACT

- Over the years, students have studied at RCCD and entered or re-entered the workforce with newly-acquired knowledge and skills. Today, hundreds of thousands of these former students are employed in the RCCD Service Area.
- The net impact of RCCD's former students currently employed in the regional workforce amounted to **\$602 million** in added income in FY 2016-17.



Investment analysis

STUDENT PERSPECTIVE

- RCCD's FY 2016-17 students paid a present value of **\$55.1 million** to cover the cost of tuition, fees, supplies, and interest on student loans. They also forwent **\$93.9 million** in money that they would have earned had they been working instead of attending college.
- In return for their investment, students will receive **\$1 billion** in increased earnings over their working lives. This translates to a return of **\$6.80** in higher future earnings for every dollar students invest in their education. Students' average annual rate of return is **21.4%**.

TAXPAYER PERSPECTIVE

- Taxpayers provided RCCD with **\$203.2 million** of funding in FY 2016-17. In return, they will benefit from added tax revenue, stemming from students' higher lifetime earnings and increased business output, amounting to **\$424.6 million**. A reduced demand for government-funded services in California will add another **\$65 million** in benefits to taxpayers.
- For every dollar of public money invested in RCCD, taxpayers will receive **\$2.40** in return, over the course of students' working lives. The average annual rate of return for taxpayers is **5.9%**.

SOCIAL PERSPECTIVE

- In FY 2016-17, California invested **\$424.6 million** to fully support RCCD. In turn, the California economy will grow by **\$6.2 billion**, over the course of students' working lives. Society will also benefit from **\$84.3 million** of public and private sector savings.
- For every dollar invested in RCCD educations in FY 2016-17, people in California will receive **\$14.80** in return, for as long as RCCD's FY 2016-17 students remain active in the state workforce.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN RCCD



21.4%

Average annual return for RCCD students



10.1%

Stock market 30-year average annual return



0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.



FOR EVERY \$1...



Students gain

\$6.80

in lifetime earnings



Taxpayers gain

\$2.40

in added tax revenue and public sector savings



Society gains

\$14.80

in added income and social savings





The economic value of Moreno Valley College

ANALYSIS OF THE ECONOMIC IMPACT
AND RETURN ON INVESTMENT OF EDUCATION

Emsi & Community Colleges

15+ years working with higher education institutions

1,800+ economic impact studies completed

1.2M students used Emsi's career pathways tool last year

9 of 10 2019 Aspen Prize finalists are Emsi customers



What is an
ECONOMIC IMPACT ANALYSIS?

Measures how an event or institution affects the local economy

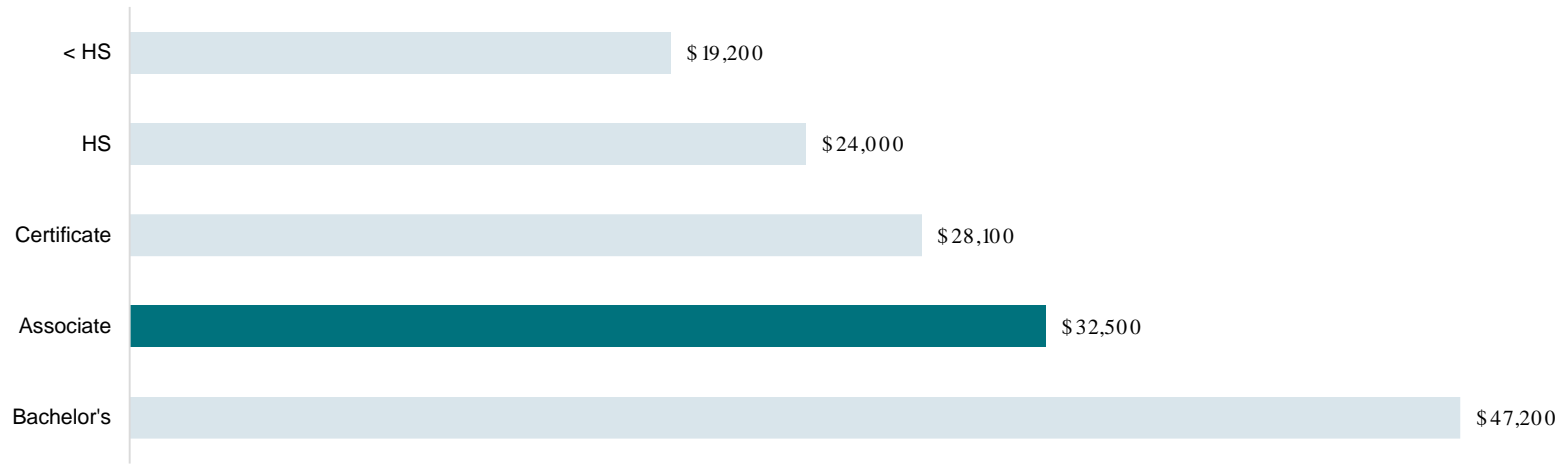


What is an
INVESTMENT ANALYSIS?

A comparison of the costs and benefits to determine the return on investment **208**

About the MVC Service Area

AVERAGE EARNINGS BY EDUCATION LEVEL

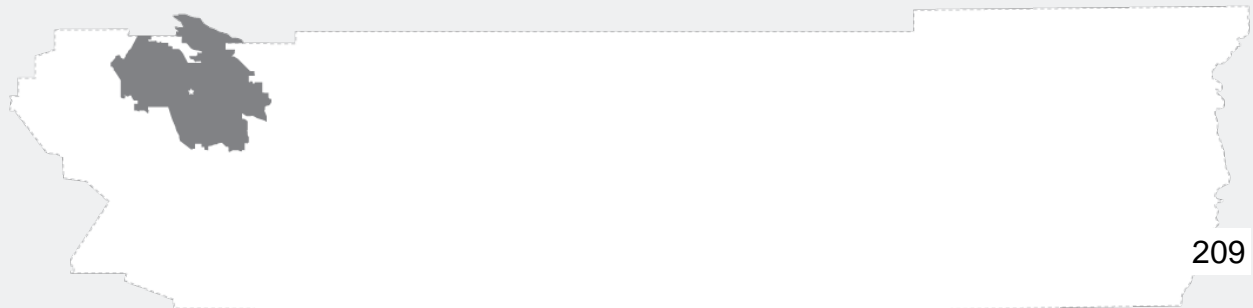


\$15.9 billion

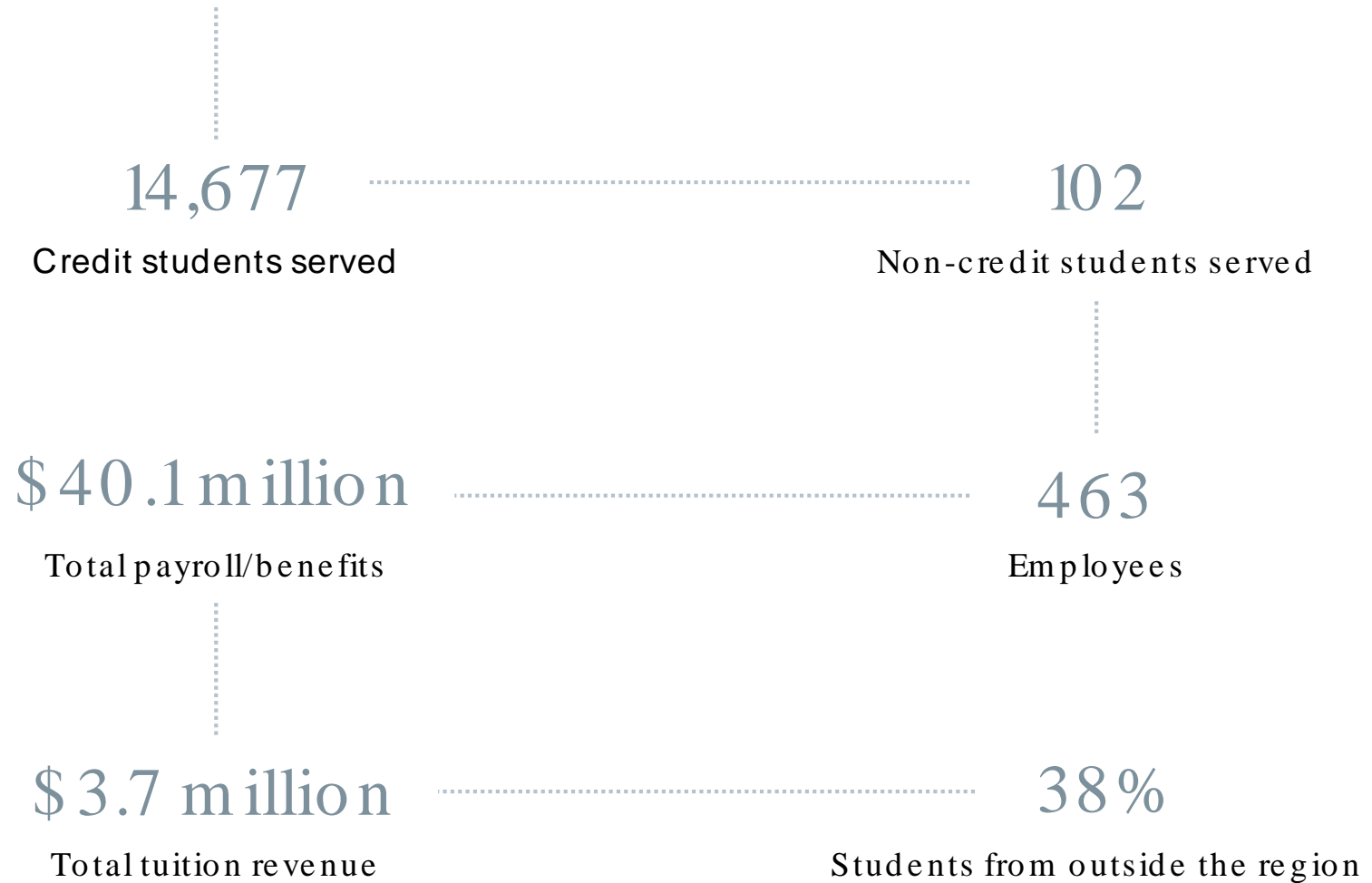
Total Gross Regional
Product (GRP)

203,304

Total Jobs



MVC in FY 20 16-17



Overview of results



\$129.2 million

Total income added to the region

0.8%

Of region's GRP

1,708

Total jobs supported in the region



7.6

Benefit-cost ratio for students

2.4

Benefit-cost ratio for taxpayers

13.6

Benefit-cost ratio for society



ECONOMIC IMPACT ANALYSIS



Operations Spending Impact

*College payroll and
other spending + ripple effects*

\$43.3 million

Added regional income

OR

510

Jobs supported in the region



Student Spending Impact

*Retained student
spending + ripple effects*

\$7.7 million

Added regional income

OR

142

Jobs supported in the region



Alumni Impact

*Higher alumni earnings and increased
business profit + ripple effects*

\$78.2 million

Added regional income

OR

1,056

Jobs supported in the region
212



Total Impact

\$129.2 million

Total income added
in the region

OR

0.8%

Of region's GRP

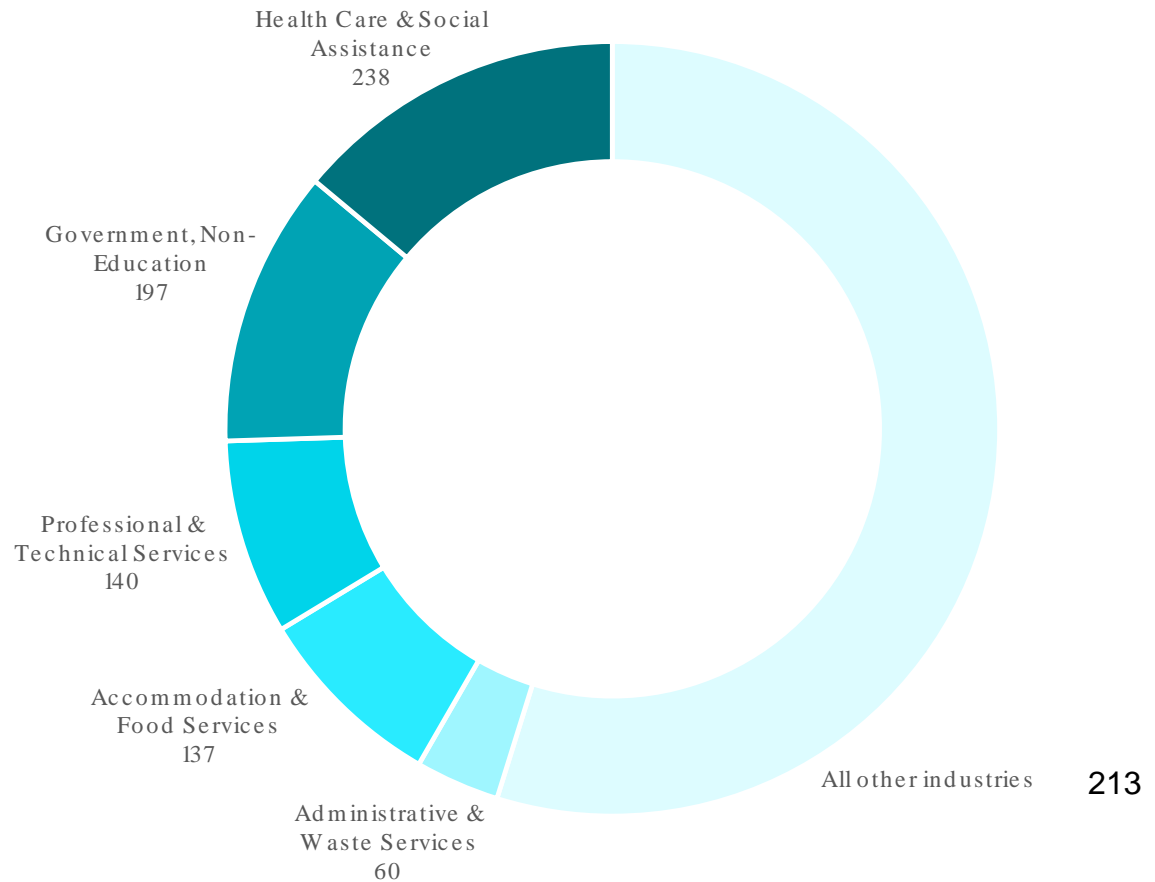
1,708

Total jobs supported
in the region

OR

1 out of **119** jobs in the
region

Top industries impacted by MVC (jobs supported)





INVESTMENT ANALYSIS



Student Perspective

\$260.4 million

Benefit: Higher future earnings

\$34.3 million

Cost: Tuition, supplies, opportunity cost

7.6

Benefit/cost ratio

23.2%

Rate of return



Taxpayer Perspective

\$105.6 million

Benefit: Future tax revenue, government savings

\$44.7 million

Cost: State and local funding

2.4

Benefit/cost ratio

5.7%

Rate of return



Social Perspective

\$1.3 billion

Benefit: Future earnings, tax revenue, private savings

\$95.1 million

Cost: All college and student costs

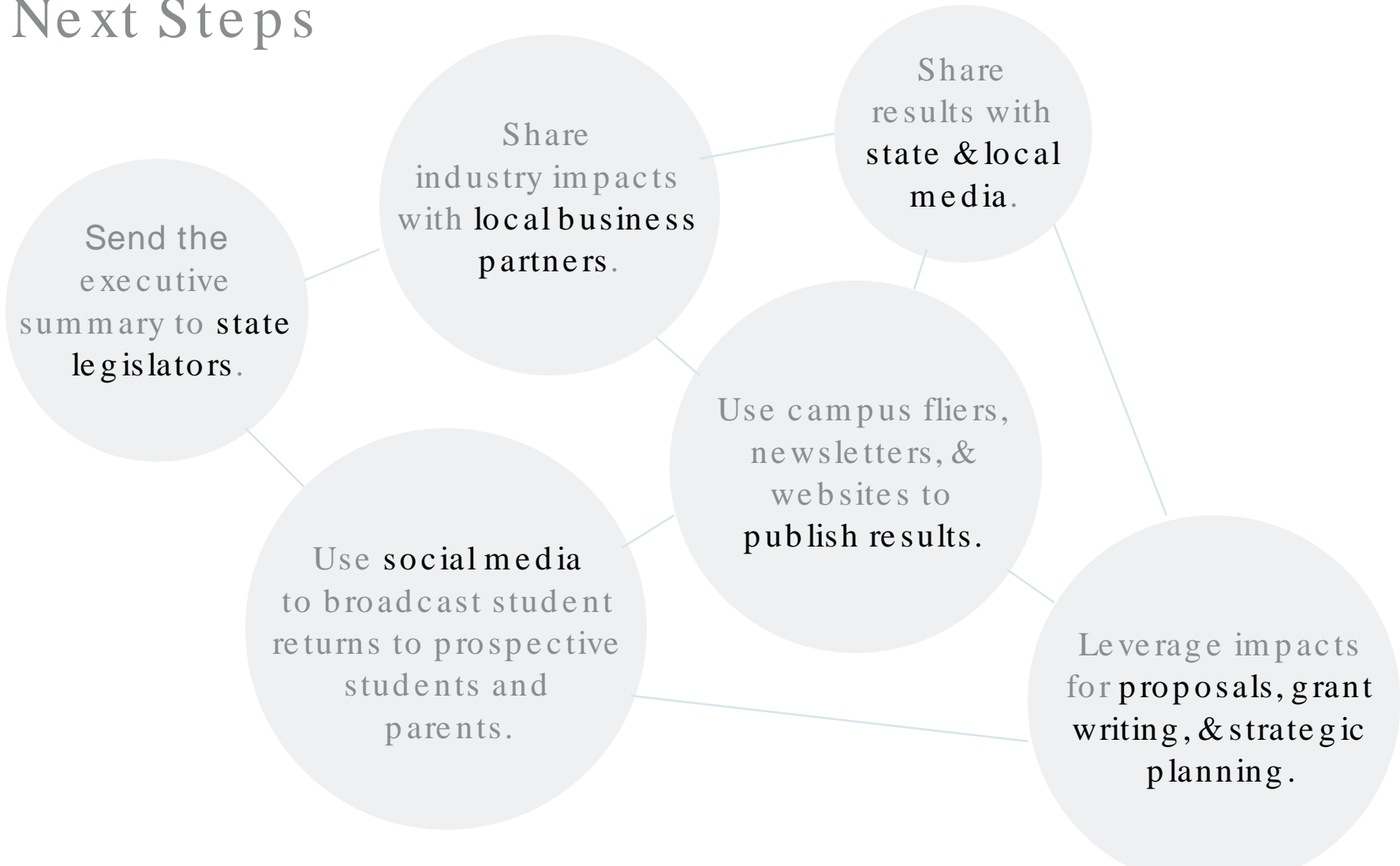
13.6

Benefit/cost ratio

n/a

Rate of return

Next Steps



HOW CAN
EMSI HELP?

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packet

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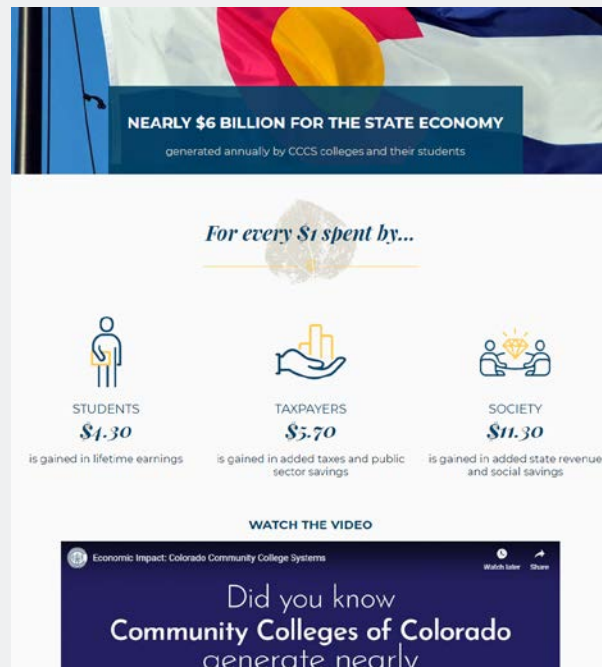
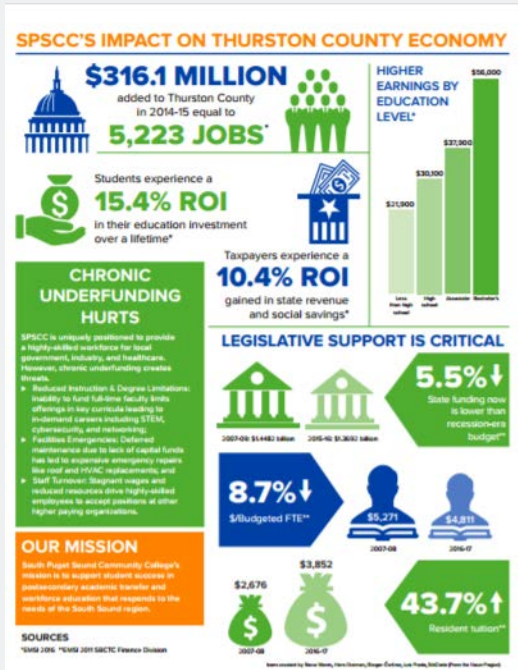
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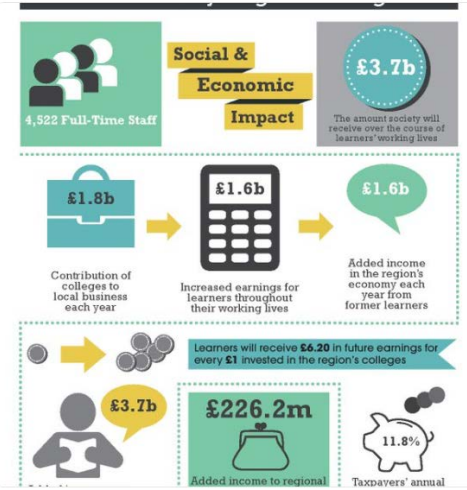
Students, employers tell how @grcc noncredit workforce programs change lives and build a talented workforce to fill great jobs. New study shows the economic impact of such programs is hundreds of millions of dollars on West MI economy grcc.edu/communications ...



1:58 PM - 13 Nov 2018

Use social media to share your investment results with prospective students.

Did you know that learners will receive £6.20 in future earnings for every £1 invested in the region's colleges?



4,522 Full-Time Staff

£3.7b The amount society will receive over the course of learners' working lives

£1.8b Contribution of colleges to local business each year

£1.6b Increased earnings for learners throughout their working lives

£1.6b Added income in the region's economy each year from former learners

£3.7b Learners will receive **£6.20** in future earnings for every **£1** invested in the region's colleges

£226.2m Added income to regional

11.8% Taxpayers' annual

RETWEETS 5

Use your study to help secure additional funding.

Emsi's Capital Analysis Justifies Funding for New UT Martin STEM Facility

OCTOBER 24, 2016 BY MATTHEW HYNDMAN

Summary:

In a time of serious need, the University of Tennessee at Martin (UT Martin) used Emsi's Economic Impact and Capital Analysis studies to demonstrate the ROI that would come from building a proposed STEM facility. The results, in part, led to a boost in state funding—reducing the university's share of facility construction costs from 25% to 10%.

Key takeaways:

- UT Martin leveraged Emsi's Economic Impact and Capital Analysis studies to communicate the institution's value and make the case for additional state funding to build a new STEM facility—now known as the Latimer Engineering and Science Building.
- Among other things, the study found that building the new facility would generate 900-plus jobs.
- The Capital Analysis helped justify a state budget amendment increasing state funding of the \$65 million project.

Led by its current Interim Chancellor, Dr. Robert Smith—a longtime acquaintance of Emsi from his time at Slippery Rock University in Pennsylvania—UT Martin came to Emsi last year needing support for a critical project. Limited by inadequate space and antiquated laboratory facilities, UT Martin needed to prove that the proposed construction of a new STEM facility would be a smart and profitable investment for the state.

After working with Emsi several years ago, Smith knew that Emsi could provide him with the analysis he needed to advance UT Martin's cause. Emsi consultants worked closely with the UT Martin team to develop a customized report based on the Economic Impact Study and the Capital Analysis. The report would show the broad-reaching value of UT Martin and detail the potential ROI of building the new STEM facility.



The results of this study
were prepared by



For a copy of the report, please contact MVC.



The Economic Value of Moreno Valley College

EXECUTIVE SUMMARY



MORENO Valley College (MVC) creates value in many ways. The college plays a key role in helping students increase their employability and achieve their individual potential. The college draws students to the region, generating new dollars and opportunities for the MVC Service Area. MVC provides students with the education, training, and skills they need to have fulfilling and prosperous careers. Furthermore, MVC is a place for students to meet new people, increase their self-confidence, and promote their overall health and well-being.

MVC influences both the lives of its students and the regional economy. The college supports a variety of industries in the MVC Service Area,¹ serves regional businesses, and benefits society as a whole in California from an expanded economy and improved quality of life. The benefits created by MVC even extend to the state and local government through increased tax revenues and public sector savings.

This study measures the economic impacts created by MVC on the business community and the benefits the college generates in return for the investments made by its key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:



Economic impact analysis



Investment analysis

All results reflect employee, student, and financial data, provided by the district, for fiscal year (FY) 2016-17. Impacts on the MVC Service Area economy are reported under the economic impact analysis and are measured in terms of added income. The returns on investment to students, taxpayers, and society in California are reported under the investment analysis.

¹ For the purposes of this analysis, the MVC Service Area is comprised of 17 ZIP codes primarily located in the northwest corner of Riverside County in California.

*The value of MVC influences both the **lives of its students** and the **regional economy**.*



Economic impact analysis

MVC promotes economic growth in the MVC Service Area through its direct expenditures and the resulting expenditures of students and regional businesses. The college serves as an employer and buyer of goods and services for its day-to-day operations. The college's activities attract students from outside the MVC Service Area, whose expenditures benefit regional vendors. In addition, MVC is a primary source of higher education to the MVC Service Area residents and a supplier of trained workers to regional industries, enhancing overall productivity in the regional workforce.

Operations Spending Impact



MVC adds economic value to the MVC Service Area as an employer of regional residents and a large-scale buyer of goods and services. In FY 2016-17, the college employed 463 full-time and part-time faculty and staff, 45% of whom lived in the MVC Service Area. Total payroll at MVC was \$40.1 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. In addition, the college spent \$17.2 million on day-to-day expenses related to facilities, supplies, and professional services.

MVC's day-to-day operations spending added \$43.3 million in income to the region during the analysis year. This figure represents the college's payroll, the multiplier effects generated by the in-region spending of the college and its employees, and a downward adjustment to account for funding that the college received from regional sources. The \$43.3 million in added income is equivalent to supporting 510 jobs in the region.

Student Spending Impact



Some in-region students, referred to as retained students, would have left the MVC Service Area if not for the existence of MVC. While attending the college, these retained students spent money on groceries, accommodation, transportation, and other household expenses. This spending generated \$7.7 million in added income for the regional economy in FY 2016-17, which supported 142 jobs in the MVC Service Area.

Alumni Impact



The education and training MVC provides for regional residents has the greatest impact. Since its establishment, students have studied

IMPACTS CREATED BY MVC
IN FY 2016-17



\$43.3 million
Operations Spending Impact



\$7.7 million
Student Spending Impact



\$78.2 million
Alumni Impact



\$129.2 million
TOTAL IMPACT

- OR -

1,708
JOBS SUPPORTED

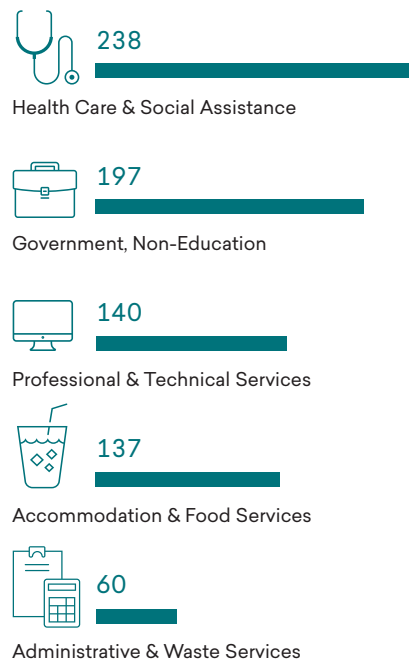
at MVC and entered the regional workforce with greater knowledge and new skills. Today, thousands of former MVC students are employed in the MVC Service Area. As a result of their MVC educations, the students receive higher earnings and increase the productivity of the businesses that employ them. In FY 2016-17, MVC alumni generated \$78.2 million in added income for the regional economy, which is equivalent to supporting 1,056 jobs.

Total Impact

MVC added \$129.2 million in income to the MVC Service Area economy during the analysis year, equal to the sum of the operations spending impact, the student spending impact, and the alumni impact. For context, the \$129.2 million impact was equal to approximately 0.8% of the total gross regional product (GRP) of the MVC Service Area. This contribution that the college provided on its own was larger than the entire Arts, Entertainment, & Recreation industry in the region.

MVC's total impact can also be expressed in terms of jobs supported. The \$129.2 million impact supported 1,708 regional jobs, using the jobs-to-sales ratios specific to each industry in the region. This means that one out of every 119 jobs in the MVC Service Area is supported by the activities of MVC and its students. In addition, the \$129.2 million, or 1,708 supported jobs, impacted regional industries in different ways. Among non-education industry sectors, MVC supported the most jobs in the Health Care & Social Assistance industry sector – supporting 238 jobs in FY 2016-17. These are impacts that would not have been generated without the college's presence in the MVC Service Area.

TOP INDUSTRIES IMPACTED BY MVC (JOBS SUPPORTED)





Investment analysis

An investment analysis evaluates the costs associated with a proposed venture against its expected benefits. If the benefits outweigh the costs, then the investment is financially worthwhile. The analysis presented here considers MVC as an investment from the perspectives of students, taxpayers, and society in California.

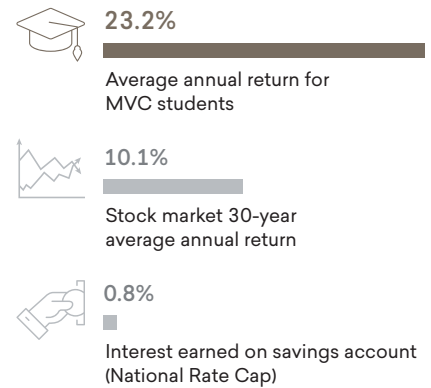
Student perspective



In FY 2016-17, MVC served 14,677 credit and 102 non-credit students. In order to attend the college, the students paid for tuition, fees, books, and supplies. They also took out loans and will incur interest on those loans. Additionally, students gave up money they would have otherwise earned had they been working instead of attending college. The total investment made by MVC's students in FY 2016-17 amounted to a present value of \$34.3 million, equal to \$13 million in out-of-pocket expenses (including future principal and interest on student loans) and \$21.3 million in forgone time and money.

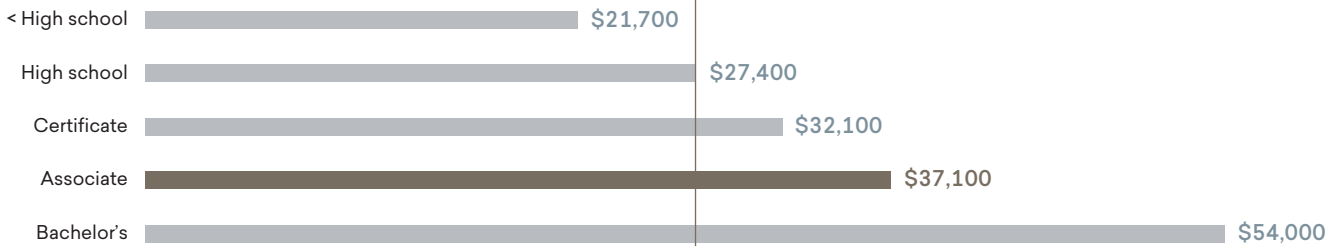
In return for their investment, MVC's students will receive a stream of higher future earnings that will continue to grow throughout their working lives. For example, the average MVC associate degree graduate from FY 2016-17 will see an increase in earnings of \$9,700 each year compared to a person with a high school diploma or equivalent working in California. Over a working lifetime, the benefits of the associate degree over a high school diploma will amount to an undiscounted value of \$397.7 thousand in higher earnings per graduate. Altogether, MVC's FY 2016-17 students will receive \$260.4 million in higher future earnings over their working lives, as a result of their education and training at MVC.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN MVC



Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.

The average associate degree graduate from MVC will see an increase in earnings of **\$9,700** each year compared to a person with a high school diploma or equivalent working in California.



Source: Emsi complete employment data.

The students' benefit-cost ratio is 7.6. In other words, for every dollar students invest in MVC, in the form of out-of-pocket expenses and forgone time and money, they will receive a cumulative value of \$7.60 in higher future earnings. Annually, the students' investment in MVC has an average annual internal rate of return of 23.2%, which is impressive compared to the U.S. stock market's 30-year average rate of return of 10.1%.

Taxpayer perspective



MVC generates more in tax revenue than it takes. These benefits to taxpayers consist primarily of taxes that the state and local government will collect from the added revenue created in the state. As MVC students will earn more, they will make higher tax payments throughout their working lives. Students' employers will also make higher tax payments as they increase their output and purchases of goods and services. By the end of the FY 2016-17 students' working lives, the state and local government will have collected a present value of \$89.3 million in added taxes.

Benefits to taxpayers will also consist of savings generated by the improved lifestyles of MVC students and the corresponding reduced government services. Education is statistically correlated with a variety of lifestyle changes. Students'

MVC educations will generate savings in three main categories: 1) healthcare, 2) crime, and 3) income assistance. Improved health will lower students' demand for national health care services. In addition, students will be less likely to interact with the criminal justice system, resulting in a reduced demand for law enforcement and victim costs. MVC students will be more employable, so their reduced demand for income assistance such as welfare and unemployment benefits will benefit taxpayers. For a list of study references, contact the college for a copy of the main report. Altogether, the present value of the benefits associated with a MVC education will generate \$16.3 million in savings to state and local taxpayers.

Total taxpayer benefits amount to \$105.6 million, the present value sum of the added taxes and public sector savings. Taxpayer costs are \$44.7 million, equal to the amount of state and local government funding MVC received in FY 2016-17. These benefits and costs yield a benefit-cost ratio of 2.4. This means that for every dollar of public money invested in MVC in FY 2016-17, taxpay-

*For every dollar of public money invested in MVC, taxpayers will receive a cumulative value of **\$2.40** over the course of the students' working lives.*



STUDENT PERSPECTIVE

\$260.4 million
Present value benefits

\$34.3 million
Present value costs

\$226.1 million
Net present value

Benefit-cost Ratio	Rate of Return
7.6	23.2%



TAXPAYER PERSPECTIVE

\$105.6 million
Present value benefits

\$44.7 million
Present value costs

\$60.8 million
Net present value

Benefit-cost Ratio	Rate of Return
2.4	5.7%



SOCIAL PERSPECTIVE

\$1.3 billion
Present value benefits

\$95.1 million
Present value costs

\$1.2 billion
Net present value

Benefit-cost Ratio	Rate of Return
13.6	n/a*

* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.

ers will receive a cumulative value of \$2.40 over the course of the students' working lives. The average annual internal rate of return for taxpayers is 5.7%, which compares favorably to other long-term investments in the public and private sectors.

Social perspective



Society as a whole in California benefits from the presence of MVC in two major ways. Primarily, society benefits from an increased economic base in the state. This is attributed to higher student earnings and increased business output, which raise economic prosperity in California.

Benefits to society also consist of the savings generated by the improved lifestyles of MVC students. As discussed in the previous section, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers but are distinct from the costs avoided by the taxpayers outlined above. Healthcare savings include avoided medical costs associated with smoking, alcohol dependence, obesity, drug abuse, and depression. Savings related to crime include reduced security expenditures and insurance administration, lower victim costs, and reduced expenditures by the criminal justice system. Income assistance savings include reduced welfare and unemployment claims. For a list of study references, contact the college for a copy of the main report.

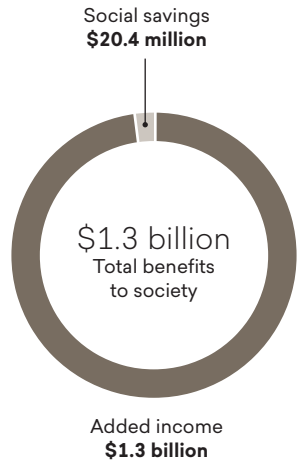
Altogether, the social benefits of MVC equal a present value of \$1.3 billion. These benefits include \$1.3 billion in added income through students' increased lifetime earnings and increased business output, as well as \$20.4 million in social savings related to health, crime, and income assistance in California. People in California invested a present value total of \$95.1 million in MVC in FY 2016-17. The cost includes all the college and student costs.

The benefit-cost ratio for society is 13.6, equal to the \$1.3 billion in benefits divided by the \$95.1 million in costs. In other words, for every dollar invested in MVC, people in California will receive a cumulative value of \$13.60 in benefits. The benefits of this investment will occur for as long as MVC's FY 2016-17 students remain employed in the state workforce.

Summary of investment analysis results

The results of the analysis demonstrate that MVC is a strong investment for all three major stakeholder groups—students, taxpayers, and society. As shown, students receive a great return for their investments in an MVC education. At the same time, taxpayers' investment in MVC returns more to government budgets than it costs and creates a wide range of social benefits throughout California.

SOCIAL BENEFITS IN CALIFORNIA FROM MVC



Conclusion

The results of this study demonstrate that MVC creates value from multiple perspectives. The college benefits regional businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers to the workforce. MVC enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. The college benefits state and local taxpayers through increased tax receipts and a reduced demand for government-supported social services. Finally, MVC benefits society as a whole in California by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students.

About the Study

Data and assumptions used in the study are based on several sources, including the FY 2016-17 academic and financial reports on MVC provided by the district, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Emsi's Multi-Regional Social Accounting Matrix model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach used in the study, please contact the college for a copy of the main report.

The results of this study demonstrate that MVC creates value from
multiple perspectives.



Emsi is a leading provider of economic impact studies and labor market data to educational institutions, workforce planners, and regional developers in the U.S. and internationally. Since 2000, Emsi has completed over 1,800 economic impact studies for educational institutions in four countries. Visit www.economicmodeling.com for more information about Emsi's products and services.



The Economic Value of Moreno Valley College

MAIN REPORT

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Executive Summary

This report assesses the impact of Moreno Valley College (MVC) on the regional economy and the benefits generated by the college for students, taxpayers, and society. The results of this study show that MVC creates a positive net impact on the regional economy and generates a positive return on investment for students, taxpayers, and society.





Economic Impact Analysis



During the analysis year, MVC spent \$40.1 million on payroll and benefits for 463 full-time and part-time employees, and spent another \$17.2 million on goods and services to carry out its day-to-day operations. This initial round of spending creates more spending across other businesses throughout the regional economy, resulting in the commonly referred to multiplier effects. This analysis estimates the net economic impact of MVC that directly takes into account the fact that state and local dollars spent on MVC could have been spent elsewhere in the region if not directed towards MVC and would have created impacts regardless.

We account for this by estimating the impacts that would have been created from the alternative spending and subtracting the alternative impacts from the spending impacts of MVC.

This analysis shows that in fiscal year (FY) 2016-17, operations and student spending of MVC, together with the enhanced productivity of its alumni, generated **\$129.2 million** in added income for the MVC Service Area economy. The additional income of **\$129.2 million** created by MVC is equal to approximately **0.8%** of the total gross regional product (GRP) of the MVC Service Area. For

*The additional income of **\$129.2 million** created by MVC is equal to approximately **0.8%** of the total gross regional product of the MVC Service Area.*

perspective, this impact from the college is larger than the entire Arts, Entertainment, & Recreation industry in the region. The impact of **\$129.2 million** is equivalent to supporting **1,708** jobs. For further perspective, this means that one out of every **119** jobs in the MVC Service Area is supported by the activities of MVC and its students. These economic impacts break down as follows:

Operations spending impact



Payroll and benefits to support MVC's day-to-day operations amounted to \$40.1 million. The college's non-pay expenditures amounted to \$17.2 million. The net impact of operations spending by the college in the MVC Service Area during the analysis year was approximately **\$43.3 million** in added income, which is equivalent to supporting **510** jobs.

Student spending impact



Some students are residents of the MVC Service Area who would have left the region if not for the existence of MVC. The money that these students spent toward living expenses in the MVC Service Area is attributable to MVC.

The expenditures of retained students in the region during the analysis year added approximately **\$7.7 million** in income for the MVC Service Area economy, which is equivalent to supporting **142** jobs.

Alumni impact



Over the years, students gained new skills, making them more productive workers, by studying at MVC. Today, thousands of these former students are employed in the MVC Service Area.

The accumulated impact of former students currently employed in the MVC Service Area workforce amounted to **\$78.2 million** in added income for the MVC Service Area economy, which is equivalent to supporting **1,056** jobs.

Important Note

When reviewing the impacts estimated in this study, it's important to note that it reports impacts in the form of added income rather than sales. Sales includes all of the intermediary costs associated with producing goods and services, as well as money that leaks out of the region as it is spent at out-of-region businesses. Income, on the other hand, is a net measure that excludes these intermediary costs and leakages, and is synonymous with gross regional product (GRP) and value added. For this reason, it is a more meaningful measure of new economic activity than sales.



Investment Analysis



Investment analysis is the practice of comparing the costs and benefits of an investment to determine whether or not it is profitable. This study considers MVC as an investment from the perspectives of students, taxpayers, and society.

Student perspective



Students invest their own money and time in their education to pay for tuition, books, and supplies. Many take out student loans to attend the college, which they will pay back over time. While some students were employed while attending the college, students overall forewent earnings that they would have generated had they been in full employment instead of learning. Summing these direct outlays, opportunity costs, and future student loan costs yields a total of **\$34.3 million** in present value student costs.

In return, students will receive a present value of **\$260.4 million** in increased earnings over their working lives. This translates to a return of **\$7.60** in higher future earnings for every \$1 that students pay for their education at MVC. The corresponding annual rate of return is **23.2%**.

Taxpayer perspective



Taxpayers provided **\$44.7 million** of state and local funding to MVC in FY 2016-17. In return, taxpayers will receive an estimated present value of **\$89.3 million** in added tax revenue stemming from the students' higher lifetime earnings and the increased output of businesses.

Savings to the public sector add another estimated **\$16.3 million** in benefits due to a reduced demand for government-funded social services in California.

For every tax dollar spent educating students attending MVC, taxpayers will receive an average of **\$2.40** in return over the course of the students' working lives. In other words, taxpayers enjoy an annual rate of return of **5.7%**.

Social perspective



California as a whole spent an estimated **\$95.1 million** on educations obtained at MVC in FY 2016-17. This includes the college's expenditures, student expenses, and student opportunity costs. In return, the state of California will receive an estimated present value of **\$1.3 billion** in added state revenue over the course of the students' working lives. California will also benefit from an estimated **\$20.4 million** in present value social savings related to reduced crime, lower welfare and unemployment, and increased health and well-being across the state. For every dollar society invests in educations from MVC, an average of **\$13.60** in benefits will accrue to California over the course of the students' careers.

*For every tax dollar spent educating students attending MVC, taxpayers will receive an average of **\$2.40** in return over the course of the students' working lives.*

Acknowledgments

Emsi gratefully acknowledges the excellent support of the staff at Moreno Valley College in making this study possible. Special thanks go to Dr. Robin Steinback, President, who approved the study, and to David Torres, Dean, Institutional Research & Strategic Planning, who collected much of the data and information requested. Any errors in the report are the responsibility of Emsi and not of any of the above-mentioned individuals.

Introduction

Moreno Valley College (MVC), established in 1991, has today grown to serve 14,677 credit and 102 non-credit students. The college is led by Dr. Robin Steinback, President. The college's service region, for the purpose of this report, is referred to as the MVC Service Area and is comprised of 17 ZIP codes primarily located in the northwest corner of Riverside County in California (see figure).

THE MVC SERVICE AREA

While MVC affects the region in a variety of ways, many of them difficult to quantify, this study is concerned with considering its economic benefits. The college naturally helps students achieve their individual potential and develop the knowledge, skills, and abilities they need to have fulfilling and prosperous careers. However, MVC impacts the MVC Service Area beyond influencing the lives of students. The college's program offerings supply employers with workers to make their businesses more productive. The college, its day-to-day operations, and the expenditures of its students support the regional economy through the output and employment generated by regional vendors. The benefits created by the college extend as far as the state treasury in terms of the increased tax receipts and decreased public sector costs generated by students across the state.



This report assesses the impact of MVC as a whole on the regional economy and the benefits generated by the college for students, taxpayers, and society. The approach is twofold. We begin with an economic impact analysis of the college on the MVC Service Area economy. To derive results, we rely on a specialized Multi-Regional Social Accounting Matrix (MR-SAM) model to calculate the added income created in the MVC Service Area economy as a result of increased consumer spending and the added knowledge, skills, and abilities of students. Results of the economic impact analysis are broken out according to the following impacts: 1) impact of the college's day-to-day operations, 2) impact of student spending, and 3) impact of alumni who are still employed in the MVC Service Area workforce.

The second component of the study measures the benefits generated by MVC for the following stakeholder groups: students, taxpayers, and society.

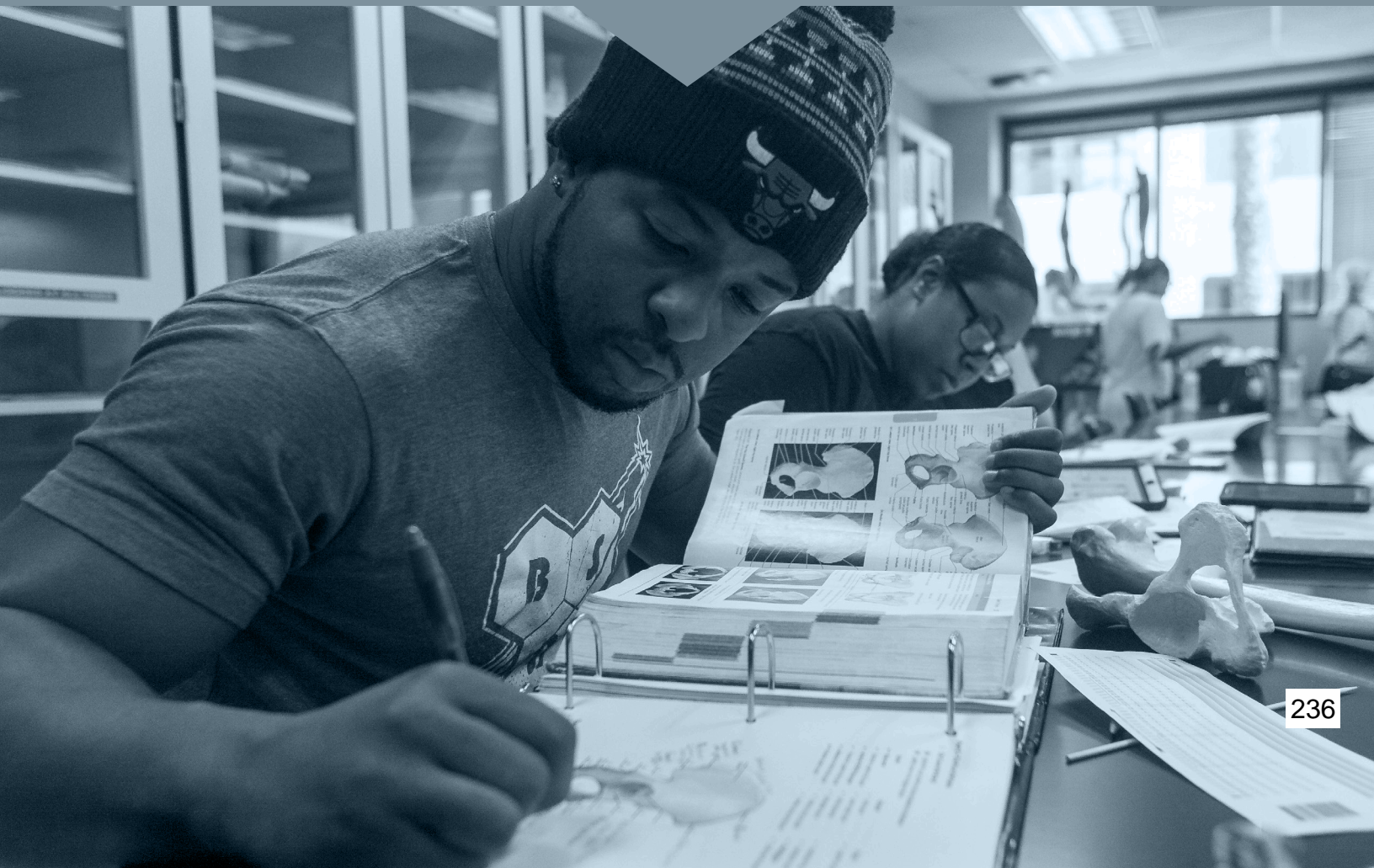
For students, we perform an investment analysis to determine how the money spent by students on their education performs as an investment over time. The students' investment in this case consists of their out-of-pocket expenses, the cost of interest incurred on student loans, and the opportunity cost of attending the college as opposed to working. In return for these investments, students receive a lifetime of higher earnings. For taxpayers, the study measures the benefits to state taxpayers in the form of increased tax revenues and public sector savings stemming from a reduced demand for social services. Finally, for society, the study assesses how the students' higher earnings and improved quality of life create benefits throughout California as a whole.

The study uses a wide array of data that are based on several sources, including the FY 2016-17 academic and financial reports from MVC; industry and employment data from the Bureau of Labor Statistics and Census Bureau; outputs of Emsi's impact model and MR-SAM model; and a variety of published materials relating education to social behavior.

CHAPTER 1:

Profile of Moreno Valley College and the Economy

Moreno Valley College (MVC), part of the Riverside Community College District (RCCD) and the California Community College System, is a degree-granting institution of higher education in the city of Moreno Valley, California. Opened in 1991, MVC offers a wide variety of affordable, accessible educational options to residents of Riverside County. In FY 2016-17, it served 15,000 credit and non-credit students.



In the mid-1980's, as Riverside County's population and economy grew, the existing educational infrastructure found itself falling behind. In response, the existing Riverside Community College expanded into a multi-location system, opening both MVC and its sister college, Norco College (NC), in 1991. After two decades of growth, both MVC and NC were fully accredited as colleges in 2010.

As part of California's higher education system, one of the key assets MVC offers its students is the ability to easily transfer to California universities to complete four-year degrees. While transfer degrees are a strong part of its academic catalogue, career-oriented degrees are also increasingly important. In total, MVC offers 54 different programs, including degrees and certificates in fields like business administration, fire technology, medical assisting, and more. It is also the district's designated center for health sciences and public safety programs.

In addition to providing the community and region with a skilled workforce through for-credit programs, MVC benefits its economy through a variety of non-credit program offerings and other services. For example, it partners with local first responders (firefighters, EMTs, and police officers) to provide training. MVC also offers a variety of basic education classes, and its career and technical training programs provide local employees with job-specific skills training.



Opened in 1991, MVC offers a wide variety of affordable, accessible educational options to residents of Riverside County.



MVC employee and finance data

The study uses two general types of information: 1) data collected from RCCD and 2) regional economic data obtained from various public sources and Emsi's proprietary data modeling tools.¹ This chapter presents the basic underlying information from MVC used in this analysis and provides an overview of the MVC Service Area economy.

Employee data

Data provided by the district include information on faculty and staff by place of work and by place of residence. These data appear in Table 1.1. As shown, MVC employed 189 full-time and 274 part-time faculty and staff in FY 2016-17 (including student workers). Of these, 100% worked in the region and 45% lived in the region. These data are used to isolate the portion of the employees' payroll and household expenses that remains in the regional economy.

Revenues

Figure 1.1 shows the college's annual revenues by funding source – a total of \$64.8 million in FY 2016-17. As indicated, tuition and fees comprised 6% of total revenue, and revenues from local, state, and federal government sources comprised another 88%. All other revenue (i.e., auxiliary revenue, sales and services, interest, and donations) comprised the remaining 6%. These data are critical in identifying the annual costs of educating the student body from the perspectives of students, taxpayers, and society.

Expenditures

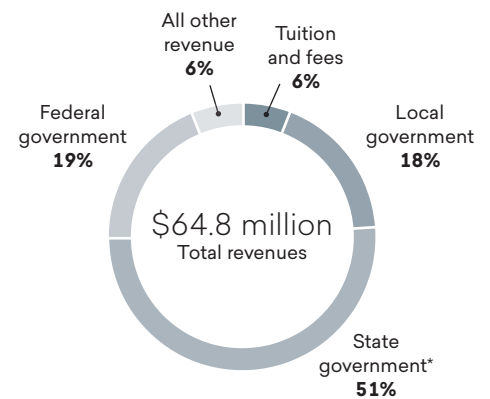
Figure 1.2 displays MVC's expense data. The combined payroll at MVC, including student salaries and wages, amounted to \$40.1 million. This was equal to 62% of the college's total expenses for FY 2016-17. Other expenditures, including operation and maintenance of plant, depreciation, and purchases of supplies and services, made up \$24.2 million. When we calculate the impact of these expenditures in Chapter 2, we exclude expenses for depreciation and interest, as they represent a devaluing of the college's assets rather than an outflow of expenditures.

TABLE 1.1: EMPLOYEE DATA, FY 2016-17

Full-time faculty and staff	189
Part-time faculty and staff	274
Total faculty and staff	463
% of employees who work in the region	100%
% of employees who live in the region	45%

Source: Data provided by RCCD.

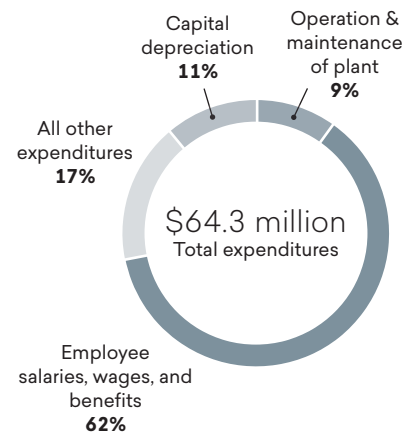
FIGURE 1.1: MVC REVENUES BY SOURCE, FY 2016-17



*Revenue from state and local government includes capital appropriations.

Source: Data provided by RCCD.

FIGURE 1.2: MVC EXPENSES BY FUNCTION, FY 2016-17



Source: Data provided by RCCD.

Percentages may not add due to rounding.

¹ See Appendix 5 for a detailed description of the data sources used in the Emsi modeling tools.



Students

MVC served 14,677 students taking courses for credit and 102 non-credit students in FY 2016-17. These numbers represent unduplicated student headcounts. The breakdown of the student body by gender was 41% male and 59% female. The breakdown by ethnicity was 15% white and 85% minority. The students' overall average age was 26 years old.² An estimated 62% of students remain in the MVC Service Area after finishing their time at MVC, another 37% settle outside the region but in the state, and the remaining 1% settle outside the state.³

Table 1.2 summarizes the breakdown of the student population and their corresponding awards and credits by education level. In FY 2016-17, MVC served 465 associate degree graduates and 286 certificate graduates. Another 12,701 students enrolled in courses for credit but did not complete a degree during the reporting year. The college offered dual credit courses to high schools, serving a total of 723 students over the course of the year. The college also served 502 basic education students and 102 personal enrichment students enrolled in non-credit courses.

We use credit hour equivalents (CHEs) to track the educational workload of the students. One CHE is equal to 15 contact hours of classroom instruction per semester. In the analysis, we exclude the CHE production of personal enrichment students under the assumption that they do not attain knowledge, skills, and abilities that will increase their earnings. The average number of CHEs per student (excluding personal enrichment students) was 8.1.

TABLE 1.2: BREAKDOWN OF STUDENT HEADCOUNT AND CHE PRODUCTION BY EDUCATION LEVEL, FY 2016-17

Category	Headcount	Total CHEs	Average CHEs
Associate degree graduates	465	7,356	15.8
Certificate graduates	286	5,343	18.7
Continuing students	12,701	98,405	7.7
Dual credit students	723	6,806	9.4
Basic education students	502	1,569	3.1
Personal enrichment students	102	163	1.6
Total, all students	14,779	119,641	8.1
Total, less personal enrichment students	14,677	119,478	8.1

Source: Data provided by RCCD.

² Unduplicated headcount, gender, ethnicity, and age data provided by RCCD.

³ Because MVC was unable to provide settlement data, Emsi used estimates based on student origin.



The MVC Service Area economy

MVC serves a region referred to as the MVC Service Area in California.⁴ Since the college was first established, it has been serving the MVC Service Area by enhancing the workforce, providing local residents with easy access to higher education opportunities, and preparing students for highly-skilled, technical professions. Table 1.3 summarizes the breakdown of the regional economy by major industrial sector ordered by total income, with details on labor and non-labor income. Labor income refers to wages, salaries, and proprietors' income. Non-labor income refers to profits, rents, and other forms of investment income.

TABLE 1.3: INCOME BY MAJOR INDUSTRY SECTOR IN THE MVC SERVICE AREA, 2017*

Industry sector	Labor income (millions)	Non-labor income (millions)	Total income (millions)**	% of total income	Sales (millions)
Other Services (except Public Administration)	\$252	\$1,855	\$2,107	13%	\$2,549
Government, Non-Education	\$1,393	\$249	\$1,642	10%	\$7,095
Health Care & Social Assistance	\$1,327	\$153	\$1,481	9%	\$2,517
Retail Trade	\$751	\$558	\$1,309	8%	\$2,053
Government, Education	\$1,306	\$0	\$1,306	8%	\$1,475
Wholesale Trade	\$580	\$641	\$1,222	8%	\$1,702
Transportation & Warehousing	\$894	\$259	\$1,153	7%	\$1,940
Manufacturing	\$539	\$498	\$1,037	7%	\$2,868
Construction	\$582	\$275	\$857	5%	\$1,521
Finance & Insurance	\$405	\$428	\$833	5%	\$1,307
Administrative & Waste Services	\$459	\$117	\$576	4%	\$898
Professional & Technical Services	\$429	\$113	\$543	3%	\$815
Accommodation & Food Services	\$291	\$184	\$475	3%	\$935
Real Estate & Rental & Leasing	\$224	\$221	\$445	3%	\$966
Information	\$129	\$246	\$375	2%	\$700
Utilities	\$43	\$125	\$168	1%	\$218
Arts, Entertainment, & Recreation	\$87	\$16	\$103	1%	\$184
Educational Services	\$83	\$6	\$89	1%	\$140
Management of Companies & Enterprises	\$65	\$6	\$72	<1%	\$128
Agriculture, Forestry, Fishing & Hunting	\$49	\$19	\$68	<1%	\$150
Mining, Quarrying, & Oil and Gas Extraction	\$4	\$5	\$10	<1%	\$14
Total	\$9,893	\$5,977	\$15,870	100%	\$30,175

* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.

** Numbers may not add due to rounding.

Source: Emsi industry data.

4 The following ZIP codes comprise the MVC Service Area: 92551, 92553, 92571, 92518, 92555, 92508, 92557, 92572, 92599, 92567, 92556, 92552, 92373, 92507, 92506, 92554, and 92521.

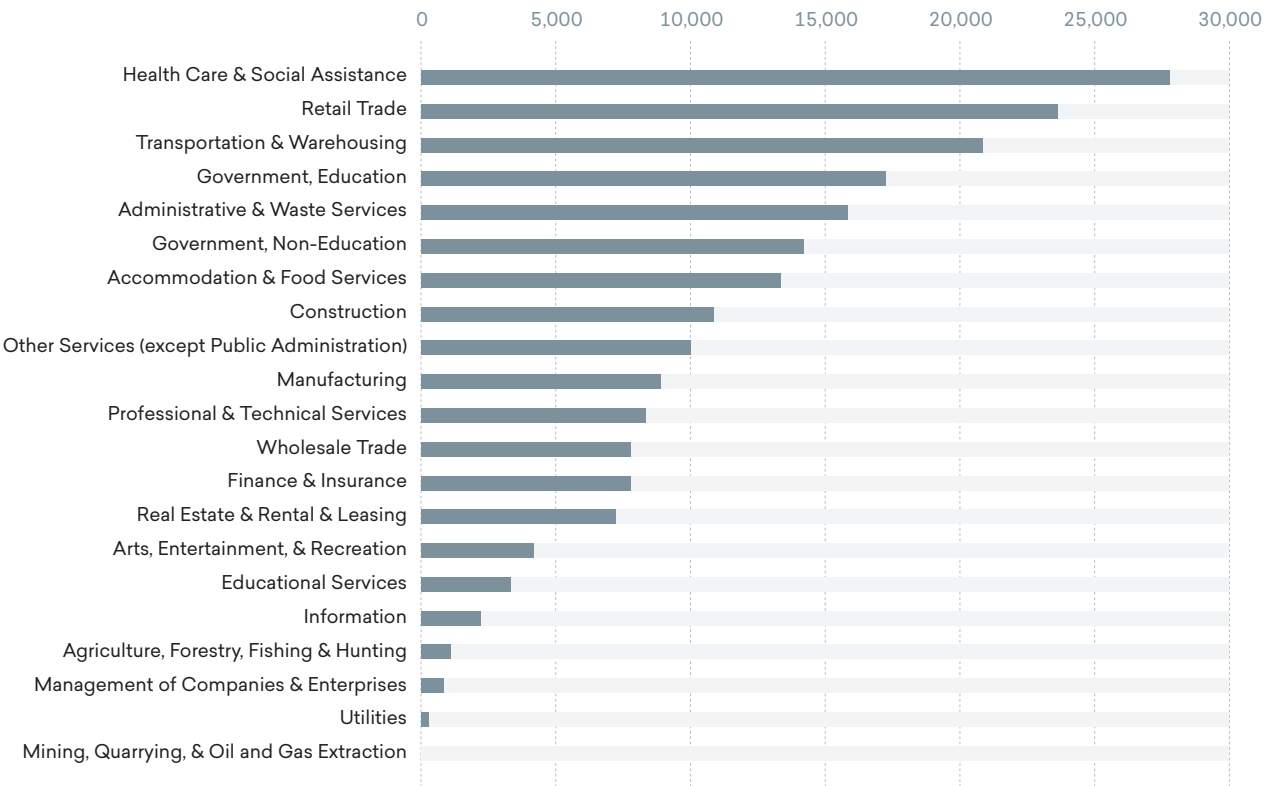


Together, labor and non-labor income comprise the region’s total income, which can also be considered as the region’s gross regional product (GRP).

As shown in Table 1.3, the total income, or GRP, of the MVC Service Area is approximately \$15.9 billion, equal to the sum of labor income (\$9.9 billion) and non-labor income (\$6 billion). In Chapter 2, we use the total added income as the measure of the relative impacts of the college on the regional economy.

Figure 1.3 provides the breakdown of jobs by industry in the MVC Service Area. The Health Care & Social Assistance sector is the largest employer, supporting 27,443 jobs or 13.5% of total employment in the region. The second largest employer is the Retail Trade sector, supporting 23,412 jobs or 11.5% of the region’s total employment. Altogether, the region supports 203,304 jobs.⁵

FIGURE 1.3: JOBS BY MAJOR INDUSTRY SECTOR IN THE MVC SERVICE AREA, 2017*



* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.
Source: Emsi employment data.

5 Job numbers reflect Emsi’s complete employment data, which includes the following four job classes: 1) employees that are counted in the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages (QCEW), 2) employees that are not covered by the federal or state unemployment insurance (UI) system and are thus excluded from QCEW, 3) self-employed workers, and 4) extended proprietors.



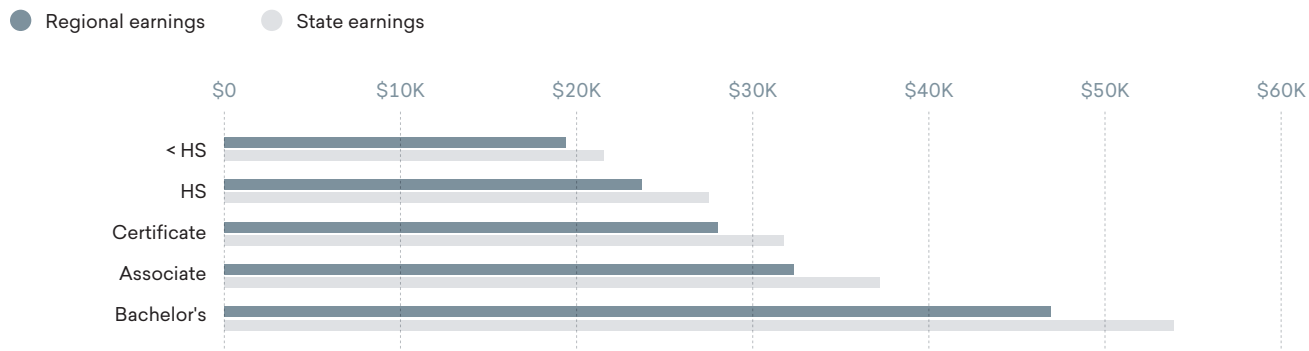
Table 1.4 and Figure 1.4 present the mean earnings by education level in the MVC Service Area and the state of California at the midpoint of the average-aged worker's career. These numbers are derived from Emsi's complete employment data on average earnings per worker in the region and the state.⁶ The numbers are then weighted by the college's demographic profile. As shown, students have the potential to earn more as they achieve higher levels of education compared to maintaining a high school diploma. Students who earn an associate degree from MVC can expect approximate wages of \$32,500 per year within the MVC Service Area, approximately \$8,500 more than someone with a high school diploma.

TABLE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN MVC STUDENT'S CAREER MIDPOINT

Education level	Regional earnings	Difference from next lowest degree	State earnings	Difference from next lowest degree
Less than high school	\$19,200	n/a	\$21,700	n/a
High school or equivalent	\$24,000	\$4,800	\$27,400	\$5,700
Certificate	\$28,100	\$4,100	\$32,100	\$4,700
Associate degree	\$32,500	\$4,400	\$37,100	\$5,000
Bachelor's degree	\$47,200	\$14,700	\$54,000	\$16,900

Source: Emsi employment data.

FIGURE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN MVC STUDENT'S CAREER MIDPOINT



Source: Emsi employment data.

⁶ Wage rates in the Emsi MR-SAM model combine state and federal sources to provide earnings that reflect complete employment in the state, including proprietors, self-employed workers, and others not typically included in regional or state data, as well as benefits and all forms of employer contributions. As such, Emsi industry earnings-per-worker numbers are generally higher than those reported by other sources.



CHAPTER 2:

Economic Impacts on the MVC Service Area Economy

MVC impacts the MVC Service Area economy in a variety of ways. The college is an employer and buyer of goods and services. It attracts monies that otherwise would not have entered the regional economy through its day-to-day operations and the expenditures of its students. Further, it provides students with the knowledge, skills, and abilities they need to become productive citizens and add to the overall output of the region.



In this chapter, we estimate the following economic impacts of MVC: 1) the operations spending impact, 2) the student spending impact, and 3) the alumni impact, measuring the income added in the region as former students expand the regional economy's stock of human capital.

When exploring each of these economic impacts, we consider the following hypothetical question:

How would economic activity change in the MVC Service Area if MVC and all its alumni did not exist in FY 2016-17?

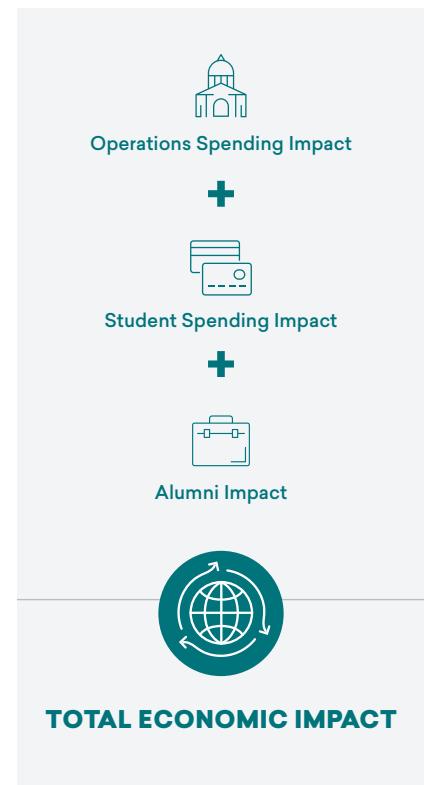
Each of the economic impacts should be interpreted according to this hypothetical question. Another way to think about the question is to realize that we measure net impacts, not gross impacts. Gross impacts represent an upper-bound estimate in terms of capturing all activity stemming from the college; however, net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

Economic impact analyses use different types of impacts to estimate the results. The impact focused on in this study assesses the change in income. This measure is similar to the commonly used gross regional product (GRP). Income may be further broken out into the **labor income impact**, also known as earnings, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in business profits. Together, labor income and non-labor income sum to total income.

Another way to state the impact is in terms of **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. Finally, a frequently used measure is the **sales impact**, which comprises the change in business sales revenue in the economy as a result of increased economic activity. It is important to bear in mind, however, that much of this sales revenue leaves the regional economy through intermediary transactions and costs.⁷ All of these measures – added labor and non-labor income, total income, jobs, and sales – are used to estimate the economic impact results presented in this chapter. The analysis breaks out the impact measures into different components, each based on the economic effect that caused the impact. The following is a list of each type of effect presented in this analysis:

- The **initial effect** is the exogenous shock to the economy caused by the initial spending of money, whether to pay for salaries and wages, purchase goods or services, or cover operating expenses.

⁷ See Appendix 4 for an example of the intermediary costs included in the sales impact but not in the income impact.



- The initial round of spending creates more spending in the economy, resulting in what is commonly known as the **multiplier effect**. The multiplier effect comprises the additional activity that occurs across all industries in the economy and may be further decomposed into the following three types of effects:
 - The **direct effect** refers to the additional economic activity that occurs as the industries affected by the initial effect spend money to purchase goods and services from their supply chain industries.
 - The **indirect effect** occurs as the supply chain of the initial industries creates even more activity in the economy through their own inter-industry spending.
 - The **induced effect** refers to the economic activity created by the household sector as the businesses affected by the initial, direct, and indirect effects raise salaries or hire more people.

Net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

The terminology used to describe the economic effects listed above differs slightly from that of other commonly used input-output models, such as IMPLAN. For example, the initial effect in this study is called the “direct effect” by IMPLAN, as shown in the table below. Further, the term “indirect effect” as used by IMPLAN refers to the combined direct and indirect effects defined in this study. To avoid confusion, readers are encouraged to interpret the results presented in this chapter in the context of the terms and definitions listed above. Note that, regardless of the effects used to decompose the results, the total impact measures are analogous.

Emsi	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

Multiplier effects in this analysis are derived using Emsi’s MR-SAM input-output model that captures the interconnection of industries, government, and households in the region. The Emsi MR-SAM contains approximately 1,000 industry sectors at the highest level of detail available in the North American Industry Classification System (NAICS) and supplies the industry-specific multipliers required to determine the impacts associated with increased activity within a given economy. For more information on the Emsi MR-SAM model and its data sources, see Appendix 5.





Operations spending impact

Faculty and staff payroll is part of the region’s total earnings, and the spending of employees for groceries, apparel, and other household expenditures helps support regional businesses. The college itself purchases supplies and services, and many of its vendors are located in the MVC Service Area. These expenditures create a ripple effect that generates still more jobs and higher wages throughout the economy.

Table 2.1 presents college expenditures for the following three categories: 1) salaries, wages, and benefits, 2) operation and maintenance of plant, and 3) all other expenditures (including purchases for supplies and services). In this analysis, we exclude expenses for depreciation and interest due to the way those measures are calculated in the national input-output accounts, and because depreciation represents the devaluing of the college’s assets rather than an outflow of expenditures.⁸ The first step in estimating the multiplier effects of the college’s operational expenditures is to map these categories of expenditures to the approximately 1,000 industries of the Emsi MR-SAM model. Assuming that the spending patterns of college personnel approximately match those of the average consumer, we map salaries, wages, and benefits to spending on industry outputs using national household expenditure coefficients provided by Emsi’s national SAM. All MVC employees work in the MVC Service Area (see Table 1.1), and therefore we consider 100% of the salaries, wages, and benefits. For the other two expenditure categories (i.e., operation and maintenance of plant and all other expenditures), we assume the college’s spending patterns approximately match national averages and apply the national spending coefficients for NAICS 611210 (Junior Colleges).⁹ Operation and maintenance of plant



TABLE 2.1: MVC EXPENSES BY FUNCTION (EXCLUDING DEPRECIATION & INTEREST), FY 2016-17

Expense category	In-region expenditures (thousands)	Out-of-region expenditures (thousands)	Total expenditures (thousands)
Employee salaries, wages, and benefits	\$40,097	\$0	\$40,097
Operation and maintenance of plant	\$1,887	\$4,199	\$6,086
All other expenditures	\$2,339	\$8,804	\$11,143
Total	\$44,323	\$13,003	\$57,326

Source: Data provided by RCCD and the Emsi impact model.

⁸ This aligns with the economic impact guidelines set by the Association of Public and Land-Grant Universities. Ultimately, excluding these measures results in more conservative and defensible estimates.

⁹ See Appendix 2 for a definition of NAICS.



expenditures are mapped to the industries that relate to capital construction, maintenance, and support, while the college's remaining expenditures are mapped to the remaining industries.

We now have three vectors of expenditures for MVC: one for salaries, wages, and benefits; another for operation and maintenance of plant; and a third for the college's purchases of supplies and services. The next step is to estimate the portion of these expenditures that occurs inside the region. The expenditures occurring outside the region are known as leakages. We estimate in-region expenditures using regional purchase coefficients (RPCs), a measure of the overall demand for the commodities produced by each sector that is satisfied by regional suppliers, for each of the approximately 1,000 industries in the MR-SAM model.¹⁰ For example, if 40% of the demand for NAICS 541211 (Offices of Certified Public Accountants) is satisfied by regional suppliers, the RPC for that industry is 40%. The remaining 60% of the demand for NAICS 541211 is provided by suppliers located outside the region. The three vectors of expenditures are multiplied, industry by industry, by the corresponding RPC to arrive at the in-region expenditures associated with the college. See Table 2.1 for a break-out of the expenditures that occur in-region. Finally, in-region spending is entered, industry by industry, into the MR-SAM model's multiplier matrix, which in turn provides an estimate of the associated multiplier effects on regional labor income, non-labor income, total income, sales, and jobs.

Table 2.2 presents the economic impact of college operations spending. The people employed by MVC and their salaries, wages, and benefits comprise the initial effect, shown in the top row of the table in terms of labor income, non-labor income, total added income, sales, and jobs. The additional impacts created by the initial effect appear in the next four rows under the section

TABLE 2.2: OPERATIONS SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$40,097	\$0	\$40,097	\$57,326	463
Multiplier effect					
Direct effect	\$1,250	\$1,043	\$2,293	\$4,225	34
Indirect effect	\$147	\$90	\$237	\$509	4
Induced effect	\$1,539	\$1,582	\$3,121	\$4,903	38
Total multiplier effect	\$2,937	\$2,715	\$5,652	\$9,637	77
Gross impact (initial + multiplier)	\$43,034	\$2,715	\$45,749	\$66,963	540
Less alternative uses of funds	-\$1,221	-\$1,226	-\$2,447	-\$3,810	-30
Net impact	\$41,813	\$1,489	\$43,302	\$63,152	510

Source: Emsi impact model.

10 See Appendix 5 for a description of Emsi's MR-SAM model.



labeled *multiplier effect*. Summing the initial and multiplier effects, the gross impacts are \$43 million in labor income and \$2.7 million in non-labor income. This comes to a total impact of \$45.7 million in total added income associated with the spending of the college and its employees in the region. This is equivalent to supporting 540 jobs.

The \$45.7 million in gross impact is often reported by researchers as the total impact. We go a step further to arrive at a net impact by applying a counterfactual scenario, i.e., what would have happened if a given event – in this case, the expenditure of in-region funds on MVC – had not occurred. MVC received an estimated 25% of its funding from sources within the MVC Service Area. These monies came from the tuition and fees paid by resident students, from the auxiliary revenue and donations from private sources located within the region, from state and local taxes, and from the financial aid issued to students by state and local government. We must account for the opportunity cost of this in-region funding. Had other industries received these monies rather than MVC, income impacts would have still been created in the economy. In economic analysis, impacts that occur under counterfactual conditions are used to offset the impacts that actually occur in order to derive the true impact of the event under analysis.

We estimate this counterfactual by simulating a scenario where in-region monies spent on the college are instead spent on consumer goods and savings. This simulates the in-region monies being returned to the taxpayers and being spent by the household sector. Our approach is to establish the total amount spent by in-region students and taxpayers on MVC, map this to the detailed industries of the MR-SAM model using national household expenditure coefficients, use the industry RPCs to estimate in-region spending, and run the in-region spending through the MR-SAM model's multiplier matrix to derive multiplier effects. The results of this exercise are shown as negative values in the row labeled *less alternative uses of funds* in Table 2.2.

The total net impact of the college's operations is equal to the gross impact less the impact of the alternative use of funds – the opportunity cost of the regional money. As shown in the last row of Table 2.2, the total net impact is approximately \$41.8 million in labor income and \$1.5 million in non-labor income. This sums together to \$43.3 million in total added income and is equivalent to supporting 510 jobs. These impacts represent new economic activity created in the regional economy solely attributable to the operations of MVC.

*The total net impact of the college's operations is **\$43.3 million** in total added income, which is equivalent to supporting **510** jobs.*





Student spending impact



In-region students contribute to the student spending impact of MVC; however, not all of these students can be counted towards the impact. Only those students who were retained, or who would have left the region to seek education elsewhere had they not attended MVC, are measured. Students who would have stayed in the region anyway are not counted towards the impact since their monies would have been added to the MVC Service Area economy regardless of MVC.

While there were 8,397 students attending MVC who originated from the MVC Service Area (not including personal enrichment students and dual credit high school students), not all of them would have remained in the region if not for the existence of MVC. We apply a conservative assumption that 10% of these students would have left the MVC Service Area for other education opportunities if MVC did not exist.¹¹ Therefore, we recognize that the in-region spending of 840 students retained in the region is attributable to MVC. These students, called retained students, spent money at businesses in the region for everyday needs such as groceries, accommodation, and transportation.

The average costs for students appear in the first section of Table 2.3, equal to \$19,818 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations impact discussed in the previous section. We multiply the \$19,818 in annual

¹¹ See Appendix 1 for a sensitivity analysis of the retained student variable.



costs by the 840 students who were retained because of MVC and lived in-region but off campus. This provides us with an estimate of their total spending. The off-campus spending of retained students, once net of monies paid to student workers, generated sales of \$16.6 million, as shown in the bottom row of Table 2.3.

TABLE 2.3: AVERAGE STUDENT COSTS AND TOTAL SALES GENERATED BY RETAINED STUDENTS IN THE MVC SERVICE AREA, FY 2016-17

Room and board	\$15,660
Personal expenses	\$2,363
Transportation	\$1,795
Total expenses per student	\$19,818
Number of students that were retained	840
Total gross off-campus sales	\$16,641,175
Wages and salaries paid to student workers*	\$20,893
Net off-campus sales	\$16,620,282

* This figure reflects only the portion of payroll that was used to cover the living expenses of retained student workers who lived in the region.

Source: Student costs provided by RCCD. Emsi provided an estimate of the monies paid to student workers because the district was unable to provide the data. The number of retained students who lived in the region off campus while attending is derived by Emsi from the student origin data and in-term residence data provided by RCCD. The data is based on all students.

Estimating the impacts generated by the \$16.6 million in student spending follows a procedure similar to that of the operations impact described above. We distribute the \$16.6 million in sales to the industry sectors of the MR-SAM model, apply RPCs to reflect in-region spending, and run the net sales figures through the MR-SAM model to derive multiplier effects.

Table 2.4 presents the results. The initial effect is purely sales-oriented and there is no change in labor or non-labor income. The impact of retained student spending thus falls entirely under the multiplier effect. The total impact of student spending is \$3.9 million in labor income and \$3.8 million in non-labor income. This sums together to \$7.7 million in total added income and is equivalent to supporting 142 jobs. These values represent the direct effects created at the businesses patronized by the students, the indirect effects created by the supply chain of those businesses, and the effects of the increased spending of the household sector throughout the regional economy as a result of the direct and indirect effects.

*The total impact of student spending is **\$7.7 million** in total added income and is equivalent to supporting **142 jobs**.*



TABLE 2.4: STUDENT SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$0	\$0	\$0	\$16,620	0
Multiplier effect					
Direct effect	\$3,185	\$3,129	\$6,314	\$10,050	117
Indirect effect	\$203	\$194	\$397	\$635	7
Induced effect	\$489	\$503	\$992	\$1,571	18
Total multiplier effect	\$3,877	\$3,826	\$7,703	\$12,256	142
Total impact (initial + multiplier)	\$3,877	\$3,826	\$7,703	\$28,876	142

Source: Emsi impact model.





Alumni impact



In this section, we estimate the economic impacts stemming from the added labor income of alumni in combination with their employers' added non-labor income. This impact is based on the number of students who have attended MVC *throughout its history*. We then use this total number to consider the impact of those students in the single FY 2016-17. Former students who earned a degree as well as those who may not have finished their degree or did not take courses for credit are considered alumni.

While MVC creates an economic impact through its operations and student spending, the greatest economic impact of MVC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni. While attending MVC, students gain experience, education, and the knowledge, skills, and abilities that increase their productivity and allow them to command a higher wage once they enter the workforce. But the reward of increased productivity does not stop there. Talented professionals make capital more productive too (e.g., buildings, production facilities, equipment). The employers of MVC alumni enjoy the fruits of this increased productivity in the form of additional non-labor income (i.e., higher profits).

The methodology here differs from the previous impacts in one fundamental way. Whereas the previous spending impacts depend on an annually renewed injection of new sales into the regional economy, the alumni impact is the result

The greatest economic impact of MVC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni.



of years of past instruction and the associated accumulation of human capital. The initial effect of alumni is comprised of two main components. The first and largest of these is the added labor income of MVC's former students. The second component of the initial effect is comprised of the added non-labor income of the businesses that employ former students of MVC.

We begin by estimating the portion of alumni who are employed in the workforce. To estimate the historical employment patterns of alumni in the region, we use the following sets of data or assumptions: 1) settling-in factors to determine how long it takes the average student to settle into a career;¹² 2) death, retirement, and unemployment rates from the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics; and 3) state migration data from the Census Bureau. The result is the estimated portion of alumni from each previous year who were still actively employed in the region as of FY 2016-17.

The next step is to quantify the skills and human capital that alumni acquired from the college. We use the students' production of CHEs as a proxy for accumulated human capital. The average number of CHEs completed per student in FY 2016-17 was 8.1. To estimate the number of CHEs present in the workforce during the analysis year, we use the college's historical student headcount over the past 27 years, from FY 1990-91 to FY 2016-17.¹³ We multiply the 8.1 average CHEs per student by the headcounts that we estimate are still actively employed from each of the previous years.¹⁴ Students who enroll at the college more than one year are counted at least twice in the historical enrollment data. However, CHEs remain distinct regardless of when and by whom they were earned, so there is no duplication in the CHE counts. We estimate there are approximately 1 million CHEs from alumni active in the workforce.

Next, we estimate the value of the CHEs, or the skills and human capital acquired by MVC alumni. This is done using the *incremental* added labor income stemming from the students' higher wages. The incremental added labor income is the difference between the wage earned by MVC alumni and the alternative wage they would have earned had they not attended MVC. Using the regional incremental earnings, credits required, and distribution of credits at each level of study, we estimate the average value per CHE to equal \$119. This value represents the regional average incremental increase in wages that alumni of MVC received during the analysis year for every CHE they completed.

12 Settling-in factors are used to delay the onset of the benefits to students in order to allow time for them to find employment and settle into their careers. In the absence of hard data, we assume a range between one and three years for students who graduate with a certificate or a degree, and between one and five years for returning students.

13 The 27-year time horizon is equal to the number of years that MVC was in operation since it was established in 1991.

14 This assumes the average level of study from past years is equal to the level of study of students today. Emsi used data provided by RCCD for a previous study to estimate students' credit load in prior years.



Because workforce experience leads to increased productivity and higher wages, the value per CHE varies depending on the students' workforce experience, with the highest value applied to the CHEs of students who had been employed the longest by FY 2016-17, and the lowest value per CHE applied to students who were just entering the workforce. More information on the theory and calculations behind the value per CHE appears in Appendix 6. In determining the amount of added labor income attributable to alumni, we multiply the CHEs of former students in each year of the historical time horizon by the corresponding average value per CHE for that year, and then sum the products together. This calculation yields approximately \$123.1 million in gross labor income from increased wages received by former students in FY 2016-17 (as shown in Table 2.5).

TABLE 2.5: NUMBER OF CHES IN WORKFORCE AND INITIAL LABOR INCOME CREATED IN THE MVC SERVICE AREA, FY 2016-17

Number of CHEs in workforce	1,036,872
Average value per CHE	\$119
Initial labor income, gross	\$123,149,445
Counterfactuals	
Percent reduction for alternative education opportunities	15%
Percent reduction for adjustment for labor import effects	50%
Initial labor income, net	\$52,338,514

Source: Emsi impact model.

The next two rows in Table 2.5 show two adjustments used to account for counterfactual outcomes. As discussed above, counterfactual outcomes in economic analysis represent what would have happened if a given event had not occurred. The event in question is the education and training provided by MVC and subsequent influx of skilled labor into the regional economy. The first counterfactual scenario that we address is the adjustment for alternative education opportunities. In the counterfactual scenario where MVC does not exist, we assume a portion of MVC alumni would have received a comparable education elsewhere in the region or would have left the region and received a comparable education and then returned to the region. The incremental added labor income that accrues to those students cannot be counted towards the added labor income from MVC alumni. The adjustment for alternative education opportunities amounts to a 15% reduction of the \$123.1 million in added labor income. This means that 15% of the added labor income from MVC alumni would have been generated in the region anyway, even if the college did not exist. For more information on the alternative education adjustment, see Appendix 7.

The other adjustment in Table 2.5 accounts for the importation of labor. Suppose MVC did not exist and in consequence there were fewer skilled workers



in the region. Businesses could still satisfy some of their need for skilled labor by recruiting from outside the MVC Service Area. We refer to this as the labor import effect. Lacking information on its possible magnitude, we assume 50% of the jobs that students fill at regional businesses could have been filled by workers recruited from outside the region if the college did not exist.¹⁵ Consequently, the gross labor income must be adjusted to account for the importation of this labor, since it would have happened regardless of the presence of the college. We conduct a sensitivity analysis for this assumption in Appendix 1. With the 50% adjustment, the net added labor income added to the economy comes to \$52.3 million, as shown in Table 2.5.

The \$52.3 million in added labor income appears under the initial effect in the labor income column of Table 2.6. To this we add an estimate for initial non-labor income. As discussed earlier in this section, businesses that employ former students of MVC see higher profits as a result of the increased productivity of their capital assets. To estimate this additional income, we allocate the initial increase in labor income (\$52.3 million) to the six-digit NAICS industry sectors where students are most likely to be employed. This allocation entails a process that maps completers in the region to the detailed occupations for which those completers have been trained, and then maps the detailed occupations to the six-digit industry sectors in the MR-SAM model.¹⁶ Using a crosswalk created by National Center for Education Statistics (NCES) and the Bureau of Labor Statistics, we map the breakdown of the college's completers to the approximately 700 detailed occupations in the Standard Occupational Classification (SOC) system. Finally, we apply a matrix of wages by industry and by occupation from the MR-SAM model to map the occupational distribution of the \$52.3 million in initial labor income effects to the detailed industry sectors in the MR-SAM model.¹⁷

Once these allocations are complete, we apply the ratio of non-labor to labor income provided by the MR-SAM model for each sector to our estimate of initial labor income. This computation yields an estimated \$13.6 million in added non-labor income attributable to the college's alumni. Summing initial labor and non-labor income together provides the total initial effect of alumni productivity in the MVC Service Area economy, equal to approximately \$66 million. To estimate multiplier effects, we convert the industry-specific income figures generated through the initial effect to sales using sales-to-income



15 A similar assumption is used by Walden (2014) in his analysis of the Cooperating Raleigh Colleges.

16 Completer data comes from the Integrated Postsecondary Education Data System (IPEDS), which organizes program completions according to the Classification of Instructional Programs (CIP) developed by the National Center for Education Statistics (NCES).

17 For example, if the MR-SAM model indicates that 20% of wages paid to workers in SOC 51-4121 (Welders) occur in NAICS 332313 (Plate Work Manufacturing), then we allocate 20% of the initial labor income effect under SOC 51-4121 to NAICS 332313.



ratios from the MR-SAM model. We then run the values through the MR-SAM's multiplier matrix.

TABLE 2.6: ALUMNI IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$52,339	\$13,613	\$65,952	\$169,258	900
Multiplier effect					
Direct effect	\$3,097	\$739	\$3,836	\$8,393	57
Indirect effect	\$300	\$77	\$377	\$799	6
Induced effect	\$6,214	\$1,780	\$7,994	\$20,215	93
Total multiplier effect	\$9,611	\$2,595	\$12,207	\$29,406	156
Total impact (initial + multiplier)	\$61,950	\$16,209	\$78,159	\$198,664	1,056

Source: Emsi impact model.

Table 2.6 shows the multiplier effects of alumni. Multiplier effects occur as alumni generate an increased demand for consumer goods and services through the expenditure of their higher wages. Further, as the industries where alumni are employed increase their output, there is a corresponding increase in the demand for input from the industries in the employers' supply chain. Together, the incomes generated by the expansions in business input purchases and household spending constitute the multiplier effect of the increased productivity of the college's alumni. The final results are \$9.6 million in added labor income and \$2.6 million in added non-labor income, for an overall total of \$12.2 million in multiplier effects. The grand total of the alumni impact thus comes to \$78.2 million in total added income, the sum of all initial and multiplier labor and non-labor income effects. This is equivalent to supporting 1,056 jobs.





Total MVC impact

The total economic impact of MVC on the MVC Service Area can be generalized into two broad types of impacts. First, on an annual basis, MVC generates a flow of spending that has a significant impact on the MVC Service Area economy. The impacts of this spending are captured by the operations and student spending impacts. While not insignificant, these impacts do not capture the true purpose of MVC. The basic mission of MVC is to foster human capital. Every year, a new cohort of former MVC students adds to the stock of human capital in the MVC Service Area, and a portion of alumni continues to add to the MVC Service Area economy. Table 2.7 displays the grand total impacts of MVC on the MVC Service Area economy in FY 2016-17. For context, the percentages of MVC compared to the total labor income, total non-labor income, combined total income, sales, and jobs in the MVC Service Area, as presented in Table 1.3 and Figure 1.3, are included. The total added value of MVC is **\$129.2 million**, equivalent to **0.8%** of the GRP of the MVC Service Area. By comparison, this contribution that the college provided on its own was larger than the entire Arts, Entertainment, & Recreation industry in the region. MVC's total impact supported **1,708** jobs in FY 2016-17. For perspective, this means that one out of every **119** jobs in the MVC Service Area is supported by the activities of MVC and its students.

TABLE 2.7: TOTAL MVC IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Operations spending	\$41,813	\$1,489	\$43,302	\$63,152	510
Student spending	\$3,877	\$3,826	\$7,703	\$28,876	142
Alumni	\$61,950	\$16,209	\$78,159	\$198,664	1,056
Total impact	\$107,640	\$21,523	\$129,163	\$290,692	1,708
% of the MVC Service Area economy	1.1%	0.4%	0.8%	1.0%	0.8%

Source: Emsi impact model.



These impacts, stemming from spending related to the college and its students, spread throughout the regional economy and affect individual industry sectors. Table 2.8 displays the total impact of MVC on industry sectors based on their two-digit NAICS code. The table shows the total impact of operations, students, and alumni, as shown in Table 2.7, broken down by industry sector using processes outlined earlier in this chapter. By showing the impact on individual industry sectors, it is possible to see in finer detail where MVC has the greatest impact. For example, MVC’s impact for the Health Care & Social Assistance industry sector was 238 jobs in FY 2016-17.

TABLE 2.8: TOTAL MVC IMPACT BY INDUSTRY, FY 2016-17

Industry sector	Total income (thousands)	Jobs supported
Government, Education	\$51,722	618
Government, Non-Education	\$23,593	197
Health Care & Social Assistance	\$12,373	238
Accommodation & Food Services	\$7,258	137
Professional & Technical Services	\$5,519	140
Manufacturing	\$5,359	32
Management of Companies & Enterprises	\$3,560	37
Utilities	\$2,532	6
Finance & Insurance	\$2,500	16
Administrative & Waste Services	\$2,240	60
Wholesale Trade	\$1,852	12
Retail Trade	\$1,834	32
Construction	\$1,572	21
Information	\$1,518	9
Transportation & Warehousing	\$1,380	24
Real Estate & Rental & Leasing	\$1,338	23
Other Services (except Public Administration)	\$1,302	41
Arts, Entertainment, & Recreation	\$998	40
Educational Services	\$574	22
Agriculture, Forestry, Fishing, & Hunting	\$91	2
Mining, Quarrying, & Oil and Gas Extraction	\$48	<1
Total impact	\$129,163	1,708

Source: Emsi impact model.



Investment Analysis

The benefits generated by MVC affect the lives of many people. The most obvious beneficiaries are the college's students; they give up time and money to go to the college in return for a lifetime of higher wages and improved quality of life. But the benefits do not stop there. As students earn more, communities and citizens throughout California benefit from an enlarged economy and a reduced demand for social services. In the form of increased tax revenues and public sector savings, the benefits of education extend as far as the state and local government.

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered infeasible. In this chapter, we consider MVC as a worthwhile investment from the perspectives of students, taxpayers, and society.





Student perspective

To enroll in postsecondary education, students pay money for tuition and forego monies that otherwise they would have earned had they chosen to work instead of attend college. From the perspective of students, education is the same as an investment; i.e., they incur a cost, or put up a certain amount of money, with the expectation of receiving benefits in return. The total costs consist of the monies that students pay in the form of tuition and fees and the opportunity costs of foregone time and money. The benefits are the higher earnings that students receive as a result of their education.

Calculating student costs

Student costs consist of three main items: direct outlays, opportunity costs, and future principal and interest costs incurred from student loans. Direct outlays include tuition and fees, equal to \$3.7 million from Figure 1.1. Direct outlays also include the cost of books and supplies. On average, full-time students spent \$1,792 each on books and supplies during the reporting year.¹⁸ Multiplying this figure by the number of full-time equivalents (FTEs) produced by MVC in FY 2016-17¹⁹ generates a total cost of \$9.3 million for books and supplies.

In order to pay the cost of tuition, many students had to take out loans. These students not only incur the cost of tuition from the college but also incur the interest cost of taking out loans. In FY 2016-17, students received a total of \$785.5 thousand in federal loans to attend MVC.²⁰ Students pay back these loans along with interest over the span of several years in the future. Since students pay off these loans over time, they accrue no initial cost during the analysis year. Hence, to avoid double counting, the \$785.5 thousand in federal loans is subtracted from the costs incurred by students in FY 2016-17.

In addition to the cost of tuition, books, and supplies, students also experience an opportunity cost of attending college during the analysis year. Opportunity cost is the most difficult component of student costs to estimate. It measures the value of time and earnings foregone by students who go to the college rather than work. To calculate it, we need to know the difference between the students' full earning potential and what they actually earn while attending the college.

18 Based on the data provided by RCCD.

19 A single FTE is equal to 30 CHEs, so there were 3,983 FTEs produced by students in FY 2016-17, equal to 119,641 CHEs divided by 30 (excluding personal enrichment students).

20 Due to data limitations, only federal loans are considered in this analysis.



STUDENT COSTS



Out-of-Pocket Expenses



Opportunity Costs

STUDENT BENEFITS



Higher Earnings from Education



We derive the students' full earning potential by weighting the average annual earnings levels in Table 1.4 according to the education level breakdown of the student population when they first enrolled.²¹ However, the earnings levels in Table 1.4 reflect what average workers earn at the midpoint of their careers, not while attending the college. Because of this, we adjust the earnings levels to the average age of the student population (26) to better reflect their wages at their current age.²² This calculation yields an average full earning potential of \$16,126 per student.

In determining how much students earn while enrolled in postsecondary education, an important factor to consider is the time that they actually spend on postsecondary education, since this is the only time that they are required to give up a portion of their earnings. We use the students' CHE production as a proxy for time, under the assumption that the more CHEs students earn, the less time they have to work, and, consequently, the greater their foregone earnings. Overall, students attending MVC earned an average of 8.1 CHEs per student (excluding personal enrichment students and dual credit high school students), which is approximately equal to 27% of a full academic year.²³ We thus include no more than \$4,340 (or 27%) of the students' full earning potential in the opportunity cost calculations.

Another factor to consider is the students' employment status while enrolled in postsecondary education. It is estimated that 75% of students are employed.²⁴ For the remainder of students, we assume that they are either seeking work or planning to seek work once they complete their educational goals (with the exception of personal enrichment students, who are not included in this calculation). By choosing to enroll, therefore, non-working students give up everything that they can potentially earn during the academic year (i.e., the \$4,340). The total value of their foregone earnings thus comes to \$15.1 million.

Working students are able to maintain all or part of their earnings while enrolled. However, many of them hold jobs that pay less than statistical averages, usually because those are the only jobs they can find that accommodate their course schedule. These jobs tend to be at entry level, such as restaurant servers or cashiers. To account for this, we assume that working students hold jobs that pay 69% of what they would have earned had they chosen to work full-time rather than go to college.²⁵ The remaining 31% comprises the percentage of

21 This is based on students who reported their prior level of education to MVC. The prior level of education data was then adjusted to exclude dual credit high school students.

22 Further discussion on this adjustment appears in Appendix 6.

23 Equal to 8.1 CHEs divided by \$30, the assumed number of CHEs in a full-time academic year.

24 Emsi provided an estimate of the percentage of students employed because MVC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

25 The 69% assumption is based on the average hourly wage of jobs commonly held by working students divided by the national average hourly wage. Occupational wage estimates are published by the Bureau of Labor Statistics (see http://www.bls.gov/oes/current/oes_nat.htm).



their full earning potential that they forego. Obviously this assumption varies by person; some students forego more and others less. Since we do not know the actual jobs that students hold while attending, the 31% in foregone earnings serves as a reasonable average.

Working students also give up a portion of their leisure time in order to attend higher education institutions. According to the Bureau of Labor Statistics American Time Use Survey, students forego up to 0.5 hours of leisure time per day.²⁶ Assuming that an hour of leisure is equal in value to an hour of work, we derive the total cost of leisure by multiplying the number of leisure hours foregone during the academic year by the average hourly pay of the students' full earning potential. For working students, therefore, their total opportunity cost comes to \$17.3 million, equal to the sum of their foregone earnings (\$14.3 million) and foregone leisure time (\$3 million).

Thus far we have discussed student costs during the analysis year. However, recall that students take out student loans to attend college during the year, which they will have to pay back over time. The amount they will be paying in the future must be a part of their decision to attend the college today. Students who take out loans are not only required to pay back the principal of the loan but to also pay back a certain amount in interest. The first step in calculating students' loan interest cost is to determine the payback time for the loans. The \$785.5 thousand in loans was awarded to 147 students, averaging \$5,344 per student in the analysis year. However, this figure represents only one year of loans. Because loan payback time is determined by total indebtedness, we make an assumption that since MVC is a two-year college, students will be indebted twice that amount, or \$10,687 on average. According to the U.S. Department of Education, this level of indebtedness will take 15 years to pay back under the standard repayment plan.²⁷

This indebtedness calculation is used solely to estimate the loan payback period. Students will be paying back the principal amount of \$785.5 thousand over time. After taking into consideration the time value of money, this means that students will pay off a discounted present value of \$544.4 thousand in principal over the 15 years. In order to calculate interest, we only consider interest on the federal loans awarded to students in FY 2016-17. Using the student discount rate of 4.5%²⁸ as our interest rate, we calculate that students will pay a total discounted present value of \$230.1 thousand in interest on student loans



26 "Charts by Topic: Leisure and Sports Activities," American Time Use Survey, Last modified December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

27 Repayment period based on total education loan indebtedness, U.S. Department of Education, 2017. <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>.

28 The student discount rate is derived from the baseline forecasts for the 10-year discount rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



throughout the first 15 years of their working lifetime. The stream of these future interest costs together with the stream of loan payments is included in the costs of Column 5 of Table 3.2.

The steps leading up to the calculation of student costs appear in Table 3.1. Direct outlays amount to \$12.2 million, the sum of tuition and fees (\$3.7 million) and books and supplies (\$9.3 million), less federal loans received (\$785.5 thousand) and \$5 thousand in direct outlays of personal enrichment students (those students are excluded from the cost calculations). Opportunity costs for working and non-working students amount to \$21.3 million, excluding \$11.1 million in offsetting residual aid that is paid directly to students.²⁹ Finally, we have the present value of future student loan costs, amounting to \$774.5 thousand between principal and interest. Summing direct outlays, opportunity costs, and future student loan costs together yields a total of \$34.3 million in present value student costs.

TABLE 3.1: PRESENT VALUE OF STUDENT COSTS, FY 2016-17 (THOUSANDS)

Direct outlays in FY 2016-17	
Tuition and fees	\$3,675
Less federal loans received	-\$786
Books and supplies	\$9,350
Less direct outlays of personal enrichment students	-\$5
Total direct outlays	\$12,234
Opportunity costs in FY 2016-17	
Earnings foregone by non-working students	\$15,141
Earnings foregone by working students	\$14,266
Value of leisure time foregone by working students	\$3,013
Less residual aid	-\$11,143
Total opportunity costs	\$21,278
Future student loan costs (present value)	
Student loan principal	\$544
Student loan interest	\$230
Total present value student loan costs	\$775
Total present value student costs	\$34,287

Source: Based on data provided by RCCD and outputs of the Emsi impact model.

²⁹ Residual aid is the remaining portion of scholarship or grant aid distributed directly to a student after the college applies tuition and fees.



Linking education to earnings

Having estimated the costs of education to students, we weigh these costs against the benefits that students receive in return. The relationship between education and earnings is well documented and forms the basis for determining student benefits. As shown in Table 1.4, state mean earnings levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of education. The differences between state earnings levels define the incremental benefits of moving from one education level to the next.

A key component in determining the students' return on investment is the value of their future benefits stream; i.e., what they can expect to earn in return for the investment they make in education. We calculate the future benefits stream to the college's FY 2016-17 students first by determining their average annual increase in earnings, equal to \$18.9 million. This value represents the higher wages that accrue to students at the midpoint of their careers and is calculated based on the marginal wage increases of the CHEs that students complete while attending the college. Using the state of California earnings, the marginal wage increase per CHE is \$158. For a full description of the methodology used to derive the \$18.9 million, see Appendix 6.

The second step is to project the \$18.9 million annual increase in earnings into the future, for as long as students remain in the workforce. We do this using the Mincer function to predict the change in earnings at each point in an individual's working career.³⁰ The Mincer function originated from Mincer's seminal work on human capital (1958). The function estimates earnings using an individual's years of education and post-schooling experience. While some have criticized Mincer's earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Card (1999 and 2001) addresses a number of these criticisms using U.S. based research over the last three decades and concludes that any upward bias in the Mincer parameters is on the order of 10% or less. We use state-specific and education level-specific Mincer coefficients. To account for any upward bias, we incorporate a 10% reduction in our projected earnings, otherwise known as the ability bias. With the \$18.9 million representing the students' higher earnings at the midpoint of their careers, we apply scalars from the Mincer function to yield a stream of projected future benefits that gradually increase from the time students enter the workforce, peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 67. This earnings stream appears in Column 2 of Table 3.2.

As shown in Table 3.2, the \$18.9 million in gross higher earnings occurs around Year 16, which is the approximate midpoint of the students' future working



³⁰ Appendix 6 provides more information on the Mincer function and how it is used to predict future earnings growth.



TABLE 3.2: PROJECTED BENEFITS AND COSTS, STUDENT PERSPECTIVE

1	2	3	4	5	6
Year	Gross higher earnings to students (millions)	% active in workforce*	Net higher earnings to students (millions)	Student costs (millions)	Net cash flow (millions)
0	\$9.6	2%	\$0.2	\$33.5	-\$33.3
1	\$10.2	7%	\$0.8	<\$0.1	\$0.7
2	\$10.8	17%	\$1.8	<\$0.1	\$1.7
3	\$11.4	34%	\$3.9	<\$0.1	\$3.8
4	\$12.0	60%	\$7.2	<\$0.1	\$7.1
5	\$12.6	94%	\$11.9	<\$0.1	\$11.9
6	\$13.3	94%	\$12.5	<\$0.1	\$12.5
7	\$13.9	95%	\$13.1	<\$0.1	\$13.0
8	\$14.5	95%	\$13.7	<\$0.1	\$13.6
9	\$15.1	95%	\$14.3	<\$0.1	\$14.2
10	\$15.7	95%	\$14.8	<\$0.1	\$14.8
11	\$16.3	95%	\$15.4	<\$0.1	\$15.3
12	\$16.8	95%	\$15.9	<\$0.1	\$15.8
13	\$17.4	95%	\$16.4	<\$0.1	\$16.4
14	\$17.9	94%	\$16.9	<\$0.1	\$16.8
15	\$18.4	94%	\$17.4	<\$0.1	\$17.3
16	\$18.9	94%	\$17.8	\$0.0	\$17.8
17	\$19.3	94%	\$18.2	\$0.0	\$18.2
18	\$19.7	94%	\$18.6	\$0.0	\$18.6
19	\$20.1	94%	\$18.9	\$0.0	\$18.9
20	\$20.5	94%	\$19.1	\$0.0	\$19.1
21	\$20.8	93%	\$19.4	\$0.0	\$19.4
22	\$21.0	93%	\$19.5	\$0.0	\$19.5
23	\$21.2	93%	\$19.7	\$0.0	\$19.7
24	\$21.4	92%	\$19.8	\$0.0	\$19.8
25	\$21.5	92%	\$19.8	\$0.0	\$19.8
26	\$21.6	92%	\$19.8	\$0.0	\$19.8
27	\$21.6	91%	\$19.7	\$0.0	\$19.7
28	\$21.6	91%	\$19.6	\$0.0	\$19.6
29	\$21.5	90%	\$19.4	\$0.0	\$19.4
30	\$21.4	90%	\$19.2	\$0.0	\$19.2
31	\$21.2	89%	\$18.9	\$0.0	\$18.9
32	\$21.0	88%	\$18.6	\$0.0	\$18.6
33	\$20.7	88%	\$18.2	\$0.0	\$18.2
34	\$20.4	87%	\$17.8	\$0.0	\$17.8
35	\$20.1	86%	\$17.3	\$0.0	\$17.3
36	\$19.7	85%	\$16.8	\$0.0	\$16.8
37	\$19.3	84%	\$16.3	\$0.0	\$16.3
38	\$18.9	83%	\$15.7	\$0.0	\$15.7
39	\$18.4	82%	\$15.1	\$0.0	\$15.1
40	\$17.9	81%	\$14.5	\$0.0	\$14.5
Present value			\$260.4	\$34.3	\$226.1

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
23.2%	7.6	5.7

* Includes the "settling-in" factors and attrition.

Source: Emsi impact model.



careers given the average age of the student population and an assumed retirement age of 67. In accordance with the Mincer function, the gross higher earnings that accrue to students in the years leading up to the midpoint are less than \$18.9 million and the gross higher earnings in the years after the midpoint are greater than \$18.9 million.

The final step in calculating the students' future benefits stream is to net out the potential benefits generated by students who are either not yet active in the workforce or who leave the workforce over time. This adjustment appears in Column 3 of Table 3.2 and represents the percentage of the FY 2016-17 student population that will be employed in the workforce in a given year. Note that the percentages in the first five years of the time horizon are relatively lower than those in subsequent years. This is because many students delay their entry into the workforce, either because they are still enrolled at the college or because they are unable to find a job immediately upon graduation. Accordingly, we apply a set of "settling-in" factors to account for the time needed by students to find employment and settle into their careers. As discussed in Chapter 2, settling-in factors delay the onset of the benefits by one to three years for students who graduate with a certificate or a degree and by one to five years for degree-seeking students who do not complete during the analysis year.

Beyond the first five years of the time horizon, students will leave the workforce for any number of reasons, whether death, retirement, or unemployment. We estimate the rate of attrition using the same data and assumptions applied in the calculation of the attrition rate in the economic impact analysis of Chapter 2.³¹ The likelihood of leaving the workforce increases as students age, so the attrition rate is more aggressive near the end of the time horizon than in the beginning. Column 4 of Table 3.2 shows the net higher earnings to students after accounting for both the settling-in patterns and attrition.

Return on investment to students

Having estimated the students' costs and their future benefits stream, the next step is to discount the results to the present to reflect the time value of money. For the student perspective we assume a discount rate of 4.5% (see below). Because students tend to rely upon debt to pay for their educations – i.e. they are negative savers – their discount rate is based upon student loan interest rates.³² In Appendix 1, we conduct a sensitivity analysis of this discount rate. The



Discount Rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, \$1,000 in higher earnings realized 30 years in the future is worth much less than \$1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes. In this study we assume a 4.5% discount rate from the student perspective and a 0.6% discount rate from the perspectives of taxpayers and society.

31 See the discussion of the alumni impact in Chapter 2. The main sources for deriving the attrition rate are the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics. Note that we do not account for migration patterns in the student investment analysis because the higher earnings that students receive as a result of their education will accrue to them regardless of where they find employment.

32 The student discount rate is derived from the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



present value of the benefits is then compared to student costs to derive the investment analysis results, expressed in terms of a benefit-cost ratio, rate of return, and payback period. The investment is feasible if returns match or exceed the minimum threshold values; i.e., a benefit-cost ratio greater than 1, a rate of return that exceeds the discount rate, and a reasonably short payback period.

In Table 3.2, the net higher earnings of students yield a cumulative discounted sum of approximately \$260.4 million, the present value of all of the future earnings increments (see the bottom section of Column 4). This may also be interpreted as the gross capital asset value of the students' higher earnings stream. In effect, the aggregate FY 2016-17 student body is rewarded for its investment in MVC with a capital asset valued at \$260.4 million.

The students' cost of attending the college is shown in Column 5 of Table 3.2, equal to a present value of \$34.3 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 7.6 (equal to \$260.4 million in benefits divided by \$34.3 million in costs).

Another way to compare the same benefits stream and associated cost is to compute the rate of return. The rate of return indicates the interest rate that a bank would have to pay a depositor to yield an equally attractive stream of future payments.³³ Table 3.2 shows students of MVC earning average returns of 23.2% on their investment of time and money. This is a favorable return compared, for example, to approximately 1% on a standard bank savings account, or 10% on stocks and bonds (30-year average return).

*MVC students earn an average rate of return of **23.2%** for their investment of time and money.*

Note that returns reported in this study are real returns, not nominal. When a bank promises to pay a certain rate of interest on a savings account, it employs an implicitly nominal rate. Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the stated rate of return, then money is lost in real terms. In contrast, a real rate of return is on top of inflation. For example, if inflation is running at 3% and a nominal percentage of 5% is paid, then the real rate of return on the investment is only 2%. In Table 3.2, the 23.2% student rate of return is a real rate. With an inflation rate of 2.1% (the average rate reported over the past 20 years as per the U.S. Department of Commerce, Consumer

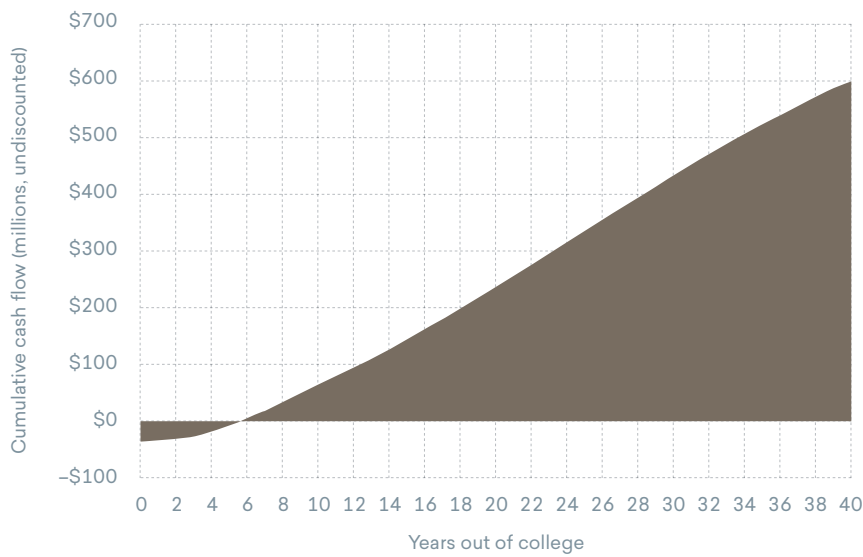
³³ Rates of return are computed using the familiar internal rate-of-return calculation. Note that, with a bank deposit or stock market investment, the depositor puts up a principal, receives in return a stream of periodic payments, and then recovers the principal at the end. Someone who invests in education, on the other hand, receives a stream of periodic payments that include the recovery of the principal as part of the periodic payments, but there is no principal recovery at the end. These differences notwithstanding comparable cash flows for both bank and education investors yield the same internal rate of return.



Price Index), the corresponding nominal rate of return is 25.3%, higher than what is reported in Table 3.2.

The payback period is defined as the length of time it takes to entirely recoup the initial investment.³⁴ Beyond that point, returns are what economists would call pure costless rent. As indicated in Table 3.2, students at MVC see, on average, a payback period of 5.7 years, meaning 5.7 years after their initial investment of foregone earnings and out-of-pocket costs, they will have received enough higher future earnings to fully recover those costs (Figure 3.1).

FIGURE 3.1: STUDENT PAYBACK PERIOD



Source: Emsi impact model.

34 Payback analysis is generally used by the business community to rank alternative investments when safety of investments is an issue. Its greatest drawback is it does not take into account the time value of money. The payback period is calculated by dividing the cost of the investment by the net return per period. In this study, the cost of the investment includes tuition and fees plus the opportunity cost of time; it does not take into account student living expenses.





Taxpayer perspective

From the taxpayer perspective, the pivotal step here is to home in on the public benefits that specifically accrue to state and local government. For example, benefits resulting from earnings growth are limited to increased state and local tax payments. Similarly, savings related to improved health, reduced crime, and fewer welfare and unemployment claims, discussed below, are limited to those received strictly by state and local government. In all instances, benefits to private residents, local businesses, or the federal government are excluded.

Growth in state tax revenues

As a result of their time at MVC, students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce. These in turn increase tax revenues since state and local government is able to apply tax rates to higher earnings.

Estimating the effect of MVC on increased tax revenues begins with the present value of the students' future earnings stream, which is displayed in Column 4 of Table 3.2. To this, we apply a multiplier derived from Emsi's MR-SAM model to estimate the added labor income created in the state as students and businesses spend their higher earnings.³⁵ As labor income increases, so does non-labor income, which consists of monies gained through investments. To calculate the growth in non-labor income, we multiply the increase in labor income by a ratio of the California gross state product to total labor income in the state. We also include the spending impacts discussed in Chapter 2 that were created in FY 2016-17 from operations and student spending. To each of these, we apply the prevailing tax rates so we capture only the tax revenues attributable to state and local government from this additional revenue.

Not all of these tax revenues may be counted as benefits to the state, however. Some students leave the state during the course of their careers, and the higher earnings they receive as a result of their education leaves the state with them. To account for this dynamic, we combine student settlement data from the college with data on migration patterns from the Census Bureau to estimate the number of students who will leave the state workforce over time.

³⁵ For a full description of the Emsi MR-SAM model, see Appendix 5.



TAXPAYER COSTS



State/Local Funding

TAXPAYER BENEFITS



Increased Tax Revenue



Avoided Costs to
State/Local Government



We apply another reduction factor to account for the students' alternative education opportunities. This is the same adjustment that we use in the calculation of the alumni impact in Chapter 2 and is designed to account for the counterfactual scenario where MVC does not exist. The assumption in this case is that any benefits generated by students who could have received an education even without the college cannot be counted as new benefits to society. For this analysis, we assume an alternative education variable of 15%, meaning that 15% of the student population at the college would have generated benefits anyway even without the college. For more information on the alternative education variable, see Appendix 7.

We apply a final adjustment factor to account for the "shutdown point" that nets out benefits that are not directly linked to the state and local government costs of supporting the college. As with the alternative education variable discussed under the alumni impact, the purpose of this adjustment is to account for counterfactual scenarios. In this case, the counterfactual scenario is where state and local government funding for MVC did not exist and MVC had to derive the revenue elsewhere. To estimate this shutdown point, we apply a sub-model that simulates the students' demand curve for education by reducing state and local support to zero and progressively increasing student tuition and fees. As student tuition and fees increase, enrollment declines. For MVC, the shutdown point adjustment is 0%, meaning that the college could not operate without taxpayer support. As such, no reduction applies. For more information on the theory and methodology behind the estimation of the shutdown point, see Appendix 9.

After adjusting for attrition, alternative education opportunities, and the shutdown point, we calculate the present value of the future added tax revenues that occur in the state, equal to \$89.3 million. Recall from the discussion of the student return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%. This is the real treasury interest rate recommended by the Office of Management and Budget (OMB) for 30-year investments, and in Appendix 1, we conduct a sensitivity analysis of this discount rate.³⁶

Government savings

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes

³⁶ Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



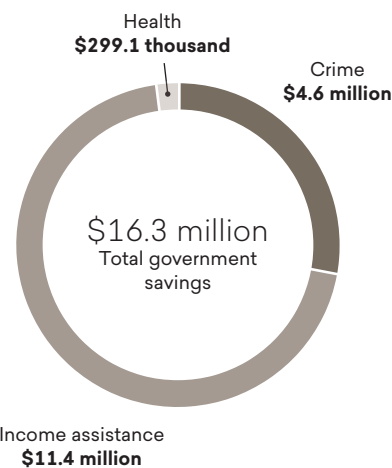
that generate social savings, also known as external or incidental benefits of education. These represent the avoided costs to the government that otherwise would have been drawn from public resources absent the education provided by MVC. Government savings appear in Figure 3.2 and Table 3.3 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. Health savings include avoided medical costs that would have otherwise been covered by state and local government. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections). Income assistance benefits comprise avoided costs due to the reduced number of welfare and unemployment insurance claims.

The model quantifies government savings by calculating the probability at each education level that individuals will have poor health, commit crimes, or claim welfare and unemployment benefits. Deriving the probabilities involves assembling data from a variety of studies and surveys analyzing the correlation between education and health, crime, and income assistance at the national and state level. We spread the probabilities across the education ladder and multiply the marginal differences by the number of students who achieved CHEs at each step. The sum of these marginal differences counts as the upper bound measure of the number of students who, due to the education they received at the college, will not have poor health, commit crimes, or demand income assistance. We dampen these results by the ability bias adjustment discussed earlier in the student perspective section and in Appendix 6 to account for factors (besides education) that influence individual behavior. We then multiply the marginal effects of education times the associated costs of health, crime, and income assistance.³⁷ Finally, we apply the same adjustments for attrition, alternative education, and the shutdown point to derive the net savings to the government. Total government savings appear in Figure 3.2 and sum to \$16.3 million.

Table 3.3 displays all benefits to taxpayers. The first row shows the added tax revenues created in the state, equal to \$89.3 million, from students' higher earnings, increases in non-labor income, and spending impacts. The sum of the government savings and the added income in the state is \$105.6 million, as shown in the bottom row of Table 3.3. These savings continue to accrue in the future as long as the FY 2016-17 student population of MVC remains in the workforce.

*In addition to the creation of **higher tax revenues** to the state and local government, education is statistically associated with a variety of lifestyle changes that generate **social savings**.*

FIGURE 3.2: PRESENT VALUE OF GOVERNMENT SAVINGS



Source: Emsi impact model.

³⁷ For a full list of the data sources used to calculate the social externalities, see the Resources and References section. See also Appendix 10 for a more in-depth description of the methodology.



TABLE 3.3: PRESENT VALUE OF ADDED TAX REVENUE AND GOVERNMENT SAVINGS (THOUSANDS)

Added tax revenue	\$89,291
Government savings	
Health-related savings	\$299
Crime-related savings	\$4,595
Income assistance savings	\$11,372
Total government savings	\$16,266
Total taxpayer benefits	\$105,556

Source: Emsi impact model.

Return on investment to taxpayers

Taxpayer costs are reported in Table 3.4 and come to \$44.7 million, equal to the contribution of state and local government to MVC. In return for their public support, taxpayers are rewarded with an investment benefit-cost ratio of 2.4 (= \$105.6 million ÷ \$44.7 million), indicating a profitable investment.

At 5.7%, the rate of return to state and local taxpayers is favorable. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%, the real treasury interest rate recommended by the Office of Management and Budget for 30-year investments.³⁸ This is the return governments are assumed to be able to earn on generally safe investments of unused funds, or alternatively, the interest rate for which governments, as relatively safe borrowers, can obtain funds. A rate of return of 0.6% would mean that the college just pays its own way. In principle, governments could borrow monies used to support MVC and repay the loans out of the resulting added taxes and reduced government expenditures. A rate of return of 5.7%, on the other hand, means that MVC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs. It is unlikely that other government programs could make such a claim.

*A rate of return of **5.7%** means that MVC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.*

38 Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent). Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



TABLE 3.4: PROJECTED BENEFITS AND COSTS, TAXPAYER PERSPECTIVE

1	2	3	4
Year	Benefits to taxpayers (millions)	State and local gov't costs (millions)	Net cash flow (millions)
0	\$6.4	\$44.7	-\$38.3
1	\$0.2	\$0.0	\$0.2
2	\$0.4	\$0.0	\$0.4
3	\$0.8	\$0.0	\$0.8
4	\$1.4	\$0.0	\$1.4
5	\$2.3	\$0.0	\$2.3
6	\$2.4	\$0.0	\$2.4
7	\$2.5	\$0.0	\$2.5
8	\$2.6	\$0.0	\$2.6
9	\$2.7	\$0.0	\$2.7
10	\$2.7	\$0.0	\$2.7
11	\$2.8	\$0.0	\$2.8
12	\$2.9	\$0.0	\$2.9
13	\$3.0	\$0.0	\$3.0
14	\$3.1	\$0.0	\$3.1
15	\$3.2	\$0.0	\$3.2
16	\$3.2	\$0.0	\$3.2
17	\$3.3	\$0.0	\$3.3
18	\$3.3	\$0.0	\$3.3
19	\$3.4	\$0.0	\$3.4
20	\$3.4	\$0.0	\$3.4
21	\$3.5	\$0.0	\$3.5
22	\$3.5	\$0.0	\$3.5
23	\$3.5	\$0.0	\$3.5
24	\$3.5	\$0.0	\$3.5
25	\$3.5	\$0.0	\$3.5
26	\$3.5	\$0.0	\$3.5
27	\$3.5	\$0.0	\$3.5
28	\$3.4	\$0.0	\$3.4
29	\$3.4	\$0.0	\$3.4
30	\$3.4	\$0.0	\$3.4
31	\$3.3	\$0.0	\$3.3
32	\$3.2	\$0.0	\$3.2
33	\$3.1	\$0.0	\$3.1
34	\$3.1	\$0.0	\$3.1
35	\$3.0	\$0.0	\$3.0
36	\$2.9	\$0.0	\$2.9
37	\$2.8	\$0.0	\$2.8
38	\$2.7	\$0.0	\$2.7
39	\$2.6	\$0.0	\$2.6
40	\$2.4	\$0.0	\$2.4
Present value	\$105.6	\$44.7	\$60.8

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
5.7%	2.4	16.7

Source: Emsi impact model.





Social perspective

California benefits from the education that MVC provides through the earnings that students create in the state and through the savings that they generate through their improved lifestyles. To receive these benefits, however, members of society must pay money and forego services that they otherwise would have enjoyed if MVC did not exist. Society's investment in MVC stretches across a number of investor groups, from students to employers to taxpayers. We weigh the benefits generated by MVC to these investor groups against the total social costs of generating those benefits. The total social costs include all MVC expenditures, all student expenditures (including interest on student loans) less tuition and fees, and all student opportunity costs, totaling a present value of \$95.1 million.

On the benefits side, any benefits that accrue to California as a whole – including students, employers, taxpayers, and anyone else who stands to benefit from the activities of MVC – are counted as benefits under the social perspective. We group these benefits under the following broad headings: 1) increased earnings in the state, and 2) social externalities stemming from improved health, reduced crime, and reduced unemployment in the state (see the Beekeeper Analogy box for a discussion of externalities). Both of these benefits components are described more fully in the following sections.

Growth in state economic base

In the process of absorbing the newly-acquired skills of students who attend MVC, not only does the productivity of the California workforce increase, but so does the productivity of its physical capital and assorted infrastructure. Students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce.

Estimating the effect of MVC on the state's economic base follows the same process used when calculating increased tax revenues in the taxpayer perspective. However, instead of looking at just the tax revenue portion, we include all of the added earnings and business output. We again factor in student attrition and alternative education opportunities. The shutdown point does not apply to the growth of the economic base because the social perspective captures not only the state and local taxpayer support to the college, but also the support from the students and other non-governmental sources.



SOCIAL COSTS



MVC Expenditures



Student Out-of-Pocket Expenses



Student Opportunity Costs

SOCIAL BENEFITS



Increased State Earnings



Avoided Costs to Society



After adjusting for attrition and alternative education opportunities, we calculate the present value of the future added income that occurs in the state, equal to \$1.3 billion. Recall from the discussion of the student and taxpayer return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. As stated in the taxpayer perspective, given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%.

Social savings

Similar to the government savings discussed above, society as a whole sees savings due to external or incidental benefits of education. These represent the avoided costs that otherwise would have been drawn from private and public resources absent the education provided by MVC. Social benefits appear in Table 3.5 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. These are similar to the categories from the taxpayer perspective above, although health savings now also include lost productivity and other effects associated with smoking, alcohol dependence, obesity, depression, and drug abuse. In addition to avoided costs to the justice system, crime savings also consist of avoided victim costs and benefits stemming from the added productivity of individuals who otherwise would have been incarcerated. Income assistance savings are comprised of the avoided government costs due to the reduced number of welfare and unemployment insurance claims.

Table 3.5 displays the results of the analysis. The first row shows the increased economic base in the state, equal to \$1.3 billion, from students' higher earnings and their multiplier effects, increases in non-labor income, and spending impacts. Social savings appear next, beginning with a breakdown of savings related to health. These include savings due to a reduced demand for medical treatment and social services, improved worker productivity and reduced absenteeism, and a reduced number of vehicle crashes and fires induced by alcohol or smoking-related incidents. Although the prevalence of these health conditions generally declines as individuals attain higher levels of education, prevalence rates are sometimes higher for individuals with certain levels of education. For example, adults with college degrees may be more likely to spend more on alcohol and become dependent on alcohol. Thus, in some cases the social savings associated with a health factor can be negative. Nevertheless, the overall health savings for society are positive, amounting to \$4.2 million. Crime savings amount to \$4.8 million, including savings associated with a reduced number of crime victims, added worker productivity, and reduced expenditures for police and law enforcement, courts and administration of



Beekeeper Analogy

Beekeepers provide a classic example of positive externalities (sometimes called “neighborhood effects”). The beekeeper’s intention is to make money selling honey. Like any other business, receipts must at least cover operating costs. If they don’t, the business shuts down.

But from society’s standpoint there is more. Flowers provide the nectar that bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognized that society might actually do well to subsidize activities that produce positive externalities, such as beekeeping.

Educational institutions are like beekeepers. While their principal aim is to provide education and raise people’s earnings, in the process an array of external benefits is created. Students’ health and lifestyles are improved, and society indirectly benefits just as orchard owners indirectly benefit from beekeepers. Aiming at a more complete accounting of the benefits generated by education, the model tracks and accounts for many of these external social benefits.



justice, and corrective services. Finally, the present value of the savings related to income assistance amount to \$11.4 million, stemming from a reduced number of persons in need of welfare or unemployment benefits. All told, social savings amounted to \$20.4 million in benefits to communities and citizens in California.

TABLE 3.5: PRESENT VALUE OF THE FUTURE INCREASED ECONOMIC BASE AND SOCIAL SAVINGS IN THE STATE (THOUSANDS)

Increased economic base	\$1,270,373
Social Savings	
Health	
Smoking	\$8,776
Alcohol dependence	-\$4,425
Obesity	\$3,395
Depression	-\$3,349
Drug abuse	-\$188
Total health savings*	\$4,209
Crime	
Criminal justice system savings	\$4,561
Crime victim savings	\$56
Added productivity	\$231
Total crime savings	\$4,847
Income assistance	
Welfare savings	\$9,392
Unemployment savings	\$1,980
Total income assistance savings	\$11,372
Total social savings	\$20,428
Total, increased economic base + social savings	\$1,290,802

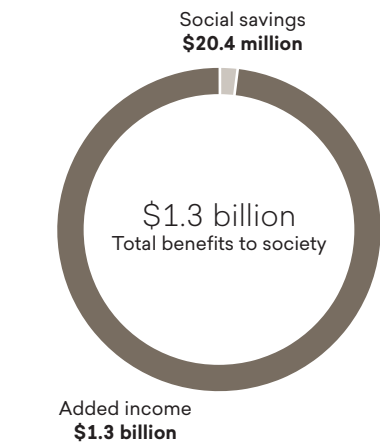
* In some cases, health savings may be negative. This is due to increased prevalence rates at certain education levels. Source: Emsi impact model.

The sum of the social savings and the increased state economic base is \$1.3 billion, as shown in the bottom row of Table 3.5 and in Figure 3.3. These savings accrue in the future as long as the FY 2016-17 student population of MVC remains in the workforce.

Return on investment to society

Table 3.6 presents the stream of benefits accruing to the California society and the total social costs of generating those benefits. Comparing the present value of the benefits and the social costs, we have a benefit-cost ratio of 13.6. This means that for every dollar invested in an education from MVC, whether it is the

FIGURE 3.3: PRESENT VALUE OF BENEFITS TO SOCIETY



Source: Emsi impact model.



TABLE 3.6: PROJECTED BENEFITS AND COSTS, SOCIAL PERSPECTIVE

1	2	3	4
Year	Benefits to society (millions)	Social costs (millions)	Net cash flow (millions)
0	\$103.5	\$94.1	\$9.4
1	\$1.8	<\$0.1	\$1.7
2	\$4.2	<\$0.1	\$4.2
3	\$9.1	<\$0.1	\$9.0
4	\$16.8	<\$0.1	\$16.7
5	\$27.8	<\$0.1	\$27.7
6	\$29.0	<\$0.1	\$28.9
7	\$30.1	<\$0.1	\$30.0
8	\$31.2	<\$0.1	\$31.2
9	\$32.3	<\$0.1	\$32.2
10	\$33.4	<\$0.1	\$33.3
11	\$34.4	<\$0.1	\$34.3
12	\$35.4	<\$0.1	\$35.3
13	\$36.3	<\$0.1	\$36.2
14	\$37.2	<\$0.1	\$37.1
15	\$38.0	<\$0.1	\$37.9
16	\$38.7	\$0.0	\$38.7
17	\$39.4	\$0.0	\$39.4
18	\$40.0	\$0.0	\$40.0
19	\$40.5	\$0.0	\$40.5
20	\$40.9	\$0.0	\$40.9
21	\$41.2	\$0.0	\$41.2
22	\$41.4	\$0.0	\$41.4
23	\$41.6	\$0.0	\$41.6
24	\$41.6	\$0.0	\$41.6
25	\$41.5	\$0.0	\$41.5
26	\$41.4	\$0.0	\$41.4
27	\$41.1	\$0.0	\$41.1
28	\$40.7	\$0.0	\$40.7
29	\$40.3	\$0.0	\$40.3
30	\$39.7	\$0.0	\$39.7
31	\$39.1	\$0.0	\$39.1
32	\$38.3	\$0.0	\$38.3
33	\$37.5	\$0.0	\$37.5
34	\$36.5	\$0.0	\$36.5
35	\$35.5	\$0.0	\$35.5
36	\$34.5	\$0.0	\$34.5
37	\$33.3	\$0.0	\$33.3
38	\$32.1	\$0.0	\$32.1
39	\$30.8	\$0.0	\$30.8
40	\$29.5	\$0.0	\$29.5
Present value	\$1,290.8	\$95.1	\$1,195.7

Benefit-cost ratio

13.6

Source: Emsi impact model.



money spent on operations of the college or money spent by students on tuition and fees, an average of \$13.60 in benefits will accrue to society in California.³⁹

With and without social savings

Earlier in this chapter, social benefits attributable to education (improved health, reduced crime, and reduced demand for income assistance) were defined as externalities that are incidental to the operations of MVC. Some would question the legitimacy of including these benefits in the calculation of rates of return to education, arguing that only the tangible benefits (higher earnings) should be counted. Table 3.4 and Table 3.6 are inclusive of social benefits reported as attributable to MVC. Recognizing the other point of view, Table 3.7 shows rates of return for both the taxpayer and social perspectives exclusive of social benefits. As indicated, returns are still above threshold values (a benefit-cost ratio greater than 1.0 and a rate of return greater than 0.6%), confirming that taxpayers receive value from investing in MVC.

TABLE 3.7: TAXPAYER AND SOCIAL PERSPECTIVES WITH AND WITHOUT SOCIAL SAVINGS

	Including social savings	Excluding social savings
Taxpayer perspective		
Net present value (millions)	\$60.8	\$44.6
Benefit-cost ratio	2.4	2.0
Internal rate of return	5.7%	4.5%
Payback period (no. of years)	16.7	20.3
Social perspective		
Net present value (millions)	\$1,195.7	\$1,175.2
Benefit-cost ratio	13.6	13.4

Source: Emsi impact model.

³⁹ The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.



CHAPTER 4:
Conclusion



WHILE MVC's value to the MVC Service Area is larger than simply its economic impact, understanding the dollars and cents value is an important asset to understanding the college's value as a whole. In order to fully assess MVC's value to the regional economy, this report has evaluated the college from the perspectives of economic impact analysis and investment analysis.

From an economic impact perspective, we calculated that MVC generates a total economic impact of **\$129.2 million** in total added income for the regional economy. This represents the sum of several different impacts, including the college's:

- Operations spending impact (**\$43.3 million**);
- Student spending impact (**\$7.7 million**); and
- Alumni impact (**\$78.2 million**).

The total impact of \$129.2 million is equivalent to approximately **0.8%** of the total GRP of the MVC Service Area and is equivalent to supporting **1,708** jobs. For perspective, this means that one out of every **119** jobs in the MVC Service Area is supported by the activities of MVC and its students.

Since MVC's activity represents an investment by various parties, including students, taxpayers, and society as a whole, we also considered the college as an investment to see the value it provides to these investors. For each dollar invested by students, taxpayers, and society, MVC offers a benefit of **\$7.60**, **\$2.40**, and **\$13.60**, respectively. These results indicate that MVC is an attractive investment to students with rates of return that exceed alternative investment opportunities. At the same time, the presence of the college expands the state economy and creates a wide range of positive social benefits that accrue to taxpayers and society in general within California.

Modeling the impact of the college is subject to many factors, the variability of which we considered in our sensitivity analysis (Appendix 1). With this variability accounted for, we present the findings of this study as a robust picture of the economic value of MVC.



One out of every 119 jobs in the MVC Service Area is supported by the activities of MVC and its students.



Resources and References

Administration for Children and Families. "Fiscal Year 2016 TANF Financial Data." *Office of Family Assistance, TANF Financial Data*. 2018. <https://www.acf.hhs.gov/ofa/resource/tanf-financial-data-fy-2016>.

Arias, Elizabeth. "United States Life Tables, 2008." *National Vital Statistics Reports* 61, no. 3 (September 24, 2012). Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf.

Baryla, Edward and Douglas Dotterweich. "Student Migration: Do Significant Factors Vary by Region?" *Education Economics* 9, no. 3 (2001).

Becker, Gary S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia College Press for NBER, 1964.

Bilkic, Natasa, Thomas Gries, and Margarethe Pilichowski. "Stay in School or Start Working? The Human Capital Investment Decision under Uncertainty and Irreversibility." *Labour Economics* 19, no. 5 (October 2012): 706-717.

Bureau of Economic Analysis. "Table 1.1.6. Real Gross Domestic Product, Chained Dollars." *GDP and Personal Income*. Last modified January 27, 2017. <http://www.bea.gov/iTable/iTableHtml.cfm?reqid=9&step=3&isuri=1&903=6>.

Bureau of Justice Statistics. "Table 2: Prisoners under the Jurisdiction of State or Federal Correctional Authorities, by Jurisdiction, December 31, 2015 and 2016." *Prisoners in 2016, NCJ 251149, 2018*. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Bureau of Labor Statistics. "Charts by Topic: Leisure and Sports Activities." *American Time Use Survey*. December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

Bureau of Labor Statistics. "Charts by Topic: Students." *American Time Use Survey*. December 2016. <https://www.bls.gov/TUS/CHARTS/STUDENTS.HTM>.

Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." *Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017*. <http://www.bls.gov/cps/cpsaat07.pdf>.

Bureau of Labor Statistics. "Table 24: Historical Consumer Price Index for all Urban Consumers (CPI-U): U.S. City Average, All Items." 2018. <https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-201801.pdf>.



Emsi is a leading provider of economic impact studies and labor market data to educational institutions, workforce planners, and regional developers in the U.S. and internationally. Since 2000, Emsi has completed over 1,800 economic impact studies for educational institutions in four countries. Visit www.economicmodeling.com for more information about Emsi's products and services.

- Buss, Christian, Jeffrey Parker, and Jon Rivenburg. "Cost, Quality and Enrollment Demand at Liberal Arts Colleges." *Economics of Education Review* 23, no. 1 (February 2004): 57-65.
- Card, David. "The Causal Effect of Education on Earnings." *Handbook of Labor Economics* 3 (1999): 1801-1863.
- Card, David. "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems." *Econometrica* 69, no. 5 (September 2001): 1127-1160.
- Center on Budget and Policy Priorities. "Policy Basics - How Many Weeks of Unemployment are Available?" April 2018. <https://www.cbpp.org/sites/default/files/atoms/files/policybasics-uiweeks.pdf>.
- Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data* [Data set]. <https://www.cdc.gov/statesystem/cigaretteuseadult.html>.
- Centers for Disease Control and Prevention. "Heavy Drinkers (Adult Men Having More Than Two Drinks per Day and Adult Women Having More Than One Drink per Day)." *Alcohol Consumption - 2016 Behavioral Risk Factor Surveillance System Prevalence and Trends Data*. https://nccd.cdc.gov/BRFSSPrevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByTopic&irbLocationType=StatesAndMMSA&islClass=CLASS01&islTopic=TOPIC30&islYear=2016&islLocation=
- Centers for Disease Control and Prevention. "Table. Characteristics of Current Adult Cigarette Smokers." *National Health Interview Survey, United States, 2016*. https://www.cdc.gov/mmwr/volumes/67/wr/mm6702a1.htm#T1_down.
- Centers for Medicare and Medicaid Services. "Table 16: National Health Expenditures, Amounts and Average Annual Growth from Previous Year Shown, by Type of Sponsor, Selected Calendar Years 2009-2025." *NHE Projections 2015-2025 - Tables*. February 2016. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
- College Board. "Figure 1: Average Estimated Full-Time Undergraduate Budgets, 2018-19 (Enrollment-Weighted)." *The College Board, Annual Survey of Colleges, Average Estimated Undergraduate Budgets, 2018-19*. <https://trends.collegeboard.org/college-pricing/figures-tables/average-estimated-undergraduate-budgets-2018-19>.
- Congressional Budget Office. "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline." *Congressional Budget Office Publications CBO's April 2018 Baseline Projections for the Student Loan Program*. Last

modified April 2018. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.

Criminal Justice Expenditure and Employment Extracts Program. "Table 4. Justice System Expenditure by Character, State and Type of Government, Fiscal Year 2015" *Justice Expenditure and Employment Extracts 2015 (preliminary) NCJ 251780*. <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=286>.

Dickerson, Andy, and Steven McIntosh. "The Impact of Distance to Nearest Education Institution on the Post Compulsory Education Participation Decision." *Urban Studies* 50, no. 4 (2013): 742-758.

Dynarski, Susan M. "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *American Economic Review* 93, no. 1 (2003): 279-288.

Emsi Labor Market Data and Software. www.economicmodeling.com.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 1: Crime in the United States." Crime in the United States 2016, Offenses Known to Law Enforcement. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-1>.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 18: Estimated Number of Arrests, United States, 2016" in "Uniform Crime Reports." Crime in the United States, 2016, Persons Arrested. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-18>.

Finkelstein, Eric A., Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale. "The Costs of Obesity in the Workplace." *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" *Journal of Clinical Psychiatry* 76:2, 2015.

Guerino, Paul, Paige M. Harrison, and William J. Sabol. "Prisoners in 2016." *Bureau of Justice Statistics NCJ 236096*, January 2018. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Hamadeh, Mohamad and Roy Khoueiri. "Demand Elasticities for Higher Education in the United States." *International Journal of Business and Economic Perspectives* 5, no. 2 (2010): 60-67.

Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach*. New York: McGraw-Hill Book Company, 1971.

Hernández-Murillo, Rubén, Lesli S. Ott, Michael T. Owyang, and Denise Whalen. "Patterns of Interstate Migration in the United States from the Sur-

- vey of Income and Program Participation.” *Federal Reserve Bank of St. Louis Review* 93, no. 3 (May/June 2011): 169-186. <https://files.stlouisfed.org/files/htdocs/publications/review/11/05/169-186Hernandez.pdf>.
- Jaeger, David A. and Marianne E. Page. “New Evidence on Sheepskin Effects in the Returns to Education.” *The Review of Economics and Statistics* 78, no. 4 (November 1996): 733-740.
- Jamal Ahmed, Elyse Phillips, Andrea S. Gentzke, David M. Homa, Stephen D. Babb, Brian A. King, and Linda J. Neff. “Current Cigarette Smoking Among Adults – United States, 2016.” *Morbidity and Mortality Weekly Report* 2018 67:53-59. DOI: <http://dx.doi.org/10.15585/mmwr.mm6702a1>.
- Kaeding, Nicole. “State Individual Income Tax Rates and Brackets for 2016.” *Tax Foundation Fiscal Fact* no. 500 (February 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF500.pdf.
- Kelchtermans, Stijn and Frank Verboven. “Participation and Study Decisions in a Public System of Higher Education.” *Journal of Applied Econometrics* 25, no. 3 (2010): 355-391.
- Leigh, Andrew and Chris Ryan. “Estimating Returns to Education Using Different Natural Experiments Techniques.” *Economics of Education Review* 27 (2008): 149-160.
- Leonesio, Michael V. “The Economics of Retirement: A Nontechnical Guide.” *Social Security Bulletin* 59, no. 4 (Winter 1996): 29-50.
- McCollister, Kathryn E., Michael T. French, and Hai Fang. “The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.” *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835847>.
- Mincer, Jacob. “Investment in Human Capital and Personal Income Distribution.” *Journal of Political Economy* 66, no. 4 (August 1958): 281-302.
- Mincer, Jacob. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research, 1974.
- Morgan, James N. and Edward H. Robb. “The Impact of Age Upon Interregional Migration.” *The Annals of Regional Science* 15, no. 3 (November 1981): 31-45.
- National Center for Education Statistics. Integrated Post-secondary Education Data System (IPEDS). <http://nces.ed.gov/ipeds>.
- National Center for Education Statistics. “Table 219.60 Number of People Taking the GED Test and Percentage Distribution of Those who Passed, by Age Group: 1971 through 2013.” *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_219.60.asp?current=yes.

- National Center for Education Statistics. "Table 507.20 Participants in State-Administered Adult Basic Education, Secondary Education, and English as a Second Language Programs, by Type of Program and State or Jurisdiction: Selected Fiscal Years, 2000 through 2014." *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_507.20.asp?current=yes.
- National Center for Health Statistics. "Table 58. Normal Weight, Overweight, and Obesity Among Persons 20 Years of Age and Over, by Selected Characteristics: United States, Selected Years 1988-1994 through 2011-2014." *Centers for Disease Control and Prevention, Health, United States, 2015*. <https://www.cdc.gov/nchs/data/hus/2015/058.pdf>.
- National Employment Law Project. "Unemployment Insurance: An Overview of the Challenges and Strengths of Today's System". 2016. <https://waysandmeans.house.gov/wp-content/uploads/2016/09/20160907HR-Testimony-Conti.pdf>.
- National Survey on Drug Use and Health. "Table 19. Illicit Drug Use Disorder in the Past Year, by Age Group and State: Percentages, Annual Averages Based on 2015 and 2016 NSDUHs." *National Survey on Drug Use and Health: Model-Based Prevalence Estimates (50 States and the District of Columbia)*. <https://www.samhsa.gov/data/sites/default/files/NSDUHsaePercents2016/NSDUHsaePercents2016.pdf>
- National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016." <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf>.
- National Survey on Drug Use and Health. "Table 15: Major Depressive Episode in the Past Year, by age group and state: Percentages, annual averages, and P values from tests of differences between percentages, 2008-2009 and 2015-2016." <https://www.samhsa.gov/data/sites/default/files/NSDUHsae-ShortTermCHG2016/NSDUHsaeShortTermCHG2016.htm>.
- Nowotny, Kathryn, Ryan Masters, and Jason Boardman, 2016. "The relationship between education and health among incarcerated man and women in the United States" *BMC Public Health*. September 2016. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5009667/>.

- OECD. "Household Net Saving Rates: As a Percentage of Household Disposable Income." *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics* (2016). <http://dx.doi.org/10.1787/factbook-2015-19-en>.
- Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.
- Ogden, Cynthia L., Molly M. Lamb, Margaret D. Carroll, and Katherine M. Flegal. "Figure 3. Prevalence of Obesity among Adults Aged 20 Years and Over, by Education, Sex, and Race and Ethnicity: United States 2005-2008." *Obesity and Socioeconomic Status in Adults: United States 2005-2008*, National Center for Health Statistics no. 50. (2010).
- Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017). https://www.cdc.gov/mmwr/volumes/66/wr/mm6650a1.htm?s_cid=mm6650a1_w#suggestedcitation.
- Polachek, Solomon W. "Earnings Over the Lifecycle: The Mincer Earnings Function and its Applications." *Foundations and Trends in Microeconomics* 4, no. 3 (2008): 165-272.
- Polachek, Solomon W. "Mincer's Overtaking Point and the Lifecycle Earnings Distribution." *Review of the Economics of the Household* 1, no. 4 (December 2003): 273-304.
- Ramey, Valerie and Neville Francis. "A Century of Work and Leisure." *American Economic Journal: Macroeconomics* 1, no. 2 (2009): 189-224.
- Sacks, Gonzales, Bouchery, Tomedi, & Brewer (2015). 2010 National and State Costs of Excessive Alcohol Consumption. *American Journal of Preventive Medicine*, 49(5), E73-E79. [https://www.ajpmonline.org/article/S0749-3797\(15\)00354-2/pdf/](https://www.ajpmonline.org/article/S0749-3797(15)00354-2/pdf/).
- Sevilla, Almudena, Jose Ignacio Gimenez-Nadal, and Jonathan I. Gershuny. "Leisure Inequality in the United States: 1965-2003." IZA Discussion Paper no. 6708 (July 2012).
- Social Security Administration. "Retirement Benefits." *Full Retirement Age*. May 2016. <https://www.ssa.gov/pubs/EN-05-10035.pdf>.
- State of Obesity. "Adult Obesity in the United States." Adult Obesity Rate by State, 2016. <https://stateofobesity.org/adult-obesity/>.

- Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." *Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.* <https://store.samhsa.gov/shin/content/SMA16-4975/SMA16-4975.pdf>.
- Substance Abuse and Mental Health Services Administration. "Table 5.4B - Illicit Drug Use Disorder in Past Year among Persons Aged 12 or Older, by Age Group and Demographic Characteristics: Percentages, 2015 and 2016" SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-4B>.
- Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-6A>.
- Supplemental Nutrition Assistance Program. "State Activity Report Fiscal Year 2016." *Food and Nutrition Service, Supplemental Nutrition Assistance Program, Program Accountability and Administration Division* (September 2017). <https://fns-prod.azureedge.net/sites/default/files/snap/FY16-State-Activity-Report.pdf>.
- U.S. Census Bureau. "Annual Estimates of the Resident Population for Selected Age Groups by Sex: April 1, 2010 to July 1, 2015." *National Population by Characteristics Tables: 2010-2015*. December 2016. <http://www.census.gov/data/tables/2015/demo/popest/nation-detail.html>.
- U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011. <https://www.census.gov/library/working-papers/2011/demo/SEHSD-WP2011-08.html>.
- U.S. Census Bureau. "Social Insurance and Human Services." *The 2012 Statistical Abstract*. http://www.census.gov/compendia/statab/cats/social_insurance_human_services.html.
- U.S. Department of Agriculture, Office of Policy Support. Supplemental Nutrition Assistance Program Nutrition Assistance Program Report Series. "Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2016." <https://fns-prod.azureedge.net/sites/default/files/ops/Characteristics2016.pdf>.

- U.S. Department of Education, Federal Student Aid Office. “The Standard Repayment Plan.” <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>
- U.S. Department of Health and Human Services. “2016 Welfare Indicators and Risk Factors: Fifteenth Report to Congress” Annual Report to Congress, 2016. <https://aspe.hhs.gov/system/files/pdf/206736/WelfareIndicators15thReport.pdf>.
- U.S. Department of Health and Human Services, Office of Family Assistance. “Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016.” <https://www.acf.hhs.gov/ofa/resource/characteristics-and-financial-circumstances-of-tanf-recipients-fiscal-year-2016-0>.
- U.S. Department of Health & Human Services. “The Health Consequences of Smoking—50 Years of Progress.” A Report of the Surgeon General, 2014. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/50-years-of-progress-by-section.html>.
- U.S. Department of Labor. “Unemployment Insurance Data Summary, 4th Quarter 2017.” https://workforcesecurity.doleta.gov/unemploy/content/data_stats/datasum17/DataSum_2017_4.pdf.
- Walczak, Jared, Scott Drenkard. “State and Local Sales Tax Rates, Midyear 2016.” *Tax Foundation Fiscal Fact* no. 515 (July 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF515.pdf.
- Walden, Michael, “The Local Economic Impact of the Cooperating Raleigh Colleges: Update 2013.” March 2014. <http://crcraleighcolleges.org/files/crcimpact2013-final.pdf>.

Appendix 1: Sensitivity Analysis

Sensitivity analysis measures the extent to which a model’s outputs are affected by hypothetical changes in the background data and assumptions. This is especially important when those variables are inherently uncertain. This analysis allows us to identify a plausible range of potential results that would occur if the value of any of the variables is in fact different from what was expected. In this chapter we test the sensitivity of the model to the following input factors: 1) the alternative education variable, 2) the labor import effect variable, 3) the student employment variables, 4) the discount rate, and 5) the retained student variable.

Alternative education variable

The alternative education variable (15%) accounts for the counterfactual scenario where students would have to seek a similar education elsewhere absent the publicly-funded college in the region. Given the difficulty in accurately specifying the alternative education variable, we test the sensitivity of the taxpayer and social investment analysis results to its magnitude. Variations in the alternative education assumption are calculated around base case results listed in the middle column of Table A1.1. Next, the model brackets the base case assumption on either side with a plus or minus 10%, 25%, and 50% variation in assumptions. Analyses are then repeated introducing one change at a time, holding all other variables constant. For example, an increase of 10% in the alternative education assumption (from 15% to 17%) reduces the taxpayer perspective rate of return from 5.7% to 5.6%. Likewise, a decrease of 10% (from 15% to 14%) in the assumption increases the rate of return from 5.7% to 5.8%.

TABLE A1.1 SENSITIVITY ANALYSIS OF ALTERNATIVE EDUCATION VARIABLE, TAXPAYER AND SOCIAL PERSPECTIVES

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Alternative education variable	8%	11%	14%	15%	17%	19%	23%
Taxpayer perspective							
Net present value (millions)	\$70	\$66	\$63	\$61	\$59	\$56	\$52
Rate of return	6.3%	6.0%	5.8%	5.7%	5.6%	5.4%	5.0%
Benefit-cost ratio	2.6	2.5	2.4	2.4	2.3	2.3	2.2
Social perspective							
Net present value (millions)	\$1,310	\$1,253	\$1,218	\$1,196	\$1,173	\$1,139	\$1,082
Benefit-cost ratio	14.8	14.2	13.8	13.6	13.3	13.0	12.4

Based on this sensitivity analysis, the conclusion can be drawn that MVC investment analysis results from the taxpayer and social perspectives are not very sensitive to relatively large variations in the alternative education variable. As indicated, results are still above their threshold levels (net present value greater than 0, benefit-cost ratio greater than 1, and rate of return greater than the discount rate of 0.6%), even when the alternative education assumption is increased by as much as 50% (from 15% to 23%). The conclusion is that although the assumption is difficult to specify, its impact on overall investment analysis results for the taxpayer and social perspectives is not very sensitive.

Labor import effect variable

The labor import effect variable only affects the alumni impact calculation in Table 2.6. In the model we assume a labor import effect variable of 50%, which means that 50% of the region’s labor demands would have been satisfied without the presence of MVC. In other words, businesses that hired MVC students could have substituted some of these workers with equally-qualified people from outside the region had there been no MVC students to hire. Therefore, we attribute only the remaining 50% of the initial labor income generated by increased alumni productivity to the college.

Table A1.2 presents the results of the sensitivity analysis for the labor import effect variable. As explained earlier, the assumption increases and decreases relative to the base case of 50% by the increments indicated in the table. Alumni productivity impacts attributable to MVC, for example, range from a high of \$117.2 million at a -50% variation to a low of \$39.1 million at a +50% variation from the base case assumption. This means that if the labor import effect variable increases, the impact that we claim as attributable to alumni decreases. Even under the most conservative assumptions, the alumni impact on the MVC Service Area economy still remains sizeable.

TABLE A1.2: SENSITIVITY ANALYSIS OF LABOR IMPORT EFFECT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Labor import effect variable	25%	38%	45%	50%	55%	63%	75%
Alumni impact (millions)	\$117	\$98	\$86	\$78	\$70	\$59	\$39

Student employment variables

Student employment variables are difficult to estimate because many students do not report their employment status or because colleges generally do not collect this kind of information. Employment variables include the following: 1) the percentage of students who are employed while attending the college and 2) the percentage of earnings that working students receive relative to the

earnings they would have received had they not chosen to attend the college. Both employment variables affect the investment analysis results from the student perspective.

Students incur substantial expense by attending MVC because of the time they spend not gainfully employed. Some of that cost is recaptured if students remain partially (or fully) employed while attending. It is estimated that 75% of students are employed.⁴⁰ This variable is tested in the sensitivity analysis by changing it first to 100% and then to 0%.

The second student employment variable is more difficult to estimate. In this study we estimate that students who are working while attending the college earn only 69%, on average, of the earnings that they statistically would have received if not attending MVC. This suggests that many students hold part-time jobs that accommodate their MVC attendance, though it is at an additional cost in terms of receiving a wage that is less than what they otherwise might make. The 69% variable is an estimation based on the average hourly wages of the most common jobs held by students while attending college relative to the average hourly wages of all occupations in the U.S. The model captures this difference in wages and counts it as part of the opportunity cost of time. As above, the 69% estimate is tested in the sensitivity analysis by changing it to 100% and then to 0%.

The changes generate results summarized in Table A1.3, with A defined as the percent of students employed and B defined as the percent that students earn relative to their full earning potential. Base case results appear in the shaded row; here the assumptions remain unchanged, with A equal to 75% and B equal to 69%. Sensitivity analysis results are shown in non-shaded rows. Scenario 1 increases A to 100% while holding B constant, Scenario 2 increases B to 100% while holding A constant, Scenario 3 increases both A and B to 100%, and Scenario 4 decreases both A and B to 0%.

TABLE A1.3: SENSITIVITY ANALYSIS OF STUDENT EMPLOYMENT VARIABLES

Variations in assumptions	Net present value (millions)	Internal rate of return	Benefit-cost ratio
Base case: A = 75%, B = 69%	\$226.1	23.2%	7.6
Scenario 1: A = 100%, B = 69%	\$235.5	28.4%	10.5
Scenario 2: A = 75%, B = 100%	\$240.4	32.5%	13.0
Scenario 3: A = 100%, B = 100%	\$254.5	69.4%	44.3
Scenario 4: A = 0%, B = 0%	\$197.9	15.6%	4.2

Note: A = percent of students employed; B = percent earned relative to statistical averages

⁴⁰ Emsi provided an estimate of the percentage of students employed because MVC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

- **Scenario 1:** Increasing the percentage of students employed (A) from 75% to 100%, the net present value, internal rate of return, and benefit-cost ratio improve to \$235.5 million, 28.4%, and 10.5, respectively, relative to base case results. Improved results are attributable to a lower opportunity cost of time; all students are employed in this case.
- **Scenario 2:** Increasing earnings relative to statistical averages (B) from 69% to 100%, the net present value, internal rate of return, and benefit-cost ratio results improve to \$240.4 million, 32.5%, and 13.0, respectively, relative to base case results; a strong improvement, again attributable to a lower opportunity cost of time.
- **Scenario 3:** Increasing both assumptions A and B to 100% simultaneously, the net present value, internal rate of return, and benefit-cost ratio improve yet further to \$254.5 million, 69.4%, and 44.3, respectively, relative to base case results. This scenario assumes that all students are fully employed and earning full salaries (equal to statistical averages) while attending classes.
- **Scenario 4:** Finally, decreasing both A and B to 0% reduces the net present value, internal rate of return, and benefit-cost ratio to \$197.9 million, 15.6%, and 4.2, respectively, relative to base case results. These results are reflective of an increased opportunity cost; none of the students are employed in this case.⁴¹

It is strongly emphasized in this section that base case results are very attractive in that results are all above their threshold levels. As is clearly demonstrated here, results of the first three alternative scenarios appear much more attractive, although they overstate benefits. Results presented in Chapter 3 are realistic, indicating that investments in MVC generate excellent returns, well above the long-term average percent rates of return in stock and bond markets.

Discount rate

The discount rate is a rate of interest that converts future monies to their present value. In investment analysis, the discount rate accounts for two fundamental principles: 1) the time value of money, and 2) the level of risk that an investor is willing to accept. Time value of money refers to the value of money after interest or inflation has accrued over a given length of time. An investor must be willing to forego the use of money in the present to receive compensation for it in the future. The discount rate also addresses the investors' risk preferences by serving as a proxy for the minimum rate of return that the proposed risky asset must be expected to yield before the investors will be persuaded to invest in it. Typically, this minimum rate of return is determined by the known

⁴¹ Note that reducing the percent of students employed to 0% automatically negates the percent they earn relative to full earning potential, since none of the students receive any earnings in this case.

returns of less risky assets where the investors might alternatively consider placing their money.

In this study, we assume a 4.5% discount rate for students and a 0.6% discount rate for society and taxpayers.⁴² Similar to the sensitivity analysis of the alternative education variable, we vary the base case discount rates for students, taxpayers, and society on either side by increasing the discount rate by 10%, 25%, and 50%, and then reducing it by 10%, 25%, and 50%. Note that, because the rate of return and the payback period are both based on the undiscounted cash flows, they are unaffected by changes in the discount rate. As such, only variations in the net present value and the benefit-cost ratio are shown for students, taxpayers, and society in Table A1.4.

TABLE A1.4: SENSITIVITY ANALYSIS OF DISCOUNT RATE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Student perspective							
Discount rate	2.2%	3.3%	4.0%	4.5%	4.9%	5.6%	6.7%
Net present value (millions)	\$360	\$284	\$247	\$226	\$207	\$182	\$177
Benefit-cost ratio	11.5	9.3	8.2	7.6	7.0	6.3	6.2
Taxpayer perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$68	\$64	\$62	\$61	\$60	\$58	\$55
Benefit-cost ratio	2.5	2.4	2.4	2.4	2.3	2.3	2.2
Social perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$1,276	\$1,235	\$1,211	\$1,196	\$1,180	\$1,158	\$1,122
Benefit-cost ratio	14.4	14.0	13.7	13.6	13.4	13.2	12.8

As demonstrated in the table, an increase in the discount rate leads to a corresponding decrease in the expected returns, and vice versa. For example, increasing the student discount rate by 50% (from 4.5% to 6.7%) reduces the students' benefit-cost ratio from 7.6 to 6.2. Conversely, reducing the discount rate for students by 50% (from 4.5% to 2.2%) increases the benefit-cost ratio from 7.6 to 11.5. The sensitivity analysis results for society and taxpayers show the same inverse relationship between the discount rate and the benefit-cost ratio, with the variance in results being the greatest under the social perspective (from a 14.4 benefit-cost ratio at a -50% variation from the base case, to a 12.8 benefit-cost ratio at a 50% variation from the base case).

42 These values are based on the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office and the real treasury interest rates recommended by the Office of Management and Budget for 30-year investments. See the Congressional Budget Office "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline" and the Office of Management and Budget "Discount Rates for Cost-Effectiveness of Federal Programs."

Retained student variable

The retained student variable only affects the student spending impact calculation in Table 2.4. For this analysis, we assume a retained student variable of 10%, which means that 10% of MVC's students who originated from the MVC Service Area would have left the region for other opportunities, whether that be education or employment, if MVC did not exist. The money these retained students spent in the region for accommodation and other personal and household expenses is attributable to MVC.

Table A1.5 presents the results of the sensitivity analysis for the retained student variable. The assumption increases and decreases relative to the base case of 10% by the increments indicated in the table. The student spending impact is recalculated at each value of the assumption, holding all else constant. Student spending impacts attributable to MVC range from a high of \$11.6 million when the retained student variable is 15% to a low of \$3.9 million when the retained student variable is 5%. This means as the retained student variable decreases, the student spending attributable to MVC decreases. Even under the most conservative assumptions, the student spending impact on the MVC Service Area economy remains substantial.

TABLE A1.5: SENSITIVITY ANALYSIS OF RETAINED STUDENT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Retained student variable	5%	8%	9%	10%	11%	13%	15%
Student spending impact (thousands)	\$3,851	\$5,777	\$6,933	\$7,703	\$8,473	\$9,629	\$11,554

Appendix 2: Glossary of Terms

Alternative education A “with” and “without” measure of the percent of students who would still be able to avail themselves of education if the college under analysis did not exist. An estimate of 10%, for example, means that 10% of students do not depend directly on the existence of the college in order to obtain their education.

Alternative use of funds A measure of how monies that are currently used to fund the college might otherwise have been used if the college did not exist.

Asset value Capitalized value of a stream of future returns. Asset value measures what someone would have to pay today for an instrument that provides the same stream of future revenues.

Attrition rate Rate at which students leave the workforce due to out-migration, unemployment, retirement, or death.

Benefit-cost ratio Present value of benefits divided by present value of costs. If the benefit-cost ratio is greater than 1, then benefits exceed costs, and the investment is feasible.

Credit hour equivalent Credit hour equivalent, or CHE, is defined as 15 contact hours of education if on a semester system, and 10 contact hours if on a quarter system. In general, it requires 450 contact hours to complete one full-time equivalent, or FTE.

Demand Relationship between the market price of education and the volume of education demanded (expressed in terms of enrollment). The law of the downward-sloping demand curve is related to the fact that enrollment increases only if the price (tuition and fees) is lowered, or conversely, enrollment decreases if price increases.

Discounting Expressing future revenues and costs in present value terms.

Earnings (labor income) Income that is received as a result of labor; i.e., wages.

Economics Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Elasticity of demand Degree of responsiveness of the quantity of education demanded (enrollment) to changes in market prices (tuition and fees). If a decrease in fees increases or decreases total enrollment by a significant

amount, demand is elastic. If enrollment remains the same or changes only slightly, demand is inelastic.

Externalities Impacts (positive and negative) for which there is no compensation. Positive externalities of education include improved social behaviors such as improved health, lower crime, and reduced demand for income assistance. Educational institutions do not receive compensation for these benefits, but benefits still occur because education is statistically proven to lead to improved social behaviors.

Gross regional product Measure of the final value of all goods and services produced in a region after netting out the cost of goods used in production. Alternatively, gross regional product (GRP) equals the combined incomes of all factors of production; i.e., labor, land and capital. These include wages, salaries, proprietors' incomes, profits, rents, and other. Gross regional product is also sometimes called value added or added income.

Initial effect Income generated by the initial injection of monies into the economy through the payroll of the college and the higher earnings of its students.

Input-output analysis Relationship between a given set of demands for final goods and services and the implied amounts of manufactured inputs, raw materials, and labor that this requires. When educational institutions pay wages and salaries and spend money for supplies in the region, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods and services and jobs. Moreover, as students enter or rejoin the workforce with higher skills, they earn higher salaries and wages. In turn, this generates more consumption and spending in other sectors of the economy.

Internal rate of return Rate of interest that, when used to discount cash flows associated with investing in education, reduces its net present value to zero (i.e., where the present value of revenues accruing from the investment are just equal to the present value of costs incurred). This, in effect, is the breakeven rate of return on investment since it shows the highest rate of interest at which the investment makes neither a profit nor a loss.

Multiplier effect Additional income created in the economy as the college and its students spend money in the region. It consists of the income created by the supply chain of the industries initially affected by the spending of the college and its students (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

Net cash flow Benefits minus costs, i.e., the sum of revenues accruing from an investment minus costs incurred.

Net present value Net cash flow discounted to the present. All future cash flows are collapsed into one number, which, if positive, indicates feasibility. The result is expressed as a monetary measure.

Non-labor income Income received from investments, such as rent, interest, and dividends.

Opportunity cost Benefits foregone from alternative B once a decision is made to allocate resources to alternative A. Or, if individuals choose to attend college, they forego earnings that they would have received had they chose instead to work full-time. Foregone earnings, therefore, are the “price tag” of choosing to attend college.

Payback period Length of time required to recover an investment. The shorter the period, the more attractive the investment. The formula for computing payback period is:

$$\text{Payback period} = \text{cost of investment} / \text{net return per period}$$

Appendix 3: Frequently Asked Questions (FAQs)

This appendix provides answers to some frequently asked questions about the results.

What is economic impact analysis?

Economic impact analysis quantifies the impact from a given economic event – in this case, the presence of a college – on the economy of a specified region.

What is investment analysis?

Investment analysis is a standard method for determining whether or not an existing or proposed investment is economically viable. This methodology is appropriate in situations where a stakeholder puts up a certain amount of money with the expectation of receiving benefits in return, where the benefits that the stakeholder receives are distributed over time, and where a discount rate must be applied in order to account for the time value of money.

Do the results differ by region, and if so, why?

Yes. Regional economic data are drawn from Emsi's proprietary MR-SAM model, the Census Bureau, and other sources to reflect the specific earnings levels, jobs numbers, unemployment rates, population demographics, and other key characteristics of the region served by the college. Therefore, model results for the college are specific to the given region.

Are the funds transferred to the college increasing in value, or simply being re-directed?

Emsi's approach is not a simple "rearranging of the furniture" where the impact of operations spending is essentially a restatement of the level of funding received by the college. Rather, it is an impact assessment of the additional income created in the region as a result of the college spending on payroll and other non-pay expenditures, net of any impacts that would have occurred anyway if the college did not exist.

How does my college's rates of return compare to that of other institutions?

In general, Emsi discourages comparisons between institutions since many factors, such as regional economic conditions, institutional differences, and student demographics are outside of the college's control. It is best to compare the rate of return to the discount rates of 4.5% (for students) and 0.6% (for society and taxpayers), which can also be seen as the opportunity cost of the investment (since these stakeholder groups could be spending their time and money in other investment schemes besides education). If the rate of return is higher than the discount rate, the stakeholder groups can expect to receive a positive return on their educational investment.

Emsi recognizes that some institutions may want to make comparisons. As a word of caution, if comparing to an institution that had a study commissioned by a firm other than Emsi, then differences in methodology will create an "apples to oranges" comparison and will therefore be difficult. The study results should be seen as unique to each institution.

Net Present Value (NPV): How do I communicate this in laymen's terms?

Which would you rather have: a dollar right now or a dollar 30 years from now? That most people will choose a dollar now is the crux of net present value. The preference for a dollar today means today's dollar is therefore worth more than it would be in the future (in most people's opinion). Because the dollar today is worth more than a dollar in 30 years, the dollar 30 years from now needs to be adjusted to express its worth today. Adjusting the values for this "time value of money" is called discounting and the result of adding them all up after discounting each value is called net present value.

Internal Rate of Return (IRR): How do I communicate this in laymen's terms?

Using the bank as an example, an individual needs to decide between spending all of their paycheck today and putting it into savings. If they spend it today, they know what it is worth: \$1 = \$1. If they put it into savings, they need to know that there will be some sort of return to them for spending those dollars in the future rather than now. This is why banks offer interest rates and deposit interest earnings. This makes it so an individual can expect, for example, a 3% return in the future for money that they put into savings now.

Total Economic Impact: How do I communicate this in laymen's terms?

Big numbers are great, but putting them into perspective can be a challenge. To add perspective, find an industry with roughly the same “% of GRP” as your college (Table 1.3). This percentage represents its portion of the total gross regional product in the region (similar to the nationally recognized gross domestic product but at a regional level). This allows the college to say that their single brick and mortar campus does just as much for the MVC Service Area as the entire Utilities *industry*, for example. This powerful statement can help put the large total impact number into perspective.

Appendix 4: Example of Sales versus Income

Emsi's economic impact study differs from many other studies because we prefer to report the impacts in terms of income rather than sales (or output). Income is synonymous with value added or gross regional product (GRP). Sales include all the intermediary costs associated with producing goods and services. Income is a net measure that excludes these intermediary costs:

$$\text{Income} = \text{Sales} - \text{Intermediary Costs}$$

For this reason, income is a more meaningful measure of new economic activity than reporting sales. This is evidenced by the use of gross domestic product (GDP) – a measure of income – by economists when considering the economic growth or size of a country. The difference is GRP reflects a region and GDP a country.

To demonstrate the difference between income and sales, let us consider an example of a baker's production of a loaf of bread. The baker buys the ingredients such as eggs, flour, and yeast for \$2.00. He uses capital such as a mixer to combine the ingredients and an oven to bake the bread and convert it into a final product. Overhead costs for these steps are \$1.00. Total intermediary costs are \$3.00. The baker then sells the loaf of bread for \$5.00.

The sales amount of the loaf of bread is \$5.00. The income from the loaf of bread is equal to the sales amount less the intermediary costs:

$$\text{Income} = \$5.00 - \$3.00 = \$2.00$$

In our analysis, we provide context behind the income figures by also reporting the associated number of jobs. The impacts are also reported in sales and earnings terms for reference.

Appendix 5: Emsi MR-SAM

Emsi's MR-SAM represents the flow of all economic transactions in a given region. It replaces Emsi's previous input-output (IO) model, which operated with some 1,000 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (*i.e.*, multipliers) in the regional economy as a result of industries entering or exiting the region. The MR-SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,000 industries, government, household and investment sectors embedded in the old IO tool, the MR-SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

This appendix presents a high-level overview of the MR-SAM. Additional documentation on the technical aspects of the model is available upon request.

Data sources for the model

The Emsi MR-SAM model relies on a number of internal and external data sources, mostly compiled by the federal government. What follows is a listing and short explanation of our sources. The use of these data will be covered in more detail later in this appendix.

Emsi Data are produced from many data sources to produce detailed industry, occupation, and demographic jobs and earnings data at the local level. This information (especially sales-to-jobs ratios derived from jobs and earnings-to-sales ratios) is used to help regionalize the national matrices as well as to disaggregate them into more detailed industries than are normally available.

BEA Make and Use Tables (MUT) are the basis for input-output models in the U.S. The *make* table is a matrix that describes the amount of each commodity made by each industry in a given year. Industries are placed in the rows and commodities in the columns. The *use* table is a matrix that describes the amount of each commodity used by each industry in a given year. In the use table, commodities are placed in the rows and industries in the columns. The BEA produces two different sets of MUTs, the benchmark and the summary. The benchmark set contains about 500 sectors and is released every five years, with a five-year lag time (e.g., 2002 benchmark MUTs were released in 2007). The summary set contains about 80 sectors and is released every year, with a two-year lag (e.g., 2010 summary MUTs were released in late 2011/early 2012).

The MUTs are used in the Emsi MR-SAM model to produce an industry-by-industry matrix describing all industry purchases from all industries.

BEA Gross Domestic Product by State (GSP) describes gross domestic product from the value added (also known as added income) perspective. Value added is equal to employee compensation, gross operating surplus, and taxes on production and imports, less subsidies. Each of these components is reported for each state and an aggregate group of industries. This dataset is updated once per year, with a one-year lag. The Emsi MR-SAM model makes use of this data as a control and pegs certain pieces of the model to values from this dataset.

BEA National Income and Product Accounts (NIPA) cover a wide variety of economic measures for the nation, including gross domestic product (GDP), sources of output, and distribution of income. This dataset is updated periodically throughout the year and can be between a month and several years old depending on the specific account. NIPA data are used in many of the Emsi MR-SAM processes as both controls and seeds.

BEA Local Area Income (LPI) encapsulates multiple tables with geographies down to the county level. The following two tables are specifically used: CA05 (Personal income and earnings by industry) and CA91 (Gross flow of earnings). CA91 is used when creating the commuting submodel and CA05 is used in several processes to help with place-of-work and place-of-residence differences, as well as to calculate personal income, transfers, dividends, interest, and rent.

Bureau of Labor Statistics Consumer Expenditure Survey (CEX) reports on the buying habits of consumers along with some information as to their income, consumer unit, and demographics. Emsi utilizes this data heavily in the creation of the national demographic by income type consumption on industries.

Census of Government's (CoG) state and local government finance dataset is used specifically to aid breaking out state and local data that is reported in the MUTs. This allows Emsi to have unique production functions for each of its state and local government sectors.

Census' OnTheMap (OTM) is a collection of three datasets for the census block level for multiple years. **Origin-Destination (OD)** offers job totals associated with both home census blocks and a work census block. **Residence Area Characteristics (RAC)** offers jobs totaled by home census block. **Workplace Area Characteristics (WAC)** offers jobs totaled by work census block. All three of these are used in the commuting submodel to gain better estimates of earnings by industry that may be counted as commuting. This dataset has holes for specific years and regions. These holes are filled with Census' Journey-to-Work described later.

Census' Current Population Survey (CPS) is used as the basis for the demographic breakout data of the MR-SAM model. This set is used to estimate the ratios of demographic cohorts and their income for the three different income categories (i.e., wages, property income, and transfers).

Census' Journey-to-Work (JtW) is part of the 2000 Census and describes the amount of commuting jobs between counties. This set is used to fill in the areas where OTM does not have data.

Census' American Community Survey (ACS) Public Use Microdata Sample (PUMS) is the replacement for Census' long form and is used by Emsi to fill the holes in the CPS data.

Oak Ridge National Lab (ORNL) County-to-County Distance Matrix (Skim Tree) contains a matrix of distances and network impedances between each county via various modes of transportation such as highway, railroad, water, and combined highway-rail. Also included in this set are minimum impedances utilizing the best combination of paths. The ORNL distance matrix is used in Emsi's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Emsi's MR-SAM modeling system is a comparative static model in the same general class as RIMS II (Bureau of Economic Analysis) and IMPLAN (Minnesota Implan Group). The MR-SAM model is thus not an econometric model, the primary example of which is PolicyInsight by REMI. It relies on a matrix representation of industry-to-industry purchasing patterns originally based on national data which are regionalized with the use of local data and mathematical manipulation (i.e., non-survey methods). Models of this type estimate the ripple effects of changes in jobs, earnings, or sales in one or more industries upon other industries in a region.

The Emsi MR-SAM model shows final equilibrium impacts – that is, the user enters a change that perturbs the economy and the model shows the changes required to establish a new equilibrium. As such, it is not a dynamic model that shows year-by-year changes over time (as REMI's does).

NATIONAL SAM

Following standard practice, the SAM model appears as a square matrix, with each row sum exactly equaling the corresponding column sum. Reflecting its kinship with the standard Leontief input-output framework, individual SAM elements show accounting flows between row and column sectors during a chosen base year. Read across rows, SAM entries show the flow of funds into column accounts (also known as receipts or the appropriation of funds by

those column accounts). Read down columns, SAM entries show the flow of funds into row accounts (also known as expenditures or the dispersal of funds to those row accounts).

The SAM may be broken into three different aggregation layers: broad accounts, sub-accounts, and detailed accounts. The broad layer is the most aggregate and will be covered first. Broad accounts cover between one and four sub-accounts, which in turn cover many detailed accounts. This appendix will not discuss detailed accounts directly because of their number. For example, in the industry broad account, there are two sub-accounts and over 1,000 detailed accounts.

MULTI-REGIONAL ASPECT OF THE MR-SAM

Multi-regional (MR) describes a non-survey model that has the ability to analyze the transactions and ripple effects (i.e., multipliers) of not just a single region, but multiple regions interacting with each other. Regions in this case are made up of a collection of counties.

Emsi's multi-regional model is built off of gravitational flows, assuming that the larger a county's economy, the more influence it will have on the surrounding counties' purchases and sales. The equation behind this model is essentially the same that Isaac Newton used to calculate the gravitational pull between planets and stars. In Newton's equation, the masses of both objects are multiplied, then divided by the distance separating them and multiplied by a constant. In Emsi's model, the masses are replaced with the supply of a sector for one county and the demand for that same sector from another county. The distance is replaced with an impedance value that takes into account the distance, type of roads, rail lines, and other modes of transportation. Once this is calculated for every county-to-county pair, a set of mathematical operations is performed to make sure all counties absorb the correct amount of supply from every county and the correct amount of demand from every county. These operations produce more than 200 million data points.

Components of the Emsi MR-SAM model

The Emsi MR-SAM is built from a number of different components that are gathered together to display information whenever a user selects a region. What follows is a description of each of these components and how each is created. Emsi's internally created data are used to a great extent throughout the processes described below, but its creation is not described in this appendix.

COUNTY EARNINGS DISTRIBUTION MATRIX

The county earnings distribution matrices describe the earnings spent by every industry on every occupation for a year – i.e., earnings by occupation.

The matrices are built utilizing Emsi's industry earnings, occupational average earnings, and staffing patterns.

Each matrix starts with a region's staffing pattern matrix which is multiplied by the industry jobs vector. This produces the number of occupational jobs in each industry for the region. Next, the occupational average hourly earnings per job are multiplied by 2,080 hours, which converts the average hourly earnings into a yearly estimate. Then the matrix of occupational jobs is multiplied by the occupational annual earnings per job, converting it into earnings values. Last, all earnings are adjusted to match the known industry totals. This is a fairly simple process, but one that is very important. These matrices describe the place-of-work earnings used by the MR-SAM.

COMMUTING MODEL

The commuting sub-model is an integral part of Emsi's MR-SAM model. It allows the regional and multi-regional models to know what amount of the earnings can be attributed to place-of-residence vs. place-of-work. The commuting data describe the flow of earnings from any county to any other county (including within the counties themselves). For this situation, the commuted earnings are not just a single value describing total earnings flows over a complete year, but are broken out by occupation and demographic. Breaking out the earnings allows for analysis of place-of-residence and place-of-work earnings. These data are created using Bureau of Labor Statistics' OnTheMap dataset, Census' Journey-to-Work, BEA's LPI CA91 and CA05 tables, and some of Emsi's data. The process incorporates the cleanup and disaggregation of the OnTheMap data, the estimation of a closed system of county inflows and outflows of earnings, and the creation of finalized commuting data.

NATIONAL SAM

The national SAM as described above is made up of several different components. Many of the elements discussed are filled in with values from the national Z matrix – or industry-to-industry transaction matrix. This matrix is built from BEA data that describe which industries make and use what commodities at the national level. These data are manipulated with some industry standard equations to produce the national Z matrix. The data in the Z matrix act as the basis for the majority of the data in the national SAM. The rest of the values are filled in with data from the county earnings distribution matrices, the commuting data, and the BEA's National Income and Product Accounts.

One of the major issues that affect any SAM project is the combination of data from multiple sources that may not be consistent with one another. Matrix balancing is the broad name for the techniques used to correct this problem.

Emsi uses a modification of the “diagonal similarity scaling” algorithm to balance the national SAM.

GRAVITATIONAL FLOWS MODEL

The most important piece of the Emsi MR-SAM model is the gravitational flows model that produces county-by-county regional purchasing coefficients (RPCs). RPCs estimate how much an industry purchases from other industries inside and outside of the defined region. This information is critical for calculating all IO models.

Gravity modeling starts with the creation of an impedance matrix that values the difficulty of moving a product from county to county. For each sector, an impedance matrix is created based on a set of distance impedance methods for that sector. A distance impedance method is one of the measurements reported in the Oak Ridge National Laboratory’s County-to-County Distance Matrix. In this matrix, every county-to-county relationship is accounted for in six measures: great-circle distance, highway impedance, rail miles, rail impedance, water impedance, and highway-rail-highway impedance. Next, using the impedance information, the trade flows for each industry in every county are solved for. The result is an estimate of multi-regional flows from every county to every county. These flows are divided by each respective county’s demand to produce multi-regional RPCs.

Appendix 6: Value per Credit Hour Equivalent and the Mincer Function

Two key components in the analysis are 1) the value of the students' educational achievements, and 2) the change in that value over the students' working careers. Both of these components are described in detail in this appendix.

Value per CHE

Typically, the educational achievements of students are marked by the credentials they earn. However, not all students who attended MVC in the 2016-17 analysis year obtained a degree or certificate. Some returned the following year to complete their education goals, while others took a few courses and entered the workforce without graduating. As such, the only way to measure the value of the students' achievement is through their credit hour equivalents, or CHEs. This approach allows us to see the benefits to all students who attended the college, not just those who earned a credential.

To calculate the value per CHE, we first determine how many CHEs are required to complete each education level. For example, assuming that there are 30 CHEs in an academic year, a student generally completes 120 CHEs in order to move from a high school diploma to a bachelor's degree, another 60 CHEs to move from a bachelor's degree to a master's degree, and so on. This progression of CHEs generates an education ladder beginning at the less than high school level and ending with the completion of a doctoral degree, with each level of education representing a separate stage in the progression.

The second step is to assign a unique value to the CHEs in the education ladder based on the wage differentials presented in Table 1.4.⁴³ For example, the difference in regional earnings between a high school diploma and an associate degree is \$8,500. We spread this \$8,500 wage differential across the 60 CHEs that occur between a high school diploma and an associate degree, applying a ceremonial "boost" to the last CHE in the stage to mark the achievement of the degree.⁴⁴ We repeat this process for each education level in the ladder.

43 The value per CHE is different between the economic impact analysis and the investment analysis. The economic impact analysis uses the region as its background and, therefore, uses regional earnings to calculate value per CHE, while the investment analysis uses the state as its backdrop and, therefore, uses state earnings. The methodology outlined in this appendix will use regional earnings; however, the same methodology is followed for the investment analysis when state earnings are used.

44 Economic theory holds that workers that acquire education credentials send a signal to employers about their ability level. This phenomenon is commonly known as the sheepskin effect or signaling effect. The ceremonial boosts applied to the achievement of degrees in the Emsi impact model are derived from Jaeger and Page (1996).

Next we map the CHE production of the FY 2016-17 student population to the education ladder. Table 1.2 provides information on the CHE production of students attending MVC, broken out by educational achievement. In total, students completed 119,478 CHEs during the analysis year, excluding personal enrichment students. We map each of these CHEs to the education ladder depending on the students' education level and the average number of CHEs they completed during the year. For example, bachelor's degree graduates are allocated to the stage between the associate degree and the bachelor's degree, and the average number of CHEs they completed informs the shape of the distribution curve used to spread out their total CHE production within that stage of the progression.

The sum product of the CHEs earned at each step within the education ladder and their corresponding value yields the students' aggregate annual increase in income (ΔE), as shown in the following equation: and n is the number of steps

$$\Delta E = \sum_{i=1}^n e_i h_i \text{ where } i \in 1, 2, \dots, n$$

and n is the number of steps in the education ladder, e_i is the marginal earnings gain at step i , and h_i is the number of CHEs completed at step i .

Table A6.1 displays the result for the students' aggregate annual increase in income (ΔE), a total of \$16.4 million. By dividing this value by the students' total production of 119,478 CHEs during the analysis year, we derive an overall value of \$138 per CHE.

TABLE A6.1: AGGREGATE ANNUAL INCREASE IN INCOME OF STUDENTS AND VALUE PER CHE

Aggregate annual increase in income	\$16,439,244
Total credit hour equivalents (CHEs) in FY 2016-17*	119,478
Value per CHE	\$138

* Excludes the CHE production of personal enrichment students.
Source: Emsi impact model.

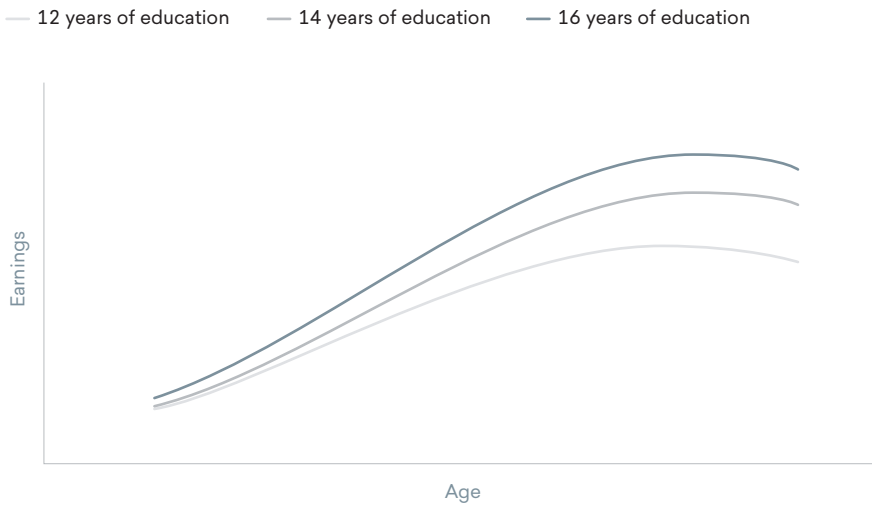
Mincer Function

The \$138 value per CHE in Table A6.1 only tells part of the story, however. Human capital theory holds that earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also shows that the earnings increment between educated and non-educated workers grows through time. These basic patterns in earnings over time were originally identified by Jacob Mincer, who viewed the lifecycle earnings distribution as a function with the key elements being earnings, years of

education, and work experience, with age serving as a proxy for experience.⁴⁵ While some have criticized Mincer’s earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Those critical of the Mincer function point to several unobserved factors such as ability, socioeconomic status, and family background that also help explain higher earnings. Failure to account for these factors results in what is known as an “ability bias.” Research by Card (1999 and 2001) suggests that the benefits estimated using Mincer’s function are biased upwards by 10% or less. As such, we reduce the estimated benefits by 10%. We use state-specific and education level-specific Mincer coefficients.

Figure A6.1 illustrates several important points about the Mincer function. First, as demonstrated by the shape of the curves, an individual’s earnings initially increase at an increasing rate, then increase at a decreasing rate, reach a maximum somewhere well after the midpoint of the working career, and then decline in later years. Second, individuals with higher levels of education reach their maximum earnings at an older age compared to individuals with lower levels of education (recall that age serves as a proxy for years of experience). And third, the benefits of education, as measured by the difference in earnings between education levels, increase with age.

FIGURE A6.1: LIFECYCLE CHANGE IN EARNINGS



In calculating the alumni impact in Chapter 2, we use the slope of the curve in Mincer’s earnings function to condition the \$138 value per CHE to the students’ age and work experience. To the students just starting their career during the analysis year, we apply a lower value per CHE; to the students in the latter half or approaching the end of their careers we apply a higher value per CHE. The

45 See Mincer (1958 and 1974).

original \$138 value per CHE applies only to the CHE production of students precisely at the midpoint of their careers during the analysis year.

In Chapter 3 we again apply the Mincer function, this time to project the benefits stream of the FY 2016-17 student population into the future. Here too the value per CHE is lower for students at the start of their career and higher near the end of it, in accordance with the scalars derived from the slope of the Mincer curve illustrated in Figure A6.1.

Appendix 7: Alternative Education Variable

In a scenario where the college did not exist, some of its students would still be able to avail themselves of an alternative comparable education. These students create benefits in the region even in the absence of the college. The alternative education variable accounts for these students and is used to discount the benefits we attribute to the college.

Recall this analysis considers only relevant economic information regarding the college. Considering the existence of various other academic institutions surrounding the college, we have to assume that a portion of the students could find alternative educations and either remain in or return to the region. For example, some students may participate in online programs while remaining in the region. Others may attend an out-of-region institution and return to the region upon completing their studies. For these students – who would have found an alternative education and produced benefits in the region regardless of the presence of the college – we discount the benefits attributed to the college. An important distinction must be made here: the benefits from students who would find alternative educations outside the region and not return to the region are *not* discounted. Because these benefits would not occur in the region without the presence of the college, they must be included.

In the absence of the college, we assume 15% of the college's students would find alternative education opportunities and remain in or return to the region. We account for this by discounting the alumni impact, the benefits to taxpayers, and the benefits to society in the region in Chapters 2 and 3 by 15%. In other words, we assume 15% of the benefits created by the college's students would have occurred anyways in the counterfactual scenario where the college did not exist. A sensitivity analysis of this adjustment is presented in Appendix 1.

Appendix 8: Overview of Investment Analysis Measures

The appendix provides context to the investment analysis results using the simple hypothetical example summarized in Table A8.1 below. The table shows the projected benefits and costs for a single student over time and associated investment analysis results.⁴⁶

TABLE A8.1: EXAMPLE OF THE BENEFITS AND COSTS OF EDUCATION FOR A SINGLE STUDENT

1	2	3	4	5	6
Year	Tuition	Opportunity cost	Total cost	Higher earnings	Net cash flow
1	\$1,500	\$20,000	\$21,500	\$0	-\$21,500
2	\$0	\$0	\$0	\$5,000	\$5,000
3	\$0	\$0	\$0	\$5,000	\$5,000
4	\$0	\$0	\$0	\$5,000	\$5,000
5	\$0	\$0	\$0	\$5,000	\$5,000
6	\$0	\$0	\$0	\$5,000	\$5,000
7	\$0	\$0	\$0	\$5,000	\$5,000
8	\$0	\$0	\$0	\$5,000	\$5,000
9	\$0	\$0	\$0	\$5,000	\$5,000
10	\$0	\$0	\$0	\$5,000	\$5,000
Net present value			\$21,500	\$35,753	\$14,253

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
18.0%	1.7	4.2

Assumptions are as follows:

- Benefits and costs are projected out 10 years into the future (Column 1).
- The student attends the college for one year, and the cost of tuition is \$1,500 (Column 2).
- Earnings foregone while attending the college for one year (opportunity cost) come to \$20,000 (Column 3).

⁴⁶ Note that this is a hypothetical example. The numbers used are not based on data collected from an existing college.

- Together, tuition and earnings foregone cost sum to \$21,500. This represents the out-of-pocket investment made by the student (Column 4).
- In return, the student earns \$5,000 more per year than he otherwise would have earned without the education (Column 5).
- The net cash flow (NCF) in Column 6 shows higher earnings (Column 5) less the total cost (Column 4).
- The assumed going rate of interest is 4%, the rate of return from alternative investment schemes for the use of the \$21,500.

Results are expressed in standard investment analysis terms, which are as follows: the net present value, the internal rate of return, the benefit-cost ratio, and the payback period. Each of these is briefly explained below in the context of the cash flow numbers presented in Table A8.1.

Net present value

The student in Table A8.1 can choose either to attend college or to forego post-secondary education and maintain his present employment. If he decides to enroll, certain economic implications unfold. Tuition and fees must be paid, and earnings will cease for one year. In exchange, the student calculates that with post-secondary education, his earnings will increase by at least the \$5,000 per year, as indicated in the table.

The question is simple: Will the prospective student be economically better off by choosing to enroll? If he adds up higher earnings of \$5,000 per year for the remaining nine years in Table A8.1, the total will be \$45,000. Compared to a total investment of \$21,500, this appears to be a very solid investment. The reality, however, is different. Benefits are far lower than \$45,000 because future money is worth less than present money. Costs (tuition plus earnings foregone) are felt immediately because they are incurred today, in the present. Benefits, on the other hand, occur in the future. They are not yet available. All future benefits must be discounted by the going rate of interest (referred to as the discount rate) to be able to express them in present value terms.⁴⁷

Let us take a brief example. At 4%, the present value of \$5,000 to be received one year from today is \$4,807. If the \$5,000 were to be received in year 10, the present value would reduce to \$3,377. Put another way, \$4,807 deposited in the bank today earning 4% interest will grow to \$5,000 in one year; and \$3,377 deposited today would grow to \$5,000 in 10 years. An “economically rational” person would, therefore, be equally satisfied receiving \$3,377 today or \$5,000

⁴⁷ Technically, the interest rate is applied to compounding – the process of looking at deposits today and determining how much they will be worth in the future. The same interest rate is called a discount rate when the process is reversed – determining the present value of future earnings.

10 years from today given the going rate of interest of 4%. The process of discounting – finding the present value of future higher earnings – allows the model to express values on an equal basis in future or present value terms.

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today (in this example, tuition plus earnings foregone). As indicated in Table A8.1 the cumulative present value of \$5,000 worth of higher earnings between years 2 and 10 is \$35,753 given the 4% interest rate, far lower than the undiscounted \$45,000 discussed above.

The net present value of the investment is \$14,253. This is simply the present value of the benefits less the present value of the costs, or $\$35,753 - \$21,500 = \$14,253$. In other words, the present value of benefits exceeds the present value of costs by as much as \$14,253. The criterion for an economically worthwhile investment is that the net present value is equal to or greater than zero. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment in education is very strong.

Internal rate of return

The internal rate of return is another way of measuring the worth of investing in education using the same cash flows shown in Table A8.1. In technical terms, the internal rate of return is a measure of the average earning power of money used over the life of the investment. It is simply the interest rate that makes the net present value equal to zero. In the discussion of the net present value above, the model applies the going rate of interest of 4% and computes a positive net present value of \$14,253. The question now is what the interest rate would have to be in order to reduce the net present value to zero. Obviously it would have to be higher – 18.0% in fact, as indicated in Table A8.1. Or, if a discount rate of 18.0% were applied to the net present value calculations instead of the 4%, then the net present value would reduce to zero.

What does this mean? The internal rate of return of 18.0% defines a breakeven solution – the point where the present value of benefits just equals the present value of costs, or where the net present value equals zero. Or, at 18.0%, higher earnings of \$5,000 per year for the next nine years will earn back all investments of \$21,500 made plus pay 18.0% for the use of that money (\$21,500) in the meantime. Is this a good return? Indeed, it is. If it is compared to the 4% going rate of interest applied to the net present value calculations, 18.0% is far higher than 4%. It may be concluded, therefore, that the investment in this case is solid. Alternatively, comparing the 18.0% rate of return to the long-term 10% rate or so obtained from investments in stocks and bonds also indicates that the investment in education is strong relative to the stock market returns (on average).

Benefit-cost ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or $\$35,753 \div \$21,500 = 1.7$ (based on the 4% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 18.0% internal rate of return discussed above would reduce the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than the 18.0% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 1.7 ratio means that a dollar invested today will return a cumulative \$1.70 over the ten-year time period.

Payback period

This is the length of time from the beginning of the investment (consisting of tuition and earnings foregone) until higher future earnings give a return on the investment made. For the student in Table A8.1, it will take roughly 4.2 years of \$5,000 worth of higher earnings to recapture his investment of \$1,500 in tuition and the \$20,000 in earnings foregone while attending the college. Higher earnings that occur beyond 4.2 years are the returns that make the investment in education in this example economically worthwhile. The payback period is a fairly rough, albeit common, means of choosing between investments. The shorter the payback period, the stronger the investment.

Appendix 9: Shutdown Point

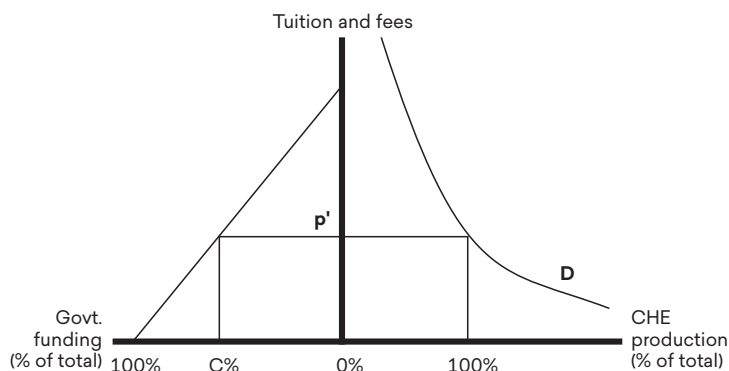
The investment analysis in Chapter 3 weighs the benefits generated by the college against the state and local taxpayer funding that the college receives to support its operations. An important part of this analysis is factoring out the benefits that the college would have been able to generate anyway, even without state and local taxpayer support. This adjustment is used to establish a direct link between what taxpayers pay and what they receive in return. If the college is able to generate benefits without taxpayer support, then it would not be a true investment.⁴⁸

The overall approach includes a sub-model that simulates the effect on student enrollment if the college loses its state and local funding and has to raise student tuition and fees in order to stay open. If the college can still operate without state and local support, then any benefits it generates at that level are discounted from total benefit estimates. If the simulation indicates that the college cannot stay open, however, then benefits are directly linked to costs, and no discounting applies. This appendix documents the underlying theory behind these adjustments.

State and local government support versus student demand for education

Figure A9.1 presents a simple model of student demand and state and local government support. The right side of the graph is a standard demand curve (*D*) showing student enrollment as a function of student tuition and fees. Enrollment

FIGURE A9.1: STUDENT DEMAND AND GOVERNMENT FUNDING BY TUITION AND FEES

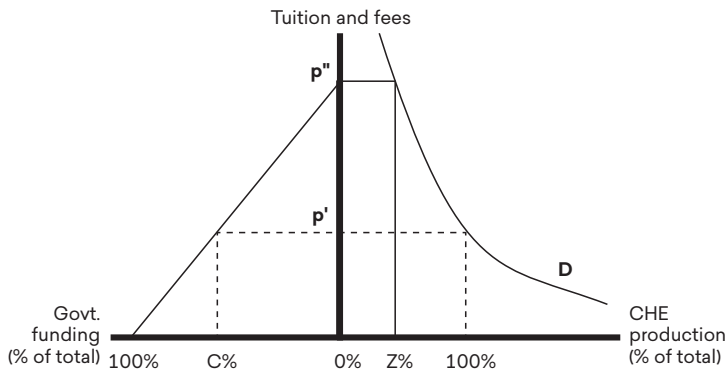


48 Of course, as a public training provider, the college would not be permitted to continue without public funding, so the situation in which it would lose all state support is entirely hypothetical. The purpose of the adjustment factor is to examine the college in standard investment analysis terms by netting out any benefits it may be able to generate that are not directly linked to the costs of supporting it.

is measured in terms of total credit hour equivalents (CHEs) and expressed as a percentage of the college's current CHE production. Current student tuition and fees are represented by p' , and state and local government support covers $C\%$ of all costs. At this point in the analysis, it is assumed that the college has only two sources of revenues: 1) student tuition and fees and 2) state and local government support.

Figure A9.2 shows another important reference point in the model – where state and local government support is 0% , student tuition and fees are increased to p'' , and CHE production is at $Z\%$ (less than 100%). The reduction in CHEs reflects the price elasticity of the students' demand for education, *i.e.*, the extent to which the students' decision to attend the college is affected by the change in tuition and fees. Ignoring for the moment those issues concerning the college's minimum operating scale (considered below in the section called "Calculating benefits at the shutdown point"), the implication for the investment analysis is that benefits to state and local government must be adjusted to net out the benefits that the college can provide absent state and local government support, represented as $Z\%$ of the college's current CHE production in Figure A9.2.

FIGURE A9.2: CHE PRODUCTION AND GOVERNMENT FUNDING BY TUITION AND FEES



To clarify the argument, it is useful to consider the role of enrollment in the larger benefit-cost model. Let B equal the benefits attributable to state and local government support. The analysis derives all benefits as a function of student enrollment, measured in terms of CHEs produced. For consistency with the graphs in this appendix, B is expressed as a function of the percent of the college's current CHE production. Equation 1 is thus as follows:

$$1) B = B(100\%)$$

This reflects the total benefits generated by enrollments at their current levels.

Consider benefits now with reference to Z. The point at which state and local government support is zero nonetheless provides for Z% (less than 100%) of the current enrollment, and benefits are symbolically indicated by the following equation:

$$2) B = B(Z\%)$$

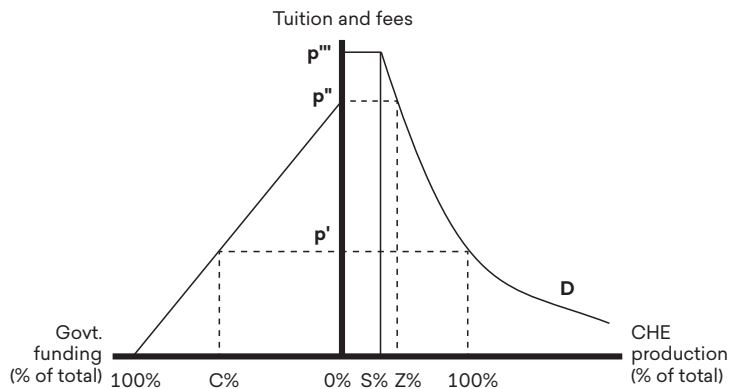
Inasmuch as the benefits in equation 2 occur with or without state and local government support, the benefits appropriately attributed to state and local government support are given by equation 3 as follows:

$$3) B = B(100\%) - B(Z\%)$$

Calculating benefits at the shutdown point

Colleges and universities cease to operate when the revenue they receive from the quantity of education demanded is insufficient to justify their continued operations. This is commonly known in economics as the shutdown point.⁴⁹ The shutdown point is introduced graphically in Figure A9.3 as S%. The location of point S% indicates that the college can operate at an even lower enrollment level than Z% (the point at which the college receives zero state and local government funding). State and local government support at point S% is still zero, and student tuition and fees have been raised to p^{'''}. State and local government support is thus credited with the benefits given by equation 3, or $B = B(100\%) - B(Z\%)$. With student tuition and fees still higher than p^{'''}, the college would no longer be able to attract enough students to keep the doors open, and it would shut down.

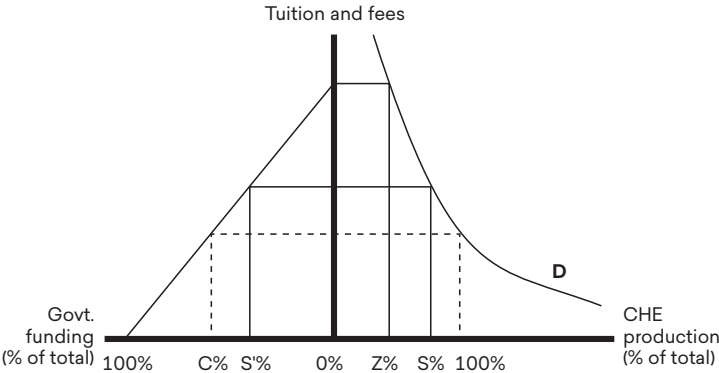
FIGURE A9.3: SHUTDOWN POINT AFTER ZERO GOVERNMENT FUNDING



49 In the traditional sense, the shutdown point applies to firms seeking to maximize profits and minimize losses. Although profit maximization is not the primary aim of colleges and universities, the principle remains the same, *i.e.*, that there is a minimum scale of operation required in order for colleges and universities to stay open.

Figure A9.4 illustrates yet another scenario. Here, the shutdown point occurs at a level of CHE production greater than Z% (the level of zero state and local government support), meaning some minimum level of state and local government support is needed for the college to operate at all. This minimum portion of overall funding is indicated by S% on the left side of the chart, and as before, the shutdown point is indicated by S% on the right side of chart. In this case, state and local government support is appropriately credited with all the benefits generated by the college's CHE production, or $B = B(100\%)$.

FIGURE A9.4: SHUTDOWN POINT BEFORE ZERO GOVERNMENT FUNDING



Appendix 10: Social Externalities

Education has a predictable and positive effect on a diverse array of social benefits. These, when quantified in dollar terms, represent significant social savings that directly benefit society communities and citizens throughout the region, including taxpayers. In this appendix we discuss the following three main benefit categories: 1) improved health, 2) reductions in crime, and 3) reduced demand for government-funded income assistance.

It is important to note that the data and estimates presented here should not be viewed as exact, but rather as indicative of the positive impacts of education on an individual's quality of life. The process of quantifying these impacts requires a number of assumptions to be made, creating a level of uncertainty that should be borne in mind when reviewing the results.

Health

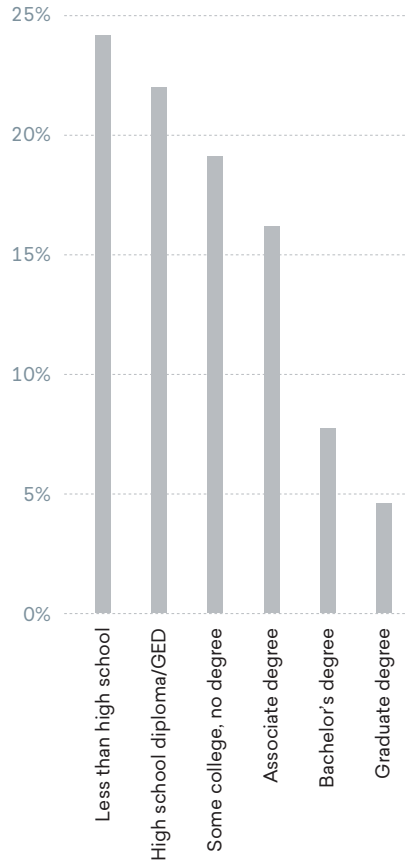
Statistics show a correlation between increased education and improved health. The manifestations of this are found in five health-related variables: smoking, alcohol dependence, obesity, depression, and drug abuse. There are other health-related areas that link to educational attainment, but these are omitted from the analysis until we can invoke adequate (and mutually exclusive) databases and are able to fully develop the functional relationships between them.

SMOKING

Despite a marked decline over the last several decades in the percentage of U.S. residents who smoke, a sizeable percentage of the U.S. population still smokes. The negative health effects of smoking are well documented in the literature, which identifies smoking as one of the most serious health issues in the U.S.

Figure A10.1 shows the prevalence of cigarette smoking among adults, 25 years and over, based on data provided by the National Health Interview Survey.⁵⁰ The data include adults who reported smoking more than 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. As indicated, the percent of who smoke begins to decline beyond the level of high school education.

FIGURE A10.1: PREVALENCE OF SMOKING AMONG U.S. ADULTS BY EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

50 Centers for Disease Control and Prevention. "Table. Characteristics of current adult cigarette smokers," National Health Interview Survey, United States, 2016.

The Centers for Disease Control and Prevention (CDC) reports the percentage of adults who are current smokers by state.⁵¹ We use this information to create an index value by which we adjust the national prevalence data on smoking to each state. For example, 11.0% of California adults were smokers in 2016, relative to 15.5% for the nation. We thus apply a scalar of 0.71 to the national probabilities of smoking in order to adjust them to the state of California.

ALCOHOL DEPENDENCE

Although alcohol dependence has large public and private costs, it is difficult to measure and define. There are many patterns of drinking, ranging from abstinence to heavy drinking. Alcohol abuse is riddled with social costs, including health care expenditures for treatment, prevention, and support; workplace losses due to reduced worker productivity; and other effects.

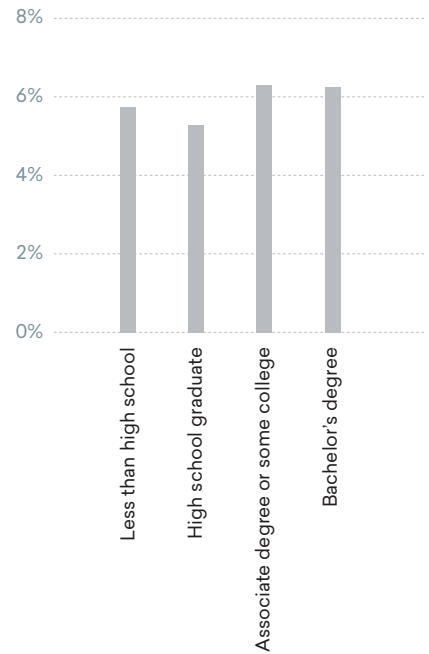
Figure A10.2 compares the percentage of adults, 18 and older, that abuse or depend on alcohol by education level, based on data from the Substance Abuse and Mental Health Services Administration (SAMHSA).⁵² These statistics give an indication of the correlation between education and the reduced probability of alcohol dependence. Adults with an associate degree or some college have higher rates of alcohol dependence than adults with a high school diploma or lower. Prevalence rates are lower for adults with a bachelor’s degree or higher than those with an associate degree or some college. Although the data do not maintain a pattern of decreased alcohol dependence at every level of increased education, we include these rates in our model to ensure we provide a comprehensive view of the social benefits and costs correlated with education.

OBESITY

The rise in obesity and diet-related chronic diseases has led to increased attention on how expenditures relating to obesity have increased in recent years. The average cost of obesity-related medical conditions is calculated using information from the *Journal of Occupational and Environmental Medicine*, which reports incremental medical expenditures and productivity losses due to excess weight.⁵³

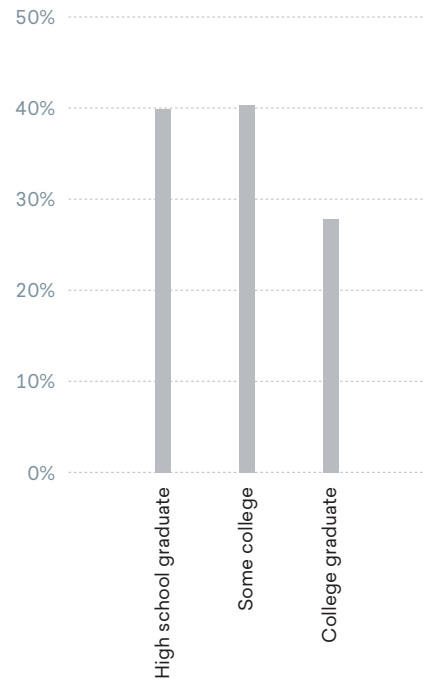
Data for Figure A10.3 is derived from the National Center for Health Statistics which shows the prevalence of obesity among adults aged 20 years and over

FIGURE A10.2: PREVALENCE OF ALCOHOL DEPENDENCE OR ABUSE BY SEX AND EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

FIGURE A10.3: PREVALENCE OF OBESITY BY EDUCATION LEVEL



Source: Derived from data provided by the National Center for Health Statistics.

51 Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data*, 2016.
 52 Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016.
 53 Eric A. Finkelstein, Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale, "The Costs of Obesity in the Workplace," *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

by education, gender, and ethnicity.⁵⁴ As indicated, college graduates are less likely to be obese than individuals with a high school diploma. However, the prevalence of obesity among adults with some college is actually greater than those with just a high school diploma. In general, though, obesity tends to decline with increasing levels of education.

DEPRESSION

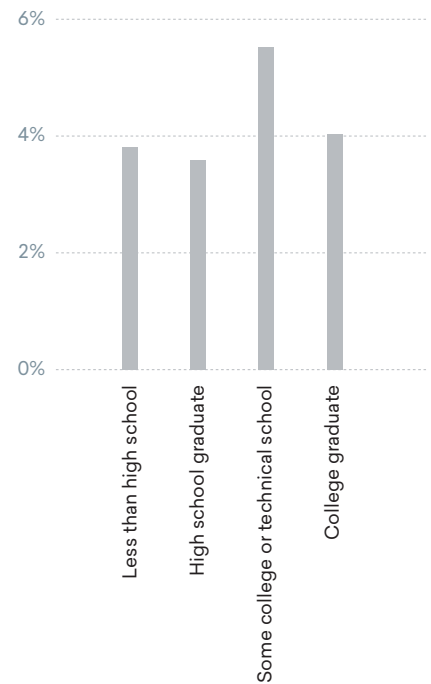
Capturing the full economic cost of mental illness is difficult because not all mental disorders have a correlation with education. For this reason, we only examine the economic costs associated with major depressive disorder (MDD), which are comprised of medical and pharmaceutical costs, workplace costs such as absenteeism, and suicide-related costs.⁵⁵

Figure A10.4 summarizes the prevalence of MDD among adults by education level, based on data provided by the CDC.⁵⁶ As shown, people with some college are most likely to have MDD compared to those with other levels of educational attainment. People with a high school diploma or less, along with college graduates, are all fairly similar in the prevalence rates.

DRUG ABUSE

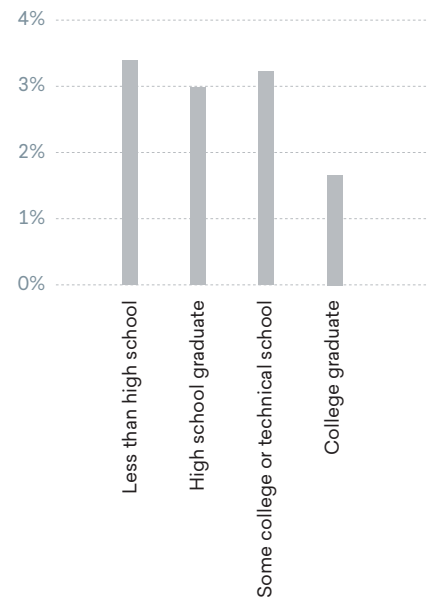
The burden and cost of illicit drug abuse is enormous in the U.S., but little is known about the magnitude of costs and effects at a national level. What is known is that the rate of people abusing drugs is inversely proportional to their education level. The higher the education level, the less likely a person is to abuse or depend on illicit drugs. The probability that a person with less than a high school diploma will abuse drugs is 3.4%, twice as large as the probability of drug abuse for college graduates (1.7%). This relationship is presented in Figure A10.5 based on data supplied by SAMHSA.⁵⁷ Similar to alcohol abuse, prevalence does not strictly decline at every education level. Health costs associated with illegal drug use are also available from SAMSHA, with costs to state and local government representing 40% of the total cost related to illegal drug use.⁵⁸

FIGURE A10.4: PREVALENCE OF MAJOR DEPRESSIVE EPISODE BY EDUCATION LEVEL



Source: National Survey on Drug Use and Health.

FIGURE A10.5: PREVALENCE OF ILLICIT DRUG DEPENDENCE OR ABUSE BY EDUCATION LEVEL



Source: Substance Abuse and Mental Health Services Administration.

54 Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017).

55 Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" *Journal of Clinical Psychiatry* 76:2, 2015.

56 National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016."

57 Substance Abuse and Mental Health Services Administration, National Survey on Drug Use and Health, 2010 and 2011.

58 Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." *Behavioral Health Spending & Use Accounts, 1986 – 2014*. HHS Publication No. SMA-16-4975, 2016.

Crime

As people achieve higher education levels, they are statistically less likely to commit crimes. The analysis identifies the following three types of crime-related expenses: 1) criminal justice expenditures, including police protection, judicial and legal, and corrections, 2) victim costs, and 3) productivity lost as a result of time spent in jail or prison rather than working.

Figure A10.6 displays the educational attainment of the incarcerated population in the U.S. Data are derived from the breakdown of the inmate population by education level in federal, state, and local prisons as provided by the U.S. Census Bureau.⁵⁹

Victim costs comprise material, medical, physical, and emotional losses suffered by crime victims. Some of these costs are hidden, while others are available in various databases. Estimates of victim costs vary widely, attributable to differences in how the costs are measured. The lower end of the scale includes only tangible out-of-pocket costs, while the higher end includes intangible costs related to pain and suffering.⁶⁰

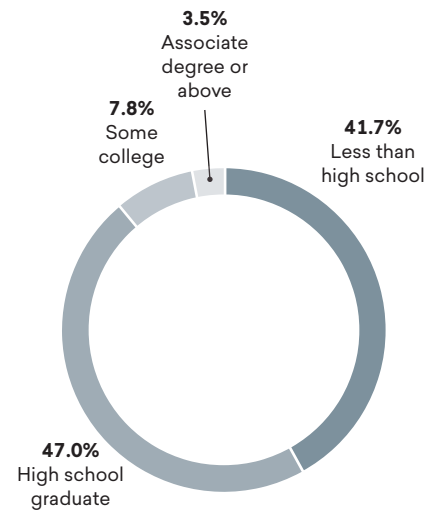
Yet another measurable cost is the economic productivity of people who are incarcerated and are thus not employed. The measurable productivity cost is simply the number of additional incarcerated people, who could have been in the labor force, multiplied by the average income of their corresponding education levels.

Income Assistance

Statistics show that as education levels increase, the number of applicants for government-funded income assistance such as welfare and unemployment benefits declines. Welfare and unemployment claimants can receive assistance from a variety of different sources, including Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), and unemployment insurance.⁶¹

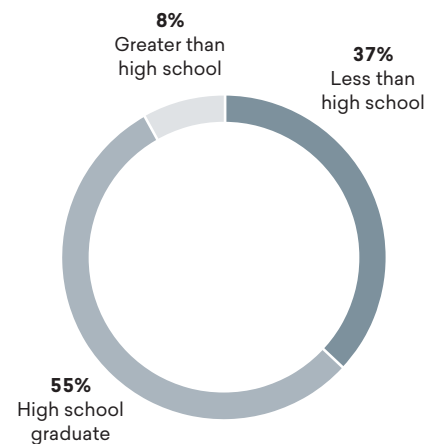
Figure A10.7 relates the breakdown of TANF recipients by education level, derived from data provided by the U.S. Department of Health and Human Services.⁶² As shown, the demographic characteristics of TANF recipients are

FIGURE A10.6: EDUCATIONAL ATTAINMENT OF THE INCARCERATED POPULATION



Source: Derived from data provided by the U.S. Census Bureau.

FIGURE A10.7: BREAKDOWN OF TANF RECIPIENTS BY EDUCATION LEVEL



Source: U.S. Department of Health and Human Services, Office of Family Assistance.

59 U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011.

60 McCollister, Kathryn E., Michael T. French, and Hai Fang. "The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation." *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109.

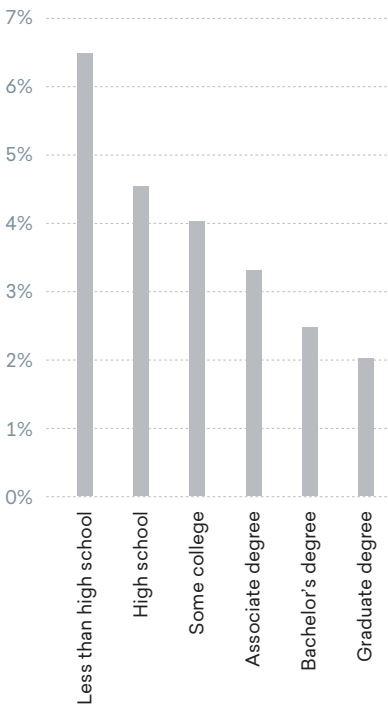
61 Medicaid is not considered in this analysis because it overlaps with the medical expenses in the analyses for smoking, alcohol dependence, obesity, depression, and drug abuse. We also exclude any welfare benefits associated with disability and age.

62 U.S. Department of Health and Human Services, Office of Family Assistance. "Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016."

weighted heavily towards the less than high school and high school categories, with a much smaller representation of individuals with greater than a high school education.

Unemployment rates also decline with increasing levels of education, as illustrated in Figure A10.8. These data are provided by the Bureau of Labor Statistics.⁶³ As shown, unemployment rates range from 6.5% for those with less than a high school diploma to 2.0% for those at the graduate degree level or higher.

FIGURE A10.8: UNEMPLOYMENT BY EDUCATION LEVEL



Source: Bureau of Labor Statistics.

63 Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017.



The Economic Value of Moreno Valley College

FACT SHEET

MORENO Valley College (MVC) creates a significant positive impact on the business community and generates a return on investment to its major stakeholder groups—students, taxpayers, and society. Using a two-pronged approach that involves an economic impact analysis and an investment analysis, this study calculates the benefits received by each of these groups. Results of the analysis reflect fiscal year (FY) 2016-17.

Economic impact analysis

In FY 2016-17, MVC added **\$129.2 million** in income to the MVC Service Area¹ economy, a value approximately equal to **0.8%** of the region's total gross regional product (GRP). Expressed in terms of jobs, MVC's impact supported **1,708** regional jobs. For perspective, the activities of MVC and its students support one out of every **119** jobs in the MVC Service Area.

OPERATIONS SPENDING IMPACT

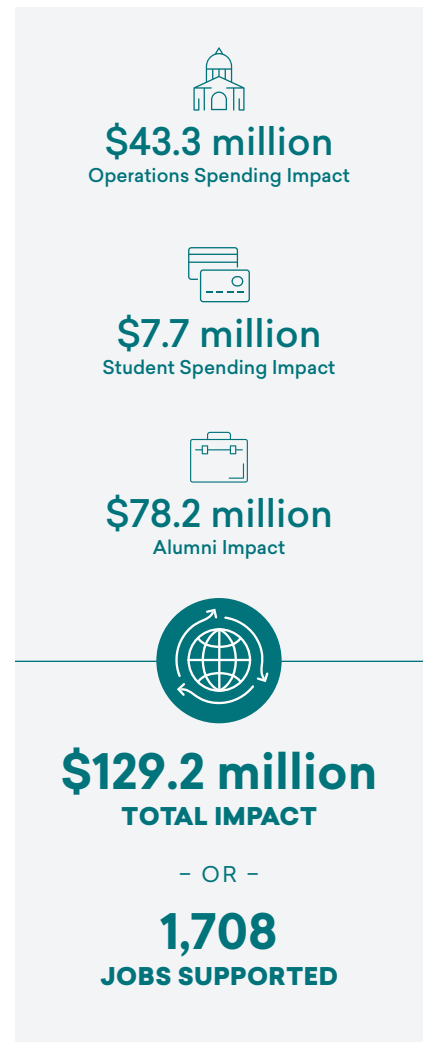
- MVC employed 463 full-time and part-time faculty and staff. Payroll amounted to \$40.1 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. The college spent another \$17.2 million on day-to-day expenses related to facilities, supplies, and professional services.
- The net impact of the college's operations spending in FY 2016-17 added **\$43.3 million** in income to the regional economy.

STUDENT SPENDING IMPACT

- Some in-region students would have left the MVC Service Area for other educational opportunities if not for MVC. These students spent money on groceries, mortgage and rent payments, and so on at regional businesses.
- The expenditures of retained students in FY 2016-17 added **\$7.7 million** in income to the MVC Service Area economy.

¹ For the purposes of this analysis, the MVC Service Area is comprised of 17 ZIP codes primarily located in the northwest corner of Riverside County in California.

IMPACTS CREATED BY MVC
IN FY 2016-17



ALUMNI IMPACT

- Over the years, students have studied at MVC and entered or re-entered the workforce with newly-acquired knowledge and skills. Today, thousands of these former students are employed in the MVC Service Area.
- The net impact of MVC's former students currently employed in the regional workforce amounted to **\$78.2 million** in added income in FY 2016-17.



Investment analysis

STUDENT PERSPECTIVE

- MVC's FY 2016-17 students paid a present value of **\$13 million** to cover the cost of tuition, fees, supplies, and interest on student loans. They also forwent **\$21.3 million** in money that they would have earned had they been working instead of attending college.
- In return for their investment, students will receive **\$260.4 million** in increased earnings over their working lives. This translates to a return of **\$7.60** in higher future earnings for every dollar students invest in their education. Students' average annual rate of return is **23.2%**.

TAXPAYER PERSPECTIVE

- Taxpayers provided MVC with **\$44.7 million** of funding in FY 2016-17. In return, they will benefit from added tax revenue, stemming from students' higher lifetime earnings and increased business output, amounting to **\$89.3 million**. A reduced demand for government-funded services in California will add another **\$16.3 million** in benefits to taxpayers.
- For every dollar of public money invested in MVC, taxpayers will receive **\$2.40** in return, over the course of students' working lives. The average annual rate of return for taxpayers is **5.7%**.

SOCIAL PERSPECTIVE

- In FY 2016-17, California invested **\$95.1 million** to fully support MVC. In turn, the California economy will grow by **\$1.3 billion**, over the course of students' working lives. Society will also benefit from **\$20.4 million** of public and private sector savings.
- For every dollar invested in MVC educations in FY 2016-17, people in California will receive **\$13.60** in return, for as long as MVC's FY 2016-17 students remain active in the state workforce.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN MVC



23.2%

Average annual return for MVC students



10.1%

Stock market 30-year average annual return



0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.



FOR EVERY \$1...



Students gain

\$7.60

in lifetime earnings



Taxpayers gain

\$2.40

in added tax revenue and public sector savings



Society gains

\$13.60

in added income and social savings





The economic value of Norco College

ANALYSIS OF THE ECONOMIC IMPACT
AND RETURN ON INVESTMENT OF EDUCATION

Emsi & Community Colleges

15+ years working with higher education institutions

1,800+ economic impact studies completed

1.2M students used Emsi's career pathways tool last year

9 of 10 2019 Aspen Prize finalists are Emsi customers



What is an
ECONOMIC IMPACT ANALYSIS?

Measures how an event or institution affects the local economy

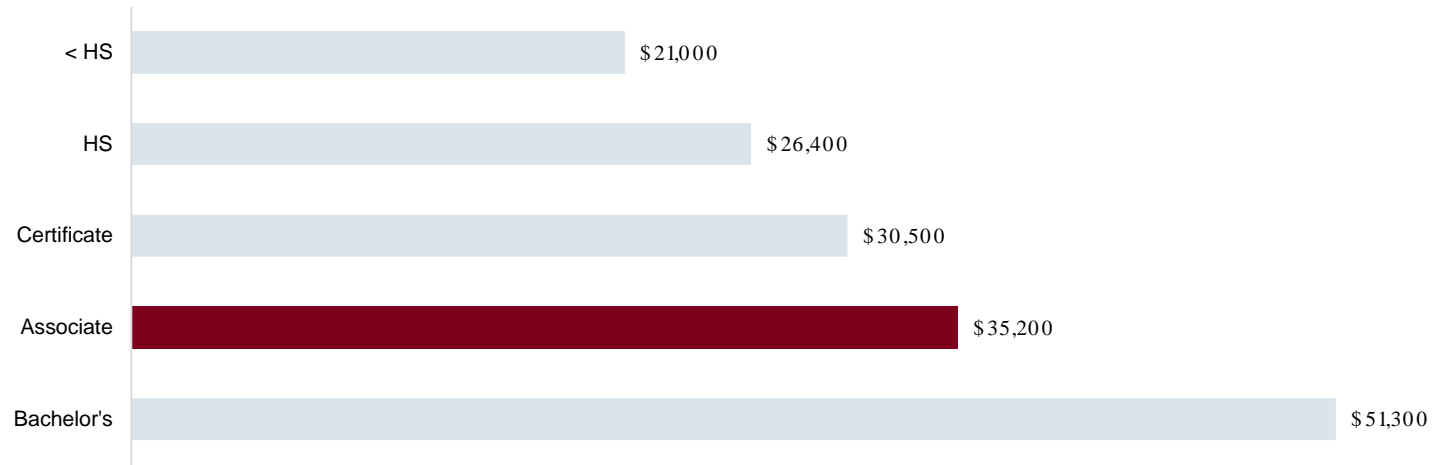


What is an
INVESTMENT ANALYSIS?

A comparison of the costs and benefits to determine the return on investment **330**

About the NC Service Area

AVERAGE EARNINGS BY EDUCATION LEVEL

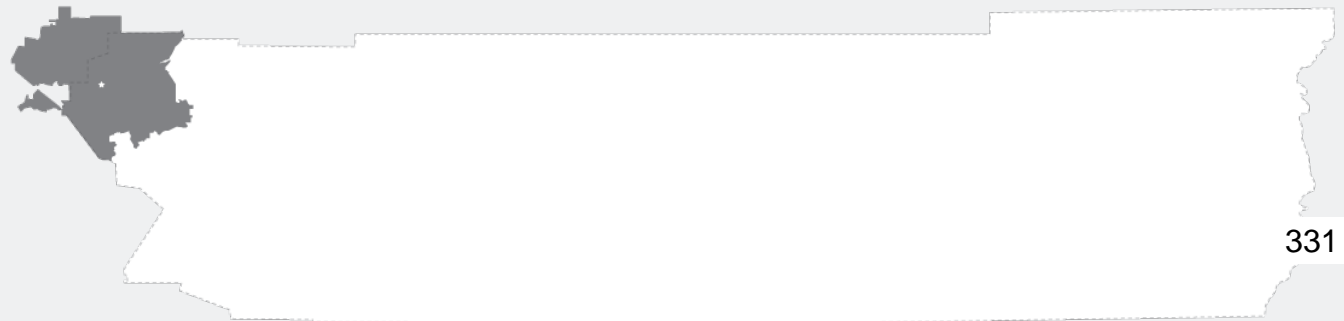


\$44 billion

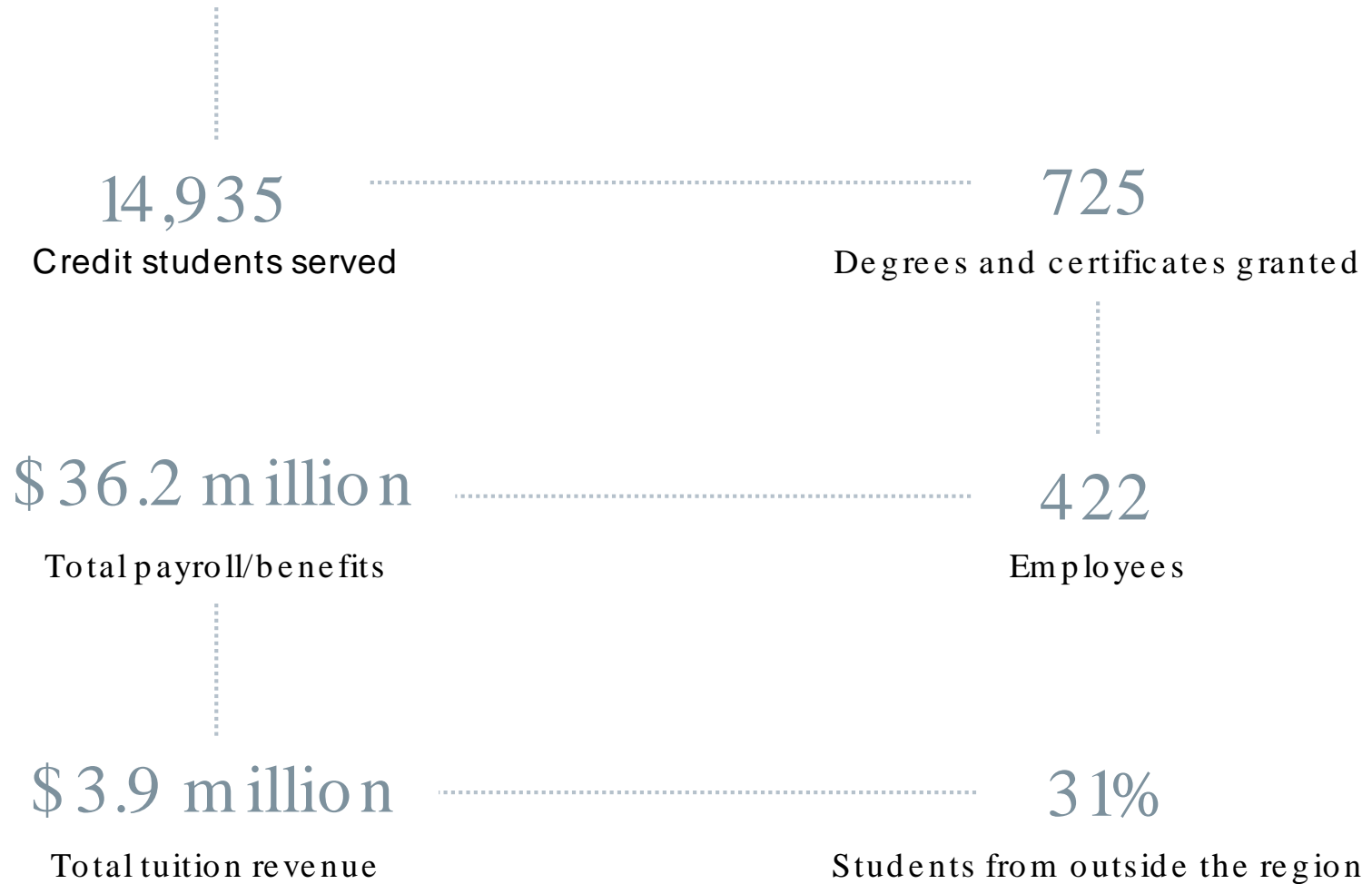
Total Gross Regional Product (GRP)

505,261

Total Jobs



NC in FY 20 16-17



Overview of results



\$160.1 million

Total income added to the region

0.4%

Of region's GRP

2,287

Total jobs supported in the region



7.1

Benefit-cost ratio for students

2.7

Benefit-cost ratio for taxpayers

15.6

Benefit-cost ratio for society



ECONOMIC IMPACT ANALYSIS



Operations Spending Impact

*College payroll and
other spending + ripple effects*

\$42.7 million

Added regional income

OR

513

Jobs supported in the region



Student Spending Impact

*Retained student
spending + ripple effects*

\$13.4 million

Added regional income

OR

275

Jobs supported in the region



Alumni Impact

*Higher alumni earnings and increased
business profit + ripple effects*

\$104 million

Added regional income

OR

1,499

Jobs supported in the region
334



ECONOMIC IMPACT ANALYSIS

Total Impact

\$160.1 million

Total income added
in the region

OR

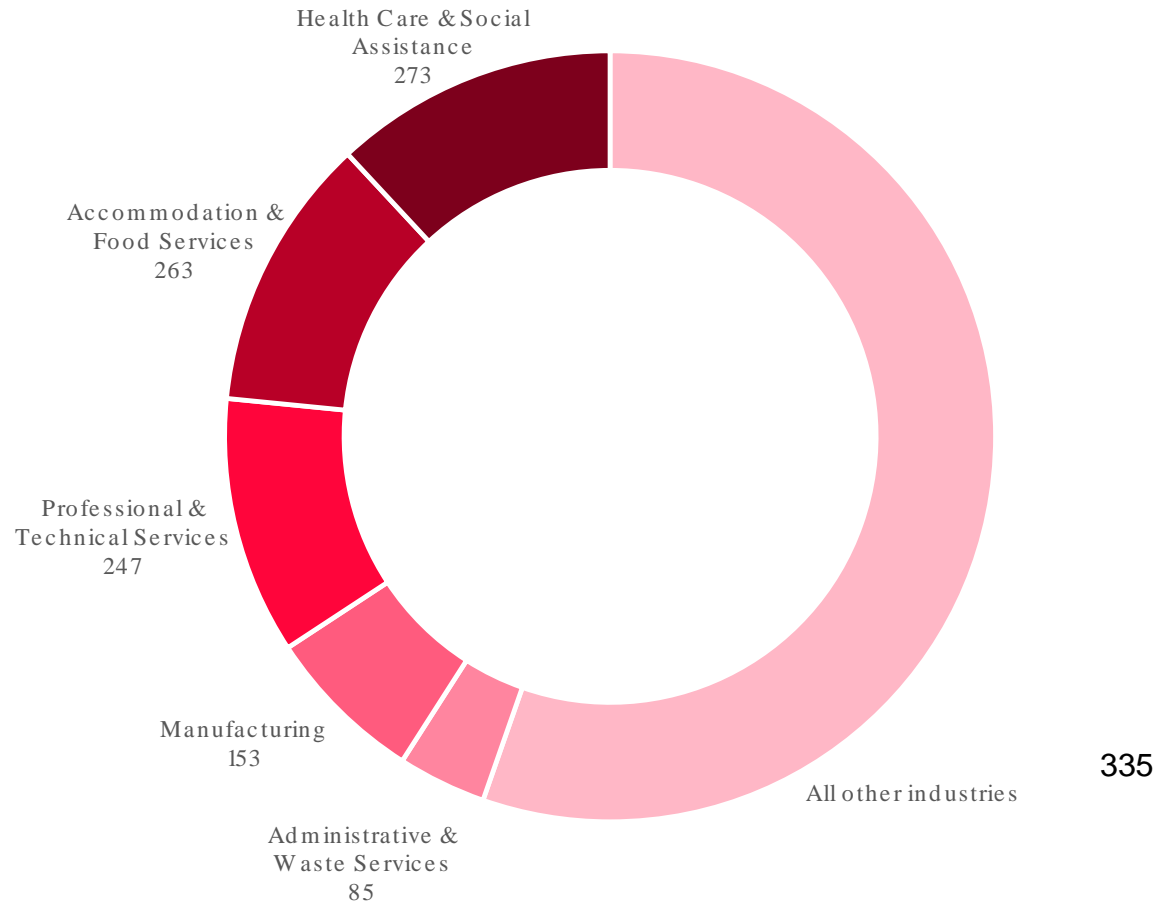
0.4%

Of region's GRP

2,287

Total jobs supported
in the region

Top industries impacted by NC (jobs supported)





INVESTMENT ANALYSIS



Student Perspective

\$271.1 million

Benefit: Higher future earnings

\$38.2 million

Cost: Tuition, supplies, opportunity cost

7.1

Benefit/cost ratio

21.5%

Rate of return



Taxpayer Perspective

\$127.6 million

Benefit: Future tax revenue, government savings

\$48 million

Cost: State and local funding

2.7

Benefit/cost ratio

6.3%

Rate of return



Social Perspective

\$1.6 billion

Benefit: Future earnings, tax revenue, private savings

\$105.3 million

Cost: All college and student costs

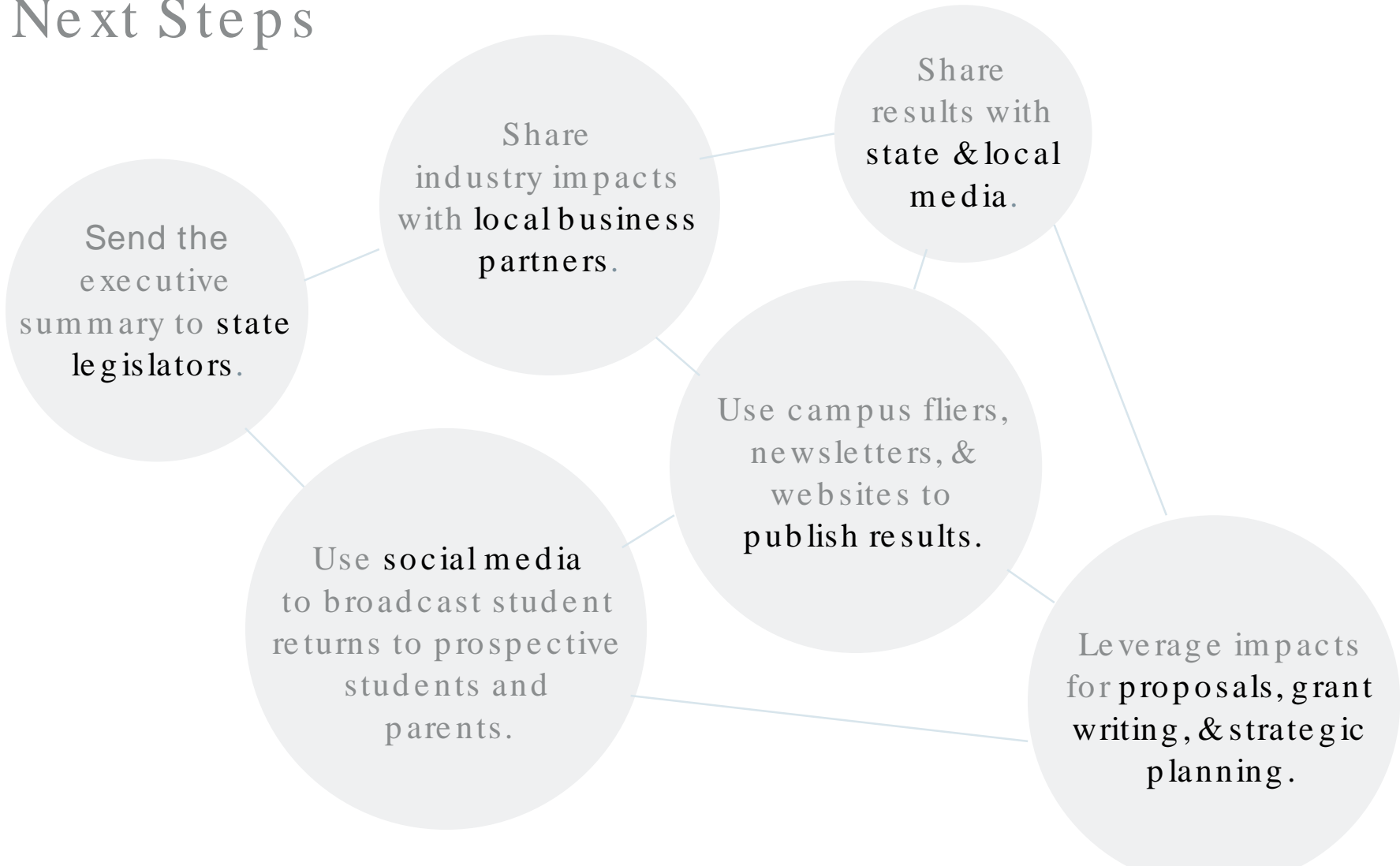
15.6

Benefit/cost ratio

n/a

Rate of return

Next Steps



**HOW CAN
EMSI HELP?**

Emsi's press
packet

Ongoing presentations
from your Emsi economist

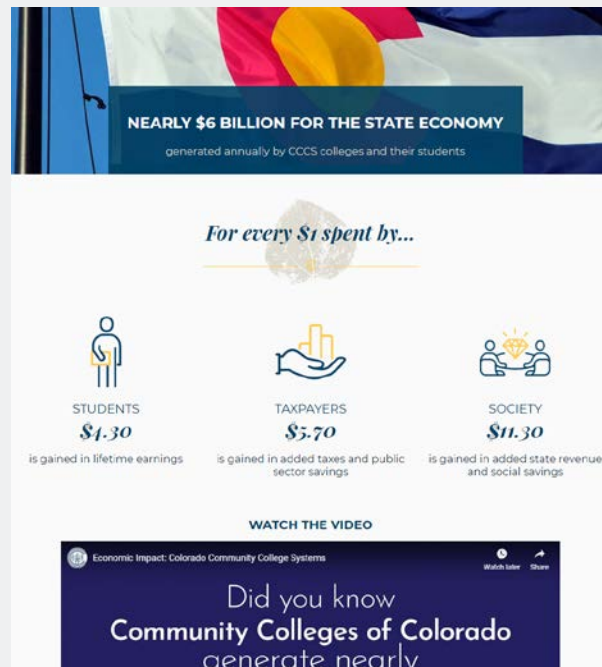
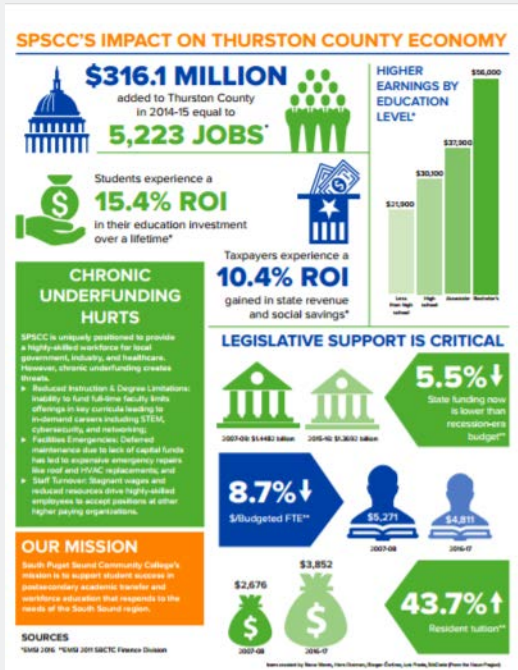
Email/call
us anytime

Share your results

Combine your results with other institutional highlights to create a fact sheet.

Create a web page that includes written highlights, animations, and videos.

Include your results in your periodic publications.



ADVANCE
South Puget Sound Community College • Winter 2017

Special Issue:
The **\$316.1 Million Economic Impact** of SPSCC on Thurston County

The skills you need for the life you want

Winter Classes Begin
Jan. 3, 2017

South Puget Sound
COMMUNITY COLLEGE

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spsc.edu

Share your results

Create a press release or hold a press conference to share results with your state and local media.

GRCC @grcc Follow

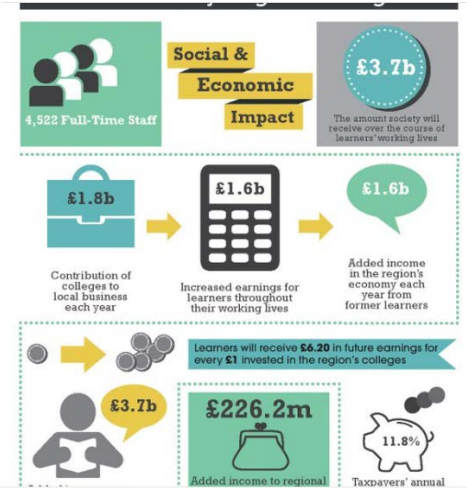
Students, employers tell how @grcc noncredit workforce programs change lives and build a talented workforce to fill great jobs. New study shows the economic impact of such programs is hundreds of millions of dollars on West MI economy grcc.edu/communications ...



1:58 PM - 13 Nov 2018

Use social media to share your investment results with prospective students.

Did you know that learners will receive £6.20 in future earnings for every £1 invested in the region's colleges?



4,522 Full-Time Staff

£3.7b The amount society will receive over the course of learners' working lives

£1.8b Contribution of colleges to local business each year

£1.6b Increased earnings for learners throughout their working lives

£1.6b Added income in the region's economy each year from former learners

£3.7b Learners will receive **£6.20** in future earnings for every **£1** invested in the region's colleges

£226.2m Added income to regional

11.8% Taxpayers' annual

RETWEETS 5

Use your study to help secure additional funding.

Emsi's Capital Analysis Justifies Funding for New UT Martin STEM Facility

OCTOBER 24, 2016 BY MATTHEW HYNDMAN

Summary:

In a time of serious need, the University of Tennessee at Martin (UT Martin) used Emsi's Economic Impact and Capital Analysis studies to demonstrate the ROI that would come from building a proposed STEM facility. The results, in part, led to a boost in state funding—reducing the university's share of facility construction costs from 25% to 10%.

Key takeaways:

- UT Martin leveraged Emsi's Economic Impact and Capital Analysis studies to communicate the institution's value and make the case for additional state funding to build a new STEM facility—now known as the Latimer Engineering and Science Building.
- Among other things, the study found that building the new facility would generate 900-plus jobs.
- The Capital Analysis helped justify a state budget amendment increasing state funding of the \$65 million project.

Led by its current Interim Chancellor, Dr. Robert Smith—a longtime acquaintance of Emsi from his time at Slippery Rock University in Pennsylvania—UT Martin came to Emsi last year needing support for a critical project. Limited by inadequate space and antiquated laboratory facilities, UT Martin needed to prove that the proposed construction of a new STEM facility would be a smart and profitable investment for the state.

After working with Emsi several years ago, Smith knew that Emsi could provide him with the analysis he needed to advance UT Martin's cause. Emsi consultants worked closely with the UT Martin team to develop a customized report based on the Economic Impact Study and the Capital Analysis. The report would show the broad-reaching value of UT Martin and detail the potential ROI of building the new STEM facility.



The results of this study
were prepared by



For a copy of the report, please contact NC.



NORCO COLLEGE

The Economic Value of Norco College

EXECUTIVE SUMMARY



NORCO College (NC) creates value in many ways. The college plays a key role in helping students increase their employability and achieve their individual potential. The college draws students to the region, generating new dollars and opportunities for the NC Service Area. NC provides students with the education, training, and skills they need to have fulfilling and prosperous careers. Furthermore, NC is a place for students to meet new people, increase their self-confidence, and promote their overall health and well-being.

NC influences both the lives of its students and the regional economy. The college supports a variety of industries in the NC Service Area,¹ serves regional businesses, and benefits society as a whole in California from an expanded economy and improved quality of life. The benefits created by NC even extend to the state and local government through increased tax revenues and public sector savings.

This study measures the economic impacts created by NC on the business community and the benefits the college generates in return for the investments made by its key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:



Economic impact analysis



Investment analysis

All results reflect employee, student, and financial data, provided by the district, for fiscal year (FY) 2016-17. Impacts on the NC Service Area economy are reported under the economic impact analysis and are measured in terms of added income. The returns on investment to students, taxpayers, and society in California are reported under the investment analysis.

¹ For the purposes of this analysis, the NC Service Area consists of 18 ZIP codes primarily located in the northwest portion of Riverside County in California.

*The value of NC influences both the **lives of its students** and the **regional economy**.*



Economic impact analysis

NC promotes economic growth in the NC Service Area through its direct expenditures and the resulting expenditures of students and regional businesses. The college serves as an employer and buyer of goods and services for its day-to-day operations. The college's activities attract students from outside the NC Service Area, whose expenditures benefit regional vendors. In addition, NC is a primary source of higher education to the NC Service Area residents and a supplier of trained workers to regional industries, enhancing overall productivity in the regional workforce.

Operations Spending Impact



NC adds economic value to the NC Service Area as an employer of regional residents and a large-scale buyer of goods and services. In FY 2016-17, the college employed 422 full-time and part-time faculty and staff, 48% of whom lived in the NC Service Area. Total payroll at NC was \$36.2 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. In addition, the college spent \$27.3 million on day-to-day expenses related to facilities, supplies, and professional services.

NC's day-to-day operations spending added \$42.7 million in income to the region during the analysis year. This figure represents the college's payroll, the multiplier effects generated by the in-region spending of the college and its employees, and a downward adjustment to account for funding that the college received from regional sources. The \$42.7 million in added income is equivalent to supporting 513 jobs in the region.

Student Spending Impact



Some in-region students, referred to as retained students, would have left the NC Service Area if not for the existence of NC. While attending the college, these retained students spent money on groceries, accommodation, transportation, and other household expenses. This spending generated \$13.4 million in added income for the regional economy in FY 2016-17, which supported 275 jobs in the NC Service Area.

Alumni Impact



The education and training NC provides for regional residents has the greatest impact. Since its establishment, students have studied at

IMPACTS CREATED BY NC
IN FY 2016-17



\$42.7 million
Operations Spending Impact



\$13.4 million
Student Spending Impact



\$104 million
Alumni Impact



\$160.1 million
TOTAL IMPACT

- OR -

2,287
JOBS SUPPORTED

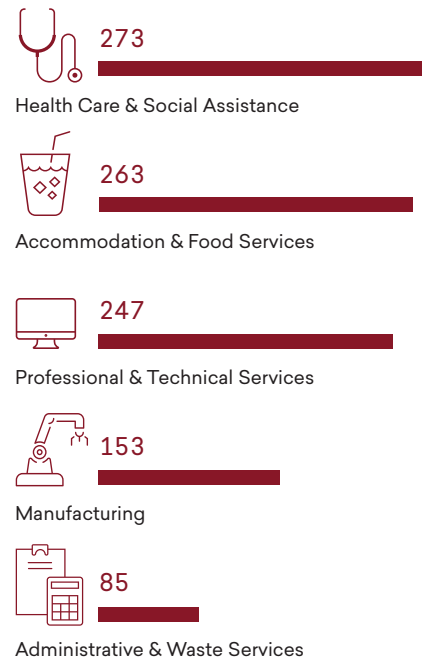
NC and entered the regional workforce with greater knowledge and new skills. Today, thousands of former NC students are employed in the NC Service Area. As a result of their NC educations, the students receive higher earnings and increase the productivity of the businesses that employ them. In FY 2016-17, NC alumni generated \$104 million in added income for the regional economy, which is equivalent to supporting 1,499 jobs.

Total Impact

NC added \$160.1 million in income to the NC Service Area economy during the analysis year, equal to the sum of the operations spending impact, the student spending impact, and the alumni impact. For context, the \$160.1 million impact was equal to approximately 0.4% of the total gross regional product (GRP) of the NC Service Area. This contribution that the college provided on its own was slightly larger than the entire Utilities industry in the region.

NC's total impact can also be expressed in terms of jobs supported. The \$160.1 million impact supported 2,287 regional jobs, using the jobs-to-sales ratios specific to each industry in the region. In addition, the \$160.1 million, or 2,287 supported jobs, impacted regional industries in different ways. Among non-education industry sectors, NC supported the most jobs in the Health Care & Social Assistance industry sector – supporting 273 jobs in FY 2016-17. These are impacts that would not have been generated without the college's presence in the NC Service Area.

TOP INDUSTRIES IMPACTED BY NC (JOBS SUPPORTED)





Investment analysis

An investment analysis evaluates the costs associated with a proposed venture against its expected benefits. If the benefits outweigh the costs, then the investment is financially worthwhile. The analysis presented here considers NC as an investment from the perspectives of students, taxpayers, and society in California.

Student perspective



In FY 2016-17, NC served 14,935 students. In order to attend the college, the students paid for tuition, fees, books, and supplies. They also took out loans and will incur interest on those loans.

Additionally, students gave up money they would have otherwise earned had they been working instead of attending college. The total investment made by NC's students in FY 2016-17 amounted to a present value of \$38.2 million, equal to \$13 million in out-of-pocket expenses (including future principal and interest on student loans) and \$25.2 million in forgone time and money.

In return for their investment, NC's students will receive a stream of higher future earnings that will continue to grow throughout their working lives. For example, the average NC associate degree graduate from FY 2016-17 will see an increase in earnings of \$9,600 each year compared to a person with a high school diploma or equivalent working in California. Over a working lifetime, the benefits of the associate degree over a high school diploma will amount to an undiscounted value of \$412.8 thousand in higher earnings per graduate. Altogether, NC's FY 2016-17 students will receive \$271.1 million in higher future earnings over their working lives, as a result of their education and training at NC.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN NC



21.5%

Average annual return for NC students



10.1%

Stock market 30-year average annual return

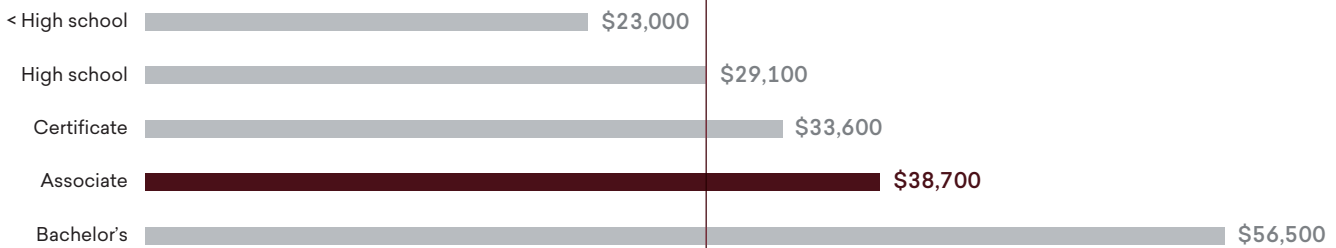


0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.

The average associate degree graduate from NC will see an increase in earnings of **\$9,600** each year compared to a person with a high school diploma or equivalent working in California.



Source: Emsi complete employment data.

The students' benefit-cost ratio is 7.1. In other words, for every dollar students invest in NC, in the form of out-of-pocket expenses and forgone time and money, they will receive a cumulative value of \$7.10 in higher future earnings. Annually, the students' investment in NC has an average annual internal rate of return of 21.5%, which is impressive compared to the U.S. stock market's 30-year average rate of return of 10.1%.

Taxpayer perspective



NC generates more in tax revenue than it takes. These benefits to taxpayers consist primarily of taxes that the state and local government will collect from the added revenue created in the state. As NC students will earn more, they will make higher tax payments throughout their working lives. Students' employers will also make higher tax payments as they increase their output and purchases of goods and services. By the end of the FY 2016-17 students' working lives, the state and local government will have collected a present value of \$111.9 million in added taxes.

Benefits to taxpayers will also consist of savings generated by the improved lifestyles of NC students and the corresponding reduced government services. Education is statistically correlated with a variety of lifestyle changes. Students'

NC educations will generate savings in three main categories: 1) healthcare, 2) crime, and 3) income assistance. Improved health will lower students' demand for national health care services. In addition, students will be less likely to interact with the criminal justice system, resulting in a reduced demand for law enforcement and victim costs. NC students will be more employable, so their reduced demand for income assistance such as welfare and unemployment benefits will benefit taxpayers. For a list of study references, contact the college for a copy of the main report. Altogether, the present value of the benefits associated with an NC education will generate \$15.7 million in savings to state and local taxpayers.

Total taxpayer benefits amount to \$127.6 million, the present value sum of the added taxes and public sector savings. Taxpayer costs are \$48 million, equal to the amount of state and local government funding NC received in FY 2016-17. These benefits and costs yield a benefit-cost ratio of 2.7. This means that for

*For every dollar of public money invested in NC, taxpayers will receive a cumulative value of **\$2.70** over the course of the students' working lives.*



STUDENT PERSPECTIVE

\$271.1 million
Present value benefits

\$38.2 million
Present value costs

\$232.9 million
Net present value

Benefit-cost Ratio Rate of Return

7.1

21.5%



TAXPAYER PERSPECTIVE

\$127.6 million
Present value benefits

\$48 million
Present value costs

\$79.6 million
Net present value

Benefit-cost Ratio Rate of Return

2.7

6.3%



SOCIAL PERSPECTIVE

\$1.6 billion
Present value benefits

\$105.3 million
Present value costs

\$1.5 billion
Net present value

Benefit-cost Ratio Rate of Return

15.6

n/a*

* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.

every dollar of public money invested in NC in FY 2016-17, taxpayers will receive a cumulative value of \$2.70 over the course of the students' working lives. The average annual internal rate of return for taxpayers is 6.3%, which compares favorably to other long-term investments in the public and private sectors.

Social perspective



Society as a whole in California benefits from the presence of NC in two major ways. Primarily, society benefits from an increased economic base in the state. This is attributed to higher student earnings and increased business output, which raise economic prosperity in California.

Benefits to society also consist of the savings generated by the improved lifestyles of NC students. As discussed in the previous section, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers but are distinct from the costs avoided by the taxpayers outlined above. Healthcare savings include avoided medical costs associated with smoking, alcohol dependence, obesity, drug abuse, and depression. Savings related to crime include reduced security expenditures and insurance administration, lower victim costs, and reduced expenditures by the criminal justice system. Income assistance savings include reduced welfare and unemployment claims. For a list of study references, contact the college for a copy of the main report.

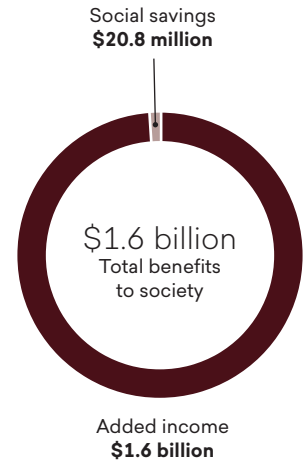
Altogether, the social benefits of NC equal a present value of \$1.6 billion. These benefits include \$1.6 billion in added income through students' increased lifetime earnings and increased business output, as well as \$20.8 million in social savings related to health, crime, and income assistance in California. People in California invested a present value total of \$105.3 million in NC in FY 2016-17. The cost includes all the college and student costs.

The benefit-cost ratio for society is 15.6, equal to the \$1.6 billion in benefits divided by the \$105.3 million in costs. In other words, for every dollar invested in NC, people in California will receive a cumulative value of \$15.60 in benefits. The benefits of this investment will occur for as long as NC's FY 2016-17 students remain employed in the state workforce.

Summary of investment analysis results

The results of the analysis demonstrate that NC is a strong investment for all three major stakeholder groups—students, taxpayers, and society. As shown, students receive a great return for their investments in an NC education. At the same time, taxpayers' investment in NC returns more to government budgets than it costs and creates a wide range of social benefits throughout California.

SOCIAL BENEFITS IN CALIFORNIA FROM NC



Conclusion

The results of this study demonstrate that NC creates value from multiple perspectives. The college benefits regional businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers to the workforce. NC enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. The college benefits state and local taxpayers through increased tax receipts and a reduced demand for government-supported social services. Finally, NC benefits society as a whole in California by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students.

About the Study

Data and assumptions used in the study are based on several sources, including the FY 2016-17 academic and financial reports on NC provided by the district, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Emsi's Multi-Regional Social Accounting Matrix model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach used in the study, please contact the college for a copy of the main report.

The results of this study demonstrate that NC creates value from
multiple perspectives.



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NORCO COLLEGE

The Economic Value of Norco College

MAIN REPORT

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Executive Summary

This report assesses the impact of Norco College (NC) on the regional economy and the benefits generated by the college for students, taxpayers, and society. The results of this study show that NC creates a positive net impact on the regional economy and generates a positive return on investment for students, taxpayers, and society.





Economic Impact Analysis



During the analysis year, NC spent \$36.2 million on payroll and benefits for 422 full-time and part-time employees, and spent another \$27.3 million on goods and services to carry out its day-to-day operations. This initial round of spending creates more spending across other businesses throughout the regional economy, resulting in the commonly referred to multiplier effects. This analysis estimates the net economic

impact of NC that directly takes into account the fact that state and local dollars spent on NC could have been spent elsewhere in the region if not directed towards NC and would have created impacts regardless. We account for this by estimating the impacts that would have been created from the alternative spending and subtracting the alternative impacts from the spending impacts of NC.

This analysis shows that in fiscal year (FY) 2016-17, operations and student spending of NC, together with the enhanced productivity of its alumni, generated **\$160.1 million** in added income for the NC Service Area economy. The additional income of **\$160.1 million** created by NC is equal to approximately **0.4%** of the total gross regional product (GRP) of the NC Service Area. For perspective, this impact from the college is slightly larger than the entire Utilities

*The additional income of **\$160.1 million** created by NC is equal to approximately **0.4%** of the total gross regional product of the NC Service Area.*

industry in the region. The impact of **\$160.1 million** is equivalent to supporting **2,287** jobs. These economic impacts break down as follows:

Operations spending impact



Payroll and benefits to support NC's day-to-day operations amounted to \$36.2 million. The college's non-pay expenditures amounted to \$27.3 million. The net impact of operations spending by the college in the NC Service Area during the analysis year was approximately **\$42.7 million** in added income, which is equivalent to supporting **513** jobs.

Student spending impact



Some students are residents of the NC Service Area who would have left the region if not for the existence of NC. The money that these students spent toward living expenses in the NC Service Area is attributable to NC.

The expenditures of retained students in the region during the analysis year added approximately **\$13.4 million** in income for the NC Service Area economy, which is equivalent to supporting **275** jobs.

Alumni impact



Over the years, students gained new skills, making them more productive workers, by studying at NC. Today, thousands of these former students are employed in the NC Service Area.

The accumulated impact of former students currently employed in the NC Service Area workforce amounted to **\$104 million** in added income for the NC Service Area economy, which is equivalent to supporting **1,499** jobs.

Important Note

When reviewing the impacts estimated in this study, it's important to note that it reports impacts in the form of added income rather than sales. Sales includes all of the intermediary costs associated with producing goods and services, as well as money that leaks out of the region as it is spent at out-of-region businesses. Income, on the other hand, is a net measure that excludes these intermediary costs and leakages, and is synonymous with gross regional product (GRP) and value added. For this reason, it is a more meaningful measure of new economic activity than sales.



Investment Analysis



Investment analysis is the practice of comparing the costs and benefits of an investment to determine whether or not it is profitable. This study considers NC as an investment from the perspectives of students, taxpayers, and society.

Student perspective



Students invest their own money and time in their education to pay for tuition, books, and supplies. Many take out student loans to attend the college, which they will pay back over time. While some students were employed while attending the college, students overall forewent earnings that they would have generated had they been in full employment instead of learning. Summing these direct outlays, opportunity costs, and future student loan costs yields a total of **\$38.2 million** in present value student costs.

In return, students will receive a present value of **\$271.1 million** in increased earnings over their working lives. This translates to a return of **\$7.10** in higher future earnings for every \$1 that students pay for their education at NC. The corresponding annual rate of return is **21.5%**.

Taxpayer perspective



Taxpayers provided **\$48 million** of state and local funding to NC in FY 2016-17. In return, taxpayers will receive an estimated present value of **\$111.9 million** in added tax revenue stemming from the students' higher lifetime earnings and the increased output of businesses. Sav-

ings to the public sector add another estimated **\$15.7 million** in benefits due to a reduced demand for government-funded social services in California. For every tax dollar spent educating students attending NC, taxpayers will receive an average of **\$2.70** in return over the course of the students' working lives. In other words, taxpayers enjoy an annual rate of return of **6.3%**.

Social perspective



California as a whole spent an estimated **\$105.3 million** on educations obtained at NC in FY 2016-17. This includes the college's expenditures, student expenses, and student opportunity costs.

In return, the state of California will receive an estimated present value of **\$1.6 billion** in added state revenue over the course of the students' working lives. California will also benefit from an estimated **\$20.8 million** in present value social savings related to reduced crime, lower welfare and unemployment, and increased health and well-being across the state. For every dollar society invests in educations from NC, an average of **\$15.60** in benefits will accrue to California over the course of the students' careers.

*For every tax dollar spent educating students attending NC, taxpayers will receive an average of **\$2.70** in return over the course of the students' working lives.*

Acknowledgments

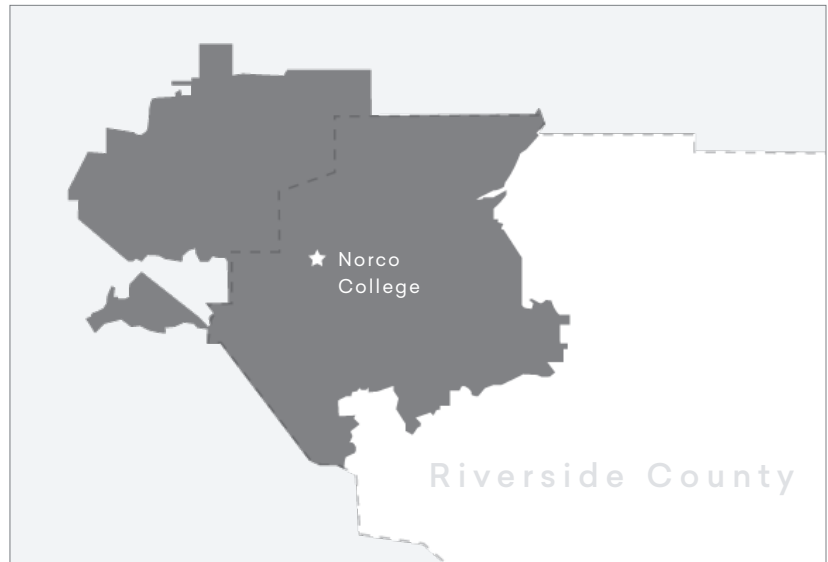
Emsi gratefully acknowledges the excellent support of the staff at Norco College in making this study possible. Special thanks go to Dr. Bryan Reece, President, who approved the study, and to David Torres, Dean, Institutional Research & Strategic Planning, who collected much of the data and information requested. Any errors in the report are the responsibility of Emsi and not of any of the above-mentioned individuals.

Introduction

Norco College (NC), established in 1991, has today grown to serve 14,935 students. The college is led by Dr. Bryan Reece, President. The college's service region, for the purpose of this report, is referred to as the NC Service Area and consists of 18 ZIP codes comprising the northwest portion of Riverside County (see figure).

THE NC SERVICE AREA

While NC affects the region in a variety of ways, many of them difficult to quantify, this study is concerned with considering its economic benefits. The college naturally helps students achieve their individual potential and develop the knowledge, skills, and abilities they need to have fulfilling and prosperous careers. However, NC impacts the NC Service Area beyond influencing the lives of students. The college's program offerings supply employers with workers to make their businesses more productive. The college, its day-to-day operations, and the expenditures of its students support the regional economy through the output and employment generated by regional vendors. The benefits created by the college extend as far as the state treasury in terms of the increased tax receipts and decreased public sector costs generated by students across the state.



This report assesses the impact of NC as a whole on the regional economy and the benefits generated by the college for students, taxpayers, and society. The approach is twofold. We begin with an economic impact analysis of the college on the NC Service Area economy. To derive results, we rely on a specialized Multi-Regional Social Accounting Matrix (MR-SAM) model to calculate the added income created in the NC Service Area economy as a result of increased consumer spending and the added knowledge, skills, and abilities of students. Results of the economic impact analysis are broken out according to the following impacts: 1) impact of the college's day-to-day operations, 2) impact of student spending, and 3) impact of alumni who are still employed in the NC Service Area workforce.

The second component of the study measures the benefits generated by NC for the following stakeholder groups: students, taxpayers, and society. For students, we perform an investment analysis to determine how the money spent by students on their education performs as an investment over time. The students' investment in this case consists of their out-of-pocket expenses, the cost of interest incurred on student loans, and the opportunity cost of attending the college as opposed to working. In return for these investments, students receive a lifetime of higher earnings. For taxpayers, the study measures the benefits to state taxpayers in the form of increased tax revenues and public sector savings stemming from a reduced demand for social services. Finally, for society, the study assesses how the students' higher earnings and improved quality of life create benefits throughout California as a whole.

The study uses a wide array of data that are based on several sources, including the FY 2016-17 academic and financial reports from NC; industry and employment data from the Bureau of Labor Statistics and Census Bureau; outputs of Emsi's impact model and MR-SAM model; and a variety of published materials relating education to social behavior.



CHAPTER 1:

Profile of Norco College and the Economy

Norco College (NC), part of the Riverside Community College District (RCCD) and the California Community College System, is a degree-granting institution of higher education in the city of Norco, California. Opened in 1991, NC offers a wide variety of affordable, accessible educational options to residents of Riverside County.

In FY 2016-17, the college served approximately 15,000 students.



In the mid-1980's, as Riverside County's population and economy grew, the existing educational infrastructure found itself falling behind. In response, the existing Riverside Community College expanded into a multi-location system, opening both NC and its sister college, Moreno Valley College (MVC), in 1991. After two decades of growth, both MVC and NC were fully accredited as colleges in 2010.

As part of California's higher education system, one of the key assets NC offers its students is the ability to easily transfer to California universities to complete four-year degrees. While transfer degrees are a strong part of the college's academic catalogue, career-oriented degrees are also increasingly important. In total, NC offers 65 different programs, including 45 certificates in areas ranging from logistic management to engineering technology, as well as seven area-of-emphasis associate degrees and 13 transfer degrees.

NC offers a wide variety of affordable, accessible educational options to residents of Riverside County.



NC employee and finance data

The study uses two general types of information: 1) data collected from RCCD and 2) regional economic data obtained from various public sources and Emsi's proprietary data modeling tools.¹ This chapter presents the basic underlying information from NC used in this analysis and provides an overview of the NC Service Area economy.

Employee data

Data provided by the district include information on faculty and staff by place of work and by place of residence. These data appear in Table 1.1. As shown, NC employed 185 full-time and 237 part-time faculty and staff in FY 2016-17 (including student workers). Of these, 100% worked in the region and 48% lived in the region. These data are used to isolate the portion of the employees' payroll and household expenses that remains in the regional economy.

Revenues

Figure 1.1 shows the college's annual revenues by funding source – a total of \$69.7 million in FY 2016-17. As indicated, tuition and fees comprised 6% of total revenue, and revenues from local, state, and federal government sources comprised another 88%. All other revenue (i.e., auxiliary revenue, sales and services, interest, and donations) comprised the remaining 6%. These data are critical in identifying the annual costs of educating the student body from the perspectives of students, taxpayers, and society.

Expenditures

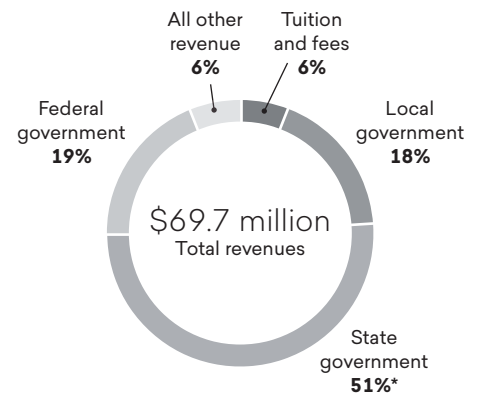
Figure 1.2 displays NC's expense data. The combined payroll at NC, including student salaries and wages, amounted to \$36.2 million. This was equal to 51% of the college's total expenses for FY 2016-17. Other expenditures, including operation and maintenance of plant, depreciation, and purchases of supplies and services, made up \$34.7 million. When we calculate the impact of these expenditures in Chapter 2, we exclude expenses for depreciation and interest, as they represent a devaluing of the college's assets rather than an outflow of expenditures.

TABLE 1.1: EMPLOYEE DATA, FY 2016-17

Full-time faculty and staff	185
Part-time faculty and staff	237
Total faculty and staff	422
% of employees who work in the region	100%
% of employees who live in the region	48%

Source: Data provided by RCCD.

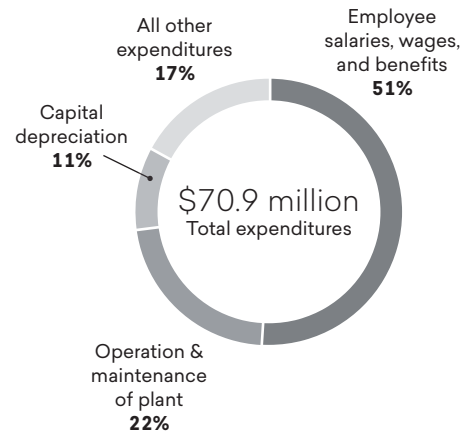
FIGURE 1.1: NC REVENUES BY SOURCE, FY 2016-17



*Revenue from state and local government includes capital appropriations.

Source: Data provided by RCCD.

FIGURE 1.2: NC EXPENSES BY FUNCTION, FY 2016-17



Source: Data provided by RCCD.

Percentages may not add due to rounding.

¹ See Appendix 5 for a detailed description of the data sources used in the Emsi modeling tools.



Students

NC served 14,935 students in FY 2016-17. These numbers represent unduplicated student headcounts. The breakdown of the student body by gender was 45% male and 55% female. The breakdown by ethnicity was 24% white and 76% minority. The students' overall average age was 24 years old.² An estimated 69% of students remain in the NC Service Area after finishing their time at NC, another 29% settle outside the region but in the state, and the remaining 2% settle outside the state.³

Table 1.2 summarizes the breakdown of the student population and their corresponding awards and credits by education level. In FY 2016-17, NC served 569 associate degree graduates and 156 certificate graduates. Another 13,042 students enrolled in courses for credit but did not complete a degree during the reporting year. The college offered dual credit courses to high schools, serving a total of 601 students over the course of the year. The college also served 567 basic education students.

We use credit hour equivalents (CHEs) to track the educational workload of the students. One CHE is equal to 15 contact hours of classroom instruction per semester. The average number of CHEs per student was 9.0.

TABLE 1.2: BREAKDOWN OF STUDENT HEADCOUNT AND CHE PRODUCTION BY EDUCATION LEVEL, FY 2016-17

Category	Headcount	Total CHEs	Average CHEs
Associate degree graduates	569	9,154	16.1
Certificate graduates	156	2,168	13.9
Continuing students	13,042	114,751	8.8
Dual credit students	601	5,890	9.8
Basic education students	567	1,963	3.5
Total, all students	14,935	133,925	9.0

Source: Data provided by RCCD.

² Unduplicated headcount, gender, ethnicity, and age data provided by RCCD.

³ Because NC was unable to provide settlement data, Emsi used estimates based on student origin.



The NC Service Area economy

NC serves a region referred to as the NC Service Area in California.⁴ Since the college was first established, it has been serving the NC Service Area by enhancing the workforce, providing local residents with easy access to higher education opportunities, and preparing students for highly-skilled, technical professions. Table 1.3 summarizes the breakdown of the regional economy by major industrial sector ordered by total income, with details on labor and non-labor income. Labor income refers to wages, salaries, and proprietors' income. Non-labor income refers to profits, rents, and other forms of investment income.

TABLE 1.3: INCOME BY MAJOR INDUSTRY SECTOR IN THE NC SERVICE AREA, 2017*

Industry sector	Labor income (millions)	Non-labor income (millions)	Total income (millions)**	% of total income	Sales (millions)
Manufacturing	\$3,318	\$3,524	\$6,842	16%	\$18,061
Wholesale Trade	\$2,696	\$2,974	\$5,670	13%	\$7,901
Other Services (except Public Administration)	\$739	\$4,654	\$5,394	12%	\$6,603
Construction	\$2,835	\$1,344	\$4,179	9%	\$7,417
Retail Trade	\$1,771	\$1,324	\$3,096	7%	\$4,740
Transportation & Warehousing	\$2,258	\$789	\$3,047	7%	\$5,642
Health Care & Social Assistance	\$2,429	\$342	\$2,771	6%	\$4,702
Government, Non-Education	\$2,343	\$407	\$2,750	6%	\$11,932
Administrative & Waste Services	\$1,347	\$380	\$1,727	4%	\$2,757
Government, Education	\$1,705	\$0	\$1,705	4%	\$1,897
Professional & Technical Services	\$1,134	\$245	\$1,380	3%	\$2,081
Finance & Insurance	\$734	\$569	\$1,302	3%	\$2,172
Real Estate & Rental & Leasing	\$557	\$609	\$1,166	3%	\$2,471
Accommodation & Food Services	\$644	\$391	\$1,035	2%	\$2,019
Information	\$252	\$657	\$909	2%	\$1,668
Educational Services	\$282	\$31	\$313	1%	\$494
Management of Companies & Enterprises	\$267	\$26	\$293	1%	\$523
Arts, Entertainment, & Recreation	\$153	\$44	\$196	<1%	\$356
Utilities	\$41	\$108	\$149	<1%	\$200
Mining, Quarrying, & Oil and Gas Extraction	\$24	\$32	\$57	<1%	\$84
Agriculture, Forestry, Fishing & Hunting	\$27	\$13	\$40	<1%	\$92
Total	\$25,557	\$18,465	\$44,022	100%	\$83,811

* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.

** Numbers may not add due to rounding.

Source: Emsi industry data.

4 The NC Service Area is comprised of the following ZIP codes: 92860, 92880, 92878, 92877, 92879, 92505, 91708, 91752, 92882, 92503, 91761, 92881, 91710, 91762, 92509, 91709, 92887, and 92504.

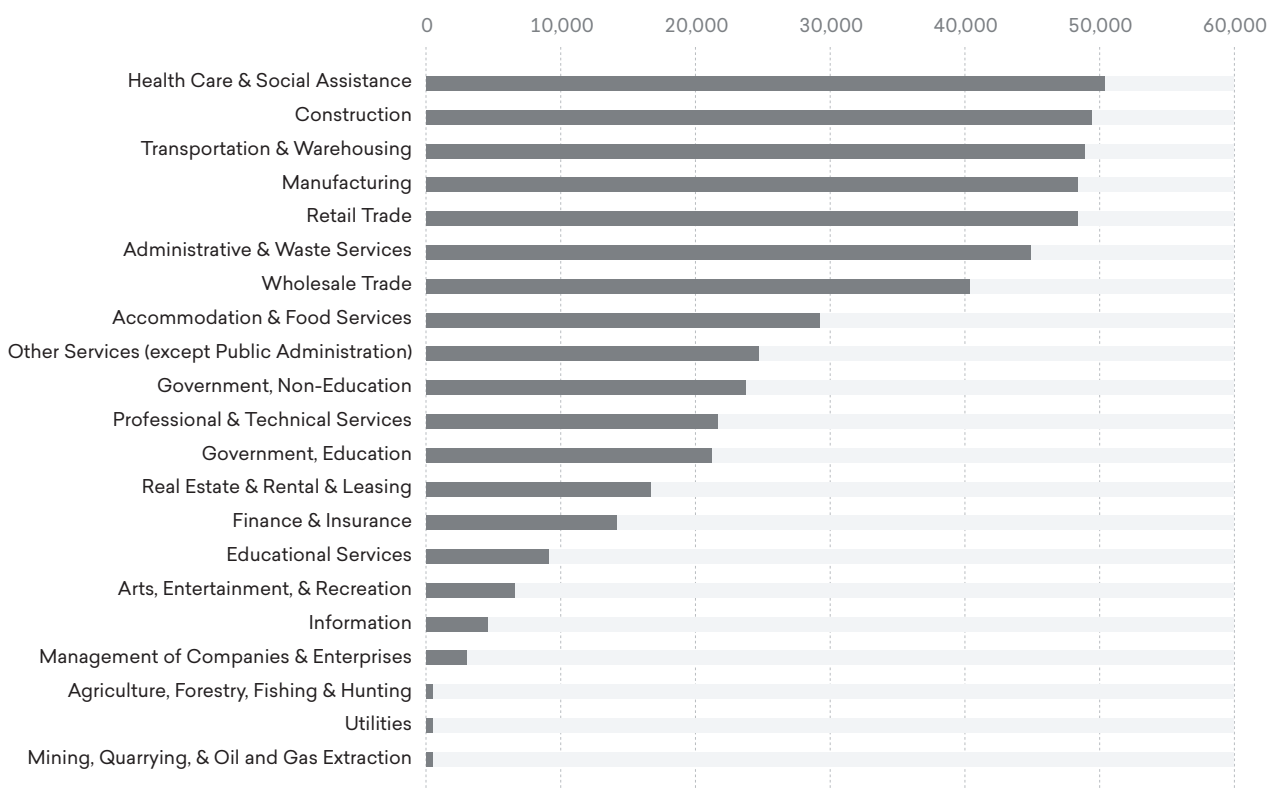


Together, labor and non-labor income comprise the region’s total income, which can also be considered as the region’s gross regional product (GRP).

As shown in Table 1.3, the total income, or GRP, of the NC Service Area is approximately \$44 billion, equal to the sum of labor income (\$25.6 billion) and non-labor income (\$18.5 billion). In Chapter 2, we use the total added income as the measure of the relative impacts of the college on the regional economy.

Figure 1.3 provides the breakdown of jobs by industry in the NC Service Area. The Health Care & Social Assistance sector is the largest employer, supporting 50,213 jobs or 9.9% of total employment in the region. The second largest employer is the Construction sector, supporting 49,107 jobs or 9.7% of the region’s total employment. Altogether, the region supports 505,261 jobs.⁵

FIGURE 1.3: JOBS BY MAJOR INDUSTRY SECTOR IN THE NC SERVICE AREA, 2017*



* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.
Source: Emsi employment data.

5 Job numbers reflect Emsi’s complete employment data, which includes the following four job classes: 1) employees that are counted in the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages (QCEW), 2) employees that are not covered by the federal or state unemployment insurance (UI) system and are thus excluded from QCEW, 3) self-employed workers, and 4) extended proprietors.



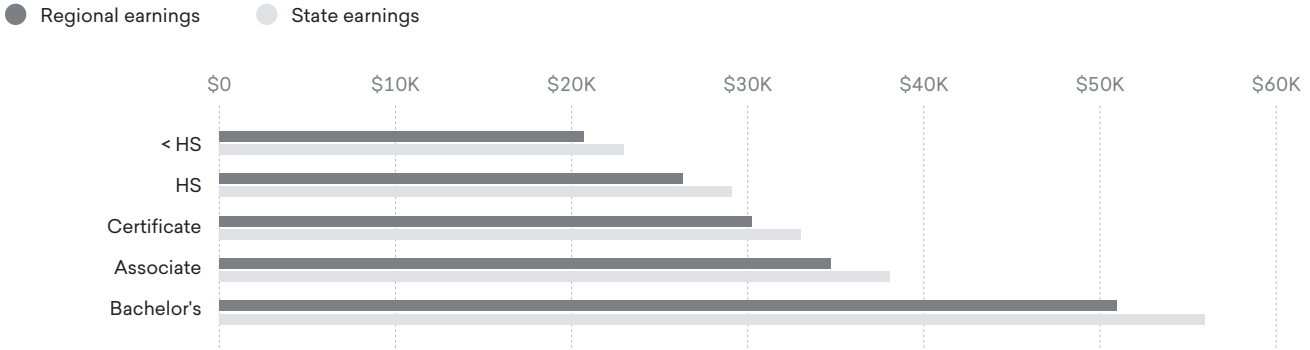
Table 1.4 and Figure 1.4 present the mean earnings by education level in the NC Service Area and the state of California at the midpoint of the average-aged worker's career. These numbers are derived from Emsi's complete employment data on average earnings per worker in the region and the state.⁶ The numbers are then weighted by the college's demographic profile. As shown, students have the potential to earn more as they achieve higher levels of education compared to maintaining a high school diploma. Students who earn an associate degree from NC can expect approximate wages of \$35,200 per year within the NC Service Area, approximately \$8,800 more than someone with a high school diploma.

TABLE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN NC STUDENT'S CAREER MIDPOINT

Education level	Regional earnings	Difference from next lowest degree	State earnings	Difference from next lowest degree
Less than high school	\$21,000	n/a	\$23,000	n/a
High school or equivalent	\$26,400	\$5,400	\$29,100	\$6,100
Certificate	\$30,500	\$4,100	\$33,600	\$4,500
Associate degree	\$35,200	\$4,700	\$38,700	\$5,100
Bachelor's degree	\$51,300	\$16,100	\$56,500	\$17,800

Source: Emsi employment data.

FIGURE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN NC STUDENT'S CAREER MIDPOINT



Source: Emsi employment data.

⁶ Wage rates in the Emsi MR-SAM model combine state and federal sources to provide earnings that reflect complete employment in the state, including proprietors, self-employed workers, and others not typically included in regional or state data, as well as benefits and all forms of employer contributions. As such, Emsi industry earnings-per-worker numbers are generally higher than those reported by other sources.



CHAPTER 2:

Economic Impacts on the NC Service Area Economy

NC impacts the NC Service Area economy in a variety of ways. The college is an employer and buyer of goods and services. It attracts monies that otherwise would not have entered the regional economy through its day-to-day operations and the expenditures of its students. Further, it provides students with the knowledge, skills, and abilities they need to become productive citizens and add to the overall output of the region.



In this chapter, we estimate the following economic impacts of NC: 1) the operations spending impact, 2) the student spending impact, and 3) the alumni impact, measuring the income added in the region as former students expand the regional economy's stock of human capital.

When exploring each of these economic impacts, we consider the following hypothetical question:

How would economic activity change in the NC Service Area if NC and all its alumni did not exist in FY 2016-17?

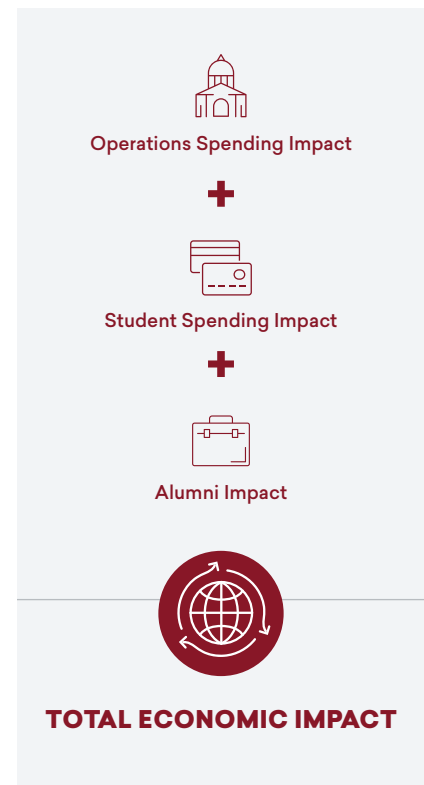
Each of the economic impacts should be interpreted according to this hypothetical question. Another way to think about the question is to realize that we measure net impacts, not gross impacts. Gross impacts represent an upper-bound estimate in terms of capturing all activity stemming from the college; however, net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

Economic impact analyses use different types of impacts to estimate the results. The impact focused on in this study assesses the change in income. This measure is similar to the commonly used gross regional product (GRP). Income may be further broken out into the **labor income impact**, also known as earnings, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in business profits. Together, labor income and non-labor income sum to total income.

Another way to state the impact is in terms of **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. Finally, a frequently used measure is the **sales impact**, which comprises the change in business sales revenue in the economy as a result of increased economic activity. It is important to bear in mind, however, that much of this sales revenue leaves the regional economy through intermediary transactions and costs.⁷ All of these measures – added labor and non-labor income, total income, jobs, and sales – are used to estimate the economic impact results presented in this chapter. The analysis breaks out the impact measures into different components, each based on the economic effect that caused the impact. The following is a list of each type of effect presented in this analysis:

- The **initial effect** is the exogenous shock to the economy caused by the initial spending of money, whether to pay for salaries and wages, purchase goods or services, or cover operating expenses.

⁷ See Appendix 4 for an example of the intermediary costs included in the sales impact but not in the income impact.



- The initial round of spending creates more spending in the economy, resulting in what is commonly known as the **multiplier effect**. The multiplier effect comprises the additional activity that occurs across all industries in the economy and may be further decomposed into the following three types of effects:
 - The **direct effect** refers to the additional economic activity that occurs as the industries affected by the initial effect spend money to purchase goods and services from their supply chain industries.
 - The **indirect effect** occurs as the supply chain of the initial industries creates even more activity in the economy through their own inter-industry spending.
 - The **induced effect** refers to the economic activity created by the household sector as the businesses affected by the initial, direct, and indirect effects raise salaries or hire more people.

Net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

The terminology used to describe the economic effects listed above differs slightly from that of other commonly used input-output models, such as IMPLAN. For example, the initial effect in this study is called the “direct effect” by IMPLAN, as shown in the table below. Further, the term “indirect effect” as used by IMPLAN refers to the combined direct and indirect effects defined in this study. To avoid confusion, readers are encouraged to interpret the results presented in this chapter in the context of the terms and definitions listed above. Note that, regardless of the effects used to decompose the results, the total impact measures are analogous.

Emsi	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

Multiplier effects in this analysis are derived using Emsi’s MR-SAM input-output model that captures the interconnection of industries, government, and households in the region. The Emsi MR-SAM contains approximately 1,000 industry sectors at the highest level of detail available in the North American Industry Classification System (NAICS) and supplies the industry-specific multipliers required to determine the impacts associated with increased activity within a given economy. For more information on the Emsi MR-SAM model and its data sources, see Appendix 5.





Operations spending impact

Faculty and staff payroll is part of the region’s total earnings, and the spending of employees for groceries, apparel, and other household expenditures helps support regional businesses. The college itself purchases supplies and services, and many of its vendors are located in the NC Service Area. These expenditures create a ripple effect that generates still more jobs and higher wages throughout the economy.

Table 2.1 presents college expenditures for the following three categories: 1) salaries, wages, and benefits, 2) operation and maintenance of plant, and 3) all other expenditures (including purchases for supplies and services). In this analysis, we exclude expenses for depreciation and interest due to the way those measures are calculated in the national input-output accounts, and because depreciation represents the devaluing of the college’s assets rather than an outflow of expenditures.⁸ The first step in estimating the multiplier effects of the college’s operational expenditures is to map these categories of expenditures to the approximately 1,000 industries of the Emsi MR-SAM model. Assuming that the spending patterns of college personnel approximately match those of the average consumer, we map salaries, wages, and benefits to spending on industry outputs using national household expenditure coefficients provided by Emsi’s national SAM. All NC employees work in the NC Service Area (see Table 1.1), and therefore we consider 100% of the salaries, wages, and benefits. For the other two expenditure categories (i.e., operation and maintenance of plant and all other expenditures), we assume the college’s spending patterns approximately match national averages and apply the national spending coefficients for NAICS 611210 (Junior Colleges).⁹ Operation and maintenance of plant

TABLE 2.1: NC EXPENSES BY FUNCTION (EXCLUDING DEPRECIATION & INTEREST), FY 2016-17

Expense category	In-region expenditures (thousands)	Out-of-region expenditures (thousands)	Total expenditures (thousands)
Employee salaries, wages, and benefits	\$36,184	\$0	\$36,184
Operation and maintenance of plant	\$5,507	\$9,858	\$15,365
All other expenditures	\$2,936	\$8,974	\$11,910
Total	\$44,627	\$18,832	\$63,459

Source: Data provided by RCCD and the Emsi impact model.

8 This aligns with the economic impact guidelines set by the Association of Public and Land-Grant Universities. Ultimately, excluding these measures results in more conservative and defensible estimates.

9 See Appendix 2 for a definition of NAICS.



expenditures are mapped to the industries that relate to capital construction, maintenance, and support, while the college's remaining expenditures are mapped to the remaining industries.

We now have three vectors of expenditures for NC: one for salaries, wages, and benefits; another for operation and maintenance of plant; and a third for the college's purchases of supplies and services. The next step is to estimate the portion of these expenditures that occurs inside the region. The expenditures occurring outside the region are known as leakages. We estimate in-region expenditures using regional purchase coefficients (RPCs), a measure of the overall demand for the commodities produced by each sector that is satisfied by regional suppliers, for each of the approximately 1,000 industries in the MR-SAM model.¹⁰ For example, if 40% of the demand for NAICS 541211 (Offices of Certified Public Accountants) is satisfied by regional suppliers, the RPC for that industry is 40%. The remaining 60% of the demand for NAICS 541211 is provided by suppliers located outside the region. The three vectors of expenditures are multiplied, industry by industry, by the corresponding RPC to arrive at the in-region expenditures associated with the college. See Table 2.1 for a break-out of the expenditures that occur in-region. Finally, in-region spending is entered, industry by industry, into the MR-SAM model's multiplier matrix, which in turn provides an estimate of the associated multiplier effects on regional labor income, non-labor income, total income, sales, and jobs.

Table 2.2 presents the economic impact of college operations spending. The people employed by NC and their salaries, wages, and benefits comprise the initial effect, shown in the top row of the table in terms of labor income, non-labor income, total added income, sales, and jobs. The additional impacts created by the initial effect appear in the next four rows under the section labeled

TABLE 2.2: OPERATIONS SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$36,184	\$0	\$36,184	\$63,459	422
Multiplier effect					
Direct effect	\$2,775	\$2,172	\$4,948	\$8,443	70
Indirect effect	\$397	\$219	\$616	\$1,203	11
Induced effect	\$1,946	\$2,424	\$4,369	\$6,719	47
Total multiplier effect	\$5,118	\$4,815	\$9,933	\$16,365	128
Gross impact (initial + multiplier)	\$41,302	\$4,815	\$46,117	\$79,824	550
Less alternative uses of funds	-\$1,506	-\$1,924	-\$3,430	-\$5,206	-37
Net impact	\$39,796	\$2,891	\$42,687	\$74,618	513

Source: Emsi impact model.

10 See Appendix 5 for a description of Emsi's MR-SAM model.



multiplier effect. Summing the initial and multiplier effects, the gross impacts are \$41.3 million in labor income and \$4.8 million in non-labor income. This comes to a total impact of \$46.1 million in total added income associated with the spending of the college and its employees in the region. This is equivalent to supporting 550 jobs.

The \$46.1 million in gross impact is often reported by researchers as the total impact. We go a step further to arrive at a net impact by applying a counterfactual scenario, i.e., what would have happened if a given event – in this case, the expenditure of in-region funds on NC – had not occurred. NC received an estimated 26% of its funding from sources within the NC Service Area. These monies came from the tuition and fees paid by resident students, from the auxiliary revenue and donations from private sources located within the region, from state and local taxes, and from the financial aid issued to students by state and local government. We must account for the opportunity cost of this in-region funding. Had other industries received these monies rather than NC, income impacts would have still been created in the economy. In economic analysis, impacts that occur under counterfactual conditions are used to offset the impacts that actually occur in order to derive the true impact of the event under analysis.

We estimate this counterfactual by simulating a scenario where in-region monies spent on the college are instead spent on consumer goods and savings. This simulates the in-region monies being returned to the taxpayers and being spent by the household sector. Our approach is to establish the total amount spent by in-region students and taxpayers on NC, map this to the detailed industries of the MR-SAM model using national household expenditure coefficients, use the industry RPCs to estimate in-region spending, and run the in-region spending through the MR-SAM model's multiplier matrix to derive multiplier effects. The results of this exercise are shown as negative values in the row labeled *less alternative uses of funds* in Table 2.2.

The total net impact of the college's operations is equal to the gross impact less the impact of the alternative use of funds – the opportunity cost of the regional money. As shown in the last row of Table 2.2, the total net impact is approximately \$39.8 million in labor income and \$2.9 million in non-labor income. This sums together to \$42.7 million in total added income and is equivalent to supporting 513 jobs. These impacts represent new economic activity created in the regional economy solely attributable to the operations of NC.

*The total net impact of the college's operations is **\$42.7 million** in total added income, which is equivalent to supporting **513 jobs**.*





Student spending impact



In-region students contribute to the student spending impact of NC; however, not all of these students can be counted towards the impact. Only those students who were retained, or who would have left the region to seek education elsewhere had they not attended NC, are measured. Students who would have stayed in the region anyway are not counted towards the impact since their monies would have been added to the NC Service Area economy regardless of NC.

While there were 9,637 students attending NC who originated from the NC Service Area (not including dual credit high school students), not all of them would have remained in the region if not for the existence of NC. We apply a conservative assumption that 10% of these students would have left the NC Service Area for other education opportunities if NC did not exist.¹¹ Therefore, we recognize that the in-region spending of 964 students retained in the region is attributable to NC. These students, called retained students, spent money at businesses in the region for everyday needs such as groceries, accommodation, and transportation.

The average costs for students appear in the first section of Table 2.3, equal to \$19,818 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations impact discussed in the previous section. We multiply the \$19,818 in annual costs by the 964 students who were retained because of NC and lived in-region

¹¹ See Appendix 1 for a sensitivity analysis of the retained student variable.



but off campus. This provides us with an estimate of their total spending. The off-campus spending of retained students, once net of monies paid to student workers, generated sales of \$19.1 million, as shown in the bottom row of Table 2.3.

TABLE 2.3: AVERAGE STUDENT COSTS AND TOTAL SALES GENERATED BY RETAINED STUDENTS IN THE NC SERVICE AREA, FY 2016-17

Room and board	\$15,660
Personal expenses	\$2,363
Transportation	\$1,795
Total expenses per student	\$19,818
Number of students that were retained	964
Total gross off-campus sales	\$19,098,607
Wages and salaries paid to student workers*	\$21,412
Net off-campus sales	\$19,077,195

*This figure reflects only the portion of payroll that was used to cover the living expenses of retained student workers who lived in the region.

Source: Student costs provided by RCCD. Emsi provided an estimate of the monies paid to student workers because the college was district to provide the data. The number of retained students who lived in the region off campus while attending is derived by Emsi from the student origin data and in-term residence data provided by RCCD. The data is based on all students.

Estimating the impacts generated by the \$19.1 million in student spending follows a procedure similar to that of the operations impact described above. We distribute the \$19.1 million in sales to the industry sectors of the MR-SAM model, apply RPCs to reflect in-region spending, and run the net sales figures through the MR-SAM model to derive multiplier effects.

Table 2.4 presents the results. The initial effect is purely sales-oriented and there is no change in labor or non-labor income. The impact of retained student spending thus falls entirely under the multiplier effect. The total impact of student spending is \$6.7 million in labor income and \$6.7 million in non-labor income. This sums together to \$13.4 million in total added income and is equivalent to supporting 275 jobs. These values represent the direct effects created at the businesses patronized by the students, the indirect effects created by the supply chain of those businesses, and the effects of the increased spending of the household sector throughout the regional economy as a result of the direct and indirect effects.

*The total impact of student spending is **\$13.4 million** in total added income and is equivalent to supporting **275** jobs.*



TABLE 2.4: STUDENT SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$0	\$0	\$0	\$19,077	0
Multiplier effect					
Direct effect	\$5,098	\$5,108	\$10,206	\$16,170	209
Indirect effect	\$501	\$497	\$999	\$1,587	20
Induced effect	\$1,093	\$1,127	\$2,220	\$3,503	45
Total multiplier effect	\$6,693	\$6,732	\$13,425	\$21,260	275
Total impact (initial + multiplier)	\$6,693	\$6,732	\$13,425	\$40,338	275

Source: Emsi impact model.





Alumni impact



In this section, we estimate the economic impacts stemming from the added labor income of alumni in combination with their employers' added non-labor income. This impact is based on the number of students who have attended NC *throughout its history*. We then use this total number to consider the impact of those students in the single FY 2016-17. Former students who earned a degree as well as those who may not have finished their degree or did not take courses for credit are considered alumni.

While NC creates an economic impact through its operations and student spending, the greatest economic impact of NC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni. While attending NC, students gain experience, education, and the knowledge, skills, and abilities that increase their productivity and allow them to command a higher wage once they enter the workforce. But the reward of increased productivity does not stop there. Talented professionals make capital more productive too (e.g., buildings, production facilities, equipment). The employers of NC alumni enjoy the fruits of this increased productivity in the form of additional non-labor income (i.e., higher profits).

The methodology here differs from the previous impacts in one fundamental way. Whereas the previous spending impacts depend on an annually renewed injection of new sales into the regional economy, the alumni impact is the result

The greatest economic impact of NC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni.



of years of past instruction and the associated accumulation of human capital. The initial effect of alumni is comprised of two main components. The first and largest of these is the added labor income of NC's former students. The second component of the initial effect is comprised of the added non-labor income of the businesses that employ former students of NC.

We begin by estimating the portion of alumni who are employed in the workforce. To estimate the historical employment patterns of alumni in the region, we use the following sets of data or assumptions: 1) settling-in factors to determine how long it takes the average student to settle into a career;¹² 2) death, retirement, and unemployment rates from the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics; and 3) state migration data from the Census Bureau. The result is the estimated portion of alumni from each previous year who were still actively employed in the region as of FY 2016-17.

The next step is to quantify the skills and human capital that alumni acquired from the college. We use the students' production of CHEs as a proxy for accumulated human capital. The average number of CHEs completed per student in FY 2016-17 was 9.0. To estimate the number of CHEs present in the workforce during the analysis year, we use the college's historical student headcount over the past 26 years, from FY 1991-92 to FY 2016-17.¹³ We multiply the 9.0 average CHEs per student by the headcounts that we estimate are still actively employed from each of the previous years.¹⁴ Students who enroll at the college more than one year are counted at least twice in the historical enrollment data. However, CHEs remain distinct regardless of when and by whom they were earned, so there is no duplication in the CHE counts. We estimate there are approximately 1.2 million CHEs from alumni active in the workforce.

Next, we estimate the value of the CHEs, or the skills and human capital acquired by NC alumni. This is done using the *incremental* added labor income stemming from the students' higher wages. The incremental added labor income is the difference between the wage earned by NC alumni and the alternative wage they would have earned had they not attended NC. Using the regional incremental earnings, credits required, and distribution of credits at each level of study, we estimate the average value per CHE to equal \$110. This value represents the regional average incremental increase in wages that alumni of NC received during the analysis year for every CHE they completed.

12 Settling-in factors are used to delay the onset of the benefits to students in order to allow time for them to find employment and settle into their careers. In the absence of hard data, we assume a range between one and three years for students who graduate with a certificate or a degree, and between one and five years for returning students.

13 The 26-year time horizon is equal to the number of years that NC was in operation since it was established in 1991.

14 This assumes the average level of study from past years is equal to the level of study of students today. Emsi used data provided by RCCD for a previous study to estimate students' credit load in prior years.



Because workforce experience leads to increased productivity and higher wages, the value per CHE varies depending on the students' workforce experience, with the highest value applied to the CHEs of students who had been employed the longest by FY 2016-17, and the lowest value per CHE applied to students who were just entering the workforce. More information on the theory and calculations behind the value per CHE appears in Appendix 6. In determining the amount of added labor income attributable to alumni, we multiply the CHEs of former students in each year of the historical time horizon by the corresponding average value per CHE for that year, and then sum the products together. This calculation yields approximately \$134.7 million in gross labor income from increased wages received by former students in FY 2016-17 (as shown in Table 2.5).

TABLE 2.5: NUMBER OF CHES IN WORKFORCE AND INITIAL LABOR INCOME CREATED IN THE NC SERVICE AREA, FY 2016-17

Number of CHEs in workforce	1,219,426
Average value per CHE	\$110
Initial labor income, gross	\$134,745,654
Counterfactuals	
Percent reduction for alternative education opportunities	15%
Percent reduction for adjustment for labor import effects	50%
Initial labor income, net	\$57,266,903

Source: Emsi impact model.

The next two rows in Table 2.5 show two adjustments used to account for counterfactual outcomes. As discussed above, counterfactual outcomes in economic analysis represent what would have happened if a given event had not occurred. The event in question is the education and training provided by NC and subsequent influx of skilled labor into the regional economy. The first counterfactual scenario that we address is the adjustment for alternative education opportunities. In the counterfactual scenario where NC does not exist, we assume a portion of NC alumni would have received a comparable education elsewhere in the region or would have left the region and received a comparable education and then returned to the region. The incremental added labor income that accrues to those students cannot be counted towards the added labor income from NC alumni. The adjustment for alternative education opportunities amounts to a 15% reduction of the \$134.7 million in added labor income. This means that 15% of the added labor income from NC alumni would have been generated in the region anyway, even if the college did not exist. For more information on the alternative education adjustment, see Appendix 7.

The other adjustment in Table 2.5 accounts for the importation of labor. Suppose NC did not exist and in consequence there were fewer skilled workers in the region. Businesses could still satisfy some of their need for skilled labor by



recruiting from outside the NC Service Area. We refer to this as the labor import effect. Lacking information on its possible magnitude, we assume 50% of the jobs that students fill at regional businesses could have been filled by workers recruited from outside the region if the college did not exist.¹⁵ Consequently, the gross labor income must be adjusted to account for the importation of this labor, since it would have happened regardless of the presence of the college. We conduct a sensitivity analysis for this assumption in Appendix 1. With the 50% adjustment, the net added labor income added to the economy comes to \$57.3 million, as shown in Table 2.5.

The \$57.3 million in added labor income appears under the initial effect in the labor income column of Table 2.6. To this we add an estimate for initial non-labor income. As discussed earlier in this section, businesses that employ former students of NC see higher profits as a result of the increased productivity of their capital assets. To estimate this additional income, we allocate the initial increase in labor income (\$57.3 million) to the six-digit NAICS industry sectors where students are most likely to be employed. This allocation entails a process that maps completers in the region to the detailed occupations for which those completers have been trained, and then maps the detailed occupations to the six-digit industry sectors in the MR-SAM model.¹⁶ Using a crosswalk created by National Center for Education Statistics (NCES) and the Bureau of Labor Statistics, we map the breakdown of the college's completers to the approximately 700 detailed occupations in the Standard Occupational Classification (SOC) system. Finally, we apply a matrix of wages by industry and by occupation from the MR-SAM model to map the occupational distribution of the \$57.3 million in initial labor income effects to the detailed industry sectors in the MR-SAM model.¹⁷

Once these allocations are complete, we apply the ratio of non-labor to labor income provided by the MR-SAM model for each sector to our estimate of initial labor income. This computation yields an estimated \$24.5 million in added non-labor income attributable to the college's alumni. Summing initial labor and non-labor income together provides the total initial effect of alumni productivity in the NC Service Area economy, equal to approximately \$81.8 million. To estimate multiplier effects, we convert the industry-specific income figures generated through the initial effect to sales using sales-to-income ratios from the MR-SAM model. We then run the values through the MR-SAM's multiplier matrix.

15 A similar assumption is used by Walden (2014) in his analysis of the Cooperating Raleigh Colleges.

16 Completer data comes from the Integrated Postsecondary Education Data System (IPEDS), which organizes program completions according to the Classification of Instructional Programs (CIP) developed by the National Center for Education Statistics (NCES).

17 For example, if the MR-SAM model indicates that 20% of wages paid to workers in SOC 51-4121 (Welders) occur in NAICS 332313 (Plate Work Manufacturing), then we allocate 20% of the initial labor income effect under SOC 51-4121 to NAICS 332313.



TABLE 2.6: ALUMNI IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$57,267	\$24,519	\$81,786	\$179,876	1,192
Multiplier effect					
Direct effect	\$5,636	\$2,459	\$8,095	\$16,915	122
Indirect effect	\$873	\$366	\$1,240	\$2,582	20
Induced effect	\$8,547	\$4,361	\$12,909	\$26,654	165
Total multiplier effect	\$15,056	\$7,187	\$22,244	\$46,151	306
Total impact (initial + multiplier)	\$72,323	\$31,706	\$104,030	\$226,027	1,499

Source: Emsi impact model.

Table 2.6 shows the multiplier effects of alumni. Multiplier effects occur as alumni generate an increased demand for consumer goods and services through the expenditure of their higher wages. Further, as the industries where alumni are employed increase their output, there is a corresponding increase in the demand for input from the industries in the employers' supply chain. Together, the incomes generated by the expansions in business input purchases and household spending constitute the multiplier effect of the increased productivity of the college's alumni. The final results are \$15.1 million in added labor income and \$7.2 million in added non-labor income, for an overall total of \$22.2 million in multiplier effects. The grand total of the alumni impact thus comes to \$104 million in total added income, the sum of all initial and multiplier labor and non-labor income effects. This is equivalent to supporting 1,499 jobs.





Total NC impact

The total economic impact of NC on the NC Service Area can be generalized into two broad types of impacts. First, on an annual basis, NC generates a flow of spending that has a significant impact on the NC Service Area economy. The impacts of this spending are captured by the operations and student spending impacts. While not insignificant, these impacts do not capture the true purpose of NC. The basic mission of NC is to foster human capital. Every year, a new cohort of former NC students adds to the stock of human capital in the NC Service Area, and a portion of alumni continues to add to the NC Service Area economy. Table 2.7 displays the grand total impacts of NC on the NC Service Area economy in FY 2016-17. For context, the percentages of NC compared to the total labor income, total non-labor income, combined total income, sales, and jobs in the NC Service Area, as presented in Table 1.3 and Figure 1.3, are included. The total added value of NC is **\$160.1 million**, equivalent to **0.4%** of the GRP of the NC Service Area. By comparison, this contribution that the college provides on its own is slightly larger than the entire Utilities industry in the region. NC's total impact supported **2,287** jobs in FY 2016-17.

TABLE 2.7: TOTAL NC IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Operations spending	\$39,796	\$2,891	\$42,687	\$74,618	513
Student spending	\$6,693	\$6,732	\$13,425	\$40,338	275
Alumni	\$72,323	\$31,706	\$104,030	\$226,027	1,499
Total impact	\$118,812	\$41,329	\$160,141	\$340,983	2,287
% of the NC Service Area economy	0.5%	0.2%	0.4%	0.4%	0.5%

Source: Emsi impact model.

These impacts, stemming from spending related to the college and its students, spread throughout the regional economy and affect individual industry sectors. Table 2.8 displays the total impact of NC on industry sectors based on their two-digit NAICS code. The table shows the total impact of operations, students, and alumni, as shown in Table 2.7, broken down by industry sector using processes outlined earlier in this chapter. By showing the impact on individual industry sectors, it is possible to see in finer detail where NC has the greatest impact. For example, NC's impact for the Health Care & Social Assistance industry sector was 273 jobs in FY 2016-17.



TABLE 2.8: TOTAL NC IMPACT BY INDUSTRY, FY 2016-17

Industry sector	Total income (thousands)	Jobs supported
Government, Education	\$43,988	521
Manufacturing	\$26,047	153
Accommodation & Food Services	\$12,446	263
Professional & Technical Services	\$10,227	247
Government, Non-Education	\$9,936	80
Health Care & Social Assistance	\$8,496	273
Educational Services	\$7,422	184
Management of Companies & Enterprises	\$6,555	70
Wholesale Trade	\$6,382	45
Construction	\$6,193	70
Real Estate & Rental & Leasing	\$3,880	66
Utilities	\$3,314	9
Administrative & Waste Services	\$3,260	85
Information	\$2,938	18
Retail Trade	\$2,457	38
Other Services (except Public Administration)	\$2,321	69
Arts, Entertainment, & Recreation	\$1,877	66
Transportation & Warehousing	\$1,533	24
Finance & Insurance	\$799	5
Mining, Quarrying, & Oil and Gas Extraction	\$57	<1
Agriculture, Forestry, Fishing, & Hunting	\$16	<1
Total impact	\$160,141	2,287

Source: Emsi impact model.



Investment Analysis

The benefits generated by NC affect the lives of many people. The most obvious beneficiaries are the college's students; they give up time and money to go to the college in return for a lifetime of higher wages and improved quality of life. But the benefits do not stop there. As students earn more, communities and citizens throughout California benefit from an enlarged economy and a reduced demand for social services. In the form of increased tax revenues and public sector savings, the benefits of education extend as far as the state and local government.

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered infeasible. In this chapter, we consider NC as a worthwhile investment from the perspectives of students, taxpayers, and society.





Student perspective

To enroll in postsecondary education, students pay money for tuition and forego monies that otherwise they would have earned had they chosen to work instead of attend college. From the perspective of students, education is the same as an investment; i.e., they incur a cost, or put up a certain amount of money, with the expectation of receiving benefits in return. The total costs consist of the monies that students pay in the form of tuition and fees and the opportunity costs of foregone time and money. The benefits are the higher earnings that students receive as a result of their education.

Calculating student costs

Student costs consist of three main items: direct outlays, opportunity costs, and future principal and interest costs incurred from student loans. Direct outlays include tuition and fees, equal to \$3.9 million from Figure 1.1. Direct outlays also include the cost of books and supplies. On average, full-time students spent \$1,792 each on books and supplies during the reporting year.¹⁸ Multiplying this figure by the number of full-time equivalents (FTEs) produced by NC in FY 2016-17¹⁹ generates a total cost of \$9 million for books and supplies.

In order to pay the cost of tuition, many students had to take out loans. These students not only incur the cost of tuition from the college but also incur the interest cost of taking out loans. In FY 2016-17, students received a total of \$494.7 thousand in federal loans to attend NC.²⁰ Students pay back these loans along with interest over the span of several years in the future. Since students pay off these loans over time, they accrue no initial cost during the analysis year. Hence, to avoid double counting, the \$494.7 thousand in federal loans is subtracted from the costs incurred by students in FY 2016-17.

In addition to the cost of tuition, books, and supplies, students also experience an opportunity cost of attending college during the analysis year. Opportunity cost is the most difficult component of student costs to estimate. It measures the value of time and earnings foregone by students who go to the college rather than work. To calculate it, we need to know the difference between the students' full earning potential and what they actually earn while attending the college.

18 Based on the data provided by RCCD.

19 A single FTE is equal to 30 CHEs, so there were 4,464 FTEs produced by students in FY 2016-17, equal to 133,925 CHEs divided by 30.

20 Due to data limitations, only federal loans are considered in this analysis.



STUDENT COSTS



Out-of-Pocket Expenses



Opportunity Costs

STUDENT BENEFITS



Higher Earnings from Education



We derive the students' full earning potential by weighting the average annual earnings levels in Table 1.4 according to the education level breakdown of the student population when they first enrolled.²¹ However, the earnings levels in Table 1.4 reflect what average workers earn at the midpoint of their careers, not while attending the college. Because of this, we adjust the earnings levels to the average age of the student population (24) to better reflect their wages at their current age.²² This calculation yields an average full earning potential of \$16,255 per student.

In determining how much students earn while enrolled in postsecondary education, an important factor to consider is the time that they actually spend on postsecondary education, since this is the only time that they are required to give up a portion of their earnings. We use the students' CHE production as a proxy for time, under the assumption that the more CHEs students earn, the less time they have to work, and, consequently, the greater their foregone earnings. Overall, students attending NC earned an average of 8.9 CHEs per student (excluding dual credit high school students), which is approximately equal to 30% of a full academic year.²³ We thus include no more than \$4,840 (or 30%) of the students' full earning potential in the opportunity cost calculations.

Another factor to consider is the students' employment status while enrolled in postsecondary education. It is estimated that 75% of students are employed.²⁴ For the remainder of students, we assume that they are either seeking work or planning to seek work once they complete their educational goals. By choosing to enroll, therefore, non-working students give up everything that they can potentially earn during the academic year (i.e., the \$4,840). The total value of their foregone earnings thus comes to \$17.3 million.

Working students are able to maintain all or part of their earnings while enrolled. However, many of them hold jobs that pay less than statistical averages, usually because those are the only jobs they can find that accommodate their course schedule. These jobs tend to be at entry level, such as restaurant servers or cashiers. To account for this, we assume that working students hold jobs that pay 69% of what they would have earned had they chosen to work full-time rather than go to college.²⁵ The remaining 31% comprises the percentage of their full earning potential that they forego. Obviously this assumption varies by person; some students forego more and others less. Since we do not know

21 This is based on students who reported their prior level of education to NC. The prior level of education data was then adjusted to exclude dual credit high school students.

22 Further discussion on this adjustment appears in Appendix 6.

23 Equal to 8.9 CHEs divided by \$30, the assumed number of CHEs in a full-time academic year.

24 Emsi provided an estimate of the percentage of students employed because NC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

25 The 69% assumption is based on the average hourly wage of jobs commonly held by working students divided by the national average hourly wage. Occupational wage estimates are published by the Bureau of Labor Statistics (see http://www.bls.gov/oes/current/oes_nat.htm).



the actual jobs that students hold while attending, the 31% in foregone earnings serves as a reasonable average.

Working students also give up a portion of their leisure time in order to attend higher education institutions. According to the Bureau of Labor Statistics American Time Use Survey, students forego up to 0.5 hours of leisure time per day.²⁶ Assuming that an hour of leisure is equal in value to an hour of work, we derive the total cost of leisure by multiplying the number of leisure hours foregone during the academic year by the average hourly pay of the students' full earning potential. For working students, therefore, their total opportunity cost comes to \$19.8 million, equal to the sum of their foregone earnings (\$16.3 million) and foregone leisure time (\$3.5 million).

Thus far we have discussed student costs during the analysis year. However, recall that students take out student loans to attend college during the year, which they will have to pay back over time. The amount they will be paying in the future must be a part of their decision to attend the college today. Students who take out loans are not only required to pay back the principal of the loan but to also pay back a certain amount in interest. The first step in calculating students' loan interest cost is to determine the payback time for the loans. The \$494.7 thousand in loans was awarded to 91 students, averaging \$5,437 per student in the analysis year. However, this figure represents only one year of loans. Because loan payback time is determined by total indebtedness, we make an assumption that since NC is a two-year college, students will be indebted twice that amount, or \$10,873 on average. According to the U.S. Department of Education, this level of indebtedness will take 15 years to pay back under the standard repayment plan.²⁷

This indebtedness calculation is used solely to estimate the loan payback period. Students will be paying back the principal amount of \$494.7 thousand over time. After taking into consideration the time value of money, this means that students will pay off a discounted present value of \$342.9 thousand in principal over the 15 years. In order to calculate interest, we only consider interest on the federal loans awarded to students in FY 2016-17. Using the student discount rate of 4.5%²⁸ as our interest rate, we calculate that students will pay a total discounted present value of \$144.9 thousand in interest on student loans throughout the first 15 years of their working lifetime. The stream of these

26 "Charts by Topic: Leisure and Sports Activities," American Time Use Survey, Last modified December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

27 Repayment period based on total education loan indebtedness, U.S. Department of Education, 2017. <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>.

28 The student discount rate is derived from the baseline forecasts for the 10-year discount rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



future interest costs together with the stream of loan payments is included in the costs of Column 5 of Table 3.2.

The steps leading up to the calculation of student costs appear in Table 3.1. Direct outlays amount to \$12.5 million, the sum of tuition and fees (\$3.9 million) and books and supplies (\$9 million), less federal loans received (\$494.7 thousand). Opportunity costs for working and non-working students amount to \$25.2 million, excluding \$11.9 million in offsetting residual aid that is paid directly to students.²⁹ Finally, we have the present value of future student loan costs, amounting to \$487.8 thousand between principal and interest. Summing direct outlays, opportunity costs, and future student loan costs together yields a total of \$38.2 million in present value student costs.

TABLE 3.1: PRESENT VALUE OF STUDENT COSTS, FY 2016-17 (THOUSANDS)

Direct outlays in FY 2016-17	
Tuition and fees	\$3,946
Less federal loans received	-\$495
Books and supplies	\$9,036
Total direct outlays	\$12,487
Opportunity costs in FY 2016-17	
Earnings foregone by non-working students	\$17,343
Earnings foregone by working students	\$16,341
Value of leisure time foregone by working students	\$3,451
Less residual aid	-\$11,910
Total opportunity costs	\$25,224
Future student loan costs (present value)	
Student loan principal	\$343
Student loan interest	\$145
Total present value student loan costs	\$488
Total present value student costs	\$38,199

Source: Based on data provided by RCCD and outputs of the Emsi impact model.

Linking education to earnings

Having estimated the costs of education to students, we weigh these costs against the benefits that students receive in return. The relationship between education and earnings is well documented and forms the basis for determining student benefits. As shown in Table 1.4, state mean earnings levels at the

²⁹ Residual aid is the remaining portion of scholarship or grant aid distributed directly to a student after the college applies tuition and fees.



midpoint of the average-aged worker's career increase as people achieve higher levels of education. The differences between state earnings levels define the incremental benefits of moving from one education level to the next.

A key component in determining the students' return on investment is the value of their future benefits stream; i.e., what they can expect to earn in return for the investment they make in education. We calculate the future benefits stream to the college's FY 2016-17 students first by determining their average annual increase in earnings, equal to \$19.5 million. This value represents the higher wages that accrue to students at the midpoint of their careers and is calculated based on the marginal wage increases of the CHEs that students complete while attending the college. Using the state of California earnings, the marginal wage increase per CHE is \$146. For a full description of the methodology used to derive the \$19.5 million, see Appendix 6.

The second step is to project the \$19.5 million annual increase in earnings into the future, for as long as students remain in the workforce. We do this using the Mincer function to predict the change in earnings at each point in an individual's working career.³⁰ The Mincer function originated from Mincer's seminal work on human capital (1958). The function estimates earnings using an individual's years of education and post-schooling experience. While some have criticized Mincer's earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Card (1999 and 2001) addresses a number of these criticisms using U.S. based research over the last three decades and concludes that any upward bias in the Mincer parameters is on the order of 10% or less. We use state-specific and education level-specific Mincer coefficients. To account for any upward bias, we incorporate a 10% reduction in our projected earnings, otherwise known as the ability bias. With the \$19.5 million representing the students' higher earnings at the midpoint of their careers, we apply scalars from the Mincer function to yield a stream of projected future benefits that gradually increase from the time students enter the workforce, peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 67. This earnings stream appears in Column 2 of Table 3.2.

As shown in Table 3.2, the \$19.5 million in gross higher earnings occurs around Year 17, which is the approximate midpoint of the students' future working careers given the average age of the student population and an assumed retirement age of 67. In accordance with the Mincer function, the gross higher earnings that accrue to students in the years leading up to the midpoint are less than \$19.5 million and the gross higher earnings in the years after the midpoint are greater than \$19.5 million.

30 Appendix 6 provides more information on the Mincer function and how it is used to predict future earnings growth.



TABLE 3.2: PROJECTED BENEFITS AND COSTS, STUDENT PERSPECTIVE

1	2	3	4	5	6
Year	Gross higher earnings to students (millions)	% active in workforce*	Net higher earnings to students (millions)	Student costs (millions)	Net cash flow (millions)
0	\$9.4	2%	\$0.2	\$37.7	-\$37.5
1	\$9.9	8%	\$0.7	<\$0.1	\$0.7
2	\$10.5	17%	\$1.8	<\$0.1	\$1.7
3	\$11.2	34%	\$3.8	<\$0.1	\$3.8
4	\$11.8	60%	\$7.1	<\$0.1	\$7.1
5	\$12.4	95%	\$11.8	<\$0.1	\$11.7
6	\$13.1	95%	\$12.4	<\$0.1	\$12.4
7	\$13.7	95%	\$13.0	<\$0.1	\$13.0
8	\$14.3	95%	\$13.6	<\$0.1	\$13.6
9	\$15.0	95%	\$14.2	<\$0.1	\$14.2
10	\$15.6	95%	\$14.8	<\$0.1	\$14.8
11	\$16.2	95%	\$15.4	<\$0.1	\$15.4
12	\$16.8	95%	\$16.0	<\$0.1	\$15.9
13	\$17.4	95%	\$16.5	<\$0.1	\$16.5
14	\$18.0	95%	\$17.1	<\$0.1	\$17.0
15	\$18.5	95%	\$17.6	<\$0.1	\$17.5
16	\$19.0	95%	\$18.0	\$0.0	\$18.0
17	\$19.5	95%	\$18.5	\$0.0	\$18.5
18	\$20.0	95%	\$18.9	\$0.0	\$18.9
19	\$20.4	94%	\$19.3	\$0.0	\$19.3
20	\$20.8	94%	\$19.6	\$0.0	\$19.6
21	\$21.1	94%	\$19.9	\$0.0	\$19.9
22	\$21.4	94%	\$20.1	\$0.0	\$20.1
23	\$21.7	94%	\$20.3	\$0.0	\$20.3
24	\$21.9	93%	\$20.5	\$0.0	\$20.5
25	\$22.1	93%	\$20.5	\$0.0	\$20.5
26	\$22.2	93%	\$20.6	\$0.0	\$20.6
27	\$22.3	92%	\$20.6	\$0.0	\$20.6
28	\$22.3	92%	\$20.5	\$0.0	\$20.5
29	\$22.3	91%	\$20.4	\$0.0	\$20.4
30	\$22.2	91%	\$20.2	\$0.0	\$20.2
31	\$22.1	90%	\$20.0	\$0.0	\$20.0
32	\$21.9	90%	\$19.7	\$0.0	\$19.7
33	\$21.7	89%	\$19.4	\$0.0	\$19.4
34	\$21.4	89%	\$19.0	\$0.0	\$19.0
35	\$21.1	88%	\$18.6	\$0.0	\$18.6
36	\$20.8	87%	\$18.1	\$0.0	\$18.1
37	\$20.4	86%	\$17.6	\$0.0	\$17.6
38	\$20.0	85%	\$17.0	\$0.0	\$17.0
39	\$19.5	84%	\$16.5	\$0.0	\$16.5
40	\$19.0	83%	\$15.9	\$0.0	\$15.9
41	\$18.5	82%	\$15.2	\$0.0	\$15.2
42	\$18.0	81%	\$14.6	\$0.0	\$14.6
Present value			\$271.1	\$38.2	\$232.9
Internal rate of return		Benefit-cost ratio		Payback period (no. of years)	
21.5%		7.1		6.0	

* Includes the "settling-in" factors and attrition.

Source: Emsi impact model.



The final step in calculating the students' future benefits stream is to net out the potential benefits generated by students who are either not yet active in the workforce or who leave the workforce over time. This adjustment appears in Column 3 of Table 3.2 and represents the percentage of the FY 2016-17 student population that will be employed in the workforce in a given year. Note that the percentages in the first five years of the time horizon are relatively lower than those in subsequent years. This is because many students delay their entry into the workforce, either because they are still enrolled at the college or because they are unable to find a job immediately upon graduation. Accordingly, we apply a set of "settling-in" factors to account for the time needed by students to find employment and settle into their careers. As discussed in Chapter 2, settling-in factors delay the onset of the benefits by one to three years for students who graduate with a certificate or a degree and by one to five years for degree-seeking students who do not complete during the analysis year.

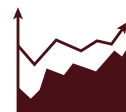
Beyond the first five years of the time horizon, students will leave the workforce for any number of reasons, whether death, retirement, or unemployment. We estimate the rate of attrition using the same data and assumptions applied in the calculation of the attrition rate in the economic impact analysis of Chapter 2.³¹ The likelihood of leaving the workforce increases as students age, so the attrition rate is more aggressive near the end of the time horizon than in the beginning. Column 4 of Table 3.2 shows the net higher earnings to students after accounting for both the settling-in patterns and attrition.

Return on investment to students

Having estimated the students' costs and their future benefits stream, the next step is to discount the results to the present to reflect the time value of money. For the student perspective we assume a discount rate of 4.5% (see below). Because students tend to rely upon debt to pay for their educations – i.e. they are negative savers – their discount rate is based upon student loan interest rates.³² In Appendix 1, we conduct a sensitivity analysis of this discount rate. The present value of the benefits is then compared to student costs to derive the investment analysis results, expressed in terms of a benefit-cost ratio, rate of return, and payback period. The investment is feasible if returns match or exceed the minimum threshold values; i.e., a benefit-cost ratio greater than 1, a rate of return that exceeds the discount rate, and a reasonably short payback period.

31 See the discussion of the alumni impact in Chapter 2. The main sources for deriving the attrition rate are the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics. Note that we do not account for migration patterns in the student investment analysis because the higher earnings that students receive as a result of their education will accrue to them regardless of where they find employment.

32 The student discount rate is derived from the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



Discount Rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, \$1,000 in higher earnings realized 30 years in the future is worth much less than \$1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes. In this study we assume a 4.5% discount rate from the student perspective and a 0.6% discount rate from the perspectives of taxpayers and society.



In Table 3.2, the net higher earnings of students yield a cumulative discounted sum of approximately \$271.1 million, the present value of all of the future earnings increments (see the bottom section of Column 4). This may also be interpreted as the gross capital asset value of the students' higher earnings stream. In effect, the aggregate FY 2016-17 student body is rewarded for its investment in NC with a capital asset valued at \$271.1 million.

The students' cost of attending the college is shown in Column 5 of Table 3.2, equal to a present value of \$38.2 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 7.1 (equal to \$271.1 million in benefits divided by \$38.2 million in costs).

Another way to compare the same benefits stream and associated cost is to compute the rate of return. The rate of return indicates the interest rate that a bank would have to pay a depositor to yield an equally attractive stream of future payments.³³ Table 3.2 shows students of NC earning average returns of 21.5% on their investment of time and money. This is a favorable return compared, for example, to approximately 1% on a standard bank savings account, or 10% on stocks and bonds (30-year average return).

Note that returns reported in this study are real returns, not nominal. When a bank promises to pay a certain rate of interest on a savings account, it employs an implicitly nominal rate. Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the stated rate of return, then money is lost in real terms. In contrast, a real rate of return is on top of inflation. For example, if inflation is running at 3% and a nominal percentage of 5% is paid, then the real rate of return on the investment is only 2%. In Table 3.2, the 21.5% student rate of return is a real rate. With an inflation rate of 2.1% (the average rate reported over the past 20 years as per the U.S. Department of Commerce, Consumer Price Index), the corresponding nominal rate of return is 23.7%, higher than what is reported in Table 3.2.

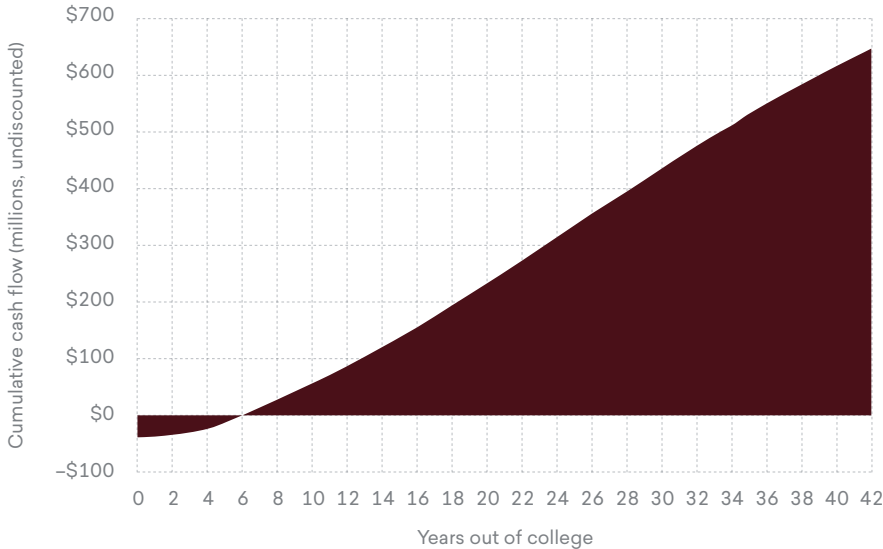
*NC students earn an average rate of return of **21.5%** for their investment of time and money.*

³³ Rates of return are computed using the familiar internal rate-of-return calculation. Note that, with a bank deposit or stock market investment, the depositor puts up a principal, receives in return a stream of periodic payments, and then recovers the principal at the end. Someone who invests in education, on the other hand, receives a stream of periodic payments that include the recovery of the principal as part of the periodic payments, but there is no principal recovery at the end. These differences notwithstanding comparable cash flows for both bank and education investors yield the same internal rate of return.



The payback period is defined as the length of time it takes to entirely recoup the initial investment.³⁴ Beyond that point, returns are what economists would call pure costless rent. As indicated in Table 3.2, students at NC see, on average, a payback period of 6.0 years, meaning 6.0 years after their initial investment of foregone earnings and out-of-pocket costs, they will have received enough higher future earnings to fully recover those costs (Figure 3.1).

FIGURE 3.1: STUDENT PAYBACK PERIOD



Source: Emsi impact model.

34 Payback analysis is generally used by the business community to rank alternative investments when safety of investments is an issue. Its greatest drawback is it does not take into account the time value of money. The payback period is calculated by dividing the cost of the investment by the net return per period. In this study, the cost of the investment includes tuition and fees plus the opportunity cost of time; it does not take into account student living expenses.





Taxpayer perspective

From the taxpayer perspective, the pivotal step here is to home in on the public benefits that specifically accrue to state and local government. For example, benefits resulting from earnings growth are limited to increased state and local tax payments. Similarly, savings related to improved health, reduced crime, and fewer welfare and unemployment claims, discussed below, are limited to those received strictly by state and local government. In all instances, benefits to private residents, local businesses, or the federal government are excluded.

Growth in state tax revenues

As a result of their time at NC, students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce. These in turn increase tax revenues since state and local government is able to apply tax rates to higher earnings.

Estimating the effect of NC on increased tax revenues begins with the present value of the students' future earnings stream, which is displayed in Column 4 of Table 3.2. To this, we apply a multiplier derived from Emsi's MR-SAM model to estimate the added labor income created in the state as students and businesses spend their higher earnings.³⁵ As labor income increases, so does non-labor income, which consists of monies gained through investments. To calculate the growth in non-labor income, we multiply the increase in labor income by a ratio of the California gross state product to total labor income in the state. We also include the spending impacts discussed in Chapter 2 that were created in FY 2016-17 from operations and student spending. To each of these, we apply the prevailing tax rates so we capture only the tax revenues attributable to state and local government from this additional revenue.

Not all of these tax revenues may be counted as benefits to the state, however. Some students leave the state during the course of their careers, and the higher earnings they receive as a result of their education leaves the state with them. To account for this dynamic, we combine student settlement data from the college with data on migration patterns from the Census Bureau to estimate the number of students who will leave the state workforce over time.

³⁵ For a full description of the Emsi MR-SAM model, see Appendix 5.



TAXPAYER COSTS



State/Local Funding

TAXPAYER BENEFITS



Increased Tax Revenue



Avoided Costs to State/Local Government



We apply another reduction factor to account for the students' alternative education opportunities. This is the same adjustment that we use in the calculation of the alumni impact in Chapter 2 and is designed to account for the counterfactual scenario where NC does not exist. The assumption in this case is that any benefits generated by students who could have received an education even without the college cannot be counted as new benefits to society. For this analysis, we assume an alternative education variable of 15%, meaning that 15% of the student population at the college would have generated benefits anyway even without the college. For more information on the alternative education variable, see Appendix 7.

We apply a final adjustment factor to account for the "shutdown point" that nets out benefits that are not directly linked to the state and local government costs of supporting the college. As with the alternative education variable discussed under the alumni impact, the purpose of this adjustment is to account for counterfactual scenarios. In this case, the counterfactual scenario is where state and local government funding for NC did not exist and NC had to derive the revenue elsewhere. To estimate this shutdown point, we apply a sub-model that simulates the students' demand curve for education by reducing state and local support to zero and progressively increasing student tuition and fees. As student tuition and fees increase, enrollment declines. For NC, the shutdown point adjustment is 0%, meaning that the college could not operate without taxpayer support. As such, no reduction applies. For more information on the theory and methodology behind the estimation of the shutdown point, see Appendix 9.

After adjusting for attrition, alternative education opportunities, and the shutdown point, we calculate the present value of the future added tax revenues that occur in the state, equal to \$111.9 million. Recall from the discussion of the student return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%. This is the real treasury interest rate recommended by the Office of Management and Budget (OMB) for 30-year investments, and in Appendix 1, we conduct a sensitivity analysis of this discount rate.³⁶

Government savings

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes

³⁶ Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



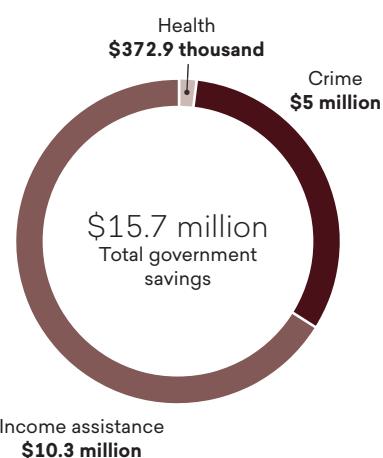
that generate social savings, also known as external or incidental benefits of education. These represent the avoided costs to the government that otherwise would have been drawn from public resources absent the education provided by NC. Government savings appear in Figure 3.2 and Table 3.3 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. Health savings include avoided medical costs that would have otherwise been covered by state and local government. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections). Income assistance benefits comprise avoided costs due to the reduced number of welfare and unemployment insurance claims.

The model quantifies government savings by calculating the probability at each education level that individuals will have poor health, commit crimes, or claim welfare and unemployment benefits. Deriving the probabilities involves assembling data from a variety of studies and surveys analyzing the correlation between education and health, crime, and income assistance at the national and state level. We spread the probabilities across the education ladder and multiply the marginal differences by the number of students who achieved CHEs at each step. The sum of these marginal differences counts as the upper bound measure of the number of students who, due to the education they received at the college, will not have poor health, commit crimes, or demand income assistance. We dampen these results by the ability bias adjustment discussed earlier in the student perspective section and in Appendix 6 to account for factors (besides education) that influence individual behavior. We then multiply the marginal effects of education times the associated costs of health, crime, and income assistance.³⁷ Finally, we apply the same adjustments for attrition, alternative education, and the shutdown point to derive the net savings to the government. Total government savings appear in Figure 3.2 and sum to \$15.7 million.

Table 3.3 displays all benefits to taxpayers. The first row shows the added tax revenues created in the state, equal to \$111.9 million, from students' higher earnings, increases in non-labor income, and spending impacts. The sum of the government savings and the added income in the state is \$127.6 million, as shown in the bottom row of Table 3.3. These savings continue to accrue in the future as long as the FY 2016-17 student population of NC remains in the workforce.

*In addition to the creation of **higher tax revenues** to the state and local government, education is statistically associated with a variety of lifestyle changes that generate **social savings**.*

FIGURE 3.2: PRESENT VALUE OF GOVERNMENT SAVINGS



Source: Emsi impact model.

³⁷ For a full list of the data sources used to calculate the social externalities, see the Resources and References section. See also Appendix 10 for a more in-depth description of the methodology.



TABLE 3.3: PRESENT VALUE OF ADDED TAX REVENUE AND GOVERNMENT SAVINGS (THOUSANDS)

Added tax revenue	\$111,943
Government savings	
Health-related savings	\$373
Crime-related savings	\$5,031
Income assistance savings	\$10,281
Total government savings	\$15,686
Total taxpayer benefits	\$127,629

Source: Emsi impact model.

Return on investment to taxpayers

Taxpayer costs are reported in Table 3.4 and come to \$48 million, equal to the contribution of state and local government to NC. In return for their public support, taxpayers are rewarded with an investment benefit-cost ratio of 2.7 (= \$127.6 million ÷ \$48 million), indicating a profitable investment.

At 6.3%, the rate of return to state and local taxpayers is favorable. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%, the real treasury interest rate recommended by the Office of Management and Budget for 30-year investments.³⁸ This is the return governments are assumed to be able to earn on generally safe investments of unused funds, or alternatively, the interest rate for which governments, as relatively safe borrowers, can obtain funds. A rate of return of 0.6% would mean that the college just pays its own way. In principle, governments could borrow monies used to support NC and repay the loans out of the resulting added taxes and reduced government expenditures. A rate of return of 6.3%, on the other hand, means that NC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.

*A rate of return of **6.3%** means that NC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.*

38 Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent). Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



TABLE 3.4: PROJECTED BENEFITS AND COSTS, TAXPAYER PERSPECTIVE

1	2	3	4
Year	Benefits to taxpayers (millions)	State and local gov't costs (millions)	Net cash flow (millions)
0	\$7.2	\$48.0	-\$40.8
1	\$0.2	\$0.0	\$0.2
2	\$0.4	\$0.0	\$0.4
3	\$0.8	\$0.0	\$0.8
4	\$1.6	\$0.0	\$1.6
5	\$2.6	\$0.0	\$2.6
6	\$2.7	\$0.0	\$2.7
7	\$2.8	\$0.0	\$2.8
8	\$2.9	\$0.0	\$2.9
9	\$3.0	\$0.0	\$3.0
10	\$3.1	\$0.0	\$3.1
11	\$3.2	\$0.0	\$3.2
12	\$3.3	\$0.0	\$3.3
13	\$3.4	\$0.0	\$3.4
14	\$3.5	\$0.0	\$3.5
15	\$3.6	\$0.0	\$3.6
16	\$3.7	\$0.0	\$3.7
17	\$3.8	\$0.0	\$3.8
18	\$3.9	\$0.0	\$3.9
19	\$3.9	\$0.0	\$3.9
20	\$4.0	\$0.0	\$4.0
21	\$4.0	\$0.0	\$4.0
22	\$4.1	\$0.0	\$4.1
23	\$4.1	\$0.0	\$4.1
24	\$4.1	\$0.0	\$4.1
25	\$4.1	\$0.0	\$4.1
26	\$4.1	\$0.0	\$4.1
27	\$4.1	\$0.0	\$4.1
28	\$4.1	\$0.0	\$4.1
29	\$4.1	\$0.0	\$4.1
30	\$4.0	\$0.0	\$4.0
31	\$4.0	\$0.0	\$4.0
32	\$3.9	\$0.0	\$3.9
33	\$3.8	\$0.0	\$3.8
34	\$3.7	\$0.0	\$3.7
35	\$3.6	\$0.0	\$3.6
36	\$3.5	\$0.0	\$3.5
37	\$3.4	\$0.0	\$3.4
38	\$3.3	\$0.0	\$3.3
39	\$3.2	\$0.0	\$3.2
40	\$3.0	\$0.0	\$3.0
41	\$2.9	\$0.0	\$2.9
42	\$2.8	\$0.0	\$2.8
Present value	\$127.6	\$48.0	\$79.6

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
6.3%	2.7	16.0

Source: Emsi impact model.





Social perspective

California benefits from the education that NC provides through the earnings that students create in the state and through the savings that they generate through their improved lifestyles. To receive these benefits, however, members of society must pay money and forego services that they otherwise would have enjoyed if NC did not exist. Society's investment in NC stretches across a number of investor groups, from students to employers to taxpayers. We weigh the benefits generated by NC to these investor groups against the total social costs of generating those benefits. The total social costs include all NC expenditures, all student expenditures (including interest on student loans) less tuition and fees, and all student opportunity costs, totaling a present value of \$105.3 million.

On the benefits side, any benefits that accrue to California as a whole – including students, employers, taxpayers, and anyone else who stands to benefit from the activities of NC – are counted as benefits under the social perspective. We group these benefits under the following broad headings: 1) increased earnings in the state, and 2) social externalities stemming from improved health, reduced crime, and reduced unemployment in the state (see the Beekeeper Analogy box for a discussion of externalities). Both of these benefits components are described more fully in the following sections.

Growth in state economic base

In the process of absorbing the newly-acquired skills of students who attend NC, not only does the productivity of the California workforce increase, but so does the productivity of its physical capital and assorted infrastructure. Students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce.

Estimating the effect of NC on the state's economic base follows the same process used when calculating increased tax revenues in the taxpayer perspective. However, instead of looking at just the tax revenue portion, we include all of the added earnings and business output. We again factor in student attrition and alternative education opportunities. The shutdown point does not apply to the growth of the economic base because the social perspective captures not only the state and local taxpayer support to the college, but also the support from the students and other non-governmental sources.



SOCIAL COSTS



NC Expenditures



Student Out-of-Pocket Expenses



Student Opportunity Costs

SOCIAL BENEFITS



Increased State Earnings



Avoided Costs to Society



After adjusting for attrition and alternative education opportunities, we calculate the present value of the future added income that occurs in the state, equal to \$1.6 billion. Recall from the discussion of the student and taxpayer return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. As stated in the taxpayer perspective, given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%.

Social savings

Similar to the government savings discussed above, society as a whole sees savings due to external or incidental benefits of education. These represent the avoided costs that otherwise would have been drawn from private and public resources absent the education provided by NC. Social benefits appear in Table 3.5 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. These are similar to the categories from the taxpayer perspective above, although health savings now also include lost productivity and other effects associated with smoking, alcohol dependence, obesity, depression, and drug abuse. In addition to avoided costs to the justice system, crime savings also consist of avoided victim costs and benefits stemming from the added productivity of individuals who otherwise would have been incarcerated. Income assistance savings are comprised of the avoided government costs due to the reduced number of welfare and unemployment insurance claims.

Table 3.5 displays the results of the analysis. The first row shows the increased economic base in the state, equal to \$1.6 billion, from students' higher earnings and their multiplier effects, increases in non-labor income, and spending impacts. Social savings appear next, beginning with a breakdown of savings related to health. These include savings due to a reduced demand for medical treatment and social services, improved worker productivity and reduced absenteeism, and a reduced number of vehicle crashes and fires induced by alcohol or smoking-related incidents. Although the prevalence of these health conditions generally declines as individuals attain higher levels of education, prevalence rates are sometimes higher for individuals with certain levels of education. For example, adults with college degrees may be more likely to spend more on alcohol and become dependent on alcohol. Thus, in some cases the social savings associated with a health factor can be negative. Nevertheless, the overall health savings for society are positive, amounting to \$5.2 million. Crime savings amount to \$5.3 million, including savings associated with a reduced number of crime victims, added worker productivity, and reduced expenditures for police and law enforcement, courts and administration of jus-



Beekeeper Analogy

Beekeepers provide a classic example of positive externalities (sometimes called “neighborhood effects”). The beekeeper’s intention is to make money selling honey. Like any other business, receipts must at least cover operating costs. If they don’t, the business shuts down.

But from society’s standpoint there is more. Flowers provide the nectar that bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognized that society might actually do well to subsidize activities that produce positive externalities, such as beekeeping.

Educational institutions are like beekeepers. While their principal aim is to provide education and raise people’s earnings, in the process an array of external benefits is created. Students’ health and lifestyles are improved, and society indirectly benefits just as orchard owners indirectly benefit from beekeepers. Aiming at a more complete accounting of the benefits generated by education, the model tracks and accounts for many of these external social benefits.



tice, and corrective services. Finally, the present value of the savings related to income assistance amount to \$10.3 million, stemming from a reduced number of persons in need of welfare or unemployment benefits. All told, social savings amounted to \$20.8 million in benefits to communities and citizens in California.

TABLE 3.5: PRESENT VALUE OF THE FUTURE INCREASED ECONOMIC BASE AND SOCIAL SAVINGS IN THE STATE (THOUSANDS)

Increased economic base	\$1,627,647
Social Savings	
Health	
Smoking	\$10,649
Alcohol dependence	-\$5,607
Obesity	\$4,565
Depression	-\$4,190
Drug abuse	-\$239
Total health savings*	\$5,180
Crime	
Criminal justice system savings	\$4,994
Crime victim savings	\$61
Added productivity	\$255
Total crime savings	\$5,310
Income assistance	
Welfare savings	\$8,260
Unemployment savings	\$2,021
Total income assistance savings	\$10,281
Total social savings	\$20,771
Total, increased economic base + social savings	\$1,648,418

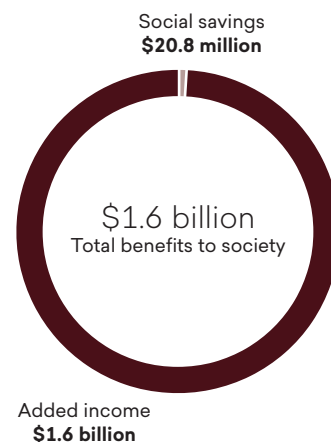
* In some cases, health savings may be negative. This is due to increased prevalence rates at certain education levels. Source: Emsi impact model.

The sum of the social savings and the increased state economic base is \$1.6 billion, as shown in the bottom row of Table 3.5 and in Figure 3.3. These savings accrue in the future as long as the FY 2016-17 student population of NC remains in the workforce.

Return on investment to society

Table 3.6 presents the stream of benefits accruing to the California society and the total social costs of generating those benefits. Comparing the present value of the benefits and the social costs, we have a benefit-cost ratio of 15.6. This means that for every dollar invested in an education from NC, whether it is the

FIGURE 3.3: PRESENT VALUE OF BENEFITS TO SOCIETY



Source: Emsi impact model.



TABLE 3.6: PROJECTED BENEFITS AND COSTS, SOCIAL PERSPECTIVE

1	2	3	4
Year	Benefits to society (millions)	Social costs (millions)	Net cash flow (millions)
0	\$119.3	\$104.7	\$14.6
1	\$2.1	<\$0.1	\$2.1
2	\$5.1	<\$0.1	\$5.0
3	\$10.9	<\$0.1	\$10.9
4	\$20.2	<\$0.1	\$20.2
5	\$33.2	<\$0.1	\$33.2
6	\$34.7	<\$0.1	\$34.6
7	\$36.1	<\$0.1	\$36.0
8	\$37.5	<\$0.1	\$37.5
9	\$38.9	<\$0.1	\$38.8
10	\$40.2	<\$0.1	\$40.2
11	\$41.6	<\$0.1	\$41.5
12	\$42.8	<\$0.1	\$42.8
13	\$44.0	<\$0.1	\$44.0
14	\$45.2	<\$0.1	\$45.1
15	\$46.3	<\$0.1	\$46.2
16	\$47.3	\$0.0	\$47.3
17	\$48.2	\$0.0	\$48.2
18	\$49.0	\$0.0	\$49.0
19	\$49.7	\$0.0	\$49.7
20	\$50.3	\$0.0	\$50.3
21	\$50.9	\$0.0	\$50.9
22	\$51.3	\$0.0	\$51.3
23	\$51.6	\$0.0	\$51.6
24	\$51.7	\$0.0	\$51.7
25	\$51.8	\$0.0	\$51.8
26	\$51.7	\$0.0	\$51.7
27	\$51.5	\$0.0	\$51.5
28	\$51.2	\$0.0	\$51.2
29	\$50.7	\$0.0	\$50.7
30	\$50.2	\$0.0	\$50.2
31	\$49.5	\$0.0	\$49.5
32	\$48.7	\$0.0	\$48.7
33	\$47.8	\$0.0	\$47.8
34	\$46.7	\$0.0	\$46.7
35	\$45.6	\$0.0	\$45.6
36	\$44.4	\$0.0	\$44.4
37	\$43.1	\$0.0	\$43.1
38	\$41.7	\$0.0	\$41.7
39	\$40.2	\$0.0	\$40.2
40	\$38.6	\$0.0	\$38.6
41	\$37.0	\$0.0	\$37.0
42	\$35.4	\$0.0	\$35.4
Present value	\$1,648.4	\$105.3	\$1,543.1

Benefit-cost ratio

15.6

Source: Emsi impact model.



money spent on operations of the college or money spent by students on tuition and fees, an average of \$15.60 in benefits will accrue to society in California.³⁹

With and without social savings

Earlier in this chapter, social benefits attributable to education (improved health, reduced crime, and reduced demand for income assistance) were defined as externalities that are incidental to the operations of NC. Some would question the legitimacy of including these benefits in the calculation of rates of return to education, arguing that only the tangible benefits (higher earnings) should be counted. Table 3.4 and Table 3.6 are inclusive of social benefits reported as attributable to NC. Recognizing the other point of view, Table 3.7 shows rates of return for both the taxpayer and social perspectives exclusive of social benefits. As indicated, returns are still above threshold values (a benefit-cost ratio greater than 1.0 and a rate of return greater than 0.6%), confirming that taxpayers receive value from investing in NC.

TABLE 3.7: TAXPAYER AND SOCIAL PERSPECTIVES WITH AND WITHOUT SOCIAL SAVINGS

	Including social savings	Excluding social savings
Taxpayer perspective		
Net present value (millions)	\$79.6	\$63.9
Benefit-cost ratio	2.7	2.3
Internal rate of return	6.3%	5.3%
Payback period (no. of years)	16.0	19.0
Social perspective		
Net present value (millions)	\$1,543.1	\$1,522.3
Benefit-cost ratio	15.6	15.5

Source: Emsi impact model.

³⁹ The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.



CHAPTER 4:
Conclusion



WHILE NC's value to the NC Service Area is larger than simply its economic impact, understanding the dollars and cents value is an important asset to understanding the college's value as a whole. In order to fully assess NC's value to the regional economy, this report has evaluated the college from the perspectives of economic impact analysis and investment analysis.

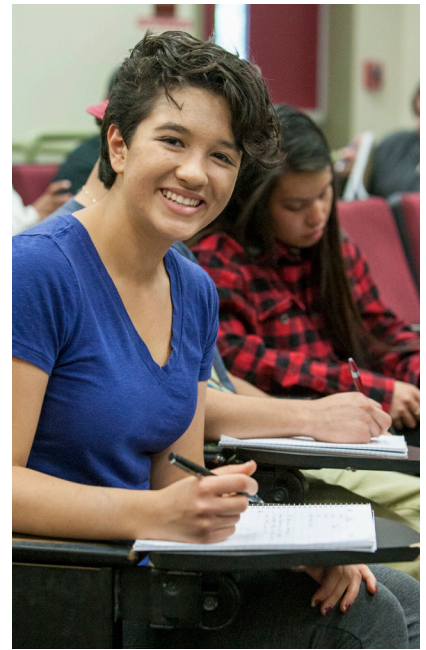
From an economic impact perspective, we calculated that NC generates a total economic impact of **\$160.1 million** in total added income for the regional economy. This represents the sum of several different impacts, including the college's:

- Operations spending impact (**\$42.7 million**);
- Student spending impact (**\$13.4 million**); and
- Alumni impact (**\$104 million**).

The total impact of \$160.1 million is equivalent to approximately **0.4%** of the total GRP of the NC Service Area and is equivalent to supporting **2,287** jobs.

Since NC's activity represents an investment by various parties, including students, taxpayers, and society as a whole, we also considered the college as an investment to see the value it provides to these investors. For each dollar invested by students, taxpayers, and society, NC offers a benefit of **\$7.10**, **\$2.70**, and **\$15.60**, respectively. These results indicate that NC is an attractive investment to students with rates of return that exceed alternative investment opportunities. At the same time, the presence of the college expands the state economy and creates a wide range of positive social benefits that accrue to taxpayers and society in general within California.

Modeling the impact of the college is subject to many factors, the variability of which we considered in our sensitivity analysis (Appendix 1). With this variability accounted for, we present the findings of this study as a robust picture of the economic value of NC.



The presence of the college expands the state economy and creates a wide range of positive social benefits that accrue to taxpayers and society in general within California.



Resources and References

Administration for Children and Families. "Fiscal Year 2016 TANF Financial Data." *Office of Family Assistance, TANF Financial Data*. 2018. <https://www.acf.hhs.gov/ofa/resource/tanf-financial-data-fy-2016>.

Arias, Elizabeth. "United States Life Tables, 2008." *National Vital Statistics Reports* 61, no. 3 (September 24, 2012). Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf.

Baryla, Edward and Douglas Dotterweich. "Student Migration: Do Significant Factors Vary by Region?" *Education Economics* 9, no. 3 (2001).

Becker, Gary S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia College Press for NBER, 1964.

Bilkic, Natasa, Thomas Gries, and Margarethe Pilichowski. "Stay in School or Start Working? The Human Capital Investment Decision under Uncertainty and Irreversibility." *Labour Economics* 19, no. 5 (October 2012): 706-717.

Bureau of Economic Analysis. "Table 1.1.6. Real Gross Domestic Product, Chained Dollars." *GDP and Personal Income*. Last modified January 27, 2017. <http://www.bea.gov/iTable/iTableHtml.cfm?reqid=9&step=3&isuri=1&903=6>.

Bureau of Justice Statistics. "Table 2: Prisoners under the Jurisdiction of State or Federal Correctional Authorities, by Jurisdiction, December 31, 2015 and 2016." *Prisoners in 2016, NCJ 251149, 2018*. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Bureau of Labor Statistics. "Charts by Topic: Leisure and Sports Activities." *American Time Use Survey*. December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

Bureau of Labor Statistics. "Charts by Topic: Students." *American Time Use Survey*. December 2016. <https://www.bls.gov/TUS/CHARTS/STUDENTS.HTM>.

Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." *Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017*. <http://www.bls.gov/cps/cpsaat07.pdf>.

Bureau of Labor Statistics. "Table 24: Historical Consumer Price Index for all Urban Consumers (CPI-U): U.S. City Average, All Items." 2018. <https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-201801.pdf>.



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- Buss, Christian, Jeffrey Parker, and Jon Rivenburg. "Cost, Quality and Enrollment Demand at Liberal Arts Colleges." *Economics of Education Review* 23, no. 1 (February 2004): 57-65.
- Card, David. "The Causal Effect of Education on Earnings." *Handbook of Labor Economics* 3 (1999): 1801-1863.
- Card, David. "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems." *Econometrica* 69, no. 5 (September 2001): 1127-1160.
- Center on Budget and Policy Priorities. "Policy Basics - How Many Weeks of Unemployment are Available?" April 2018. <https://www.cbpp.org/sites/default/files/atoms/files/policybasics-uiweeks.pdf>.
- Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data* [Data set]. <https://www.cdc.gov/statesystem/cigaretteuseadult.html>.
- Centers for Disease Control and Prevention. "Heavy Drinkers (Adult Men Having More Than Two Drinks per Day and Adult Women Having More Than One Drink per Day)." *Alcohol Consumption - 2016 Behavioral Risk Factor Surveillance System Prevalence and Trends Data*. https://nccd.cdc.gov/BRFSSPrevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByTopic&irbLocationType=StatesAndMMSA&islClass=CLASS01&islTopic=TOPIC30&islYear=2016&islLocation=
- Centers for Disease Control and Prevention. "Table. Characteristics of Current Adult Cigarette Smokers." *National Health Interview Survey, United States, 2016*. https://www.cdc.gov/mmwr/volumes/67/wr/mm6702a1.htm#T1_down.
- Centers for Medicare and Medicaid Services. "Table 16: National Health Expenditures, Amounts and Average Annual Growth from Previous Year Shown, by Type of Sponsor, Selected Calendar Years 2009-2025." *NHE Projections 2015-2025 - Tables*. February 2016. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
- College Board. "Figure 1: Average Estimated Full-Time Undergraduate Budgets, 2018-19 (Enrollment-Weighted)." *The College Board, Annual Survey of Colleges, Average Estimated Undergraduate Budgets, 2018-19*. <https://trends.collegeboard.org/college-pricing/figures-tables/average-estimated-undergraduate-budgets-2018-19>.
- Congressional Budget Office. "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline." *Congressional Budget Office Publications CBO's April 2018 Baseline Projections for the Student Loan Program*. Last

modified April 2018. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.

Criminal Justice Expenditure and Employment Extracts Program. "Table 4. Justice System Expenditure by Character, State and Type of Government, Fiscal Year 2015" *Justice Expenditure and Employment Extracts 2015 (preliminary) NCJ 251780*. <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=286>.

Dickerson, Andy, and Steven McIntosh. "The Impact of Distance to Nearest Education Institution on the Post Compulsory Education Participation Decision." *Urban Studies* 50, no. 4 (2013): 742-758.

Dynarski, Susan M. "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *American Economic Review* 93, no. 1 (2003): 279-288.

Emsi Labor Market Data and Software. www.economicmodeling.com.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 1: Crime in the United States." Crime in the United States 2016, Offenses Known to Law Enforcement. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-1>.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 18: Estimated Number of Arrests, United States, 2016" in "Uniform Crime Reports." Crime in the United States, 2016, Persons Arrested. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-18>.

Finkelstein, Eric A., Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale. "The Costs of Obesity in the Workplace." *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" *Journal of Clinical Psychiatry* 76:2, 2015.

Guerino, Paul, Paige M. Harrison, and William J. Sabol. "Prisoners in 2016." *Bureau of Justice Statistics NCJ 236096*, January 2018. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Hamadeh, Mohamad and Roy Khoueiri. "Demand Elasticities for Higher Education in the United States." *International Journal of Business and Economic Perspectives* 5, no. 2 (2010): 60-67.

Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach*. New York: McGraw-Hill Book Company, 1971.

Hernández-Murillo, Rubén, Lesli S. Ott, Michael T. Owyang, and Denise Whalen. "Patterns of Interstate Migration in the United States from the Sur-

- vey of Income and Program Participation.” *Federal Reserve Bank of St. Louis Review* 93, no. 3 (May/June 2011): 169-186. <https://files.stlouisfed.org/files/htdocs/publications/review/11/05/169-186Hernandez.pdf>.
- Jaeger, David A. and Marianne E. Page. “New Evidence on Sheepskin Effects in the Returns to Education.” *The Review of Economics and Statistics* 78, no. 4 (November 1996): 733-740.
- Jamal Ahmed, Elyse Phillips, Andrea S. Gentzke, David M. Homa, Stephen D. Babb, Brian A. King, and Linda J. Neff. “Current Cigarette Smoking Among Adults – United States, 2016.” *Morbidity and Mortality Weekly Report 2018* 67:53-59. DOI: <http://dx.doi.org/10.15585/mmwr.mm6702a1>.
- Kaeding, Nicole. “State Individual Income Tax Rates and Brackets for 2016.” *Tax Foundation Fiscal Fact* no. 500 (February 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF500.pdf.
- Kelchtermans, Stijn and Frank Verboven. “Participation and Study Decisions in a Public System of Higher Education.” *Journal of Applied Econometrics* 25, no. 3 (2010): 355-391.
- Leigh, Andrew and Chris Ryan. “Estimating Returns to Education Using Different Natural Experiments Techniques.” *Economics of Education Review* 27 (2008): 149-160.
- Leonesio, Michael V. “The Economics of Retirement: A Nontechnical Guide.” *Social Security Bulletin* 59, no. 4 (Winter 1996): 29-50.
- McCollister, Kathryn E., Michael T. French, and Hai Fang. “The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.” *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835847>.
- Mincer, Jacob. “Investment in Human Capital and Personal Income Distribution.” *Journal of Political Economy* 66, no. 4 (August 1958): 281-302.
- Mincer, Jacob. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research, 1974.
- Morgan, James N. and Edward H. Robb. “The Impact of Age Upon Interregional Migration.” *The Annals of Regional Science* 15, no. 3 (November 1981): 31-45.
- National Center for Education Statistics. Integrated Post-secondary Education Data System (IPEDS). <http://nces.ed.gov/ipeds>.
- National Center for Education Statistics. “Table 219.60 Number of People Taking the GED Test and Percentage Distribution of Those who Passed, by Age Group: 1971 through 2013.” *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_219.60.asp?current=yes.

- National Center for Education Statistics. "Table 507.20 Participants in State-Administered Adult Basic Education, Secondary Education, and English as a Second Language Programs, by Type of Program and State or Jurisdiction: Selected Fiscal Years, 2000 through 2014." *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_507.20.asp?current=yes.
- National Center for Health Statistics. "Table 58. Normal Weight, Overweight, and Obesity Among Persons 20 Years of Age and Over, by Selected Characteristics: United States, Selected Years 1988-1994 through 2011-2014." *Centers for Disease Control and Prevention, Health, United States, 2015*. <https://www.cdc.gov/nchs/data/hus/2015/058.pdf>.
- National Employment Law Project. "Unemployment Insurance: An Overview of the Challenges and Strengths of Today's System". 2016. <https://waysandmeans.house.gov/wp-content/uploads/2016/09/20160907HR-Testimony-Conti.pdf>.
- National Survey on Drug Use and Health. "Table 19. Illicit Drug Use Disorder in the Past Year, by Age Group and State: Percentages, Annual Averages Based on 2015 and 2016 NSDUHs." *National Survey on Drug Use and Health: Model-Based Prevalence Estimates (50 States and the District of Columbia)*. <https://www.samhsa.gov/data/sites/default/files/NSDUHsaePercents2016/NSDUHsaePercents2016.pdf>
- National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016." <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf>.
- National Survey on Drug Use and Health. "Table 15: Major Depressive Episode in the Past Year, by age group and state: Percentages, annual averages, and P values from tests of differences between percentages, 2008-2009 and 2015-2016." <https://www.samhsa.gov/data/sites/default/files/NSDUHsae-ShortTermCHG2016/NSDUHsaeShortTermCHG2016.htm>.
- Nowotny, Kathryn, Ryan Masters, and Jason Boardman, 2016. "The relationship between education and health among incarcerated man and women in the United States" *BMC Public Health*. September 2016. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5009667/>.

- OECD. "Household Net Saving Rates: As a Percentage of Household Disposable Income." *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics* (2016). <http://dx.doi.org/10.1787/factbook-2015-19-en>.
- Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.
- Ogden, Cynthia L., Molly M. Lamb, Margaret D. Carroll, and Katherine M. Flegal. "Figure 3. Prevalence of Obesity among Adults Aged 20 Years and Over, by Education, Sex, and Race and Ethnicity: United States 2005-2008." *Obesity and Socioeconomic Status in Adults: United States 2005-2008*, National Center for Health Statistics no. 50. (2010).
- Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017). https://www.cdc.gov/mmwr/volumes/66/wr/mm6650a1.htm?s_cid=mm6650a1_w#suggestedcitation.
- Polachek, Solomon W. "Earnings Over the Lifecycle: The Mincer Earnings Function and its Applications." *Foundations and Trends in Microeconomics* 4, no. 3 (2008): 165-272.
- Polachek, Solomon W. "Mincer's Overtaking Point and the Lifecycle Earnings Distribution." *Review of the Economics of the Household* 1, no. 4 (December 2003): 273-304.
- Ramey, Valerie and Neville Francis. "A Century of Work and Leisure." *American Economic Journal: Macroeconomics* 1, no. 2 (2009): 189-224.
- Sacks, Gonzales, Bouchery, Tomedi, & Brewer (2015). 2010 National and State Costs of Excessive Alcohol Consumption. *American Journal of Preventive Medicine*, 49(5), E73-E79. [https://www.ajpmonline.org/article/S0749-3797\(15\)00354-2/pdf/](https://www.ajpmonline.org/article/S0749-3797(15)00354-2/pdf/).
- Sevilla, Almudena, Jose Ignacio Gimenez-Nadal, and Jonathan I. Gershuny. "Leisure Inequality in the United States: 1965-2003." IZA Discussion Paper no. 6708 (July 2012).
- Social Security Administration. "Retirement Benefits." *Full Retirement Age*. May 2016. <https://www.ssa.gov/pubs/EN-05-10035.pdf>.
- State of Obesity. "Adult Obesity in the United States." Adult Obesity Rate by State, 2016. <https://stateofobesity.org/adult-obesity/>.

- Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." *Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.* <https://store.samhsa.gov/shin/content/SMA16-4975/SMA16-4975.pdf>.
- Substance Abuse and Mental Health Services Administration. "Table 5.4B - Illicit Drug Use Disorder in Past Year among Persons Aged 12 or Older, by Age Group and Demographic Characteristics: Percentages, 2015 and 2016" SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-4B>.
- Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-6A>.
- Supplemental Nutrition Assistance Program. "State Activity Report Fiscal Year 2016." *Food and Nutrition Service, Supplemental Nutrition Assistance Program, Program Accountability and Administration Division* (September 2017). <https://fns-prod.azureedge.net/sites/default/files/snap/FY16-State-Activity-Report.pdf>.
- U.S. Census Bureau. "Annual Estimates of the Resident Population for Selected Age Groups by Sex: April 1, 2010 to July 1, 2015." *National Population by Characteristics Tables: 2010-2015*. December 2016. <http://www.census.gov/data/tables/2015/demo/popest/nation-detail.html>.
- U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011. <https://www.census.gov/library/working-papers/2011/demo/SEHSD-WP2011-08.html>.
- U.S. Census Bureau. "Social Insurance and Human Services." *The 2012 Statistical Abstract*. http://www.census.gov/compendia/statab/cats/social_insurance_human_services.html.
- U.S. Department of Agriculture, Office of Policy Support. Supplemental Nutrition Assistance Program Nutrition Assistance Program Report Series. "Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2016." <https://fns-prod.azureedge.net/sites/default/files/ops/Characteristics2016.pdf>.

- U.S. Department of Education, Federal Student Aid Office. “The Standard Repayment Plan.” <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>
- U.S. Department of Health and Human Services. “2016 Welfare Indicators and Risk Factors: Fifteenth Report to Congress” Annual Report to Congress, 2016. <https://aspe.hhs.gov/system/files/pdf/206736/WelfareIndicators15thReport.pdf>.
- U.S. Department of Health and Human Services, Office of Family Assistance. “Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016.” <https://www.acf.hhs.gov/ofa/resource/characteristics-and-financial-circumstances-of-tanf-recipients-fiscal-year-2016-0>.
- U.S. Department of Health & Human Services. “The Health Consequences of Smoking—50 Years of Progress.” A Report of the Surgeon General, 2014. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/50-years-of-progress-by-section.html>.
- U.S. Department of Labor. “Unemployment Insurance Data Summary, 4th Quarter 2017.” https://workforcesecurity.doleta.gov/unemploy/content/data_stats/datasum17/DataSum_2017_4.pdf.
- Walczak, Jared, Scott Drenkard. “State and Local Sales Tax Rates, Midyear 2016.” *Tax Foundation Fiscal Fact* no. 515 (July 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF515.pdf.
- Walden, Michael, “The Local Economic Impact of the Cooperating Raleigh Colleges: Update 2013.” March 2014. <http://crcraleighcolleges.org/files/crcimpact2013-final.pdf>.

Appendix 1: Sensitivity Analysis

Sensitivity analysis measures the extent to which a model’s outputs are affected by hypothetical changes in the background data and assumptions. This is especially important when those variables are inherently uncertain. This analysis allows us to identify a plausible range of potential results that would occur if the value of any of the variables is in fact different from what was expected. In this chapter we test the sensitivity of the model to the following input factors: 1) the alternative education variable, 2) the labor import effect variable, 3) the student employment variables, 4) the discount rate, and 5) the retained student variable.

Alternative education variable

The alternative education variable (15%) accounts for the counterfactual scenario where students would have to seek a similar education elsewhere absent the publicly-funded college in the region. Given the difficulty in accurately specifying the alternative education variable, we test the sensitivity of the taxpayer and social investment analysis results to its magnitude. Variations in the alternative education assumption are calculated around base case results listed in the middle column of Table A1.1. Next, the model brackets the base case assumption on either side with a plus or minus 10%, 25%, and 50% variation in assumptions. Analyses are then repeated introducing one change at a time, holding all other variables constant. For example, an increase of 10% in the alternative education assumption (from 15% to 17%) reduces the taxpayer perspective rate of return from 6.3% to 6.1%. Likewise, a decrease of 10% (from 15% to 14%) in the assumption increases the rate of return from 6.3% to 6.4%.

TABLE A1.1 SENSITIVITY ANALYSIS OF ALTERNATIVE EDUCATION VARIABLE, TAXPAYER AND SOCIAL PERSPECTIVES

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Alternative education variable	8%	11%	14%	15%	17%	19%	23%
Taxpayer perspective							
Net present value (millions)	\$91	\$85	\$82	\$80	\$77	\$74	\$68
Rate of return	6.9%	6.6%	6.4%	6.3%	6.1%	5.9%	5.6%
Benefit-cost ratio	2.9	2.8	2.7	2.7	2.6	2.5	2.4
Social perspective							
Net present value (millions)	\$1,689	\$1,616	\$1,572	\$1,543	\$1,514	\$1,470	\$1,398
Benefit-cost ratio	17.0	16.3	15.9	15.6	15.4	15.0	14.3

Based on this sensitivity analysis, the conclusion can be drawn that NC investment analysis results from the taxpayer and social perspectives are not very sensitive to relatively large variations in the alternative education variable. As indicated, results are still above their threshold levels (net present value greater than 0, benefit-cost ratio greater than 1, and rate of return greater than the discount rate of 0.6%), even when the alternative education assumption is increased by as much as 50% (from 15% to 23%). The conclusion is that although the assumption is difficult to specify, its impact on overall investment analysis results for the taxpayer and social perspectives is not very sensitive.

Labor import effect variable

The labor import effect variable only affects the alumni impact calculation in Table 2.6. In the model we assume a labor import effect variable of 50%, which means that 50% of the region’s labor demands would have been satisfied without the presence of NC. In other words, businesses that hired NC students could have substituted some of these workers with equally-qualified people from outside the region had there been no NC students to hire. Therefore, we attribute only the remaining 50% of the initial labor income generated by increased alumni productivity to the college.

Table A1.2 presents the results of the sensitivity analysis for the labor import effect variable. As explained earlier, the assumption increases and decreases relative to the base case of 50% by the increments indicated in the table. Alumni productivity impacts attributable to NC, for example, range from a high of \$156 million at a -50% variation to a low of \$52 million at a +50% variation from the base case assumption. This means that if the labor import effect variable increases, the impact that we claim as attributable to alumni decreases. Even under the most conservative assumptions, the alumni impact on the NC Service Area economy still remains sizeable.

TABLE A1.2: SENSITIVITY ANALYSIS OF LABOR IMPORT EFFECT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Labor import effect variable	25%	38%	45%	50%	55%	63%	75%
Alumni impact (millions)	\$156	\$130	\$114	\$104	\$94	\$78	\$52

Student employment variables

Student employment variables are difficult to estimate because many students do not report their employment status or because colleges generally do not collect this kind of information. Employment variables include the following: 1) the percentage of students who are employed while attending the college and 2) the percentage of earnings that working students receive relative to the

earnings they would have received had they not chosen to attend the college. Both employment variables affect the investment analysis results from the student perspective.

Students incur substantial expense by attending NC because of the time they spend not gainfully employed. Some of that cost is recaptured if students remain partially (or fully) employed while attending. It is estimated that 75% of students are employed.⁴⁰ This variable is tested in the sensitivity analysis by changing it first to 100% and then to 0%.

The second student employment variable is more difficult to estimate. In this study we estimate that students who are working while attending the college earn only 69%, on average, of the earnings that they statistically would have received if not attending NC. This suggests that many students hold part-time jobs that accommodate their NC attendance, though it is at an additional cost in terms of receiving a wage that is less than what they otherwise might make. The 69% variable is an estimation based on the average hourly wages of the most common jobs held by students while attending college relative to the average hourly wages of all occupations in the U.S. The model captures this difference in wages and counts it as part of the opportunity cost of time. As above, the 69% estimate is tested in the sensitivity analysis by changing it to 100% and then to 0%.

The changes generate results summarized in Table A1.3, with A defined as the percent of students employed and B defined as the percent that students earn relative to their full earning potential. Base case results appear in the shaded row; here the assumptions remain unchanged, with A equal to 75% and B equal to 69%. Sensitivity analysis results are shown in non-shaded rows. Scenario 1 increases A to 100% while holding B constant, Scenario 2 increases B to 100% while holding A constant, Scenario 3 increases both A and B to 100%, and Scenario 4 decreases both A and B to 0%.

TABLE A1.3: SENSITIVITY ANALYSIS OF STUDENT EMPLOYMENT VARIABLES

Variations in assumptions	Net present value (millions)	Internal rate of return	Benefit-cost ratio
Base case: A = 75%, B = 69%	\$232.9	21.5%	7.1
Scenario 1: A = 100%, B = 69%	\$243.6	26.5%	9.9
Scenario 2: A = 75%, B = 100%	\$249.2	30.5%	12.4
Scenario 3: A = 100%, B = 100%	\$265.4	68.7%	47.8
Scenario 4: A = 0%, B = 0%	\$200.6	14.4%	3.8

Note: A = percent of students employed; B = percent earned relative to statistical averages

40 Emsi provided an estimate of the percentage of students employed because NC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

- **Scenario 1:** Increasing the percentage of students employed (A) from 75% to 100%, the net present value, internal rate of return, and benefit-cost ratio improve to \$243.6 million, 26.5%, and 9.9, respectively, relative to base case results. Improved results are attributable to a lower opportunity cost of time; all students are employed in this case.
- **Scenario 2:** Increasing earnings relative to statistical averages (B) from 69% to 100%, the net present value, internal rate of return, and benefit-cost ratio results improve to \$249.2 million, 30.5%, and 12.4, respectively, relative to base case results; a strong improvement, again attributable to a lower opportunity cost of time.
- **Scenario 3:** Increasing both assumptions A and B to 100% simultaneously, the net present value, internal rate of return, and benefit-cost ratio improve yet further to \$265.4 million, 68.7%, and 47.8, respectively, relative to base case results. This scenario assumes that all students are fully employed and earning full salaries (equal to statistical averages) while attending classes.
- **Scenario 4:** Finally, decreasing both A and B to 0% reduces the net present value, internal rate of return, and benefit-cost ratio to \$200.6 million, 14.4%, and 3.8, respectively, relative to base case results. These results are reflective of an increased opportunity cost; none of the students are employed in this case.⁴¹

It is strongly emphasized in this section that base case results are very attractive in that results are all above their threshold levels. As is clearly demonstrated here, results of the first three alternative scenarios appear much more attractive, although they overstate benefits. Results presented in Chapter 3 are realistic, indicating that investments in NC generate excellent returns, well above the long-term average percent rates of return in stock and bond markets.

Discount rate

The discount rate is a rate of interest that converts future monies to their present value. In investment analysis, the discount rate accounts for two fundamental principles: 1) the time value of money, and 2) the level of risk that an investor is willing to accept. Time value of money refers to the value of money after interest or inflation has accrued over a given length of time. An investor must be willing to forego the use of money in the present to receive compensation for it in the future. The discount rate also addresses the investors' risk preferences by serving as a proxy for the minimum rate of return that the proposed risky asset must be expected to yield before the investors will be persuaded to invest in it. Typically, this minimum rate of return is determined by the known

⁴¹ Note that reducing the percent of students employed to 0% automatically negates the percent they earn relative to full earning potential, since none of the students receive any earnings in this case.

returns of less risky assets where the investors might alternatively consider placing their money.

In this study, we assume a 4.5% discount rate for students and a 0.6% discount rate for society and taxpayers.⁴² Similar to the sensitivity analysis of the alternative education variable, we vary the base case discount rates for students, taxpayers, and society on either side by increasing the discount rate by 10%, 25%, and 50%, and then reducing it by 10%, 25%, and 50%. Note that, because the rate of return and the payback period are both based on the undiscounted cash flows, they are unaffected by changes in the discount rate. As such, only variations in the net present value and the benefit-cost ratio are shown for students, taxpayers, and society in Table A1.4.

TABLE A1.4: SENSITIVITY ANALYSIS OF DISCOUNT RATE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Student perspective							
Discount rate	2.2%	3.3%	4.0%	4.5%	4.9%	5.6%	6.7%
Net present value (millions)	\$379	\$296	\$256	\$233	\$212	\$185	\$179
Benefit-cost ratio	10.9	8.7	7.7	7.1	6.6	5.8	5.7
Taxpayer perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$88	\$84	\$81	\$80	\$78	\$76	\$72
Benefit-cost ratio	2.8	2.7	2.7	2.7	2.6	2.6	2.5
Social perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$1,651	\$1,596	\$1,564	\$1,543	\$1,523	\$1,493	\$1,444
Benefit-cost ratio	16.7	16.2	15.8	15.6	15.5	15.2	14.7

As demonstrated in the table, an increase in the discount rate leads to a corresponding decrease in the expected returns, and vice versa. For example, increasing the student discount rate by 50% (from 4.5% to 6.7%) reduces the students' benefit-cost ratio from 7.1 to 5.7. Conversely, reducing the discount rate for students by 50% (from 4.5% to 2.2%) increases the benefit-cost ratio from 7.1 to 10.9. The sensitivity analysis results for society and taxpayers show the same inverse relationship between the discount rate and the benefit-cost ratio, with the variance in results being the greatest under the social perspective (from a 16.7 benefit-cost ratio at a -50% variation from the base case, to a 14.7 benefit-cost ratio at a 50% variation from the base case).

42 These values are based on the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office and the real treasury interest rates recommended by the Office of Management and Budget for 30-year investments. See the Congressional Budget Office "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline" and the Office of Management and Budget "Discount Rates for Cost-Effectiveness of Federal Programs."

Retained student variable

The retained student variable only affects the student spending impact calculation in Table 2.4. For this analysis, we assume a retained student variable of 10%, which means that 10% of NC's students who originated from the NC Service Area would have left the region for other opportunities, whether that be education or employment, if NC did not exist. The money these retained students spent in the region for accommodation and other personal and household expenses is attributable to NC.

Table A1.5 presents the results of the sensitivity analysis for the retained student variable. The assumption increases and decreases relative to the base case of 10% by the increments indicated in the table. The student spending impact is recalculated at each value of the assumption, holding all else constant. Student spending impacts attributable to NC range from a high of \$20.1 million when the retained student variable is 15% to a low of \$6.7 million when the retained student variable is 5%. This means as the retained student variable decreases, the student spending attributable to NC decreases. Even under the most conservative assumptions, the student spending impact on the NC Service Area economy remains substantial.

TABLE A1.5: SENSITIVITY ANALYSIS OF RETAINED STUDENT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Retained student variable	5%	8%	9%	10%	11%	13%	15%
Student spending impact (thousands)	\$6,712	\$10,068	\$12,082	\$13,425	\$14,767	\$16,781	\$20,137

Appendix 2: Glossary of Terms

Alternative education A “with” and “without” measure of the percent of students who would still be able to avail themselves of education if the college under analysis did not exist. An estimate of 10%, for example, means that 10% of students do not depend directly on the existence of the college in order to obtain their education.

Alternative use of funds A measure of how monies that are currently used to fund the college might otherwise have been used if the college did not exist.

Asset value Capitalized value of a stream of future returns. Asset value measures what someone would have to pay today for an instrument that provides the same stream of future revenues.

Attrition rate Rate at which students leave the workforce due to out-migration, unemployment, retirement, or death.

Benefit-cost ratio Present value of benefits divided by present value of costs. If the benefit-cost ratio is greater than 1, then benefits exceed costs, and the investment is feasible.

Credit hour equivalent Credit hour equivalent, or CHE, is defined as 15 contact hours of education if on a semester system, and 10 contact hours if on a quarter system. In general, it requires 450 contact hours to complete one full-time equivalent, or FTE.

Demand Relationship between the market price of education and the volume of education demanded (expressed in terms of enrollment). The law of the downward-sloping demand curve is related to the fact that enrollment increases only if the price (tuition and fees) is lowered, or conversely, enrollment decreases if price increases.

Discounting Expressing future revenues and costs in present value terms.

Earnings (labor income) Income that is received as a result of labor; i.e., wages.

Economics Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Elasticity of demand Degree of responsiveness of the quantity of education demanded (enrollment) to changes in market prices (tuition and fees). If a decrease in fees increases or decreases total enrollment by a significant amount, demand is elastic. If enrollment remains the same or changes only slightly, demand is inelastic.

Externalities Impacts (positive and negative) for which there is no compensation. Positive externalities of education include improved social behaviors such as improved health, lower crime, and reduced demand for income assistance. Educational institutions do not receive compensation for these benefits, but benefits still occur because education is statistically proven to lead to improved social behaviors.

Gross regional product Measure of the final value of all goods and services produced in a region after netting out the cost of goods used in production. Alternatively, gross regional product (GRP) equals the combined incomes of all factors of production; i.e., labor, land and capital. These include wages, salaries, proprietors' incomes, profits, rents, and other. Gross regional product is also sometimes called value added or added income.

Initial effect Income generated by the initial injection of monies into the economy through the payroll of the college and the higher earnings of its students.

Input-output analysis Relationship between a given set of demands for final goods and services and the implied amounts of manufactured inputs, raw materials, and labor that this requires. When educational institutions pay wages and salaries and spend money for supplies in the region, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods and services and jobs. Moreover, as students enter or rejoin the workforce with higher skills, they earn higher salaries and wages. In turn, this generates more consumption and spending in other sectors of the economy.

Internal rate of return Rate of interest that, when used to discount cash flows associated with investing in education, reduces its net present value to zero (i.e., where the present value of revenues accruing from the investment are just equal to the present value of costs incurred). This, in effect, is the breakeven rate of return on investment since it shows the highest rate of interest at which the investment makes neither a profit nor a loss.

Multiplier effect Additional income created in the economy as the college and its students spend money in the region. It consists of the income created by the supply chain of the industries initially affected by the spending of the college and its students (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

Net cash flow Benefits minus costs, i.e., the sum of revenues accruing from an investment minus costs incurred.

Net present value Net cash flow discounted to the present. All future cash flows are collapsed into one number, which, if positive, indicates feasibility. The result is expressed as a monetary measure.

Non-labor income Income received from investments, such as rent, interest, and dividends.

Opportunity cost Benefits foregone from alternative B once a decision is made to allocate resources to alternative A. Or, if individuals choose to attend college, they forego earnings that they would have received had they chose instead to work full-time. Foregone earnings, therefore, are the “price tag” of choosing to attend college.

Payback period Length of time required to recover an investment. The shorter the period, the more attractive the investment. The formula for computing payback period is:

$$\text{Payback period} = \text{cost of investment} / \text{net return per period}$$

Appendix 3: Frequently Asked Questions (FAQs)

This appendix provides answers to some frequently asked questions about the results.

What is economic impact analysis?

Economic impact analysis quantifies the impact from a given economic event – in this case, the presence of a college – on the economy of a specified region.

What is investment analysis?

Investment analysis is a standard method for determining whether or not an existing or proposed investment is economically viable. This methodology is appropriate in situations where a stakeholder puts up a certain amount of money with the expectation of receiving benefits in return, where the benefits that the stakeholder receives are distributed over time, and where a discount rate must be applied in order to account for the time value of money.

Do the results differ by region, and if so, why?

Yes. Regional economic data are drawn from Emsi’s proprietary MR-SAM model, the Census Bureau, and other sources to reflect the specific earnings levels, jobs numbers, unemployment rates, population demographics, and other key characteristics of the region served by the college. Therefore, model results for the college are specific to the given region.

Are the funds transferred to the college increasing in value, or simply being re-directed?

Emsi’s approach is not a simple “rearranging of the furniture” where the impact of operations spending is essentially a restatement of the level of funding received by the college. Rather, it is an impact assessment of the additional income created in the region as a result of the college spending on payroll and other non-pay expenditures, net of any impacts that would have occurred anyway if the college did not exist.

How does my college's rates of return compare to that of other institutions?

In general, Emsi discourages comparisons between institutions since many factors, such as regional economic conditions, institutional differences, and student demographics are outside of the college's control. It is best to compare the rate of return to the discount rates of 4.5% (for students) and 0.6% (for society and taxpayers), which can also be seen as the opportunity cost of the investment (since these stakeholder groups could be spending their time and money in other investment schemes besides education). If the rate of return is higher than the discount rate, the stakeholder groups can expect to receive a positive return on their educational investment.

Emsi recognizes that some institutions may want to make comparisons. As a word of caution, if comparing to an institution that had a study commissioned by a firm other than Emsi, then differences in methodology will create an "apples to oranges" comparison and will therefore be difficult. The study results should be seen as unique to each institution.

Net Present Value (NPV): How do I communicate this in laymen's terms?

Which would you rather have: a dollar right now or a dollar 30 years from now? That most people will choose a dollar now is the crux of net present value. The preference for a dollar today means today's dollar is therefore worth more than it would be in the future (in most people's opinion). Because the dollar today is worth more than a dollar in 30 years, the dollar 30 years from now needs to be adjusted to express its worth today. Adjusting the values for this "time value of money" is called discounting and the result of adding them all up after discounting each value is called net present value.

Internal Rate of Return (IRR): How do I communicate this in laymen's terms?

Using the bank as an example, an individual needs to decide between spending all of their paycheck today and putting it into savings. If they spend it today, they know what it is worth: \$1 = \$1. If they put it into savings, they need to know that there will be some sort of return to them for spending those dollars in the future rather than now. This is why banks offer interest rates and deposit interest earnings. This makes it so an individual can expect, for example, a 3% return in the future for money that they put into savings now.

Total Economic Impact: How do I communicate this in laymen's terms?

Big numbers are great, but putting them into perspective can be a challenge. To add perspective, find an industry with roughly the same “% of GRP” as your college (Table 1.3). This percentage represents its portion of the total gross regional product in the region (similar to the nationally recognized gross domestic product but at a regional level). This allows the college to say that their single brick and mortar campus does just as much for the NC Service Area as the entire Utilities *industry*, for example. This powerful statement can help put the large total impact number into perspective.

Appendix 4: Example of Sales versus Income

Emsi's economic impact study differs from many other studies because we prefer to report the impacts in terms of income rather than sales (or output). Income is synonymous with value added or gross regional product (GRP). Sales include all the intermediary costs associated with producing goods and services. Income is a net measure that excludes these intermediary costs:

$$\text{Income} = \text{Sales} - \text{Intermediary Costs}$$

For this reason, income is a more meaningful measure of new economic activity than reporting sales. This is evidenced by the use of gross domestic product (GDP) – a measure of income – by economists when considering the economic growth or size of a country. The difference is GRP reflects a region and GDP a country.

To demonstrate the difference between income and sales, let us consider an example of a baker's production of a loaf of bread. The baker buys the ingredients such as eggs, flour, and yeast for \$2.00. He uses capital such as a mixer to combine the ingredients and an oven to bake the bread and convert it into a final product. Overhead costs for these steps are \$1.00. Total intermediary costs are \$3.00. The baker then sells the loaf of bread for \$5.00.

The sales amount of the loaf of bread is \$5.00. The income from the loaf of bread is equal to the sales amount less the intermediary costs:

$$\text{Income} = \$5.00 - \$3.00 = \$2.00$$

In our analysis, we provide context behind the income figures by also reporting the associated number of jobs. The impacts are also reported in sales and earnings terms for reference.

Appendix 5: Emsi MR-SAM

Emsi's MR-SAM represents the flow of all economic transactions in a given region. It replaces Emsi's previous input-output (IO) model, which operated with some 1,000 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (*i.e.*, multipliers) in the regional economy as a result of industries entering or exiting the region. The MR-SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,000 industries, government, household and investment sectors embedded in the old IO tool, the MR-SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

This appendix presents a high-level overview of the MR-SAM. Additional documentation on the technical aspects of the model is available upon request.

Data sources for the model

The Emsi MR-SAM model relies on a number of internal and external data sources, mostly compiled by the federal government. What follows is a listing and short explanation of our sources. The use of these data will be covered in more detail later in this appendix.

Emsi Data are produced from many data sources to produce detailed industry, occupation, and demographic jobs and earnings data at the local level. This information (especially sales-to-jobs ratios derived from jobs and earnings-to-sales ratios) is used to help regionalize the national matrices as well as to disaggregate them into more detailed industries than are normally available.

BEA Make and Use Tables (MUT) are the basis for input-output models in the U.S. The *make* table is a matrix that describes the amount of each commodity made by each industry in a given year. Industries are placed in the rows and commodities in the columns. The *use* table is a matrix that describes the amount of each commodity used by each industry in a given year. In the use table, commodities are placed in the rows and industries in the columns. The BEA produces two different sets of MUTs, the benchmark and the summary. The benchmark set contains about 500 sectors and is released every five years, with a five-year lag time (e.g., 2002 benchmark MUTs were released in 2007). The summary set contains about 80 sectors and is released every year, with a two-year lag (e.g., 2010 summary MUTs were released in late 2011/early 2012).

The MUTs are used in the Emsi MR-SAM model to produce an industry-by-industry matrix describing all industry purchases from all industries.

BEA Gross Domestic Product by State (GSP) describes gross domestic product from the value added (also known as added income) perspective. Value added is equal to employee compensation, gross operating surplus, and taxes on production and imports, less subsidies. Each of these components is reported for each state and an aggregate group of industries. This dataset is updated once per year, with a one-year lag. The Emsi MR-SAM model makes use of this data as a control and pegs certain pieces of the model to values from this dataset.

BEA National Income and Product Accounts (NIPA) cover a wide variety of economic measures for the nation, including gross domestic product (GDP), sources of output, and distribution of income. This dataset is updated periodically throughout the year and can be between a month and several years old depending on the specific account. NIPA data are used in many of the Emsi MR-SAM processes as both controls and seeds.

BEA Local Area Income (LPI) encapsulates multiple tables with geographies down to the county level. The following two tables are specifically used: CA05 (Personal income and earnings by industry) and CA91 (Gross flow of earnings). CA91 is used when creating the commuting submodel and CA05 is used in several processes to help with place-of-work and place-of-residence differences, as well as to calculate personal income, transfers, dividends, interest, and rent.

Bureau of Labor Statistics Consumer Expenditure Survey (CEX) reports on the buying habits of consumers along with some information as to their income, consumer unit, and demographics. Emsi utilizes this data heavily in the creation of the national demographic by income type consumption on industries.

Census of Government's (CoG) state and local government finance dataset is used specifically to aid breaking out state and local data that is reported in the MUTs. This allows Emsi to have unique production functions for each of its state and local government sectors.

Census' OnTheMap (OTM) is a collection of three datasets for the census block level for multiple years. **Origin-Destination (OD)** offers job totals associated with both home census blocks and a work census block. **Residence Area Characteristics (RAC)** offers jobs totaled by home census block. **Workplace Area Characteristics (WAC)** offers jobs totaled by work census block. All three of these are used in the commuting submodel to gain better estimates of earnings by industry that may be counted as commuting. This dataset has holes for specific years and regions. These holes are filled with Census' Journey-to-Work described later.

Census' Current Population Survey (CPS) is used as the basis for the demographic breakout data of the MR-SAM model. This set is used to estimate the ratios of demographic cohorts and their income for the three different income categories (i.e., wages, property income, and transfers).

Census' Journey-to-Work (JtW) is part of the 2000 Census and describes the amount of commuting jobs between counties. This set is used to fill in the areas where OTM does not have data.

Census' American Community Survey (ACS) Public Use Microdata Sample (PUMS) is the replacement for Census' long form and is used by Emsi to fill the holes in the CPS data.

Oak Ridge National Lab (ORNL) County-to-County Distance Matrix (Skim Tree) contains a matrix of distances and network impedances between each county via various modes of transportation such as highway, railroad, water, and combined highway-rail. Also included in this set are minimum impedances utilizing the best combination of paths. The ORNL distance matrix is used in Emsi's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Emsi's MR-SAM modeling system is a comparative static model in the same general class as RIMS II (Bureau of Economic Analysis) and IMPLAN (Minnesota Implan Group). The MR-SAM model is thus not an econometric model, the primary example of which is PolicyInsight by REMI. It relies on a matrix representation of industry-to-industry purchasing patterns originally based on national data which are regionalized with the use of local data and mathematical manipulation (i.e., non-survey methods). Models of this type estimate the ripple effects of changes in jobs, earnings, or sales in one or more industries upon other industries in a region.

The Emsi MR-SAM model shows final equilibrium impacts – that is, the user enters a change that perturbs the economy and the model shows the changes required to establish a new equilibrium. As such, it is not a dynamic model that shows year-by-year changes over time (as REMI's does).

NATIONAL SAM

Following standard practice, the SAM model appears as a square matrix, with each row sum exactly equaling the corresponding column sum. Reflecting its kinship with the standard Leontief input-output framework, individual SAM elements show accounting flows between row and column sectors during a chosen base year. Read across rows, SAM entries show the flow of funds into column accounts (also known as receipts or the appropriation of funds by

those column accounts). Read down columns, SAM entries show the flow of funds into row accounts (also known as expenditures or the dispersal of funds to those row accounts).

The SAM may be broken into three different aggregation layers: broad accounts, sub-accounts, and detailed accounts. The broad layer is the most aggregate and will be covered first. Broad accounts cover between one and four sub-accounts, which in turn cover many detailed accounts. This appendix will not discuss detailed accounts directly because of their number. For example, in the industry broad account, there are two sub-accounts and over 1,000 detailed accounts.

MULTI-REGIONAL ASPECT OF THE MR-SAM

Multi-regional (MR) describes a non-survey model that has the ability to analyze the transactions and ripple effects (i.e., multipliers) of not just a single region, but multiple regions interacting with each other. Regions in this case are made up of a collection of counties.

Emsi's multi-regional model is built off of gravitational flows, assuming that the larger a county's economy, the more influence it will have on the surrounding counties' purchases and sales. The equation behind this model is essentially the same that Isaac Newton used to calculate the gravitational pull between planets and stars. In Newton's equation, the masses of both objects are multiplied, then divided by the distance separating them and multiplied by a constant. In Emsi's model, the masses are replaced with the supply of a sector for one county and the demand for that same sector from another county. The distance is replaced with an impedance value that takes into account the distance, type of roads, rail lines, and other modes of transportation. Once this is calculated for every county-to-county pair, a set of mathematical operations is performed to make sure all counties absorb the correct amount of supply from every county and the correct amount of demand from every county. These operations produce more than 200 million data points.

Components of the Emsi MR-SAM model

The Emsi MR-SAM is built from a number of different components that are gathered together to display information whenever a user selects a region. What follows is a description of each of these components and how each is created. Emsi's internally created data are used to a great extent throughout the processes described below, but its creation is not described in this appendix.

COUNTY EARNINGS DISTRIBUTION MATRIX

The county earnings distribution matrices describe the earnings spent by every industry on every occupation for a year – i.e., earnings by occupation.

The matrices are built utilizing Emsi's industry earnings, occupational average earnings, and staffing patterns.

Each matrix starts with a region's staffing pattern matrix which is multiplied by the industry jobs vector. This produces the number of occupational jobs in each industry for the region. Next, the occupational average hourly earnings per job are multiplied by 2,080 hours, which converts the average hourly earnings into a yearly estimate. Then the matrix of occupational jobs is multiplied by the occupational annual earnings per job, converting it into earnings values. Last, all earnings are adjusted to match the known industry totals. This is a fairly simple process, but one that is very important. These matrices describe the place-of-work earnings used by the MR-SAM.

COMMUTING MODEL

The commuting sub-model is an integral part of Emsi's MR-SAM model. It allows the regional and multi-regional models to know what amount of the earnings can be attributed to place-of-residence vs. place-of-work. The commuting data describe the flow of earnings from any county to any other county (including within the counties themselves). For this situation, the commuted earnings are not just a single value describing total earnings flows over a complete year, but are broken out by occupation and demographic. Breaking out the earnings allows for analysis of place-of-residence and place-of-work earnings. These data are created using Bureau of Labor Statistics' OnTheMap dataset, Census' Journey-to-Work, BEA's LPI CA91 and CA05 tables, and some of Emsi's data. The process incorporates the cleanup and disaggregation of the OnTheMap data, the estimation of a closed system of county inflows and outflows of earnings, and the creation of finalized commuting data.

NATIONAL SAM

The national SAM as described above is made up of several different components. Many of the elements discussed are filled in with values from the national Z matrix – or industry-to-industry transaction matrix. This matrix is built from BEA data that describe which industries make and use what commodities at the national level. These data are manipulated with some industry standard equations to produce the national Z matrix. The data in the Z matrix act as the basis for the majority of the data in the national SAM. The rest of the values are filled in with data from the county earnings distribution matrices, the commuting data, and the BEA's National Income and Product Accounts.

One of the major issues that affect any SAM project is the combination of data from multiple sources that may not be consistent with one another. Matrix balancing is the broad name for the techniques used to correct this problem.

Emsi uses a modification of the “diagonal similarity scaling” algorithm to balance the national SAM.

GRAVITATIONAL FLOWS MODEL

The most important piece of the Emsi MR-SAM model is the gravitational flows model that produces county-by-county regional purchasing coefficients (RPCs). RPCs estimate how much an industry purchases from other industries inside and outside of the defined region. This information is critical for calculating all IO models.

Gravity modeling starts with the creation of an impedance matrix that values the difficulty of moving a product from county to county. For each sector, an impedance matrix is created based on a set of distance impedance methods for that sector. A distance impedance method is one of the measurements reported in the Oak Ridge National Laboratory’s County-to-County Distance Matrix. In this matrix, every county-to-county relationship is accounted for in six measures: great-circle distance, highway impedance, rail miles, rail impedance, water impedance, and highway-rail-highway impedance. Next, using the impedance information, the trade flows for each industry in every county are solved for. The result is an estimate of multi-regional flows from every county to every county. These flows are divided by each respective county’s demand to produce multi-regional RPCs.

Appendix 6: Value per Credit Hour Equivalent and the Mincer Function

Two key components in the analysis are 1) the value of the students' educational achievements, and 2) the change in that value over the students' working careers. Both of these components are described in detail in this appendix.

Value per CHE

Typically, the educational achievements of students are marked by the credentials they earn. However, not all students who attended NC in the 2016-17 analysis year obtained a degree or certificate. Some returned the following year to complete their education goals, while others took a few courses and entered the workforce without graduating. As such, the only way to measure the value of the students' achievement is through their credit hour equivalents, or CHEs. This approach allows us to see the benefits to all students who attended the college, not just those who earned a credential.

To calculate the value per CHE, we first determine how many CHEs are required to complete each education level. For example, assuming that there are 30 CHEs in an academic year, a student generally completes 120 CHEs in order to move from a high school diploma to a bachelor's degree, another 60 CHEs to move from a bachelor's degree to a master's degree, and so on. This progression of CHEs generates an education ladder beginning at the less than high school level and ending with the completion of a doctoral degree, with each level of education representing a separate stage in the progression.

The second step is to assign a unique value to the CHEs in the education ladder based on the wage differentials presented in Table 1.4.⁴³ For example, the difference in regional earnings between a high school diploma and an associate degree is \$8,800. We spread this \$8,800 wage differential across the 60 CHEs that occur between a high school diploma and an associate degree, applying a ceremonial "boost" to the last CHE in the stage to mark the achievement of the degree.⁴⁴ We repeat this process for each education level in the ladder.

43 The value per CHE is different between the economic impact analysis and the investment analysis. The economic impact analysis uses the region as its background and, therefore, uses regional earnings to calculate value per CHE, while the investment analysis uses the state as its backdrop and, therefore, uses state earnings. The methodology outlined in this appendix will use regional earnings; however, the same methodology is followed for the investment analysis when state earnings are used.

44 Economic theory holds that workers that acquire education credentials send a signal to employers about their ability level. This phenomenon is commonly known as the sheepskin effect or signaling effect. The ceremonial boosts applied to the achievement of degrees in the Emsi impact model are derived from Jaeger and Page (1996).

Next we map the CHE production of the FY 2016-17 student population to the education ladder. Table 1.2 provides information on the CHE production of students attending NC, broken out by educational achievement. In total, students completed 133,925 CHEs during the analysis year. We map each of these CHEs to the education ladder depending on the students' education level and the average number of CHEs they completed during the year. For example, bachelor's degree graduates are allocated to the stage between the associate degree and the bachelor's degree, and the average number of CHEs they completed informs the shape of the distribution curve used to spread out their total CHE production within that stage of the progression.

The sum product of the CHEs earned at each step within the education ladder and their corresponding value yields the students' aggregate annual increase in income (ΔE), as shown in the following equation:

$$\Delta E = \sum_{i=1}^n e_i h_i \text{ where } i \in 1, 2, \dots, n$$

and n is the number of steps in the education ladder, e_i is the marginal earnings gain at step i , and h_i is the number of CHEs completed at step i .

Table A6.1 displays the result for the students' aggregate annual increase in income (ΔE), a total of \$17.6 million. By dividing this value by the students' total production of 133,925 CHEs during the analysis year, we derive an overall value of \$131 per CHE.

TABLE A6.1: AGGREGATE ANNUAL INCREASE IN INCOME OF STUDENTS AND VALUE PER CHE

Aggregate annual increase in income	\$17,565,533
Total credit hour equivalents (CHEs) in FY 2016-17	133,925
Value per CHE	\$131

Source: Emsi impact model.

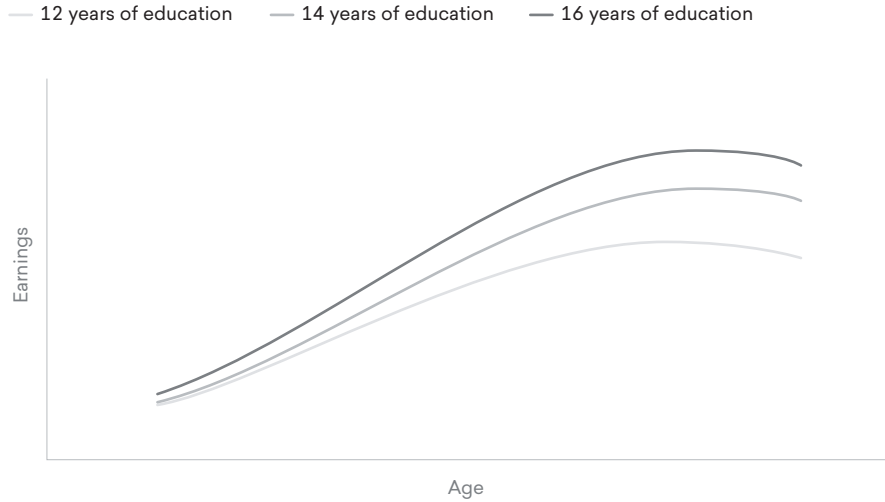
Mincer Function

The \$131 value per CHE in Table A6.1 only tells part of the story, however. Human capital theory holds that earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also shows that the earnings increment between educated and non-educated workers grows through time. These basic patterns in earnings over time were originally identified by Jacob Mincer, who viewed the lifecycle earnings distribution as a function with the key elements being earnings, years of

education, and work experience, with age serving as a proxy for experience.⁴⁵ While some have criticized Mincer’s earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Those critical of the Mincer function point to several unobserved factors such as ability, socioeconomic status, and family background that also help explain higher earnings. Failure to account for these factors results in what is known as an “ability bias.” Research by Card (1999 and 2001) suggests that the benefits estimated using Mincer’s function are biased upwards by 10% or less. As such, we reduce the estimated benefits by 10%. We use state-specific and education level-specific Mincer coefficients.

Figure A6.1 illustrates several important points about the Mincer function. First, as demonstrated by the shape of the curves, an individual’s earnings initially increase at an increasing rate, then increase at a decreasing rate, reach a maximum somewhere well after the midpoint of the working career, and then decline in later years. Second, individuals with higher levels of education reach their maximum earnings at an older age compared to individuals with lower levels of education (recall that age serves as a proxy for years of experience). And third, the benefits of education, as measured by the difference in earnings between education levels, increase with age.

FIGURE A6.1: LIFECYCLE CHANGE IN EARNINGS



In calculating the alumni impact in Chapter 2, we use the slope of the curve in Mincer’s earnings function to condition the \$131 value per CHE to the students’ age and work experience. To the students just starting their career during the analysis year, we apply a lower value per CHE; to the students in the latter half or approaching the end of their careers we apply a higher value per CHE. The

45 See Mincer (1958 and 1974).

original \$131 value per CHE applies only to the CHE production of students precisely at the midpoint of their careers during the analysis year.

In Chapter 3 we again apply the Mincer function, this time to project the benefits stream of the FY 2016-17 student population into the future. Here too the value per CHE is lower for students at the start of their career and higher near the end of it, in accordance with the scalars derived from the slope of the Mincer curve illustrated in Figure A6.1.

Appendix 7: Alternative Education Variable

In a scenario where the college did not exist, some of its students would still be able to avail themselves of an alternative comparable education. These students create benefits in the region even in the absence of the college. The alternative education variable accounts for these students and is used to discount the benefits we attribute to the college.

Recall this analysis considers only relevant economic information regarding the college. Considering the existence of various other academic institutions surrounding the college, we have to assume that a portion of the students could find alternative educations and either remain in or return to the region. For example, some students may participate in online programs while remaining in the region. Others may attend an out-of-region institution and return to the region upon completing their studies. For these students – who would have found an alternative education and produced benefits in the region regardless of the presence of the college – we discount the benefits attributed to the college. An important distinction must be made here: the benefits from students who would find alternative educations outside the region and not return to the region are *not* discounted. Because these benefits would not occur in the region without the presence of the college, they must be included.

In the absence of the college, we assume 15% of the college's students would find alternative education opportunities and remain in or return to the region. We account for this by discounting the alumni impact, the benefits to taxpayers, and the benefits to society in the region in Chapters 2 and 3 by 15%. In other words, we assume 15% of the benefits created by the college's students would have occurred anyways in the counterfactual scenario where the college did not exist. A sensitivity analysis of this adjustment is presented in Appendix 1.

Appendix 8: Overview of Investment Analysis Measures

The appendix provides context to the investment analysis results using the simple hypothetical example summarized in Table A8.1 below. The table shows the projected benefits and costs for a single student over time and associated investment analysis results.⁴⁶

TABLE A8.1: EXAMPLE OF THE BENEFITS AND COSTS OF EDUCATION FOR A SINGLE STUDENT

1	2	3	4	5	6
Year	Tuition	Opportunity cost	Total cost	Higher earnings	Net cash flow
1	\$1,500	\$20,000	\$21,500	\$0	-\$21,500
2	\$0	\$0	\$0	\$5,000	\$5,000
3	\$0	\$0	\$0	\$5,000	\$5,000
4	\$0	\$0	\$0	\$5,000	\$5,000
5	\$0	\$0	\$0	\$5,000	\$5,000
6	\$0	\$0	\$0	\$5,000	\$5,000
7	\$0	\$0	\$0	\$5,000	\$5,000
8	\$0	\$0	\$0	\$5,000	\$5,000
9	\$0	\$0	\$0	\$5,000	\$5,000
10	\$0	\$0	\$0	\$5,000	\$5,000
Net present value			\$21,500	\$35,753	\$14,253

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
18.0%	1.7	4.2

Assumptions are as follows:

- Benefits and costs are projected out 10 years into the future (Column 1).
- The student attends the college for one year, and the cost of tuition is \$1,500 (Column 2).
- Earnings foregone while attending the college for one year (opportunity cost) come to \$20,000 (Column 3).

⁴⁶ Note that this is a hypothetical example. The numbers used are not based on data collected from an existing college.

- Together, tuition and earnings foregone cost sum to \$21,500. This represents the out-of-pocket investment made by the student (Column 4).
- In return, the student earns \$5,000 more per year than he otherwise would have earned without the education (Column 5).
- The net cash flow (NCF) in Column 6 shows higher earnings (Column 5) less the total cost (Column 4).
- The assumed going rate of interest is 4%, the rate of return from alternative investment schemes for the use of the \$21,500.

Results are expressed in standard investment analysis terms, which are as follows: the net present value, the internal rate of return, the benefit-cost ratio, and the payback period. Each of these is briefly explained below in the context of the cash flow numbers presented in Table A8.1.

Net present value

The student in Table A8.1 can choose either to attend college or to forego post-secondary education and maintain his present employment. If he decides to enroll, certain economic implications unfold. Tuition and fees must be paid, and earnings will cease for one year. In exchange, the student calculates that with post-secondary education, his earnings will increase by at least the \$5,000 per year, as indicated in the table.

The question is simple: Will the prospective student be economically better off by choosing to enroll? If he adds up higher earnings of \$5,000 per year for the remaining nine years in Table A8.1, the total will be \$45,000. Compared to a total investment of \$21,500, this appears to be a very solid investment. The reality, however, is different. Benefits are far lower than \$45,000 because future money is worth less than present money. Costs (tuition plus earnings foregone) are felt immediately because they are incurred today, in the present. Benefits, on the other hand, occur in the future. They are not yet available. All future benefits must be discounted by the going rate of interest (referred to as the discount rate) to be able to express them in present value terms.⁴⁷

Let us take a brief example. At 4%, the present value of \$5,000 to be received one year from today is \$4,807. If the \$5,000 were to be received in year 10, the present value would reduce to \$3,377. Put another way, \$4,807 deposited in the bank today earning 4% interest will grow to \$5,000 in one year; and \$3,377 deposited today would grow to \$5,000 in 10 years. An “economically rational” person would, therefore, be equally satisfied receiving \$3,377 today or \$5,000

⁴⁷ Technically, the interest rate is applied to compounding – the process of looking at deposits today and determining how much they will be worth in the future. The same interest rate is called a discount rate when the process is reversed – determining the present value of future earnings.

10 years from today given the going rate of interest of 4%. The process of discounting – finding the present value of future higher earnings – allows the model to express values on an equal basis in future or present value terms.

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today (in this example, tuition plus earnings foregone). As indicated in Table A8.1 the cumulative present value of \$5,000 worth of higher earnings between years 2 and 10 is \$35,753 given the 4% interest rate, far lower than the undiscounted \$45,000 discussed above.

The net present value of the investment is \$14,253. This is simply the present value of the benefits less the present value of the costs, or $\$35,753 - \$21,500 = \$14,253$. In other words, the present value of benefits exceeds the present value of costs by as much as \$14,253. The criterion for an economically worthwhile investment is that the net present value is equal to or greater than zero. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment in education is very strong.

Internal rate of return

The internal rate of return is another way of measuring the worth of investing in education using the same cash flows shown in Table A8.1. In technical terms, the internal rate of return is a measure of the average earning power of money used over the life of the investment. It is simply the interest rate that makes the net present value equal to zero. In the discussion of the net present value above, the model applies the going rate of interest of 4% and computes a positive net present value of \$14,253. The question now is what the interest rate would have to be in order to reduce the net present value to zero. Obviously it would have to be higher – 18.0% in fact, as indicated in Table A8.1. Or, if a discount rate of 18.0% were applied to the net present value calculations instead of the 4%, then the net present value would reduce to zero.

What does this mean? The internal rate of return of 18.0% defines a breakeven solution – the point where the present value of benefits just equals the present value of costs, or where the net present value equals zero. Or, at 18.0%, higher earnings of \$5,000 per year for the next nine years will earn back all investments of \$21,500 made plus pay 18.0% for the use of that money (\$21,500) in the meantime. Is this a good return? Indeed, it is. If it is compared to the 4% going rate of interest applied to the net present value calculations, 18.0% is far higher than 4%. It may be concluded, therefore, that the investment in this case is solid. Alternatively, comparing the 18.0% rate of return to the long-term 10% rate or so obtained from investments in stocks and bonds also indicates that the investment in education is strong relative to the stock market returns (on average).

Benefit-cost ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or $\$35,753 \div \$21,500 = 1.7$ (based on the 4% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 18.0% internal rate of return discussed above would reduce the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than the 18.0% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 1.7 ratio means that a dollar invested today will return a cumulative \$1.70 over the ten-year time period.

Payback period

This is the length of time from the beginning of the investment (consisting of tuition and earnings foregone) until higher future earnings give a return on the investment made. For the student in Table A8.1, it will take roughly 4.2 years of \$5,000 worth of higher earnings to recapture his investment of \$1,500 in tuition and the \$20,000 in earnings foregone while attending the college. Higher earnings that occur beyond 4.2 years are the returns that make the investment in education in this example economically worthwhile. The payback period is a fairly rough, albeit common, means of choosing between investments. The shorter the payback period, the stronger the investment.

Appendix 9: Shutdown Point

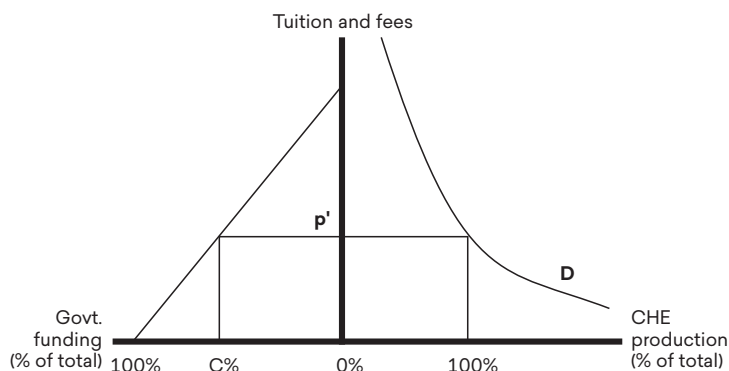
The investment analysis in Chapter 3 weighs the benefits generated by the college against the state and local taxpayer funding that the college receives to support its operations. An important part of this analysis is factoring out the benefits that the college would have been able to generate anyway, even without state and local taxpayer support. This adjustment is used to establish a direct link between what taxpayers pay and what they receive in return. If the college is able to generate benefits without taxpayer support, then it would not be a true investment.⁴⁸

The overall approach includes a sub-model that simulates the effect on student enrollment if the college loses its state and local funding and has to raise student tuition and fees in order to stay open. If the college can still operate without state and local support, then any benefits it generates at that level are discounted from total benefit estimates. If the simulation indicates that the college cannot stay open, however, then benefits are directly linked to costs, and no discounting applies. This appendix documents the underlying theory behind these adjustments.

State and local government support versus student demand for education

Figure A9.1 presents a simple model of student demand and state and local government support. The right side of the graph is a standard demand curve (*D*) showing student enrollment as a function of student tuition and fees. Enrollment

FIGURE A9.1: STUDENT DEMAND AND GOVERNMENT FUNDING BY TUITION AND FEES

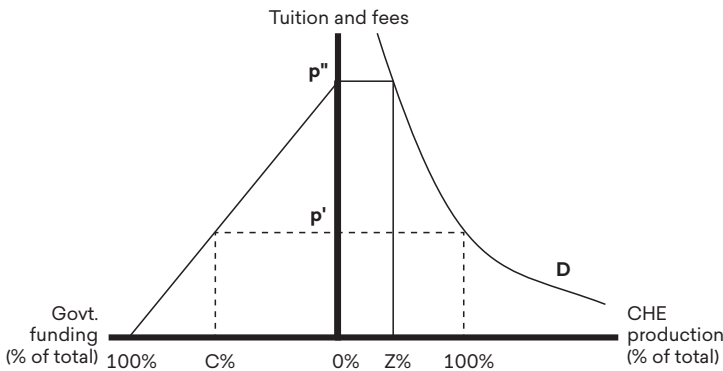


48 Of course, as a public training provider, the college would not be permitted to continue without public funding, so the situation in which it would lose all state support is entirely hypothetical. The purpose of the adjustment factor is to examine the college in standard investment analysis terms by netting out any benefits it may be able to generate that are not directly linked to the costs of supporting it.

is measured in terms of total credit hour equivalents (CHEs) and expressed as a percentage of the college's current CHE production. Current student tuition and fees are represented by p' , and state and local government support covers $C\%$ of all costs. At this point in the analysis, it is assumed that the college has only two sources of revenues: 1) student tuition and fees and 2) state and local government support.

Figure A9.2 shows another important reference point in the model – where state and local government support is 0% , student tuition and fees are increased to p'' , and CHE production is at $Z\%$ (less than 100%). The reduction in CHEs reflects the price elasticity of the students' demand for education, *i.e.*, the extent to which the students' decision to attend the college is affected by the change in tuition and fees. Ignoring for the moment those issues concerning the college's minimum operating scale (considered below in the section called "Calculating benefits at the shutdown point"), the implication for the investment analysis is that benefits to state and local government must be adjusted to net out the benefits that the college can provide absent state and local government support, represented as $Z\%$ of the college's current CHE production in Figure A9.2.

FIGURE A9.2: CHE PRODUCTION AND GOVERNMENT FUNDING BY TUITION AND FEES



To clarify the argument, it is useful to consider the role of enrollment in the larger benefit-cost model. Let B equal the benefits attributable to state and local government support. The analysis derives all benefits as a function of student enrollment, measured in terms of CHEs produced. For consistency with the graphs in this appendix, B is expressed as a function of the percent of the college's current CHE production. Equation 1 is thus as follows:

$$1) B = B(100\%)$$

This reflects the total benefits generated by enrollments at their current levels.

Consider benefits now with reference to Z. The point at which state and local government support is zero nonetheless provides for Z% (less than 100%) of the current enrollment, and benefits are symbolically indicated by the following equation:

$$2) B = B(Z\%)$$

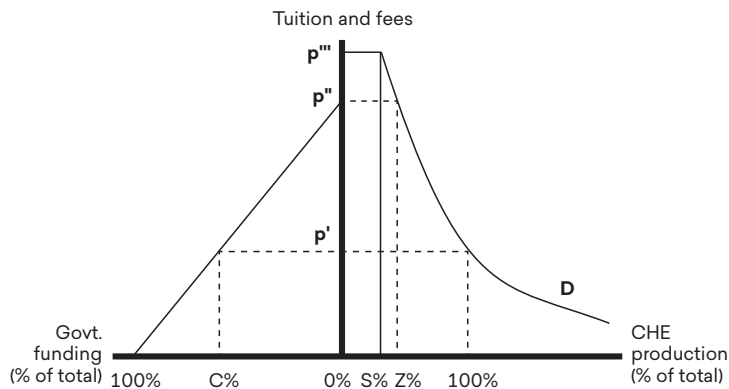
Inasmuch as the benefits in equation 2 occur with or without state and local government support, the benefits appropriately attributed to state and local government support are given by equation 3 as follows:

$$3) B = B(100\%) - B(Z\%)$$

Calculating benefits at the shutdown point

Colleges and universities cease to operate when the revenue they receive from the quantity of education demanded is insufficient to justify their continued operations. This is commonly known in economics as the shutdown point.⁴⁹ The shutdown point is introduced graphically in Figure A9.3 as S%. The location of point S% indicates that the college can operate at an even lower enrollment level than Z% (the point at which the college receives zero state and local government funding). State and local government support at point S% is still zero, and student tuition and fees have been raised to p'''. State and local government support is thus credited with the benefits given by equation 3, or $B = B(100\%) - B(Z\%)$. With student tuition and fees still higher than p'', the college would no longer be able to attract enough students to keep the doors open, and it would shut down.

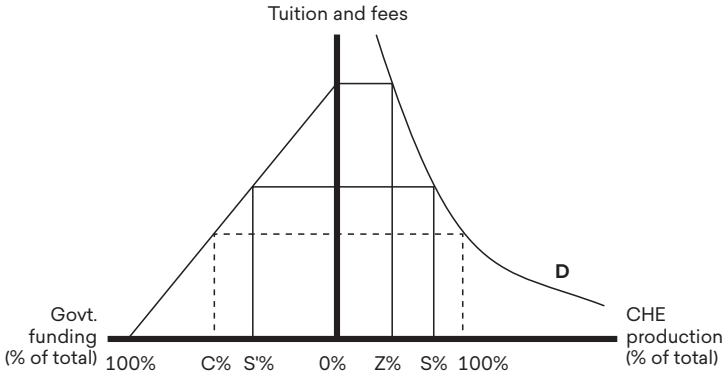
FIGURE A9.3: SHUTDOWN POINT AFTER ZERO GOVERNMENT FUNDING



49 In the traditional sense, the shutdown point applies to firms seeking to maximize profits and minimize losses. Although profit maximization is not the primary aim of colleges and universities, the principle remains the same, *i.e.*, that there is a minimum scale of operation required in order for colleges and universities to stay open.

Figure A9.4 illustrates yet another scenario. Here, the shutdown point occurs at a level of CHE production greater than Z% (the level of zero state and local government support), meaning some minimum level of state and local government support is needed for the college to operate at all. This minimum portion of overall funding is indicated by S% on the left side of the chart, and as before, the shutdown point is indicated by S% on the right side of chart. In this case, state and local government support is appropriately credited with all the benefits generated by the college's CHE production, or $B = B(100\%)$.

FIGURE A9.4: SHUTDOWN POINT BEFORE ZERO GOVERNMENT FUNDING



Appendix 10: Social Externalities

Education has a predictable and positive effect on a diverse array of social benefits. These, when quantified in dollar terms, represent significant social savings that directly benefit society communities and citizens throughout the region, including taxpayers. In this appendix we discuss the following three main benefit categories: 1) improved health, 2) reductions in crime, and 3) reduced demand for government-funded income assistance.

It is important to note that the data and estimates presented here should not be viewed as exact, but rather as indicative of the positive impacts of education on an individual's quality of life. The process of quantifying these impacts requires a number of assumptions to be made, creating a level of uncertainty that should be borne in mind when reviewing the results.

Health

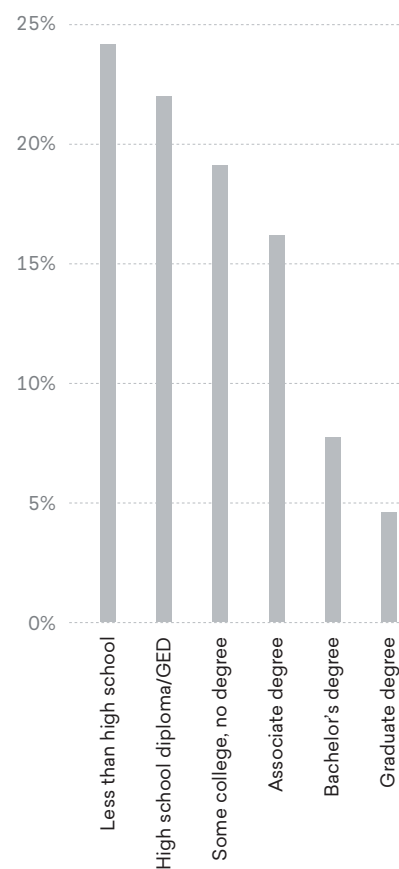
Statistics show a correlation between increased education and improved health. The manifestations of this are found in five health-related variables: smoking, alcohol dependence, obesity, depression, and drug abuse. There are other health-related areas that link to educational attainment, but these are omitted from the analysis until we can invoke adequate (and mutually exclusive) databases and are able to fully develop the functional relationships between them.

SMOKING

Despite a marked decline over the last several decades in the percentage of U.S. residents who smoke, a sizeable percentage of the U.S. population still smokes. The negative health effects of smoking are well documented in the literature, which identifies smoking as one of the most serious health issues in the U.S.

Figure A10.1 shows the prevalence of cigarette smoking among adults, 25 years and over, based on data provided by the National Health Interview Survey.⁵⁰ The data include adults who reported smoking more than 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. As indicated, the percent of who smoke begins to decline beyond the level of high school education.

FIGURE A10.1: PREVALENCE OF SMOKING AMONG U.S. ADULTS BY EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

50 Centers for Disease Control and Prevention. "Table. Characteristics of current adult cigarette smokers," National Health Interview Survey, United States, 2016.

The Centers for Disease Control and Prevention (CDC) reports the percentage of adults who are current smokers by state.⁵¹ We use this information to create an index value by which we adjust the national prevalence data on smoking to each state. For example, 11.0% of California adults were smokers in 2016, relative to 15.5% for the nation. We thus apply a scalar of 0.71 to the national probabilities of smoking in order to adjust them to the state of California.

ALCOHOL DEPENDENCE

Although alcohol dependence has large public and private costs, it is difficult to measure and define. There are many patterns of drinking, ranging from abstinence to heavy drinking. Alcohol abuse is riddled with social costs, including health care expenditures for treatment, prevention, and support; workplace losses due to reduced worker productivity; and other effects.

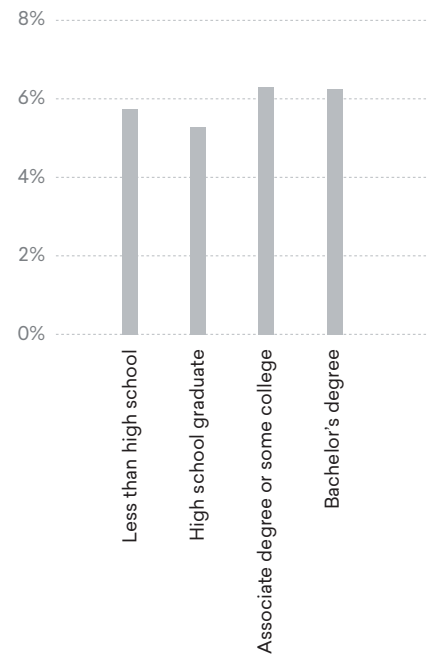
Figure A10.2 compares the percentage of adults, 18 and older, that abuse or depend on alcohol by education level, based on data from the Substance Abuse and Mental Health Services Administration (SAMHSA).⁵² These statistics give an indication of the correlation between education and the reduced probability of alcohol dependence. Adults with an associate degree or some college have higher rates of alcohol dependence than adults with a high school diploma or lower. Prevalence rates are lower for adults with a bachelor's degree or higher than those with an associate degree or some college. Although the data do not maintain a pattern of decreased alcohol dependence at every level of increased education, we include these rates in our model to ensure we provide a comprehensive view of the social benefits and costs correlated with education.

OBESITY

The rise in obesity and diet-related chronic diseases has led to increased attention on how expenditures relating to obesity have increased in recent years. The average cost of obesity-related medical conditions is calculated using information from the *Journal of Occupational and Environmental Medicine*, which reports incremental medical expenditures and productivity losses due to excess weight.⁵³

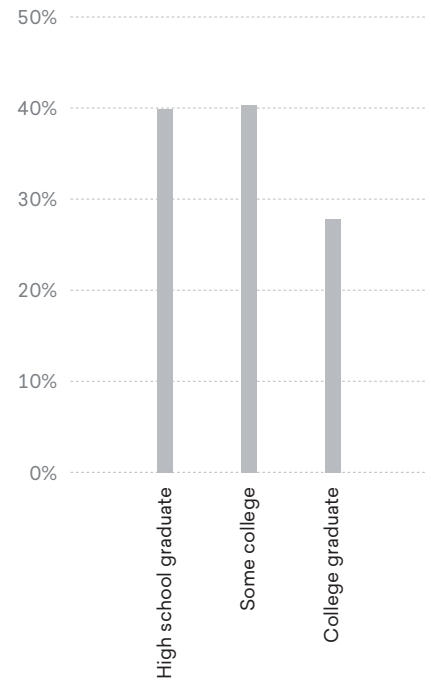
Data for Figure A10.3 is derived from the National Center for Health Statistics which shows the prevalence of obesity among adults aged 20 years and over

FIGURE A10.2: PREVALENCE OF ALCOHOL DEPENDENCE OR ABUSE BY SEX AND EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

FIGURE A10.3: PREVALENCE OF OBESITY BY EDUCATION LEVEL



Source: Derived from data provided by the National Center for Health Statistics.

51 Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data*, 2016.

52 Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016.

53 Eric A. Finkelstein, Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale, "The Costs of Obesity in the Workplace," *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

by education, gender, and ethnicity.⁵⁴ As indicated, college graduates are less likely to be obese than individuals with a high school diploma. However, the prevalence of obesity among adults with some college is actually greater than those with just a high school diploma. In general, though, obesity tends to decline with increasing levels of education.

DEPRESSION

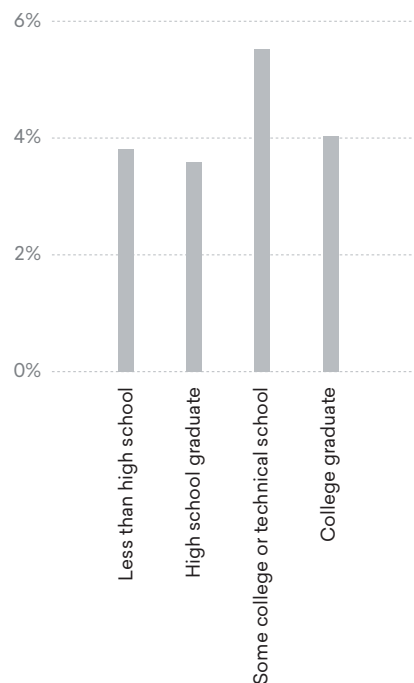
Capturing the full economic cost of mental illness is difficult because not all mental disorders have a correlation with education. For this reason, we only examine the economic costs associated with major depressive disorder (MDD), which are comprised of medical and pharmaceutical costs, workplace costs such as absenteeism, and suicide-related costs.⁵⁵

Figure A10.4 summarizes the prevalence of MDD among adults by education level, based on data provided by the CDC.⁵⁶ As shown, people with some college are most likely to have MDD compared to those with other levels of educational attainment. People with a high school diploma or less, along with college graduates, are all fairly similar in the prevalence rates.

DRUG ABUSE

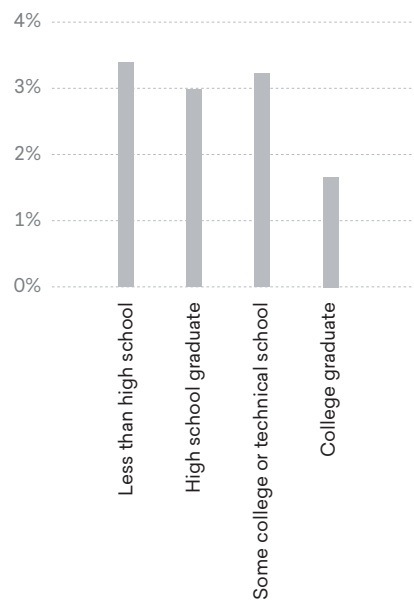
The burden and cost of illicit drug abuse is enormous in the U.S., but little is known about the magnitude of costs and effects at a national level. What is known is that the rate of people abusing drugs is inversely proportional to their education level. The higher the education level, the less likely a person is to abuse or depend on illicit drugs. The probability that a person with less than a high school diploma will abuse drugs is 3.4%, twice as large as the probability of drug abuse for college graduates (1.7%). This relationship is presented in Figure A10.5 based on data supplied by SAMHSA.⁵⁷ Similar to alcohol abuse, prevalence does not strictly decline at every education level. Health costs associated with illegal drug use are also available from SAMSHA, with costs to state and local government representing 40% of the total cost related to illegal drug use.⁵⁸

FIGURE A10.4: PREVALENCE OF MAJOR DEPRESSIVE EPISODE BY EDUCATION LEVEL



Source: National Survey on Drug Use and Health.

FIGURE A10.5: PREVALENCE OF ILLICIT DRUG DEPENDENCE OR ABUSE BY EDUCATION LEVEL



Source: Substance Abuse and Mental Health Services Administration.

54 Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017).

55 Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" Journal of Clinical Psychiatry 76:2, 2015.

56 National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016."

57 Substance Abuse and Mental Health Services Administration, National Survey on Drug Use and Health, 2010 and 2011.

58 Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.

Crime

As people achieve higher education levels, they are statistically less likely to commit crimes. The analysis identifies the following three types of crime-related expenses: 1) criminal justice expenditures, including police protection, judicial and legal, and corrections, 2) victim costs, and 3) productivity lost as a result of time spent in jail or prison rather than working.

Figure A10.6 displays the educational attainment of the incarcerated population in the U.S. Data are derived from the breakdown of the inmate population by education level in federal, state, and local prisons as provided by the U.S. Census Bureau.⁵⁹

Victim costs comprise material, medical, physical, and emotional losses suffered by crime victims. Some of these costs are hidden, while others are available in various databases. Estimates of victim costs vary widely, attributable to differences in how the costs are measured. The lower end of the scale includes only tangible out-of-pocket costs, while the higher end includes intangible costs related to pain and suffering.⁶⁰

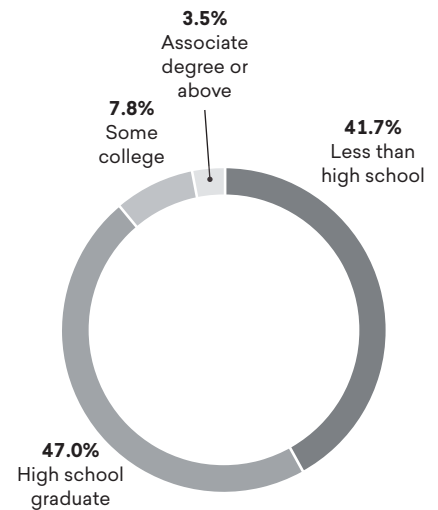
Yet another measurable cost is the economic productivity of people who are incarcerated and are thus not employed. The measurable productivity cost is simply the number of additional incarcerated people, who could have been in the labor force, multiplied by the average income of their corresponding education levels.

Income Assistance

Statistics show that as education levels increase, the number of applicants for government-funded income assistance such as welfare and unemployment benefits declines. Welfare and unemployment claimants can receive assistance from a variety of different sources, including Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), and unemployment insurance.⁶¹

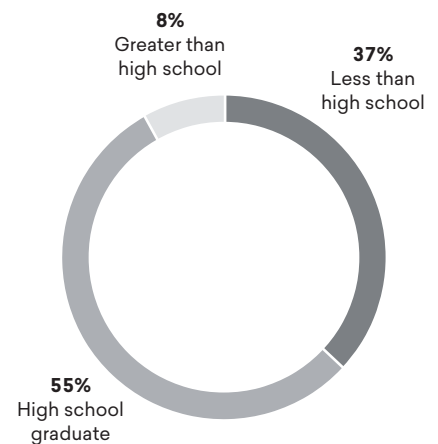
Figure A10.7 relates the breakdown of TANF recipients by education level, derived from data provided by the U.S. Department of Health and Human Services.⁶² As shown, the demographic characteristics of TANF recipients are

FIGURE A10.6: EDUCATIONAL ATTAINMENT OF THE INCARCERATED POPULATION



Source: Derived from data provided by the U.S. Census Bureau.

FIGURE A10.7: BREAKDOWN OF TANF RECIPIENTS BY EDUCATION LEVEL



Source: U.S. Department of Health and Human Services, Office of Family Assistance.

59 U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011.

60 McCollister, Kathryn E., Michael T. French, and Hai Fang. "The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation." *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109.

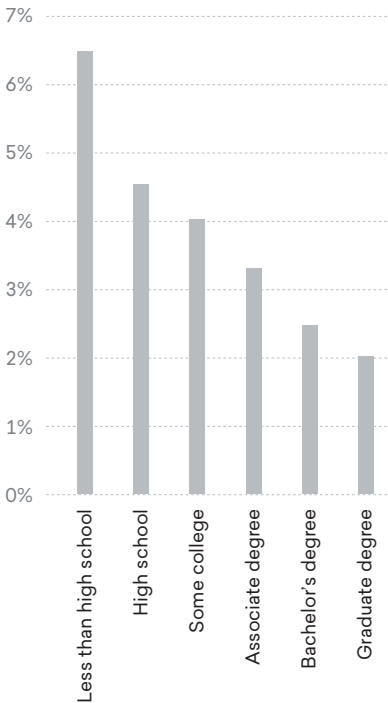
61 Medicaid is not considered in this analysis because it overlaps with the medical expenses in the analyses for smoking, alcohol dependence, obesity, depression, and drug abuse. We also exclude any welfare benefits associated with disability and age.

62 U.S. Department of Health and Human Services, Office of Family Assistance. "Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016."

weighted heavily towards the less than high school and high school categories, with a much smaller representation of individuals with greater than a high school education.

Unemployment rates also decline with increasing levels of education, as illustrated in Figure A10.8. These data are provided by the Bureau of Labor Statistics.⁶³ As shown, unemployment rates range from 6.5% for those with less than a high school diploma to 2.0% for those at the graduate degree level or higher.

FIGURE A10.8: UNEMPLOYMENT BY EDUCATION LEVEL



Source: Bureau of Labor Statistics.

63 Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017.



The Economic Value of Norco College

FACT SHEET

NORCO College (NC) creates a significant positive impact on the business community and generates a return on investment to its major stakeholder groups—students, taxpayers, and society. Using a two-pronged approach that involves an economic impact analysis and an investment analysis, this study calculates the benefits received by each of these groups. Results of the analysis reflect fiscal year (FY) 2016-17.

Economic impact analysis

In FY 2016-17, NC added **\$160.1 million** in income to the NC Service Area¹ economy, a value approximately equal to **0.4%** of the region's total gross regional product (GRP). Expressed in terms of jobs, NC's impact supported **2,287** regional jobs.

OPERATIONS SPENDING IMPACT

- NC employed 422 full-time and part-time faculty and staff. Payroll amounted to \$36.2 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. The college spent another \$27.3 million on day-to-day expenses related to facilities, supplies, and professional services.
- The net impact of the college's operations spending in FY 2016-17 added **\$42.7 million** in income to the regional economy.

STUDENT SPENDING IMPACT

- Some in-region students would have left the NC Service Area for other educational opportunities if not for NC. These students spent money on groceries, mortgage and rent payments, and so on at regional businesses.
- The expenditures of retained students in FY 2016-17 added **\$13.4 million** in income to the NC Service Area economy.

IMPACTS CREATED BY NC
IN FY 2016-17



¹ For the purposes of this analysis, the NC Service Area consists of 18 ZIP codes primarily located in the northwest portion of Riverside County in California.

ALUMNI IMPACT

- Over the years, students have studied at NC and entered or re-entered the workforce with newly-acquired knowledge and skills. Today, thousands of these former students are employed in the NC Service Area.
- The net impact of NC's former students currently employed in the regional workforce amounted to **\$104 million** in added income in FY 2016-17.



Investment analysis

STUDENT PERSPECTIVE

- NC's FY 2016-17 students paid a present value of **\$13 million** to cover the cost of tuition, fees, supplies, and interest on student loans. They also forwent **\$25.2 million** in money that they would have earned had they been working instead of attending college.
- In return for their investment, students will receive **\$271.1 million** in increased earnings over their working lives. This translates to a return of **\$7.10** in higher future earnings for every dollar students invest in their education. Students' average annual rate of return is **21.5%**.

TAXPAYER PERSPECTIVE

- Taxpayers provided NC with **\$48 million** of funding in FY 2016-17. In return, they will benefit from added tax revenue, stemming from students' higher lifetime earnings and increased business output, amounting to **\$111.9 million**. A reduced demand for government-funded services in California will add another **\$15.7 million** in benefits to taxpayers.
- For every dollar of public money invested in NC, taxpayers will receive **\$2.70** in return, over the course of students' working lives. The average annual rate of return for taxpayers is **6.3%**.

SOCIAL PERSPECTIVE

- In FY 2016-17, California invested **\$105.3 million** to fully support NC. In turn, the California economy will grow by **\$1.6 billion**, over the course of students' working lives. Society will also benefit from **\$20.8 million** of public and private sector savings.
- For every dollar invested in NC educations in FY 2016-17, people in California will receive **\$15.60** in return, for as long as NC's FY 2016-17 students remain active in the state workforce.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN NC



21.5%

Average annual return for NC students



10.1%

Stock market 30-year average annual return



0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.



FOR EVERY \$1...



Students gain

\$7.10

in lifetime earnings



Taxpayers gain

\$2.70

in added tax revenue and public sector savings



Society gains

\$15.60

in added state revenue and social savings





The economic value of Riverside City College

ANALYSIS OF THE ECONOMIC IMPACT
AND RETURN ON INVESTMENT OF EDUCATION

Emsi & Community Colleges

15+ years working with higher education institutions

1,800+ economic impact studies completed

1.2M students used Emsi's career pathways tool last year

9 of 10 2019 Aspen Prize finalists are Emsi customers



What is an
ECONOMIC IMPACT ANALYSIS?

Measures how an event or institution affects the local economy

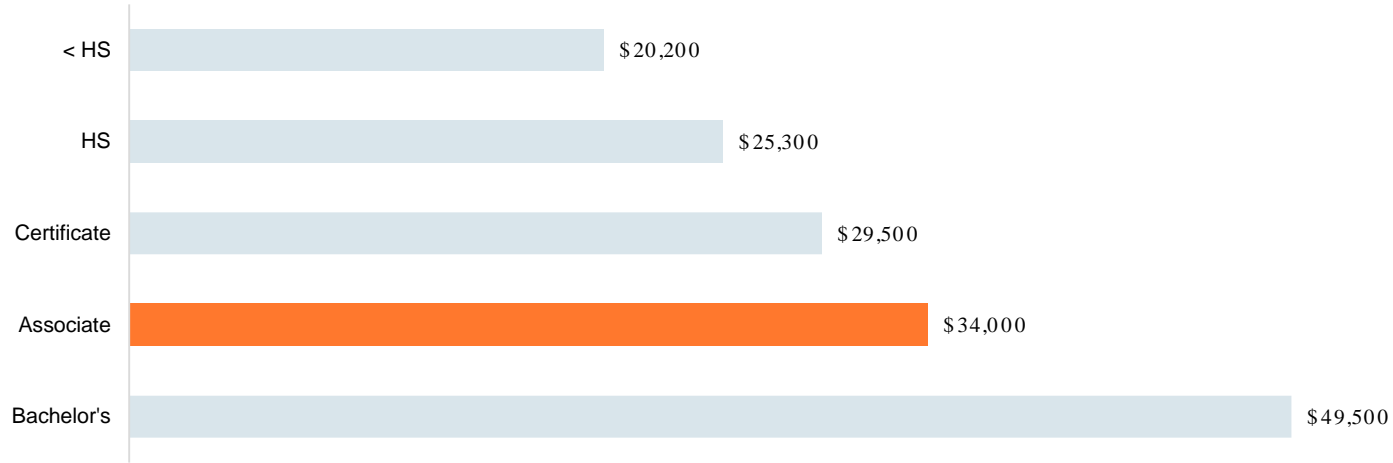


What is an
INVESTMENT ANALYSIS?

A comparison of the costs and benefits to determine the return on investment

About the RCC Service Area

AVERAGE EARNINGS BY EDUCATION LEVEL

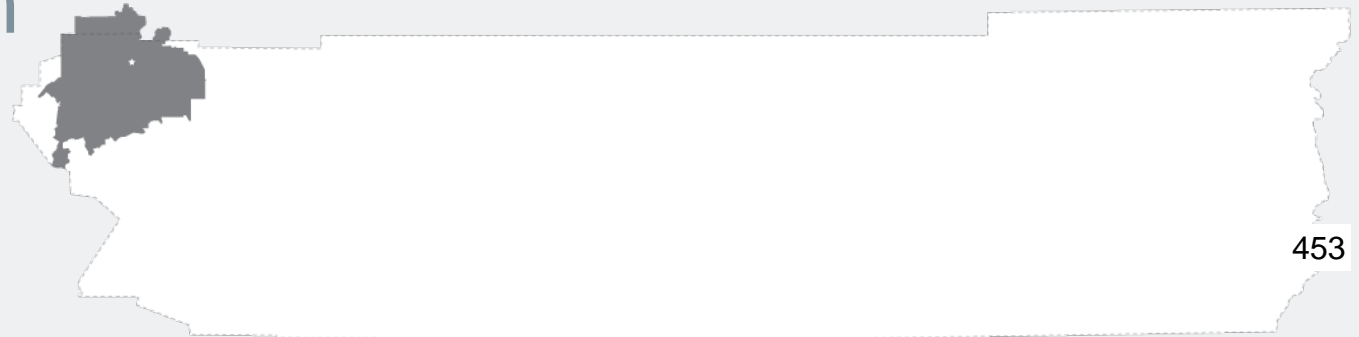


\$34.3 billion

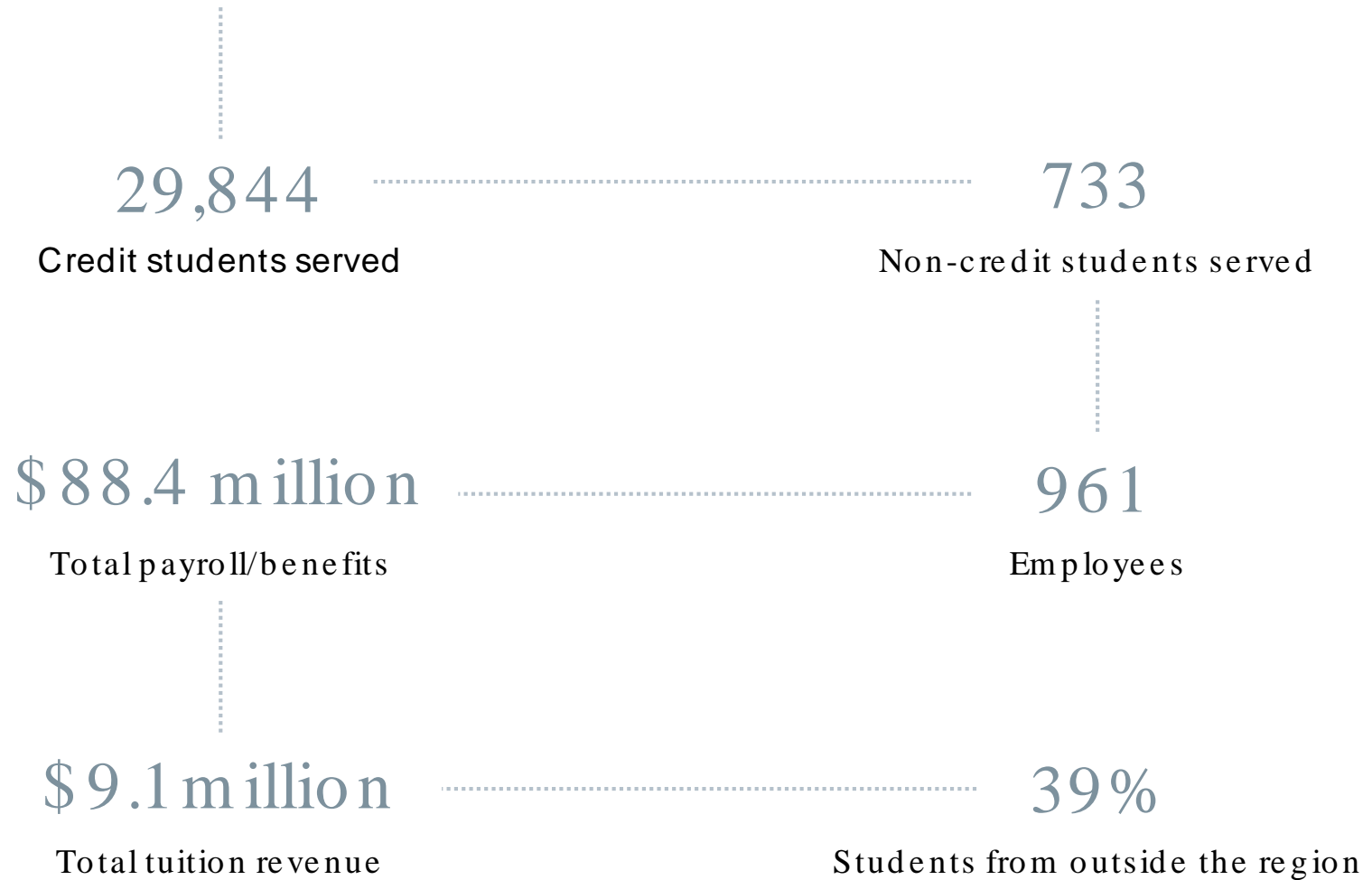
Total Gross Regional Product (GRP)

423,749

Total Jobs



RCC in FY 20 16-17



Overview of results



\$356.8 million

Total income added to the region

1.0%

Of region's GRP

5,484

Total jobs supported in the region



6.4

Benefit-cost ratio for students

2.2

Benefit-cost ratio for taxpayers

13.1

Benefit-cost ratio for society



ECONOMIC IMPACT ANALYSIS



Operations Spending Impact

*College payroll and
other spending + ripple effects*

\$ 103.3 million

Added regional income

OR

1,187

Jobs supported in the region



Student Spending Impact

*Retained student
spending + ripple effects*

\$ 12.3 million

Added regional income

OR

251

Jobs supported in the region



Alumni Impact

*Higher alumni earnings and increased
business profit + ripple effects*

\$ 241.2 million

Added regional income

OR

4,046

Jobs supported in the region
456



ECONOMIC IMPACT ANALYSIS

Total Impact

\$356.8 million

Total income added
in the region

OR

1.0%

Of region's GRP

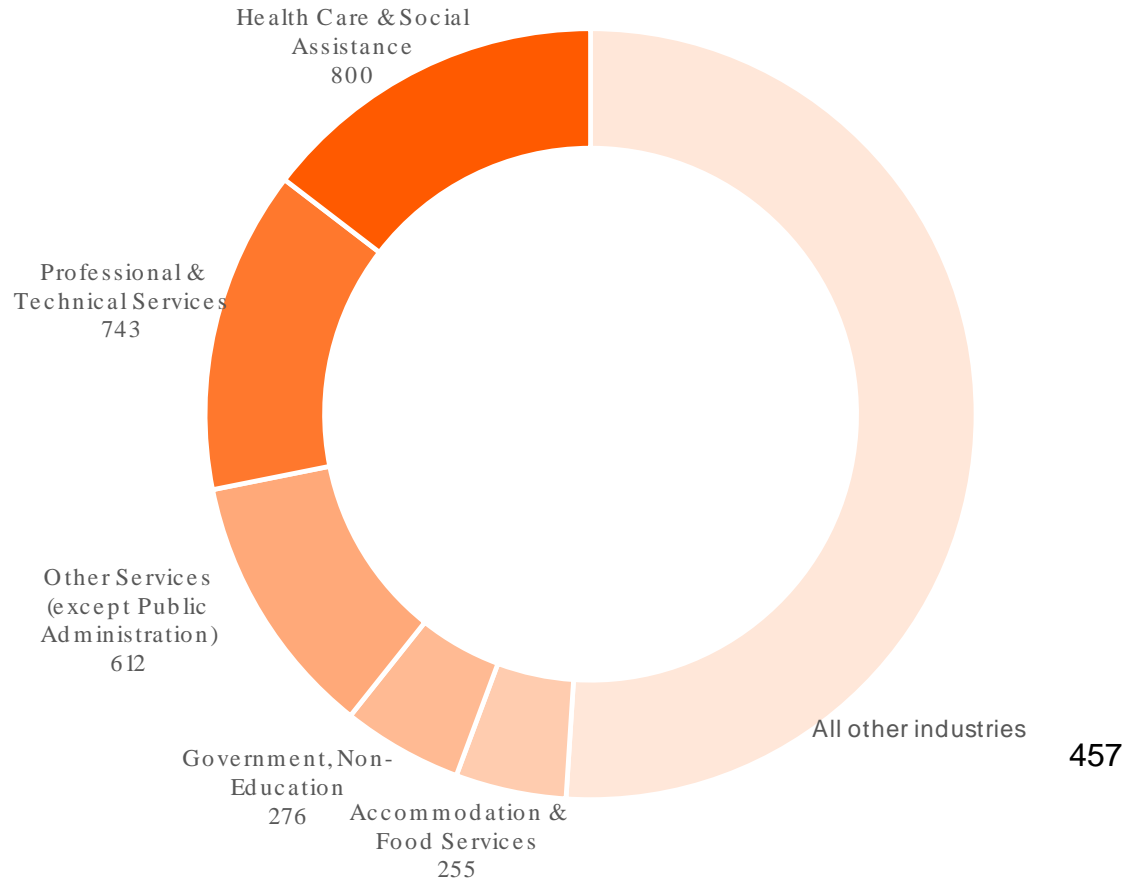
5,484

Total jobs supported
in the region

OR

1 out of **77** jobs in the
region

Top industries impacted by RCC (jobs supported)





INVESTMENT ANALYSIS



Student Perspective

\$539.5 million

Benefit: Higher future earnings

\$84 million

Cost: Tuition, supplies, opportunity cost

6.4

Benefit/cost ratio

20.7%

Rate of return



Taxpayer Perspective

\$244.2 million

Benefit: Future tax revenue, government savings

\$110.5 million

Cost: State and local funding

2.2

Benefit/cost ratio

5.2%

Rate of return



Social Perspective

\$3 billion

Benefit: Future earnings, tax revenue, private savings

\$231.6 million

Cost: All college and student costs

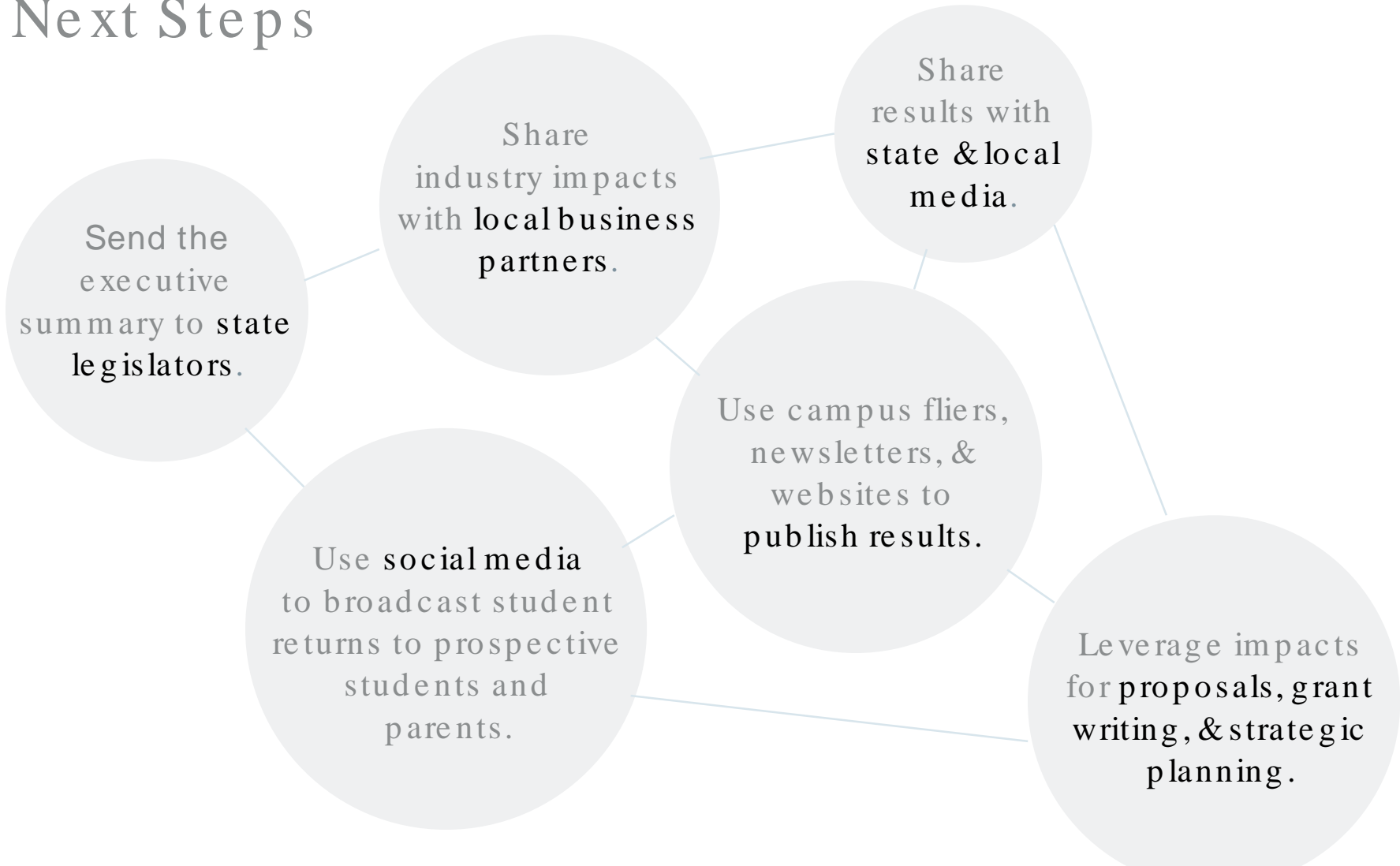
13.1

Benefit/cost ratio

n/a

Rate of return

Next Steps



**HOW CAN
EMSI HELP?**

Emsi's press
packet

Ongoing presentations
from your Emsi economist

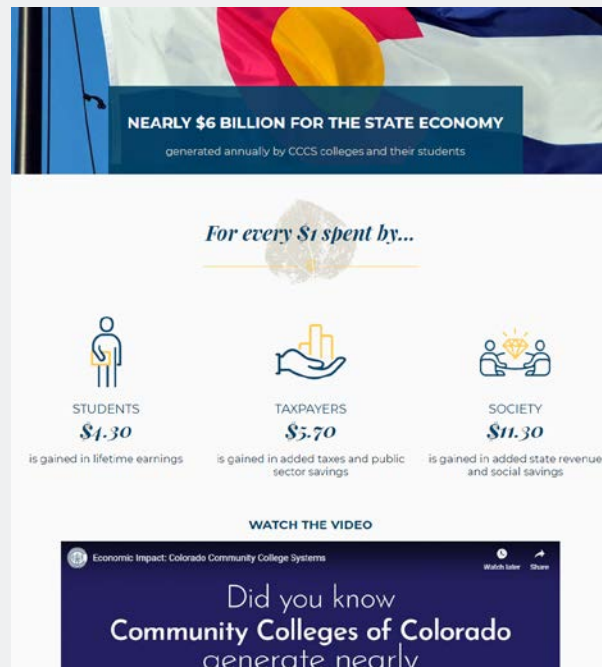
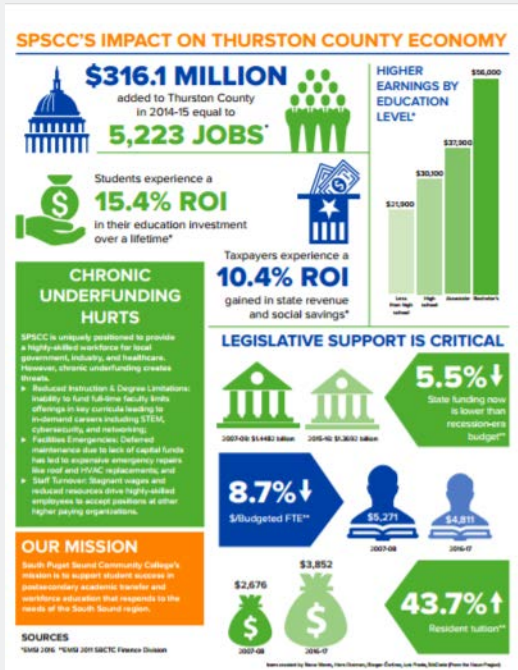
Email/call
us anytime

Share your results

Combine your results with other institutional highlights to create a fact sheet.

Create a web page that includes written highlights, animations, and videos.

Include your results in your periodic publications.



ADVANCE
South Puget Sound Community College • Winter 2017

Special Issue:
The **\$316.1 Million Economic Impact** of SPSCC on Thurston County

The skills you need for the life you want

Winter Classes Begin
Jan. 3, 2017

South Puget Sound COMMUNITY COLLEGE

460
spsc.edu

Share your results

Create a press release or hold a press conference to share results with your state and local media.

GRCC @grcc Follow

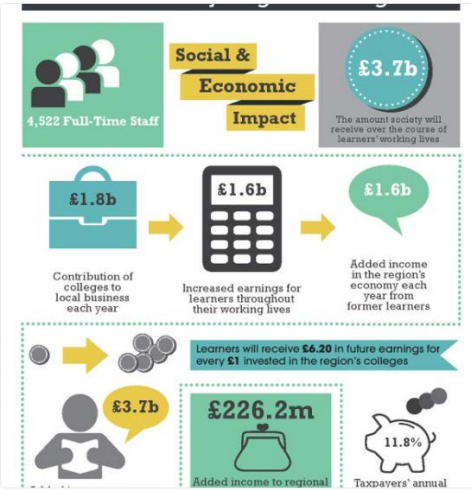
Students, employers tell how @grcc noncredit workforce programs change lives and build a talented workforce to fill great jobs. New study shows the economic impact of such programs is hundreds of millions of dollars on West MI economy grcc.edu/communications ...



1:58 PM - 13 Nov 2018

Use social media to share your investment results with prospective students.

Did you know that learners will receive £6.20 in future earnings for every £1 invested in the region's colleges?



4,522 Full-Time Staff

Social & Economic Impact

£3.7b The amount society will receive over the course of learners' working lives

£1.8b Contribution of colleges to local business each year

£1.6b Increased earnings for learners throughout their working lives

£1.6b Added income in the region's economy each year from former learners

Learners will receive **£6.20** in future earnings for every **£1** invested in the region's colleges

£3.7b

£226.2m Added income to regional

11.8% Taxpayers' annual

RETWEETS 5

Use your study to help secure additional funding.

Emsi's Capital Analysis Justifies Funding for New UT Martin STEM Facility

OCTOBER 24, 2016 BY MATTHEW HYNDMAN

Summary:

In a time of serious need, the University of Tennessee at Martin (UT Martin) used Emsi's Economic Impact and Capital Analysis studies to demonstrate the ROI that would come from building a proposed STEM facility. The results, in part, led to a boost in state funding—reducing the university's share of facility construction costs from 25% to 10%.

Key takeaways:

- UT Martin leveraged Emsi's Economic Impact and Capital Analysis studies to communicate the institution's value and make the case for additional state funding to build a new STEM facility—now known as the Latimer Engineering and Science Building.
- Among other things, the study found that building the new facility would generate 900-plus jobs.
- The Capital Analysis helped justify a state budget amendment increasing state funding of the \$65 million project.

Led by its current Interim Chancellor, Dr. Robert Smith—a longtime acquaintance of Emsi from his time at Slippery Rock University in Pennsylvania—UT Martin came to Emsi last year needing support for a critical project. Limited by inadequate space and antiquated laboratory facilities, UT Martin needed to prove that the proposed construction of a new STEM facility would be a smart and profitable investment for the state.

After working with Emsi several years ago, Smith knew that Emsi could provide him with the analysis he needed to advance UT Martin's cause. Emsi consultants worked closely with the UT Martin team to develop a customized report based on the Economic Impact Study and the Capital Analysis. The report would show the broad-reaching value of UT Martin and detail the potential ROI of building the new STEM facility.



The results of this study
were prepared by



For a copy of the report, please contact RCC.



The Economic Value of Riverside City College

EXECUTIVE SUMMARY



RIVERSIDE City College (RCC) creates value in many ways. The college plays a key role in helping students increase their employability and achieve their individual potential. The college draws students to the region, generating new dollars and opportunities for the RCC Service Area. RCC provides students with the education, training, and skills they need to have fulfilling and prosperous careers. Furthermore, RCC is a place for students to meet new people, increase their self-confidence, and promote their overall health and well-being.

RCC influences both the lives of its students and the regional economy. The college supports a variety of industries in the RCC Service Area¹, serves regional businesses, and benefits society as a whole in California from an expanded economy and improved quality of life. The benefits created by RCC even extend to the state and local government through increased tax revenues and public sector savings.

This study measures the economic impacts created by RCC on the business community and the benefits the college generates in return for the investments made by its key stakeholder groups—students, taxpayers, and society. The following two analyses are presented:



Economic impact analysis



Investment analysis

All results reflect employee, student, and financial data, provided by the district, for fiscal year (FY) 2016-17. Impacts on the RCC Service Area economy are reported under the economic impact analysis and are measured in terms of added income. The returns on investment to students, taxpayers, and society in California are reported under the investment analysis.

¹ For the purposes of this analysis, the RCC Service Area is comprised of 29 ZIP codes in the northwest corner of Riverside County in California.

*The value of RCC influences both the **lives of its students** and the **regional economy**.*



Economic impact analysis

RCC promotes economic growth in the RCC Service Area through its direct expenditures and the resulting expenditures of students and regional businesses. The college serves as an employer and buyer of goods and services for its day-to-day operations. The college's activities attract students from outside the RCC Service Area, whose expenditures benefit regional vendors. In addition, RCC is a primary source of higher education to the RCC Service Area residents and a supplier of trained workers to regional industries, enhancing overall productivity in the regional workforce.

Operations Spending Impact



RCC adds economic value to the RCC Service Area as an employer of regional residents and a large-scale buyer of goods and services. In FY 2016-17, the college employed 961 full-time and part-time faculty and staff, 58% of whom lived in the RCC Service Area. Total payroll at RCC was \$88.4 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. In addition, the college spent \$50.5 million on day-to-day expenses related to facilities, supplies, and professional services.

RCC's day-to-day operations spending added \$103.3 million in income to the region during the analysis year. This figure represents the college's payroll, the multiplier effects generated by the in-region spending of the college and its employees, and a downward adjustment to account for funding that the college received from regional sources. The \$103.3 million in added income is equivalent to supporting 1,187 jobs in the region.

Student Spending Impact



Some in-region students, referred to as retained students, would have left the RCC Service Area if not for the existence of RCC. While attending the college, these retained students spent money on groceries, accommodation, transportation, and other household expenses. This spending generated \$12.3 million in added income for the regional economy in FY 2016-17, which supported 251 jobs in the RCC Service Area.

Alumni Impact



The education and training RCC provides for regional residents has the greatest impact. Since its establishment, students have studied

IMPACTS CREATED BY RCC
IN FY 2016-17



\$103.3 million
Operations Spending Impact



\$12.3 million
Student Spending Impact



\$241.2 million
Alumni Impact



\$356.8 million
TOTAL IMPACT

- OR -

5,484
JOBS SUPPORTED

at RCC and entered the regional workforce with greater knowledge and new skills. Today, thousands of former RCC students are employed in the RCC Service Area. As a result of their RCC educations, the students receive higher earnings and increase the productivity of the businesses that employ them. In FY 2016-17, RCC alumni generated \$241.2 million in added income for the regional economy, which is equivalent to supporting 4,046 jobs.

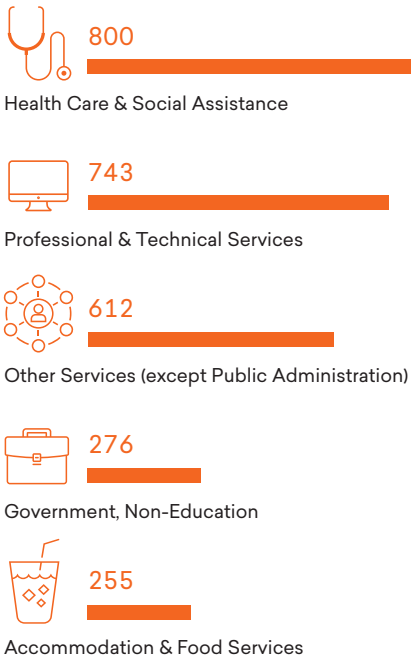


Total Impact

RCC added \$356.8 million in income to the RCC Service Area economy during the analysis year, equal to the sum of the operations spending impact, the student spending impact, and the alumni impact. For context, the \$356.8 million impact was equal to approximately 1.0% of the total gross regional product (GRP) of the RCC Service Area. This contribution that the college provided on its own is over twice the size of the entire Arts, Entertainment, & Recreation industry in the region.

RCC's total impact can also be expressed in terms of jobs supported. The \$356.8 million impact supported 5,484 regional jobs, using the jobs-to-sales ratios specific to each industry in the region. This means that one out of every 77 jobs in the RCC Service Area is supported by the activities of RCC and its students. In addition, the \$356.8 million, or 5,484 supported jobs, impacted regional industries in different ways. Among non-education industry sectors, RCC supported the most jobs in the Health Care & Social Assistance industry sector – supporting 800 jobs in FY 2016-17. These are impacts that would not have been generated without the college's presence in the RCC Service Area.

TOP INDUSTRIES IMPACTED BY RCC (JOBS SUPPORTED)





Investment analysis

An investment analysis evaluates the costs associated with a proposed venture against its expected benefits. If the benefits outweigh the costs, then the investment is financially worthwhile. The analysis presented here considers RCC as an investment from the perspectives of students, taxpayers, and society in California.

Student perspective



In FY 2016-17, RCC served 29,844 credit and 733 non-credit students. In order to attend the college, the students paid for tuition, fees, books, and supplies. They also took out loans and will incur interest on those loans. Additionally, students gave up money they would have otherwise earned had they been working instead of attending college. The total investment made by RCC's students in FY 2016-17 amounted to a present value of \$84 million, equal to \$29.1 million in out-of-pocket expenses (including future principal and interest on student loans) and \$54.9 million in forgone time and money.

In return for their investment, RCC's students will receive a stream of higher future earnings that will continue to grow throughout their working lives. For example, the average RCC associate degree graduate from FY 2016-17 will see an increase in earnings of \$9,900 each year compared to a person with a high school diploma or equivalent working in California. Over a working lifetime, the benefits of the associate degree over a high school diploma will amount to an undiscounted value of \$415.8 thousand in higher earnings per graduate. Altogether, RCC's FY 2016-17 students will receive \$539.5 million in higher future earnings over their working lives, as a result of their education and training at RCC.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN RCC



20.7%

Average annual return for RCC students



10.1%

Stock market 30-year average annual return

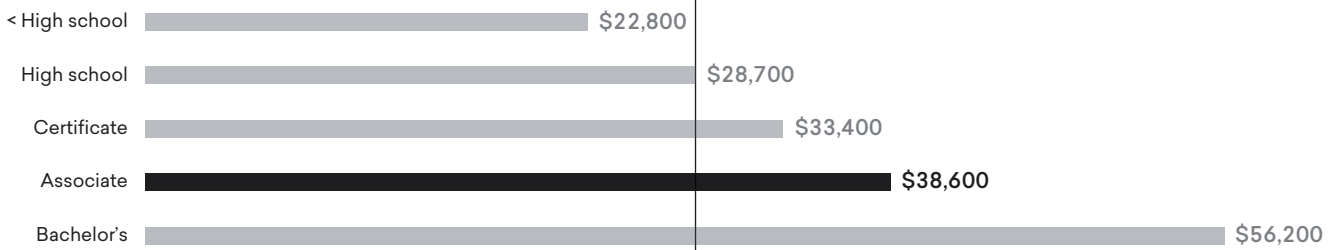


0.8%

Interest earned on savings account (National Rate Cap)

Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.

The average associate degree graduate from RCC will see an increase in earnings of **\$9,900** each year compared to a person with a high school diploma or equivalent working in California.



Source: Emsi complete employment data.

The students' benefit-cost ratio is 6.4. In other words, for every dollar students invest in RCC, in the form of out-of-pocket expenses and forgone time and money, they will receive a cumulative value of \$6.40 in higher future earnings. Annually, the students' investment in RCC has an average annual internal rate of return of 20.7%, which is impressive compared to the U.S. stock market's 30-year average rate of return of 10.1%.

Taxpayer perspective



RCC generates more in tax revenue than it takes. These benefits to taxpayers consist primarily of taxes that the state and local government will collect from the added revenue created in the state. As RCC students will earn more, they will make higher tax payments throughout their working lives. Students' employers will also make higher tax payments as they increase their output and purchases of goods and services. By the end of the FY 2016-17 students' working lives, the state and local government will have collected a present value of \$211.1 million in added taxes.

Benefits to taxpayers will also consist of savings generated by the improved lifestyles of RCC students and the corresponding reduced government services. Education is statistically correlated with a variety of lifestyle changes. Students'

RCC educations will generate savings in three main categories: 1) healthcare, 2) crime, and 3) income assistance. Improved health will lower students' demand for national health care services. In addition, students will be less likely to interact with the criminal justice system, resulting in a reduced demand for law enforcement and victim costs. RCC students will be more employable, so their reduced demand for income assistance such as welfare and unemployment benefits will benefit taxpayers. For a list of study references, contact the college for a copy of the main report. Altogether, the present value of the benefits associated with an RCC education will generate \$33.1 million in savings to state and local taxpayers.

Total taxpayer benefits amount to \$244.2 million, the present value sum of the added taxes and public sector savings. Taxpayer costs are \$110.5 million, equal to the amount of state and local government funding RCC received in FY 2016-17. These benefits and costs yield a benefit-cost ratio of 2.2. This means

*For every dollar of public money invested in RCC, taxpayers will receive a cumulative value of **\$2.20** over the course of the students' working lives.*



STUDENT PERSPECTIVE

\$539.5 million
Present value benefits

\$84 million
Present value costs

\$455.5 million
Net present value

Benefit-cost Ratio	Rate of Return
6.4	20.7%



TAXPAYER PERSPECTIVE

\$244.2 million
Present value benefits

\$110.5 million
Present value costs

\$133.7 million
Net present value

Benefit-cost Ratio	Rate of Return
2.2	5.2%



SOCIAL PERSPECTIVE

\$3 billion
Present value benefits

\$231.6 million
Present value costs

\$2.8 billion
Net present value

Benefit-cost Ratio	Rate of Return
13.1	n/a*

* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.

that for every dollar of public money invested in RCC in FY 2016-17, taxpayers will receive a cumulative value of \$2.20 over the course of the students' working lives. The average annual internal rate of return for taxpayers is 5.2%, which compares favorably to other long-term investments in the public and private sectors.

Social perspective



Society as a whole in California benefits from the presence of RCC in two major ways. Primarily, society benefits from an increased economic base in the state. This is attributed to higher student earnings and increased business output, which raise economic prosperity in California.

Benefits to society also consist of the savings generated by the improved lifestyles of RCC students. As discussed in the previous section, education is statistically correlated with a variety of lifestyle changes that generate social savings. Note that these costs are avoided by the consumers but are distinct from the costs avoided by the taxpayers outlined above. Healthcare savings include avoided medical costs associated with smoking, alcohol dependence, obesity, drug abuse, and depression. Savings related to crime include reduced security expenditures and insurance administration, lower victim costs, and reduced expenditures by the criminal justice system. Income assistance savings include reduced welfare and unemployment claims. For a list of study references, contact the college for a copy of the main report.

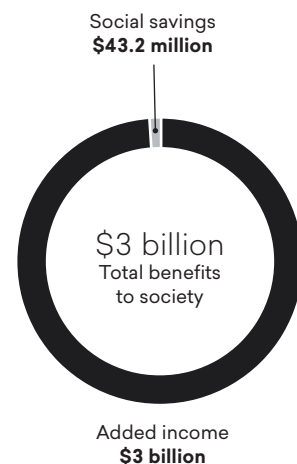
Altogether, the social benefits of RCC equal a present value of \$3 billion. These benefits include \$3 billion in added income through students' increased lifetime earnings and increased business output, as well as \$43.2 million in social savings related to health, crime, and income assistance in California. People in California invested a present value total of \$231.6 million in RCC in FY 2016-17. The cost includes all the college and student costs.

The benefit-cost ratio for society is 13.1, equal to the \$3 billion in benefits divided by the \$231.6 million in costs. In other words, for every dollar invested in RCC, people in California will receive a cumulative value of \$13.10 in benefits. The benefits of this investment will occur for as long as RCC's FY 2016-17 students remain employed in the state workforce.

Summary of investment analysis results

The results of the analysis demonstrate that RCC is a strong investment for all three major stakeholder groups—students, taxpayers, and society. As shown, students receive a great return for their investments in an RCC education. At the same time, taxpayers' investment in RCC returns more to government budgets than it costs and creates a wide range of social benefits throughout California.

SOCIAL BENEFITS IN CALIFORNIA FROM RCC



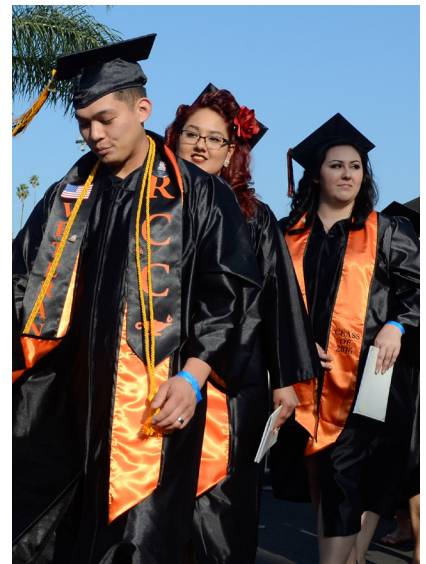
Conclusion

The results of this study demonstrate that RCC creates value from multiple perspectives. The college benefits regional businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers to the workforce. RCC enriches the lives of students by raising their lifetime earnings and helping them achieve their individual potential. The college benefits state and local taxpayers through increased tax receipts and a reduced demand for government-supported social services. Finally, RCC benefits society as a whole in California by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students.

About the Study

Data and assumptions used in the study are based on several sources, including the FY 2016-17 academic and financial reports on RCC provided by the district, industry and employment data from the U.S. Bureau of Labor Statistics and U.S. Census Bureau, outputs of Emsi's Multi-Regional Social Accounting Matrix model, and a variety of studies and surveys relating education to social behavior. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach used in the study, please contact the college for a copy of the main report.

The results of this study demonstrate that RCC creates value from
multiple perspectives.



Emsi is a leading provider of economic impact studies and labor market data to educational institutions, workforce planners, and regional developers in the U.S. and internationally. Since 2000, Emsi has completed over 1,800 economic impact studies for educational institutions in four countries. Visit www.economicmodeling.com for more information about Emsi's products and services.



The Economic Value of Riverside City College

MAIN REPORT

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Executive Summary

This report assesses the impact of Riverside City College (RCC) on the regional economy and the benefits generated by the college for students, taxpayers, and society. The results of this study show that RCC creates a positive net impact on the regional economy and generates a positive return on investment for students, taxpayers, and society.





Economic Impact Analysis



During the analysis year, RCC spent \$88.4 million on payroll and benefits for 961 full-time and part-time employees, and spent another \$50.5 million on goods and services to carry out its day-to-day operations. This initial round of spending creates more spending across other businesses throughout the regional economy, resulting in the commonly referred to multiplier effects.

This analysis estimates the net economic impact of RCC that directly takes into account the fact that state and local dollars spent on RCC could have been spent elsewhere in the region if not directed towards RCC and would have created impacts regardless. We account for this by estimating the impacts that would have been created from the alternative spending and subtracting the alternative impacts from the spending impacts of RCC.

This analysis shows that in fiscal year (FY) 2016-17, operations and student spending of RCC, together with the enhanced productivity of its alumni, generated **\$356.8 million** in added income for the RCC Service Area economy. The additional income of **\$356.8 million** created by RCC is equal to approximately **1.0%** of the total gross regional product (GRP) of the RCC Service Area. For

*The additional income of **\$356.8 million** created by RCC is equal to approximately **1.0%** of the total gross regional product of the RCC Service Area.*

perspective, this impact from the college is over twice the size of the entire Arts, Entertainment, & Recreation industry in the region. The impact of **\$356.8 million** is equivalent to supporting **5,484** jobs. For further perspective, this means that one out of every **77** jobs in the RCC Service Area is supported by the activities of RCC and its students. These economic impacts break down as follows:

Operations spending impact



Payroll and benefits to support RCC's day-to-day operations amounted to \$88.4 million. The college's non-pay expenditures amounted to \$50.5 million. The net impact of operations spending by the college in the RCC Service Area during the analysis year was approximately **\$103.3 million** in added income, which is equivalent to supporting **1,187** jobs.

Student spending impact



Some students are residents of the RCC Service Area who would have left the region if not for the existence of RCC. The money that these students spent toward living expenses in the RCC Service Area is attributable to RCC.

The expenditures of retained students in the region during the analysis year added approximately **\$12.3 million** in income for the RCC Service Area economy, which is equivalent to supporting **251** jobs.

Alumni impact



Over the years, students gained new skills, making them more productive workers, by studying at RCC. Today, thousands of these former students are employed in the RCC Service Area.

The accumulated impact of former students currently employed in the RCC Service Area workforce amounted to **\$241.2 million** in added income for the RCC Service Area economy, which is equivalent to supporting **4,046** jobs.

Important Note

When reviewing the impacts estimated in this study, it's important to note that it reports impacts in the form of added income rather than sales. Sales includes all of the intermediary costs associated with producing goods and services, as well as money that leaks out of the region as it is spent at out-of-region businesses. Income, on the other hand, is a net measure that excludes these intermediary costs and leakages, and is synonymous with gross regional product (GRP) and value added. For this reason, it is a more meaningful measure of new economic activity than sales.



Investment Analysis



Investment analysis is the practice of comparing the costs and benefits of an investment to determine whether or not it is profitable. This study considers RCC as an investment from the perspectives of students, taxpayers, and society.

Student perspective



Students invest their own money and time in their education to pay for tuition, books, and supplies. Many take out student loans to attend the college, which they will pay back over time. While some students were employed while attending the college, students overall forewent earnings that they would have generated had they been in full employment instead of learning. Summing these direct outlays, opportunity costs, and future student loan costs yields a total of **\$84 million** in present value student costs.

In return, students will receive a present value of **\$539.5 million** in increased earnings over their working lives. This translates to a return of **\$6.40** in higher future earnings for every \$1 that students pay for their education at RCC. The corresponding annual rate of return is **20.7%**.

Taxpayer perspective



Taxpayers provided **\$110.5 million** of state and local funding to RCC in FY 2016-17. In return, taxpayers will receive an estimated present value of **\$211.1 million** in added tax revenue stemming from the students' higher lifetime earnings and the increased output of businesses.

Savings to the public sector add another estimated **\$33.1 million** in benefits due to a reduced demand for government-funded social services in California. For every tax dollar spent educating students attending RCC, taxpayers will receive an average of **\$2.20** in return over the course of the students' working lives. In other words, taxpayers enjoy an annual rate of return of **5.2%**.

Social perspective



California as a whole spent an estimated **\$231.6 million** on educations obtained at RCC in FY 2016-17. This includes the college's expenditures, student expenses, and student opportunity costs. In return, the state of California will receive an estimated present value of **\$3 billion** in added state revenue over the course of the students' working lives. California will also benefit from an estimated **\$43.2 million** in present value social savings related to reduced crime, lower welfare and unemployment, and increased health and well-being across the state. For every dollar society invests in educations from RCC, an average of **\$13.10** in benefits will accrue to California over the course of the students' careers.

*For every tax dollar spent educating students attending RCC, taxpayers will receive an average of **\$2.20** in return over the course of the students' working lives.*

Acknowledgments

Emsi gratefully acknowledges the excellent support of the staff at Riverside City College in making this study possible. Special thanks go to Dr. Irving Hendrick, Interim President, who approved the study, and to David Torres, Dean, Institutional Research & Strategic Planning, who collected much of the data and information requested. Any errors in the report are the responsibility of Emsi and not of any of the above-mentioned individuals.

Introduction

Riverside City College (RCC), established in 1916, has today grown to serve 29,844 credit and 733 non-credit students. The college is led by Dr. Irving Hendrick, Interim President. The college's service region, for the purpose of this report, is referred to as the RCC Service Area and consists of 29 ZIP codes primarily located in the northwest corner of Riverside County in California (see figure).

While RCC affects the region in a variety of ways, many of them difficult to quantify, this study is concerned with considering its economic benefits. The college naturally helps students achieve their individual potential and develop the knowledge, skills, and abilities they need to have fulfilling and prosperous careers. However, RCC impacts the RCC Service Area beyond influencing the lives of students. The college's program offerings supply employers with workers to make their businesses more productive. The college, its day-to-day operations, and the expenditures of its students support the

regional economy through the output and employment generated by regional vendors. The benefits created by the college extend as far as the state treasury in terms of the increased tax receipts and decreased public sector costs generated by students across the state.

This report assesses the impact of RCC as a whole on the regional economy and the benefits generated by the college for students, taxpayers, and society. The approach is twofold. We begin with an economic impact analysis of the college on the RCC Service Area economy. To derive results, we rely on a specialized Multi-Regional Social Accounting Matrix (MR-SAM) model to calculate the added income created in the RCC Service Area economy as a result of increased consumer spending and the added knowledge, skills, and abilities of students. Results of the economic impact analysis are broken out according to the following impacts: 1) impact of the college's day-to-day operations, 2) impact of student spending, and 3) impact of alumni who are still employed in the RCC Service Area workforce.

The second component of the study measures the benefits generated by RCC for the following stakeholder groups: students, taxpayers, and society.

THE RCC SERVICE AREA



For students, we perform an investment analysis to determine how the money spent by students on their education performs as an investment over time. The students' investment in this case consists of their out-of-pocket expenses, the cost of interest incurred on student loans, and the opportunity cost of attending the college as opposed to working. In return for these investments, students receive a lifetime of higher earnings. For taxpayers, the study measures the benefits to state taxpayers in the form of increased tax revenues and public sector savings stemming from a reduced demand for social services. Finally, for society, the study assesses how the students' higher earnings and improved quality of life create benefits throughout California as a whole.

The study uses a wide array of data that are based on several sources, including the FY 2016-17 academic and financial reports from RCC; industry and employment data from the Bureau of Labor Statistics and Census Bureau; outputs of Emsi's impact model and MR-SAM model; and a variety of published materials relating education to social behavior.



CHAPTER 1:

Profile of Riverside City College and the Economy

Riverside City College (RCC), part of the Riverside Community College District (RCCD) and the California Community College System, is a degree-granting institution of higher education in Riverside, California. Originally established in 1916, RCC has over a century of history providing affordable education options to a diverse range of students. In FY 2017-18, it served 30,000 credit and non-credit students.



RCC opened in 1916, operating out of the same site as the city's polytechnic high school under the name Riverside Junior College until 1924. In the 1960's it became a community college, before taking its current name in 2008. Today, the college has a network of locations in and around Riverside; its primary campus in downtown Riverside, facilities in Norco and Moreno Valley, as well as several specialized training facilities.

As part of California's higher education system, one of the key assets RCC offers its students is the ability to easily transfer to California universities to complete four-year degrees. While transfer degrees are a strong part of RCC's academic catalogue, career and technical degrees are also increasingly important. In total, RCC offers more than 70 different programs, including programs in its School of Nursing and programs in Auto Body Technology, Journalism, Military Science, Welding, and many more.

In addition to providing the community and region with a skilled workforce, RCC also benefits its economy through a variety of non-credit program offerings and other services. For example, the college hosts training programs for firefighters, EMTs, and police officers. RCC's Office of Economic Development provides training services and other workforce development services to area employers. It houses the Library and Learning Resource Center, to give the community access to library services. It also works with local secondary schools and teachers to prepare students for college success through programs like the Riverside English Articulation Project.



Originally established in 1916, Riverside has over a century of history providing affordable education options to a diverse range of students.



RCC employee and finance data

The study uses two general types of information: 1) data collected from RCCD and 2) regional economic data obtained from various public sources and Emsi's proprietary data modeling tools.¹ This chapter presents the basic underlying information from RCC used in this analysis and provides an overview of the RCC Service Area economy.

Employee data

Data provided by the district include information on faculty and staff by place of work and by place of residence. These data appear in Table 1.1. As shown, RCC employed 480 full-time and 481 part-time faculty and staff in FY 2016-17 (including student workers). Of these, 100% worked in the region and 58% lived in the region. These data are used to isolate the portion of the employees' payroll and household expenses that remains in the regional economy.

Revenues

Figure 1.1 shows the college's annual revenues by funding source – a total of \$160 million in FY 2016-17. As indicated, tuition and fees comprised 6% of total revenue, and revenues from local, state, and federal government sources comprised another 88%. All other revenue (i.e., auxiliary revenue, sales and services, interest, and donations) comprised the remaining 6%. These data are critical in identifying the annual costs of educating the student body from the perspectives of students, taxpayers, and society.

Expenditures

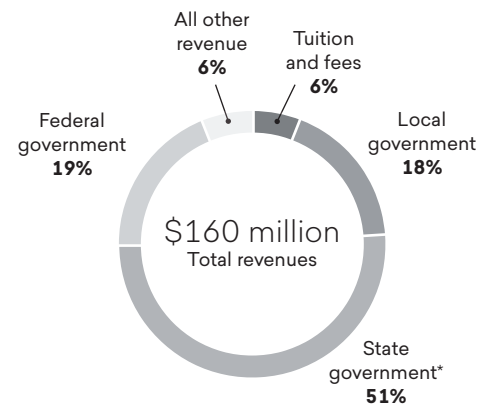
Figure 1.2 displays RCC's expense data. The combined payroll at RCC, including student salaries and wages, amounted to \$88.4 million. This was equal to 57% of the college's total expenses for FY 2016-17. Other expenditures, including operation and maintenance of plant, depreciation, and purchases of supplies and services, made up \$67.7 million. When we calculate the impact of these expenditures in Chapter 2, we exclude expenses for depreciation and interest, as they represent a devaluing of the college's assets rather than an outflow of expenditures.

TABLE 1.1: EMPLOYEE DATA, FY 2016-17

Full-time faculty and staff	480
Part-time faculty and staff	481
Total faculty and staff	961
% of employees who work in the region	100%
% of employees who live in the region	58%

Source: Data provided by RCCD.

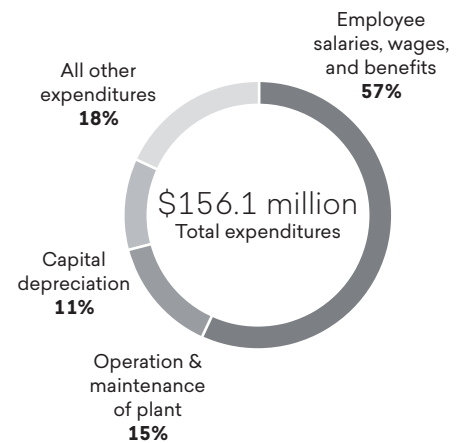
FIGURE 1.1: RCC REVENUES BY SOURCE, FY 2016-17



*Revenue from state and local government includes capital appropriations.

Source: Data provided by RCCD.

FIGURE 1.2: RCC EXPENSES BY FUNCTION, FY 2016-17



Source: Data provided by RCCD.

Percentages may not add due to rounding.

¹ See Appendix 5 for a detailed description of the data sources used in the Emsi modeling tools.



Students

RCC served 29,844 students taking courses for credit and 733 non-credit students in FY 2016-17. These numbers represent unduplicated student headcounts. The breakdown of the student body by gender was 43% male and 57% female. The breakdown by ethnicity was 20% white and 80% minority. The students' overall average age was 25 years old.² An estimated 61% of students remain in the RCC Service Area after finishing their time at RCC, another 37% settle outside the region but in the state, and the remaining 2% settle outside the state.³

Table 1.2 summarizes the breakdown of the student population and their corresponding awards and credits by education level. In FY 2016-17, RCC served 1,274 associate degree graduates and 401 certificate graduates. Another 27,066 students enrolled in courses for credit but did not complete a degree during the reporting year. The college offered dual credit courses to high schools, serving a total of 461 students over the course of the year. The college also served 664 basic education students and 711 personal enrichment students enrolled in non-credit courses.

We use credit hour equivalents (CHEs) to track the educational workload of the students. One CHE is equal to 15 contact hours of classroom instruction per semester. In the analysis, we exclude the CHE production of personal enrichment students under the assumption that they do not attain knowledge, skills, and abilities that will increase their earnings. The average number of CHEs per student (excluding personal enrichment students) was 9.1.

TABLE 1.2: BREAKDOWN OF STUDENT HEADCOUNT AND CHE PRODUCTION BY EDUCATION LEVEL, FY 2016-17

Category	Headcount	Total CHEs	Average CHEs
Associate degree graduates	1,274	20,956	16.4
Certificate graduates	401	6,274	15.6
Continuing students	27,066	241,212	8.9
Dual credit students	461	2,593	5.6
Basic education students	664	1,674	2.5
Personal enrichment students	711	1,138	1.6
Total, all students	30,577	273,846	9.0
Total, less personal enrichment students	29,866	272,709	9.1

Source: Data provided by RCCD.

² Unduplicated headcount, gender, ethnicity, and age data provided by RCCD.

³ Because RCC was unable to provide settlement data, Emsi used estimates based on student origin.



The RCC Service Area economy

RCC serves a region referred to as the RCC Service Area in California.⁴ Since the college was first established, it has been serving the RCC Service Area by enhancing the workforce, providing local residents with easy access to higher education opportunities, and preparing students for highly-skilled, technical professions. Table 1.3 summarizes the breakdown of the regional economy by major industrial sector ordered by total income, with details on labor and non-labor income. Labor income refers to wages, salaries, and proprietors' income. Non-labor income refers to profits, rents, and other forms of investment income.

TABLE 1.3: INCOME BY MAJOR INDUSTRY SECTOR IN THE RCC SERVICE AREA, 2017*

Industry sector	Labor income (millions)	Non-labor income (millions)	Total income (millions)**	% of total income	Sales (millions)
Other Services (except Public Administration)	\$615	\$3,363	\$3,979	12%	\$4,985
Wholesale Trade	\$1,666	\$1,841	\$3,507	10%	\$4,887
Manufacturing	\$1,776	\$1,599	\$3,375	10%	\$8,698
Construction	\$2,148	\$1,018	\$3,166	9%	\$5,618
Health Care & Social Assistance	\$2,338	\$291	\$2,629	8%	\$4,389
Government, Education	\$2,579	\$0	\$2,579	8%	\$2,890
Transportation & Warehousing	\$1,862	\$690	\$2,552	7%	\$4,809
Government, Non-Education	\$2,159	\$387	\$2,547	7%	\$10,985
Retail Trade	\$1,368	\$1,022	\$2,390	7%	\$3,697
Finance & Insurance	\$716	\$733	\$1,449	4%	\$2,288
Professional & Technical Services	\$999	\$250	\$1,249	4%	\$1,856
Administrative & Waste Services	\$965	\$253	\$1,219	4%	\$1,967
Real Estate & Rental & Leasing	\$499	\$563	\$1,062	3%	\$2,199
Accommodation & Food Services	\$592	\$371	\$962	3%	\$1,878
Information	\$219	\$560	\$779	2%	\$1,440
Educational Services	\$280	\$29	\$308	1%	\$497
Management of Companies & Enterprises	\$140	\$14	\$154	<1%	\$274
Arts, Entertainment, & Recreation	\$113	\$31	\$144	<1%	\$267
Utilities	\$29	\$70	\$99	<1%	\$133
Agriculture, Forestry, Fishing & Hunting	\$60	\$23	\$83	<1%	\$182
Mining, Quarrying, & Oil and Gas Extraction	\$22	\$31	\$53	<1%	\$79
Total	\$21,145	\$13,141	\$34,285	100%	\$64,019

* Data reflect the most recent year for which data are available. Emsi data are updated quarterly.

** Numbers may not add due to rounding.

Source: Emsi industry data.

4 The following ZIP codes comprise the RCC Service Area: 92519, 92522, 92517, 92516, 92514, 92513, 92502, 92504, 92503, 92506, 92501, 92509, 92505, 92521, 92507, 92508, 91752, 92881, 92879, 92337, 92331, 92313, 92518, 92316, 92860, 92557, 92553, 92878, and 92877.

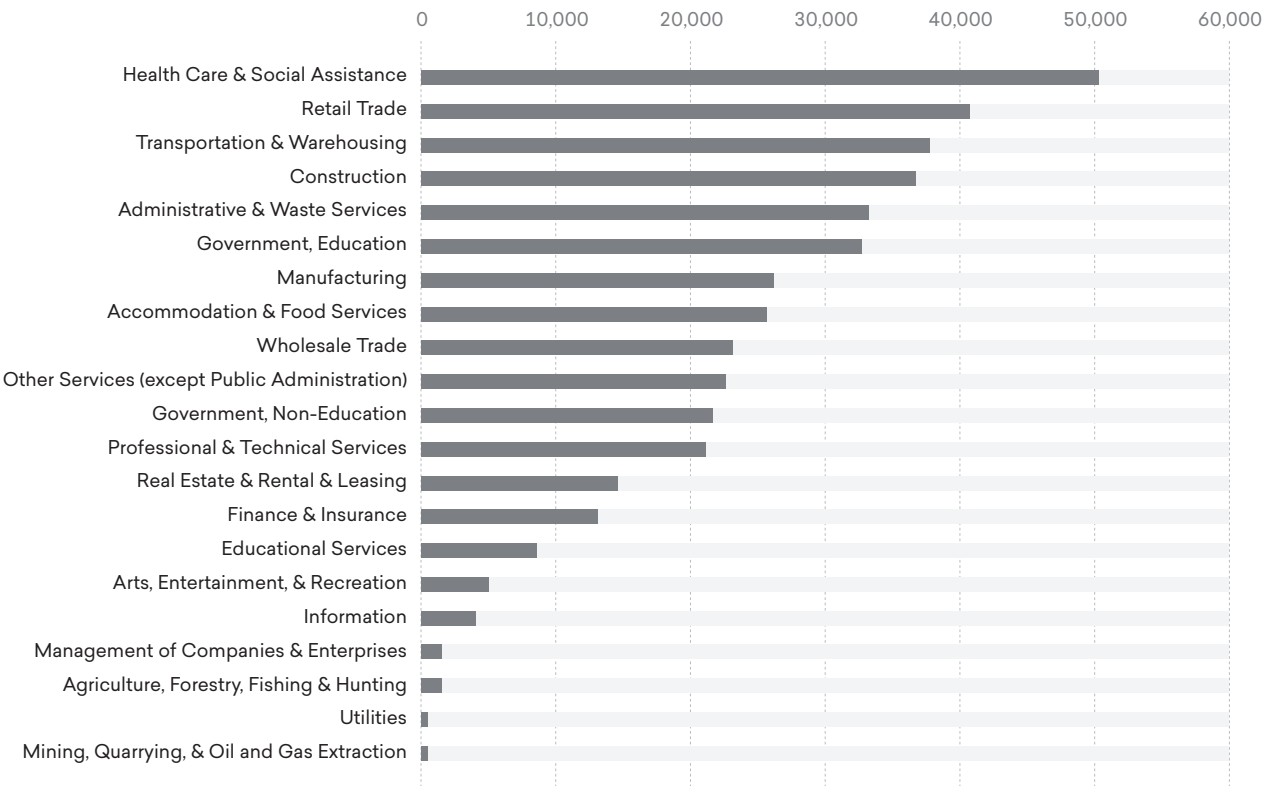


Together, labor and non-labor income comprise the region’s total income, which can also be considered as the region’s gross regional product (GRP).

As shown in Table 1.3, the total income, or GRP, of the RCC Service Area is approximately \$34.3 billion, equal to the sum of labor income (\$21.1 billion) and non-labor income (\$13.1 billion). In Chapter 2, we use the total added income as the measure of the relative impacts of the college on the regional economy.

Figure 1.3 provides the breakdown of jobs by industry in the RCC Service Area. The Health Care & Social Assistance sector is the largest employer, supporting 50,756 jobs or 12.0% of total employment in the region. The second largest employer is the Retail Trade sector, supporting 40,894 jobs or 9.7% of the region’s total employment. Altogether, the region supports 423,749 jobs.⁵

FIGURE 1.3: JOBS BY MAJOR INDUSTRY SECTOR IN THE RCC SERVICE AREA, 2017*



* Data reflect the most recent year for which data are available. Emsi data are updated quarterly. Source: Emsi complete employment data.

⁵ Job numbers reflect Emsi’s complete employment data, which includes the following four job classes: 1) employees that are counted in the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages (QCEW), 2) employees that are not covered by the federal or state unemployment insurance (UI) system and are thus excluded from QCEW, 3) self-employed workers, and 4) extended proprietors.



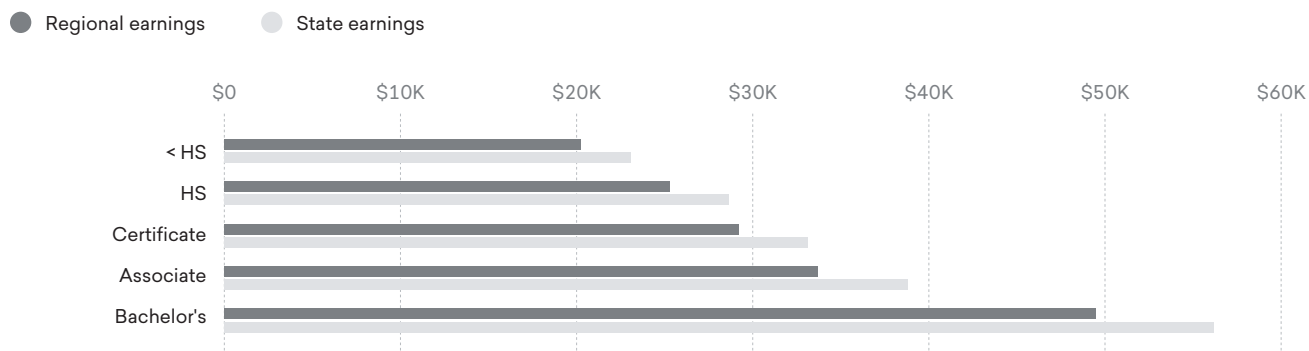
Table 1.4 and Figure 1.4 present the mean earnings by education level in the RCC Service Area and the state of California at the midpoint of the average-aged worker's career. These numbers are derived from Emsi's complete employment data on average earnings per worker in the region and the state.⁶ The numbers are then weighted by the college's demographic profile. As shown, students have the potential to earn more as they achieve higher levels of education compared to maintaining a high school diploma. Students who earn an associate degree from RCC can expect approximate wages of \$34,000 per year within the RCC Service Area, approximately \$8,700 more than someone with a high school diploma.

TABLE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN RCC STUDENT'S CAREER MIDPOINT

Education level	Regional earnings	Difference from next lowest degree	State earnings	Difference from next lowest degree
Less than high school	\$20,200	n/a	\$22,800	n/a
High school or equivalent	\$25,300	\$5,100	\$28,700	\$5,900
Certificate	\$29,500	\$4,200	\$33,400	\$4,700
Associate degree	\$34,000	\$4,500	\$38,600	\$5,200
Bachelor's degree	\$49,500	\$15,500	\$56,200	\$17,600

Source: Emsi complete employment data.

FIGURE 1.4: AVERAGE EARNINGS BY EDUCATION LEVEL AT AN RCC STUDENT'S CAREER MIDPOINT



Source: Emsi complete employment data.

⁶ Wage rates in the Emsi MR-SAM model combine state and federal sources to provide earnings that reflect complete employment in the state, including proprietors, self-employed workers, and others not typically included in regional or state data, as well as benefits and all forms of employer contributions. As such, Emsi industry earnings-per-worker numbers are generally higher than those reported by other sources.



CHAPTER 2:

Economic Impacts on the RCC Service Area Economy

RCC impacts the RCC Service Area economy in a variety of ways. The college is an employer and buyer of goods and services. It attracts monies that otherwise would not have entered the regional economy through its day-to-day operations and the expenditures of its students. Further, it provides students with the knowledge, skills, and abilities they need to become productive citizens and add to the overall output of the region.



In this chapter, we estimate the following economic impacts of RCC: 1) the operations spending impact, 2) the student spending impact, and 3) the alumni impact, measuring the income added in the region as former students expand the regional economy's stock of human capital.

When exploring each of these economic impacts, we consider the following hypothetical question:

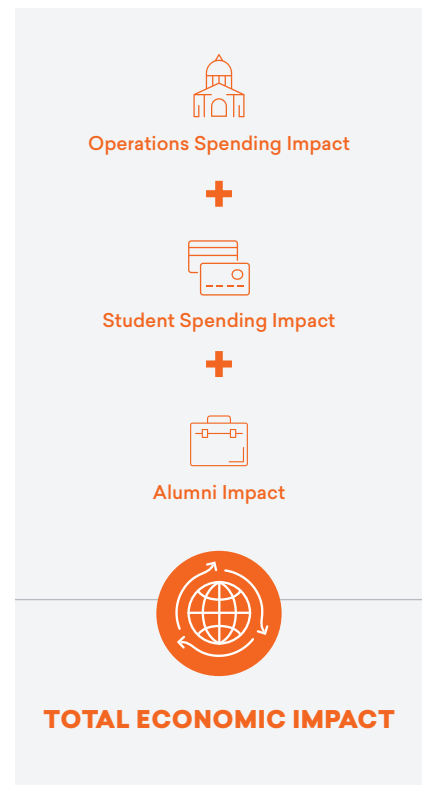
How would economic activity change in the RCC Service Area if RCC and all its alumni did not exist in FY 2016-17?

Each of the economic impacts should be interpreted according to this hypothetical question. Another way to think about the question is to realize that we measure net impacts, not gross impacts. Gross impacts represent an upper-bound estimate in terms of capturing all activity stemming from the college; however, net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

Economic impact analyses use different types of impacts to estimate the results. The impact focused on in this study assesses the change in income. This measure is similar to the commonly used gross regional product (GRP). Income may be further broken out into the **labor income impact**, also known as earnings, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in business profits. Together, labor income and non-labor income sum to total income.

Another way to state the impact is in terms of **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. Finally, a frequently used measure is the **sales impact**, which comprises the change in business sales revenue in the economy as a result of increased economic activity. It is important to bear in mind, however, that much of this sales revenue leaves the regional economy through intermediary transactions and costs.⁷ All of these measures – added labor and non-labor income, total income, jobs, and sales – are used to estimate the economic impact results presented in this chapter. The analysis breaks out the impact measures into different components, each based on the economic effect that caused the impact. The following is a list of each type of effect presented in this analysis:

- The **initial effect** is the exogenous shock to the economy caused by the initial spending of money, whether to pay for salaries and wages, purchase goods or services, or cover operating expenses.



⁷ See Appendix 4 for an example of the intermediary costs included in the sales impact but not in the income impact.



- The initial round of spending creates more spending in the economy, resulting in what is commonly known as the **multiplier effect**. The multiplier effect comprises the additional activity that occurs across all industries in the economy and may be further decomposed into the following three types of effects:
 - The **direct effect** refers to the additional economic activity that occurs as the industries affected by the initial effect spend money to purchase goods and services from their supply chain industries.
 - The **indirect effect** occurs as the supply chain of the initial industries creates even more activity in the economy through their own inter-industry spending.
 - The **induced effect** refers to the economic activity created by the household sector as the businesses affected by the initial, direct, and indirect effects raise salaries or hire more people.

Net impacts reflect a truer measure of economic impact since they demonstrate what would not have existed in the regional economy if not for the college.

The terminology used to describe the economic effects listed above differs slightly from that of other commonly used input-output models, such as IMPLAN. For example, the initial effect in this study is called the “direct effect” by IMPLAN, as shown in the table below. Further, the term “indirect effect” as used by IMPLAN refers to the combined direct and indirect effects defined in this study. To avoid confusion, readers are encouraged to interpret the results presented in this chapter in the context of the terms and definitions listed above. Note that, regardless of the effects used to decompose the results, the total impact measures are analogous.

Emsi	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

Multiplier effects in this analysis are derived using Emsi’s MR-SAM input-output model that captures the interconnection of industries, government, and households in the region. The Emsi MR-SAM contains approximately 1,000 industry sectors at the highest level of detail available in the North American Industry Classification System (NAICS) and supplies the industry-specific multipliers required to determine the impacts associated with increased activity within a given economy. For more information on the Emsi MR-SAM model and its data sources, see Appendix 5.





Operations spending impact

Faculty and staff payroll is part of the region’s total earnings, and the spending of employees for groceries, apparel, and other household expenditures helps support regional businesses. The college itself purchases supplies and services, and many of its vendors are located in the RCC Service Area. These expenditures create a ripple effect that generates still more jobs and higher wages throughout the economy.

Table 2.1 presents college expenditures for the following three categories: 1) salaries, wages, and benefits, 2) operation and maintenance of plant, and 3) all other expenditures (including purchases for supplies and services). In this analysis, we exclude expenses for depreciation and interest due to the way those measures are calculated in the national input-output accounts, and because depreciation represents the devaluing of the college’s assets rather than an outflow of expenditures.⁸ The first step in estimating the multiplier effects of the college’s operational expenditures is to map these categories of expenditures to the approximately 1,000 industries of the Emsi MR-SAM model. Assuming that the spending patterns of college personnel approximately match those of the average consumer, we map salaries, wages, and benefits to spending on industry outputs using national household expenditure coefficients provided by Emsi’s national SAM. All RCC employees work in the RCC Service Area (see Table 1.1), and therefore we consider 100% of the salaries, wages, and benefits. For the other two expenditure categories (i.e., operation and maintenance of plant and all other expenditures), we assume the college’s spending patterns approximately match national averages and apply the national spending coefficients for NAICS 611210 (Junior Colleges).⁹ Operation and maintenance of plant



TABLE 2.1: RCC EXPENSES BY FUNCTION (EXCLUDING DEPRECIATION & INTEREST), FY 2016-17

Expense category	In-region expenditures (thousands)	Out-of-region expenditures (thousands)	Total expenditures (thousands)
Employee salaries, wages, and benefits	\$88,404	\$0	\$88,404
Operation and maintenance of plant	\$7,832	\$14,888	\$22,719
All other expenditures	\$8,744	\$19,062	\$27,806
Total	\$104,979	\$33,950	\$138,929

Source: Data provided by RCCD and the Emsi impact model.

8 This aligns with the economic impact guidelines set by the Association of Public and Land-Grant Universities. Ultimately, excluding these measures results in more conservative and defensible estimates.

9 See Appendix 2 for a definition of NAICS.



expenditures are mapped to the industries that relate to capital construction, maintenance, and support, while the college's remaining expenditures are mapped to the remaining industries.

We now have three vectors of expenditures for RCC: one for salaries, wages, and benefits; another for operation and maintenance of plant; and a third for the college's purchases of supplies and services. The next step is to estimate the portion of these expenditures that occurs inside the region. The expenditures occurring outside the region are known as leakages. We estimate in-region expenditures using regional purchase coefficients (RPCs), a measure of the overall demand for the commodities produced by each sector that is satisfied by regional suppliers, for each of the approximately 1,000 industries in the MR-SAM model.¹⁰ For example, if 40% of the demand for NAICS 541211 (Offices of Certified Public Accountants) is satisfied by regional suppliers, the RPC for that industry is 40%. The remaining 60% of the demand for NAICS 541211 is provided by suppliers located outside the region. The three vectors of expenditures are multiplied, industry by industry, by the corresponding RPC to arrive at the in-region expenditures associated with the college. See Table 2.1 for a break-out of the expenditures that occur in-region. Finally, in-region spending is entered, industry by industry, into the MR-SAM model's multiplier matrix, which in turn provides an estimate of the associated multiplier effects on regional labor income, non-labor income, total income, sales, and jobs.

Table 2.2 presents the economic impact of college operations spending. The people employed by RCC and their salaries, wages, and benefits comprise the initial effect, shown in the top row of the table in terms of labor income, non-labor income, total added income, sales, and jobs. The additional impacts created by the initial effect appear in the next four rows under the section labeled

TABLE 2.2: OPERATIONS SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$88,404	\$0	\$88,404	\$138,929	961
Multiplier effect					
Direct effect	\$5,377	\$3,698	\$9,075	\$16,576	145
Indirect effect	\$916	\$559	\$1,475	\$3,030	26
Induced effect	\$6,342	\$6,390	\$12,732	\$20,171	161
Total multiplier effect	\$12,635	\$10,647	\$23,282	\$39,776	332
Gross impact (initial + multiplier)	\$101,039	\$10,647	\$111,686	\$178,705	1,293
Less alternative uses of funds	-\$4,153	-\$4,199	-\$8,352	-\$13,056	-105
Net impact	\$96,886	\$6,447	\$103,333	\$165,649	1,187

Source: Emsi impact model.

10 See Appendix 5 for a description of Emsi's MR-SAM model.



multiplier effect. Summing the initial and multiplier effects, the gross impacts are \$101 million in labor income and \$10.6 million in non-labor income. This comes to a total impact of \$111.7 million in total added income associated with the spending of the college and its employees in the region. This is equivalent to supporting 1,293 jobs.

The \$111.7 million in gross impact is often reported by researchers as the total impact. We go a step further to arrive at a net impact by applying a counterfactual scenario, i.e., what would have happened if a given event – in this case, the expenditure of in-region funds on RCC – had not occurred. RCC received an estimated 25% of its funding from sources within the RCC Service Area. These monies came from the tuition and fees paid by resident students, from the auxiliary revenue and donations from private sources located within the region, from state and local taxes, and from the financial aid issued to students by state and local government. We must account for the opportunity cost of this in-region funding. Had other industries received these monies rather than RCC, income impacts would have still been created in the economy. In economic analysis, impacts that occur under counterfactual conditions are used to offset the impacts that actually occur in order to derive the true impact of the event under analysis.

We estimate this counterfactual by simulating a scenario where in-region monies spent on the college are instead spent on consumer goods and savings. This simulates the in-region monies being returned to the taxpayers and being spent by the household sector. Our approach is to establish the total amount spent by in-region students and taxpayers on RCC, map this to the detailed industries of the MR-SAM model using national household expenditure coefficients, use the industry RPCs to estimate in-region spending, and run the in-region spending through the MR-SAM model's multiplier matrix to derive multiplier effects. The results of this exercise are shown as negative values in the row labeled *less alternative uses of funds* in Table 2.2.

The total net impact of the college's operations is equal to the gross impact less the impact of the alternative use of funds – the opportunity cost of the regional money. As shown in the last row of Table 2.2, the total net impact is approximately \$96.9 million in labor income and \$6.4 million in non-labor income. This sums together to \$103.3 million in total added income and is equivalent to supporting 1,187 jobs. These impacts represent new economic activity created in the regional economy solely attributable to the operations of RCC.

*The total net impact of the college's operations is **\$103.3 million** in total added income, which is equivalent to supporting **1,187** jobs.*





Student spending impact



In-region students contribute to the student spending impact of RCC; however, not all of these students can be counted towards the impact. Only those students who were retained, or who would have left the region to seek education elsewhere had they not attended RCC, are measured. Students who would have stayed in the region anyway are not counted towards the impact since their monies would have been added to the RCC Service Area economy regardless of RCC.

While there were 17,389 students attending RCC who originated from the RCC Service Area (not including personal enrichment students and dual credit high school students), not all of them would have remained in the region if not for the existence of RCC. We apply a conservative assumption that 10% of these students would have left the RCC Service Area for other education opportunities if RCC did not exist.¹¹ Therefore, we recognize that the in-region spending of 1,739 students retained in the region is attributable to RCC. These students, called retained students, spent money at businesses in the region for everyday needs such as groceries, accommodation, and transportation.

The average costs for students appear in the first section of Table 2.3, equal to \$19,818 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations impact discussed in the previous section. We multiply the \$19,818 in annual

¹¹ See Appendix 1 for a sensitivity analysis of the retained student variable.



costs by the 1,739 students who were retained because of RCC and lived in-region but off campus. This provides us with an estimate of their total spending. The off-campus spending of retained students generated gross sales of \$34.5 million. This figure, once net of the monies paid to student workers, yields net off-campus sales of \$34.4 million, as shown in the bottom row of Table 2.3.

TABLE 2.3: AVERAGE STUDENT COSTS AND TOTAL SALES GENERATED BY RETAINED STUDENTS IN THE RCC SERVICE AREA, FY 2016-17

Room and board	\$15,660
Personal expenses	\$2,363
Transportation	\$1,795
Total expenses per student	\$19,818
Number of students that were retained	1,739
Total gross off-campus sales	\$34,461,520
Wages and salaries paid to student workers*	\$46,106
Net off-campus sales	\$34,415,415

* This figure reflects only the portion of payroll that was used to cover the living expenses of retained student workers who lived in the region.

Source: Student costs provided by RCCD. Emsi provided an estimate of the monies paid to student workers because the district was unable to provide the data. The number of retained students who lived in the region off campus while attending is derived by Emsi from the student origin data and in-term residence data provided by RCCD. The data is based on all students.



Estimating the impacts generated by the \$34.4 million in student spending follows a procedure similar to that of the operations impact described above. We distribute the \$34.4 million in sales to the industry sectors of the MR-SAM model, apply RPCs to reflect in-region spending, and run the net sales figures through the MR-SAM model to derive multiplier effects.

Table 2.4 presents the results. The initial effect is purely sales-oriented and there is no change in labor or non-labor income. The impact of retained student spending thus falls entirely under the multiplier effect.

The total impact of student spending is \$6.4 million in labor income and \$5.9 million in non-labor income. This sums together to \$12.3 million in total added income and is equivalent to supporting 251 jobs. These values represent the direct effects created at the businesses patronized by the students, the indirect effects created by the supply chain of those businesses, and the effects of the increased spending of the household sector throughout the regional economy as a result of the direct and indirect effects.

*The total impact of student spending is **\$12.3 million** in total added income and is equivalent to supporting **251 jobs**.*



TABLE 2.4: STUDENT SPENDING IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$0	\$0	\$0	\$34,415	0
Multiplier effect					
Direct effect	\$4,848	\$4,413	\$9,261	\$14,805	189
Indirect effect	\$508	\$449	\$957	\$1,541	19
Induced effect	\$1,059	\$1,028	\$2,087	\$3,308	42
Total multiplier effect	\$6,414	\$5,890	\$12,305	\$19,654	251
Total impact (initial + multiplier)	\$6,414	\$5,890	\$12,305	\$54,070	251

Source: Emsi impact model.





Alumni impact



In this section, we estimate the economic impacts stemming from the added labor income of alumni in combination with their employers' added non-labor income. This impact is based on the number of students who have attended RCC *throughout its history*. We then use this total number to consider the impact of those students in the single FY 2016-17. Former students who earned a degree as well as those who may not have finished their degree or did not take courses for credit are considered alumni.

While RCC creates an economic impact through its operations and student spending, the greatest economic impact of RCC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni. While attending RCC, students gain experience, education, and the knowledge, skills, and abilities that increase their productivity and allow them to command a higher wage once they enter the workforce. But the reward of increased productivity does not stop there. Talented professionals make capital more productive too (e.g., buildings, production facilities, equipment). The employers of RCC alumni enjoy the fruits of this increased productivity in the form of additional non-labor income (i.e., higher profits).

The methodology here differs from the previous impacts in one fundamental way. Whereas the previous spending impacts depend on an annually renewed injection of new sales into the regional economy, the alumni impact is the result

The greatest economic impact of RCC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni.



of years of past instruction and the associated accumulation of human capital. The initial effect of alumni is comprised of two main components. The first and largest of these is the added labor income of RCC's former students. The second component of the initial effect is comprised of the added non-labor income of the businesses that employ former students of RCC.

We begin by estimating the portion of alumni who are employed in the workforce. To estimate the historical employment patterns of alumni in the region, we use the following sets of data or assumptions: 1) settling-in factors to determine how long it takes the average student to settle into a career;¹² 2) death, retirement, and unemployment rates from the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics; and 3) state migration data from the Census Bureau. The result is the estimated portion of alumni from each previous year who were still actively employed in the region as of FY 2016-17.

The next step is to quantify the skills and human capital that alumni acquired from the college. We use the students' production of CHEs as a proxy for accumulated human capital. The average number of CHEs completed per student in FY 2016-17 was 9.1. To estimate the number of CHEs present in the workforce during the analysis year, we use the college's historical student headcount over the past 30 years, from FY 1987-88 to FY 2016-17.¹³ We multiply the 9.1 average CHEs per student by the headcounts that we estimate are still actively employed from each of the previous years.¹⁴ Students who enroll at the college more than one year are counted at least twice in the historical enrollment data. However, CHEs remain distinct regardless of when and by whom they were earned, so there is no duplication in the CHE counts. We estimate there are approximately 3 million CHEs from alumni active in the workforce.

Next, we estimate the value of the CHEs, or the skills and human capital acquired by RCC alumni. This is done using the *incremental* added labor income stemming from the students' higher wages. The incremental added labor income is the difference between the wage earned by RCC alumni and the alternative wage they would have earned had they not attended RCC. Using the regional incremental earnings, credits required, and distribution of credits at each level of study, we estimate the average value per CHE to equal \$114. This value represents the regional average incremental increase in wages that alumni of RCC received during the analysis year for every CHE they completed.

12 Settling-in factors are used to delay the onset of the benefits to students in order to allow time for them to find employment and settle into their careers. In the absence of hard data, we assume a range between one and three years for students who graduate with a certificate or a degree, and between one and five years for returning students.

13 We apply a 30-year time horizon because the data on students who attended RCC prior to FY 1987-88 is less reliable, and because most of the students served more than 30 years ago had left the regional workforce by FY 2016-17.

14 This assumes the average level of study from past years is equal to the level of study of students today. Emsi used data provided by RCCD for a previous study to estimate students' credit load in prior years.



Because workforce experience leads to increased productivity and higher wages, the value per CHE varies depending on the students' workforce experience, with the highest value applied to the CHEs of students who had been employed the longest by FY 2016-17, and the lowest value per CHE applied to students who were just entering the workforce. More information on the theory and calculations behind the value per CHE appears in Appendix 6. In determining the amount of added labor income attributable to alumni, we multiply the CHEs of former students in each year of the historical time horizon by the corresponding average value per CHE for that year, and then sum the products together. This calculation yields approximately \$341.8 million in gross labor income from increased wages received by former students in FY 2016-17 (as shown in Table 2.5).

TABLE 2.5: NUMBER OF CHES IN WORKFORCE AND INITIAL LABOR INCOME CREATED IN THE RCC SERVICE AREA, FY 2016-17

Number of CHEs in workforce	2,988,218
Average value per CHE	\$114
Initial labor income, gross	\$341,847,779
Counterfactuals	
Percent reduction for alternative education opportunities	15%
Percent reduction for adjustment for labor import effects	50%
Initial labor income, net	\$145,285,306

Source: Emsi impact model.

The next two rows in Table 2.5 show two adjustments used to account for counterfactual outcomes. As discussed above, counterfactual outcomes in economic analysis represent what would have happened if a given event had not occurred. The event in question is the education and training provided by RCC and subsequent influx of skilled labor into the regional economy. The first counterfactual scenario that we address is the adjustment for alternative education opportunities. In the counterfactual scenario where RCC does not exist, we assume a portion of RCC alumni would have received a comparable education elsewhere in the region or would have left the region and received a comparable education and then returned to the region. The incremental added labor income that accrues to those students cannot be counted towards the added labor income from RCC alumni. The adjustment for alternative education opportunities amounts to a 15% reduction of the \$341.8 million in added labor income. This means that 15% of the added labor income from RCC alumni would have been generated in the region anyway, even if the college did not exist. For more information on the alternative education adjustment, see Appendix 7.

The other adjustment in Table 2.5 accounts for the importation of labor. Suppose RCC did not exist and in consequence there were fewer skilled workers in the region. Businesses could still satisfy some of their need for skilled labor



by recruiting from outside the RCC Service Area. We refer to this as the labor import effect. Lacking information on its possible magnitude, we assume 50% of the jobs that students fill at regional businesses could have been filled by workers recruited from outside the region if the college did not exist.¹⁵ Consequently, the gross labor income must be adjusted to account for the importation of this labor, since it would have happened regardless of the presence of the college. We conduct a sensitivity analysis for this assumption in Appendix 1. With the 50% adjustment, the net added labor income added to the economy comes to \$145.3 million, as shown in Table 2.5.

The \$145.3 million in added labor income appears under the initial effect in the labor income column of Table 2.6. To this we add an estimate for initial non-labor income. As discussed earlier in this section, businesses that employ former students of RCC see higher profits as a result of the increased productivity of their capital assets. To estimate this additional income, we allocate the initial increase in labor income (\$145.3 million) to the six-digit NAICS industry sectors where students are most likely to be employed. This allocation entails a process that maps completers in the region to the detailed occupations for which those completers have been trained, and then maps the detailed occupations to the six-digit industry sectors in the MR-SAM model.¹⁶ Using a crosswalk created by National Center for Education Statistics (NCES) and the Bureau of Labor Statistics, we map the breakdown of the college’s completers to the approximately 700 detailed occupations in the Standard Occupational Classification (SOC) system. Finally, we apply a matrix of wages by industry and by occupation from the MR-SAM model to map the occupational distribution of the \$145.3 million in initial labor income effects to the detailed industry sectors in the MR-SAM model.¹⁷

Once these allocations are complete, we apply the ratio of non-labor to labor income provided by the MR-SAM model for each sector to our estimate of initial labor income. This computation yields an estimated \$42.2 million in added non-labor income attributable to the college’s alumni. Summing initial labor and non-labor income together provides the total initial effect of alumni productivity in the RCC Service Area economy, equal to approximately \$187.4 million. To estimate multiplier effects, we convert the industry-specific income figures generated through the initial effect to sales using sales-to-income ratios from the MR-SAM model. We then run the values through the MR-SAM’s multiplier matrix.



15 A similar assumption is used by Walden (2014) in his analysis of the Cooperating Raleigh Colleges.
 16 Completer data comes from the Integrated Postsecondary Education Data System (IPEDS), which organizes program completions according to the Classification of Instructional Programs (CIP) developed by the National Center for Education Statistics (NCES).
 17 For example, if the MR-SAM model indicates that 20% of wages paid to workers in SOC 51-4121 (Welders) occur in NAICS 332313 (Plate Work Manufacturing), then we allocate 20% of the initial labor income effect under SOC 51-4121 to NAICS 332313.



TABLE 2.6: ALUMNI IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Initial effect	\$145,285	\$42,163	\$187,448	\$402,213	3,182
Multiplier effect					
Direct effect	\$13,562	\$3,976	\$17,538	\$34,536	316
Indirect effect	\$2,184	\$617	\$2,801	\$5,456	55
Induced effect	\$25,383	\$7,990	\$33,373	\$70,242	493
Total multiplier effect	\$41,129	\$12,583	\$53,711	\$110,234	864
Total impact (initial + multiplier)	\$186,414	\$54,746	\$241,160	\$512,447	4,046

Source: Emsi impact model.

Table 2.6 shows the multiplier effects of alumni. Multiplier effects occur as alumni generate an increased demand for consumer goods and services through the expenditure of their higher wages. Further, as the industries where alumni are employed increase their output, there is a corresponding increase in the demand for input from the industries in the employers' supply chain. Together, the incomes generated by the expansions in business input purchases and household spending constitute the multiplier effect of the increased productivity of the college's alumni. The final results are \$41.1 million in added labor income and \$12.6 million in added non-labor income, for an overall total of \$53.7 million in multiplier effects. The grand total of the alumni impact thus comes to \$241.2 million in total added income, the sum of all initial and multiplier labor and non-labor income effects. This is equivalent to supporting 4,046 jobs.





Total RCC impact

The total economic impact of RCC on the RCC Service Area can be generalized into two broad types of impacts. First, on an annual basis, RCC generates a flow of spending that has a significant impact on the RCC Service Area economy. The impacts of this spending are captured by the operations and student spending impacts. While not insignificant, these impacts do not capture the true purpose of RCC. The basic mission of RCC is to foster human capital. Every year, a new cohort of former RCC students adds to the stock of human capital in the RCC Service Area, and a portion of alumni continues to add to the RCC Service Area economy. Table 2.7 displays the grand total impacts of RCC on the RCC Service Area economy in FY 2016-17. For context, the percentages of RCC compared to the total labor income, total non-labor income, combined total income, sales, and jobs in the RCC Service Area, as presented in Table 1.3 and Figure 1.3, are included. The total added value of RCC is **\$356.8 million**, equivalent to **1.0%** of the GRP of the RCC Service Area. By comparison, this contribution that the college provides on its own is over twice as large as the entire Arts, Entertainment, & Recreation industry in the region. RCC's total impact supported **5,484** jobs in FY 2016-17. For perspective, this means that one out of every **77** jobs in the RCC Service Area is supported by the activities of RCC and its students.

TABLE 2.7: TOTAL RCC IMPACT, FY 2016-17

	Labor income (thousands)	Non-labor income (thousands)	Total income (thousands)	Sales (thousands)	Jobs supported
Operations spending	\$96,886	\$6,447	\$103,333	\$165,649	1,187
Student spending	\$6,414	\$5,890	\$12,305	\$54,070	251
Alumni	\$186,414	\$54,746	\$241,160	\$512,447	4,046
Total impact	\$289,715	\$67,083	\$356,798	\$732,165	5,484
% of the RCC Service Area economy	1.4%	0.5%	1.0%	1.1%	1.3%

Source: Emsi impact model.



These impacts, stemming from spending related to the college and its students, spread throughout the regional economy and affect individual industry sectors. Table 2.8 displays the total impact of RCC on industry sectors based on their two-digit NAICS code. The table shows the total impact of operations, students, and alumni, as shown in Table 2.7, broken down by industry sector using processes outlined earlier in this chapter. By showing the impact on individual industry sectors, it is possible to see in finer detail where RCC has the greatest impact. For example, RCC's impact for the Health Care & Social Assistance industry sector was 800 jobs in FY 2016-17.

TABLE 2.8: TOTAL RCC IMPACT BY INDUSTRY, FY 2016-17

Industry sector	Total income (thousands)	Jobs supported
Government, Education	\$126,272	1,458
Government, Non-Education	\$34,067	276
Health Care & Social Assistance	\$31,598	800
Manufacturing	\$29,517	173
Professional & Technical Services	\$28,329	743
Other Services (except Public Administration)	\$16,161	612
Accommodation & Food Services	\$11,716	255
Wholesale Trade	\$9,060	60
Management of Companies & Enterprises	\$8,258	87
Retail Trade	\$7,871	121
Information	\$7,856	51
Educational Services	\$7,774	220
Construction	\$7,323	87
Real Estate & Rental & Leasing	\$6,578	89
Arts, Entertainment, & Recreation	\$5,926	216
Administrative & Waste Services	\$5,522	154
Utilities	\$5,331	16
Finance & Insurance	\$4,779	27
Transportation & Warehousing	\$2,563	36
Mining, Quarrying, & Oil and Gas Extraction	\$192	1
Agriculture, Forestry, Fishing, & Hunting	\$105	2
Total impact	\$356,798	5,484

Source: Emsi impact model.



Investment Analysis

The benefits generated by RCC affect the lives of many people. The most obvious beneficiaries are the college's students; they give up time and money to go to the college in return for a lifetime of higher wages and improved quality of life. But the benefits do not stop there. As students earn more, communities and citizens throughout California benefit from an enlarged economy and a reduced demand for social services. In the form of increased tax revenues and public sector savings, the benefits of education extend as far as the state and local government.

Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is thus considered infeasible. In this chapter, we consider RCC as a worthwhile investment from the perspectives of students, taxpayers, and society.





Student perspective

To enroll in postsecondary education, students pay money for tuition and forego monies that otherwise they would have earned had they chosen to work instead of attend college. From the perspective of students, education is the same as an investment; i.e., they incur a cost, or put up a certain amount of money, with the expectation of receiving benefits in return. The total costs consist of the monies that students pay in the form of tuition and fees and the opportunity costs of foregone time and money. The benefits are the higher earnings that students receive as a result of their education.

Calculating student costs

Student costs consist of three main items: direct outlays, opportunity costs, and future principal and interest costs incurred from student loans. Direct outlays include tuition and fees, equal to \$9.1 million from Figure 1.1. Direct outlays also include the cost of books and supplies. On average, full-time students spent \$1,792 each on books and supplies during the reporting year.¹⁸ Multiplying this figure by the number of full-time equivalents (FTEs) produced by RCC in FY 2016-17¹⁹ generates a total cost of \$20.1 million for books and supplies.

In order to pay the cost of tuition, many students had to take out loans. These students not only incur the cost of tuition from the college but also incur the interest cost of taking out loans. In FY 2016-17, students received a total of \$1.9 million in federal loans to attend RCC.²⁰ Students pay back these loans along with interest over the span of several years in the future. Since students pay off these loans over time, they accrue no initial cost during the analysis year. Hence, to avoid double counting, the \$1.9 million in federal loans is subtracted from the costs incurred by students in FY 2016-17.

In addition to the cost of tuition, books, and supplies, students also experience an opportunity cost of attending college during the analysis year. Opportunity cost is the most difficult component of student costs to estimate. It measures the value of time and earnings foregone by students who go to the college rather than work. To calculate it, we need to know the difference between the students' full earning potential and what they actually earn while attending the college.

18 Based on the data provided by RCCD.

19 A single FTE is equal to 30 CHEs, so there were 9,090 FTEs produced by students in FY 2016-17, equal to 273,846 CHEs divided by 30 (excluding personal enrichment students).

20 Due to data limitations, only federal loans are considered in this analysis.



STUDENT COSTS



Out-of-Pocket Expenses



Opportunity Costs

STUDENT BENEFITS



Higher Earnings from Education



We derive the students' full earning potential by weighting the average annual earnings levels in Table 1.4 according to the education level breakdown of the student population when they first enrolled.²¹ However, the earnings levels in Table 1.4 reflect what average workers earn at the midpoint of their careers, not while attending the college. Because of this, we adjust the earnings levels to the average age of the student population (25) to better reflect their wages at their current age.²² This calculation yields an average full earning potential of \$17,157 per student.

In determining how much students earn while enrolled in postsecondary education, an important factor to consider is the time that they actually spend on postsecondary education, since this is the only time that they are required to give up a portion of their earnings. We use the students' CHE production as a proxy for time, under the assumption that the more CHEs students earn, the less time they have to work, and, consequently, the greater their foregone earnings. Overall, students attending RCC earned an average of 9.2 CHEs per student (excluding personal enrichment students and dual credit high school students), which is approximately equal to 31% of a full academic year.²³ We thus include no more than \$5,253 (or 31%) of the students' full earning potential in the opportunity cost calculations.

Another factor to consider is the students' employment status while enrolled in postsecondary education. It is estimated that 75% of students are employed.²⁴ For the remainder of students, we assume that they are either seeking work or planning to seek work once they complete their educational goals (with the exception of personal enrichment students, who are not included in this calculation). By choosing to enroll, therefore, non-working students give up everything that they can potentially earn during the academic year (i.e., the \$5,253). The total value of their foregone earnings thus comes to \$38.6 million.

Working students are able to maintain all or part of their earnings while enrolled. However, many of them hold jobs that pay less than statistical averages, usually because those are the only jobs they can find that accommodate their course schedule. These jobs tend to be at entry level, such as restaurant servers or cashiers. To account for this, we assume that working students hold jobs that pay 69% of what they would have earned had they chosen to work full-time rather than go to college.²⁵ The remaining 31% comprises the percentage of

21 This is based on students who reported their prior level of education to RCC. The prior level of education data was then adjusted to exclude dual credit high school students.

22 Further discussion on this adjustment appears in Appendix 6.

23 Equal to 9.2 CHEs divided by \$30, the assumed number of CHEs in a full-time academic year.

24 Emsi provided an estimate of the percentage of students employed because RCC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

25 The 69% assumption is based on the average hourly wage of jobs commonly held by working students divided by the national average hourly wage. Occupational wage estimates are published by the Bureau of Labor Statistics (see http://www.bls.gov/oes/current/oes_nat.htm).



their full earning potential that they forego. Obviously this assumption varies by person; some students forego more and others less. Since we do not know the actual jobs that students hold while attending, the 31% in foregone earnings serves as a reasonable average.

Working students also give up a portion of their leisure time in order to attend higher education institutions. According to the Bureau of Labor Statistics American Time Use Survey, students forego up to 0.5 hours of leisure time per day.²⁶ Assuming that an hour of leisure is equal in value to an hour of work, we derive the total cost of leisure by multiplying the number of leisure hours foregone during the academic year by the average hourly pay of the students' full earning potential. For working students, therefore, their total opportunity cost comes to \$44.1 million, equal to the sum of their foregone earnings (\$36.4 million) and foregone leisure time (\$7.7 million).

Thus far we have discussed student costs during the analysis year. However, recall that students take out student loans to attend college during the year, which they will have to pay back over time. The amount they will be paying in the future must be a part of their decision to attend the college today. Students who take out loans are not only required to pay back the principal of the loan but to also pay back a certain amount in interest. The first step in calculating students' loan interest cost is to determine the payback time for the loans. The \$1.9 million in loans was awarded to 336 students, averaging \$5,761 per student in the analysis year. However, this figure represents only one year of loans. Because loan payback time is determined by total indebtedness, we make an assumption that since RCC is a two-year college, students will be indebted twice that amount, or \$11,523 on average. According to the U.S. Department of Education, this level of indebtedness will take 15 years to pay back under the standard repayment plan.²⁷

This indebtedness calculation is used solely to estimate the loan payback period. Students will be paying back the principal amount of \$1.9 million over time. After taking into consideration the time value of money, this means that students will pay off a discounted present value of \$1.3 million in principal over the 15 years. In order to calculate interest, we only consider interest on the federal loans awarded to students in FY 2016-17. Using the student discount rate of 4.5%²⁸ as our interest rate, we calculate that students will pay a total discounted present value of \$567 thousand in interest on student loans

26 "Charts by Topic: Leisure and Sports Activities," American Time Use Survey, Last modified December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

27 Repayment period based on total education loan indebtedness, U.S. Department of Education, 2017. <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>.

28 The student discount rate is derived from the baseline forecasts for the 10-year discount rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



throughout the first 15 years of their working lifetime. The stream of these future interest costs together with the stream of loan payments is included in the costs of Column 5 of Table 3.2.

The steps leading up to the calculation of student costs appear in Table 3.1. Direct outlays amount to \$27.2 million, the sum of tuition and fees (\$9.1 million) and books and supplies (\$20.1 million), less federal loans received (\$1.9 million) and \$37.7 thousand in direct outlays of personal enrichment students (those students are excluded from the cost calculations). Opportunity costs for working and non-working students amount to \$54.9 million, excluding \$27.8 million in offsetting residual aid that is paid directly to students.²⁹ Finally, we have the present value of future student loan costs, amounting to \$1.9 million between principal and interest. Summing direct outlays, opportunity costs, and future student loan costs together yields a total of \$84 million in present value student costs.

TABLE 3.1: PRESENT VALUE OF STUDENT COSTS, FY 2016-17 (THOUSANDS)

Direct outlays in FY 2016-17	
Tuition and fees	\$9,085
Less federal loans received	-\$1,936
Books and supplies	\$20,068
Less direct outlays of personal enrichment students	-\$38
Total direct outlays	\$27,179
Opportunity costs in FY 2016-17	
Earnings foregone by non-working students	\$38,619
Earnings foregone by working students	\$36,388
Value of leisure time foregone by working students	\$7,684
Less residual aid	-\$27,806
Total opportunity costs	\$54,885
Future student loan costs (present value)	
Student loan principal	\$1,342
Student loan interest	\$567
Total present value student loan costs	\$1,909
Total present value student costs	\$83,972

Source: Based on data provided by RCCD and outputs of the Emsi impact model.

²⁹ Residual aid is the remaining portion of scholarship or grant aid distributed directly to a student after the college applies tuition and fees.



Linking education to earnings

Having estimated the costs of education to students, we weigh these costs against the benefits that students receive in return. The relationship between education and earnings is well documented and forms the basis for determining student benefits. As shown in Table 1.4, state mean earnings levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of education. The differences between state earnings levels define the incremental benefits of moving from one education level to the next.

A key component in determining the students' return on investment is the value of their future benefits stream; i.e., what they can expect to earn in return for the investment they make in education. We calculate the future benefits stream to the college's FY 2016-17 students first by determining their average annual increase in earnings, equal to \$38.6 million. This value represents the higher wages that accrue to students at the midpoint of their careers and is calculated based on the marginal wage increases of the CHEs that students complete while attending the college. Using the state of California earnings, the marginal wage increase per CHE is \$141. For a full description of the methodology used to derive the \$38.6 million, see Appendix 6.

The second step is to project the \$38.6 million annual increase in earnings into the future, for as long as students remain in the workforce. We do this using the Mincer function to predict the change in earnings at each point in an individual's working career.³⁰ The Mincer function originated from Mincer's seminal work on human capital (1958). The function estimates earnings using an individual's years of education and post-schooling experience. While some have criticized Mincer's earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Card (1999 and 2001) addresses a number of these criticisms using U.S. based research over the last three decades and concludes that any upward bias in the Mincer parameters is on the order of 10% or less. We use state-specific and education level-specific Mincer coefficients. To account for any upward bias, we incorporate a 10% reduction in our projected earnings, otherwise known as the ability bias. With the \$38.6 million representing the students' higher earnings at the midpoint of their careers, we apply scalars from the Mincer function to yield a stream of projected future benefits that gradually increase from the time students enter the workforce, peak shortly after the career midpoint, and then dampen slightly as students approach retirement at age 67. This earnings stream appears in Column 2 of Table 3.2.

As shown in Table 3.2, the \$38.6 million in gross higher earnings occurs around Year 16, which is the approximate midpoint of the students' future working



³⁰ Appendix 6 provides more information on the Mincer function and how it is used to predict future earnings growth.



TABLE 3.2: PROJECTED BENEFITS AND COSTS, STUDENT PERSPECTIVE

1	2	3	4	5	6
Year	Gross higher earnings to students (millions)	% active in workforce*	Net higher earnings to students (millions)	Student costs (millions)	Net cash flow (millions)
0	\$19.6	3%	\$0.5	\$82.1	-\$81.5
1	\$20.8	7%	\$1.6	\$0.2	\$1.4
2	\$22.1	17%	\$3.7	\$0.2	\$3.5
3	\$23.3	35%	\$8.0	\$0.2	\$7.9
4	\$24.5	62%	\$15.1	\$0.2	\$14.9
5	\$25.8	95%	\$24.4	\$0.2	\$24.2
6	\$27.1	95%	\$25.6	\$0.2	\$25.5
7	\$28.3	95%	\$26.8	\$0.2	\$26.7
8	\$29.6	95%	\$28.0	\$0.2	\$27.9
9	\$30.8	95%	\$29.2	\$0.2	\$29.0
10	\$32.0	95%	\$30.4	\$0.2	\$30.2
11	\$33.2	95%	\$31.5	\$0.2	\$31.3
12	\$34.4	95%	\$32.6	\$0.2	\$32.4
13	\$35.5	95%	\$33.6	\$0.2	\$33.5
14	\$36.6	95%	\$34.7	\$0.2	\$34.5
15	\$37.6	95%	\$35.6	\$0.2	\$35.4
16	\$38.6	95%	\$36.5	\$0.0	\$36.5
17	\$39.5	94%	\$37.3	\$0.0	\$37.3
18	\$40.3	94%	\$38.0	\$0.0	\$38.0
19	\$41.1	94%	\$38.7	\$0.0	\$38.7
20	\$41.8	94%	\$39.2	\$0.0	\$39.2
21	\$42.4	94%	\$39.7	\$0.0	\$39.7
22	\$42.9	93%	\$40.1	\$0.0	\$40.1
23	\$43.3	93%	\$40.4	\$0.0	\$40.4
24	\$43.6	93%	\$40.5	\$0.0	\$40.5
25	\$43.9	93%	\$40.6	\$0.0	\$40.6
26	\$44.0	92%	\$40.6	\$0.0	\$40.6
27	\$44.1	92%	\$40.4	\$0.0	\$40.4
28	\$44.0	91%	\$40.2	\$0.0	\$40.2
29	\$43.9	91%	\$39.8	\$0.0	\$39.8
30	\$43.6	90%	\$39.4	\$0.0	\$39.4
31	\$43.3	90%	\$38.8	\$0.0	\$38.8
32	\$42.9	89%	\$38.2	\$0.0	\$38.2
33	\$42.3	88%	\$37.5	\$0.0	\$37.5
34	\$41.7	88%	\$36.6	\$0.0	\$36.6
35	\$41.0	87%	\$35.7	\$0.0	\$35.7
36	\$40.3	86%	\$34.7	\$0.0	\$34.7
37	\$39.4	85%	\$33.7	\$0.0	\$33.7
38	\$38.5	84%	\$32.5	\$0.0	\$32.5
39	\$37.6	83%	\$31.3	\$0.0	\$31.3
40	\$36.5	82%	\$30.1	\$0.0	\$30.1
41	\$35.5	81%	\$28.8	\$0.0	\$28.8
Present value			\$539.5	\$84.0	\$455.5

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
20.7%	6.4	6.2

* Includes the "settling-in" factors and attrition.
 Source: Emsi impact model.



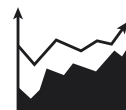
careers given the average age of the student population and an assumed retirement age of 67. In accordance with the Mincer function, the gross higher earnings that accrue to students in the years leading up to the midpoint are less than \$38.6 million and the gross higher earnings in the years after the midpoint are greater than \$38.6 million.

The final step in calculating the students' future benefits stream is to net out the potential benefits generated by students who are either not yet active in the workforce or who leave the workforce over time. This adjustment appears in Column 3 of Table 3.2 and represents the percentage of the FY 2016-17 student population that will be employed in the workforce in a given year. Note that the percentages in the first five years of the time horizon are relatively lower than those in subsequent years. This is because many students delay their entry into the workforce, either because they are still enrolled at the college or because they are unable to find a job immediately upon graduation. Accordingly, we apply a set of "settling-in" factors to account for the time needed by students to find employment and settle into their careers. As discussed in Chapter 2, settling-in factors delay the onset of the benefits by one to three years for students who graduate with a certificate or a degree and by one to five years for degree-seeking students who do not complete during the analysis year.

Beyond the first five years of the time horizon, students will leave the workforce for any number of reasons, whether death, retirement, or unemployment. We estimate the rate of attrition using the same data and assumptions applied in the calculation of the attrition rate in the economic impact analysis of Chapter 2.³¹ The likelihood of leaving the workforce increases as students age, so the attrition rate is more aggressive near the end of the time horizon than in the beginning. Column 4 of Table 3.2 shows the net higher earnings to students after accounting for both the settling-in patterns and attrition.

Return on investment to students

Having estimated the students' costs and their future benefits stream, the next step is to discount the results to the present to reflect the time value of money. For the student perspective we assume a discount rate of 4.5% (see below). Because students tend to rely upon debt to pay for their educations – i.e. they are negative savers – their discount rate is based upon student loan interest rates.³² In Appendix 1, we conduct a sensitivity analysis of this discount rate. The



Discount Rate

The discount rate is a rate of interest that converts future costs and benefits to present values. For example, \$1,000 in higher earnings realized 30 years in the future is worth much less than \$1,000 in the present. All future values must therefore be expressed in present value terms in order to compare them with investments (i.e., costs) made today. The selection of an appropriate discount rate, however, can become an arbitrary and controversial undertaking. As suggested in economic theory, the discount rate should reflect the investor's opportunity cost of capital, i.e., the rate of return one could reasonably expect to obtain from alternative investment schemes. In this study we assume a 4.5% discount rate from the student perspective and a 0.6% discount rate from the perspectives of taxpayers and society.

31 See the discussion of the alumni impact in Chapter 2. The main sources for deriving the attrition rate are the National Center for Health Statistics, the Social Security Administration, and the Bureau of Labor Statistics. Note that we do not account for migration patterns in the student investment analysis because the higher earnings that students receive as a result of their education will accrue to them regardless of where they find employment.

32 The student discount rate is derived from the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office. See the Congressional Budget Office, Student Loan and Pell Grant Programs – April 2018 Baseline. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.



present value of the benefits is then compared to student costs to derive the investment analysis results, expressed in terms of a benefit-cost ratio, rate of return, and payback period. The investment is feasible if returns match or exceed the minimum threshold values; i.e., a benefit-cost ratio greater than 1, a rate of return that exceeds the discount rate, and a reasonably short payback period.

In Table 3.2, the net higher earnings of students yield a cumulative discounted sum of approximately \$539.5 million, the present value of all of the future earnings increments (see the bottom section of Column 4). This may also be interpreted as the gross capital asset value of the students' higher earnings stream. In effect, the aggregate FY 2016-17 student body is rewarded for its investment in RCC with a capital asset valued at \$539.5 million.

The students' cost of attending the college is shown in Column 5 of Table 3.2, equal to a present value of \$84 million. Comparing the cost with the present value of benefits yields a student benefit-cost ratio of 6.4 (equal to \$539.5 million in benefits divided by \$84 million in costs).

Another way to compare the same benefits stream and associated cost is to compute the rate of return. The rate of return indicates the interest rate that a bank would have to pay a depositor to yield an equally attractive stream of future payments.³³ Table 3.2 shows students of RCC earning average returns of 20.7% on their investment of time and money. This is a favorable return compared, for example, to approximately 1% on a standard bank savings account, or 10% on stocks and bonds (30-year average return).

Note that returns reported in this study are real returns, not nominal. When a bank promises to pay a certain rate of interest on a savings account, it employs an implicitly nominal rate. Bonds operate in a similar manner. If it turns out that the inflation rate is higher than the stated rate of return, then money is lost in real terms. In contrast, a real rate of return is on top of inflation. For example, if inflation is running at 3% and a nominal percentage of 5% is paid, then the real rate of return on the investment is only 2%. In Table 3.2, the 20.7% student rate of return is a real rate. With an inflation rate of 2.1% (the average rate reported over the past 20 years as per the U.S. Department of Commerce, Consumer

*RCC students earn an average rate of return of **20.7%** for their investment of time and money.*

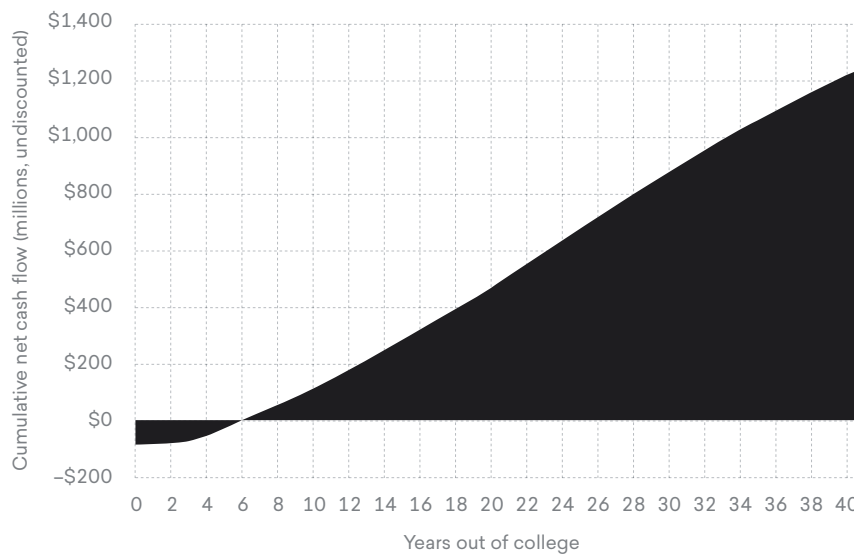
³³ Rates of return are computed using the familiar internal rate-of-return calculation. Note that, with a bank deposit or stock market investment, the depositor puts up a principal, receives in return a stream of periodic payments, and then recovers the principal at the end. Someone who invests in education, on the other hand, receives a stream of periodic payments that include the recovery of the principal as part of the periodic payments, but there is no principal recovery at the end. These differences notwithstanding comparable cash flows for both bank and education investors yield the same internal rate of return.



Price Index), the corresponding nominal rate of return is 22.9%, higher than what is reported in Table 3.2.

The payback period is defined as the length of time it takes to entirely recoup the initial investment.³⁴ Beyond that point, returns are what economists would call pure costless rent. As indicated in Table 3.2, students at RCC see, on average, a payback period of 6.2 years, meaning 6.2 years after their initial investment of foregone earnings and out-of-pocket costs, they will have received enough higher future earnings to fully recover those costs (Figure 3.1).

FIGURE 3.1: STUDENT PAYBACK PERIOD



Source: Emsi impact model.

34 Payback analysis is generally used by the business community to rank alternative investments when safety of investments is an issue. Its greatest drawback is it does not take into account the time value of money. The payback period is calculated by dividing the cost of the investment by the net return per period. In this study, the cost of the investment includes tuition and fees plus the opportunity cost of time; it does not take into account student living expenses.





Taxpayer perspective

From the taxpayer perspective, the pivotal step here is to home in on the public benefits that specifically accrue to state and local government. For example, benefits resulting from earnings growth are limited to increased state and local tax payments. Similarly, savings related to improved health, reduced crime, and fewer welfare and unemployment claims, discussed below, are limited to those received strictly by state and local government. In all instances, benefits to private residents, local businesses, or the federal government are excluded.

Growth in state tax revenues

As a result of their time at RCC, students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce. These in turn increase tax revenues since state and local government is able to apply tax rates to higher earnings.

Estimating the effect of RCC on increased tax revenues begins with the present value of the students' future earnings stream, which is displayed in Column 4 of Table 3.2. To this, we apply a multiplier derived from Emsi's MR-SAM model to estimate the added labor income created in the state as students and businesses spend their higher earnings.³⁵ As labor income increases, so does non-labor income, which consists of monies gained through investments. To calculate the growth in non-labor income, we multiply the increase in labor income by a ratio of the California gross state product to total labor income in the state. We also include the spending impacts discussed in Chapter 2 that were created in FY 2016-17 from operations and student spending. To each of these, we apply the prevailing tax rates so we capture only the tax revenues attributable to state and local government from this additional revenue.

Not all of these tax revenues may be counted as benefits to the state, however. Some students leave the state during the course of their careers, and the higher earnings they receive as a result of their education leaves the state with them. To account for this dynamic, we combine student settlement data from the college with data on migration patterns from the Census Bureau to estimate the number of students who will leave the state workforce over time.

³⁵ For a full description of the Emsi MR-SAM model, see Appendix 5.



TAXPAYER COSTS



State/Local Funding

TAXPAYER BENEFITS



Increased Tax Revenue



Avoided Costs to State/Local Government



We apply another reduction factor to account for the students' alternative education opportunities. This is the same adjustment that we use in the calculation of the alumni impact in Chapter 2 and is designed to account for the counterfactual scenario where RCC does not exist. The assumption in this case is that any benefits generated by students who could have received an education even without the college cannot be counted as new benefits to society. For this analysis, we assume an alternative education variable of 15%, meaning that 15% of the student population at the college would have generated benefits anyway even without the college. For more information on the alternative education variable, see Appendix 7.

We apply a final adjustment factor to account for the "shutdown point" that nets out benefits that are not directly linked to the state and local government costs of supporting the college. As with the alternative education variable discussed under the alumni impact, the purpose of this adjustment is to account for counterfactual scenarios. In this case, the counterfactual scenario is where state and local government funding for RCC did not exist and RCC had to derive the revenue elsewhere. To estimate this shutdown point, we apply a sub-model that simulates the students' demand curve for education by reducing state and local support to zero and progressively increasing student tuition and fees. As student tuition and fees increase, enrollment declines. For RCC, the shutdown point adjustment is 0%, meaning that the college could not operate without taxpayer support. As such, no reduction applies. For more information on the theory and methodology behind the estimation of the shutdown point, see Appendix 9.

After adjusting for attrition, alternative education opportunities, and the shutdown point, we calculate the present value of the future added tax revenues that occur in the state, equal to \$211.1 million. Recall from the discussion of the student return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%. This is the real treasury interest rate recommended by the Office of Management and Budget (OMB) for 30-year investments, and in Appendix 1, we conduct a sensitivity analysis of this discount rate.³⁶

Government savings

In addition to the creation of higher tax revenues to the state and local government, education is statistically associated with a variety of lifestyle changes

³⁶ Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



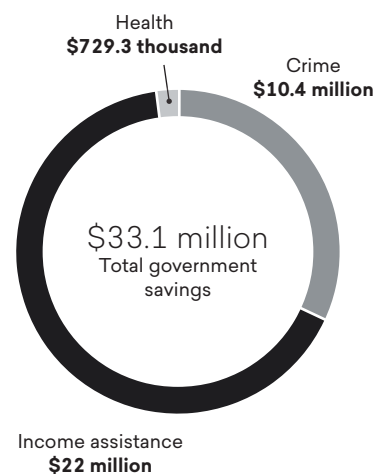
that generate social savings, also known as external or incidental benefits of education. These represent the avoided costs to the government that otherwise would have been drawn from public resources absent the education provided by RCC. Government savings appear in Figure 3.2 and Table 3.3 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. Health savings include avoided medical costs that would have otherwise been covered by state and local government. Crime savings consist of avoided costs to the justice system (i.e., police protection, judicial and legal, and corrections). Income assistance benefits comprise avoided costs due to the reduced number of welfare and unemployment insurance claims.

The model quantifies government savings by calculating the probability at each education level that individuals will have poor health, commit crimes, or claim welfare and unemployment benefits. Deriving the probabilities involves assembling data from a variety of studies and surveys analyzing the correlation between education and health, crime, and income assistance at the national and state level. We spread the probabilities across the education ladder and multiply the marginal differences by the number of students who achieved CHEs at each step. The sum of these marginal differences counts as the upper bound measure of the number of students who, due to the education they received at the college, will not have poor health, commit crimes, or demand income assistance. We dampen these results by the ability bias adjustment discussed earlier in the student perspective section and in Appendix 6 to account for factors (besides education) that influence individual behavior. We then multiply the marginal effects of education times the associated costs of health, crime, and income assistance.³⁷ Finally, we apply the same adjustments for attrition, alternative education, and the shutdown point to derive the net savings to the government. Total government savings appear in Figure 3.2 and sum to \$33.1 million.

Table 3.3 displays all benefits to taxpayers. The first row shows the added tax revenues created in the state, equal to \$211.1 million, from students' higher earnings, increases in non-labor income, and spending impacts. The sum of the government savings and the added income in the state is \$244.2 million, as shown in the bottom row of Table 3.3. These savings continue to accrue in the future as long as the FY 2016-17 student population of RCC remains in the workforce.

*In addition to the creation of **higher tax revenues** to the state and local government, education is statistically associated with a variety of lifestyle changes that generate **social savings**.*

FIGURE 3.2: PRESENT VALUE OF GOVERNMENT SAVINGS



Source: Emsi impact model.

³⁷ For a full list of the data sources used to calculate the social externalities, see the Resources and References section. See also Appendix 10 for a more in-depth description of the methodology.



TABLE 3.3: PRESENT VALUE OF ADDED TAX REVENUE AND GOVERNMENT SAVINGS (THOUSANDS)

Added tax revenue	\$211,129
Government savings	
Health-related savings	\$729
Crime-related savings	\$10,401
Income assistance savings	\$21,962
Total government savings	\$33,093
Total taxpayer benefits	\$244,222

Source: Emsi impact model.

Return on investment to taxpayers

Taxpayer costs are reported in Table 3.4 and come to \$110.5 million, equal to the contribution of state and local government to RCC. In return for their public support, taxpayers are rewarded with an investment benefit-cost ratio of 2.2 (= \$244.2 million ÷ \$110.5 million), indicating a profitable investment.

At 5.2%, the rate of return to state and local taxpayers is favorable. Given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%, the real treasury interest rate recommended by the Office of Management and Budget for 30-year investments.³⁸ This is the return governments are assumed to be able to earn on generally safe investments of unused funds, or alternatively, the interest rate for which governments, as relatively safe borrowers, can obtain funds. A rate of return of 0.6% would mean that the college just pays its own way. In principle, governments could borrow monies used to support RCC and repay the loans out of the resulting added taxes and reduced government expenditures. A rate of return of 5.2%, on the other hand, means that RCC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs. It is unlikely that other government programs could make such a claim.

*A rate of return of **5.2%** means that RCC not only pays its own way, but also generates a surplus that the state and local government can use to fund other programs.*

38 Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent). Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.



TABLE 3.4: PROJECTED BENEFITS AND COSTS, TAXPAYER PERSPECTIVE

1	2	3	4
Year	Benefits to taxpayers (millions)	State and local gov't costs (millions)	Net cash flow (millions)
0	\$15.5	\$110.5	-\$95.0
1	\$0.3	\$0.0	\$0.3
2	\$0.8	\$0.0	\$0.8
3	\$1.7	\$0.0	\$1.7
4	\$3.2	\$0.0	\$3.2
5	\$5.1	\$0.0	\$5.1
6	\$5.3	\$0.0	\$5.3
7	\$5.5	\$0.0	\$5.5
8	\$5.8	\$0.0	\$5.8
9	\$6.0	\$0.0	\$6.0
10	\$6.2	\$0.0	\$6.2
11	\$6.4	\$0.0	\$6.4
12	\$6.6	\$0.0	\$6.6
13	\$6.8	\$0.0	\$6.8
14	\$6.9	\$0.0	\$6.9
15	\$7.1	\$0.0	\$7.1
16	\$7.3	\$0.0	\$7.3
17	\$7.4	\$0.0	\$7.4
18	\$7.6	\$0.0	\$7.6
19	\$7.7	\$0.0	\$7.7
20	\$7.8	\$0.0	\$7.8
21	\$7.9	\$0.0	\$7.9
22	\$7.9	\$0.0	\$7.9
23	\$8.0	\$0.0	\$8.0
24	\$8.0	\$0.0	\$8.0
25	\$8.0	\$0.0	\$8.0
26	\$7.9	\$0.0	\$7.9
27	\$7.9	\$0.0	\$7.9
28	\$7.8	\$0.0	\$7.8
29	\$7.7	\$0.0	\$7.7
30	\$7.6	\$0.0	\$7.6
31	\$7.5	\$0.0	\$7.5
32	\$7.3	\$0.0	\$7.3
33	\$7.2	\$0.0	\$7.2
34	\$7.0	\$0.0	\$7.0
35	\$6.8	\$0.0	\$6.8
36	\$6.6	\$0.0	\$6.6
37	\$6.3	\$0.0	\$6.3
38	\$6.1	\$0.0	\$6.1
39	\$5.8	\$0.0	\$5.8
40	\$5.6	\$0.0	\$5.6
41	\$5.3	\$0.0	\$5.3
Present value	\$244.2	\$110.5	\$133.7

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
5.2%	2.2	17.9

Source: Emsi impact model.





Social perspective

California benefits from the education that RCC provides through the earnings that students create in the state and through the savings that they generate through their improved lifestyles. To receive these benefits, however, members of society must pay money and forego services that they otherwise would have enjoyed if RCC did not exist. Society's investment in RCC stretches across a number of investor groups, from students to employers to taxpayers. We weigh the benefits generated by RCC to these investor groups against the total social costs of generating those benefits. The total social costs include all RCC expenditures, all student expenditures (including interest on student loans) less tuition and fees, and all student opportunity costs, totaling a present value of \$231.6 million.

On the benefits side, any benefits that accrue to California as a whole – including students, employers, taxpayers, and anyone else who stands to benefit from the activities of RCC – are counted as benefits under the social perspective. We group these benefits under the following broad headings: 1) increased earnings in the state, and 2) social externalities stemming from improved health, reduced crime, and reduced unemployment in the state (see the Beekeeper Analogy box for a discussion of externalities). Both of these benefits components are described more fully in the following sections.

Growth in state economic base

In the process of absorbing the newly-acquired skills of students who attend RCC, not only does the productivity of the California workforce increase, but so does the productivity of its physical capital and assorted infrastructure. Students earn more because of the skills they learned while attending the college, and businesses earn more because student skills make capital more productive (buildings, machinery, and everything else). This in turn raises profits and other business property income. Together, increases in labor and non-labor (i.e., capital) income are considered the effect of a skilled workforce.

Estimating the effect of RCC on the state's economic base follows the same process used when calculating increased tax revenues in the taxpayer perspective. However, instead of looking at just the tax revenue portion, we include all of the added earnings and business output. We again factor in student attrition and alternative education opportunities. The shutdown point does not apply to the growth of the economic base because the social perspective captures not only the state and local taxpayer support to the college, but also the support from the students and other non-governmental sources.



SOCIAL COSTS



RCC Expenditures



Student Out-of-Pocket Expenses



Student Opportunity Costs

SOCIAL BENEFITS



Increased State Earnings



Avoided Costs to Society



After adjusting for attrition and alternative education opportunities, we calculate the present value of the future added income that occurs in the state, equal to \$3 billion. Recall from the discussion of the student and taxpayer return on investment that the present value represents the sum of the future benefits that accrue each year over the course of the time horizon, discounted to current year dollars to account for the time value of money. As stated in the taxpayer perspective, given that the stakeholder in this case is the public sector, we use the discount rate of 0.6%.

Social savings

Similar to the government savings discussed above, society as a whole sees savings due to external or incidental benefits of education. These represent the avoided costs that otherwise would have been drawn from private and public resources absent the education provided by RCC. Social benefits appear in Table 3.5 and break down into three main categories: 1) health savings, 2) crime savings, and 3) income assistance savings. These are similar to the categories from the taxpayer perspective above, although health savings now also include lost productivity and other effects associated with smoking, alcohol dependence, obesity, depression, and drug abuse. In addition to avoided costs to the justice system, crime savings also consist of avoided victim costs and benefits stemming from the added productivity of individuals who otherwise would have been incarcerated. Income assistance savings are comprised of the avoided government costs due to the reduced number of welfare and unemployment insurance claims.

Table 3.5 displays the results of the analysis. The first row shows the increased economic base in the state, equal to \$3 billion, from students' higher earnings and their multiplier effects, increases in non-labor income, and spending impacts. Social savings appear next, beginning with a breakdown of savings related to health. These include savings due to a reduced demand for medical treatment and social services, improved worker productivity and reduced absenteeism, and a reduced number of vehicle crashes and fires induced by alcohol or smoking-related incidents. Although the prevalence of these health conditions generally declines as individuals attain higher levels of education, prevalence rates are sometimes higher for individuals with certain levels of education. For example, adults with college degrees may be more likely to spend more on alcohol and become dependent on alcohol. Thus, in some cases the social savings associated with a health factor can be negative. Nevertheless, the overall health savings for society are positive, amounting to \$10.2 million. Crime savings amount to \$11 million, including savings associated with a reduced number of crime victims, added worker productivity, and reduced expenditures for police and law enforcement, courts and administration of



Beekeeper Analogy

Beekeepers provide a classic example of positive externalities (sometimes called “neighborhood effects”). The beekeeper’s intention is to make money selling honey. Like any other business, receipts must at least cover operating costs. If they don’t, the business shuts down.

But from society’s standpoint there is more. Flowers provide the nectar that bees need for honey production, and smart beekeepers locate near flowering sources such as orchards. Nearby orchard owners, in turn, benefit as the bees spread the pollen necessary for orchard growth and fruit production. This is an uncompensated external benefit of beekeeping, and economists have long recognized that society might actually do well to subsidize activities that produce positive externalities, such as beekeeping.

Educational institutions are like beekeepers. While their principal aim is to provide education and raise people’s earnings, in the process an array of external benefits is created. Students’ health and lifestyles are improved, and society indirectly benefits just as orchard owners indirectly benefit from beekeepers. Aiming at a more complete accounting of the benefits generated by education, the model tracks and accounts for many of these external social benefits.



justice, and corrective services. Finally, the present value of the savings related to income assistance amount to \$22 million, stemming from a reduced number of persons in need of welfare or unemployment benefits. All told, social savings amounted to \$43.2 million in benefits to communities and citizens in California.

TABLE 3.5: PRESENT VALUE OF THE FUTURE INCREASED ECONOMIC BASE AND SOCIAL SAVINGS IN THE STATE (THOUSANDS)

Increased economic base	\$2,988,296
Social Savings	
Health	
Smoking	\$20,898
Alcohol dependence	-\$11,110
Obesity	\$9,067
Depression	-\$8,182
Drug abuse	-\$478
Total health savings*	\$10,196
Crime	
Criminal justice system savings	\$10,320
Crime victim savings	\$126
Added productivity	\$556
Total crime savings	\$11,002
Income assistance	
Welfare savings	\$17,768
Unemployment savings	\$4,194
Total income assistance savings	\$21,962
Total social savings	\$43,160
Total, increased economic base + social savings	\$3,031,456

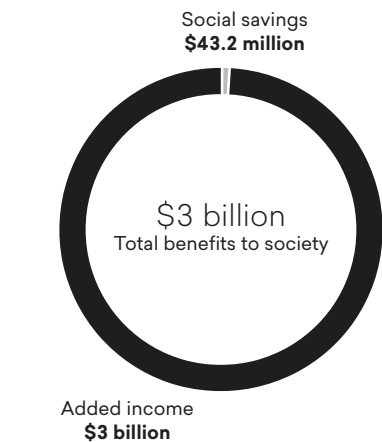
* In some cases, health savings may be negative. This is due to increased prevalence rates at certain education levels. Source: Emsi impact model.

The sum of the social savings and the increased state economic base is \$3 billion, as shown in the bottom row of Table 3.5 and in Figure 3.3. These savings accrue in the future as long as the FY 2016-17 student population of RCC remains in the workforce.

Return on investment to society

Table 3.6 presents the stream of benefits accruing to the California society and the total social costs of generating those benefits. Comparing the present value of the benefits and the social costs, we have a benefit-cost ratio of 13.1. This means that for every dollar invested in an education from RCC, whether it is the

FIGURE 3.3: PRESENT VALUE OF BENEFITS TO SOCIETY



Source: Emsi impact model.



TABLE 3.6: PROJECTED BENEFITS AND COSTS, SOCIAL PERSPECTIVE

1	2	3	4
Year	Benefits to society (millions)	Social costs (millions)	Net cash flow (millions)
0	\$249.6	\$229.1	\$20.5
1	\$4.1	\$0.2	\$3.9
2	\$9.7	\$0.2	\$9.6
3	\$21.2	\$0.2	\$21.1
4	\$39.7	\$0.2	\$39.6
5	\$63.9	\$0.2	\$63.7
6	\$66.5	\$0.2	\$66.4
7	\$69.1	\$0.2	\$69.0
8	\$71.7	\$0.2	\$71.5
9	\$74.2	\$0.2	\$74.0
10	\$76.6	\$0.2	\$76.4
11	\$79.0	\$0.2	\$78.8
12	\$81.2	\$0.2	\$81.0
13	\$83.3	\$0.2	\$83.1
14	\$85.3	\$0.2	\$85.1
15	\$87.1	\$0.2	\$87.0
16	\$88.8	\$0.0	\$88.8
17	\$90.4	\$0.0	\$90.4
18	\$91.7	\$0.0	\$91.7
19	\$92.9	\$0.0	\$92.9
20	\$93.8	\$0.0	\$93.8
21	\$94.6	\$0.0	\$94.6
22	\$95.1	\$0.0	\$95.1
23	\$95.4	\$0.0	\$95.4
24	\$95.5	\$0.0	\$95.5
25	\$95.4	\$0.0	\$95.4
26	\$95.0	\$0.0	\$95.0
27	\$94.4	\$0.0	\$94.4
28	\$93.6	\$0.0	\$93.6
29	\$92.6	\$0.0	\$92.6
30	\$91.3	\$0.0	\$91.3
31	\$89.8	\$0.0	\$89.8
32	\$88.2	\$0.0	\$88.2
33	\$86.3	\$0.0	\$86.3
34	\$84.2	\$0.0	\$84.2
35	\$82.0	\$0.0	\$82.0
36	\$79.5	\$0.0	\$79.5
37	\$76.9	\$0.0	\$76.9
38	\$74.2	\$0.0	\$74.2
39	\$71.4	\$0.0	\$71.4
40	\$68.4	\$0.0	\$68.4
41	\$65.3	\$0.0	\$65.3
Present value	\$3,031.5	\$231.6	\$2,799.8

Benefit-cost ratio

13.1

Source: Emsi impact model.



money spent on operations of the college or money spent by students on tuition and fees, an average of \$13.10 in benefits will accrue to society in California.³⁹

With and without social savings

Earlier in this chapter, social benefits attributable to education (improved health, reduced crime, and reduced demand for income assistance) were defined as externalities that are incidental to the operations of RCC. Some would question the legitimacy of including these benefits in the calculation of rates of return to education, arguing that only the tangible benefits (higher earnings) should be counted. Table 3.4 and Table 3.6 are inclusive of social benefits reported as attributable to RCC. Recognizing the other point of view, Table 3.7 shows rates of return for both the taxpayer and social perspectives exclusive of social benefits. As indicated, returns are still above threshold values (a benefit-cost ratio greater than 1.0 and a rate of return greater than 0.6%), confirming that taxpayers receive value from investing in RCC.

TABLE 3.7: TAXPAYER AND SOCIAL PERSPECTIVES WITH AND WITHOUT SOCIAL SAVINGS

	Including social savings	Excluding social savings
Taxpayer perspective		
Net present value (millions)	\$133.7	\$100.6
Benefit-cost ratio	2.2	1.9
Internal rate of return	5.2%	4.2%
Payback period (no. of years)	17.9	21.3
Social perspective		
Net present value (millions)	\$2,799.8	\$2,756.7
Benefit-cost ratio	13.1	12.9

Source: Emsi impact model.

³⁹ The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.



CHAPTER 4:
Conclusion



WHILE RCC's value to the RCC Service Area is larger than simply its economic impact, understanding the dollars and cents value is an important asset to understanding the college's value as a whole. In order to fully assess RCC's value to the regional economy, this report has evaluated the college from the perspectives of economic impact analysis and investment analysis.

From an economic impact perspective, we calculated that RCC generates a total economic impact of **\$356.8 million** in total added income for the regional economy. This represents the sum of several different impacts, including the college's:

- Operations spending impact (**\$103.3 million**);
- Student spending impact (**\$12.3 million**); and
- Alumni impact (**\$241.2 million**).

The total impact of \$356.8 million is equivalent to approximately **1.0%** of the total GRP of the RCC Service Area and is equivalent to supporting **5,484** jobs. For perspective, this means that one out of every **77** jobs in the RCC Service Area is supported by the activities of RCC and its students.

Since RCC's activity represents an investment by various parties, including students, taxpayers, and society as a whole, we also considered the college as an investment to see the value it provides to these investors. For each dollar invested by students, taxpayers, and society, RCC offers a benefit of **\$6.40**, **\$2.20**, and **\$13.10**, respectively. These results indicate that RCC is an attractive investment to students with rates of return that exceed alternative investment opportunities. At the same time, the presence of the college expands the state economy and creates a wide range of positive social benefits that accrue to taxpayers and society in general within California.

Modeling the impact of the college is subject to many factors, the variability of which we considered in our sensitivity analysis (Appendix 1). With this variability accounted for, we present the findings of this study as a robust picture of the economic value of RCC.



One out of every 77 jobs in the RCC Service Area is supported by the activities of RCC and its students.



Resources and References

Administration for Children and Families. "Fiscal Year 2016 TANF Financial Data." *Office of Family Assistance, TANF Financial Data*. 2018. <https://www.acf.hhs.gov/ofa/resource/tanf-financial-data-fy-2016>.

Arias, Elizabeth. "United States Life Tables, 2008." *National Vital Statistics Reports* 61, no. 3 (September 24, 2012). Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_03.pdf.

Baryla, Edward and Douglas Dotterweich. "Student Migration: Do Significant Factors Vary by Region?" *Education Economics* 9, no. 3 (2001).

Becker, Gary S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia College Press for NBER, 1964.

Bilkic, Natasa, Thomas Gries, and Margarethe Pilichowski. "Stay in School or Start Working? The Human Capital Investment Decision under Uncertainty and Irreversibility." *Labour Economics* 19, no. 5 (October 2012): 706-717.

Bureau of Economic Analysis. "Table 1.1.6. Real Gross Domestic Product, Chained Dollars." *GDP and Personal Income*. Last modified January 27, 2017. <http://www.bea.gov/iTable/iTableHtml.cfm?reqid=9&step=3&isuri=1&903=6>.

Bureau of Justice Statistics. "Table 2: Prisoners under the Jurisdiction of State or Federal Correctional Authorities, by Jurisdiction, December 31, 2015 and 2016." *Prisoners in 2016, NCJ 251149, 2018*. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Bureau of Labor Statistics. "Charts by Topic: Leisure and Sports Activities." *American Time Use Survey*. December 2016. <http://www.bls.gov/TUS/CHARTS/LEISURE.HTM>.

Bureau of Labor Statistics. "Charts by Topic: Students." *American Time Use Survey*. December 2016. <https://www.bls.gov/TUS/CHARTS/STUDENTS.HTM>.

Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." *Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017*. <http://www.bls.gov/cps/cpsaat07.pdf>.

Bureau of Labor Statistics. "Table 24: Historical Consumer Price Index for all Urban Consumers (CPI-U): U.S. City Average, All Items." 2018. <https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-201801.pdf>.



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- Buss, Christian, Jeffrey Parker, and Jon Rivenburg. "Cost, Quality and Enrollment Demand at Liberal Arts Colleges." *Economics of Education Review* 23, no. 1 (February 2004): 57-65.
- Card, David. "The Causal Effect of Education on Earnings." *Handbook of Labor Economics* 3 (1999): 1801-1863.
- Card, David. "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems." *Econometrica* 69, no. 5 (September 2001): 1127-1160.
- Center on Budget and Policy Priorities. "Policy Basics - How Many Weeks of Unemployment are Available?" April 2018. <https://www.cbpp.org/sites/default/files/atoms/files/policybasics-uiweeks.pdf>.
- Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data* [Data set]. <https://www.cdc.gov/statesystem/cigaretteuseadult.html>.
- Centers for Disease Control and Prevention. "Heavy Drinkers (Adult Men Having More Than Two Drinks per Day and Adult Women Having More Than One Drink per Day)." *Alcohol Consumption - 2016 Behavioral Risk Factor Surveillance System Prevalence and Trends Data*. https://nccd.cdc.gov/BRFSSPrevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByTopic&irbLocationType=StatesAndMMSA&islClass=CLASS01&islTopic=TOPIC30&islYear=2016&islLocation=
- Centers for Disease Control and Prevention. "Table. Characteristics of Current Adult Cigarette Smokers." *National Health Interview Survey, United States, 2016*. https://www.cdc.gov/mmwr/volumes/67/wr/mm6702a1.htm#T1_down.
- Centers for Medicare and Medicaid Services. "Table 16: National Health Expenditures, Amounts and Average Annual Growth from Previous Year Shown, by Type of Sponsor, Selected Calendar Years 2009-2025." *NHE Projections 2015-2025 - Tables*. February 2016. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
- College Board. "Figure 1: Average Estimated Full-Time Undergraduate Budgets, 2018-19 (Enrollment-Weighted)." *The College Board, Annual Survey of Colleges, Average Estimated Undergraduate Budgets, 2018-19*. <https://trends.collegeboard.org/college-pricing/figures-tables/average-estimated-undergraduate-budgets-2018-19>.
- Congressional Budget Office. "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline." *Congressional Budget Office Publications CBO's April 2018 Baseline Projections for the Student Loan Program*. Last

modified April 2018. <https://www.cbo.gov/system/files?file=2018-06/51310-2018-04-studentloan.pdf>.

Criminal Justice Expenditure and Employment Extracts Program. "Table 4. Justice System Expenditure by Character, State and Type of Government, Fiscal Year 2015" *Justice Expenditure and Employment Extracts 2015 (preliminary) NCJ 251780*. <https://www.bjs.gov/index.cfm?ty=dcdetail&iid=286>.

Dickerson, Andy, and Steven McIntosh. "The Impact of Distance to Nearest Education Institution on the Post Compulsory Education Participation Decision." *Urban Studies* 50, no. 4 (2013): 742-758.

Dynarski, Susan M. "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *American Economic Review* 93, no. 1 (2003): 279-288.

Emsi Labor Market Data and Software. www.economicmodeling.com.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 1: Crime in the United States." Crime in the United States 2016, Offenses Known to Law Enforcement. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-1>.

Federal Bureau of Investigation, Criminal Justice Information Services Division. "Table 18: Estimated Number of Arrests, United States, 2016" in "Uniform Crime Reports." Crime in the United States, 2016, Persons Arrested. <https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-18>.

Finkelstein, Eric A., Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale. "The Costs of Obesity in the Workplace." *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" *Journal of Clinical Psychiatry* 76:2, 2015.

Guerino, Paul, Paige M. Harrison, and William J. Sabol. "Prisoners in 2016." *Bureau of Justice Statistics NCJ 236096*, January 2018. <https://www.bjs.gov/content/pub/pdf/p16.pdf>.

Hamadeh, Mohamad and Roy Khoueiri. "Demand Elasticities for Higher Education in the United States." *International Journal of Business and Economic Perspectives* 5, no. 2 (2010): 60-67.

Henderson, James M. and Richard E. Quandt. *Microeconomic Theory: A Mathematical Approach*. New York: McGraw-Hill Book Company, 1971.

Hernández-Murillo, Rubén, Lesli S. Ott, Michael T. Owyang, and Denise Whalen. "Patterns of Interstate Migration in the United States from the Sur-

- vey of Income and Program Participation.” *Federal Reserve Bank of St. Louis Review* 93, no. 3 (May/June 2011): 169-186. <https://files.stlouisfed.org/files/htdocs/publications/review/11/05/169-186Hernandez.pdf>.
- Jaeger, David A. and Marianne E. Page. “New Evidence on Sheepskin Effects in the Returns to Education.” *The Review of Economics and Statistics* 78, no. 4 (November 1996): 733-740.
- Jamal Ahmed, Elyse Phillips, Andrea S. Gentzke, David M. Homa, Stephen D. Babb, Brian A. King, and Linda J. Neff. “Current Cigarette Smoking Among Adults – United States, 2016.” *Morbidity and Mortality Weekly Report* 2018 67:53-59. DOI: <http://dx.doi.org/10.15585/mmwr.mm6702a1>.
- Kaeding, Nicole. “State Individual Income Tax Rates and Brackets for 2016.” *Tax Foundation Fiscal Fact* no. 500 (February 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF500.pdf.
- Kelchtermans, Stijn and Frank Verboven. “Participation and Study Decisions in a Public System of Higher Education.” *Journal of Applied Econometrics* 25, no. 3 (2010): 355-391.
- Leigh, Andrew and Chris Ryan. “Estimating Returns to Education Using Different Natural Experiments Techniques.” *Economics of Education Review* 27 (2008): 149-160.
- Leonesio, Michael V. “The Economics of Retirement: A Nontechnical Guide.” *Social Security Bulletin* 59, no. 4 (Winter 1996): 29-50.
- McCollister, Kathryn E., Michael T. French, and Hai Fang. “The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation.” *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835847>.
- Mincer, Jacob. “Investment in Human Capital and Personal Income Distribution.” *Journal of Political Economy* 66, no. 4 (August 1958): 281-302.
- Mincer, Jacob. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research, 1974.
- Morgan, James N. and Edward H. Robb. “The Impact of Age Upon Interregional Migration.” *The Annals of Regional Science* 15, no. 3 (November 1981): 31-45.
- National Center for Education Statistics. Integrated Post-secondary Education Data System (IPEDS). <http://nces.ed.gov/ipeds>.
- National Center for Education Statistics. “Table 219.60 Number of People Taking the GED Test and Percentage Distribution of Those who Passed, by Age Group: 1971 through 2013.” *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_219.60.asp?current=yes.

- National Center for Education Statistics. "Table 507.20 Participants in State-Administered Adult Basic Education, Secondary Education, and English as a Second Language Programs, by Type of Program and State or Jurisdiction: Selected Fiscal Years, 2000 through 2014." *Digest of Education Statistics*. 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_507.20.asp?current=yes.
- National Center for Health Statistics. "Table 58. Normal Weight, Overweight, and Obesity Among Persons 20 Years of Age and Over, by Selected Characteristics: United States, Selected Years 1988-1994 through 2011-2014." *Centers for Disease Control and Prevention, Health, United States, 2015*. <https://www.cdc.gov/nchs/data/hus/2015/058.pdf>.
- National Employment Law Project. "Unemployment Insurance: An Overview of the Challenges and Strengths of Today's System". 2016. <https://waysandmeans.house.gov/wp-content/uploads/2016/09/20160907HR-Testimony-Conti.pdf>.
- National Survey on Drug Use and Health. "Table 19. Illicit Drug Use Disorder in the Past Year, by Age Group and State: Percentages, Annual Averages Based on 2015 and 2016 NSDUHs." *National Survey on Drug Use and Health: Model-Based Prevalence Estimates (50 States and the District of Columbia)*. <https://www.samhsa.gov/data/sites/default/files/NSDUHsaePercents2016/NSDUHsaePercents2016.pdf>
- National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016." <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf>.
- National Survey on Drug Use and Health. "Table 15: Major Depressive Episode in the Past Year, by age group and state: Percentages, annual averages, and P values from tests of differences between percentages, 2008-2009 and 2015-2016." <https://www.samhsa.gov/data/sites/default/files/NSDUHsae-ShortTermCHG2016/NSDUHsaeShortTermCHG2016.htm>.
- Nowotny, Kathryn, Ryan Masters, and Jason Boardman, 2016. "The relationship between education and health among incarcerated man and women in the United States" *BMC Public Health*. September 2016. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5009667/>.

- OECD. "Household Net Saving Rates: As a Percentage of Household Disposable Income." *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics* (2016). <http://dx.doi.org/10.1787/factbook-2015-19-en>.
- Office of Management and Budget. "Discount Rates for Cost-Effectiveness Analysis of Federal Programs." *Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent)*. Last modified February 2018. <https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf>.
- Ogden, Cynthia L., Molly M. Lamb, Margaret D. Carroll, and Katherine M. Flegal. "Figure 3. Prevalence of Obesity among Adults Aged 20 Years and Over, by Education, Sex, and Race and Ethnicity: United States 2005-2008." *Obesity and Socioeconomic Status in Adults: United States 2005-2008*, National Center for Health Statistics no. 50. (2010).
- Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017). https://www.cdc.gov/mmwr/volumes/66/wr/mm6650a1.htm?s_cid=mm6650a1_w#suggestedcitation.
- Polachek, Solomon W. "Earnings Over the Lifecycle: The Mincer Earnings Function and its Applications." *Foundations and Trends in Microeconomics* 4, no. 3 (2008): 165-272.
- Polachek, Solomon W. "Mincer's Overtaking Point and the Lifecycle Earnings Distribution." *Review of the Economics of the Household* 1, no. 4 (December 2003): 273-304.
- Ramey, Valerie and Neville Francis. "A Century of Work and Leisure." *American Economic Journal: Macroeconomics* 1, no. 2 (2009): 189-224.
- Sacks, Gonzales, Bouchery, Tomedi, & Brewer (2015). 2010 National and State Costs of Excessive Alcohol Consumption. *American Journal of Preventive Medicine*, 49(5), E73-E79. [https://www.ajpmonline.org/article/S0749-3797\(15\)00354-2/pdf/](https://www.ajpmonline.org/article/S0749-3797(15)00354-2/pdf/).
- Sevilla, Almudena, Jose Ignacio Gimenez-Nadal, and Jonathan I. Gershuny. "Leisure Inequality in the United States: 1965-2003." IZA Discussion Paper no. 6708 (July 2012).
- Social Security Administration. "Retirement Benefits." *Full Retirement Age*. May 2016. <https://www.ssa.gov/pubs/EN-05-10035.pdf>.
- State of Obesity. "Adult Obesity in the United States." Adult Obesity Rate by State, 2016. <https://stateofobesity.org/adult-obesity/>.

- Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." *Behavioral Health Spending & Use Accounts, 1986 – 2014. HHS Publication No. SMA-16-4975, 2016.* <https://store.samhsa.gov/shin/content/SMA16-4975/SMA16-4975.pdf>.
- Substance Abuse and Mental Health Services Administration. "Table 5.4B - Illicit Drug Use Disorder in Past Year among Persons Aged 12 or Older, by Age Group and Demographic Characteristics: Percentages, 2015 and 2016" SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-4B>.
- Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.htm#tab5-6A>.
- Supplemental Nutrition Assistance Program. "State Activity Report Fiscal Year 2016." *Food and Nutrition Service, Supplemental Nutrition Assistance Program, Program Accountability and Administration Division* (September 2017). <https://fns-prod.azureedge.net/sites/default/files/snap/FY16-State-Activity-Report.pdf>.
- U.S. Census Bureau. "Annual Estimates of the Resident Population for Selected Age Groups by Sex: April 1, 2010 to July 1, 2015." *National Population by Characteristics Tables: 2010-2015*. December 2016. <http://www.census.gov/data/tables/2015/demo/popest/nation-detail.html>.
- U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011. <https://www.census.gov/library/working-papers/2011/demo/SEHSD-WP2011-08.html>.
- U.S. Census Bureau. "Social Insurance and Human Services." *The 2012 Statistical Abstract*. http://www.census.gov/compendia/statab/cats/social_insurance_human_services.html.
- U.S. Department of Agriculture, Office of Policy Support. Supplemental Nutrition Assistance Program Nutrition Assistance Program Report Series. "Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2016." <https://fns-prod.azureedge.net/sites/default/files/ops/Characteristics2016.pdf>.

- U.S. Department of Education, Federal Student Aid Office. “The Standard Repayment Plan.” <https://studentaid.ed.gov/sa/repay-loans/understand/plans/standard>
- U.S. Department of Health and Human Services. “2016 Welfare Indicators and Risk Factors: Fifteenth Report to Congress” Annual Report to Congress, 2016. <https://aspe.hhs.gov/system/files/pdf/206736/WelfareIndicators15thReport.pdf>.
- U.S. Department of Health and Human Services, Office of Family Assistance. “Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016.” <https://www.acf.hhs.gov/ofa/resource/characteristics-and-financial-circumstances-of-tanf-recipients-fiscal-year-2016-0>.
- U.S. Department of Health & Human Services. “The Health Consequences of Smoking—50 Years of Progress.” A Report of the Surgeon General, 2014. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/50-years-of-progress-by-section.html>.
- U.S. Department of Labor. “Unemployment Insurance Data Summary, 4th Quarter 2017.” https://workforcesecurity.doleta.gov/unemploy/content/data_stats/datasum17/DataSum_2017_4.pdf.
- Walczak, Jared, Scott Drenkard. “State and Local Sales Tax Rates, Midyear 2016.” *Tax Foundation Fiscal Fact* no. 515 (July 2016). https://files.taxfoundation.org/legacy/docs/TaxFoundation_FF515.pdf.
- Walden, Michael, “The Local Economic Impact of the Cooperating Raleigh Colleges: Update 2013.” March 2014. <http://crcraleighcolleges.org/files/crcimpact2013-final.pdf>.

Appendix 1: Sensitivity Analysis

Sensitivity analysis measures the extent to which a model’s outputs are affected by hypothetical changes in the background data and assumptions. This is especially important when those variables are inherently uncertain. This analysis allows us to identify a plausible range of potential results that would occur if the value of any of the variables is in fact different from what was expected. In this chapter we test the sensitivity of the model to the following input factors: 1) the alternative education variable, 2) the labor import effect variable, 3) the student employment variables, 4) the discount rate, and 5) the retained student variable.

Alternative education variable

The alternative education variable (15%) accounts for the counterfactual scenario where students would have to seek a similar education elsewhere absent the publicly-funded college in the region. Given the difficulty in accurately specifying the alternative education variable, we test the sensitivity of the taxpayer and social investment analysis results to its magnitude. Variations in the alternative education assumption are calculated around base case results listed in the middle column of Table A1.1. Next, the model brackets the base case assumption on either side with a plus or minus 10%, 25%, and 50% variation in assumptions. Analyses are then repeated introducing one change at a time, holding all other variables constant. For example, an increase of 10% in the alternative education assumption (from 15% to 17%) reduces the taxpayer perspective rate of return from 5.2% to 5.1%. Likewise, a decrease of 10% (from 15% to 14%) in the assumption increases the rate of return from 5.2% to 5.3%.

TABLE A1.1 SENSITIVITY ANALYSIS OF ALTERNATIVE EDUCATION VARIABLE, TAXPAYER AND SOCIAL PERSPECTIVES

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Alternative education variable	8%	11%	14%	15%	17%	19%	23%
Taxpayer perspective							
Net present value (millions)	\$155	\$144	\$138	\$134	\$129	\$123	\$112
Rate of return	5.8%	5.5%	5.3%	5.2%	5.1%	4.9%	4.5%
Benefit-cost ratio	2.4	2.3	2.2	2.2	2.2	2.1	2.0
Social perspective							
Net present value (millions)	\$3,067	\$2,934	\$2,853	\$2,800	\$2,746	\$2,666	\$2,532
Benefit-cost ratio	14.2	13.7	13.3	13.1	12.9	12.5	11.9

Based on this sensitivity analysis, the conclusion can be drawn that RCC investment analysis results from the taxpayer and social perspectives are not very sensitive to relatively large variations in the alternative education variable. As indicated, results are still above their threshold levels (net present value greater than 0, benefit-cost ratio greater than 1, and rate of return greater than the discount rate of 0.6%), even when the alternative education assumption is increased by as much as 50% (from 15% to 23%). The conclusion is that although the assumption is difficult to specify, its impact on overall investment analysis results for the taxpayer and social perspectives is not very sensitive.

Labor import effect variable

The labor import effect variable only affects the alumni impact calculation in Table 2.6. In the model we assume a labor import effect variable of 50%, which means that 50% of the region’s labor demands would have been satisfied without the presence of RCC. In other words, businesses that hired RCC students could have substituted some of these workers with equally-qualified people from outside the region had there been no RCC students to hire. Therefore, we attribute only the remaining 50% of the initial labor income generated by increased alumni productivity to the college.

Table A1.2 presents the results of the sensitivity analysis for the labor import effect variable. As explained earlier, the assumption increases and decreases relative to the base case of 50% by the increments indicated in the table. Alumni productivity impacts attributable to RCC, for example, range from a high of \$361.7 million at a -50% variation to a low of \$120.6 million at a +50% variation from the base case assumption. This means that if the labor import effect variable increases, the impact that we claim as attributable to alumni decreases. Even under the most conservative assumptions, the alumni impact on the RCC Service Area economy still remains sizeable.

TABLE A1.2: SENSITIVITY ANALYSIS OF LABOR IMPORT EFFECT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Labor import effect variable	25%	38%	45%	50%	55%	63%	75%
Alumni impact (millions)	\$362	\$301	\$265	\$241	\$217	\$181	\$121

Student employment variables

Student employment variables are difficult to estimate because many students do not report their employment status or because colleges generally do not collect this kind of information. Employment variables include the following: 1) the percentage of students who are employed while attending the college and 2) the percentage of earnings that working students receive relative to the

earnings they would have received had they not chosen to attend the college. Both employment variables affect the investment analysis results from the student perspective.

Students incur substantial expense by attending RCC because of the time they spend not gainfully employed. Some of that cost is recaptured if students remain partially (or fully) employed while attending. It is estimated that 75% of students are employed.⁴⁰ This variable is tested in the sensitivity analysis by changing it first to 100% and then to 0%.

The second student employment variable is more difficult to estimate. In this study we estimate that students who are working while attending the college earn only 69%, on average, of the earnings that they statistically would have received if not attending RCC. This suggests that many students hold part-time jobs that accommodate their RCC attendance, though it is at an additional cost in terms of receiving a wage that is less than what they otherwise might make. The 69% variable is an estimation based on the average hourly wages of the most common jobs held by students while attending college relative to the average hourly wages of all occupations in the U.S. The model captures this difference in wages and counts it as part of the opportunity cost of time. As above, the 69% estimate is tested in the sensitivity analysis by changing it to 100% and then to 0%.

The changes generate results summarized in Table A1.3, with A defined as the percent of students employed and B defined as the percent that students earn relative to their full earning potential. Base case results appear in the shaded row; here the assumptions remain unchanged, with A equal to 75% and B equal to 69%. Sensitivity analysis results are shown in non-shaded rows. Scenario 1 increases A to 100% while holding B constant, Scenario 2 increases B to 100% while holding A constant, Scenario 3 increases both A and B to 100%, and Scenario 4 decreases both A and B to 0%.

TABLE A1.3: SENSITIVITY ANALYSIS OF STUDENT EMPLOYMENT VARIABLES

Variations in assumptions	Net present value (millions)	Internal rate of return	Benefit-cost ratio
Base case: A = 75%, B = 69%	\$455.5	20.7%	6.4
Scenario 1: A = 100%, B = 69%	\$479.5	25.7%	9.0
Scenario 2: A = 75%, B = 100%	\$491.9	29.8%	11.3
Scenario 3: A = 100%, B = 100%	\$528.0	73.0%	46.8
Scenario 4: A = 0%, B = 0%	\$383.7	13.6%	3.5

Note: A = percent of students employed; B = percent earned relative to statistical averages

⁴⁰ Emsi provided an estimate of the percentage of students employed because RCC was unable to provide data. This figure excludes dual credit high school students, who are not included in the opportunity cost calculations.

- **Scenario 1:** Increasing the percentage of students employed (A) from 75% to 100%, the net present value, internal rate of return, and benefit-cost ratio improve to \$479.5 million, 25.7%, and 9.0, respectively, relative to base case results. Improved results are attributable to a lower opportunity cost of time; all students are employed in this case.
- **Scenario 2:** Increasing earnings relative to statistical averages (B) from 69% to 100%, the net present value, internal rate of return, and benefit-cost ratio results improve to \$491.9 million, 29.8%, and 11.3, respectively, relative to base case results; a strong improvement, again attributable to a lower opportunity cost of time.
- **Scenario 3:** Increasing both assumptions A and B to 100% simultaneously, the net present value, internal rate of return, and benefit-cost ratio improve yet further to \$528 million, 73.0%, and 46.8, respectively, relative to base case results. This scenario assumes that all students are fully employed and earning full salaries (equal to statistical averages) while attending classes.
- **Scenario 4:** Finally, decreasing both A and B to 0% reduces the net present value, internal rate of return, and benefit-cost ratio to \$383.7 million, 13.6%, and 3.5, respectively, relative to base case results. These results are reflective of an increased opportunity cost; none of the students are employed in this case.⁴¹

It is strongly emphasized in this section that base case results are very attractive in that results are all above their threshold levels. As is clearly demonstrated here, results of the first three alternative scenarios appear much more attractive, although they overstate benefits. Results presented in Chapter 3 are realistic, indicating that investments in RCC generate excellent returns, well above the long-term average percent rates of return in stock and bond markets.

Discount rate

The discount rate is a rate of interest that converts future monies to their present value. In investment analysis, the discount rate accounts for two fundamental principles: 1) the time value of money, and 2) the level of risk that an investor is willing to accept. Time value of money refers to the value of money after interest or inflation has accrued over a given length of time. An investor must be willing to forego the use of money in the present to receive compensation for it in the future. The discount rate also addresses the investors' risk preferences by serving as a proxy for the minimum rate of return that the proposed risky asset must be expected to yield before the investors will be persuaded to invest in it. Typically, this minimum rate of return is determined by the known

⁴¹ Note that reducing the percent of students employed to 0% automatically negates the percent they earn relative to full earning potential, since none of the students receive any earnings in this case.

returns of less risky assets where the investors might alternatively consider placing their money.

In this study, we assume a 4.5% discount rate for students and a 0.6% discount rate for society and taxpayers.⁴² Similar to the sensitivity analysis of the alternative education variable, we vary the base case discount rates for students, taxpayers, and society on either side by increasing the discount rate by 10%, 25%, and 50%, and then reducing it by 10%, 25%, and 50%. Note that, because the rate of return and the payback period are both based on the undiscounted cash flows, they are unaffected by changes in the discount rate. As such, only variations in the net present value and the benefit-cost ratio are shown for students, taxpayers, and society in Table A1.4.

TABLE A1.4: SENSITIVITY ANALYSIS OF DISCOUNT RATE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Student perspective							
Discount rate	2.2%	3.3%	4.0%	4.5%	4.9%	5.6%	6.7%
Net present value (millions)	\$738	\$577	\$500	\$456	\$415	\$362	\$351
Benefit-cost ratio	9.8	7.9	7.0	6.4	5.9	5.3	5.2
Taxpayer perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$149	\$141	\$137	\$134	\$131	\$126	\$119
Benefit-cost ratio	2.4	2.3	2.2	2.2	2.2	2.1	2.1
Social perspective							
Discount rate	0.3%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%
Net present value (millions)	\$2,990	\$2,893	\$2,837	\$2,800	\$2,764	\$2,710	\$2,625
Benefit-cost ratio	13.9	13.5	13.2	13.1	12.9	12.7	12.3

As demonstrated in the table, an increase in the discount rate leads to a corresponding decrease in the expected returns, and vice versa. For example, increasing the student discount rate by 50% (from 4.5% to 6.7%) reduces the students' benefit-cost ratio from 6.4 to 5.2. Conversely, reducing the discount rate for students by 50% (from 4.5% to 2.2%) increases the benefit-cost ratio from 6.4 to 9.8. The sensitivity analysis results for society and taxpayers show the same inverse relationship between the discount rate and the benefit-cost ratio, with the variance in results being the greatest under the social perspective (from a 13.9 benefit-cost ratio at a -50% variation from the base case, to a 12.3 benefit-cost ratio at a 50% variation from the base case).

42 These values are based on the baseline forecasts for the 10-year Treasury rate published by the Congressional Budget Office and the real treasury interest rates recommended by the Office of Management and Budget for 30-year investments. See the Congressional Budget Office "Table 4. Projection of Borrower Interest Rates: CBO's April 2018 Baseline" and the Office of Management and Budget "Discount Rates for Cost-Effectiveness of Federal Programs."

Retained student variable

The retained student variable only affects the student spending impact calculation in Table 2.4. For this analysis, we assume a retained student variable of 10%, which means that 10% of RCC's students who originated from the RCC Service Area would have left the region for other opportunities, whether that be education or employment, if RCC did not exist. The money these retained students spent in the region for accommodation and other personal and household expenses is attributable to RCC.

Table A1.5 presents the results of the sensitivity analysis for the retained student variable. The assumption increases and decreases relative to the base case of 10% by the increments indicated in the table. The student spending impact is recalculated at each value of the assumption, holding all else constant. Student spending impacts attributable to RCC range from a high of \$18.5 million when the retained student variable is 15% to a low of \$6.2 million when the retained student variable is 5%. This means as the retained student variable decreases, the student spending attributable to RCC decreases. Even under the most conservative assumptions, the student spending impact on the RCC Service Area economy remains substantial.

TABLE A1.5: SENSITIVITY ANALYSIS OF RETAINED STUDENT VARIABLE

% variation in assumption	-50%	-25%	-10%	Base Case	10%	25%	50%
Retained student variable	5%	8%	9%	10%	11%	13%	15%
Student spending impact (thousands)	\$6,152	\$9,228	\$11,074	\$12,305	\$13,535	\$15,381	\$18,457

Appendix 2: Glossary of Terms

Alternative education A “with” and “without” measure of the percent of students who would still be able to avail themselves of education if the college under analysis did not exist. An estimate of 10%, for example, means that 10% of students do not depend directly on the existence of the college in order to obtain their education.

Alternative use of funds A measure of how monies that are currently used to fund the college might otherwise have been used if the college did not exist.

Asset value Capitalized value of a stream of future returns. Asset value measures what someone would have to pay today for an instrument that provides the same stream of future revenues.

Attrition rate Rate at which students leave the workforce due to out-migration, unemployment, retirement, or death.

Benefit-cost ratio Present value of benefits divided by present value of costs. If the benefit-cost ratio is greater than 1, then benefits exceed costs, and the investment is feasible.

Credit hour equivalent Credit hour equivalent, or CHE, is defined as 15 contact hours of education if on a semester system, and 10 contact hours if on a quarter system. In general, it requires 450 contact hours to complete one full-time equivalent, or FTE.

Demand Relationship between the market price of education and the volume of education demanded (expressed in terms of enrollment). The law of the downward-sloping demand curve is related to the fact that enrollment increases only if the price (tuition and fees) is lowered, or conversely, enrollment decreases if price increases.

Discounting Expressing future revenues and costs in present value terms.

Earnings (labor income) Income that is received as a result of labor; i.e., wages.

Economics Study of the allocation of scarce resources among alternative and competing ends. Economics is not normative (what ought to be done), but positive (describes what is, or how people are likely to behave in response to economic changes).

Elasticity of demand Degree of responsiveness of the quantity of education demanded (enrollment) to changes in market prices (tuition and fees). If a decrease in fees increases or decreases total enrollment by a significant

amount, demand is elastic. If enrollment remains the same or changes only slightly, demand is inelastic.

Externalities Impacts (positive and negative) for which there is no compensation. Positive externalities of education include improved social behaviors such as improved health, lower crime, and reduced demand for income assistance. Educational institutions do not receive compensation for these benefits, but benefits still occur because education is statistically proven to lead to improved social behaviors.

Gross regional product Measure of the final value of all goods and services produced in a region after netting out the cost of goods used in production. Alternatively, gross regional product (GRP) equals the combined incomes of all factors of production; i.e., labor, land and capital. These include wages, salaries, proprietors' incomes, profits, rents, and other. Gross regional product is also sometimes called value added or added income.

Initial effect Income generated by the initial injection of monies into the economy through the payroll of the college and the higher earnings of its students.

Input-output analysis Relationship between a given set of demands for final goods and services and the implied amounts of manufactured inputs, raw materials, and labor that this requires. When educational institutions pay wages and salaries and spend money for supplies in the region, they also generate earnings in all sectors of the economy, thereby increasing the demand for goods and services and jobs. Moreover, as students enter or rejoin the workforce with higher skills, they earn higher salaries and wages. In turn, this generates more consumption and spending in other sectors of the economy.

Internal rate of return Rate of interest that, when used to discount cash flows associated with investing in education, reduces its net present value to zero (i.e., where the present value of revenues accruing from the investment are just equal to the present value of costs incurred). This, in effect, is the breakeven rate of return on investment since it shows the highest rate of interest at which the investment makes neither a profit nor a loss.

Multiplier effect Additional income created in the economy as the college and its students spend money in the region. It consists of the income created by the supply chain of the industries initially affected by the spending of the college and its students (i.e., the direct effect), income created by the supply chain of the initial supply chain (i.e., the indirect effect), and the income created by the increased spending of the household sector (i.e., the induced effect).

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

Net cash flow Benefits minus costs, i.e., the sum of revenues accruing from an investment minus costs incurred.

Net present value Net cash flow discounted to the present. All future cash flows are collapsed into one number, which, if positive, indicates feasibility. The result is expressed as a monetary measure.

Non-labor income Income received from investments, such as rent, interest, and dividends.

Opportunity cost Benefits foregone from alternative B once a decision is made to allocate resources to alternative A. Or, if individuals choose to attend college, they forego earnings that they would have received had they chose instead to work full-time. Foregone earnings, therefore, are the “price tag” of choosing to attend college.

Payback period Length of time required to recover an investment. The shorter the period, the more attractive the investment. The formula for computing payback period is:

$$\text{Payback period} = \text{cost of investment} / \text{net return per period}$$

Appendix 3: Frequently Asked Questions (FAQs)

This appendix provides answers to some frequently asked questions about the results.

What is economic impact analysis?

Economic impact analysis quantifies the impact from a given economic event – in this case, the presence of a college – on the economy of a specified region.

What is investment analysis?

Investment analysis is a standard method for determining whether or not an existing or proposed investment is economically viable. This methodology is appropriate in situations where a stakeholder puts up a certain amount of money with the expectation of receiving benefits in return, where the benefits that the stakeholder receives are distributed over time, and where a discount rate must be applied in order to account for the time value of money.

Do the results differ by region, and if so, why?

Yes. Regional economic data are drawn from Emsi's proprietary MR-SAM model, the Census Bureau, and other sources to reflect the specific earnings levels, jobs numbers, unemployment rates, population demographics, and other key characteristics of the region served by the college. Therefore, model results for the college are specific to the given region.

Are the funds transferred to the college increasing in value, or simply being re-directed?

Emsi's approach is not a simple "rearranging of the furniture" where the impact of operations spending is essentially a restatement of the level of funding received by the college. Rather, it is an impact assessment of the additional income created in the region as a result of the college spending on payroll and other non-pay expenditures, net of any impacts that would have occurred anyway if the college did not exist.

How does my college's rates of return compare to that of other institutions?

In general, Emsi discourages comparisons between institutions since many factors, such as regional economic conditions, institutional differences, and student demographics are outside of the college's control. It is best to compare the rate of return to the discount rates of 4.5% (for students) and 0.6% (for society and taxpayers), which can also be seen as the opportunity cost of the investment (since these stakeholder groups could be spending their time and money in other investment schemes besides education). If the rate of return is higher than the discount rate, the stakeholder groups can expect to receive a positive return on their educational investment.

Emsi recognizes that some institutions may want to make comparisons. As a word of caution, if comparing to an institution that had a study commissioned by a firm other than Emsi, then differences in methodology will create an "apples to oranges" comparison and will therefore be difficult. The study results should be seen as unique to each institution.

Net Present Value (NPV): How do I communicate this in laymen's terms?

Which would you rather have: a dollar right now or a dollar 30 years from now? That most people will choose a dollar now is the crux of net present value. The preference for a dollar today means today's dollar is therefore worth more than it would be in the future (in most people's opinion). Because the dollar today is worth more than a dollar in 30 years, the dollar 30 years from now needs to be adjusted to express its worth today. Adjusting the values for this "time value of money" is called discounting and the result of adding them all up after discounting each value is called net present value.

Internal Rate of Return (IRR): How do I communicate this in laymen's terms?

Using the bank as an example, an individual needs to decide between spending all of their paycheck today and putting it into savings. If they spend it today, they know what it is worth: \$1 = \$1. If they put it into savings, they need to know that there will be some sort of return to them for spending those dollars in the future rather than now. This is why banks offer interest rates and deposit interest earnings. This makes it so an individual can expect, for example, a 3% return in the future for money that they put into savings now.

Total Economic Impact: How do I communicate this in laymen's terms?

Big numbers are great, but putting them into perspective can be a challenge. To add perspective, find an industry with roughly the same “% of GRP” as your college (Table 1.3). This percentage represents its portion of the total gross regional product in the region (similar to the nationally recognized gross domestic product but at a regional level). This allows the college to say that their single brick and mortar campus does just as much for the RCC Service Area as the entire Utilities *industry*, for example. This powerful statement can help put the large total impact number into perspective.

Appendix 4: Example of Sales versus Income

Emsi's economic impact study differs from many other studies because we prefer to report the impacts in terms of income rather than sales (or output). Income is synonymous with value added or gross regional product (GRP). Sales include all the intermediary costs associated with producing goods and services. Income is a net measure that excludes these intermediary costs:

$$\text{Income} = \text{Sales} - \text{Intermediary Costs}$$

For this reason, income is a more meaningful measure of new economic activity than reporting sales. This is evidenced by the use of gross domestic product (GDP) – a measure of income – by economists when considering the economic growth or size of a country. The difference is GRP reflects a region and GDP a country.

To demonstrate the difference between income and sales, let us consider an example of a baker's production of a loaf of bread. The baker buys the ingredients such as eggs, flour, and yeast for \$2.00. He uses capital such as a mixer to combine the ingredients and an oven to bake the bread and convert it into a final product. Overhead costs for these steps are \$1.00. Total intermediary costs are \$3.00. The baker then sells the loaf of bread for \$5.00.

The sales amount of the loaf of bread is \$5.00. The income from the loaf of bread is equal to the sales amount less the intermediary costs:

$$\text{Income} = \$5.00 - \$3.00 = \$2.00$$

In our analysis, we provide context behind the income figures by also reporting the associated number of jobs. The impacts are also reported in sales and earnings terms for reference.

Appendix 5: Emsi MR-SAM

Emsi's MR-SAM represents the flow of all economic transactions in a given region. It replaces Emsi's previous input-output (IO) model, which operated with some 1,000 industries, four layers of government, a single household consumption sector, and an investment sector. The old IO model was used to simulate the ripple effects (*i.e.*, multipliers) in the regional economy as a result of industries entering or exiting the region. The MR-SAM model performs the same tasks as the old IO model, but it also does much more. Along with the same 1,000 industries, government, household and investment sectors embedded in the old IO tool, the MR-SAM exhibits much more functionality, a greater amount of data, and a higher level of detail on the demographic and occupational components of jobs (16 demographic cohorts and about 750 occupations are characterized).

This appendix presents a high-level overview of the MR-SAM. Additional documentation on the technical aspects of the model is available upon request.

Data sources for the model

The Emsi MR-SAM model relies on a number of internal and external data sources, mostly compiled by the federal government. What follows is a listing and short explanation of our sources. The use of these data will be covered in more detail later in this appendix.

Emsi Data are produced from many data sources to produce detailed industry, occupation, and demographic jobs and earnings data at the local level. This information (especially sales-to-jobs ratios derived from jobs and earnings-to-sales ratios) is used to help regionalize the national matrices as well as to disaggregate them into more detailed industries than are normally available.

BEA Make and Use Tables (MUT) are the basis for input-output models in the U.S. The *make* table is a matrix that describes the amount of each commodity made by each industry in a given year. Industries are placed in the rows and commodities in the columns. The *use* table is a matrix that describes the amount of each commodity used by each industry in a given year. In the use table, commodities are placed in the rows and industries in the columns. The BEA produces two different sets of MUTs, the benchmark and the summary. The benchmark set contains about 500 sectors and is released every five years, with a five-year lag time (e.g., 2002 benchmark MUTs were released in 2007). The summary set contains about 80 sectors and is released every year, with a two-year lag (e.g., 2010 summary MUTs were released in late 2011/early 2012).

The MUTs are used in the Emsi MR-SAM model to produce an industry-by-industry matrix describing all industry purchases from all industries.

BEA Gross Domestic Product by State (GSP) describes gross domestic product from the value added (also known as added income) perspective. Value added is equal to employee compensation, gross operating surplus, and taxes on production and imports, less subsidies. Each of these components is reported for each state and an aggregate group of industries. This dataset is updated once per year, with a one-year lag. The Emsi MR-SAM model makes use of this data as a control and pegs certain pieces of the model to values from this dataset.

BEA National Income and Product Accounts (NIPA) cover a wide variety of economic measures for the nation, including gross domestic product (GDP), sources of output, and distribution of income. This dataset is updated periodically throughout the year and can be between a month and several years old depending on the specific account. NIPA data are used in many of the Emsi MR-SAM processes as both controls and seeds.

BEA Local Area Income (LPI) encapsulates multiple tables with geographies down to the county level. The following two tables are specifically used: CA05 (Personal income and earnings by industry) and CA91 (Gross flow of earnings). CA91 is used when creating the commuting submodel and CA05 is used in several processes to help with place-of-work and place-of-residence differences, as well as to calculate personal income, transfers, dividends, interest, and rent.

Bureau of Labor Statistics Consumer Expenditure Survey (CEX) reports on the buying habits of consumers along with some information as to their income, consumer unit, and demographics. Emsi utilizes this data heavily in the creation of the national demographic by income type consumption on industries.

Census of Government's (CoG) state and local government finance dataset is used specifically to aid breaking out state and local data that is reported in the MUTs. This allows Emsi to have unique production functions for each of its state and local government sectors.

Census' OnTheMap (OTM) is a collection of three datasets for the census block level for multiple years. **Origin-Destination (OD)** offers job totals associated with both home census blocks and a work census block. **Residence Area Characteristics (RAC)** offers jobs totaled by home census block. **Workplace Area Characteristics (WAC)** offers jobs totaled by work census block. All three of these are used in the commuting submodel to gain better estimates of earnings by industry that may be counted as commuting. This dataset has holes for specific years and regions. These holes are filled with Census' Journey-to-Work described later.

Census' Current Population Survey (CPS) is used as the basis for the demographic breakout data of the MR-SAM model. This set is used to estimate the ratios of demographic cohorts and their income for the three different income categories (i.e., wages, property income, and transfers).

Census' Journey-to-Work (JtW) is part of the 2000 Census and describes the amount of commuting jobs between counties. This set is used to fill in the areas where OTM does not have data.

Census' American Community Survey (ACS) Public Use Microdata Sample (PUMS) is the replacement for Census' long form and is used by Emsi to fill the holes in the CPS data.

Oak Ridge National Lab (ORNL) County-to-County Distance Matrix (Skim Tree) contains a matrix of distances and network impedances between each county via various modes of transportation such as highway, railroad, water, and combined highway-rail. Also included in this set are minimum impedances utilizing the best combination of paths. The ORNL distance matrix is used in Emsi's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Emsi's MR-SAM modeling system is a comparative static model in the same general class as RIMS II (Bureau of Economic Analysis) and IMPLAN (Minnesota Implan Group). The MR-SAM model is thus not an econometric model, the primary example of which is PolicyInsight by REMI. It relies on a matrix representation of industry-to-industry purchasing patterns originally based on national data which are regionalized with the use of local data and mathematical manipulation (i.e., non-survey methods). Models of this type estimate the ripple effects of changes in jobs, earnings, or sales in one or more industries upon other industries in a region.

The Emsi MR-SAM model shows final equilibrium impacts – that is, the user enters a change that perturbs the economy and the model shows the changes required to establish a new equilibrium. As such, it is not a dynamic model that shows year-by-year changes over time (as REMI's does).

NATIONAL SAM

Following standard practice, the SAM model appears as a square matrix, with each row sum exactly equaling the corresponding column sum. Reflecting its kinship with the standard Leontief input-output framework, individual SAM elements show accounting flows between row and column sectors during a chosen base year. Read across rows, SAM entries show the flow of funds into column accounts (also known as receipts or the appropriation of funds by

those column accounts). Read down columns, SAM entries show the flow of funds into row accounts (also known as expenditures or the dispersal of funds to those row accounts).

The SAM may be broken into three different aggregation layers: broad accounts, sub-accounts, and detailed accounts. The broad layer is the most aggregate and will be covered first. Broad accounts cover between one and four sub-accounts, which in turn cover many detailed accounts. This appendix will not discuss detailed accounts directly because of their number. For example, in the industry broad account, there are two sub-accounts and over 1,000 detailed accounts.

MULTI-REGIONAL ASPECT OF THE MR-SAM

Multi-regional (MR) describes a non-survey model that has the ability to analyze the transactions and ripple effects (i.e., multipliers) of not just a single region, but multiple regions interacting with each other. Regions in this case are made up of a collection of counties.

Emsi's multi-regional model is built off of gravitational flows, assuming that the larger a county's economy, the more influence it will have on the surrounding counties' purchases and sales. The equation behind this model is essentially the same that Isaac Newton used to calculate the gravitational pull between planets and stars. In Newton's equation, the masses of both objects are multiplied, then divided by the distance separating them and multiplied by a constant. In Emsi's model, the masses are replaced with the supply of a sector for one county and the demand for that same sector from another county. The distance is replaced with an impedance value that takes into account the distance, type of roads, rail lines, and other modes of transportation. Once this is calculated for every county-to-county pair, a set of mathematical operations is performed to make sure all counties absorb the correct amount of supply from every county and the correct amount of demand from every county. These operations produce more than 200 million data points.

Components of the Emsi MR-SAM model

The Emsi MR-SAM is built from a number of different components that are gathered together to display information whenever a user selects a region. What follows is a description of each of these components and how each is created. Emsi's internally created data are used to a great extent throughout the processes described below, but its creation is not described in this appendix.

COUNTY EARNINGS DISTRIBUTION MATRIX

The county earnings distribution matrices describe the earnings spent by every industry on every occupation for a year – i.e., earnings by occupation.

The matrices are built utilizing Emsi's industry earnings, occupational average earnings, and staffing patterns.

Each matrix starts with a region's staffing pattern matrix which is multiplied by the industry jobs vector. This produces the number of occupational jobs in each industry for the region. Next, the occupational average hourly earnings per job are multiplied by 2,080 hours, which converts the average hourly earnings into a yearly estimate. Then the matrix of occupational jobs is multiplied by the occupational annual earnings per job, converting it into earnings values. Last, all earnings are adjusted to match the known industry totals. This is a fairly simple process, but one that is very important. These matrices describe the place-of-work earnings used by the MR-SAM.

COMMUTING MODEL

The commuting sub-model is an integral part of Emsi's MR-SAM model. It allows the regional and multi-regional models to know what amount of the earnings can be attributed to place-of-residence vs. place-of-work. The commuting data describe the flow of earnings from any county to any other county (including within the counties themselves). For this situation, the commuted earnings are not just a single value describing total earnings flows over a complete year, but are broken out by occupation and demographic. Breaking out the earnings allows for analysis of place-of-residence and place-of-work earnings. These data are created using Bureau of Labor Statistics' OnTheMap dataset, Census' Journey-to-Work, BEA's LPI CA91 and CA05 tables, and some of Emsi's data. The process incorporates the cleanup and disaggregation of the OnTheMap data, the estimation of a closed system of county inflows and outflows of earnings, and the creation of finalized commuting data.

NATIONAL SAM

The national SAM as described above is made up of several different components. Many of the elements discussed are filled in with values from the national Z matrix – or industry-to-industry transaction matrix. This matrix is built from BEA data that describe which industries make and use what commodities at the national level. These data are manipulated with some industry standard equations to produce the national Z matrix. The data in the Z matrix act as the basis for the majority of the data in the national SAM. The rest of the values are filled in with data from the county earnings distribution matrices, the commuting data, and the BEA's National Income and Product Accounts.

One of the major issues that affect any SAM project is the combination of data from multiple sources that may not be consistent with one another. Matrix balancing is the broad name for the techniques used to correct this problem.

Emsi uses a modification of the “diagonal similarity scaling” algorithm to balance the national SAM.

GRAVITATIONAL FLOWS MODEL

The most important piece of the Emsi MR-SAM model is the gravitational flows model that produces county-by-county regional purchasing coefficients (RPCs). RPCs estimate how much an industry purchases from other industries inside and outside of the defined region. This information is critical for calculating all IO models.

Gravity modeling starts with the creation of an impedance matrix that values the difficulty of moving a product from county to county. For each sector, an impedance matrix is created based on a set of distance impedance methods for that sector. A distance impedance method is one of the measurements reported in the Oak Ridge National Laboratory’s County-to-County Distance Matrix. In this matrix, every county-to-county relationship is accounted for in six measures: great-circle distance, highway impedance, rail miles, rail impedance, water impedance, and highway-rail-highway impedance. Next, using the impedance information, the trade flows for each industry in every county are solved for. The result is an estimate of multi-regional flows from every county to every county. These flows are divided by each respective county’s demand to produce multi-regional RPCs.

Appendix 6: Value per Credit Hour Equivalent and the Mincer Function

Two key components in the analysis are 1) the value of the students' educational achievements, and 2) the change in that value over the students' working careers. Both of these components are described in detail in this appendix.

Value per CHE

Typically, the educational achievements of students are marked by the credentials they earn. However, not all students who attended RCC in the 2016-17 analysis year obtained a degree or certificate. Some returned the following year to complete their education goals, while others took a few courses and entered the workforce without graduating. As such, the only way to measure the value of the students' achievement is through their credit hour equivalents, or CHEs. This approach allows us to see the benefits to all students who attended the college, not just those who earned a credential.

To calculate the value per CHE, we first determine how many CHEs are required to complete each education level. For example, assuming that there are 30 CHEs in an academic year, a student generally completes 120 CHEs in order to move from a high school diploma to a bachelor's degree, another 60 CHEs to move from a bachelor's degree to a master's degree, and so on. This progression of CHEs generates an education ladder beginning at the less than high school level and ending with the completion of a doctoral degree, with each level of education representing a separate stage in the progression.

The second step is to assign a unique value to the CHEs in the education ladder based on the wage differentials presented in Table 1.4.⁴³ For example, the difference in regional earnings between a high school diploma and an associate degree is \$8,700. We spread this \$8,700 wage differential across the 60 CHEs that occur between a high school diploma and an associate degree, applying a ceremonial "boost" to the last CHE in the stage to mark the achievement of the degree.⁴⁴ We repeat this process for each education level in the ladder.

43 The value per CHE is different between the economic impact analysis and the investment analysis. The economic impact analysis uses the region as its background and, therefore, uses regional earnings to calculate value per CHE, while the investment analysis uses the state as its backdrop and, therefore, uses state earnings. The methodology outlined in this appendix will use regional earnings; however, the same methodology is followed for the investment analysis when state earnings are used.

44 Economic theory holds that workers that acquire education credentials send a signal to employers about their ability level. This phenomenon is commonly known as the sheepskin effect or signaling effect. The ceremonial boosts applied to the achievement of degrees in the Emsi impact model are derived from Jaeger and Page (1996).

Next we map the CHE production of the FY 2016-17 student population to the education ladder. Table 1.2 provides information on the CHE production of students attending RCC, broken out by educational achievement. In total, students completed 272,709 CHEs during the analysis year, excluding personal enrichment students. We map each of these CHEs to the education ladder depending on the students' education level and the average number of CHEs they completed during the year. For example, bachelor's degree graduates are allocated to the stage between the associate degree and the bachelor's degree, and the average number of CHEs they completed informs the shape of the distribution curve used to spread out their total CHE production within that stage of the progression.

The sum product of the CHEs earned at each step within the education ladder and their corresponding value yields the students' aggregate annual increase in income (ΔE), as shown in the following equation:

$$\Delta E = \sum_{i=1}^n e_i h_i \text{ where } i \in 1, 2, \dots, n$$

and n is the number of steps in the education ladder, e_i is the marginal earnings gain at step i , and h_i is the number of CHEs completed at step i .

Table A6.1 displays the result for the students' aggregate annual increase in income (ΔE), a total of \$33.8 million. By dividing this value by the students' total production of 272,709 CHEs during the analysis year, we derive an overall value of \$124 per CHE.

TABLE A6.1: AGGREGATE ANNUAL INCREASE IN INCOME OF STUDENTS AND VALUE PER CHE

Aggregate annual increase in income	\$33,816,404
Total credit hour equivalents (CHEs) in FY 2016-17*	272,709
Value per CHE	\$124

* Excludes the CHE production of personal enrichment students.
Source: Emsi impact model.

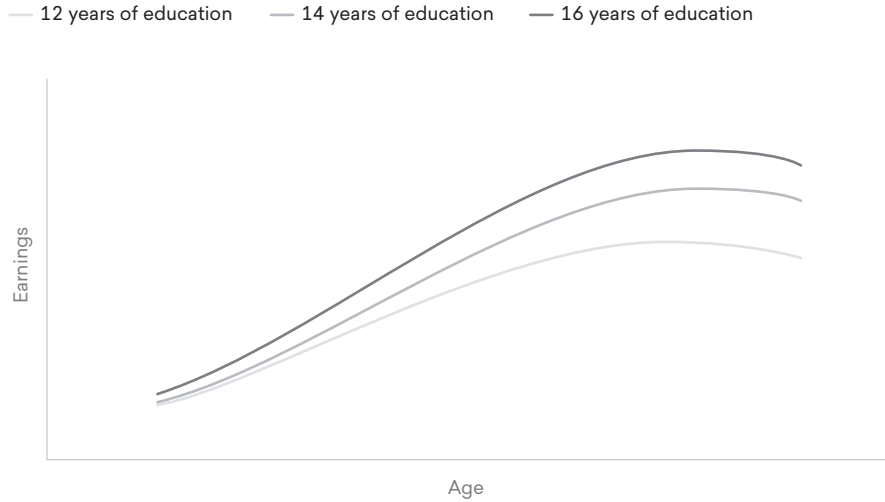
Mincer Function

The \$124 value per CHE in Table A6.1 only tells part of the story, however. Human capital theory holds that earnings levels do not remain constant; rather, they start relatively low and gradually increase as the worker gains more experience. Research also shows that the earnings increment between educated and non-educated workers grows through time. These basic patterns in earnings over time were originally identified by Jacob Mincer, who viewed the lifecycle earnings distribution as a function with the key elements being earnings, years of

education, and work experience, with age serving as a proxy for experience.⁴⁵ While some have criticized Mincer’s earnings function, it is still upheld in recent data and has served as the foundation for a variety of research pertaining to labor economics. Those critical of the Mincer function point to several unobserved factors such as ability, socioeconomic status, and family background that also help explain higher earnings. Failure to account for these factors results in what is known as an “ability bias.” Research by Card (1999 and 2001) suggests that the benefits estimated using Mincer’s function are biased upwards by 10% or less. As such, we reduce the estimated benefits by 10%. We use state-specific and education level-specific Mincer coefficients.

Figure A6.1 illustrates several important points about the Mincer function. First, as demonstrated by the shape of the curves, an individual’s earnings initially increase at an increasing rate, then increase at a decreasing rate, reach a maximum somewhere well after the midpoint of the working career, and then decline in later years. Second, individuals with higher levels of education reach their maximum earnings at an older age compared to individuals with lower levels of education (recall that age serves as a proxy for years of experience). And third, the benefits of education, as measured by the difference in earnings between education levels, increase with age.

FIGURE A6.1: LIFECYCLE CHANGE IN EARNINGS



In calculating the alumni impact in Chapter 2, we use the slope of the curve in Mincer’s earnings function to condition the \$124 value per CHE to the students’ age and work experience. To the students just starting their career during the analysis year, we apply a lower value per CHE; to the students in the latter half or approaching the end of their careers we apply a higher value per CHE. The

45 See Mincer (1958 and 1974).

original \$124 value per CHE applies only to the CHE production of students precisely at the midpoint of their careers during the analysis year.

In Chapter 3 we again apply the Mincer function, this time to project the benefits stream of the FY 2016-17 student population into the future. Here too the value per CHE is lower for students at the start of their career and higher near the end of it, in accordance with the scalars derived from the slope of the Mincer curve illustrated in Figure A6.1.

Appendix 7: Alternative Education Variable

In a scenario where the college did not exist, some of its students would still be able to avail themselves of an alternative comparable education. These students create benefits in the region even in the absence of the college. The alternative education variable accounts for these students and is used to discount the benefits we attribute to the college.

Recall this analysis considers only relevant economic information regarding the college. Considering the existence of various other academic institutions surrounding the college, we have to assume that a portion of the students could find alternative educations and either remain in or return to the region. For example, some students may participate in online programs while remaining in the region. Others may attend an out-of-region institution and return to the region upon completing their studies. For these students – who would have found an alternative education and produced benefits in the region regardless of the presence of the college – we discount the benefits attributed to the college. An important distinction must be made here: the benefits from students who would find alternative educations outside the region and not return to the region are *not* discounted. Because these benefits would not occur in the region without the presence of the college, they must be included.

In the absence of the college, we assume 15% of the college's students would find alternative education opportunities and remain in or return to the region. We account for this by discounting the alumni impact, the benefits to taxpayers, and the benefits to society in the region in Chapters 2 and 3 by 15%. In other words, we assume 15% of the benefits created by the college's students would have occurred anyways in the counterfactual scenario where the college did not exist. A sensitivity analysis of this adjustment is presented in Appendix 1.

Appendix 8: Overview of Investment Analysis Measures

The appendix provides context to the investment analysis results using the simple hypothetical example summarized in Table A8.1 below. The table shows the projected benefits and costs for a single student over time and associated investment analysis results.⁴⁶

TABLE A8.1: EXAMPLE OF THE BENEFITS AND COSTS OF EDUCATION FOR A SINGLE STUDENT

1	2	3	4	5	6
Year	Tuition	Opportunity cost	Total cost	Higher earnings	Net cash flow
1	\$1,500	\$20,000	\$21,500	\$0	-\$21,500
2	\$0	\$0	\$0	\$5,000	\$5,000
3	\$0	\$0	\$0	\$5,000	\$5,000
4	\$0	\$0	\$0	\$5,000	\$5,000
5	\$0	\$0	\$0	\$5,000	\$5,000
6	\$0	\$0	\$0	\$5,000	\$5,000
7	\$0	\$0	\$0	\$5,000	\$5,000
8	\$0	\$0	\$0	\$5,000	\$5,000
9	\$0	\$0	\$0	\$5,000	\$5,000
10	\$0	\$0	\$0	\$5,000	\$5,000
Net present value			\$21,500	\$35,753	\$14,253

Internal rate of return	Benefit-cost ratio	Payback period (no. of years)
18.0%	1.7	4.2

Assumptions are as follows:

- Benefits and costs are projected out 10 years into the future (Column 1).
- The student attends the college for one year, and the cost of tuition is \$1,500 (Column 2).
- Earnings foregone while attending the college for one year (opportunity cost) come to \$20,000 (Column 3).

⁴⁶ Note that this is a hypothetical example. The numbers used are not based on data collected from an existing college.

- Together, tuition and earnings foregone cost sum to \$21,500. This represents the out-of-pocket investment made by the student (Column 4).
- In return, the student earns \$5,000 more per year than he otherwise would have earned without the education (Column 5).
- The net cash flow (NCF) in Column 6 shows higher earnings (Column 5) less the total cost (Column 4).
- The assumed going rate of interest is 4%, the rate of return from alternative investment schemes for the use of the \$21,500.

Results are expressed in standard investment analysis terms, which are as follows: the net present value, the internal rate of return, the benefit-cost ratio, and the payback period. Each of these is briefly explained below in the context of the cash flow numbers presented in Table A8.1.

Net present value

The student in Table A8.1 can choose either to attend college or to forego post-secondary education and maintain his present employment. If he decides to enroll, certain economic implications unfold. Tuition and fees must be paid, and earnings will cease for one year. In exchange, the student calculates that with post-secondary education, his earnings will increase by at least the \$5,000 per year, as indicated in the table.

The question is simple: Will the prospective student be economically better off by choosing to enroll? If he adds up higher earnings of \$5,000 per year for the remaining nine years in Table A8.1, the total will be \$45,000. Compared to a total investment of \$21,500, this appears to be a very solid investment. The reality, however, is different. Benefits are far lower than \$45,000 because future money is worth less than present money. Costs (tuition plus earnings foregone) are felt immediately because they are incurred today, in the present. Benefits, on the other hand, occur in the future. They are not yet available. All future benefits must be discounted by the going rate of interest (referred to as the discount rate) to be able to express them in present value terms.⁴⁷

Let us take a brief example. At 4%, the present value of \$5,000 to be received one year from today is \$4,807. If the \$5,000 were to be received in year 10, the present value would reduce to \$3,377. Put another way, \$4,807 deposited in the bank today earning 4% interest will grow to \$5,000 in one year; and \$3,377 deposited today would grow to \$5,000 in 10 years. An “economically rational” person would, therefore, be equally satisfied receiving \$3,377 today or \$5,000

⁴⁷ Technically, the interest rate is applied to compounding – the process of looking at deposits today and determining how much they will be worth in the future. The same interest rate is called a discount rate when the process is reversed – determining the present value of future earnings.

10 years from today given the going rate of interest of 4%. The process of discounting – finding the present value of future higher earnings – allows the model to express values on an equal basis in future or present value terms.

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today (in this example, tuition plus earnings foregone). As indicated in Table A8.1 the cumulative present value of \$5,000 worth of higher earnings between years 2 and 10 is \$35,753 given the 4% interest rate, far lower than the undiscounted \$45,000 discussed above.

The net present value of the investment is \$14,253. This is simply the present value of the benefits less the present value of the costs, or $\$35,753 - \$21,500 = \$14,253$. In other words, the present value of benefits exceeds the present value of costs by as much as \$14,253. The criterion for an economically worthwhile investment is that the net present value is equal to or greater than zero. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment in education is very strong.

Internal rate of return

The internal rate of return is another way of measuring the worth of investing in education using the same cash flows shown in Table A8.1. In technical terms, the internal rate of return is a measure of the average earning power of money used over the life of the investment. It is simply the interest rate that makes the net present value equal to zero. In the discussion of the net present value above, the model applies the going rate of interest of 4% and computes a positive net present value of \$14,253. The question now is what the interest rate would have to be in order to reduce the net present value to zero. Obviously it would have to be higher – 18.0% in fact, as indicated in Table A8.1. Or, if a discount rate of 18.0% were applied to the net present value calculations instead of the 4%, then the net present value would reduce to zero.

What does this mean? The internal rate of return of 18.0% defines a breakeven solution – the point where the present value of benefits just equals the present value of costs, or where the net present value equals zero. Or, at 18.0%, higher earnings of \$5,000 per year for the next nine years will earn back all investments of \$21,500 made plus pay 18.0% for the use of that money (\$21,500) in the meantime. Is this a good return? Indeed, it is. If it is compared to the 4% going rate of interest applied to the net present value calculations, 18.0% is far higher than 4%. It may be concluded, therefore, that the investment in this case is solid. Alternatively, comparing the 18.0% rate of return to the long-term 10% rate or so obtained from investments in stocks and bonds also indicates that the investment in education is strong relative to the stock market returns (on average).

Benefit-cost ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or $\$35,753 \div \$21,500 = 1.7$ (based on the 4% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 18.0% internal rate of return discussed above would reduce the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than the 18.0% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 1.7 ratio means that a dollar invested today will return a cumulative \$1.70 over the ten-year time period.

Payback period

This is the length of time from the beginning of the investment (consisting of tuition and earnings foregone) until higher future earnings give a return on the investment made. For the student in Table A8.1, it will take roughly 4.2 years of \$5,000 worth of higher earnings to recapture his investment of \$1,500 in tuition and the \$20,000 in earnings foregone while attending the college. Higher earnings that occur beyond 4.2 years are the returns that make the investment in education in this example economically worthwhile. The payback period is a fairly rough, albeit common, means of choosing between investments. The shorter the payback period, the stronger the investment.

Appendix 9: Shutdown Point

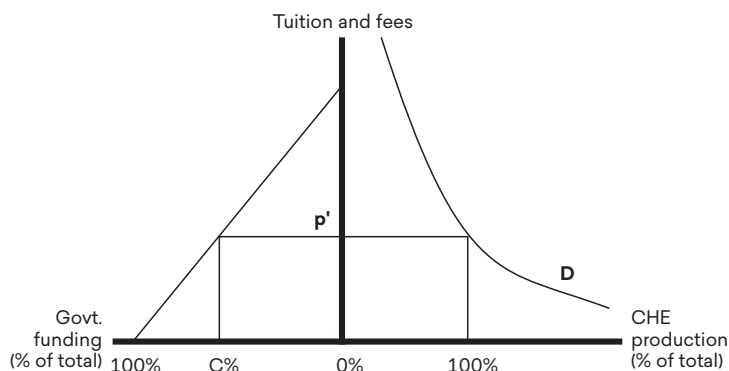
The investment analysis in Chapter 3 weighs the benefits generated by the college against the state and local taxpayer funding that the college receives to support its operations. An important part of this analysis is factoring out the benefits that the college would have been able to generate anyway, even without state and local taxpayer support. This adjustment is used to establish a direct link between what taxpayers pay and what they receive in return. If the college is able to generate benefits without taxpayer support, then it would not be a true investment.⁴⁸

The overall approach includes a sub-model that simulates the effect on student enrollment if the college loses its state and local funding and has to raise student tuition and fees in order to stay open. If the college can still operate without state and local support, then any benefits it generates at that level are discounted from total benefit estimates. If the simulation indicates that the college cannot stay open, however, then benefits are directly linked to costs, and no discounting applies. This appendix documents the underlying theory behind these adjustments.

State and local government support versus student demand for education

Figure A9.1 presents a simple model of student demand and state and local government support. The right side of the graph is a standard demand curve (D) showing student enrollment as a function of student tuition and fees. Enrollment

FIGURE A9.1: STUDENT DEMAND AND GOVERNMENT FUNDING BY TUITION AND FEES

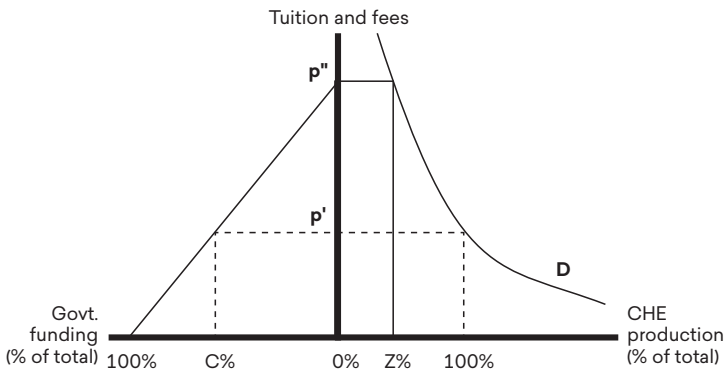


48 Of course, as a public training provider, the college would not be permitted to continue without public funding, so the situation in which it would lose all state support is entirely hypothetical. The purpose of the adjustment factor is to examine the college in standard investment analysis terms by netting out any benefits it may be able to generate that are not directly linked to the costs of supporting it.

is measured in terms of total credit hour equivalents (CHEs) and expressed as a percentage of the college's current CHE production. Current student tuition and fees are represented by p' , and state and local government support covers $C\%$ of all costs. At this point in the analysis, it is assumed that the college has only two sources of revenues: 1) student tuition and fees and 2) state and local government support.

Figure A9.2 shows another important reference point in the model – where state and local government support is 0% , student tuition and fees are increased to p'' , and CHE production is at $Z\%$ (less than 100%). The reduction in CHEs reflects the price elasticity of the students' demand for education, *i.e.*, the extent to which the students' decision to attend the college is affected by the change in tuition and fees. Ignoring for the moment those issues concerning the college's minimum operating scale (considered below in the section called "Calculating benefits at the shutdown point"), the implication for the investment analysis is that benefits to state and local government must be adjusted to net out the benefits that the college can provide absent state and local government support, represented as $Z\%$ of the college's current CHE production in Figure A9.2.

FIGURE A9.2: CHE PRODUCTION AND GOVERNMENT FUNDING BY TUITION AND FEES



To clarify the argument, it is useful to consider the role of enrollment in the larger benefit-cost model. Let B equal the benefits attributable to state and local government support. The analysis derives all benefits as a function of student enrollment, measured in terms of CHEs produced. For consistency with the graphs in this appendix, B is expressed as a function of the percent of the college's current CHE production. Equation 1 is thus as follows:

$$1) B = B(100\%)$$

This reflects the total benefits generated by enrollments at their current levels.

Consider benefits now with reference to Z. The point at which state and local government support is zero nonetheless provides for Z% (less than 100%) of the current enrollment, and benefits are symbolically indicated by the following equation:

$$2) B = B(Z\%)$$

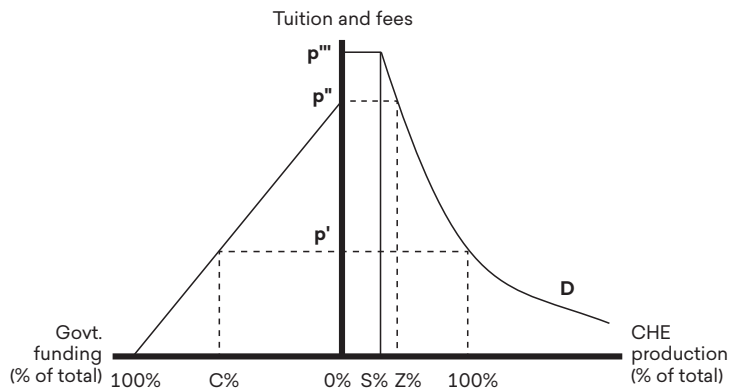
Inasmuch as the benefits in equation 2 occur with or without state and local government support, the benefits appropriately attributed to state and local government support are given by equation 3 as follows:

$$3) B = B(100\%) - B(Z\%)$$

Calculating benefits at the shutdown point

Colleges and universities cease to operate when the revenue they receive from the quantity of education demanded is insufficient to justify their continued operations. This is commonly known in economics as the shutdown point.⁴⁹ The shutdown point is introduced graphically in Figure A9.3 as S%. The location of point S% indicates that the college can operate at an even lower enrollment level than Z% (the point at which the college receives zero state and local government funding). State and local government support at point S% is still zero, and student tuition and fees have been raised to p'''. State and local government support is thus credited with the benefits given by equation 3, or $B = B(100\%) - B(Z\%)$. With student tuition and fees still higher than p'', the college would no longer be able to attract enough students to keep the doors open, and it would shut down.

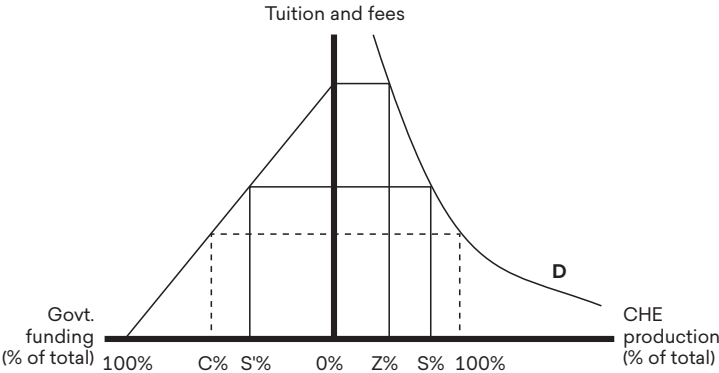
FIGURE A9.3: SHUTDOWN POINT AFTER ZERO GOVERNMENT FUNDING



49 In the traditional sense, the shutdown point applies to firms seeking to maximize profits and minimize losses. Although profit maximization is not the primary aim of colleges and universities, the principle remains the same, *i.e.*, that there is a minimum scale of operation required in order for colleges and universities to stay open.

Figure A9.4 illustrates yet another scenario. Here, the shutdown point occurs at a level of CHE production greater than Z% (the level of zero state and local government support), meaning some minimum level of state and local government support is needed for the college to operate at all. This minimum portion of overall funding is indicated by S% on the left side of the chart, and as before, the shutdown point is indicated by S% on the right side of chart. In this case, state and local government support is appropriately credited with all the benefits generated by the college's CHE production, or $B = B(100\%)$.

FIGURE A9.4: SHUTDOWN POINT BEFORE ZERO GOVERNMENT FUNDING



Appendix 10: Social Externalities

Education has a predictable and positive effect on a diverse array of social benefits. These, when quantified in dollar terms, represent significant social savings that directly benefit society communities and citizens throughout the region, including taxpayers. In this appendix we discuss the following three main benefit categories: 1) improved health, 2) reductions in crime, and 3) reduced demand for government-funded income assistance.

It is important to note that the data and estimates presented here should not be viewed as exact, but rather as indicative of the positive impacts of education on an individual's quality of life. The process of quantifying these impacts requires a number of assumptions to be made, creating a level of uncertainty that should be borne in mind when reviewing the results.

Health

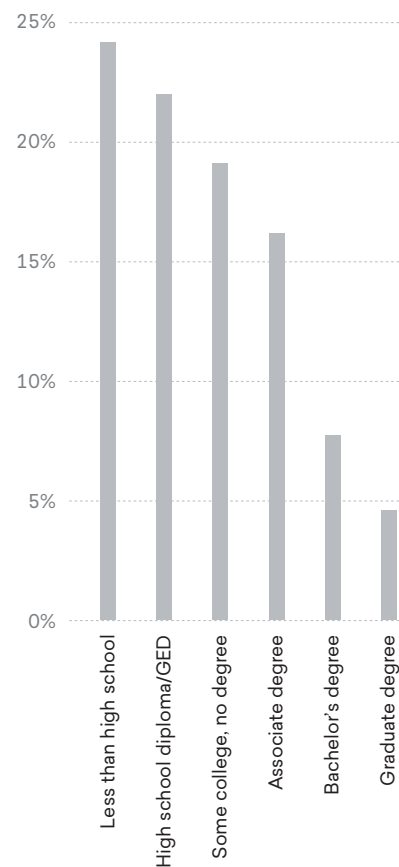
Statistics show a correlation between increased education and improved health. The manifestations of this are found in five health-related variables: smoking, alcohol dependence, obesity, depression, and drug abuse. There are other health-related areas that link to educational attainment, but these are omitted from the analysis until we can invoke adequate (and mutually exclusive) databases and are able to fully develop the functional relationships between them.

SMOKING

Despite a marked decline over the last several decades in the percentage of U.S. residents who smoke, a sizeable percentage of the U.S. population still smokes. The negative health effects of smoking are well documented in the literature, which identifies smoking as one of the most serious health issues in the U.S.

Figure A10.1 shows the prevalence of cigarette smoking among adults, 25 years and over, based on data provided by the National Health Interview Survey.⁵⁰ The data include adults who reported smoking more than 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. As indicated, the percent of who smoke begins to decline beyond the level of high school education.

FIGURE A10.1: PREVALENCE OF SMOKING AMONG U.S. ADULTS BY EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

50 Centers for Disease Control and Prevention. "Table. Characteristics of current adult cigarette smokers," National Health Interview Survey, United States, 2016.

The Centers for Disease Control and Prevention (CDC) reports the percentage of adults who are current smokers by state.⁵¹ We use this information to create an index value by which we adjust the national prevalence data on smoking to each state. For example, 11.0% of California adults were smokers in 2016, relative to 15.5% for the nation. We thus apply a scalar of 0.71 to the national probabilities of smoking in order to adjust them to the state of California.

ALCOHOL DEPENDENCE

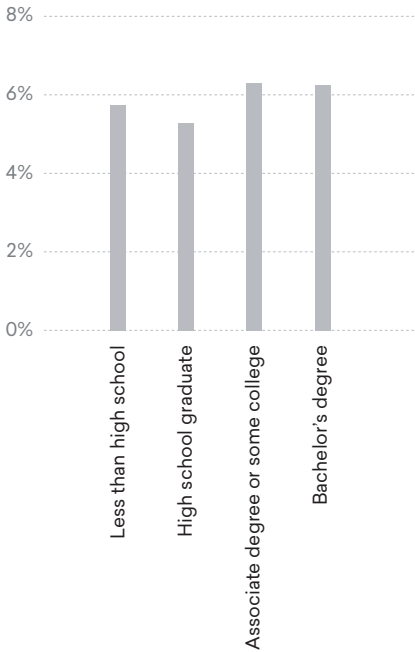
Although alcohol dependence has large public and private costs, it is difficult to measure and define. There are many patterns of drinking, ranging from abstinence to heavy drinking. Alcohol abuse is riddled with social costs, including health care expenditures for treatment, prevention, and support; workplace losses due to reduced worker productivity; and other effects.

Figure A10.2 compares the percentage of adults, 18 and older, that abuse or depend on alcohol by education level, based on data from the Substance Abuse and Mental Health Services Administration (SAMHSA).⁵² These statistics give an indication of the correlation between education and the reduced probability of alcohol dependence. Adults with an associate degree or some college have higher rates of alcohol dependence than adults with a high school diploma or lower. Prevalence rates are lower for adults with a bachelor’s degree or higher than those with an associate degree or some college. Although the data do not maintain a pattern of decreased alcohol dependence at every level of increased education, we include these rates in our model to ensure we provide a comprehensive view of the social benefits and costs correlated with education.

OBESITY

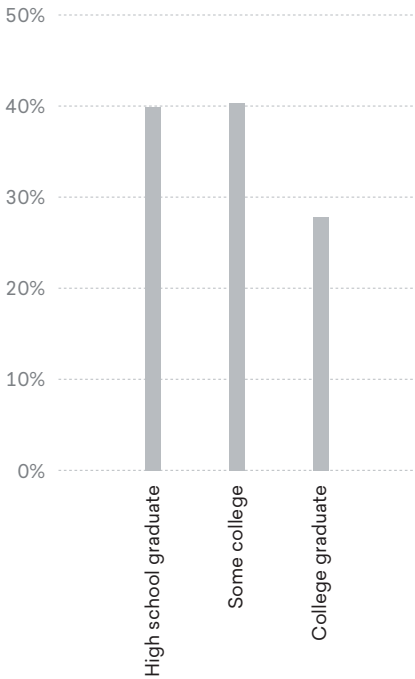
The rise in obesity and diet-related chronic diseases has led to increased attention on how expenditures relating to obesity have increased in recent years. The average cost of obesity-related medical conditions is calculated using information from the *Journal of Occupational and Environmental Medicine*, which reports incremental medical expenditures and productivity losses due to excess weight.⁵³

FIGURE A10.2: PREVALENCE OF ALCOHOL DEPENDENCE OR ABUSE BY SEX AND EDUCATION LEVEL



Source: Centers for Disease Control and Prevention.

FIGURE A10.3: PREVALENCE OF OBESITY BY EDUCATION LEVEL



Source: Derived from data provided by the National Center for Health Statistics.

51 Centers for Disease Control and Prevention. "Current Cigarette Use Among Adults (Behavior Risk Factor Surveillance System) 2016." *Behavioral Risk Factor Surveillance System Prevalence and Trends Data*, 2016.
 52 Substance Abuse and Mental Health Services Administration. "Table 5.5B - Alcohol Use Disorder in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics: Percentages, 2015 and 2016." SAMSHA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2016.
 53 Eric A. Finkelstein, Marco da Costa DiBonaventura, Somali M. Burgess, and Brent C. Hale, "The Costs of Obesity in the Workplace," *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 971-976.

Data for Figure A10.3 is derived from the National Center for Health Statistics which shows the prevalence of obesity among adults aged 20 years and over by education, gender, and ethnicity.⁵⁴ As indicated, college graduates are less likely to be obese than individuals with a high school diploma. However, the prevalence of obesity among adults with some college is actually greater than those with just a high school diploma. In general, though, obesity tends to decline with increasing levels of education.

DEPRESSION

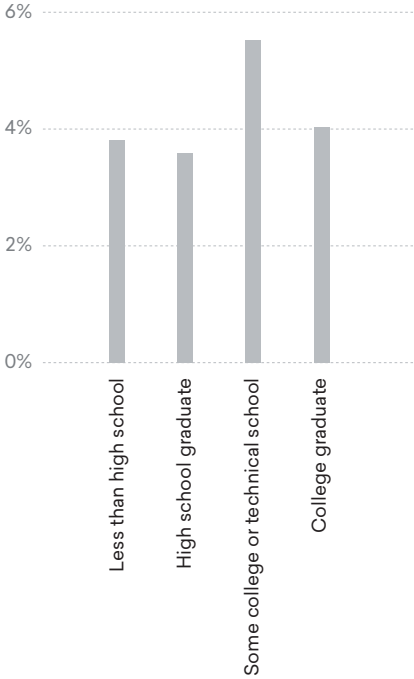
Capturing the full economic cost of mental illness is difficult because not all mental disorders have a correlation with education. For this reason, we only examine the economic costs associated with major depressive disorder (MDD), which are comprised of medical and pharmaceutical costs, workplace costs such as absenteeism, and suicide-related costs.⁵⁵

Figure A10.4 summarizes the prevalence of MDD among adults by education level, based on data provided by the CDC.⁵⁶ As shown, people with some college are most likely to have MDD compared to those with other levels of educational attainment. People with a high school diploma or less, along with college graduates, are all fairly similar in the prevalence rates.

DRUG ABUSE

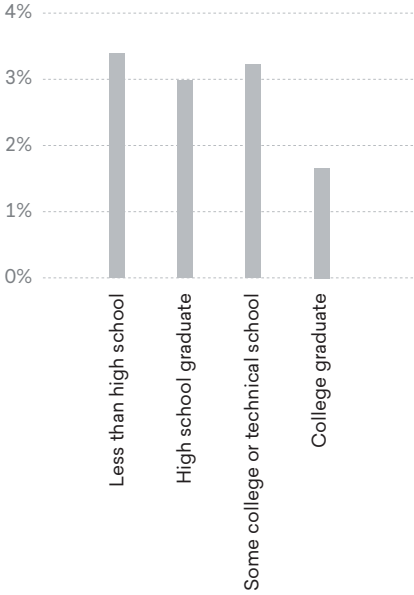
The burden and cost of illicit drug abuse is enormous in the U.S., but little is known about the magnitude of costs and effects at a national level. What is known is that the rate of people abusing drugs is inversely proportional to their education level. The higher the education level, the less likely a person is to abuse or depend on illicit drugs. The probability that a person with less than a high school diploma will abuse drugs is 3.4%, twice as large as the probability of drug abuse for college graduates (1.7%). This relationship is presented in Figure A10.5 based on data supplied by SAMHSA.⁵⁷ Similar to alcohol abuse, prevalence does not strictly decline at every education level. Health costs associated with

FIGURE A10.4: PREVALENCE OF MAJOR DEPRESSIVE EPISODE BY EDUCATION LEVEL



Source: National Survey on Drug Use and Health.

FIGURE A10.5: PREVALENCE OF ILLICIT DRUG DEPENDENCE OR ABUSE BY EDUCATION LEVEL



Source: Substance Abuse and Mental Health Services Administration.

54 Ogden Cynthia L., Tala H. Fakhouri, Margaret D. Carroll, Craig M. Hales, Cheryl D. Fryar, Xianfen Li, David S. Freedman. "Prevalence of Obesity Among Adults, by Household Income and Education – United States, 2011–2014" National Center for Health Statistics, Morbidity and Mortality Weekly Report, 66:1369–1373 (2017).

55 Greenberg, Paul, Andree-Anne Fournier, Tammy Sisitsky, Crystal Pike, and Ronald Kessler. "The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010)" Journal of Clinical Psychiatry 76:2, 2015.

56 National Survey on Drug Use and Health. "Table 8.59B: Had at Least One Major Depressive Episode (MDE) or MDE with Severe Impairment in Past Year among Persons Aged 18 or Older, and Receipt of Treatment for Depression in Past Year among Persons Aged 18 or Older with MDE or MDE with Severe Impairment in Past Year, by Geographic, Socioeconomic, and Health Characteristics: Percentages, 2015 and 2016."

57 Substance Abuse and Mental Health Services Administration, National Survey on Drug Use and Health, 2010 and 2011.

illegal drug use are also available from SAMSHA, with costs to state and local government representing 40% of the total cost related to illegal drug use.⁵⁸

Crime

As people achieve higher education levels, they are statistically less likely to commit crimes. The analysis identifies the following three types of crime-related expenses: 1) criminal justice expenditures, including police protection, judicial and legal, and corrections, 2) victim costs, and 3) productivity lost as a result of time spent in jail or prison rather than working.

Figure A10.6 displays the educational attainment of the incarcerated population in the U.S. Data are derived from the breakdown of the inmate population by education level in federal, state, and local prisons as provided by the U.S. Census Bureau.⁵⁹

Victim costs comprise material, medical, physical, and emotional losses suffered by crime victims. Some of these costs are hidden, while others are available in various databases. Estimates of victim costs vary widely, attributable to differences in how the costs are measured. The lower end of the scale includes only tangible out-of-pocket costs, while the higher end includes intangible costs related to pain and suffering.⁶⁰

Yet another measurable cost is the economic productivity of people who are incarcerated and are thus not employed. The measurable productivity cost is simply the number of additional incarcerated people, who could have been in the labor force, multiplied by the average income of their corresponding education levels.

Income Assistance

Statistics show that as education levels increase, the number of applicants for government-funded income assistance such as welfare and unemployment benefits declines. Welfare and unemployment claimants can receive assistance from a variety of different sources, including Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Medicaid, Supplemental Security Income (SSI), and unemployment insurance.⁶¹

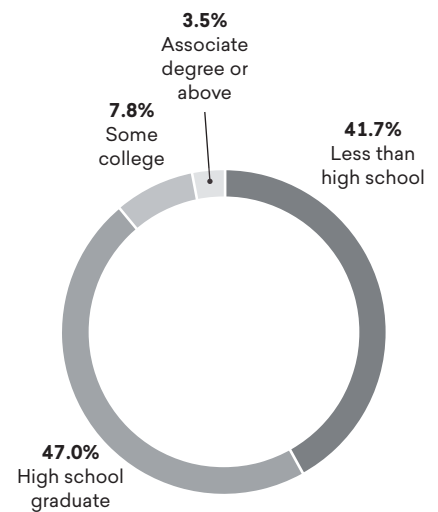
58 Substance Abuse and Mental Health Services Administration. "Table A.2. Spending by Payer: Levels and Percent Distribution for Mental Health and Substance Abuse (MHSA), Mental Health (MH), Substance Abuse (SA), Alcohol Abuse (AA), Drug Abuse (DA), and All-Health, 2014." *Behavioral Health Spending & Use Accounts, 1986 - 2014*. HHS Publication No. SMA-16-4975, 2016.

59 U.S. Census Bureau. "Educational Characteristics of Prisoners: Data from the ACS." 2011.

60 McCollister, Kathryn E., Michael T. French, and Hai Fang. "The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation." *Drug and Alcohol Dependence* 108, no. 1-2 (April 2010): 98-109.

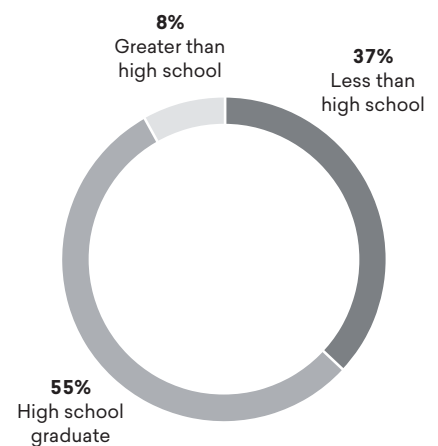
61 Medicaid is not considered in this analysis because it overlaps with the medical expenses in the analyses for smoking, alcohol dependence, obesity, depression, and drug abuse. We also exclude any welfare benefits associated with disability and age.

FIGURE A10.6: EDUCATIONAL ATTAINMENT OF THE INCARCERATED POPULATION



Source: Derived from data provided by the U.S. Census Bureau.

FIGURE A10.7: BREAKDOWN OF TANF RECIPIENTS BY EDUCATION LEVEL

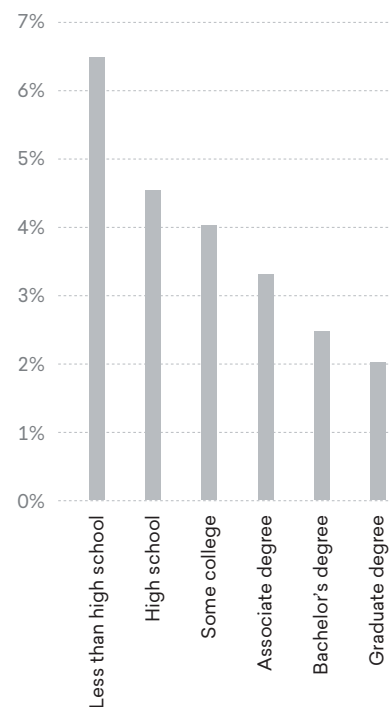


Source: U.S. Department of Health and Human Services, Office of Family Assistance.

Figure A10.7 relates the breakdown of TANF recipients by education level, derived from data provided by the U.S. Department of Health and Human Services.⁶² As shown, the demographic characteristics of TANF recipients are weighted heavily towards the less than high school and high school categories, with a much smaller representation of individuals with greater than a high school education.

Unemployment rates also decline with increasing levels of education, as illustrated in Figure A10.8. These data are provided by the Bureau of Labor Statistics.⁶³ As shown, unemployment rates range from 6.5% for those with less than a high school diploma to 2.0% for those at the graduate degree level or higher.

FIGURE A10.8: UNEMPLOYMENT BY EDUCATION LEVEL



Source: Bureau of Labor Statistics.

62 U.S. Department of Health and Human Services, Office of Family Assistance. "Characteristics and Financial Circumstances of TANF Recipients, Fiscal Year 2016."

63 Bureau of Labor Statistics. "Table 7. Employment status of the civilian noninstitutional population 25 years and over by educational attainment, sex, race, and Hispanic or Latino ethnicity." Current Population Survey, Labor Force Statistics, Household Data Annual Averages, 2017.



The Economic Value of Riverside City College

FACT SHEET

RIVERSIDE City College (RCC) creates a significant positive impact on the business community and generates a return on investment to its major stakeholder groups—students, taxpayers, and society. Using a two-pronged approach that involves an economic impact analysis and an investment analysis, this study calculates the benefits received by each of these groups. Results of the analysis reflect fiscal year (FY) 2016-17.



Economic impact analysis

In FY 2016-17, RCC added **\$356.8 million** in income to the RCC Service Area¹ economy, a value approximately equal to **1.0%** of the region's total gross regional product (GRP). Expressed in terms of jobs, RCC's impact supported **5,484** regional jobs. For perspective, the activities of RCC and its students support one out of every **77** jobs in the RCC Service Area.

OPERATIONS SPENDING IMPACT

- RCC employed 961 full-time and part-time faculty and staff. Payroll amounted to \$88.4 million, much of which was spent in the region for groceries, mortgage and rent payments, dining out, and other household expenses. The college spent another \$50.5 million on day-to-day expenses related to facilities, supplies, and professional services.
- The net impact of the college's operations spending added **\$103.3 million** in income to the regional economy.

STUDENT SPENDING IMPACT

- Some in-region students would have left the RCC Service Area for other educational opportunities if not for RCC. These students spent money on groceries, mortgage and rent payments, and so on at regional businesses.
- The expenditures of retained students in FY 2016-17 added **\$12.3 million** in income to the RCC Service Area economy.

IMPACTS CREATED BY RCC
IN FY 2016-17



\$103.3 million
Operations Spending Impact



\$12.3 million
Student Spending Impact



\$241.2 million
Alumni Impact



\$356.8 million
TOTAL IMPACT

- OR -

5,484
JOBS SUPPORTED

¹ For the purposes of this analysis, the RCC Service Area is comprised of 29 ZIP codes in the northwest corner of Riverside County in California.



ALUMNI IMPACT

- Over the years, students have studied at RCC and entered or re-entered the workforce with newly-acquired knowledge and skills. Today, thousands of these former students are employed in the RCC Service Area.
- The net impact of RCC's former students currently employed in the regional workforce amounted to **\$241.2 million** in added income in FY 2016-17.

Investment analysis

STUDENT PERSPECTIVE

- RCC's FY 2016-17 students paid a present value of **\$29.1 million** to cover the cost of tuition, fees, supplies, and interest on student loans. They also forwent **\$54.9 million** in money that they would have earned had they been working instead of attending college.
- In return for their investment, students will receive **\$539.5 million** in increased earnings over their working lives. This translates to a return of **\$6.40** in higher future earnings for every dollar students invest in their education. Students' average annual rate of return is **20.7%**.

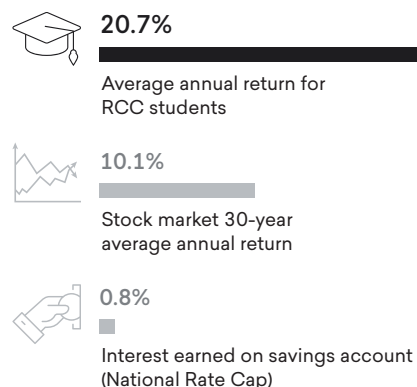
TAXPAYER PERSPECTIVE

- Taxpayers provided RCC with **\$110.5 million** of funding in FY 2016-17. In return, they will benefit from added tax revenue, stemming from students' higher lifetime earnings and increased business output, amounting to **\$211.1 million**. A reduced demand for government-funded services in California will add another **\$33.1 million** in benefits to taxpayers.
- For every dollar of public money invested in RCC, taxpayers will receive **\$2.20** in return, over the course of students' working lives. The average annual rate of return for taxpayers is **5.2%**.

SOCIAL PERSPECTIVE

- In FY 2016-17, California invested **\$231.6 million** to fully support RCC. In turn, the California economy will grow by **\$3 billion**, over the course of students' working lives. Society will also benefit from **\$43.2 million** of public and private sector savings.
- For every dollar invested in RCC educations in FY 2016-17, people in California will receive **\$13.10** in return, for as long as RCC's FY 2016-17 students remain active in the state workforce.

STUDENTS SEE A HIGH RATE OF RETURN FOR THEIR INVESTMENT IN RCC



Source: Forbes' S&P 500, 1987-2016. FDIC.gov, 7-2016.



FOR EVERY \$1...



Students gain
\$6.40
in lifetime earnings



Taxpayers gain
\$2.20
in added tax revenue and public sector savings



Society gains
\$13.10
in added state revenue and social savings





Emsi Economic Impact Study: Outline of Methodology

Economic Impact Analysis

When exploring the economic impact of the institution, we consider the following hypothetical question:

How would the region's economic activity change if the institution and all its alumni did not exist in the fiscal year?

The analysis breaks out the impact measures into different components, and focuses on assessing the change in income in a given region, similar to the commonly used Gross Domestic Product (GDP) except at the regional level. Another way to state the impact is in terms of sales, which is the change in business sales revenue in the economy as a result of increased economic activity. Bear in mind, however, that unlike income, sales includes intermediary transactions and does not account for money that leaks out of the region. Finally, a frequently used measure is the jobs impact, a measure of the number of full- and part-time jobs that would be required to support the change in income. To calculate the jobs impact, we consider how much each industry is being impacted in terms of added income, whether it's through the institution's expenditures or student spending, and divide that by the regional average wage in each industry. Finally, we sum these jobs by industry to arrive at the total number of jobs supported.

Whichever measure is used, each measure is broken out into different effects. First, the initial effect, or initial spending of money, occurs when salaries, wages, and benefits are paid or goods and services are purchased. Then, the initial spending of money creates more spending in the economy, commonly known as a multiplier or ripple effect. For example, such spending includes an employee using wages to purchase groceries and then the grocery store's purchases from their supplier and so on. All the additional income created in the economy as a result of the institution and its students spending money in the region is accounted for in the multiplier effect.

Of course, the types of goods and services purchased by the institution are very different from those purchased by a student or resident in the region. Emsi's model relies on a matrix representation of industry-to-industry purchasing patterns and is referred to as a multi-regional social accounting matrix (MR-SAM). The purchasing patterns used in the model are derived from the U.S. Department of Commerce Bureau of Economic Analysis (BEA) Make and Use Tables, called MUTs, which are the basis for any such model in the U.S. However, the BEA MUTs, because of data suppression, do not provide us with spending patterns for all U.S. industries. Furthermore, the BEA MUTs are more accurate at capturing spending patterns at a state level rather than a county level. As a result, Emsi uses additional data sources, from federal institutions as the Bureau of Labor Statistics and Census Bureau, as well as proprietary algorithms to fill in any gaps in the MUTs.

Finally, we aim to be conservative in our methodologies. The impacts presented in analysis are reported as net impacts. The gross impacts represent an upper-bound estimate of all economic activity stemming from the institution. We adjust this downward by considering several counteractions that result in the net impact being a truer and more accurate impact. For example, for the operations impact, we estimate the counterfactual by simulating a scenario where in-region monies spent on the institution are instead spent by local taxpayers and in-region students, thus creating an impact regardless of the institution's presence in the region. In addition, we do not consider the entire year's student population in the student spending impact; we only consider those who would not have been in the regional economy if not for the institution's presence. And finally, for the alumni impact, we apply two counterfactual scenarios. First, we assume a portion of the institution's alumni would have received a comparable education elsewhere, whether its inside or outside of the region, and returned to the region to work in the regional workforce. Second, we account for a labor import effect. If the institution did not exist and there were fewer skilled workers in the region, businesses would satisfy some of their need for skilled labor by recruiting from outside the region.

The following sections describe the methodologies used to calculate the value of the operations and student spending impacts and the alumni impact in the economic impact analysis.

Operations and student spending impacts

1. **CLASSIFY SPENDING:** For the operations impact, the initial income effect comprises the payroll of employees. For students, there is no initial income effect, only an initial sales effect.
2. **DISTRIBUTE SPENDING ACROSS INDUSTRIES:** Payroll –To calculate the impact of the multiplier effects, the payroll of employees living in the institution’s service region is distributed across the detailed industries in the MR-SAM model using average household spending patterns. Non-Pay Spending – Other, that is non-pay, institutional spending is also distributed across the detailed industries in the MR-SAM model, in order to capture the multiplier effects. For operations spending, other spending is distributed across industries using average college spending patterns.
3. **NET OUT WHAT’S NON-APPLICABLE:** For the student spending impacts, only the expenditures of out-of-region students are considered. Spending is distributed to the various industries using average student spending patterns and visitor spending patterns, when applicable
4. **DETERMINE IN-REGION SPENDING:** Once payroll and other spending are distributed across the detailed industries in the MR-SAM model, regional purchasing coefficients—records of purchases between industries within the region—are used to estimate the amount of spending that occurs in the region. This automatically removes from the analysis any dollars spent outside region. In-region spending by industry is run through the MR-SAM model’s multiplier matrix to estimate inter-industry multiplier impacts.
5. **APPLY “ALTERNATE USE OF FUNDS” COUNTERFACTUAL:** The calculation of operations impacts additionally considers counterfactual scenario where all money from local sources is returned to the original consumers and spent instead on households, rather than being spent by the institution. This represents the opportunity cost of money received by the institution from local sources, and is subtracted from the gross spending impact.
6. **SUM MULTIPLIERS AND INITIAL FOR TOTAL IMPACT:** All multiplier effects calculated by the MR-SAM model are reported in either added income or jobs supported. Multiplier effects together with the initial effect comprise the total added income created in the economy.

Alumni impact

1. **OBTAIN HEADCOUNT:** Determine how many alumni were served by the college. These data are provided by the college.
2. **NET OUT NON-ACTIVE ALUMNI:** Subtract alumni who are not actively employed in the region—that is, those who have died, retired, are unemployed, or have migrated out of the region. These data come from the Center for Disease Control, the Bureau of Labor Statistics, and the Census Bureau.
3. **DETERMINE ALUMNI CREDIT ACHIEVEMENTS:** Divide the year’s total credits attained by the year’s students. Now we know the average credit load per student for the fiscal year, and we apply this average credit attainment to the alumni as well.
4. **APPLY THE COUNTERFACTUAL ALTERNATIVE EDUCATION VARIABLE:** Even if the institution did not exist, a portion of the students would still get a similar education through other means. Therefore, this portion of the impact is subtracted from the gross impact.
5. **DETERMINE THE VALUE PER CREDIT:**
 - By means of public data sources, determine regional earnings by education level, including the earnings increases associated with different levels of credit attainment between award levels (the rungs on the educational ladder).
 - Institutional data provide the entry level of education (i.e., the starting point) of the fiscal year’s students. The total earnings change - attributable to the education that the institution imparts - for each student category (starting point category) is calculated by adding the earnings change associated with the average credit load of the students (credits achieved beyond their starting point) and subtracting previous levels of attainment. This yields the marginal gain in wages due to the students’ education.

- Next, this earnings change is divided by the number of credits attained in the fiscal year. This provides an average value per credit at each educational category.
 - Lastly multiply the number of total credits at each category / education level by their associated value per credit. Sum total earnings change of all categories. The total earnings change of all categories divided by total credit attainment results in the student body's value per credit.
6. MULTIPLY VALUE PER CREDIT BY ACTIVE ALUMNI CREDITS:
- Multiply the value per credit by the number of credits still active in the region (Step 3). This gives us the total added income received in the region by all active alumni during the analysis year.
 - Apply the “substitution” counterfactual: If the institution did not exist, a portion of this income would have been added to the region anyway as employers would meet their workforce needs by importing labor. Therefore, this portion of income is subtracted from the gross value.
7. USE THE ADDED INCOME TO QUANTIFY THE STUDENT CONTRIBUTION to their businesses (the non-labor income):
- Determine the students' current occupations by using a program to occupation mapping and then tie the occupations to regional industry data. The mapping is based upon the one developed by the Bureau of Labor Statistics, and the MR-SAM is used to determine which industries employ the specific occupations.
 - Apply industry-specific jobs-to-sales ratios to see the extra value that the employed students added to their businesses.
8. RUN MULTIPLIER EFFECTS AND SUM TOGETHER FOR TOTAL ALUMNI IMPACT:
- Run the income and non-labor income through the MR-SAM to derive the multipliers.
 - These are the “ripple effects” when the students with extra income spend their money in the region and when extra productive businesses buy more from their supply chains.
 - Sum up the initial values with these multipliers, and the result is the total alumni impact for the fiscal year.

Investment Analysis

Investment analysis is a standard method for determining whether or not an existing or proposed investment is economically viable. This methodology is appropriate in situations where a stakeholder puts up a certain amount of money with the expectation of receiving benefits in return, where the benefits to the stakeholder are distributed over time, and where a discount rate must be applied in order to account for the time value of money. After all, \$1 today is worth more than \$1 tomorrow.

The measures most commonly used in investment analysis are the net present value, the benefit-cost ratio, and the internal rate of return. The net present value indicates the magnitude of a given investment and is equal to the present value of the benefits less the present value of the costs. The benefit-cost ratio is used to indicate the amount of benefits received by the stakeholder for every dollar spent and is calculated simply by dividing the present value of the benefits by the present value of the costs. The rate of return measures the yield of the investment. The rate of return must be greater than the minimum acceptable rate of return (assumed in this study to be the discount rate) in order to be considered a worthwhile investment.

Student perspective

- The investment analysis from the students' perspective compares the benefits and costs that accrue to the institution's fiscal year's student population.
- Benefits include the incremental increase in lifetime earnings enjoyed by the fiscal year's student population as a result of the skills they attained during the year. Earnings are projected out over the working life of the student population and are discounted back to the present. The discount rate is derived from the baseline forecast of the 10-year Treasury rate published by the Congressional Budget Office. The projected benefits stream factors in death, unemployment, and retirement rates in order to determine how many students leave the workforce over time.
- Student costs include the direct outlays incurred by students – including tuition, fees, books, and supplies – and the opportunity cost of the time spent on education rather than working.

Taxpayer perspective

- The taxpayer perspective compares the benefits and costs that accrue to state and local taxpayers in the state.
- Benefits comprise the added tax revenue and avoided costs to state and local government in the state. They are calculated by applying average state and local tax rates to the same benefits stream used in determining the investment analysis results from the social perspective.
- Costs include all state and local government support received by the institution. If the institution received no state and local government support during the fiscal year, standard investment measures such as the net present value, benefit-cost ratio, and rate of return are not reported.

Social perspective

- The social perspective compares the benefits and costs that accrue to society in the state.
- Benefits include the added income created in the state as a result of the institution's spending impacts during the fiscal year, the higher lifetime earnings that accrue to the fiscal year's student population, the increased profits that accrue to businesses that employ the institution's fiscal year's students, and the social savings that occur across the state from the reduced demand for health, unemployment, and law enforcement services (both private and public).
- With the exception of the institution's spending impacts (these only occur during the single year), benefits are projected out to the future and discounted back to the present. The discount rate from the social perspective is defined by the Office of Management and Budget and is the same one used by the federal government to assess the feasibility of government programs.
- Costs to society include all institutional expenses (less tuition) and all student costs (including tuition and opportunity costs).



Economic Impact Study Takeaways

“Good To Know” Isn’t Good Enough

If you’ve spent money obtaining the best data available about your institution’s economic value, you need that information to serve a purpose. How can you best use the data? What stories can you tell?

1) My district generates more tax dollars than it takes.

When your district’s taxpayer benefit/cost ratio is greater than 1, it creates more tax revenue than it takes. For every dollar that state and local taxpayers give to Riverside Community College District, the colleges return \$2.40 to government coffers. This \$2.40 represents a larger future tax base from students’ higher income, which has been discounted back to the present. After all, \$1 today is worth more than \$1 tomorrow.

This message is especially potent when compared to other uses of government funds. Public parks, for example, require funds to maintain but they don’t generate more tax revenue. Your higher education institution is unique: It’s a moneymaker that generates more than it takes.

Who Cares: Legislators, Board of Directors, Homeowners

2) My district retains and creates wealth.

Income, or value added, is just another way of talking about the extra money generated in the region even after subtracting costs of production and leakages (most money spent on computers in California, for example, leaves California for Seattle to pay Microsoft). The remaining funds for the region are wages, profits, and other forms of income: money that otherwise wouldn’t exist in the region if the colleges didn’t exist. The district also creates wealth by educating students who add to their businesses’ output. This alumni impact would never have come to exist if the colleges hadn’t existed.

Who Cares: County Commissioners, Rotary/Kiwanis Clubs, Mayors, City Council, Local Businesses

3) My district performs better than the stock market.

The S&P 500 has delivered an average return of 7.2% over the last 10 years, according to Forbes. If your district has higher rates of return to its shareholders (students and taxpayers), then it’s a safer and stronger alternative to the stock market.

Who Cares: Prospective Students, Local Media, Trustees, Average Citizens



Marketing Your Economic Impact Study

“Good To Know” Isn’t Good Enough

If you’ve spent money obtaining the best data available about your institution’s economic value, you need that information to serve a purpose. What stories can you tell? How do you tell those stories?

- **Share the results on your institution’s website and social media.**

Prospective students want to know how they will benefit from investing in their education. You can create a [web page](#) about your institution’s economic impact, [tweet](#) out study highlights, or release the study results as a [news item](#).

- **Visualize it.**

Numbers and data may not be as meaningful to some of the audiences you’re sharing results with. You can create an [animation](#) to illustrate the results, or create a [video](#) to demonstrate your institution’s value to the community.

You can also create an [infographic](#) to put results into perspective. Emsi creates [infographics](#) in-house, too. [Contact us](#) if you’re interested in knowing more.

- **Let your economic impact study help you.**

Now that your community knows the value of your institution, use the study results to increase positive attention surrounding your institution. Invite the local community to learn about your institution’s economic impact. Our studies have been cited in [legislative sessions](#), bond applications, and [campaigns](#) to secure additional funding and support.

Whatever you choose to do, your Emsi economists are here to answer any questions as you roll out your results. We can read over press releases for accuracy, work with you to create custom content, and even field difficult questions from reporters. Even though we’ve completed your study, we’re still here to help you in any way you need.

More examples:

- Interactive college [web page](#)
- [Radio](#) spots
- Media roll-out [event](#)
- [Tweet](#) highlighting study
- [Newspaper article](#)
- Emsi [blog post](#)

Board of Trustees Committee Meeting (IV.E)

Meeting	April 2, 2019
Agenda Item	Planning and Operations (IV.E)
Subject	Planning and Operations Future General Obligation Bond Planning Update
College/District	District
Funding	N/A
Recommended Action	Information Only

Background Narrative:

In March 2004, the electorate of Riverside Community College District passed Measure C authorizing the issuance of \$350,000,000 of general obligation bonds to finance the acquisition, construction, improvement and renovation of educational facilities at Moreno Valley, Norco, and Riverside City Colleges. At that time, the District identified much needed projects whose cost far exceeded the total amount of Measure C funding but it was anticipated that the District would be able to leverage historically reliable State Construction Act funding to encompass a building program totaling almost \$1 billion. However, from 2010 through 2016, no new State bonds were authorized and all previous State bonds had been issued. When the State bond program began again in 2017, the amount of funds distributed for community college facility projects was severely limited, making the State an unreliable partner in funding District's facility needs. Thus, the District utilized the Measure C authorization to a greater extent than anticipated through 2019 by expending, committing or designating all but \$8 million dollars of the total authorization.

Given the tremendous enrollment growth experienced by each of the colleges since 2004 and the aforementioned suspension of the State bond program, funding to provide current, state-of-the-art facilities to meet the needs of the District's students remains a challenge. As such, the District has started to explore the feasibility of another local general obligation bond. The District has engaged TBWB Strategies and True North Research to assist the District with planning for a future general obligation bond. Representatives of both firms will be in attendance to share progress on bond feasibility efforts including: bond measure feasibility survey results; bond planning timelines; planning for internal/external outreach to stakeholders and the public; and to discuss and develop a strategy for common messaging, campaign guidelines, and raising community awareness.

Prepared By: Aaron S. Brown, Vice Chancellor, Business and Financial Services

BOND MEASURE FEASIBILITY SURVEY

CONDUCTED FOR THE
RIVERSIDE COMMUNITY
COLLEGE DISTRICT

4/2/2019



PURPOSE OF STUDY

- Determine if a bond measure is feasible
- Identify how to create a measure consistent with community priorities
- Gather information needed for communications & outreach

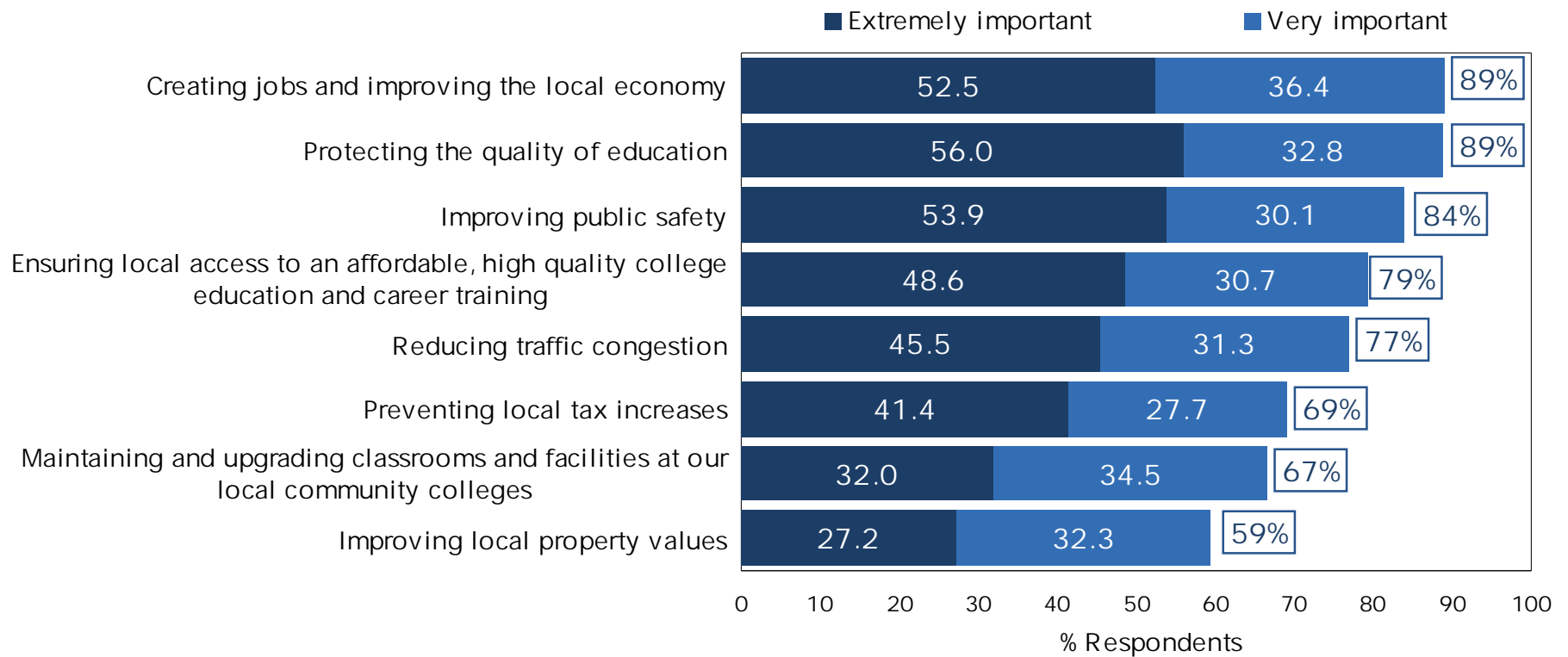


METHODOLOGY OF STUDY

- Conducted February 6th to February 18th, 2019
- 861 District voters likely to participate in November 2020 election
- Mixed-Method approach
 - Recruited via phone and email
 - Data collection via phone and online
 - 17-minute average interview length
 - English & Spanish
- Overall margin of error is $\pm 3.3\%$



IMPORTANCE OF ISSUES





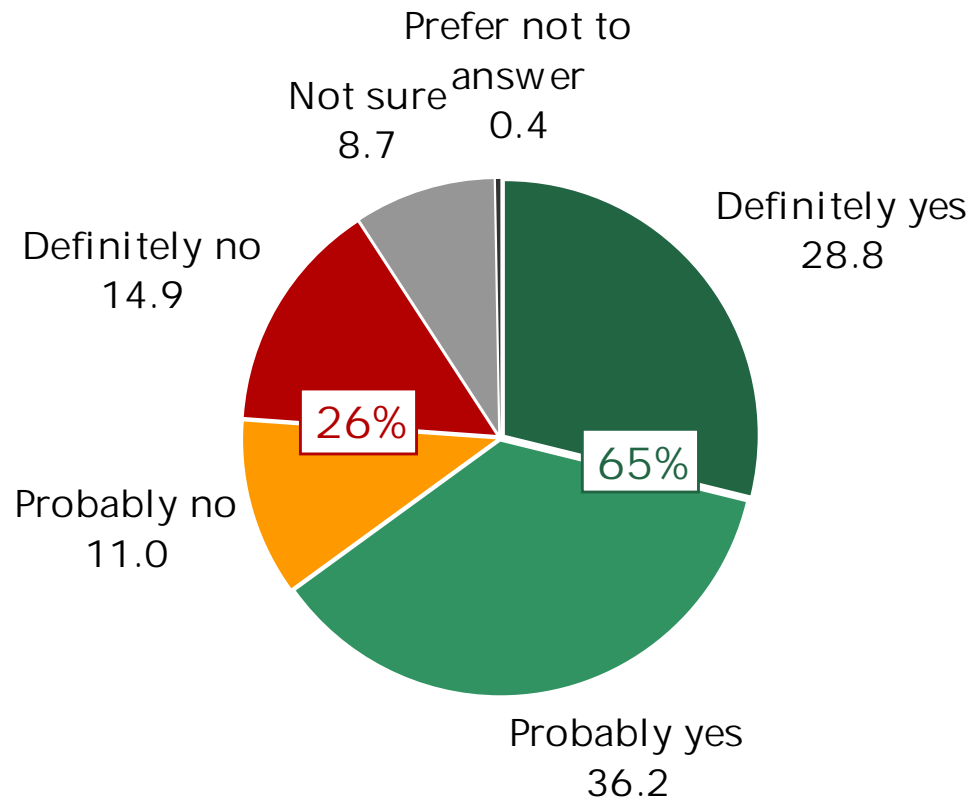
INITIAL BALLOT TEST

To improve access for students and veterans to high quality, affordable college education by:

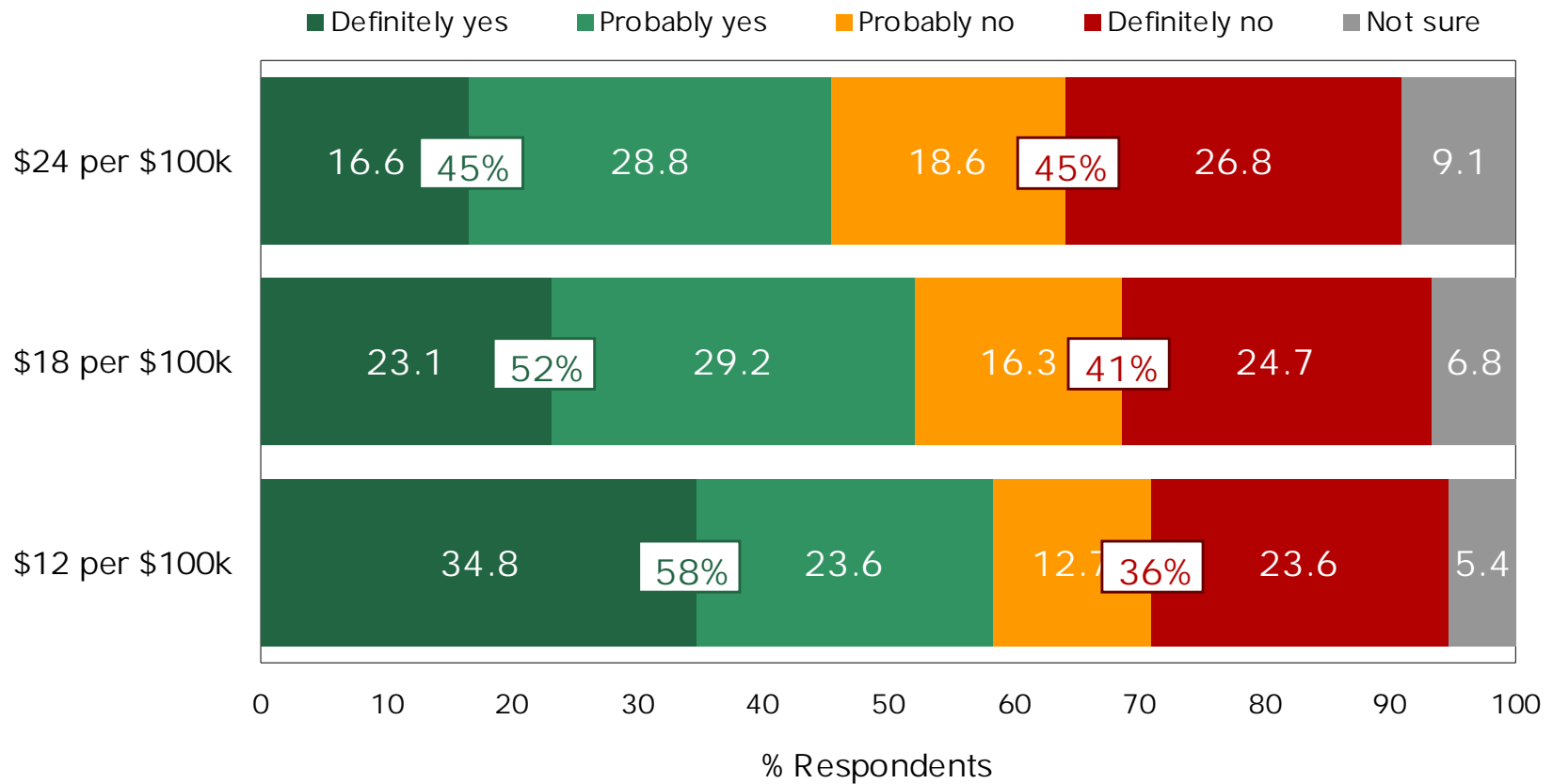
- Repairing, constructing, and acquiring classrooms, facilities, sites and equipment at Riverside City, Norco, and Moreno Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades

Shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled? If the election were held today, would you vote yes or no on this measure?

INITIAL BALLOT TEST

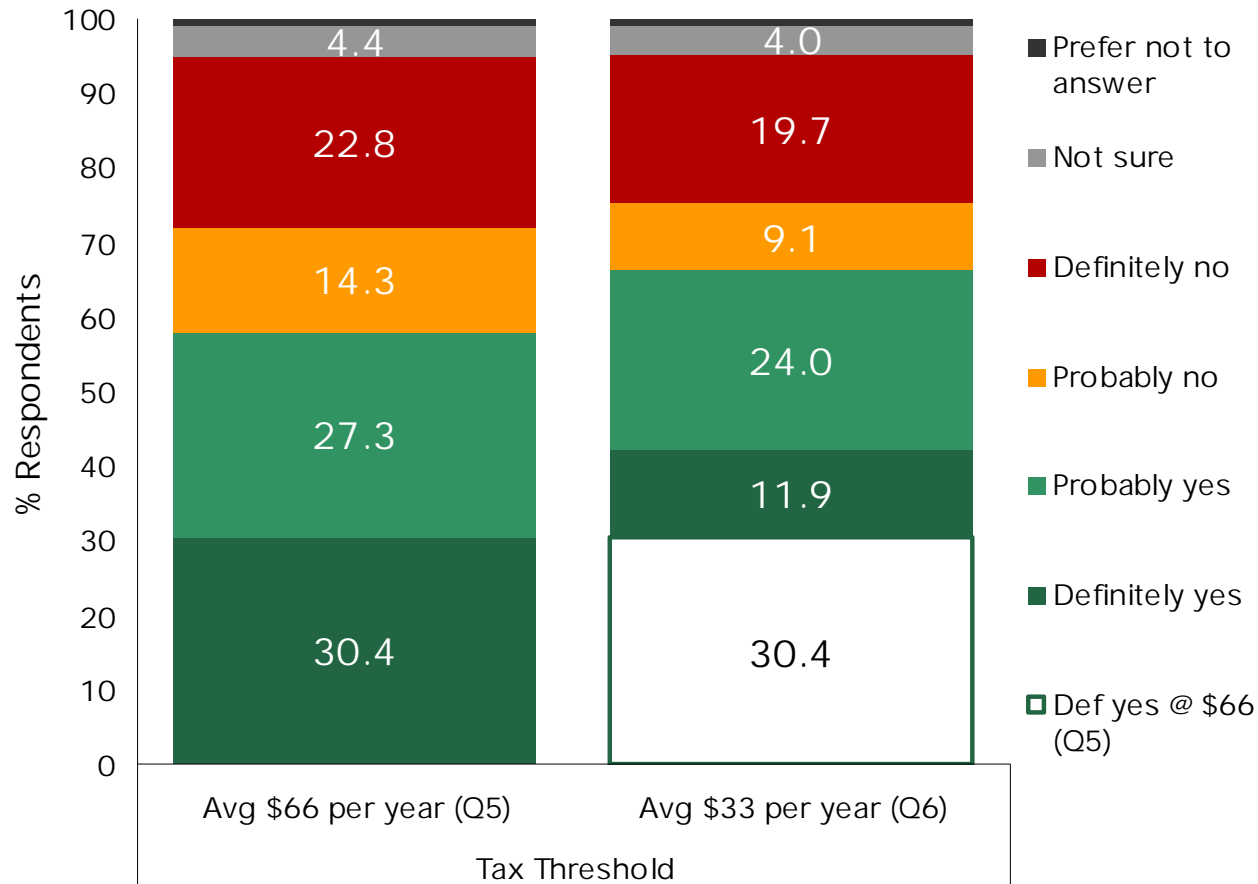


TAX THRESHOLD

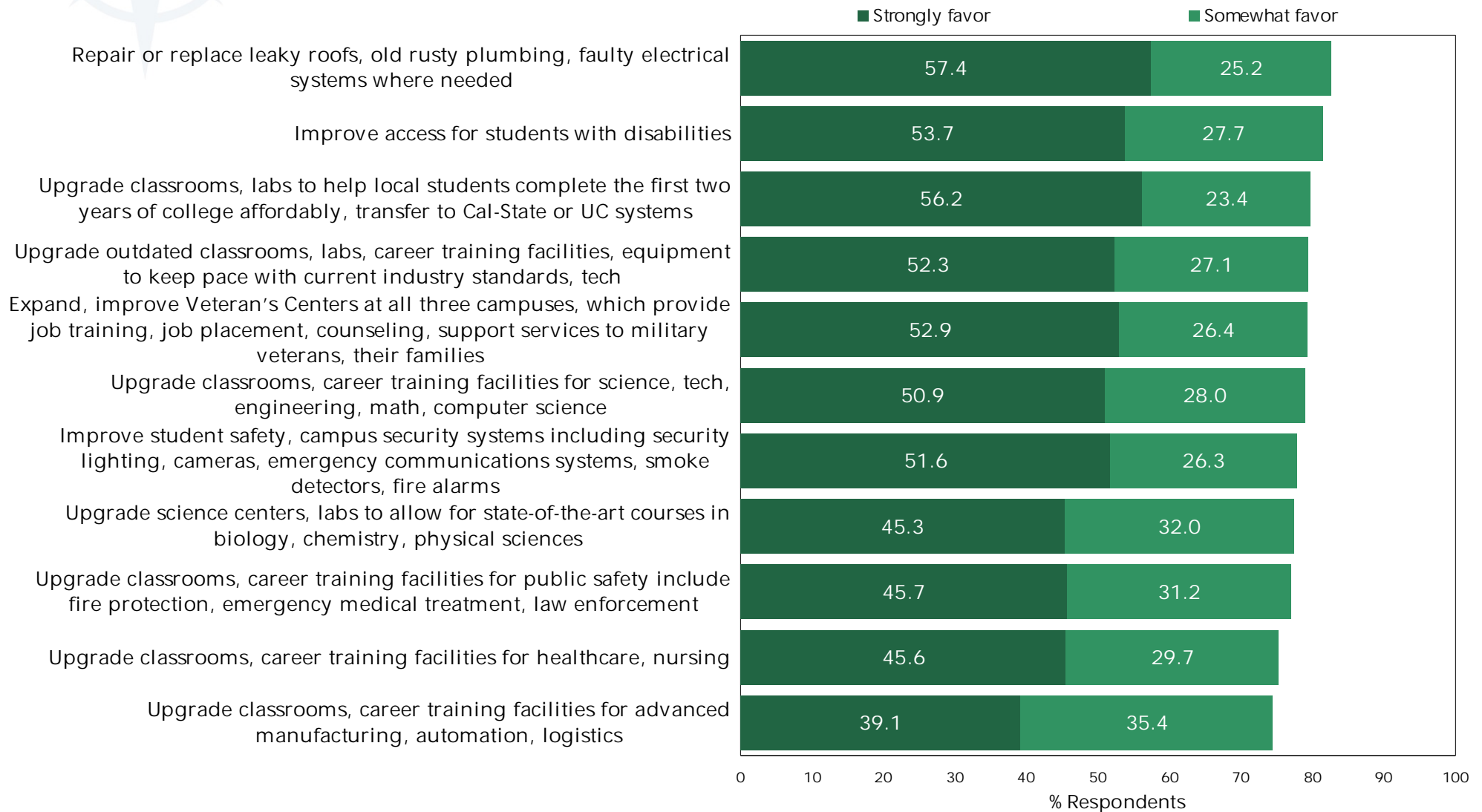


SUPPORT FOR MEASURE

AT \$66 & \$33 PER YEAR FOR TYPICAL OWNER

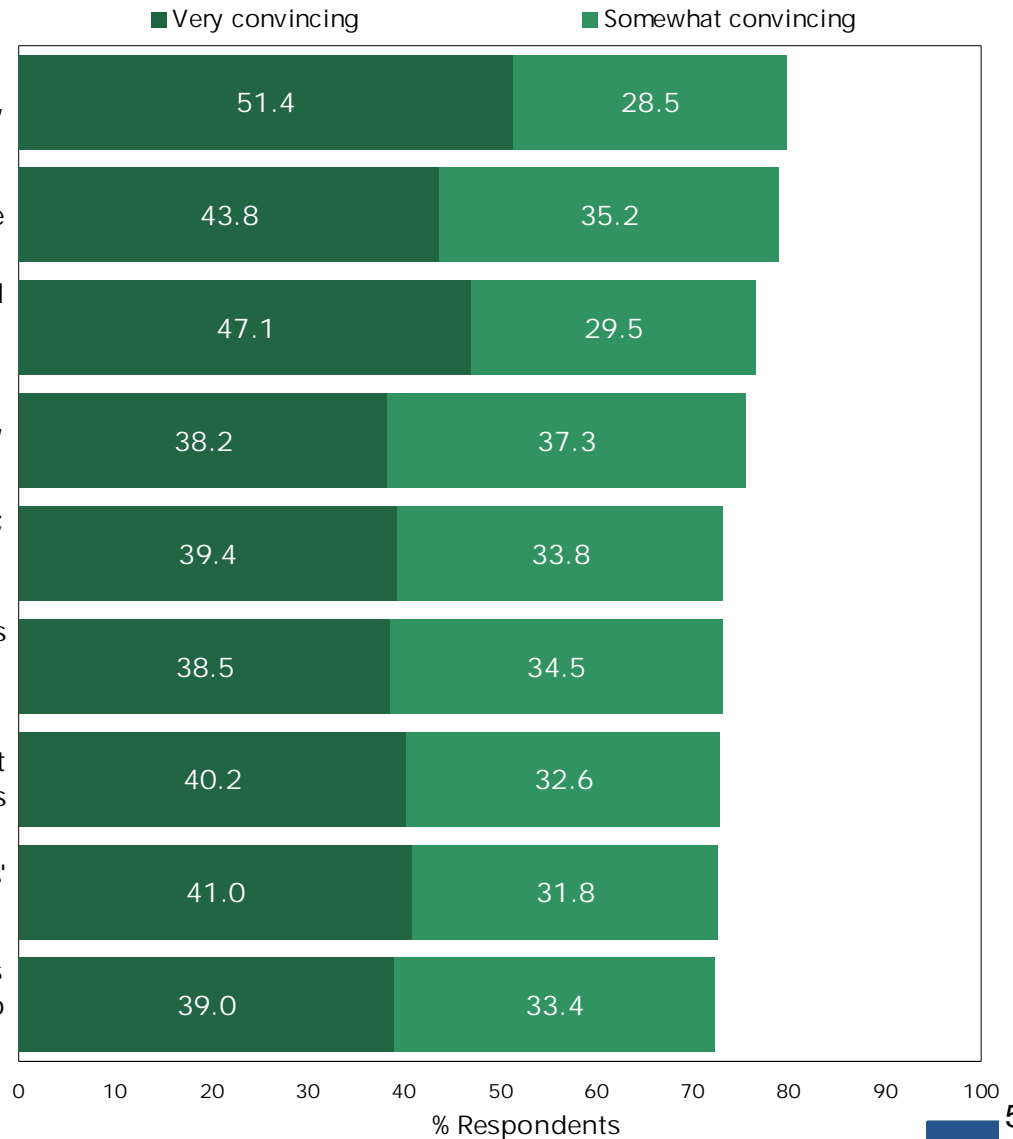


PROJECTS & PROJECTS

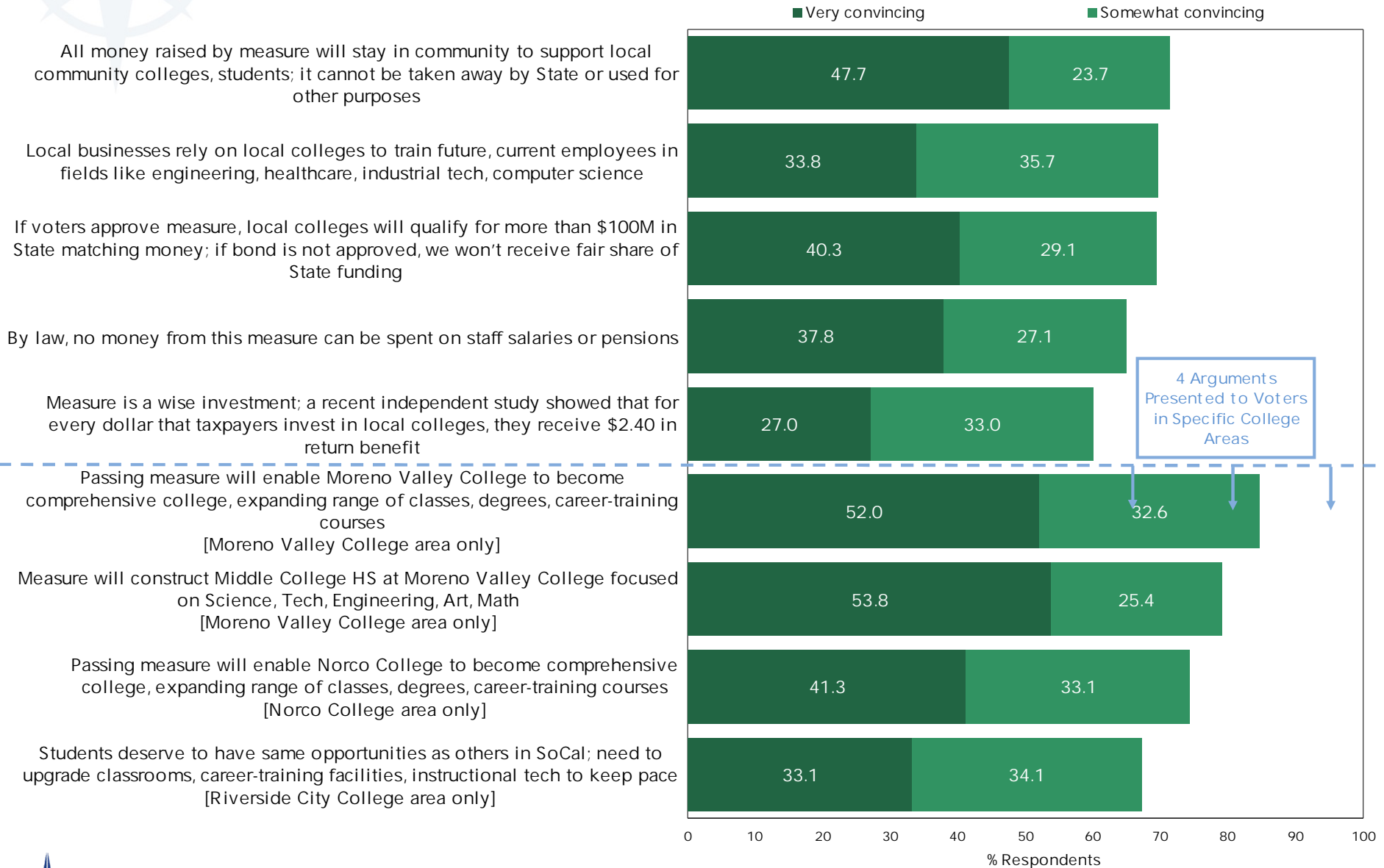


POSITIVE ARGUMENTS TIER 1

- Cost of attending college has become so expensive, more students starting at CC; measure will ensure students have access to affordable, high-quality education Riverside Co
- Nearly 40% of all HS graduates rely on local CCs to prepare for careers; we need to repair, upgrade local colleges so they can continue to serve community well for decades to come
- Local CCs ensure that lower, middle-income students who can't afford the high price of a university still have opportunity to succeed in college and careers
- The Colleges are vital resources; they educate healthcare professionals, law enforcement, firefighters, skilled workers who fuel economy
- Standards are rising for what it takes to compete for good paying jobs; measure will ensure students have access to education, facilities, tech, skills training, certifications needed
- Local hospitals, doctor's offices depend on colleges to train thousands of nurses, health care professionals to provide good, reliable health care in community
- The Colleges are vital economic engines for local biz community; last year, they added nearly \$1B to local economy, supported 13,000 jobs
- Measure requires clear system of accountability, project list, Citizens' Oversight Committee, independent audits
- Riverside CC District is one of the most important Veterans' services institutions in CA; it provides job placement, training, counseling to about 1800 vets every day

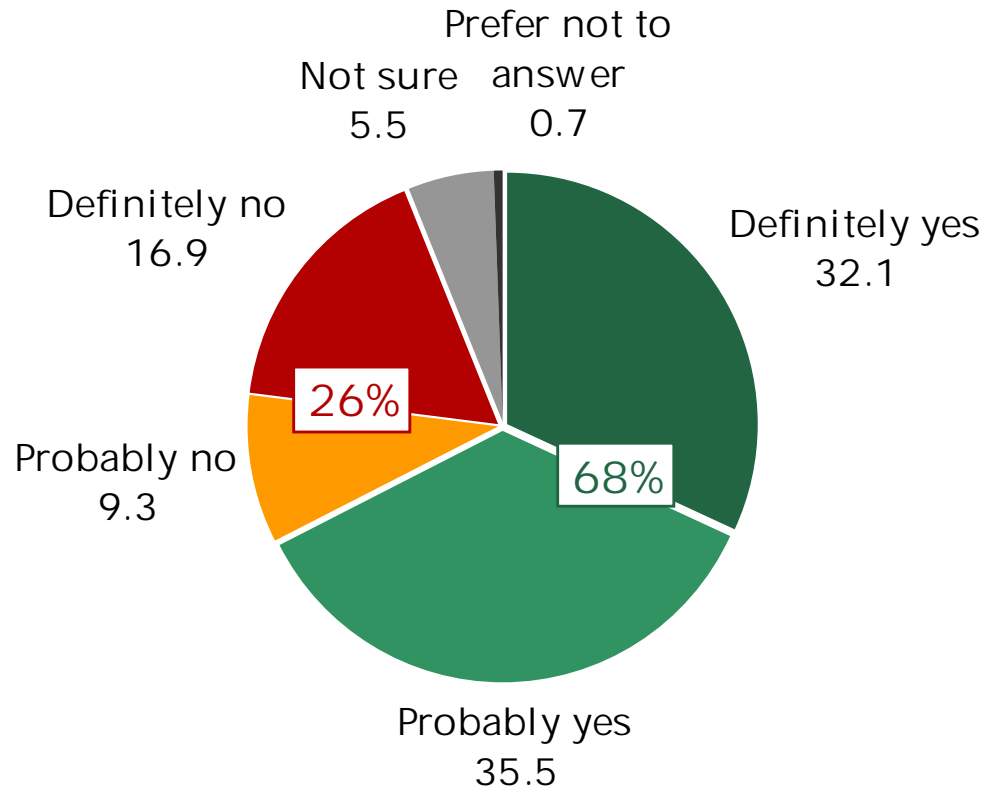


POSITIVE ARGUMENTS TIER 2

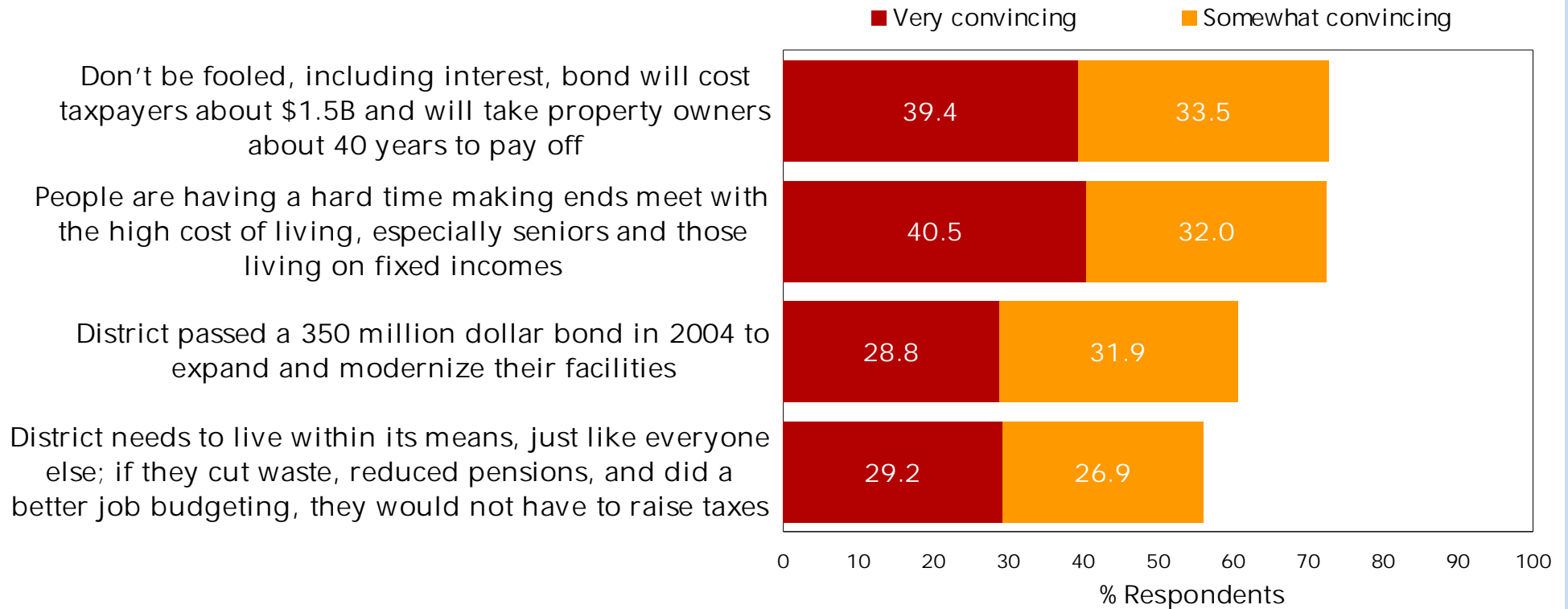




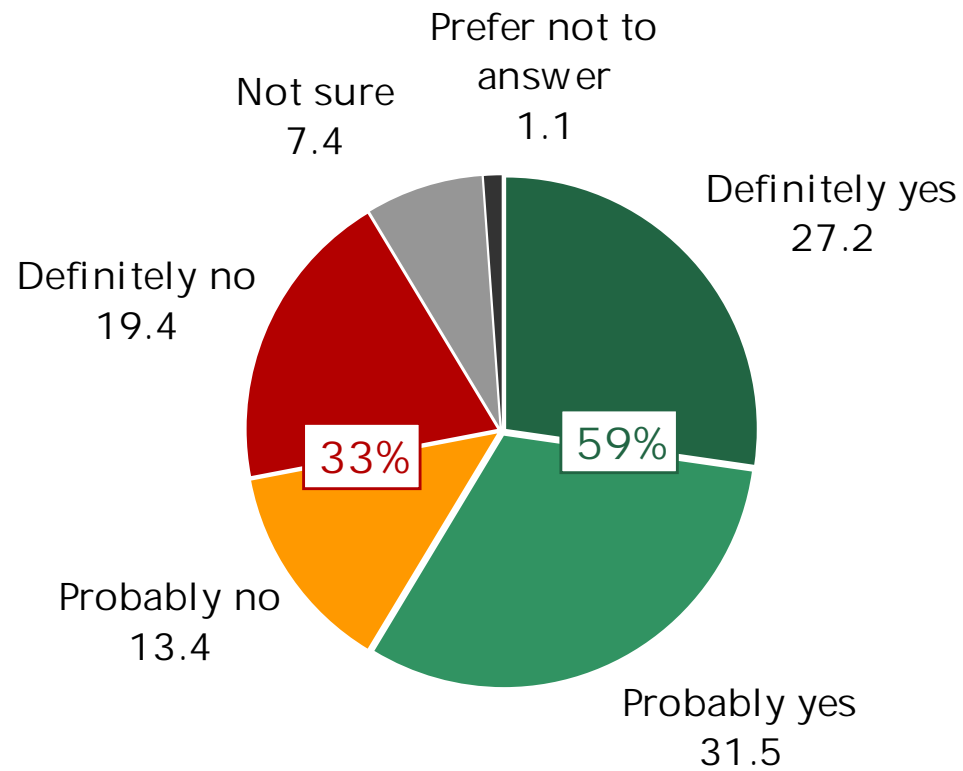
INTERIM BALLOT TEST



NEGATIVE ARGUMENTS



FINAL BALLOT TEST





KEY CONCLUSIONS

- Is it feasible to move forward with a bond measure in 2020? Yes.
 - Voters perceive that improving the quality of education and providing local access to affordable college education and career training are among the most important issues facing the community
 - Solid natural support for bond (65%)
 - Popular projects
 - Strong positive arguments
 - All ballot tests above 55% threshold



OBSERVATIONS & RECOMMENDATIONS

- Election Date: Keep both March 2020 and November 2020 as possibilities, which means proceeding according to the March 2020 time line at this point
- Price Tag: Need to keep it in voters' comfort zone and help them understand the modest annual amount.
- Project Priorities: Facility repairs, ADA, keeping classrooms, labs, career training technology & equipment up to industry standards, affordable 2-year transfer opportunities, and Veterans Centers/services.
- District Communications: Expand the conversation with the community to build awareness and consensus on a bond proposal.

Riverside Community College District

April 2, 2019

T B W B

STRATEGIES

Public Consensus → Winning Propositions

RCCD

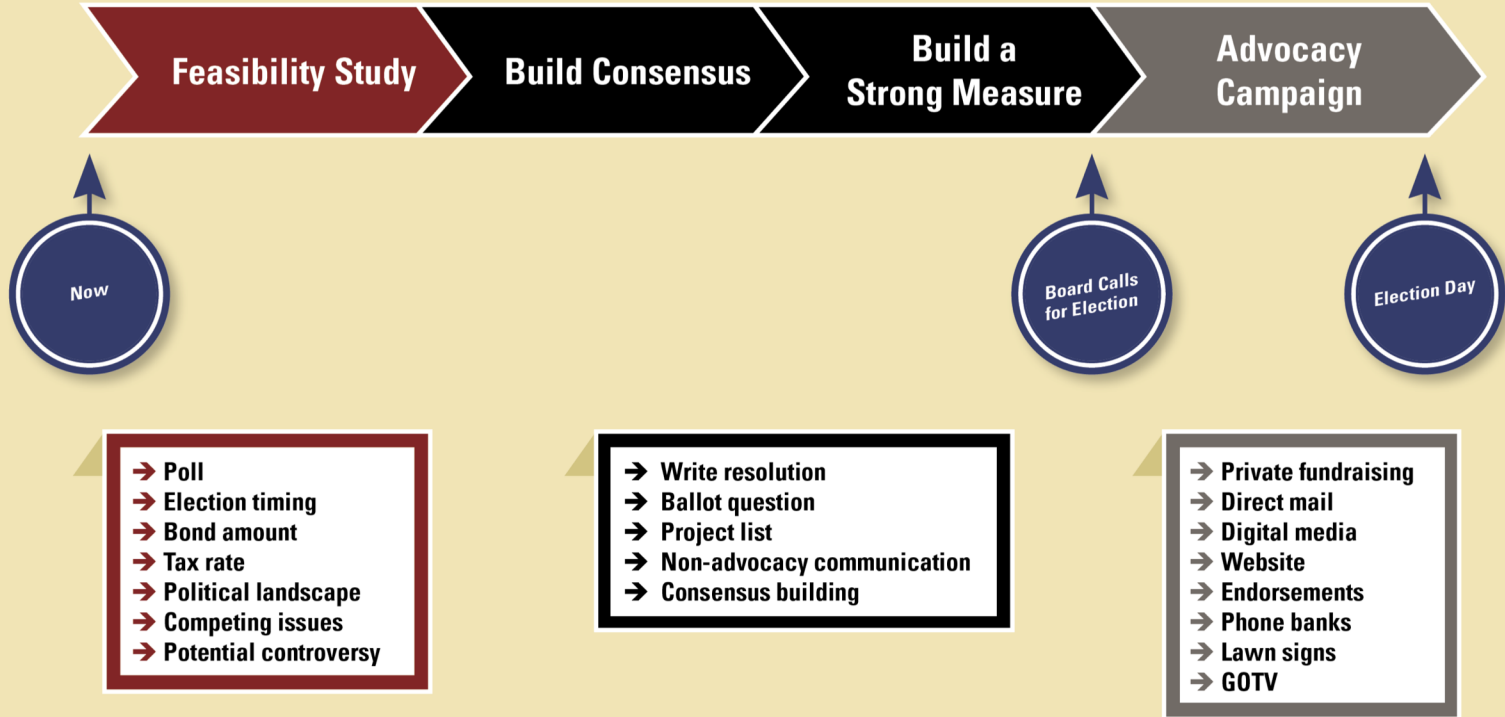
RIVERSIDE
COMMUNITY
COLLEGE
DISTRICT

About TBWB

- CA Leader in Community College Bond Measures
- 11 of 21 winning measures in CA since 2014
- Mira Costa CCD, San Bernadino CCD, Chaffey CCD, Rancho Santiago CCD, Antelope Valley CCD, College of the Canyons, Santa Monica CCD, Glendale CCD, others
- Riverside USD, Val Verde USD, Moreno Valley USD, Corona-Norco USD, Jurupa USD
- Public Consensus -> Winning Propositions

2020 Bond Planning Timeline

Board Vote Deadlines:
 December 6, 2019 (March)
 August 7, 2020 (November)



March – April 2019

- Baseline voter survey / feasibility assessment completed
- Develop informational messaging:
 - Fact sheet, talking points, FAQ, PowerPoint Presentation
 - Based on survey report
 - Do's and Don'ts for district staff
- Create internal and external district stakeholder target lists for outreach:
 - Foundation, student/staff/faculty leaders elected officials, chamber/business/civic leaders/groups, neighborhood leaders, ethnic community leaders, key Alumni, industry partners

May 2019

- Begin initial round of outreach to internal stakeholders, including faculty, staff, Foundation and student leaders
- Digital and hard copies of informational materials distributed on campuses and via college email
- Update district website
- First informational mailer with a tear-off reply card to all registered voters, encouraging community feedback

Summer 2019

- Continue outreach to internal stakeholders
- Expand outreach to external stakeholders including:
 - elected officials
 - chamber/business leaders/groups
 - neighborhood leaders
 - ethnic community leaders
 - other influential local leaders

September – October 2019

September:

- Potential second informational mailer to all registered voters
- Consider tracking survey for final March/November decision
- Present tracking survey and election recommendation to Board
- Financial professional updates potential financing scenarios
- Bond counsel develops draft of ballot resolution and project list

October:

- If March 2020, present draft ballot resolution / project list to Board
- Complete outreach to internal and external stakeholders

November - December 2019

If decision is to place measure on the March 2020 ballot:

November:

- Board of Trustees votes to place bond on March 3, 2020 ballot
- Complete outreach to internal and external stakeholders
- Update website, public informational materials

December:

- Post-board vote, possible third informational mailer announcing board action and providing voter information
- *No later than December 6, 2019 (88 days prior to election):* Deliver adopted resolution to Riverside County Registrar of Voters in order to qualify for the March 3, 2020 ballot
- Privately-funded, volunteer-led advocacy campaign kicks off

November 2020 Timing

If decision is to place measure on the November 2020 ballot:

Spring 2020

- Continue internal and external outreach to stakeholders
- Consider additional informational mailer

Summer 2020

- Board of Trustees votes to place bond on November 3, 2020 ballot
- Complete outreach to internal and external stakeholders
- Update website, public informational materials
- *No later than August 7, 2020 (88 days prior to election):*
Deliver adopted resolution to San Diego County Registrar of Voters in order to qualify for the November 3, 2020 ballot

Riverside Community College Team

- **TBWB** – coordinate feasibility assessment, create plan, timeline and materials for public outreach and engagement, help develop ballot measure
- **Financial Team** – identify bond amount, tax rates and financing plan
- **Legal Counsel** – draft resolution and project list, ensure all legal requirements are met throughout
- **Foundation, Faculty, Staff, Students, Trustees** – Help tell the story

Do's and Don'ts for District Staff

When “on the clock”, employees may:

- Provide factual, unbiased information about facility needs and what a bond measure would accomplish
- Distribute factual, unbiased flyers informing voters about the measure

On personal time, employees may:

- Participate in the campaign committee
- Volunteer for the campaign
- Donate or raise funds for the campaign

When “on the clock”, employees may not:

- Urge individuals to vote for or against the measure
- Distribute advocacy literature
- Recruit volunteers for the campaign
- Use District copiers, meeting rooms or supplies to advocate for or against the measure

Board members are volunteers, except during official Board meetings or when acting in official capacity

Riverside City College, Norco College and Moreno Valley College

Affordable, High-Quality Education for Local Students

As the cost of attending Cal-State or UC becomes more expensive, many students, especially those from middle class and lower income families, start their education at community colleges. Nearly 40% of all local high school graduates rely on our local community colleges for higher education.

Serving Our Community and Local Economy

Riverside City College, Norco College and Moreno Valley College are vital community resources, educating the healthcare professionals, law enforcement officers, firefighters and skilled workers who serve us. Last year alone, our colleges added nearly \$1 billion to the local economy and supported nearly 13,000 jobs.

Helping Veterans

The District is also one of the most important Veterans' services institutions in California, providing job placement, job training and counseling to about 1,800 vets every day.

Upgrading Classrooms and Labs to Prepare Students for Careers

While our campuses have had some updates over the years, student demand and academic standards continue to rise. To remain competitive and serve our students and communities for decades to come, we need to repair and upgrade our local college classrooms and labs to help prepare students for future success.

Local Funding to Support Student Success

To continue providing affordable, high-quality education, the RCCD Board of Trustees is considering a local bond measure. A potential measure would:

- Maintain classrooms and student service centers by replacing leaky roofs, rusty plumbing and outdated and faulty electrical systems where needed
- Improve access for students with disabilities at all campuses
- Upgrade outdated classrooms, science labs and career training facilities to keep pace with current industry standards and allow for state-of-the-art courses in biology, chemistry and physical sciences
- Expand and improve Veterans' Centers at all campuses, which provide job training, placement, counseling and support services to military veterans and their families
- Improve student safety and campus security systems including security lighting, cameras, emergency communications systems, smoke detectors and fire alarms

Fiscal Accountability and Independent Oversight

A local measure could generate up to \$840 million to upgrade our local colleges and would cost the typical homeowner approximately \$66 per year. All money raised by the measure would stay local to support our community colleges and students — no funds could be taken by the State. A clear system of accountability would be required, including a project list detailing exactly how the money would be used, a Citizens' Oversight Committee and independent audits.



Your Feedback Is Important to Us

The District welcomes your comments and questions as it evaluates the needs of our local community colleges. Please contact [Name, Phone, Email] with any questions or feedback.

BOND MEASURE FEASIBILITY SURVEY
SUMMARY REPORT

PREPARED FOR THE
RIVERSIDE COMMUNITY COLLEGE DISTRICT



FEBRUARY 26, 2019



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ENCINITAS CA 92024
760.632.9900 WWW.TN-RESEARCH.COM

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INTRODUCTION

Riverside Community College District (District) is dedicated to the success of its students and to the development of the communities it serves. By providing career and technical education programs, undergraduate degrees, university transfer courses, and certificate programs, the District helps nearly 40,000 students and returning veterans each year receive the education, counseling, and skills training they need to succeed and help strengthen the local economy.

In 2004, the District asked voters for assistance in funding the repair, renovation and upgrade of college classrooms and facilities by passing a general obligation bond: Measure C. In addition to the \$350 million raised by Measure C, the District has been able to leverage additional state matching funds and make use of other resources to construct new classrooms and make priority repairs and improvements. Despite these substantial investments, however, facility and technology needs remain for which the District does not have a funding source. In addition to basic facility repairs at all three campuses, there is a clear need to construct and acquire classrooms, facilities, sites, and equipment for science, math, engineering, technology, healthcare, arts, career training, and skilled trades for students and military veterans. However, to adequately fund its ongoing facility needs and access additional state matching funds, the District will need the financial support of the communities it serves through the passage of a local bond measure.

MOTIVATION FOR RESEARCH The primary purpose of this study was to produce an unbiased, statistically reliable evaluation of voters' interest in supporting a local bond measure to partially fund the facility repairs and improvements noted above. Additionally, should the District decide to move forward with a bond measure, the survey data provide guidance as to how to structure a measure so that it is consistent with the community's priorities and expressed needs. Specifically, the survey was designed to:

- Gauge current levels of support for a local bond measure to fund the improvement of college classrooms, facilities, sites, and equipment,
- Identify the types of projects that voters are most interested in funding, should the measure pass,
- Expose voters to arguments in favor of—and against—the proposed bond measure to gauge how information affects support for the measure, *and*
- Estimate support for the measure once voters are presented with the types of information they will likely be exposed to during the election cycle.

It is important to note at the outset that voters' opinions about tax measures are often somewhat fluid, especially when the amount of information they initially have about a measure is limited. How voters think and feel about a measure today may not be the same way they think and feel once they have had a chance to hear more information about the measure during the election cycle. Accordingly, to accurately assess the feasibility of passing a bond measure, it was important that in addition to measuring *current* opinions about the measure (Question 2), the survey expose respondents to the types of information voters are likely to encounter during an election cycle—including arguments in favor of (Question 8) and opposed to (Question 10) the measure—and gauge how this information ultimately impacts their voting decision (Questions 9 and 11).

OVERVIEW OF METHODOLOGY For a full discussion of the research methods and techniques used in this study, turn to *Methodology* on page 27. In brief, the survey was administered to a random sample of 861 registered voters in the Riverside Community College District who are likely to participate in the November 2020 general election, with a subset who are also likely to participate in the March 2020 primary election. The survey followed a mixed-method design that employed multiple recruiting methods (telephone and email) and multiple data collection methods (telephone and online). Administered in English and Spanish between February 6 and February 18, 2019, the average interview lasted 17 minutes.

ORGANIZATION OF REPORT This report is designed to meet the needs of readers who prefer a summary of the findings as well as those who are interested in the details of the results. For those who seek an overview of the findings, the sections titled *Just the Facts* and *Conclusions* are for you. They provide a summary of the most important factual findings of the survey in bullet-point format and a discussion of their implications. For the interested reader, this section is followed by a more detailed question-by-question discussion of the results from the survey by topic area (see *Table of Contents*), as well as a description of the methodology employed for collecting and analyzing the data. And, for the truly ambitious reader, the questionnaire used for the interviews is contained at the back of this report (see *Questionnaire & Toplines* on page 30) and a complete set of crosstabulations for the survey results is contained in Appendix A.

ACKNOWLEDGMENTS True North thanks the Riverside Community College District for the opportunity to assist the District in this important effort. The collective expertise, local knowledge, and insight provided by District staff and representatives improved the overall quality of the research presented here. A special thanks also to Jared Boigon and Joy Tatarka (TBWB Strategies) for assisting in the design of the study.

DISCLAIMER The statements and conclusions in this report are those of the authors (Dr. Timothy McLarney and Richard Sarles) at True North Research, Inc. and not necessarily those of the Riverside Community College District. Any errors and omissions are the responsibility of the authors.

ABOUT TRUE NORTH True North is a full-service survey research firm that is dedicated to providing public agencies with a clear understanding of the values, perceptions, priorities, and opinions of their residents and voters. Through designing and implementing scientific surveys, focus groups, and one-on-one interviews, as well as expert interpretation of the findings, True North helps its clients to move with confidence when making strategic decisions in a variety of areas—such as planning, policy evaluation, performance management, establishing fiscal priorities, passing revenue measures, and developing effective public information campaigns.

During their careers, Dr. McLarney and Mr. Sarles have designed and conducted over 1,000 survey research studies for public agencies, including more than 350 revenue measure feasibility studies. Of the measures that have gone to ballot based on Dr. McLarney's recommendation, 96% have been successful. In total, the research that Dr. McLarney has conducted has led to over \$32 billion in successful local revenue measures.



JUST THE FACTS

The following section is an outline of the main factual findings from the survey. For the reader's convenience, we have organized the findings according to the section titles used in the body of this report. Thus, if you would like to learn more about a particular finding, simply turn to the appropriate report section.

IMPORTANCE OF ISSUES

- When asked to rate the importance of eight issues, creating jobs and improving the local economy and protecting the quality of education received the highest percentage of respondents indicating that the issues were either extremely or very important (89% each), followed by improving public safety (84%).
- Given the purpose of this study, it is instructive to note that preventing local tax increases (69%) was rated as less important than protecting the quality of education (89%) and ensuring local access to an affordable, high quality college education and career training (79%), but more important than the narrow facility-based issue of maintaining and upgrading classrooms and facilities at our local community colleges (67%).

INITIAL BALLOT TEST

- With only the information provided in the ballot language, 65% of respondents indicated that they would definitely or probably support the proposed \$840 million bond, whereas 26% stated that they would oppose the measure and 9% were unsure or unwilling to share their vote choice.
- Among the minority of voters who initially opposed the bond measure (or were unsure), the most frequently mentioned specific reasons for their position were a belief that taxes are already too high, a need for more information, and concerns that District money is/will be mismanaged or misspent.

TAX THRESHOLD

- At the highest tax rate tested (\$24 per \$100,000 of assessed valuation), 45% of voters indicated that they would support the bond. Incremental reductions in the tax rate resulted in incremental increases in support for the measure, with 58% of voters indicating that they would support the bond at the lowest tax rate tested (\$12 per \$100,000 AV).
- When the highest tax rate (\$24 per \$100,000 of assessed valuation) was translated to an annual cost for the median home owner (approximately \$66 per year), 58% of those surveyed indicated that they would support the bond.
- Support was also higher when the tax rate of \$12 per \$100,000 of assessed valuation was translated to an annualized total of \$33 for the median home owner (66%).

PROJECTS & PROGRAMS

When presented with a list of 11 projects and improvements that could be funded by the bond, voters were most interested in using the money to:

- Repair or replace leaky roofs, old rusty plumbing, and faulty electrical systems where needed.
- Improve access for students with disabilities.

- Upgrade classrooms and labs to help local students complete the first two years of college affordably, and transfer to the Cal-State or UC systems.

POSITIVE ARGUMENTS

When presented with arguments in favor of the measure, voters overall found the following arguments to be the most persuasive:

- *Because the cost of attending the University of California and State University systems has become so expensive, many more students are starting their education at community colleges. This measure will ensure local students have access to an affordable, high-quality education here in Riverside County.*
- *Nearly 40% of all local high school graduates rely on our local community colleges for higher education and to prepare for careers. We need to repair and upgrade our local colleges so they can continue to serve our community well for the decades to come.*
- *Our local community colleges ensure that lower and middle-income students who can't afford the high price of a university still have an opportunity to succeed in college and careers. This measure will provide the affordable, high quality education that all students deserve.*

INTERIM BALLOT TEST

- After presenting respondents with the wording of the proposed measure, potential tax rates associated with the bond, projects and improvements that could be funded, as well as positive arguments voters may encounter, overall support for the measure among likely November 2020 voters increased to 68%, with 32% of voters indicating that they would *definitely* vote yes. Approximately 26% of respondents opposed the measure at this point in the survey, and an additional 6% were unsure or unwilling to state their vote choice.

NEGATIVE ARGUMENTS

Of the arguments in opposition to the measure, voters found the following to be the most persuasive:

- *Don't be fooled. Including interest, this bond will cost taxpayers about 1.5 billion dollars and will take property owners about 40 years to pay off.*
- *People are having a hard time making ends meet with the high cost of living, especially seniors and those living on fixed incomes. Now is NOT the time to be raising taxes.*

FINAL BALLOT TEST

- After presenting the wording of the proposed measure, potential tax rates, projects that could be funded, as well as arguments in favor of and against the proposal, support for the bond measure was found among 59% of likely November 2020 voters, with 27% indicating that they would *definitely* support the measure. Approximately 33% of respondents opposed the measure at the Final Ballot Test, and 9% were unsure or unwilling to state.



CONCLUSIONS

The bulk of this report is devoted to conveying the details of the study findings. In this section, however, we attempt to ‘see the forest through the trees’ and note how the collective results of the survey answer the key questions that motivated the research. The following conclusions are based on True North’s and TBWB’s interpretations of the survey results and the firms’ collective experience conducting revenue measure studies for public agencies throughout the State.

Is a bond measure to fund facility improvements at Riverside CCD feasible?

Yes. Voters consider protecting the quality of education and ensuring local access to an affordable, high quality college education and career training to be among the *most* important issues facing the community. These sentiments translate into strong natural support (65%) for a \$840 million bond measure to repair, construct, and acquire classrooms, facilities, sites, and equipment at Riverside City College, Norco College, and Moreno Valley College for science, math, engineering, technology, healthcare, arts, career training, and skilled trades for students and veterans.

The results of this study suggest that, if structured appropriately and combined with an effective public outreach/education effort *and* a solid independent campaign, the proposed bond measure has a good chance of passage if placed on the ballot in November 2020.

Having stated that a bond measure is feasible, it is important to note that the bond’s prospects will be shaped by external factors and that a recommendation to place the measure on the ballot in 2020 comes with several qualifications and conditions. Indeed, although the results are promising, all revenue measures must overcome challenges prior to being successful. The proposed measure is no exception. The following paragraphs discuss some of the challenges and the next steps that True North and TBWB recommend.

How does the election date affect support for the proposed measure?

Different election dates have different turnouts, different electorates, and—by extension—different opportunities and challenges. When compared to the November 2020 election, for example, the March 2020 election is expected to have lower turnout and a somewhat different demographic profile among participating voters. These demographic differences translate into different levels of support for the proposed bond measure.

The survey results reveal that as turnout increases, so too does support for the proposed bond measure. Natural support for the measure among likely November 2020 voters (65%) was approximately 9% higher than that among the smaller number of likely March 2020 voters (56%). This gap in support for the bond between the two electorates remained fairly consistent throughout the interview.

Given the strong, positive relationship between turnout and support for the proposed bond, November 2020 *appears* to be the more favorable election environment at this point. That said, circumstances could change in the coming months and there are other important factors to consider when selecting an election date—including the number and types of other measures that may be on the ballot. It is also important to point out that the March 2020 turnout model for this study was conservative in its profile, meaning it did not factor in the ‘blue wave’ effect that was witnessed in the November 2018 election. The energy of that wave and the impact that it had on reshaping voter turnout for the November 2018 election helped to propel tax measures to historically high passage rates throughout the State, even when other issues (AB195 and Proposition 6) were creating challenging cross-currents. If that wave returns for March 2020, it will have a positive impact on the bond’s prospects above and beyond the results found with the more conservative turnout model used in this study.

Accordingly, our recommendation is for the District to keep both election dates open as possibilities, which means moving forward with planning, outreach, and communications according to a schedule that would allow the District to place a measure on the March 2020 ballot. As we learn more information in the coming months about the March and November election environments, we can provide a more refined recommendation.

What projects do voters identify as priorities for a future bond?

One of the goals of this study was to identify voters’ preferences with respect to how the proceeds of a successful bond should be spent. This information can be used to ensure that the resulting bond project list and the measure are consistent with voters’ priorities.

Voters in the Riverside Community College District clearly see a need for the proposed projects and improvements that could be funded by a bond. In fact, nearly all of the projects tested were favored by at least three-quarters of voters surveyed. That said, voters expressed the *greatest* interest in using bond proceeds to repair or replace leaky roofs, old rusty plumbing, and faulty electrical systems where needed, improve access for students with disabilities, upgrade classrooms and labs to help local students complete the first two years of college affordably and transfer to the Cal-State or UC systems, and upgrade classrooms, labs, career training facilities, and equipment to keep pace with current industry standards and technology.

How will the tax rate affect support for the measure?

Naturally, the willingness of voters to support a specific revenue measure is contingent, in part, on the tax rate associated with a measure. The higher the rate, all other things being equal, the lower the level of aggregate support that can be expected. It is important that the rate be set at a level that the necessary proportion of voters view as affordable.

One of the clear patterns in the survey data is that some voters are price sensitive with respect to the proposed bond. A significant percentage of voters who were initially supportive of the \$840 million bond, for example, later hesitated when presented with the individual tax rates that could be associated with the bond. Although voter sensitivity regarding the “price” of the measure was partially overcome when the tax rates were converted to an annual total tax for the average home owner, as well as once voters were exposed to additional information about what the measure would accomplish and why it is needed, it will nevertheless be important to keep the tax rate within voters’ comfort zone.

True North and TBWB will work closely with the District and the District’s financial advisor in future months to select a tax rate and bond amount that best balances the District’s need for revenue with the political challenges associated with passing a bond measure.

How might a public information campaign affect support for the proposed measure?

As noted in the body of this report, individuals’ opinions about revenue measures are often not rigid, especially when the amount of information presented to the public on a measure has been limited. Thus, in addition to measuring current support for the measure, one of the goals of this study was to explore how the introduction of additional information about the measure may affect voters’ opinions about the bond.

It is clear from the survey results that voters’ opinions about the proposed bond measure are sensitive to the nature—and amount—of information that they have about the measure. Information about the specific improvements that could be funded by the bond, as well as arguments in favor of the measure, were found by many voters to be compelling reasons to support the measure. However, voters were also quite sensitive to opposition arguments designed to reduce support for the bond. Accordingly, one of the keys to building and *sustaining* support for the bond measure will be the presence of an effective, well-organized public outreach effort, as well as an independent campaign that focuses on the need for the measure as well as the many benefits that it will bring.

How might the economic or political climate alter support for the measure?

A survey is a snapshot in time—which means the results of this study and the conclusions noted above must be viewed in light of the current economic and political climates. Should the economy and/or political climate improve, support for the measure could increase. Conversely, negative economic and/or political developments, especially at the local level, could dampen support for the measure below what was recorded in this study.

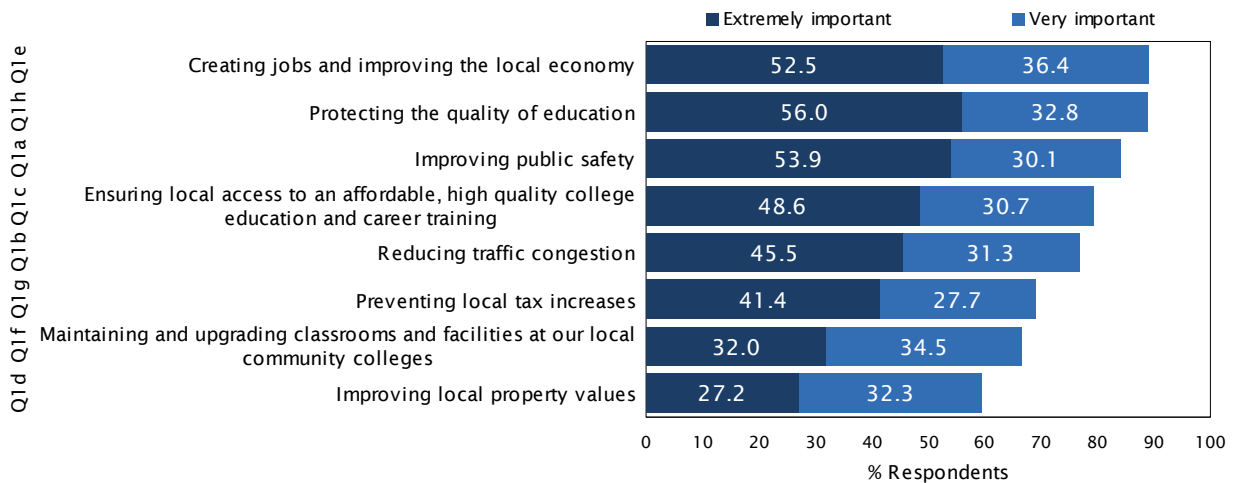
IMPORTANCE OF ISSUES

The first substantive question of the survey presented respondents with several issues facing residents in the District and asked them to rate the importance of each issue. Because the same response scale was used for each issue, the results provide an insight into how important each issue is on a scale of importance *as well as* how each issue ranks in importance relative to the other issues tested. To avoid a systematic position bias, the order in which the issues were presented was randomized for each respondent.

Figure 1 presents the issues tested, as well as the importance assigned to each by survey participants, sorted by order of importance.¹ Overall, creating jobs and improving the local economy and protecting the quality of education received the highest percentage of respondents indicating that the issues were either extremely or very important (89% each), followed by improving public safety (84%). Given the purpose of this study, it is instructive to note that preventing local tax increases (69%) was rated as less important than protecting the quality of education (89%) and ensuring local access to an affordable, high quality college education and career training (79%), but more important than the narrow facility-based issue of maintaining and upgrading classrooms and facilities at our local community colleges (67%).

Question 1 *To begin, I'm going to read a list of issues facing your community and for each one, please tell me how important you feel the issue is to you, using a scale of extremely important, very important, somewhat important or not at all important.*

FIGURE 1 IMPORTANCE OF ISSUES



1. Issues were ranked based on the percentage of respondents who indicated that the issue was either *extremely important* or *very important*.

INITIAL BALLOT TEST

The primary research objective of this survey was to estimate voters' support for a bond measure that would raise \$840 million to repair, construct, and acquire classrooms, facilities, sites, and equipment at Riverside City College, Norco College, and Moreno Valley College for science, math, engineering, technology, healthcare, arts, career training, and skilled trades for students and veterans. To this end, Question 2 was designed to take an early assessment of support for the proposed measure.

The motivation for placing Question 2 up-front in the survey is twofold. First, voter support for a measure can often depend on the amount of information they have about a measure. At this point in the survey, the respondent has not been provided information about the proposed measure beyond what is presented in the ballot language. This situation is analogous to a voter casting a ballot with limited knowledge about the measure, such as what might occur in the absence of an effective education campaign. Question 2—also known as the Initial Ballot Test—is thus a good measure of voter support for the proposed measure *as it is today*, on the natural. Because the Initial Ballot Test provides a gauge of 'uninformed' support for the measure, it also serves a second purpose in that it provides a useful baseline from which to judge the impact of various information items conveyed later in the survey on voter support for the measure.

Question 2 *Your household is within the Riverside Community College District. Next year, voters in the District may be asked to vote on a local ballot measure. Let me read you a summary of the measure. To improve access for students and veterans to high quality, affordable college education by repairing, constructing, and acquiring classrooms, facilities, sites, and equipment at Riverside City, Norco, and Moreno Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades; shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled? If the election were held today, would you vote yes or no on this measure?*

FIGURE 2 INITIAL BALLOT TEST

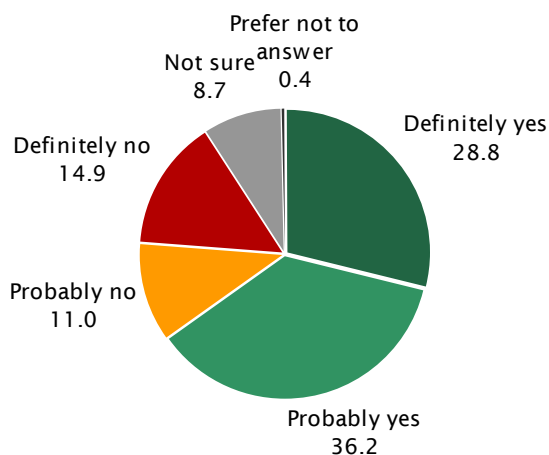


Figure 2 presents the results of the Initial Ballot Test among all respondents. Overall, 65% of likely November 2020 voters surveyed indicated that they would definitely or probably support the proposed bond, whereas 26% stated that they would oppose the measure and 9% were unsure or unwilling to share their vote choice. For Proposition 39 bonds in California, support at the Initial Ballot Test was approximately ten percentage points above the 55% support level required for the measure to pass.

SUPPORT BY SUBGROUPS For the interested reader, Table 1 shows how support for the measure at the Initial Ballot Test varied by key demographic traits. The blue column (Approximate % of Likely Voter Universe) indicates the percentage of the electorate that each subgroup category comprises. Initial support for the proposed bond measure varied considerably across voter subgroups, ranging from a low of 37% among dual Republican households to high of 84% among voters who often use Twitter as a source for local news. Initial support for the measure among the subset of voters likely to participate in the March 2020 election was approximately 9 percentage points lower than that found among the larger group of voters likely to vote in November 2020.

TABLE 1 DEMOGRAPHIC BREAKDOWN OF SUPPORT AT INITIAL BALLOT TEST

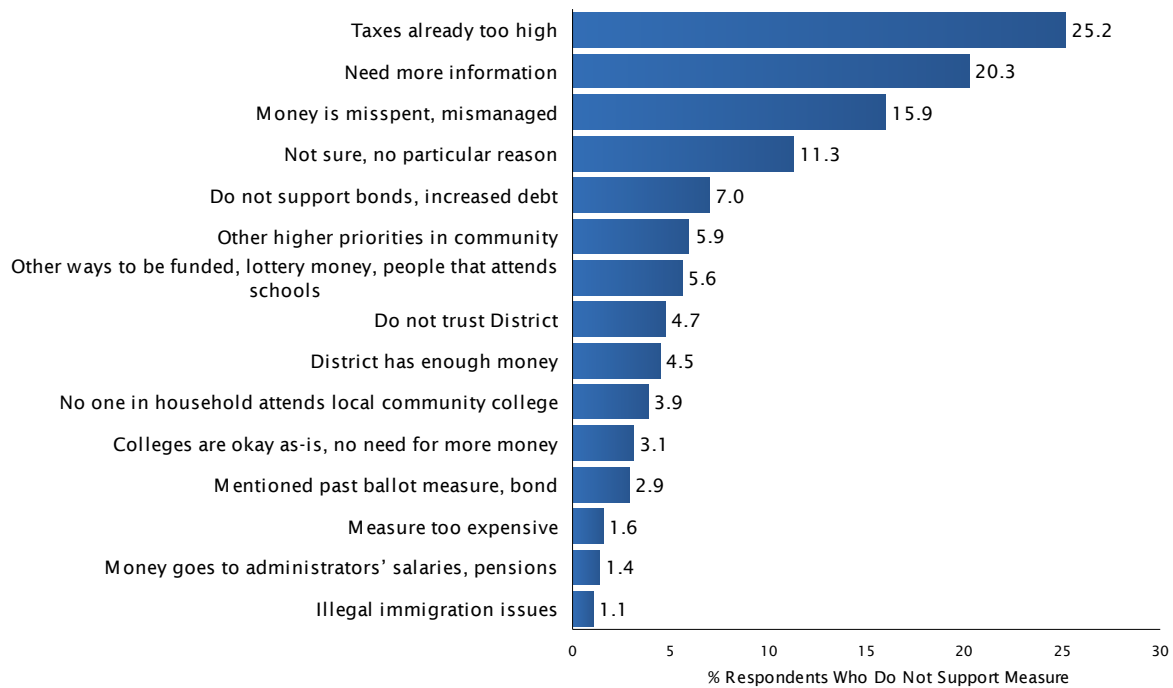
		Approximate % of Voter Universe	% Probably or Definitely Yes	% Not sure
Overall		100	65.0	8.7
Hsld Member Taken	Yes	69	64.7	9.0
	No	31	66.6	7.7
College(s) Attended by Hsld Member (QD2)	Riverside City College	55	63.0	9.2
	Norco College	25	68.1	8.8
	Moreno Valley College	19	63.0	10.3
	None	31	66.6	7.7
Public School Child in Hsld (QD3)	Yes	39	65.6	9.1
	No	61	65.0	8.3
Often-Used Local Info Sources (QD4)	Press-Enterprise	16	71.2	7.0
	NextDoor	6	64.3	4.9
	Facebook	20	70.2	6.9
	Twitter	6	83.9	2.0
	Radio	28	63.0	5.2
	Friends, family	25	70.6	5.7
Party	Democrat	44	78.5	9.6
	Republican	30	45.8	7.5
	Other / DTS	26	63.8	8.3
Household Party Type	Single dem	20	77.6	9.4
	Dual dem	13	76.1	11.7
	Single rep	10	47.0	12.8
	Dual rep	12	37.0	4.3
	Other	16	62.6	8.0
	Mixed	29	70.9	7.5
Age	18 to 29	16	81.6	10.6
	30 to 39	15	69.5	7.7
	40 to 49	16	60.4	7.5
	50 to 64	29	58.0	10.0
	65 or older	23	62.8	7.0
Registration Year	2019 to 2016	55	64.4	9.6
	2015 to 2010	23	73.3	7.5
	2009 to 2004	11	62.4	7.9
	Before 2004	11	53.2	7.1
College Area	Norco College	30	63.7	6.5
	Moreno Valley College	23	72.8	9.1
	Riverside City College	47	62.1	9.9
School District	Corona-Norco USD	30	63.7	6.5
	Moreno Valley USD	15	71.6	9.0
	Val Verde USD	7	75.4	9.2
	Riverside USD	31	61.7	9.6
	Jurupa USD	8	63.8	10.6
	Alvord USD	7	61.7	9.9
Homeowner on Voter File	Yes	70	64.1	8.2
	No	30	67.3	9.8
Likely to Vote by Mail	Yes	74	64.4	8.5
	No	26	66.9	9.2
Likely Mar 2020 Voter	Yes	62	56.2	11.0
	No	38	79.6	4.8
Gender	Male	47	64.7	5.9
	Female	53	65.7	11.8

REASONS FOR OPPOSING MEASURE Respondents who did not support the measure at Question 2 were subsequently asked if there was a particular reason for their position. Question 3 was asked in an open-ended manner, allowing respondents to mention any reason that came to mind without being prompted by or restricted to a particular list of options. True North later reviewed the verbatim responses and grouped them into the categories shown in Figure 3.

Among the specific reasons offered for not supporting the bond at the Initial Ballot Test, the belief that taxes are already too high (25%), a need for more information (20%), and concerns that District money is/will be mismanaged or misspent (16%) were the most common.

Question 3 *Is there a particular reason why you do not support or are unsure about the measure I just described?*

FIGURE 3 REASONS FOR NOT SUPPORTING MEASURE



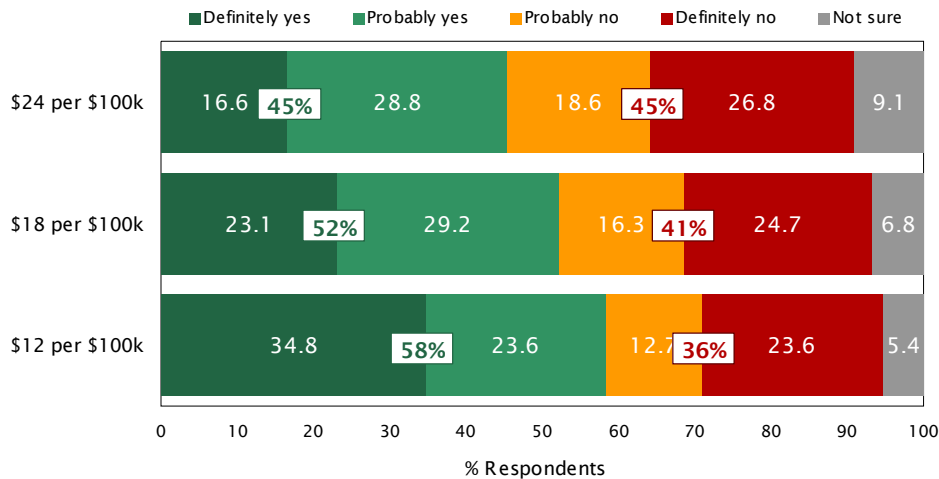
TAX THRESHOLD

Naturally, voter support for a revenue measure is often contingent on the cost of the measure. The higher the tax rate, all other things being equal, the less likely a voter is to support the measure. One of the goals of this study was thus to gauge the impact that changes in the tax rate can be expected to have on voter support for the proposed bond measure.

Questions 4, 5, and 6 were designed to do just that. Respondents were first instructed that the amount each home owner will pay if the measure passes depends on the *assessed* value of their home—not the market value. Voters were then presented with the highest tax rate (\$24 per \$100,000 assessed valuation) and asked if they would support the proposed measure at that rate. If a respondent did not answer ‘definitely yes’, they were asked whether they would support the measure at the next lowest tax rate. The three tax rates tested using this methodology and the percentage of respondents who indicated they would vote in favor of the measure at each rate are shown in Figure 4.

Question 4 *The amount each home owner will pay if the community college bond passes depends on the assessed value of their home - not the current market value of the home. If you heard that the annual property taxes on your home would increase: _____ per 100,000 dollars of assessed valuation, would you vote yes or no on the bond measure?*

FIGURE 4 TAX THRESHOLD



The most obvious pattern revealed in Figure 4 is that some voters are price sensitive when it comes to their support for the proposed bond measure. As the cost of the measure to their household increases, support for the bond decreases. At the highest tax rate tested (\$24 per \$100,000 of assessed valuation), 45% of voters indicated that they would support the bond. Incremental reductions in the tax rate resulted in incremental increases in support for the measure, with 58% of voters indicating that they would support the bond at the lowest tax rate tested (\$12 per \$100,000 of assessed valuation).

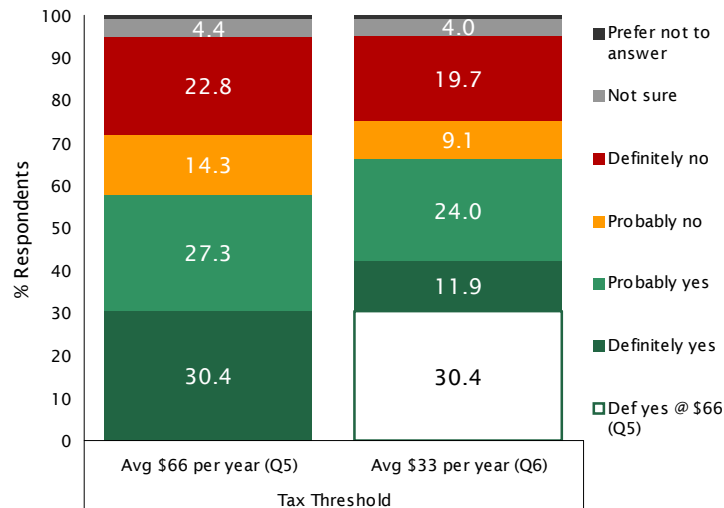
ANNUALIZED IMPACT FOR MEDIAN HOME OWNER Because voters occasionally overestimate their current assessed valuation and/or have difficulty translating the tax rate into an annualized total, the survey also tested a different approach for conveying the tax rate information. In addition to presenting rates as described above, voters were also provided with the total annual cost of the bond for the median homeowner in the District (see Questions 5 and 6) based on the \$24 and \$12 tax rates tested in Question 4. The results are presented below in Figure 5.

Voters generally respond more positively when the cost of the measure is expressed as an annual total for the median home owner when compared with a rate per \$100,000 of assessed valuation. At the highest tax rate tested (\$24 per \$100,000 of assessed valuation), 45% of voters indicated that they would support the proposed bond measure. When that rate was translated to an annual cost for the median home owner (approximately \$66 per year), 58% of those surveyed indicated that they would support the bond. Support was also higher when the tax rate of \$12 per \$100,000 AV (58%) was translated to an annualized total of \$33 for the median home owner (66%).

Question 5 *Let me put it another way: If you knew that this measure would cost the typical home owner about \$66 per year, would you vote yes or no on the bond measure?*

Question 6 *If you knew that this measure would cost the typical home owner about \$33 per year, would you vote yes or no on the bond measure?*

FIGURE 5 SUPPORT MEASURE AT AVERAGE OF \$66 & \$33 PER YEAR



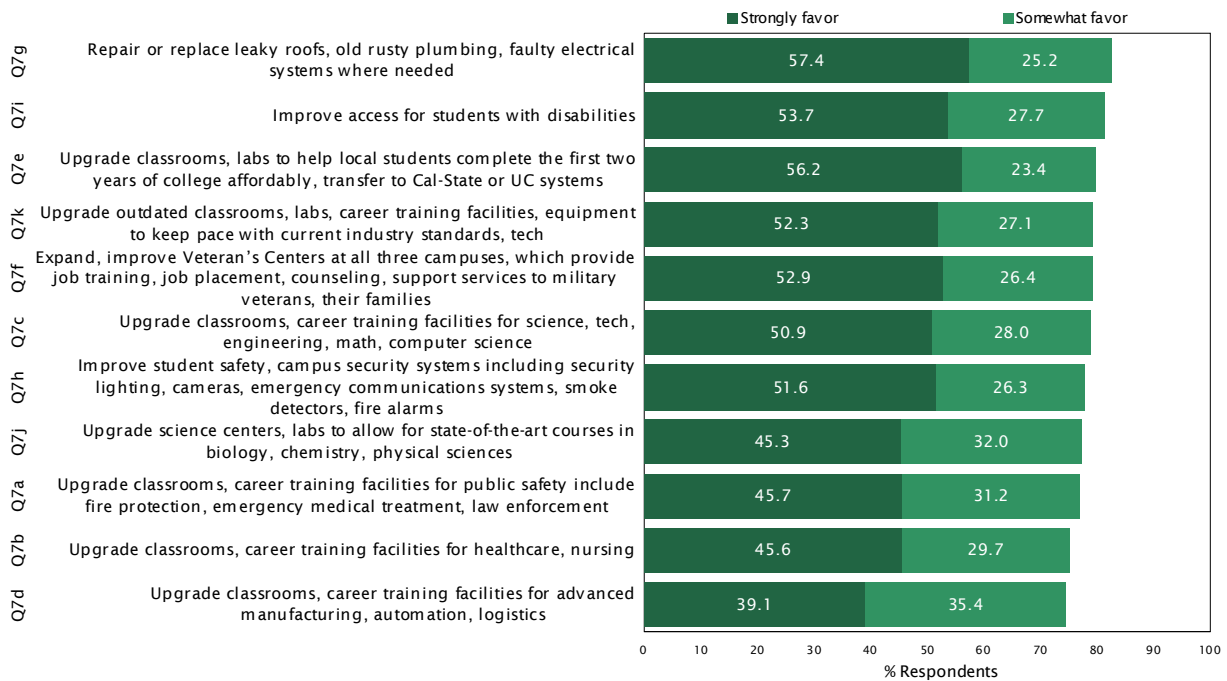
PROJECTS & PROGRAMS

The ballot language presented in Question 2 indicated that the proposed bond measure would be used to repair, construct, and acquire classrooms, facilities, sites, and equipment at Riverside City College, Norco College, and Moreno Valley College for science, math, engineering, technology, healthcare, arts, career training, and skilled trades for students and veterans. The purpose of Question 7 was to provide respondents with the full range of projects and improvements that may be funded by the proposed measure, as well as identify which of these improvements voters most favored funding with bond proceeds.

After reading each improvement that may be funded by the measure, respondents were asked if they would favor or oppose spending some of the money on that particular improvement assuming that the measure passes. Truncated descriptions of the improvements tested, as well as voters' responses, are shown in Figure 6 below.²

Question 7 *The measure we've been discussing would provide funding for a variety of projects and improvements. If the measure passes, would you favor or oppose using some of the money to: _____, or do you not have an opinion?*

FIGURE 6 PROJECTS & PROGRAMS



2. For the full text of the improvements tested, turn to Question 7 in *Questionnaire & Toplines* on page 30.

Overall, the improvements that resonated with the largest percentage of respondents were repairing or replacing leaky roofs, old rusty plumbing, and faulty electrical systems where needed (83% strongly or somewhat favor), improving access for students with disabilities (81%), and upgrading classrooms and labs to help local students complete the first two years of college affordably, and transfer to the Cal-State or UC systems (80%).

PROJECT RATINGS BY SUBGROUP Table 2 presents the top five projects (showing the percentage of respondents who *strongly* favor each) by position at the Initial Ballot Test. Not surprisingly, individuals who initially opposed the measure were generally less likely to favor spending money on a given project or service when compared with supporters. Nevertheless, initial supporters, opponents, and the undecided did agree on two of the top five priorities for funding.

TABLE 2 TOP PROJECTS & PROGRAMS BY POSITION AT INITIAL BALLOT TEST

Position at Initial Ballot Test (Q2)	Item	Project or Program Summary	% Strongly Favor
Probably or Definitely Yes (n = 560)	Q7e	Upgrade classrooms, labs to help local students complete the first two years of college affordably, transfer to Cal-State or UC systems	72
	Q7g	Repair or replace leaky roofs, old rusty plumbing, faulty electrical systems where needed	71
	Q7k	Upgrade outdated classrooms, labs, career training facilities, equipment to keep pace with current industry standards, tech	67
	Q7i	Improve access for students with disabilities	65
	Q7h	Improve student safety, campus security systems including security lighting, cameras, emergency communications systems, smoke detectors, fire alarms	64
Probably or Definitely No (n = 223)	Q7f	Expand, improve Veteran’s Centers at all three campuses, which provide job training, job placement, counseling, support services to military veterans, their families	36
	Q7i	Improve access for students with disabilities	27
	Q7g	Repair or replace leaky roofs, old rusty plumbing, faulty electrical systems where needed	25
	Q7c	Upgrade classrooms, career training facilities for science, tech, engineering, math, computer science	23
	Q7e	Upgrade classrooms, labs to help local students complete the first two years of college affordably, transfer to Cal-State or UC systems	22
Not Sure (n = 75)	Q7f	Expand, improve Veteran’s Centers at all three campuses, which provide job training, job placement, counseling, support services to military veterans, their families	53
	Q7i	Improve access for students with disabilities	52
	Q7b	Upgrade classrooms, career training facilities for healthcare, nursing	51
	Q7g	Repair or replace leaky roofs, old rusty plumbing, faulty electrical systems where needed	51
	Q7h	Improve student safety, campus security systems including security lighting, cameras, emergency communications systems, smoke detectors, fire alarms	50



POSITIVE ARGUMENTS

If the Board chooses to place a bond measure on an upcoming ballot, voters will be exposed to various arguments about the bond in the ensuing months. Proponents of the measure will present arguments to try to persuade voters to support a measure, just as opponents may present arguments to achieve the opposite goal. For this study to be a reliable gauge of voter support for the proposed bond measure, it is important that the survey simulate the type of discussion and debate that will occur prior to the vote taking place and identify how this information ultimately shapes voters' opinions about the bond.

The objective of Question 8 was thus to present respondents with arguments in favor of the proposed measure and identify if they felt the arguments were convincing reasons to support it. Arguments in opposition to the measure were also presented and are discussed later in this report (see *Negative Arguments* on page 21). Within each series, specific arguments were administered in random order to avoid a systematic position bias. Figure 5 on the next page presents the truncated positive arguments tested, as well as voters' reactions to the arguments. Statements above the blue dotted line were presented to all voters, whereas those under the line were presented only to voters within specific college areas as noted in the figure.

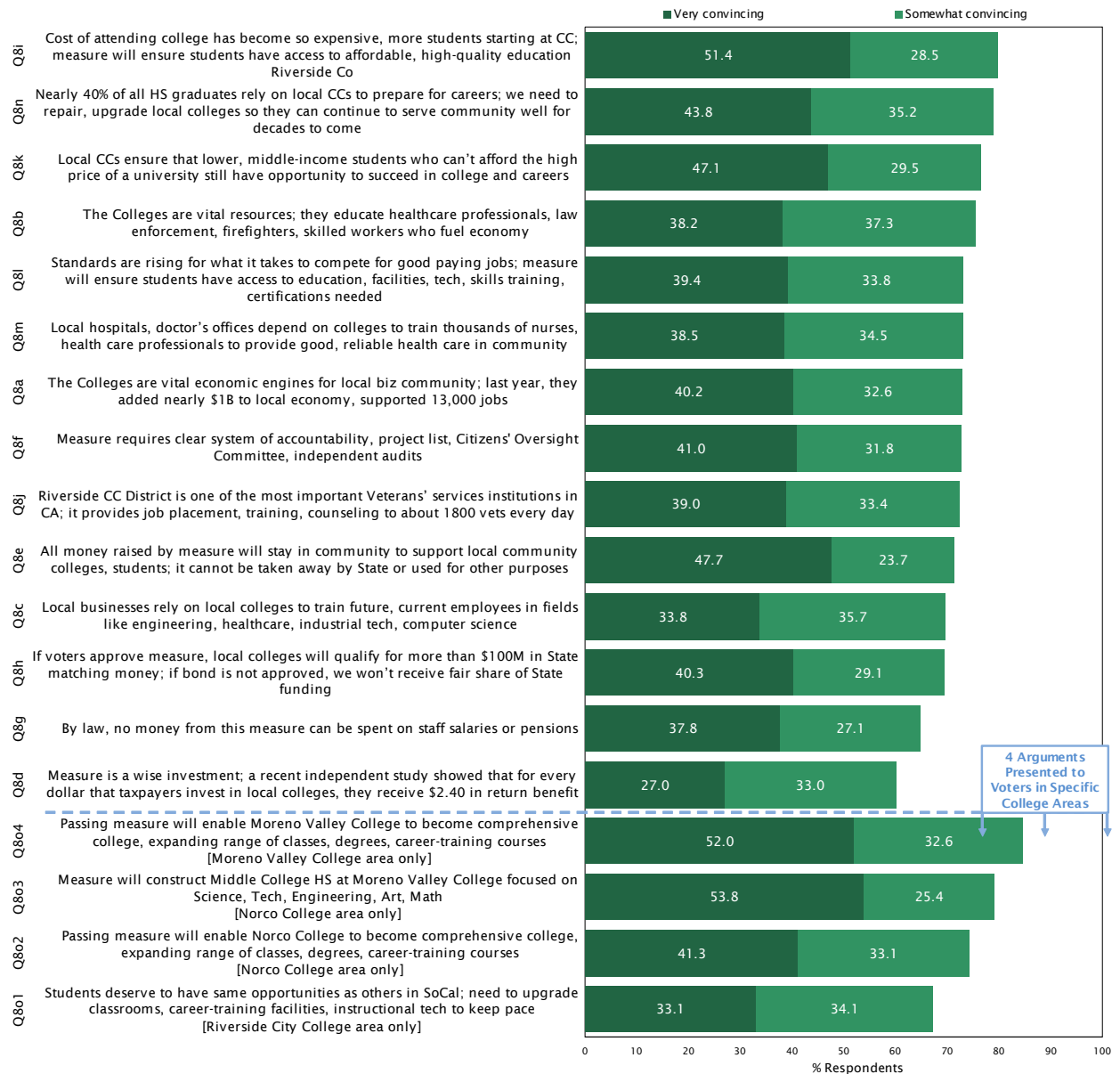
Using this methodology, the most compelling positive arguments among voters overall were: *Because the cost of attending the University of California and State University systems has become so expensive, many more students are starting their education at community colleges. This measure will ensure local students have access to an affordable, high-quality education here in Riverside County (80% very or somewhat convincing), Nearly 40% of all local high school graduates rely on our local community colleges for higher education and to prepare for careers. We need to repair and upgrade our local colleges so they can continue to serve our community well for the decades to come (79%), and Our local community colleges ensure that lower and middle-income students who can't afford the high price of a university still have an opportunity to succeed in college and careers. This measure will provide the affordable, high quality education that all students deserve (77%).*

Considering the *intensity* of voters' reactions to the statements, another strong positive argument among voters overall was: *All money raised by the measure will stay in our community to support our local community colleges and students. It cannot be taken away by the State or used for other purposes (48% very convincing).*

Of the positive arguments tested among voters residing in specific college areas, the most compelling were: *Passing this measure will enable Moreno Valley College to become a comprehensive college, expanding the range of classes, degrees, and career-training courses offered to better meet the needs of area residents (85% very or somewhat convincing among those in the Moreno Valley College area) and This measure will construct a Middle College High School at Moreno Valley College focused on Science, Technology, Engineering, Art and Mathematics that will allow students to earn a high school diploma and complete two years of college classes in just four years. This will shorten the time it takes to graduate college and make higher education more affordable (79% very or somewhat convincing among those in the Norco College area).*

Question 8 *What I'd like to do now is tell you what some people are saying about the measure we've been discussing. Supporters of the measure say: _____. Do you think this is a very convincing, somewhat convincing, or not at all convincing reason to SUPPORT the measure?*

FIGURE 7 POSITIVE ARGUMENTS



POSITIVE ARGUMENTS BY INITIAL SUPPORT Table 3 on the next page lists the top five most convincing positive arguments (showing the percentage of respondents who cited it as *very convincing*) according to respondents' vote choice at the Initial Ballot Test. The most striking pattern in the table is that the positive arguments resonated with a higher percentage of voters who were initially inclined to support the measure when compared with voters who initially opposed the measure or were unsure. Nevertheless, three specific arguments were ranked among the top five most compelling by all three groups.

TABLE 3 TOP POSITIVE ARGUMENTS BY POSITION AT INITIAL BALLOT TEST

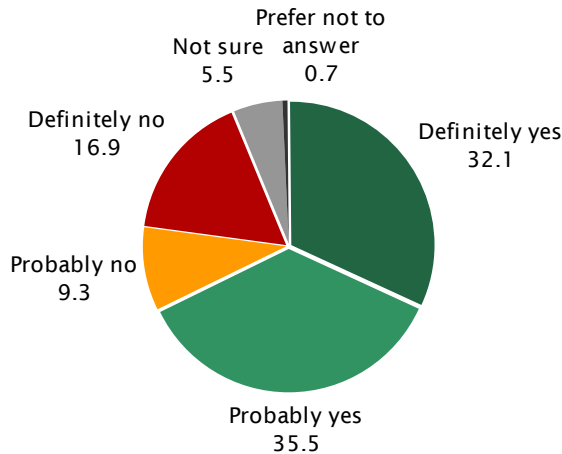
Position at Initial Ballot Test (Q2)	Item	Positive Argument Summary	% Very Convincing
Probably or Definitely Yes (n = 560)	Q8o3	Measure will construct Middle College HS at Moreno Valley College focused on Science, Tech, Engineering, Art, Math	67
	Q8i	Cost of attending college has become so expensive, more students starting at CC; measure will ensure students have access to affordable, high-quality education Riverside Co	66
	Q8o4	Passing measure will enable Moreno Valley College to become comprehensive college, expanding range of classes, degrees, career-training courses offered	64
	Q8e	All money raised by measure will stay in community to support local community colleges, students; it cannot be taken away by State or used for other purposes	62
	Q8k	Local CCs ensure that lower, middle-income students who can't afford the high price of a university still have opportunity to succeed in college and careers	61
Probably or Definitely No (n = 223)	Q8g	By law, no money from this measure can be spent on staff salaries or pensions	21
	Q8j	Riverside CC District is one of the most important Veterans' services institutions in CA; it provides job placement, training, counseling to about 1800 vets every day	19
	Q8i	Cost of attending college has become so expensive, more students starting at CC; measure will ensure students have access to affordable, high-quality education Riverside Co	18
	Q8e	All money raised by measure will stay in community to support local community colleges, students; it cannot be taken away by State or used for other purposes	16
	Q8k	Local CCs ensure that lower, middle-income students who can't afford the high price of a university still have opportunity to succeed in college and careers	15
Not Sure (n = 75)	Q8f	Measure requires clear system of accountability, project list, Citizens' Oversight Committee, independent audits	43
	Q8i	Cost of attending college has become so expensive, more students starting at CC; measure will ensure students have access to affordable, high-quality education Riverside Co	43
	Q8o4	Passing measure will enable Moreno Valley College to become comprehensive college, expanding range of classes, degrees, career-training courses offered	42
	Q8k	Local CCs ensure that lower, middle-income students who can't afford the high price of a university still have opportunity to succeed in college and careers	38
	Q8e	All money raised by measure will stay in community to support local community colleges, students; it cannot be taken away by State or used for other purposes	36

INTERIM BALLOT TEST

After informing respondents about the potential tax rates associated with the bond, projects and improvements that could be funded, as well as exposing them to positive arguments they may encounter about the bond, the survey again presented voters with the ballot language used previously to gauge how their support for the proposed bond measure may have changed. As shown in Figure 8, overall support for the measure among likely November 2020 voters increased to 68%, with 32% of voters indicating that they would *definitely* vote yes. Approximately 26% of respondents opposed the measure at this point in the survey, and an additional 6% were unsure or unwilling to state their vote choice.

Question 9 *Sometimes people change their mind about a measure once they have more information about it. Now that you have heard a bit more about the measure, let me read you a summary of it again. To improve access for students and veterans to high quality, affordable college education by repairing, constructing, and acquiring classrooms, facilities, sites, and equipment at Riverside City, Norco, and Moreno Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades; shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled? If the election were held today, would you vote yes or no on this measure?*

FIGURE 8 INTERIM BALLOT TEST



SUPPORT BY SUBGROUPS Table 4 on the next page shows how support for the measure at this point in the survey varied by key voter subgroups, as well as the percentage change in subgroup support when compared with the Initial Ballot Test. Positive differences appear in green, whereas negative differences appear in red. The largest positive gains in support for the bond were found among voters 30 to 39 years of age, voters with a household party type of other, and renters.

TABLE 4 DEMOGRAPHIC BREAKDOWN OF SUPPORT AT INTERIM BALLOT TEST

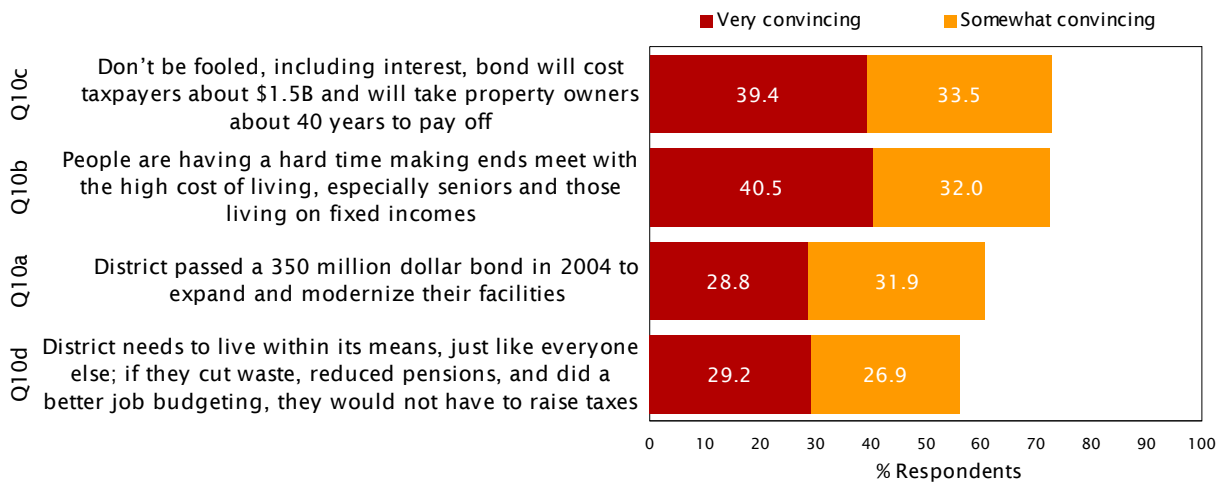
		Approximate % of Voter Universe	% Probably or Definitely Yes	Change From Initial Ballot Test (Q2)
Overall		100	67.6	+2.5
Hsld Member Taken	Yes	69	68.2	+3.5
Classes at Local College	No	31	69.0	+2.5
College(s) Attended by Hsld Member (QD2)	Riverside City College	55	67.1	+4.1
	Norco College	25	68.9	+0.7
	Moreno Valley College	19	62.8	-0.1
	None	31	69.0	+2.5
Public School Child in Hsld (QD3)	Yes	39	69.2	+3.5
	No	61	68.0	+3.0
Often-Used Local Info Sources (QD4)	Press-Enterprise	16	77.5	+6.3
	NextDoor	6	67.5	+3.2
	Facebook	20	71.7	+1.5
	Twitter	6	82.0	-1.9
	Radio	28	63.5	+0.4
Party	Friends, family	25	74.7	+4.1
	Democrat	44	83.1	+4.5
	Republican	30	43.7	-2.1
	Other / DTS	26	68.3	+4.4
Household Party Type	Single dem	20	81.0	+3.3
	Dual dem	13	83.5	+7.4
	Single rep	10	50.5	+3.5
	Dual rep	12	38.2	+1.3
	Other	16	70.4	+7.8
	Mixed	29	67.9	-2.9
Age	18 to 29	16	87.9	+6.3
	30 to 39	15	79.8	+10.3
	40 to 49	16	57.9	-2.5
	50 to 64	29	56.9	-1.1
	65 or older	23	65.7	+2.9
Registration Year	2019 to 2016	55	66.8	+2.4
	2015 to 2010	23	79.6	+6.3
	2009 to 2004	11	58.6	-3.8
	Before 2004	11	54.4	+1.1
College Area	Norco College	30	64.6	+0.8
	Moreno Valley College	23	74.1	+1.3
	Riverside City College	47	66.3	+4.2
School District	Corona-Norco USD	30	64.6	+0.8
	Moreno Valley USD	15	70.5	-1.1
	Val Verde USD	7	81.6	+6.2
	Riverside USD	31	65.2	+3.5
	Jurupa USD	8	68.3	+4.5
	Alvord USD	7	69.0	+7.2
Homeowner on Voter File	Yes	70	64.5	+0.4
	No	30	74.8	+7.5
Likely to Vote by Mail	Yes	74	67.2	+2.8
	No	26	68.6	+1.7
Likely Mar 2020 Voter	Yes	62	58.3	+2.1
	No	38	82.9	+3.3
Gender	Male	47	63.3	-1.5
	Female	53	72.7	+7.0

NEGATIVE ARGUMENTS

Whereas Question 8 presented respondents with arguments in favor of the measure, Question 10 presented respondents with arguments designed to elicit opposition to the measure. In the case of Question 10, however, respondents were asked if they felt that the argument was a very convincing, somewhat convincing, or not at all convincing reason to *oppose* the measure. The arguments tested, as well as voters' opinions about the arguments, are presented in Figure 9.

Question 10 *Next, let me tell you what opponents of the measure are saying. Opponents of the measure say: _____. Do you think this is a very convincing, somewhat convincing, or not at all convincing reason to OPPOSE the measure?*

FIGURE 9 NEGATIVE ARGUMENTS



The most compelling negative arguments tested were: *Don't be fooled. Including interest, this bond will cost taxpayers about 1.5 billion dollars and will take property owners about 40 years to pay off* (73% very or somewhat convincing) and *People are having a hard time making ends meet with the high cost of living, especially seniors and those living on fixed incomes. Now is NOT the time to be raising taxes* (73%).

NEGATIVE ARGUMENTS BY INITIAL SUPPORT Table 5 on the next page ranks the negative arguments (showing the percentage of respondents who cited each as very convincing) according to respondents' vote choice at the Initial Ballot Test.

TABLE 5 NEGATIVE ARGUMENTS BY POSITION AT INITIAL BALLOT TEST

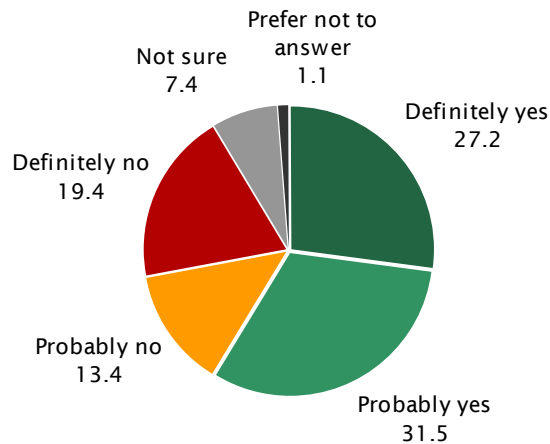
Position at Initial Ballot Test (Q2)	Item	Negative Argument Summary	% Very Convincing
Probably or Definitely Yes (n = 560)	Q10b	People are having a hard time making ends meet with the high cost of living, especially seniors and those living on fixed incomes	30
	Q10c	Don't be fooled, including interest, bond will cost taxpayers about \$1.5B and will take property owners about 40 years to pay off	28
	Q10d	District needs to live within its means, just like everyone else; if they cut waste, reduced pensions, and did a better job budgeting, they would not have to raise taxes	17
	Q10a	District passed a 350 million dollar bond in 2004 to expand and modernize their facilities	16
Probably or Definitely No (n = 223)	Q10c	Don't be fooled, including interest, bond will cost taxpayers about \$1.5B and will take property owners about 40 years to pay off	65
	Q10b	People are having a hard time making ends meet with the high cost of living, especially seniors and those living on fixed incomes	63
	Q10d	District needs to live within its means, just like everyone else; if they cut waste, reduced pensions, and did a better job budgeting, they would not have to raise taxes	59
	Q10a	District passed a 350 million dollar bond in 2004 to expand and modernize their facilities	58
Not Sure (n = 75)	Q10b	People are having a hard time making ends meet with the high cost of living, especially seniors and those living on fixed incomes	52
	Q10c	Don't be fooled, including interest, bond will cost taxpayers about \$1.5B and will take property owners about 40 years to pay off	46
	Q10a	District passed a 350 million dollar bond in 2004 to expand and modernize their facilities	33
	Q10d	District needs to live within its means, just like everyone else; if they cut waste, reduced pensions, and did a better job budgeting, they would not have to raise taxes	30

FINAL BALLOT TEST

Voters' opinions about ballot measures are often not rigid, especially when the amount of information presented to the public on a measure has been limited. An important goal of the survey was thus to gauge how voters' opinions about the proposed measure may be affected by the information they could encounter during the course of an election cycle. After providing respondents with the wording of the proposed measure, potential tax rates, projects that could be funded, and arguments in favor of and against the proposal, the survey again asked voters whether they would vote 'yes' or 'no' on the proposed bond measure.

Question 11 *Now that you have heard a bit more about the measure, let me read you a summary of it one more time. To improve access for students and veterans to high quality, affordable college education by repairing, constructing, and acquiring classrooms, facilities, sites, and equipment at Riverside City, Norco, and Moreno Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades; shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled? If the election were held today, would you vote yes or no on this measure?*

FIGURE 10 FINAL BALLOT TEST



At this point in the survey, support for the bond measure was found among 59% of likely November 2020 voters, with 27% indicating that they would *definitely* support the measure. Approximately 33% of respondents opposed the measure at the Final Ballot Test, and 9% were unsure or unwilling to state their vote choice.



CHANGE IN SUPPORT

Table 6 provides a closer look at how support for the proposed bond measure changed over the course of the interview by calculating the difference in support between the Initial, Interim, and Final Ballot Tests within various subgroups of voters. The percentage of support for the measure at the Final Ballot Test is shown in the column with the heading *% Probably or Definitely Yes*. The columns to the right show the difference between the Final and the Initial, and the Final and Interim Ballot Tests. Positive differences appear in green, and negative differences appear in red.

TABLE 6 DEMOGRAPHIC BREAKDOWN OF SUPPORT AT FINAL BALLOT TEST

		Approximate % of Voter Universe	% Probably or Definitely Yes	Change From Initial Ballot Test (Q2)	Change From Interim Ballot Test (Q9)
Overall		100	58.7	-6.4	-8.9
Hsld Member Taken	Yes	69	59.0	-5.7	-9.2
Classes at Local College	No	31	59.9	-6.7	-9.1
College(s) Attended by Hsld Member (QD2)	Riverside City College	55	58.6	-4.5	-8.6
	Norco College	25	56.5	-11.6	-12.3
	Moreno Valley College	19	59.0	-3.9	-3.8
	None	31	59.9	-6.7	-9.1
Public School Child in Hsld (QD3)	Yes	39	57.5	-8.1	-11.6
	No	61	60.4	-4.6	-7.6
Often-Used Local Info Sources (QD4)	Press-Enterprise	16	73.2	+2.0	-4.3
	NextDoor	6	61.0	-3.4	-6.6
	Facebook	20	59.6	-10.6	-12.1
	Twitter	6	70.3	-13.7	-11.7
	Radio	28	59.1	-3.9	-4.3
	Friends, family	25	63.2	-7.4	-11.5
Party	Democrat	44	76.3	-2.2	-6.8
	Republican	30	36.3	-9.5	-7.4
	Other / DTS	26	54.0	-9.8	-14.3
Household Party Type	Single dem	20	76.9	-0.7	-4.0
	Dual dem	13	74.1	-2.0	-9.4
	Single rep	10	39.5	-7.5	-11.0
	Dual rep	12	33.1	-3.9	-5.1
	Other	16	51.8	-10.8	-18.6
	Mixed	29	60.6	-10.3	-7.3
Age	18 to 29	16	76.7	-4.9	-11.2
	30 to 39	15	69.8	+0.4	-9.9
	40 to 49	16	47.7	-12.7	-10.3
	50 to 64	29	49.9	-8.1	-7.0
	65 or older	23	57.6	-5.1	-8.1
Registration Year	2019 to 2016	55	59.2	-5.2	-7.6
	2015 to 2010	23	65.6	-7.7	-14.0
	2009 to 2004	11	49.6	-12.7	-9.0
	Before 2004	11	49.9	-3.3	-4.4
College Area	Norco College	30	57.9	-5.9	-6.7
	Moreno Valley College	23	68.6	-4.3	-5.6
	Riverside City College	47	54.4	-7.7	-11.9
School District	Corona-Norco USD	30	57.9	-5.9	-6.7
	Moreno Valley USD	15	63.6	-7.9	-6.9
	Val Verde USD	7	78.8	+3.4	-2.9
	Riverside USD	31	55.9	-5.8	-9.2
	Jurupa USD	8	58.3	-5.5	-10.0
	Alvord USD	7	43.3	-18.4	-25.6
Homeowner on Voter File	Yes	70	56.3	-7.7	-8.2
	No	30	64.1	-3.1	-10.7
Likely to Vote by Mail	Yes	74	58.9	-5.5	-8.3
	No	26	58.1	-8.9	-10.5
Likely Mar 2020 Voter	Yes	62	51.2	-5.0	-7.1
	No	38	71.1	-8.6	-11.9
Gender	Male	47	54.9	-9.9	-8.4
	Female	53	62.5	-3.2	-10.2

All voter subgroups responded to the negative arguments with a reduction in their support for the measure when compared with levels recorded at the Interim Ballot Test. The general trend over the course of the entire survey (Initial to Final Ballot Test) was also one of declining support for most voter subgroups, averaging -9% overall.

Whereas Table 6 displays change in support for the measure over the course of the interview at the subgroup level, Table 7 below presents individual-level changes that occurred between the Initial and Final Ballot Tests for the measure. On the left side of the table is shown each of the response options to the Initial Ballot Test and the percentage of respondents in each group. The cells in the body of the table depict movement within each response group (row) based on the information provided throughout the course of the survey as recorded by the Final Ballot Test. For example, in the first row we see that of the 28.8% of respondents who indicated they would definitely support the measure at the Initial Ballot Test, 19.4% indicated they would definitely support the measure at the Final Ballot Test. Approximately 6.0% moved to the probably support group, 1.5% moved to the probably oppose group, 1.0% moved to the definitely oppose group, and 1.0% percent stated they were now unsure of their vote choice.

To ease interpretation of the table, the cells are color coded. Red shaded cells indicate declining support, green shaded cells indicate increasing support, whereas white cells indicate no movement. Moreover, within the cells, a white font indicates a fundamental change in the vote: from yes to no, no to yes, or not sure to either yes or no.

TABLE 7 MOVEMENT BETWEEN INITIAL & FINAL BALLOT TEST

Initial Ballot Test (Q2)		Final Ballot Test (Q11)				
		Definitely support	Probably support	Probably oppose	Definitely oppose	Not sure
Definitely support	28.8%	19.4%	6.0%	1.5%	1.0%	1.0%
Probably support	36.2%	7.1%	21.5%	3.6%	0.8%	3.2%
Probably oppose	11.0%	0.4%	1.1%	6.3%	2.9%	0.2%
Definitely oppose	14.9%	0.1%	0.4%	1.1%	13.3%	0.1%
Not sure	9.0%	0.3%	2.5%	0.8%	1.4%	4.1%

As one might expect, the information conveyed in the survey generally had the greatest impact on individuals who either weren't sure about how they would vote at the Initial Ballot Test or were tentative in their vote choice (probably yes or probably no). Moreover, Table 7 makes clear that although the information presented in the survey did impact some voters, it did not do so in a consistent way for all respondents. Some respondents found the information provided during the course of the interview to be a reason to become more supportive of the measure, while a larger percentage found the same information reason to be less supportive. Although 18% of respondents made a *fundamental*³ shift in their opinion regarding the measure over the course of the interview, the net impact is that support for the measure at the Final Ballot Test (59%) was approximately nine percentage points lower than support at the Initial Ballot Test (65%).

3. This is, they changed from a position of support, opposition, or undecided at the Initial Ballot Test to a different position at the Final Ballot Test.



BACKGROUND & DEMOGRAPHICS

TABLE 8 DEMOGRAPHICS OF SAMPLE

<i>Total Respondents</i>	<i>861</i>
Hsld Member Taken Classes at Local College (QD1)	
Yes	67.1
No	30.5
Prefer not to answer	2.4
College(s) Attended by Hsld Member (QD2)	
Riverside City College	55.3
Norco College	24.6
Moreno Valley College	18.8
None	31.2
Public School Child in Hsld (QD3)	
Yes	38.5
No	59.1
Prefer not to answer	2.4
Often-Used Local Info Sources (QD4)	
Press-Enterprise	16.8
NextDoor	6.5
Facebook	20.1
Twitter	5.7
Radio	28.4
Friends, family	25.2
Age	
18 to 29	16.0
30 to 39	15.4
40 to 49	16.4
50 to 64	29.1
65 or older	23.0
Registration Year	
2019 to 2016	55.0
2015 to 2010	23.5
2009 to 2004	10.5
Before 2004	11.0
Party	
Democrat	44.4
Republican	29.5
Other / DTS	26.1
Household Party Type	
Single dem	19.5
Dual dem	13.1
Single rep	10.1
Dual rep	12.0
Other	16.4
Mixed	28.9
Homeowner on Voter File	
Yes	70.1
No	29.9
Likely to Vote by Mail	
Yes	74.0
No	26.0
Likely Mar 2020 Voter	
Yes	62.3
No	37.7
Gender	
Male	45.8
Female	50.8
Prefer not to answer	3.4
College Area	
Norco College	30.0
Moreno Valley College	22.9
Riverside City College	47.1
School District	
Corona-Norco USD	30.0
Moreno Valley USD	15.4
Val Verde USD	7.4
Riverside USD	31.5
Jurupa USD	8.3
Alvord USD	7.3

In addition to questions directly related to the proposed measure, the study collected basic demographic information about respondents and their households. Some of this information was gathered during the interview, although much of it was collected from the voter file. The profile of the likely November 2020 voter sample used for this study is shown in Table 8.



M E T H O D O L O G Y

The following sections outline the methodology used in the study, as well as the motivation for using certain techniques.

QUESTIONNAIRE DEVELOPMENT Dr. McLarney of True North Research worked closely with the Riverside Community College District to develop a questionnaire that covered the topics of interest and avoided possible sources of systematic measurement error, including position-order effects, wording effects, response-category effects, scaling effects, and priming. Several questions included multiple individual items. Because asking the items in a set order can lead to a systematic position bias in responses, items were asked in random order for each respondent.

Some of the questions asked in this study were presented only to a subset of respondents. For example, only individuals who did not support the bond at the Initial Ballot Test (Question 2) were asked the follow-up open-ended Question 3 regarding their reasons for not supporting the measure. The questionnaire included with this report (see *Questionnaire & Toplines* on page 30) identifies the skip patterns that were used during the interview to ensure that each respondent received the appropriate questions.

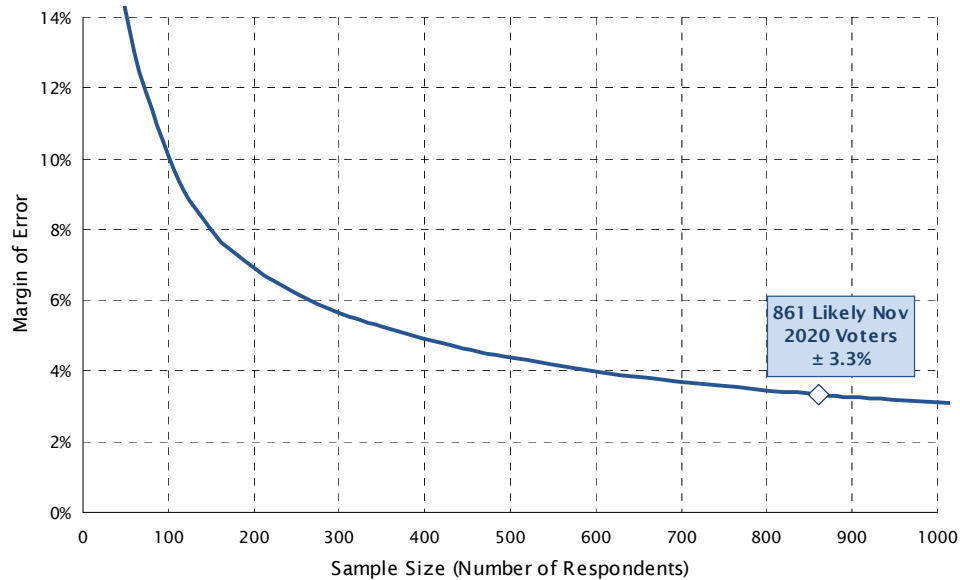
PROGRAMMING, PRE-TEST & TRANSLATION Prior to fielding the survey, the questionnaire was CATI (Computer Assisted Telephone Interviewing) programmed to assist interviewers when conducting the telephone interviews. The CATI program automatically navigates the skip patterns, randomizes the appropriate question items, and alerts the interviewer to certain types of keypunching mistakes should they happen during the interview. The survey was also programmed into a passcode-protected online survey application to allow online participation for sampled voters. The integrity of the questionnaire was pre-tested internally by True North and by dialing into voter households in the District prior to formally beginning the survey. Once finalized, the questionnaire was also professionally translated into Spanish to allow for data collection in English or Spanish according to respondent preference.

SAMPLE The survey was administered to a stratified and clustered random sample of registered voters in the District who are likely to participate in the November 2020 election, with a subset who are also likely to participate in the lower-turnout March 2020 primary election. Consistent with the profile of this universe, the sample was stratified into clusters, each representing a combination of age, gender, and household party-type. Individuals were then randomly selected based on their profile into an appropriate cluster. This method ensures that if a person of a particular profile refuses to participate in the study, they are replaced by an individual who shares their same profile.

STATISTICAL MARGIN OF ERROR By using the probability-based sampling design noted above, True North ensured that the final sample was representative of voters in the District likely to participate in the November 2020 election. The results of the sample can thus be used to estimate the opinions of *all* voters likely to participate in the November 2020 election. Because not all voters participated in the study, however, the results have what is known as a statistical margin of error due to sampling. The margin of error refers to the difference between what was found in the survey of 861 voters for a particular question and what would have been found if all 336,235 likely voters identified in the District had been surveyed for the study.

Figure 11 provides a graphic plot of the *maximum* margin of error in this study. The maximum margin of error for a dichotomous percentage result occurs when the answers are evenly split such that 50% provide one response and 50% provide the alternative response. For this survey, the maximum margin of error is $\pm 3.3\%$.

FIGURE 11 MAXIMUM MARGIN OF ERROR DUE TO SAMPLING



Within this report, figures and tables show how responses to certain questions varied by subgroups such as age, gender, and partisan affiliation. Figure 11 is thus useful for understanding how the maximum margin of error for a percentage estimate will grow as the number of individuals asked a question (or in a particular subgroup) shrinks. Because the margin of error grows exponentially as the sample size decreases, the reader should use caution when generalizing and interpreting the results for small subgroups.

RECRUITING & DATA COLLECTION The survey followed a mixed-method design that employed multiple recruiting methods (telephone and email) and multiple data collection methods (telephone and online). Telephone interviews averaged 17 minutes in length and were conducted during weekday evenings (5:30PM to 9PM) and on weekends (10AM to 5PM). It is standard practice not to call during the day on weekdays because most working adults are unavailable and thus calling during those hours would likely bias the sample.

Voters recruited via email were assigned a unique passcode to ensure that only voters who received an invitation could access the online survey site, and that each voter could complete the survey only one time. During the data collection period, an email reminder notice was also sent to encourage participation among those who had yet to take the survey. A total of 861 surveys were completed in English and Spanish between February 6 and February 18, 2019.

DATA PROCESSING Data processing consisted of checking the data for errors or inconsistencies, coding and recoding responses, and preparing frequency analyses and crosstabulations.

ROUNDING Numbers that end in 0.5 or higher are rounded up to the nearest whole number, whereas numbers that end in 0.4 or lower are rounded down to the nearest whole number. These same rounding rules are also applied, when needed, to arrive at numbers that include a decimal place in constructing figures and charts. Occasionally, these rounding rules lead to small discrepancies in the first decimal place when comparing tables and figures for a given question.

QUESTIONNAIRE & TOPLINES



Riverside Community College District
Bond Survey
Final Toplines (n=861)
February 2019

Section 1: Introduction to Study

Hi, may I please speak to _____. My name is _____, and I'm calling on behalf of TNR, an independent public opinion research firm. We're conducting a survey of voters about important issues in Riverside County and I'd like to get your opinions.

If needed: This is a survey about important issues in your community. I'm NOT trying to sell anything and I won't ask for a donation.

If needed: The survey should take about 12 minutes to complete.

If needed: If now is not a convenient time, can you let me know a better time so I can call back?

If the person asks why you need to speak to the listed person or if they ask to participate instead, explain: For statistical purposes, at this time the survey must only be completed by this particular individual.

If the person says they are an elected official or is somehow associated with the survey, politely explain that this survey is designed to measure the opinions of those not closely associated with the study, thank them for their time, and terminate the interview.

Section 2: Importance of Issues

To begin, I'm going to read a list of issues facing your community and for each one, please tell me how important you feel the issue is to you, using a scale of extremely important, very important, somewhat important or not at all important.

Here is the (first/next) issue: _____. Do you think this issue is extremely important, very important, somewhat important, or not at all important?

		Extremely Important	Very Important	Somewhat Important	Not at all Important	Not sure	Prefer not to answer
	<i>Randomize.</i>						
A	Improving public safety	54%	30%	13%	3%	0%	0%
B	Reducing traffic congestion	46%	31%	20%	3%	0%	0%
C	Ensuring local access to an affordable, high quality college education and career training	49%	31%	15%	5%	1%	0%
D	Improving local property values	27%	32%	31%	8%	1%	0%
E	Creating jobs and improving the local economy	53%	36%	9%	1%	0%	0%
F	Maintaining and upgrading classrooms and facilities at our local community colleges	32%	35%	26%	6%	2%	0%
G	Preventing local tax increases	41%	28%	24%	5%	1%	0%
H	Protecting the quality of education	56%	33%	8%	3%	0%	0%

Section 3: Initial Ballot Test

Your household is within the Riverside Community College District. Next year, voters in the District may be asked to vote on a local ballot measure. Let me read you a summary of the measure.

To improve access for students and veterans to high quality, affordable college education by:

- Repairing, constructing, and acquiring classrooms, facilities, sites and equipment at Riverside City, Norco, and Moreno (mo-Rain-oh) Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades

Q2 Shall the Riverside Community College District measure authorizing **840** million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled?

If the election were held today, would you vote yes or no on this measure? *Get answer, then ask:* Would that be definitely (yes/no) or probably (yes/no)?

1	Definitely yes	29%	Skip to Q4
2	Probably yes	36%	Skip to Q4
3	Probably no	11%	Ask Q3
4	Definitely no	15%	Ask Q3
98	Not sure	9%	Ask Q3
99	Prefer not to answer	0%	Skip to Q4

Q3 Is there a particular reason why you do not support or are unsure about the measure I just described? *If yes, ask:* Please briefly describe your reason. *Verbatim responses recorded and later grouped into categories shown below.*

Taxes already too high	25%
Need more information	20%
Money is misspent, mismanaged	16%
Not sure, no particular reason	11%
Do not support bonds, increased debt	7%
Other higher priorities in community	6%
Other ways to be funded, lottery money, people that attends schools	6%
Do not trust District	5%
District has enough money	4%
No one in household attends local community college	4%
Colleges are okay as-is, no need for more money	3%
Mentioned past ballot measure, bond	3%
Measure too expensive	2%

Money goes to administrators' salaries, pensions	1%
Illegal immigration issues	1%

Section 4: Tax Threshold

The amount each home owner will pay if the community college bond passes depends on the assessed value of their home - not the current market value of the home.

Q4 If you heard that the annual property taxes on your home would increase: _____ per 100,000 (one hundred thousand) dollars of assessed valuation, would you vote yes or no on the bond measure? *Get answer, then ask: Is that definitely (yes/no) or probably (yes/no)?*

If needed: The assessed value of your home is listed on your property tax bill.

Read in sequence starting with the highest amount (A), then the next highest (B), and so on. If respondent says 'definitely yes', record 'definitely yes' for all LOWER dollar amounts and go to next question.

		Definitely Yes	Probably Yes	Probably No	Definitely No	Not Sure	Prefer not to answer
	<i>Ask in Order</i>						
A	\$24	17%	29%	19%	27%	8%	1%
B	\$18	23%	29%	16%	25%	6%	1%
C	\$12	35%	24%	13%	24%	5%	0%

Q5 Let me put it another way: If you knew that this measure would cost the typical home owner about \$66 per year, would you vote yes or no on the bond measure? *Get answer, then ask: Is that definitely (yes/no) or probably (yes/no)?*

1	Definitely yes	30%	Skip to Q7
2	Probably yes	27%	Ask Q6
3	Probably no	14%	Ask Q6
4	Definitely no	23%	Ask Q6
98	Not sure	4%	Ask Q6
99	Prefer not to answer	1%	Skip to Q7

Q6 If you knew that this measure would cost the typical home owner about \$33 per year, would you vote yes or no on the bond measure? *Get answer, then ask: Is that definitely (yes/no) or probably (yes/no)?*

	Def yes @ \$66 (Q5)	30%
1	Definitely yes	12%
2	Probably yes	24%
3	Probably no	9%
4	Definitely no	20%
98	Not sure	4%
99	Prefer not to answer	1%

Section 5: Projects & Programs							
Q7	The measure we've been discussing would provide funding for a variety of projects and improvements.						
	If the measure passes, would you favor or oppose using some of the money to: _____, or do you not have an opinion? <i>Get answer, if favor or oppose, then ask: Would that be strongly (favor/oppose) or somewhat (favor/oppose)?</i>						
	<i>Randomize</i>	Strongly Favor	Somewhat Favor	Somewhat Oppose	Strongly Oppose	Not sure	Prefer not to answer
A	Upgrade classrooms and career training facilities for public safety include fire protection, emergency medical treatment, and law enforcement	46%	31%	6%	6%	9%	2%
B	Upgrade classrooms and career training facilities for healthcare and nursing	46%	30%	7%	7%	10%	2%
C	Upgrade classrooms and career training facilities for science, technology, engineering, math and computer science	51%	28%	6%	6%	8%	2%
D	Upgrade classrooms and career training facilities for advanced manufacturing, automation and logistics	39%	35%	8%	6%	10%	2%
E	Upgrade classrooms and labs to help local students complete the first two years of college affordably, and transfer to the Cal-State or UC systems	56%	23%	5%	7%	6%	2%
F	Expand and improve the Veteran's Centers at all three campuses, which provide job training, job placement, counseling, and support services to military veterans and their families	53%	26%	6%	6%	7%	3%
G	Repair or replace leaky roofs, old rusty plumbing, and faulty electrical systems where needed	57%	25%	4%	5%	6%	2%
H	Improve student safety and campus security systems including security lighting, cameras, emergency communications systems, smoke detectors, and fire alarms	52%	26%	7%	7%	6%	2%
I	Improve access for students with disabilities	54%	28%	6%	5%	6%	2%
J	Upgrade science centers and labs to allow for state-of-the-art courses in biology, chemistry and physical sciences	45%	32%	6%	6%	8%	2%
K	Upgrade outdated classrooms, labs, career training facilities, and equipment to keep pace with current industry standards and technology	52%	27%	5%	6%	7%	2%

Section 6: Positive Arguments

What I'd like to do now is tell you what some people are saying about the measure we've been discussing.

Q8 Supporters of the measure say: _____. Do you think this is a very convincing, somewhat convincing, or not at all convincing reason to **SUPPORT** the measure?

		Very Convincing	Somewhat Convincing	Not At All Convincing	Don't Believe	Not sure	Prefer not to answer
	<i>Randomize</i>						
A	Riverside City College, Norco College and Moreno Valley College are vital economic engines for our local business community and our economy . Last year alone, they added nearly one billion dollars to the local economy and supported nearly 13,000 jobs.	40%	33%	14%	8%	3%	2%
B	Riverside City College, Norco College and Moreno Valley College are vital resources for our community . They educate the healthcare professionals that serve our medical needs, the law enforcement officers and firefighters that keep us safe, and the skilled workers who fuel our economy.	38%	37%	13%	6%	2%	2%
C	Local businesses rely on our local colleges to train future and current employees in fields like engineering, healthcare, industrial technology, and computer science.	34%	36%	18%	7%	3%	3%
D	This measure is a wise investment. A recent independent study showed that for every dollar that taxpayers invest in our local colleges, they receive 2 dollars and 40 cents in return benefit.	27%	33%	22%	11%	5%	2%
E	All money raised by the measure will stay in our community to support our local community colleges and students. It cannot be taken away by the State or used for other purposes.	48%	24%	13%	11%	3%	2%
F	This measure requires a clear system of accountability, including a project list detailing exactly how the money will be used, a Citizens' Oversight Committee, and independent audits to ensure the money is spent properly.	41%	32%	13%	10%	2%	2%
G	By law, no money from this measure can be spent on staff salaries or pensions.	38%	27%	17%	11%	5%	2%
H	If voters approve this measure, our local colleges will qualify for more than 100 million dollars in State matching money. If the bond is not approved, we won't receive our fair share of State funding.	40%	29%	16%	9%	4%	2%

I	Because the cost of attending the University of California and State University systems has become so expensive, many more students are starting their education at community colleges. This measure will ensure local students have access to an affordable, high-quality education here in Riverside County.	51%	28%	11%	5%	2%	2%
J	Riverside Community College District is one of the most important Veterans' services institutions in California. It provides job placement, job training, and counseling to about 1800 vets every day.	39%	33%	12%	8%	5%	2%
K	Our local community colleges ensure that lower and middle-income students who can't afford the high price of a university still have an opportunity to succeed in college and careers. This measure will provide the affordable, high quality education that all students deserve.	47%	30%	11%	7%	3%	2%
L	The standards are rising for what it takes to compete for good paying jobs in today's economy. This measure will ensure local students have access to the education, facilities, technology, skills training, and certifications they need to succeed.	39%	34%	15%	7%	3%	2%
M	Our local hospitals and doctor's offices depend on our colleges to train thousands of nurses and health care professionals to provide good, reliable health care in our community.	39%	35%	15%	8%	3%	2%
N	Nearly 40% of all local high school graduates rely on our local community colleges for higher education and to prepare for careers. We need to repair and upgrade our local colleges so they can continue to serve our community well for the decades to come.	44%	35%	11%	6%	2%	2%
<i>Split Sample. Only those flagged for Riverside City College receive O1, only those flagged for Norco College receive O2, only those flagged for Moreno Valley College receive O3 & O4.</i>							
O1	Our students deserve to have the same educational opportunities as others in southern California. We need to upgrade our classrooms, career-training facilities, and instructional technology to keep pace.	33%	34%	20%	8%	2%	3%
O2	Passing this measure will enable Norco College to become a comprehensive college, expanding the range of classes, degrees, and career-training courses offered to better meet the needs of residents.	41%	33%	13%	7%	3%	3%

O3	This measure will construct a Middle College High School at Moreno Valley College focused on Science, Technology, Engineering, Art and Mathematics that will allow students to earn a high school diploma and complete two years of college classes in just four years. This will shorten the time it takes to graduate college and make higher education more affordable.	54%	25%	13%	5%	3%	0%
O4	Passing this measure will enable Moreno Valley College to become a comprehensive college, expanding the range of classes, degrees, and career-training courses offered to better meet the needs of area residents.	52%	33%	9%	4%	2%	0%

Section 7: Interim Ballot Test

Sometimes people change their mind about a measure once they have more information about it. Now that you have heard a bit more about the measure, let me read you a summary of it again.

Q9	To improve access for students and veterans to high quality, affordable college education by:		
	<ul style="list-style-type: none"> Repairing, constructing, and acquiring classrooms, facilities, sites and equipment at Riverside City, Norco, and Moreno (mo-Rain-oh) Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades 		
	Shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled?		
	If the election were held today, would you vote yes or no on this measure? <i>Get answer, then ask:</i> Would that be definitely (yes/no) or probably (yes/no)?		
	1	Definitely yes	32%
	2	Probably yes	36%
	3	Probably no	9%
4	Definitely no	17%	
98	Not sure	6%	
99	Prefer not to answer	1%	

Section 8: Negative Arguments							
Next, let me tell you what opponents of the measure are saying.							
Q10	Opponents of the measure say: ----- Do you think this is a very convincing, somewhat convincing, or not at all convincing reason to OPPOSE the measure?						
	<i>Randomize</i>	Very Convincing	Somewhat Convincing	Not At All Convincing	Don't Believe	Not sure	Prefer not to answer
A	The District passed a 350-million-dollar bond in 2004 to expand and modernize their facilities - now they want more money? That's not fair to taxpayers.	29%	32%	30%	3%	5%	2%
B	People are having a hard time making ends meet with the high cost of living - especially seniors and those living on fixed incomes. Now is NOT the time to be raising taxes.	40%	32%	21%	3%	2%	2%
C	Don't be fooled. Including interest, this bond will cost taxpayers about 1.5 billion dollars and will take property owners about 40 years to pay off.	39%	33%	15%	6%	4%	2%
D	The District needs to live within its means, just like everyone else. If they cut waste, reduced pensions, and did a better job budgeting, they would not have to raise taxes.	29%	27%	32%	8%	2%	2%

Section 9: Final Ballot Test		
Now that you have heard a bit more about the measure, let me read you a summary of it one more time.		
Q11	<p>To improve access for students and veterans to high quality, affordable college education by:</p> <ul style="list-style-type: none"> Repairing, constructing, and acquiring classrooms, facilities, sites and equipment at Riverside City, Norco, and Moreno (mo-Rain-oh) Valley Colleges for science, math, engineering, technology, healthcare, arts, career-training, and skilled trades <p>Shall the Riverside Community College District measure authorizing 840 million dollars in bonds at legal rates, levying 2 cents per 100 dollars of assessed value (\$51 million annually) while bonds are outstanding, be approved, with citizen oversight and all money locally controlled?</p> <p>If the election were held today, would you vote yes or no on this measure? <i>Get answer, then ask: Would that be definitely (yes/no) or probably (yes/no)?</i></p>	
1	Definitely yes	27%
2	Probably yes	32%

3	Probably no	13%
4	Definitely no	19%
98	Not sure	7%
99	Prefer not to answer	1%

Section 10: Background/Demographics

Thank you so much for your participation. I have just a few background questions for statistical purposes.

D1	Have you or a member of your household ever taken a class at Riverside City College, Norco College, or Moreno (mo-RAIN-oh) Valley College?							
	1	Yes	67%	Ask D2				
	2	No	30%	Skip to D3				
	98	Not sure	1%	Skip to D3				
	99	Prefer not to answer	1%	Skip to D3				
D2	Which college did you or other members of your household attend in the District? <i>If hesitates, read options. Multiple responses allowed.</i>							
	1	Riverside City College	80%					
	2	Norco College	36%					
	3	Moreno Valley College	27%					
	98	Not sure	1%					
	99	Prefer not to answer	0%					
D3	Do you have any children in your home who attend a local public school?							
	1	Yes	38%					
	2	No	59%					
	98	Not sure	1%					
	99	Prefer not to answer	2%					
D4	As I read the following names, please tell me how often you use this source for local news. Here is the (first/next) one: _____. Do you use this source often, sometimes, seldom, or never for local news?							
		<i>Randomize</i>	Often	Sometimes	Seldom	Never	Never heard of this source	Prefer not to answer
A		The Press-Enterprise	17%	28%	22%	29%	2%	2%
B		NextDoor	6%	12%	10%	53%	17%	2%

Riverside CCD Bond Survey

February 2019

C	Facebook	20%	19%	16%	43%	1%	2%
D	Twitter	6%	9%	8%	75%	1%	2%
E	Radio	28%	32%	18%	20%	0%	2%
F	Friends and Family	25%	35%	18%	17%	2%	2%

Those are all of the questions that I have for you. Thanks so much for participating in this important survey.

Post-Interview & Sample Items

S1	Gender						
	1	Male					46%
	2	Female					51%
	3	Prefer not to answer					3%
S2	Party						
	1	Democrat					44%
	2	Republican					30%
	3	Other					6%
	4	DTS					20%
S3	Age on Voter File						
	1	18 to 29					16%
	2	30 to 39					15%
	3	40 to 49					16%
	4	50 to 64					29%
	5	65 or older					23%
	99	Not Coded					0%
S4	Registration Date						
	1	2019 to 2016					55%
	2	2015 to 2010					23%
	3	2009 to 2004					11%
	4	Before 2004					11%

S5 Household Party Type		
1	Single Dem	20%
2	Dual Dem	13%
3	Single Rep	10%
4	Dual Rep	12%
5	Single Other	11%
6	Dual Other	5%
7	Dem & Rep	7%
8	Dem & Other	10%
9	Rep & Other	8%
0	Mixed (Dem + Rep + Other)	3%
S6 Homeowner on Voter File		
1	Yes	70%
2	No	30%
S7 Likely to Vote by Mail		
1	Yes	74%
2	No	26%
S8 Likely March 2020 Voter		
1	Yes	62%
2	No	38%
S9 College Area		
	Norco College	30%
	Moreno Valley College	23%
	Riverside City College	47%

Riverside CCD Bond Survey

February 2019

S10 School District		
	Corona-Norco USD	30%
	Moreno Valley USD	15%
	Val Verde USD	7%
	Riverside USD	31%
	Jurupa Valley USD	8%
	Alvord USD	7%
S11 Likely November 2020 Voter		
1	Yes	100%
2	No	0%

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Board of Trustees Committee Meeting (IV.F)

Meeting	April 2, 2019
Agenda Item	Planning and Operations (IV.F)
Subject	Planning and Operations Proposed Child Care Center Fee Increase
College/District	Riverside City College
Funding	Child Care - Resource 3300
Recommended Action	The Committee to review a proposed increase in child care fees at Riverside City College.

Background Narrative:

On April 20, 2010, the Board of Trustees approved an increase to the child care fees for Riverside City College Child Development Center. Included in that board action was approval for an additional increase of 6% per fiscal year in 2012 and 2013, if necessary. Due to the garnering of external funding to supplement parent fees at the Center, the college did not need the additional increases to fees. Therefore, no additional increases to fees has been realized since 2010.

A goal of the RCC Child Development Center is to remain fiscally solvent, which has been achieved since FY 2014-2015. Several variables have coincided that require the college to propose an increase to the child care fees: With regard to expenditures: (1) There is a foreseeable increase in expenditures related to salary increases driven by 5% COLA in FY2019 and another 5% in FY2020; (2) A currently unknown impact to expenditures related to the ongoing negotiation of childcare teacher salaries; and (3) Costs associated with maintaining the independent accreditation status of the Center and Teacher Training Laboratory.

With regard to income: As external funding sunset (First Five Access and Quality grant), the college will no longer receive that income that in the past has been able to forestall an increase to fees.

In addition, the college has researched local costs of providing such weekly services and have found that similar centers within our college area range from \$202.00 to \$313.00 for Preschool Full-Day/5 days per week, and between \$259.00 and \$463.00 for Toddler Full Day/5 days per week. As of January, 2018, the Department of Education set the Regional Market Rate (RMR) for Riverside County at \$326.36 for Infant and Toddler Full-Day/5 days per week and Preschool Full-Day/5 days per week at \$250.09. The proposed RCC Child Development Center fee increase schedule is below the RMR and provides the best service at the lowest price in our area.

This request was presented to the District Strategic Planning Council (DSPC) for a first read on February 22, 2019 and received support from this body in action taken on March 15, 2019.

At this time RCC is seeking approval for a 10% increase in child care fees, effective July 1, 2019. Additional approval is also requested for annual increases of not more than 5% effective July 1" in each new fiscal year as necessary to keep up with the rising costs of maintaining a quality, accredited child development center and Teacher Training Laboratory.

Attached for the board's review is the new proposed fee schedule along with local 2018-2020 Tuition Rate Comparison for the centers within the Riverside area, and a report of ending balances for the Center based on

projections of revenue and expenses with the addition of the proposed fee increases and salary increases driven by COLA.

Prepared By: Gregory Anderson, President, Riverside City College
Raymond (Chip) West, Vice President, Business Services, Riverside City College
Carol Farrar, Vice President, Academic Affairs, Riverside City College
Kristine DiMemmo, Dean of Instruction CTE, Riverside City College
Toni Rangel, Early Childhood Education Manager, Riverside City College

RCC Child Development Center Tuition Rate Increases (Rounded)

Riverside City College Tuition Rates		FY 18/19		FY 19/20		FY 20/21		FY 21/22
		Current Rates		10% Increase		5% Increase		5% Increase
Preschool Full-Day	Daily	Weekly	Daily	Weekly	Daily	Weekly	Daily	Weekly
Mon-Friday—5 days	\$33.00	\$163.00	\$36.00	\$180.00	\$38.00	\$189.00	\$40.00	\$199.00
MWF—3 days		\$109.00		\$120.00		\$126.00		\$133.00
TTH—2 days		\$79.00		\$87.00		\$92.00		\$97.00
Preschool Half-Day		Weekly		Weekly		Weekly		Weekly
Mon-Friday—5 days		\$140.00		\$154.00		\$162.00		\$171.00
MWF—3 days		\$84.00		\$93.00		\$98.00		\$103.00
TTH—2 days		\$56.00		\$62.00		\$66.00		\$70.00
Preschool Full-Day(Not Potty Trained)	Daily	Weekly	Daily	Weekly	Daily	Weekly	Daily	Weekly
Mon-Friday—5 days	\$46.00	\$230.00	\$51.00	\$253.00	\$53.00	\$266.00	\$55.00	\$280.00
MWF—3 days		\$138.00		\$152.00		\$160.00		\$168.00
TTH—2 days		\$92.00		\$102.00		\$108.00		\$114.00
Preschool Half-Day (Not Potty Trained)		Weekly		Weekly		Weekly		Weekly
Mon-Friday—5 days		\$144.00		\$159.00		\$167.00		\$176.00
MWF—3 days		\$86.00		\$95.00		\$100.00		\$105.00
TTH—2 days		\$58.00		\$64.00		\$68.00		\$72.00
Toddler Full-Day	Daily	Weekly	Daily	Weekly	Daily	Weekly	Daily	Weekly
Mon-Friday—5 days	\$46.00	\$230.00	\$51.00	\$253.00	\$53.00	\$266.00	\$56.00	\$280.00
MWF—3 days		\$138.00		\$152.00		\$160.00		\$168.00
TTH—2 days		\$92.00		\$102.00		\$108.00		\$114.00
Toddler Half-Day		Weekly		Weekly		Weekly		Weekly
Mon-Friday—5 days		\$144.00		\$159.00		\$167.00		\$176.00
MWF—3 days		\$86.00		\$95.00		\$100.00		\$105.00
TTH—2 days		\$58.00		\$64.00		\$68.00		\$72.00
Infant Full-Day	Daily	Weekly	Daily	Weekly	Daily	Weekly	Daily	Weekly
Mon-Friday—5 days	\$48.00	\$241.00	\$54.00	\$266.00	\$56.00	\$280.00	\$58.00	\$294.00
MWF—3 days		\$145.00		\$160.00		\$168.00		\$177.00
TTH—2 days		\$96.00		\$106.00		\$112.00		\$118.00
Infant Half-Day		Weekly		Weekly		Weekly		Weekly
Mon-Friday—5 days		\$156.00		\$172.00		\$181.00		\$191.00
MWF—3 days		\$94.00		\$104.00		\$110.00		\$116.00
TTH—2 days		\$62.00		\$69.00		\$73.00		\$77.00
Non-Refundable Registration Fee--\$75.00						Late drop off fees-\$1.00/min		
Annual Materials Fee (due each Aug)--\$75.00						Late pick up fees- \$1.00 1st time/min \$3.00 2nd time/min and \$5.00 3rd time/min		

2018/2019 Tuition Rate Comparison

Riverside City College Tuition Rates	RCC 17/18 Rates	RCC 10% Increase	UCR 2018 Tuition Rates	Temple Beth El 2018 Tuition Rates	Growing Place 2018 Tuition Rates
Preschool Full-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$163.00	\$180.00	\$313.00	\$202.00/220.00	\$242.00
MWF—3 days	\$109.00	\$120.00	\$201.00	\$126/140	
TTH—2 days	\$79.00	\$87.00	\$139.00	\$83.00/96.00	
Preschool Half-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$140.00	\$154.00		\$127.00/139.00	\$195.00
MWF—3 days	\$84.00	\$93.00		\$81.00/93.00	
TTH—2 days	\$56.00	\$62.00		\$57.00/70.00	
Preschool Full-Day(Not Potty Trained)	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$230.00	\$253.00			\$259.00
MWF—3 days	\$138.00	\$152.00			
TTH—2 days	\$92.00	\$102.00			
Preschool Half-Day (Not Potty Trained)	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$144.00	\$159.00			
MWF—3 days	\$86.00	\$95.00			
TTH—2 days	\$58.00	\$64.00			
Toddler Full-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$230.00	\$253.00	\$463.00	\$259.00	\$259.00
MWF—3 days	\$138.00	\$152.00		\$166.00	
TTH—2 days	\$92.00	\$102.00		\$110.00	
Toddler Half-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$144.00	\$159.00		\$171.00	
MWF—3 days	\$86.00	\$95.00		\$103.00	
TTH—2 days	\$58.00	\$64.00		\$86.00	
Infant Full-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$241.00	\$266.00	\$468.00	\$259.00	\$305.00
MWF—3 days	\$145.00	\$160.00		\$166.00	
TTH—2 days	\$96.00	\$106.00		\$110.00	
Infant Half-Day	Weekly	Weekly	Weekly	Weekly	Weekly
Mon-Friday—5 days	\$156.00	\$172.00		\$171.00	
MWF—3 days	\$94.00	\$104.00		\$103.00	
TTH—2 days	\$62.00	\$69.00		\$86.00	
Non-Refundable Annual Registration Fee--\$75.00 Annual Materials Fee (due each Aug)--\$75.00			Late drop off fees-\$1.00/min Late pick up fees- \$1.00 1st time/min \$3.00 2nd time/min and \$5.00 3rd time/min		

ECS Resource 3300 - FY 18/19 Ending Balance Projections and FY 19/20 Budget Projections

District 07 - RIVERSIDE COMMUNITY COLLEGE DISTRICT

DATE: 07/01/2018 - 3/14/2019

Revenue			Beginning Reserve Balance FY 18/19 \$ 659,758 \$ 567,711 \$ 370,457					
Fund	Description	Adopted Budget	Revised Budget	Rev/ Exp Net of Abatements	Encumbrances	FY 18/19 Projected Actuals	FY 19/20 Projected Budget COLA + 2% 10% Fee Increase	FY 20/21 Projected Budget COLA + 2% 5% Fee Increase
33	Federal Income	9,000.00	9,000.00	30,685.30	0.00	30,685.30	10,000.00	10,000.00
33	State Income	45,000.00	45,000.00	47,031.21	0.00	47,031.21	47,000.00	47,000.00
33	Interest Income	9,000.00	9,000.00	3,175.11	0.00	9,000.00	8,000.00	8,000.00
33	Parent Fees	850,000.00	850,000.00	482,652.55	0.00	795,003.71	872,344.00	915,961.20
33	Inter Fund TR	75,000.00	75,000.00	37,500.00	0.00	75,000.00	75,000.00	75,000.00
		988,000.00	988,000.00	601,044.17	0.00	956,720.22	1,012,344.00	1,055,961.20
Custodial								
33	CI Sal FT	24,281.00	24,281.00	15,645.91	8,076.60	23,722.51	25,623.55	26,920.10
33	Pers CI Employees	4,386.00	4,386.00	2,825.96	1,458.80	4,284.76	5,329.70	5,599.38
33	Locally Defined Oasdi, CI Employees	1,505.00	1,505.00	964.83	500.75	1,465.58	1,588.66	1,669.05
33	Medicare, CI Employees	352.00	352.00	225.65	117.11	342.76	371.54	390.34
33	H & W Ben CI Employees	14,955.00	14,955.00	9,076.68	5,878.32	14,955.00	15,702.75	6,172.24
33	H & W Ben	49.00	49.00	31.29	16.15	47.44	51.25	53.84
33	State Unemp Ins, CI Employees	12.00	12.00	7.80	4.04	11.84	12.81	13.46
33	Workers' Comp Ins CI Employees	388.00	388.00	222.65	129.23	351.88	409.98	430.72
33	GL and Property Expense	388.00	388.00	250.00	0.00	379.56	409.98	430.72
33	Repairs	10,000.00	10,000.00	0.00	0.00	0.00	10,000.00	10,000.00
ECS Program Expenditures								
33	Acad Pt Non Instr	350,000.00	350,000.00	223,763.75	0.00	371,070.78	391,588.03	411,402.38
33	Acad Oth Sub Non Instr	65,000.00	65,000.00	47,691.29	0.00	81,334.59	85,831.74	90,174.82
33	CI Sal FT Admn	101,292.00	101,292.00	67,527.86	33,764.00	101,291.86	106,892.64	70,944.77
33	CI Sal FT	49,050.00	49,050.00	32,294.00	16,756.00	49,050.00	54,389.75	57,141.87
33	Student Help Non-Instr	200,000.00	200,000.00	94,436.48	0.00	176,112.89	185,000.00	185,000.00
33	Short Term Non-Classified	15,000.00	15,000.00	16,376.36	0.00	24,693.14	30,000.00	30,000.00
33	Strs CI Employees	0.00	0.00	-53.72	0.00			
33	Strs Oth Ce Employees	67,562.00	67,562.00	19,141.57	0.00	31,901.23	47,741.98	50,157.72
33	Pers CI Employees	27,155.00	27,155.00	17,373.15	9,124.92	26,498.07	33,546.74	26,642.02
33	Locally Defined Oasdi, CI Employees	9,321.00	9,321.00	6,373.08	3,132.24	9,505.32	9,999.51	7,941.37
33	Medicare, CI Employees	2,397.00	2,397.00	1,669.72	732.54	2,402.26	2,338.59	1,857.26
33	Medicare, Oth Ce Employees	6,018.00	6,018.00	3,936.05	0.00	6,559.88	6,922.59	7,272.87
33	H & W Ben CI Employees	19,491.00	19,491.00	12,109.32	7,381.68	19,491.00	20,465.55	12,714.79
33	H & W Ben Oth Ce Employees	8,411.00	8,411.00	6,739.90	4,503.20	11,243.10	8,831.55	7,076.90
33	H & W Ben	731.00	731.00	421.26	101.04	702.30	752.56	686.17
33	H & W Ben	830.00	830.00	542.96	0.00	904.81	954.84	1,003.15
33	State Unemp Ins, CI Employees	75.00	75.00	57.55	25.26	82.81	80.64	64.04
33	State Unemp Ins Oth Ce Employees	208.00	208.00	135.72	0.00	226.20	238.71	250.79

ECS Resource 3300 - FY 18/19 Ending Balance Projections and FY 19/20 Budget Projections

District 07 - RIVERSIDE COMMUNITY COLLEGE DISTRICT

DATE: 07/01/2018 - 3/14/2019

Revenue			Beginning Reserve Balance FY 18/19 \$ 659,758 \$ 567,711 \$ 370,457					
Fund	Description	Adopted Budget	Revised Budget	Rev/ Exp Net of Abatements	Encumbrances	FY 18/19 Projected Actuals	FY 19/20 Projected Budget COLA + 2% 10% Fee Increase	FY 20/21 Projected Budget COLA + 2% 5% Fee Increase
33	Workers' Comp Ins Cl Employees	5,845.00	5,845.00	3,031.65	808.32	5,618.37	6,020.52	5,489.39
33	Workers' Comp Ins Oth Ce Employees	6,640.00	6,640.00	4,035.13	0.00	7,238.49	76,387.16	80,252.35
33	Copying And Printing	400.00	400.00	899.38	0.00	1,299.38	1,300.00	1,300.00
33	Office And Oth Supplies	13,000.00	14,500.00	5,111.44	8,460.34	17,371.78	17,372.00	17,372.00
33	Food	15,000.00	17,000.00	7,177.15	9,434.15	18,611.30	18,611.00	18,611.00
33	Paper Products	5,500.00	5,500.00	0.00	0.00	0.00	0.00	0.00
33	Postage	25.00	25.00	0.00	0.00	0.00	25.00	25.00
33	Prof Services	2,000.00	5,000.00	2,758.16	1,046.22	3,804.38	4,000.00	4,000.00
33	Conferences	0.00	1,200.00	1,029.16	0.00	1,029.16	0.00	0.00
33	Memberships	250.00	250.00	175.00	0.00	175.00	175.00	175.00
33	GL and Property Expense	12,485.00	12,485.00	6,886.00	0.00	12,856.85	13,659.23	13,514.62
33	Natural Gas	700.00	700.00	303.23	0.00	528.23	550.00	550.00
33	Electricity	13,000.00	13,000.00	8,629.42	0.00	12,079.42	13,000.00	13,000.00
33	Water	4,850.00	4,850.00	3,116.58	0.00	4,336.58	4,500.00	4,500.00
33	Cellular Telephone	500.00	1,000.00	549.43	0.00	853.43	900.00	900.00
33	Repairs	500.00	500.00	0.00	0.00	0.00	500.00	500.00
33	Computer Software Maint/Lic	5,800.00	5,800.00	672.00	0.00	1,672.00	1,672.00	1,672.00
33	Other	1,100.00	1,100.00	650.00	0.00	1,618.00	1,650.00	1,650.00
33	Other Services	3,000.00	0.00	0.00	0.00	0.00	3,000.00	3,000.00
33	Bank Charges	1,600.00	1,600.00	543.52	0.00	1,043.52	1,200.00	1,200.00
33	Equip Add \$200-\$4999	102,000.00	96,800.00	0.00	0.00	0.00	0.00	0.00
	Total Expense Projections	1,173,052.00	1,173,052.00	625,354.32	111,450.91	1,048,767.45	1,209,597.53	1,179,722.13
						Projected Total Available Revenue FY 18/19	1,616,478.22	1,580,054.77
						Projected Total Expenditures FY 18/19	1,048,767.45	1,209,597.53
						Projected Ending Balance FY 18/19	567,710.77	370,457.23
						Projected Increase /(Decrease) of Beginning Balance	(92,047.23)	(197,253.53)
								(123,760.93)

Board of Trustees Committee Meeting (IV.G)

Meeting	April 2, 2019
Agenda Item	Planning and Operations (IV.G)
Subject	Planning and Operations RCCD Foundation Strategic Plan
College/District	
Funding	N/A
Recommended Action	The Committee to review the RCCD Foundation Strategic Plan.

Background Narrative:

The RCCD Foundation Board of Directors respectfully submits its 5 year strategic plan to the RCCD Board of Trustees for approval. This plan was created in collaboration with Foundation staff and District leaders, including the Chancellor and college presidents. The plan represents the Foundation Board of Directors' vision for building the Foundation's operational and programmatic infrastructure, and strategically focusing its activities to align with and support the priorities of the District colleges.

Prepared By: Launa Wilson, Executive Director, RCCD Foundation

The logo is a circular seal for the Riverside Community College District Foundation. It features a central torch with a flame, set against a background of radiating lines. The text "RIVERSIDE COMMUNITY COLLEGE DISTRICT" is arched across the top, and "FOUNDATION" is arched across the bottom. Two banners are positioned below the torch, containing the phrases "THROUGH KNOWLEDGE, WISDOM" and "THROUGH SERVICE, PURPOSE". The year "1918" is visible at the bottom center of the seal.

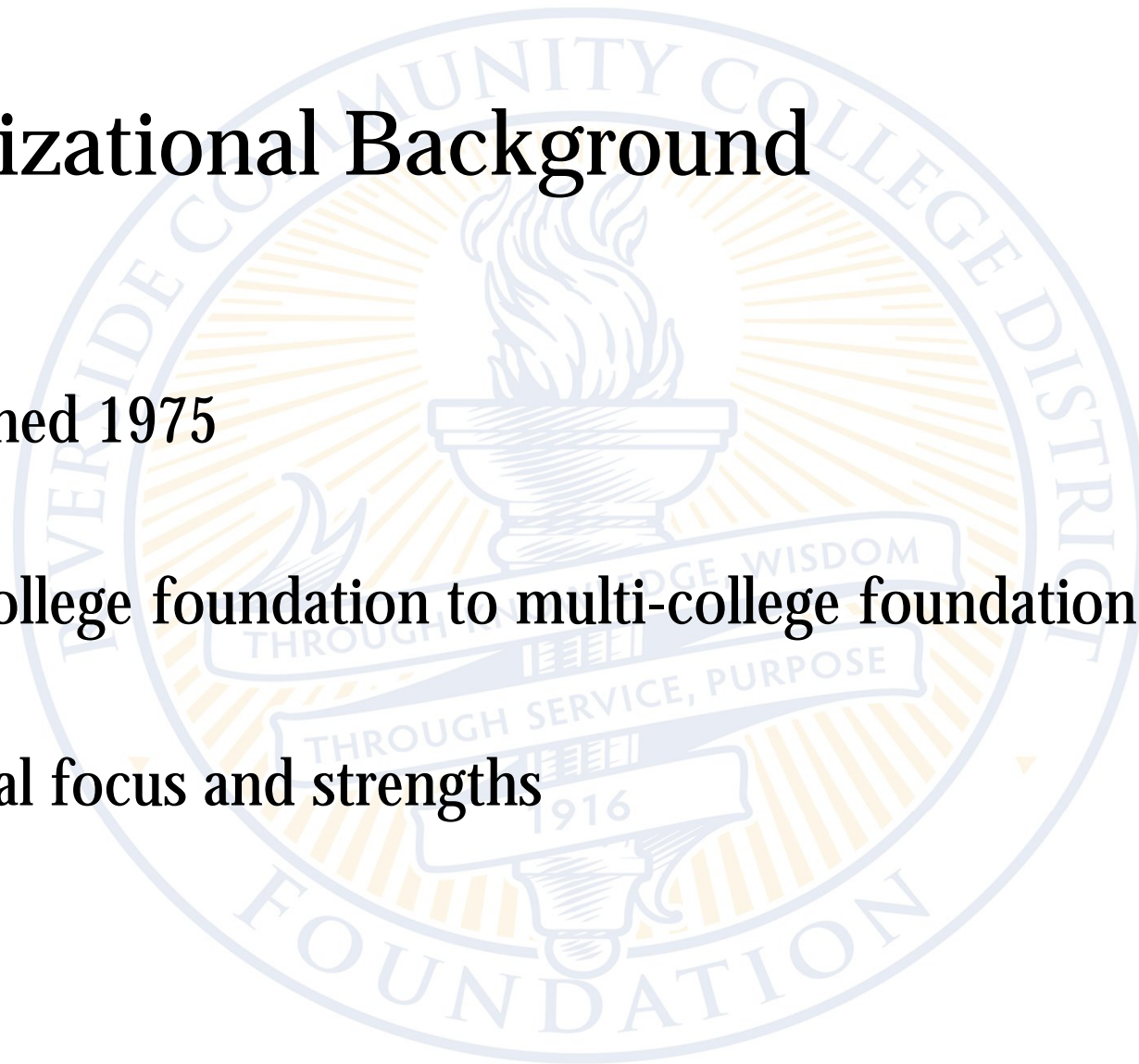
RCCD Foundation Strategic Plan

Presentation to the Board of Trustees
April 2, 2019

Launa K. Wilson, MSW
Executive Director

Organizational Background

- Established 1975
- Single-college foundation to multi-college foundation
- Historical focus and strengths



Recent Capacity Building Efforts

- Salesforce implementation
- Alumni database creation
- Operational policy/procedure improvements

Strategic Planning Process

- Board of Directors retreat – May 2018
- Ad-hoc Infrastructure Committee
- Strategic Plan draft completed October 2018
- District Strategic Planning Council December 2018

Vision

- Building a Foundation to serve the colleges
- Comprehensive development program components



Alignment with District Strategic Goals

- RCCD Strategic Goal 1: Student Access – The District will ensure all students have equitable access to the college’s courses, programs, and services.
- RCCD Strategic Goal 2: Student Success – The District will provide clear pathways and support for achieving certificates, degrees, and transfer.
- RCCD Strategic Goal 3: Equity – The District will work with community workforce and education partners to reduce and eliminate equity gaps.

Alignment with District Strategic Goals

- RCCD Strategic Goal 5: Resource Allocation – The District will acquire, manage, and deploy resources to support district goals and advancement.
- RCCD Strategic Goal 6: Partnerships & Communication – The district will position its image and reputation as a leading academic institution in the region by actively pursuing, developing and sustaining collaborative partnerships with educational institutions, civic organizations, and businesses.

RCCD Foundation Strategic Goals 2019-2023

- Realignment of Foundation Activities
- Programming
- Fundraising Metrics
- Foundation Board Engagement



Foundation Activity Realignment Goals & Objectives

GOAL #1

*Realign the Foundation's Organizational Focus to Support
District/College Priorities*

Strategy: Between 2019 and 2023, strategically refocus all fundraising activities to ensure alignment with District priorities around the themes of student access & support, student success, and student equity.

Foundation Programming Goals & Objectives

GOAL #2

Build a strong programmatic structure to enhance prospect identification, donor cultivation and stewardship, and fundraising results.

Strategy: Continue existing annual fundraising programs and add new programs and activities between 2020-2023, as staffing permits, to enhance visibility and fundraising results for the Foundation and colleges.

Foundation Fundraising Metrics Goals & Objectives

GOAL #3

Demonstrate a measurable increase in fundraising results for benefit of the District/Colleges.

Strategy: Implement strategic fundraising activities, as described in Goal 2, with associated metrics for tracking and reporting face-to-face donor visits, donor relations activities/events, solicitation outputs and outcomes, and funds raised.

Metrics for Accountability

	2018-19	2019-20	2020-21	2021-22	2022-23
Donor/Prospect Meetings	70 – 90	140 – 180	140 – 180	240 – 280	310 – 360
Community Visibility/Outreach Activities	40 – 60	60 – 100	60 – 100	75 – 110	75 – 110
Annual Gift Asks/Proposals (n ≤ \$10k)	60	100	100	160	160
Major Gift Asks/Proposals (n ≥ \$10k)	16 - 20	20 – 25	25 - 30	30 – 35	35 – 40
Mail Solicitations – College	1 per college	1 per college	1 per college	2 per college	2 per college
Mail Solicitations – Foundation	2	2	2	2	2
Donor Cultivation/Stewardship Events	4	4	5	5	6
Dollars Raised	\$1.6M	\$1.9M	\$2.3M	\$2.9M	\$3.7M

Foundation Board Engagement Goals & Objectives

Goal #4

*Improve effectiveness of RCCD Foundation Board of Directors
in supporting the overall organizational mission.*

Strategy: Increase and track the quarterly participation of Foundation Board members in fundraising, community relations, and District engagement activities.

Resources Needed for Implementation

- Current staff levels are insufficient to meet current service demand and future goals for growth.
- Need District investment in the Foundation to support strategic plan implementation.

Fiscal Year	Staff Budget Addition
2020-21	\$202,000
2021-22	\$106,000
2022-23	\$100,000
Total Permanent Budget Addition	\$408,000

Proposed Foundation Staff Infrastructure 2019-2023

	2018-19		2019-20		2020-21		2021-22		2022-23	
Current & Projected Staff Levels	<ul style="list-style-type: none"> Executive Director Admin. Assistant 	<ul style="list-style-type: none"> Assistant Director 	<ul style="list-style-type: none"> Executive Director Admin. Assist. Fundraising Officer (NC or MVC) 	<ul style="list-style-type: none"> Assistant Director Gift Processor 	<ul style="list-style-type: none"> Executive Director Admin. Assist. Fundraising Officer (NC or MVC) 	<ul style="list-style-type: none"> Assistant Director Gift Processor 	<ul style="list-style-type: none"> Executive Director Admin. Assist. Fundraising Officer (NC) Fundraising Officer (MVC) 	<ul style="list-style-type: none"> Assistant Director Gift Processor Prospect Researcher 	<ul style="list-style-type: none"> Executive Director Admin. Assist. Fundraising Officer (NC) Fundraising Officer (MVC) Fundraising Officer (RCC) 	<ul style="list-style-type: none"> Assistant Director Gift Processor Prospect Researcher
New Staff Additions	<ul style="list-style-type: none"> Fundraising Officer (existing vacancy) 	<ul style="list-style-type: none"> Gift Processor (existing vacancy) 	No new staff		<ul style="list-style-type: none"> Fundraising Officer (new position) 	<ul style="list-style-type: none"> Prospect Researcher (new position) 	<ul style="list-style-type: none"> Fundraising Officer (new position) 	<ul style="list-style-type: none"> Information Technology Analyst (new position) 		

Foundation Funded Resources

- Self-funded Operations - \$1.1M+ per year
 - ✓ Operating expenses – organizational insurance, state/federal filing fees, investment & audit related expenses, equipment/supplies, professional development, etc.
 - ✓ Program expenses – scholarship awards, programmatic support for the colleges, grant payments, etc.
 - ✓ Fundraising expenses – expenses related to fundraising activities, including solicitation mailings, event expenses, donor meetings/presentations, etc.
 - ✓ Does not include staff salary/benefits funded by District.
- Rent on leased place of business



QUESTIONS?