

Economic Impacts on the MCC Four County Service Area Economy

MCC impacts the MCC Four County 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 construction activities, 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 section we estimate the following economic impacts of MCC: 1) the day-to-day operations spending impact; 2) the construction spending impact; 3) the student spending impact; and 4) 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 MCC Four County Service Area if MCC and all its alumni did not exist in FY 2015-16?

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 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 section. 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.
- 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

⁷ See Appendix 3 for an example of the intermediary costs included in the sales impact but not in the income impact.

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 section 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 intercon-

nection 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 4.

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 MCC Four County Service Area. These expenditures create a ripple effect that generates still more jobs and higher wages throughout the economy.

Table 2.1 presents college non-construction expenditures for the following three categories: 1) salaries, wages, and benefits, 2) capital depreciation, and 3) all other expenditures (including purchases for supplies and services). 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 supplied by Emsi’s national SAM. Approximately 99% of MCC employees work in the MCC Four County Service Area (see Table 1.1), and therefore we

TABLE 2.1: MCC expenses by function, FY 2015-16

EXPENSE CATEGORY	TOTAL EXPENDITURES (THOUSANDS)	IN-REGION EXPENDITURES (THOUSANDS)	OUT-OF-REGION EXPENDITURES (THOUSANDS)
Employee salaries, wages, and benefits	\$75,415	\$74,660	\$754
Capital depreciation	\$6,512	\$5,840	\$672
All other expenditures	\$34,951	\$22,467	\$12,484
Total	\$116,877	\$102,967	\$13,910

Source: Data supplied by MCC and the Emsi impact model.



consider 99% of the salaries, wages, and benefits. For the other two expenditure categories (i.e., capital depreciation 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).⁸ Capital depreciation is mapped to the construction sectors of NAICS 611210 and the college's remaining expenditures to the non-construction sectors of NAICS 611210.

We now have three vectors of expenditures for MCC: one for salaries, wages, and benefits; another for capital items; and a third for the college's purchases of supplies and services. The next step is to estimate the portion of these expenditures that occur 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.⁹ 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

8 See Appendix 1 for a definition of NAICS.

9 See Appendix 4 for a description of Emsi's MR-SAM model.

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 MCC 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 multiplier effect. Summing the initial and multiplier effects, the gross impacts are \$107.7 million in labor income and \$30.8 million in non-labor income. This comes to a total impact of \$138.5 million in total added income associated with the spending of the college and its employees in the region. This is equivalent to 2,552 jobs.

The \$138.5 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 MCC – had not occurred. MCC received an estimated 64% of its funding from sources within the MCC Four County Service Area. These monies came from the tuition and fees paid

TABLE 2.2: Impact of MCC operations spending, FY 2015-16

	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Initial effect	\$74,660	\$0	\$74,660	\$116,877	1,764
MULTIPLIER EFFECT					
Direct effect	\$7,844	\$6,040	\$13,884	\$28,307	177
Indirect effect	\$2,875	\$2,381	\$5,256	\$11,349	68
Induced effect	\$22,344	\$22,335	\$44,678	\$73,532	542
Total multiplier effect	\$33,063	\$30,755	\$63,819	\$113,188	788
Gross impact (initial + multiplier)	\$107,724	\$30,755	\$138,479	\$230,065	2,552
Less alternative uses of funds	-\$22,057	-\$23,277	-\$45,334	-\$71,079	-544
Net impact	\$85,667	\$7,478	\$93,145	\$158,986	2,009

Source: Emsi impact model.



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 MCC, 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 MCC, 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 impacts of the college's operations are equal to the gross impacts less the impacts of the alternative use of funds – the opportunity cost of the state and local money. As shown in the last row of Table 2.2, the total net impact is approximately \$85.7 million in labor income and \$7.5 million in non-labor income. This sums together to

\$93.1 million in total added income and is equivalent to 2,009 jobs. These impacts represent new economic activity created in the regional economy solely attributable to the operations of MCC.

CONSTRUCTION SPENDING IMPACT

In this section we estimate the economic impact of the construction spending of MCC. Because construction funding is separate from operations funding in the budgeting process, it is not captured in the operations spending impact estimated earlier. However, like the operations spending, the construction spending creates subsequent rounds of spending and multiplier effects that generate still more jobs and income throughout the region. During FY 2015-16, MCC spent a total of \$33.3 million on various construction projects.

The methodology used here is similar to that used when estimating the impact of capital spending under the operations spending impact. Assuming MCC construction spending approximately matches national construction spending patterns of junior colleges, we map MCC construction spending to the construction industries of the Emsi MR-SAM model. Next, we use the RPCs to estimate the portion of this spending that occur in-region. Finally, the in-region spending is run through the multiplier matrix to estimate the direct, indirect and induced effects. Because construction is so labor intensive, the non-labor income

TABLE 2.3: Impact of construction spending of MCC, FY 2015-16

	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Initial effect	\$0	\$0	\$0	\$33,324	0
MULTIPLIER EFFECT					
Direct effect	\$11,050	\$5,218	\$16,268	\$29,883	200
Indirect effect	\$2,628	\$1,241	\$3,869	\$7,107	47
Induced effect	\$5,574	\$2,632	\$8,205	\$15,073	101
Gross impact	\$19,252	\$9,091	\$28,342	\$85,387	348
Less alternative uses of funds	-\$5,612	-\$5,898	-\$11,510	-\$18,195	-142
Net impact	\$13,640	\$3,193	\$16,833	\$67,192	205

Source: Emsi impact model.



impact is relatively small.

To account for the opportunity cost of any in-region construction money, we estimate the impacts of a similar alternative uses of funds as found in the operations spending impacts. This is done by simulating a scenario where in-region monies spent on construction are instead spent on consumer goods. These impacts are then subtracted from the gross construction spending impacts. Again, since construction is so labor intensive, most of the added income stems from labor income as opposed to non-labor income.

Table 2.3 presents the impacts of MCC construction spending during FY 2015-16. Note the initial effect is purely a sales effect, so there is no initial change in labor or non-labor income. The FY 2015-16 MCC construction spending creates a net total short-run impact of \$13.6 million in labor income and \$3.2 million in non-labor income. This is equal to \$16.8 million in added income – the equivalent of supporting 205 jobs – for the MCC Four County Service Area.

STUDENT SPENDING IMPACT

Both in-region and out-of-region students contribute to the student spending impact of MCC; however, not all of these students can be counted towards the impact. Of the in-region students, only those students who were retained, or who would have left the region to seek education elsewhere had they not attended MCC, 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 MCC Four County Service Area economy regardless of MCC. In addition, only the out-of-region students who relocated to the MCC Four County Service Area to attend MCC are measured. Students who commute from outside the region or take courses online are not counted towards the student spending impact because they are not adding money from living expenses to the region.

While there were 33,492 students attending MCC who originated from the MCC Four County Service Area, not all of them would have remained in the region if not for the existence of MCC. We apply a conservative assumption that 10% of these students would have left the MCC Four County Service Area for other education opportunities if

MCC did not exist.¹⁰ Therefore, we recognize that the in-region spending of 3,349 students retained in the region is attributable to MCC. These students, called retained students, spent money at businesses in the region for groceries, accommodation, transportation, and so on.

Relocated students are also accounted for in MCC's student spending impact. An estimated 2,951 students came from outside the region and lived off campus while attending MCC in FY 2015-16. The off-campus expenditures of out-of-region students supported jobs and created new income in the regional economy.¹¹

The average costs for students appear in the first section of Table 2.4, equal to \$10,755 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations impact

TABLE 2.4: Average student costs and total sales generated by relocated and retained students in the MCC Four County Service Area, FY 2015-16

Room and board	\$8,505
Personal expenses	\$1,398
Transportation	\$852
Total expenses per student	\$10,755
Number of students that were retained	3,349
Number of students that relocated	2,951
Gross retained student sales	\$36,020,646
Gross relocated student sales	\$31,734,348
Total gross off-campus sales	\$67,754,994
Wages and salaries paid to student workers*	\$30,898
Net off-campus sales	\$67,724,096

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

Source: Student costs and wages supplied by MCC. The number of relocated and 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 supplied by MCC. The data is based on all students.

10 See Section 4.5 for a sensitivity analysis of the retained student variable.

11 Online students and students who commuted to the MCC Four County Service Area from outside the region are not considered in this calculation because it is assumed their living expenses predominantly occurred in the region where they resided during the analysis year. We recognize that not all online students live outside the region, but keep the assumption given data limitations.

discussed in the previous section. We multiply the \$10,755 in annual costs by the 6,300 students who either were retained or relocated to the region because of MCC and lived in-region but off-campus. This provides us with an estimate of their total spending. Altogether, off-campus spending of relocated and retained students generated gross sales of \$67.8 million. This figure, once net of the monies paid to student workers, yields net off-campus sales of \$67.7 million, as shown in the bottom row of Table 2.4.

Estimating the impacts generated by the \$67.7 million in student spending follows a procedure similar to that of the operations impact described above. We distribute the \$67.7 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 2.5 presents the results. Unlike the previous subsections, the initial effect is purely sales-oriented and there is no change in labor or non-labor income. The impact of relocated and retained student spending thus falls entirely under the multiplier effect. The total impact of student spending is \$19.6 million in labor income and \$14.7 million in non-labor income. This sums together to \$34.4 million in total added income and is equivalent to 811 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.

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 MCC throughout its history. We then use this total number to consider the impact of those students in the single FY 2015-16. Former students who achieved a degree as well as those who may not have finished their degree or did not take courses for credit are considered alumni.

While MCC creates an economic impact through its operations, construction, and student spending, the greatest economic impact of MCC stems from the added human capital – the knowledge, creativity, imagination, and entrepreneurship – found in its alumni. While attending MCC, students receive 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 MCC 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 of years of past instruction and the associated accumulation of human capital. The initial effect of alumni is

TABLE 2.5: Student spending impact, FY 2015-16

	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Initial effect	\$0	\$0	\$0	\$67,724	0
MULTIPLIER EFFECT					
Direct effect	\$10,239	\$7,685	\$17,925	\$31,045	423
Indirect effect	\$3,138	\$2,333	\$5,471	\$9,579	128
Induced effect	\$6,267	\$4,700	\$10,967	\$18,858	259
Total multiplier effect	\$19,644	\$14,718	\$34,362	\$59,482	811
Total impact (initial + multiplier)	\$19,644	\$14,718	\$34,362	\$127,206	811

Source: Emsi impact model.



comprised of two main components. The first and largest of these is the added labor income of MCC'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 MCC.

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 2015-16.

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 2015-16 was 16.4. 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 1986-87 to FY 2015-16.¹³ We multiply the 16.4 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 7.6 million CHEs from alumni active in the workforce.

Next, we estimate the value of the CHEs, or the skills and human capital acquired by MCC alumni. This is done using

- 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 MCC prior to FY 1986-87 is less reliable, and because most of the students served more than 30 years ago had left the regional workforce by FY 2015-16.
- 14 This assumes the average credit load and level of study from past years is equal to the credit load and level of study of students today.

the incremental added labor income stemming from the students' higher wages. The incremental added labor income is the difference between the wage earned by MCC alumni and the alternative wage they would have earned had they not attended MCC. 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 \$128. This value represents the regional average incremental increase in wages that alumni of MCC 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 2015-16, 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 5. 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 \$975.3 million in gross labor income from increased wages received by former students in FY 2015-16 (as shown in Table 2.6).

The next two rows in Table 2.6 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

TABLE 2.6: Number of CHEs in workforce and initial labor income created in the MCC Four County Service Area, FY 2015-16

Number of CHEs in workforce	7,622,538
Average value per CHE	\$128
Initial labor income, gross	\$975,256,195
COUNTERFACTUALS	
Percent reduction for alternative education opportunities	15%
Percent reduction for adjustment for labor import effects	50%
Initial labor income, net	\$414,483,883

Source: Emsi impact model.



not occurred. The event in question is the education and training provided by MCC 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 MCC does not exist, we assume a portion of MCC 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 MCC alumni. The adjustment for alternative education opportunities amounts to a 15% reduction of the \$975.3 million in added labor income.¹⁵ This means that 15% of the added labor income from MCC 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 6.

The other adjustment in Table 2.6 accounts for the importation of labor. Suppose MCC 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 MCC Four County 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.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 college. We conduct a sensitivity analysis for this assumption in Section 4. With the 50% adjustment, the net added labor income added to the economy comes to \$414.5 million, as shown in Table 2.6.

The \$414.5 million in added labor income appears under the initial effect in the labor income column of Table 2.7. To this we add an estimate for initial non-labor income. As discussed earlier in this section, businesses that employ former students of MCC 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 (\$414.5 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 region'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 \$414.5 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 \$152.5 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 MCC Four County Service Area economy, equal to approximately \$567 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.

Table 2.7, on the next page, 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

15 For a sensitivity analysis of the alternative education opportunities variable, see Section 4.

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.



TABLE 2.7: Alumni impact, FY 2015-16

	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Initial effect	\$414,484	\$152,539	\$567,023	\$1,261,830	7,973
MULTIPLIER EFFECT					
Direct effect	\$86,028	\$33,540	\$119,568	\$237,768	1,705
Indirect effect	\$31,060	\$11,867	\$42,926	\$84,442	634
Induced effect	\$254,600	\$84,472	\$339,071	\$661,531	4,931
Total multiplier effect	\$371,687	\$129,878	\$501,566	\$983,742	7,270
Total impact (initial + multiplier)	\$786,171	\$282,418	\$1,068,589	\$2,245,572	15,242

Source: Emsi impact model.

the college's alumni. The final results are \$371.7 million in added labor income and \$129.9 million in added non-labor income, for an overall total of \$501.6 million in multiplier effects. The grand total of the alumni impact thus comes to \$1.1 billion in total added income, the sum of all initial and multiplier labor and non-labor income effects. This is equivalent to 15,242 jobs.

TOTAL IMPACT OF MCC

The total economic impact of MCC on the MCC Four County Service Area can be generalized into two broad types of impacts. First, on an annual basis, MCC generates a flow of spending that has a significant impact on the MCC Four County Service Area economy. The impacts of this spending are captured by the operations, construction, and student spending impacts. While not insignificant, these

impacts do not capture the true purpose of MCC. The basic mission of MCC is to foster human capital. Every year, a new cohort of MCC former students adds to the stock of human capital in the MCC Four County Service Area, and a portion of alumni continues to add to the MCC Four County Service Area economy. Table 2.8 displays the grand total impacts of MCC on the MCC Four County Service Area economy in FY 2015-16. For context, the percentages of MCC compared to the total labor income, total non-labor income, combined total income, sales, and jobs in the MCC Four County Service Area, as presented in Table 1.5 and Table 1.6, are included. The total added value of MCC is equivalent to 2.3% of the GRP of the MCC Four County Service Area. For perspective, this means that one out of every 31 jobs in the MCC Four County Service Area is supported by the activities of MCC and its students.

These impacts, stemming from spending related to the

TABLE 2.8: Total impact of MCC, FY 2015-16

	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Operations spending	\$85,667	\$7,478	\$93,145	\$158,986	2,009
Construction spending	\$13,640	\$3,193	\$16,833	\$67,192	205
Student spending	\$19,644	\$14,718	\$34,362	\$127,206	811
Alumni	\$786,171	\$282,418	\$1,068,589	\$2,245,572	15,242
Total impact	\$905,122	\$307,807	\$1,212,929	\$2,598,956	18,268
% of the MCC Four County Service Area economy	3.0%	1.4%	2.3%	2.4%	3.2%

college and its students, spread throughout the regional economy and affect individual industry sectors. Table 2.9 displays the total impact of MCC on industry sectors based on their two-digit NAICS code. The table shows the total impact of operations, construction, students, and alumni as shown in Table 2.8, 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 MCC has the greatest impact. For example, MCC's impact for the Health Care & Social Assistance industry sector was 2,964 jobs in FY 2015-16.

TABLE 2.9: Total impact of MCC by industry, FY 2015-16

INDUSTRY SECTOR	LABOR INCOME (THOUSANDS)	NON-LABOR INCOME (THOUSANDS)	TOTAL INCOME (THOUSANDS)	SALES (THOUSANDS)	JOBS
Agriculture, Forestry, Fishing, & Hunting	\$5,183	\$1,605	\$6,787	\$22,776	141
Mining	\$278	\$598	\$876	\$1,404	5
Utilities	\$2,354	\$7,870	\$10,224	\$15,984	14
Construction	\$70,699	\$30,132	\$100,831	\$221,489	1,206
Manufacturing	\$29,303	\$33,941	\$63,244	\$190,880	480
Wholesale Trade	\$15,426	\$17,361	\$32,787	\$46,405	200
Retail Trade	\$25,789	\$14,696	\$40,485	\$68,282	679
Transportation & Warehousing	\$16,581	\$12,716	\$29,298	\$58,942	262
Information	\$20,567	\$20,727	\$41,293	\$85,922	289
Finance & Insurance	\$36,889	\$43,519	\$80,408	\$146,148	455
Real Estate & Rental & Leasing	\$10,201	\$25,022	\$35,223	\$76,470	253
Professional & Technical Services	\$63,008	\$13,949	\$76,957	\$118,429	1,096
Management of Companies & Enterprises	\$54,671	\$10,443	\$65,113	\$113,441	471
Administrative & Waste Services	\$29,017	\$7,416	\$36,434	\$58,169	649
Educational Services, Private	\$59,953	\$6,912	\$66,865	\$110,557	1,705
Health Care & Social Assistance	\$150,533	\$14,870	\$165,403	\$294,881	2,964
Arts, Entertainment, & Recreation	\$6,393	\$2,933	\$9,326	\$18,214	305
Accommodation & Food Services	\$29,230	\$19,873	\$49,103	\$144,537	1,501
Other Services (except Public Administration)	\$25,788	\$625	\$26,413	\$54,713	1,060
Government, Non-Education	\$73,936	\$16,354	\$90,291	\$506,501	947
Government, Education	\$179,322	\$6,246	\$185,568	\$244,812	3,588
Total impact	\$905,122	\$307,807	\$1,212,929	\$2,598,956	18,268

Source: Emsi impact model.

