Main Report

MAY 2023

The Economic Impact of San Bernardino Community College District's Measure CC

Lightcast

Contents

Acknowledgments

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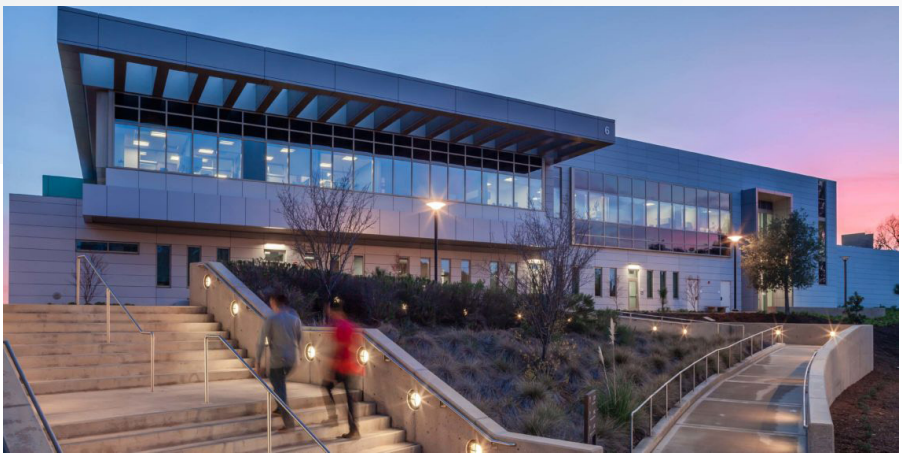
Executive summary



THE INLAND EMPIRE, CA

THIS ANALYSIS QUANTIFIES the economic impacts from the San Bernardino Community College District's (SBCCD) Bond Measure CC (Measure CC). Measure CC will generate half a billion in local funding to ensure the community has structurally safe and quality classrooms, STEM labs, and workforce training facilities at Crafton Hills College (CHC) and San Bernardino Valley College (SBVC).[1] The purpose and intent is to achieve the timely, safe, and economical construction of the facilities and to provide opportunities and programs for local residents and businesses to participate.

Short-run capital spending for Measure CC will amount to $448 million from FY 2019 to FY 2027. Measure CC will expand the district's capacity and allow it to positively affect a greater number of students, and through those students, the economy at large. This analysis spans 15 years, from FY 2019, when the first project was underway, to FY 2033, the time cap to the analysis.

> Measure CC will expand the district's capacity and **allow it to positively affect a greater number of students**, and through those students, the economy at large.

Short-run capital spending impacts

As the $448 million is spent to complete the multiple projects that are part of Measure CC, it will create a significant amount of new economic activity that will ripple throughout the Inland Empire[2] economy. These impacts span from FY 2019, when the capital spending began, to FY 2027, when the capital spending is expected to be completed.

From FY 2019 to FY 2027, the capital spending will create a present value of **$81.9 million** in total added income for the Inland Empire.

Long-run operations spending impacts

As Measure CC projects are completed, they will add various capacities that will help SBCCD meet excess student demand. Utilizing these new capacities will create demand for added faculty and staff and their associated day-to-day

Important note

When reviewing the impacts estimated in this study, it's important to note that it primarily reports impacts in the form of added income rather than sales. Sales includes all of the intermediary costs associated with producing goods and services. Income, on the other hand, is a net measure that excludes these intermediary costs 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.

1 See appendix 1 for an entire list of projects.

2 For the purposes of this study, the Inland Empire is comprised of San Bernardino and Riverside Counties.

operational expenditures. These operations spending impacts began in FY 2022, when the first Measure CC projects became operational.

From FY 2022 to FY 2033, the final year of this analysis, the increased operations spending resulting from Measure CC will create a present value of **$27.4 million** in total added income.

Long-run student spending impacts

As Measure CC projects are completed, they will allow SBCCD to serve additional students it would not have otherwise had the capacity to serve. Some students from the Inland Empire may leave the region if not for the added capacities at SBCCD. The money that these students will spend toward living expenses in the Inland Empire is attributable to Measure CC.

From FY 2020, when the first additional students enrolled, to FY 2033, the students' spending will create a present value of **$82.1 million** in total added income.

Long-run alumni impacts

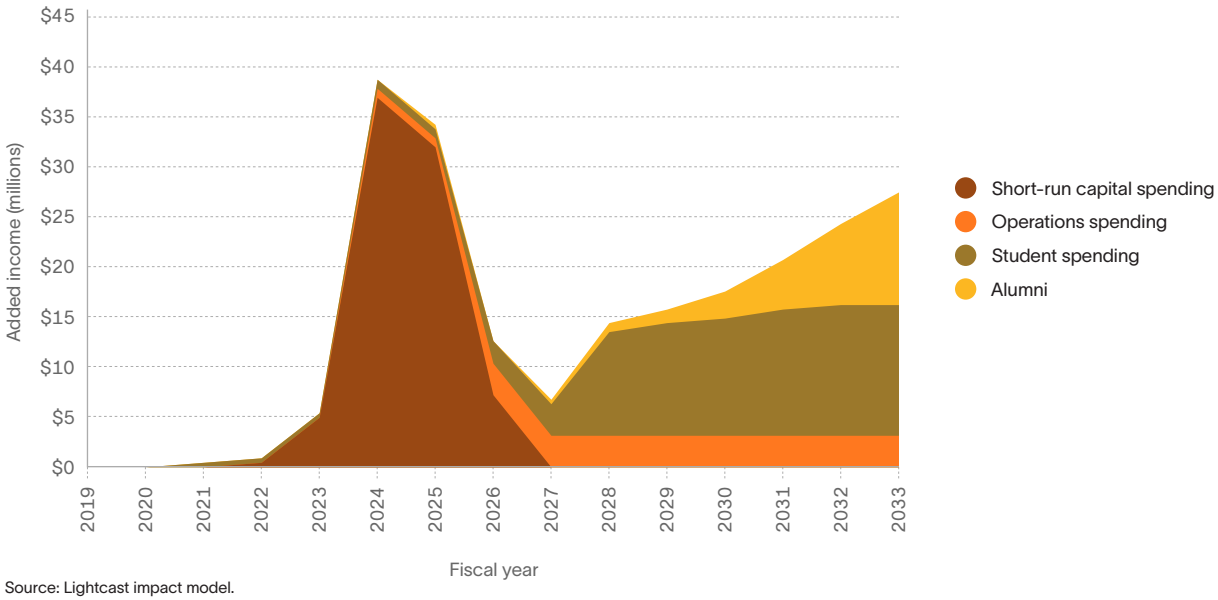
The added capacities created by Measure CC will help SBCCD respond to the demands of a growing economy and student population. The added capacities will create additional alumni who otherwise would not have been served by SBCCD. These alumni represent a significant increase in the stock of human capital available to the Inland Empire economy. They began to positively impact the regional economy in FY 2021, when the first additional graduates became active in the regional workforce. The added earnings and increased productivity of these alumni will create long-run impacts across the regional economy.

By FY 2033, the increased capacities created by Measure CC will have produced 8,404 additional alumni. From FY 2021 to FY 2033, the additional alumni will create a present value of **$31 million** in total added income to the Inland Empire economy.

Total impact

From FY 2019 to FY 2033, the present value of short- and long-run impacts created by Measure CC will generate a total economic impact on the Inland Empire economy of **$222.4 million** in total added income.

Total impacts from FY 2019 to FY 2033, undiscounted



Source: Lightcast impact model.

Annual impacts

The economic impacts discussed thus far are those summed across the 15 analysis years of FY 2019 to FY 2033 and discounted to present value terms. However, each of the three long-run types of impacts will create an annual impact. These break down as follows:

- **Operations spending annual impact:** Measure CC will increase SBCCD's operational spending. By FY 2033, increased operations spending will add around **$3.4 million** in total income on an annual basis, equivalent to supporting **27 jobs** per year.
- **Student spending annual impact:** Once the additional number of students SBCCD is able to serve stabilizes at around 15,000 students, **$12.9 million** in income will be added per year, supporting **198 jobs** annually, as a result of spending from retained students in the region.
- **Alumni annual impact:** As a result of the expanded capacities made possible through Measure CC, SBCCD will produce more alumni every year, who will then accumulate in the regional workforce. By FY 2033, the last year of this analysis, alumni are estimated to add **$11.1 million** in total income to the economy per year, supporting **142 jobs** annually. This annual impact is expected to increase every year for several years as SBCCD continues to serve more students and they enter the regional workforce.

By FY 2033, the total annual impact from Measure CC will be at least **$27.4 million** in added income. This is equivalent to supporting **367 jobs** every year. For every job created by Measure CC for operations, by the student spending, and from the higher earnings of alumni, an **an additional four jobs will be created** throughout the regional economy.

Introduction

IN THE NOVEMBER 2018 ELECTION, Bond Measure CC (Measure CC) passed with 63% of voter support. Measure CC will generate half a billion in local funding to ensure the community has structurally safe and quality classrooms, STEM labs, and workforce training facilities at Crafton Hills College (CHC) and San Bernardino Valley College (SBVC). The purpose and intent is to achieve the timely, safe, and economical construction of the facilities and to provide opportunities and programs for local residents and businesses to participate. The Community Benefits Agreement (CBA) is between the San Bernardino Community College District and the San Bernardino/Riverside Counties Building and Construction Trades Council, AFL-CIO, and the signatory Craft Unions. An independent taxpayer oversight committee and regular audits will ensure funds are spent as promised.

Measure CC consists of more than 30 projects to be completed at SBVC and CHC. See Appendix 1 for a full list of projects. Measure CC ensures the regional community has access to quality higher education and career training by:

- repairing or replacing leaky roofs, old rusty plumbing, and faulty electrical systems;
- upgrading classrooms, STEM labs, and job-training facilities to meet modern career and safety standards, and to keep local colleges in good condition for years to come;
- updating campus security systems;
- improving building access for students with disabilities; and
- modernizing student centers to allow job training, placement, counseling, and support services to military veterans and their families.

Funds allocated to spending on Measure CC projects will be used to develop the various capital resources of SBCCD. This will expand the district's capacity, allowing it to positively affect a greater number of students and, through those students, the economy at large. This analysis will quantify the new economic activity created by

Measure CC in the short-run and long-run. The analysis spans 15 years, from FY 2019 to FY 2033. We estimate four types of impacts:

- **Short-run capital spending impacts:** The initial spending for the Measure CC projects will span from FY 2019 to FY 2027 and total $448 million. As this money is spent, it will create new economic activity that will ripple throughout the Inland Empire[3] economy.
- **Long-run operations spending impacts:** As the Measure CC projects become operational, they will add various capacities that will help SBCCD meet excess student demand. Utilizing this new capacity will create the demand for added faculty and staff and their associated day-to-day operational expenditures. These operations spending impacts will begin in FY 2022. As the added capacity continues year after year, the operations spending impacts will grow until FY 2033, the last year of this analysis. Measure CC will provide long-run operations spending impacts across the Inland Empire.
- **Long-run student spending impacts:** The added capacities of Measure CC will allow SBCCD to serve additional students it would not otherwise have the capacity to serve. Some students, originally from the region, will remain in the region because of opportunities provided by Measure CC. These students will spend money on housing, food, and entertainment in the region. This injection of money is attributable to Measure CC, which began in FY 2020 when SBCCD started serving additional students. The spending from these students will continue to impact the economy year after year.
- **Long-run alumni impacts:** The added capacities created by Measure CC will help SBCCD respond to not only the demands of students but also the demands of a growing economy. The impact from additional alumni will begin to accrue in FY 2021, the first year the additional students enter the workforce after graduating. By FY 2033, the final year of this analysis, a total of 8,404 additional alumni will have been produced as a result of Measure CC, the majority of whom are expected to remain in the region. These alumni represent a significant increase in the stock of human capital available to the Inland Empire economy. The added earnings and increased productivity of these alumni will create long-run impacts across the regional economy.

This analysis spans across the four types of impacts from FY 2019 to FY 2033. However, the long-run impacts will continue long after the final year of this analysis.

3 For the purposes of this study, the Inland Empire is comprised of San Bernardino and Riverside Counties.

About economic impact analysis

Economic impact analyses use different types of impacts to estimate the results. The impact focused on in this study is the **income impact**, which assesses the change in gross regional product, or GRP. Income may be further broken out into the **labor income impact**, which assesses the change in employee compensation; and the **non-labor income impact**, which assesses the change in income business profits. Another way to state the income impact is **jobs**, a measure of the number of full- and part-time jobs that would be required to support the change in income. In the next section, jobs are reported on an annual basis rather than total because jobs are duplicated across the years. 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 region economy through intermediary transactions and costs.[4] All of these measures—jobs, income, and sales—are used to estimate the economic impact results.

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.

4 See Appendix 3 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.

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.

Lightcast	Initial	Direct	Indirect	Induced
IMPLAN	Direct	Indirect		Induced

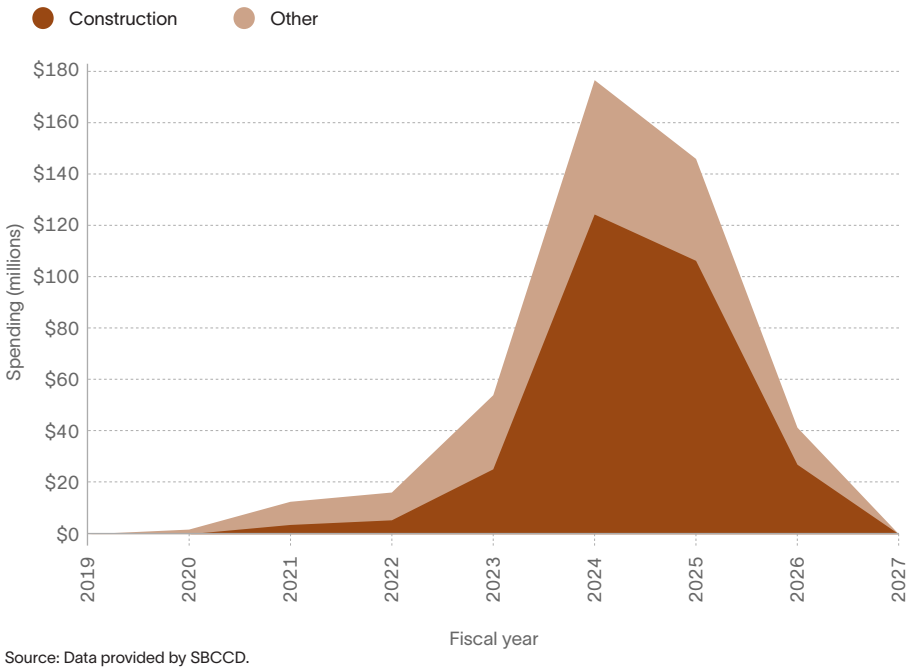
Multiplier effects in this analysis are derived using Lightcast's Multi-Regional Social Accounting Matrix (MR-SAM) input-output model that captures the interconnection of industries, government, and households in the region. The Lightcast MR-SAM contains approximately 1,000 industry sectors at the highest 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 Lightcast MR-SAM model and its data sources, see Appendix 4.

The economic impact of SBCCD's Measure CC

THIS ANALYSIS QUANTIFIES the economic impacts associated with SBCCD's Measure CC, an endeavor that began in FY 2019. In order to complete Measure CC projects, SBCCD will require $448 million in funding. All of this funding is expected to come from the local government.

Funds allocated to spending on Measure CC projects will be used to develop SBCCD's various capital resources, thereby expanding the district's capacity and allowing it to positively affect a greater number of students, and through those students, the economy at large. SBCCD has outlined the proportion of funds that would be spent on construction and other needs. Figure 1 outlines the total spending in these categories by year for Measure CC.

Figure 1: Spending by year and function, undiscounted



Source: Data provided by SBCCD.

Impacts created by SBCCD's Measure CC

Short-run capital spending impact

+

Long-run operations spending impact

+

Long-run student spending impact

+

Long-run alumni impact

Total impact

Measure CC will create impacts on the Inland Empire economy in a variety of ways. The initial spending on these projects will create short-run capital spending impacts. Once the construction is completed, the new capacities will allow SBCCD to serve additional students whom it would otherwise not be able to serve. Measure CC will create new jobs for additional faculty and staff and will increase the day-to-day operational supply chain purchases from local businesses. Additionally, SBCCD will retain students in the region who would have left, thus positively impacting the regional economy through the students' spending. This will provide a steady stream of long-run spending impacts

year after year. Lastly, as the students who would otherwise not have been served graduate, they will create long-run benefits within the region.

In this section, we estimate these impacts under four headings: 1) the short-run capital spending impact from the spending on construction and other purchases; 2) the long-run operations spending impact from the new capacities added to the district's payroll and purchases; 3) the long-run student spending impact from the day-to-day expenditures of additional students the district will be able to serve; and 4) the long-run alumni impact from the additional graduates who SBCCD will be able to produce. SBCCD's service region for which the impacts are measured is referred to as the Inland Empire and consists of San Bernardino and Riverside Counties.

Short-run capital spending impacts

The capital spending will primarily be used to renovate and expand existing facilities and construct new state-of-the-art facilities to serve more students. As outlined in Figure 1, the spending will occur during the course of nine years. We refer to this period as the construction phase. Over the course of the construction phase, a total of $448 million will be spent. This spending will create a significant increase in the demand for the goods and services that are required to complete the projects listed under Measure CC. The initial spending will create subsequent rounds of spending and corresponding multiplier effects that will generate still more jobs and income throughout the Inland Empire economy. The short-run capital spending impacts only extend until FY 2027, when the construction phase ends.

The first step in estimating the multiplier effects of the construction spending is to map the two spending categories in Figure 1—construction and other—to the approximately 1,000 industries of the Lightcast MR-SAM model. We assume SBCCD's spending patterns on Measure CC approximately match national averages for those categories and apply national spending patterns for NAICS 903612 (Colleges, Universities, and Professional Schools (Local Government)).

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 Inland Empire suppliers, for each of the approximately 1,000 industries in the MR-SAM model. For example, if 40% of the demand for NAICS 52410 (Insurance carriers) is satisfied by Measure CC's suppliers, the RPC for that industry is 40%.

The remaining 60% of the demand for NAICS 52410 is provided by suppliers located outside Inland Empire. The spending is multiplied, industry by industry, by the corresponding RPC to arrive at the in-region spending. Of the $448 million spent during the course of the construction phase, we estimate $291 million will be spent within Inland Empire and $157 million will be spent on out-of-region goods and services (Table 1). 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 labor income, non-labor income, total added income, and sales.

Table 1: Spending by year and place of occurrence, undiscounted

Year	In-region (thousands)	Out-of-region (thousands)	Total (thousands)
FY 2019	$12	$38	$50
FY 2020	$279	$715	$995
FY 2021	$4,989	$6,798	$11,786
FY 2022	$6,742	$9,119	$15,861
FY 2023	$28,404	$25,835	$54,239
FY 2024	$121,387	$55,063	$176,450
FY 2025	$102,469	$44,113	$146,582
FY 2026	$26,508	$14,876	$41,385
FY 2027	$188	$441	$629
Total	**$290,979**	**$156,998**	**$447,977**

Source: Data provided by SBCCD and the Lightcast impact model.

Table 2 and Figure 2 present the short-run economic impacts of Measure CC by year. The first row under each year in the table represents the initial effect of that year's construction spending. Results appear in the section labelled multiplier effect in the table. Adding the initial effect and the multiplier effects yields the gross impact.

Recall that to fund Measure CC, all of the funds will come from the local government. Had these funds been spent on other projects, other economic impacts would have been created. This scenario is commonly known as a counterfactual; i.e., what has not happened but what would have happened if a given event—in this case, Measure CC receiving these other funds—had not occurred. 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 public monies are instead spent on consumer goods and savings. This simulates the public monies being returned to the taxpayers and being spent by the household sector. We map these public funds 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 labelled "Less alternative uses of funds" in Table 2. The total net impacts of the construction spending are equal to the total gross impacts less the impacts of the alternative uses of funds.

Note that some years show a negative total added income. These represent years when Measure CC projects' spending was mostly in the "other" expenditure category, as opposed to construction. This means that during these particular years, the region would have benefited more from the consumer spending these funds instead of SBCCD. With that said, this is only the case for three of the 10 years and is not substantial for those three years.

For the years with positive labor income, since construction is so labor intensive, most of the added income stems from labor income as opposed to non-labor income. As a result, the non-labor impacts associated with spending in the non-construction sectors are larger than in the construction sectors, so the net non-labor impact of construction spending is negative. This means that had the construction money instead been spent on consumer goods, more non-labor income would have been created at the expense of less labor income. The total net impact is still positive and substantial.

Table 2: **Short-run capital spending impacts, undiscounted**

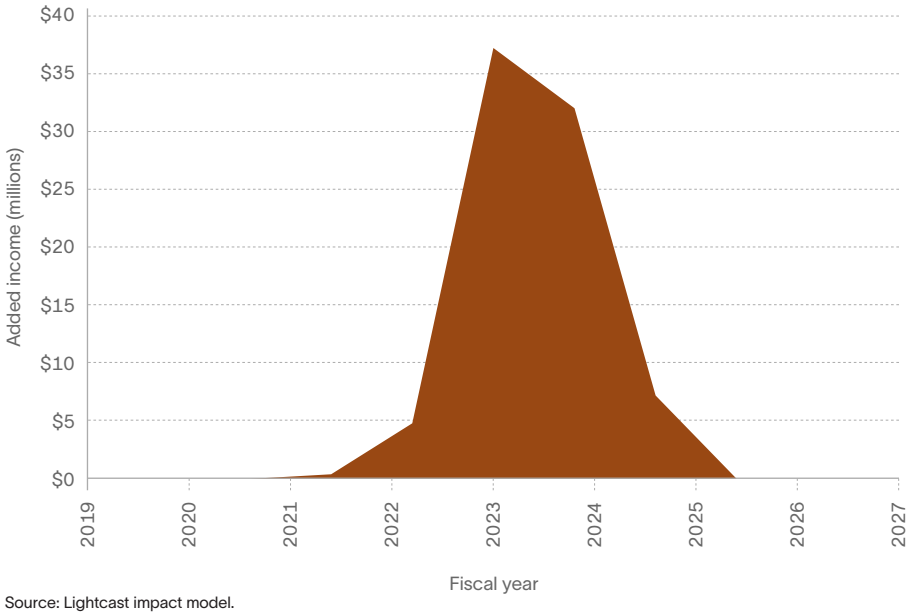
	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2019				
Initial effect	**$0**	**$0**	**$0**	**$50**
Multiplier effect				
Direct effect	$4	$4	$8	$12
Indirect effect	<$1	<$1	$1	$3
Induced effect	$2	$2	$3	$5
Gross impact	**$6**	**$6**	**$13**	**$69**
Less alternative uses of funds	-$10	-$9	-$19	-$41
Net impact	**-$3**	**-$3**	**-$6**	**$28**
FY 2020				
Initial effect	**$0**	**$0**	**$0**	**$995**
Multiplier effect				
Direct effect	$98	$78	$176	$279
Indirect effect	$22	$14	$35	$61
Induced effect	$38	$34	$72	$113
Gross impact	**$157**	**$126**	**$284**	**$1,448**
Less alternative uses of funds	-$194	-$177	-$372	-$832
Net impact	**-$37**	**-$51**	**-$88**	**$616**
FY 2021				
Initial effect	**$0**	**$0**	**$0**	**$11,786**
Multiplier effect				
Direct effect	$1,876	$974	$2,850	$4,989
Indirect effect	$453	$194	$647	$1,192
Induced effect	$689	$404	$1,094	$1,878
Gross impact	**$3,018**	**$1,573**	**$4,591**	**$19,845**
Less alternative uses of funds	-$2,300	-$2,102	-$4,402	-$9,855
Net impact	**$719**	**-$529**	**$189**	**$9,990**
FY 2022				
Initial effect	**$0**	**$0**	**$0**	**$15,861**
Multiplier effect				
Direct effect	$2,537	$1,312	$3,849	$6,742
Indirect effect	$613	$262	$875	$1,612
Induced effect	$932	$544	$1,476	$2,536
Gross impact	**$4,082**	**$2,118**	**$6,200**	**$26,752**
Less alternative uses of funds	-$3,095	-$2,829	-$5,924	-$13,262
Net impact	**$987**	**-$711**	**$276**	**$13,491**

Table 2: Short-run capital spending impacts, undiscounted

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2023				
Initial effect	**$0**	**$0**	**$0**	**$54,239**
Multiplier effect				
Direct effect	$10,963	$4,644	$15,607	$28,404
Indirect effect	$2,723	$994	$3,717	$7,001
Induced effect	$3,951	$1,851	$5,801	$10,404
Gross impact	**$17,637**	**$7,488**	**$25,125**	**$100,048**
Less alternative uses of funds	-$10,582	-$9,674	-$20,257	-$45,349
Net impact	**$7,054**	**-$2,186**	**$4,868**	**$54,699**
FY 2024				
Initial effect	**$0**	**$0**	**$0**	**$176,450**
Multiplier effect				
Direct effect	$48,061	$15,954	$64,015	$121,387
Indirect effect	$12,251	$3,775	$16,027	$30,838
Induced effect	$16,996	$5,965	$22,960	$43,228
Gross impact	**$77,307**	**$25,694**	**$103,002**	**$371,903**
Less alternative uses of funds	-$34,427	-$31,472	-$65,899	-$147,530
Net impact	**$42,880**	**-$5,778**	**$37,102**	**$224,373**
FY 2025				
Initial effect	**$0**	**$0**	**$0**	**$146,582**
Multiplier effect				
Direct effect	$40,622	$13,301	$53,923	$102,469
Indirect effect	$10,368	$3,167	$13,535	$26,071
Induced effect	$14,352	$4,952	$19,303	$36,439
Gross impact	**$65,342**	**$21,420**	**$86,762**	**$311,561**
Less alternative uses of funds	-$28,599	-$26,145	-$54,744	-$122,558
Net impact	**$36,743**	**-$4,725**	**$32,018**	**$189,003**
FY 2026				
Initial effect	**$0**	**$0**	**$0**	**$41,385**
Multiplier effect				
Direct effect	$10,433	$3,685	$14,118	$26,508
Indirect effect	$2,644	$849	$3,493	$6,687
Induced effect	$3,706	$1,403	$5,108	$9,504
Gross impact	**$16,783**	**$5,936**	**$22,719**	**$84,084**
Less alternative uses of funds	-$8,075	-$7,381	-$15,456	-$34,602
Net impact	**$8,708**	**-$1,445**	**$7,263**	**$49,482**
FY 2027				
Initial effect	**$0**	**$0**	**$0**	**$629**
Multiplier effect				
Direct effect	$67	$50	$116	$188
Indirect effect	$15	$9	$24	$42
Induced effect	$26	$22	$47	$75
Gross impact	**$107**	**$80**	**$188**	**$934**
Less alternative uses of funds	-$123	-$112	-$235	-$526
Net impact	**-$15**	**-$32**	**-$47**	**$408**

Source: Lightcast impact model.

Figure 2: Short-run capital spending impact by year, undiscounted



Source: Lightcast impact model.

Table 2 and Figure 2 present undiscounted year-by-year impacts. In order to understand the total impact from FY 2019 to FY 2027, we must discount all future impacts to their present value in 2023 dollars. This is done using a discount rate of -0.3%, the discount rate recommended by the Office of Management and Budget for long-term investments.[5] Once the future impacts are discounted, we sum the present value of each year's impacts to reach a total net impact of Measure CC's construction spending from FY 2019 to FY 2027. Results are presented in Table 3. Spending toward Measure CC projects will create a total short-run economic impact of $81.9 million in added income for the Inland Empire.

Spending toward Measure CC will create a net total short-run economic impact of **$81.9 million** in added income for the Inland Empire.

Table 3: Present value of short-run capital spending impacts, total from FY 2019 to FY 2027

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2019 – FY 2027				
Initial effect	**$0**	**$0**	**$0**	**$449,646**
Multiplier effect				
Direct effect	$115,126	$40,153	$155,279	$292,151
Indirect effect	$29,208	$9,300	$38,509	$73,805
Induced effect	$40,854	$15,233	$56,086	$104,598
Gross impact	**$185,188**	**$64,686**	**$249,874**	**$920,200**
Less alternative uses of funds	-$87,730	-$80,200	-$167,930	-$375,950
Net impact	**$97,458**	**-$15,514**	**$81,944**	**$544,251**

Source: Lightcast impact model.

5 Office of Management and Budget. "Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses." Real Interest Rates on Treasury Notes and Bonds of Specified Maturities (in Percent). https://www.whitehouse.gov/wp-content/uploads/2020/12/discount-history.pdf.

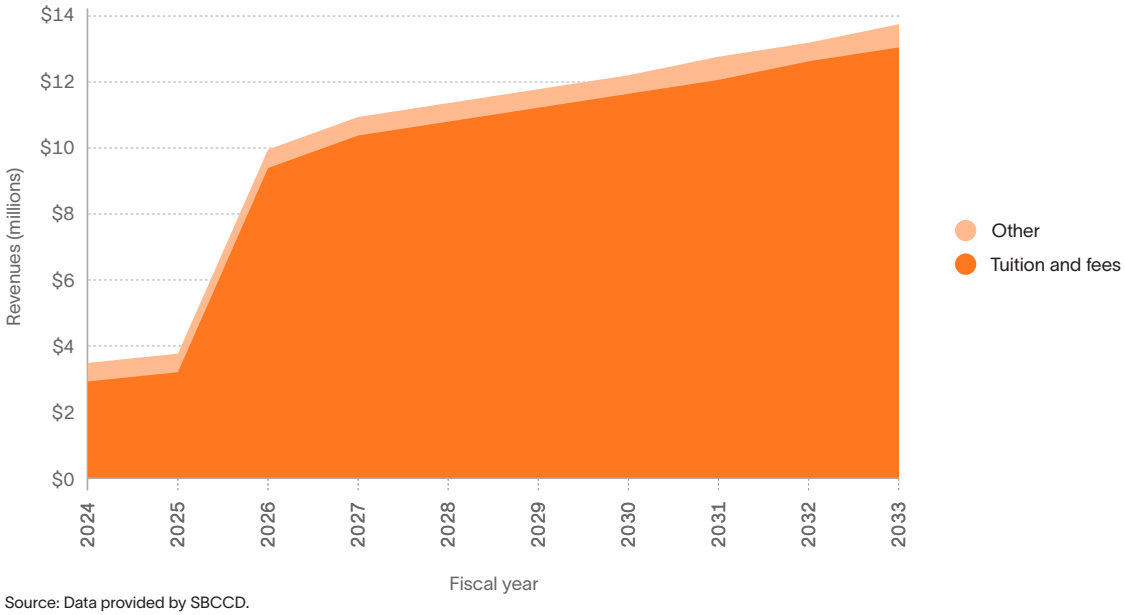
Long-run operations spending impacts

As Measure CC projects are completed, SBCCD will begin to utilize the newly added capacities. Measure CC will enhance student activities and provide valuable services to improve the district's amenities. Utilizing these and other added capacities will create a new wave of economic activity that will include additional payroll for new faculty and staff and added spending on other supplies (e.g., office supplies). In this section, we estimate the economic impact of these new rounds of operations spending that will occur once the Measure CC projects are completed. These economic impacts will continue annually as long as the added capacities created by Measure CC are utilized. We estimate the operational impacts between FY 2022—when the first Measure CC projects became operational—and FY 2033—the final year of this analysis.

To begin this analysis, we consider the revenue and spending needed to operate the capacities added by Measure CC per year. SBCCD provided information regarding the estimated increase in revenues and operations spending required. In the last year of analysis, FY 2033, the district will spend $6.3 million per year for its additional operations because of Measure CC (excluding depreciation and interest). When we calculate the impact of these expenditures, we exclude expenses for depreciation and interest, as they represent a devaluing of the district's assets rather than an outflow of expenditures. To fund these operations, the district estimates it will receive an additional $13 million in revenues, in FY 2033. Figure 3 and Figure 4 outline the operations revenue and expenditures, respectively, by year and type.[6]

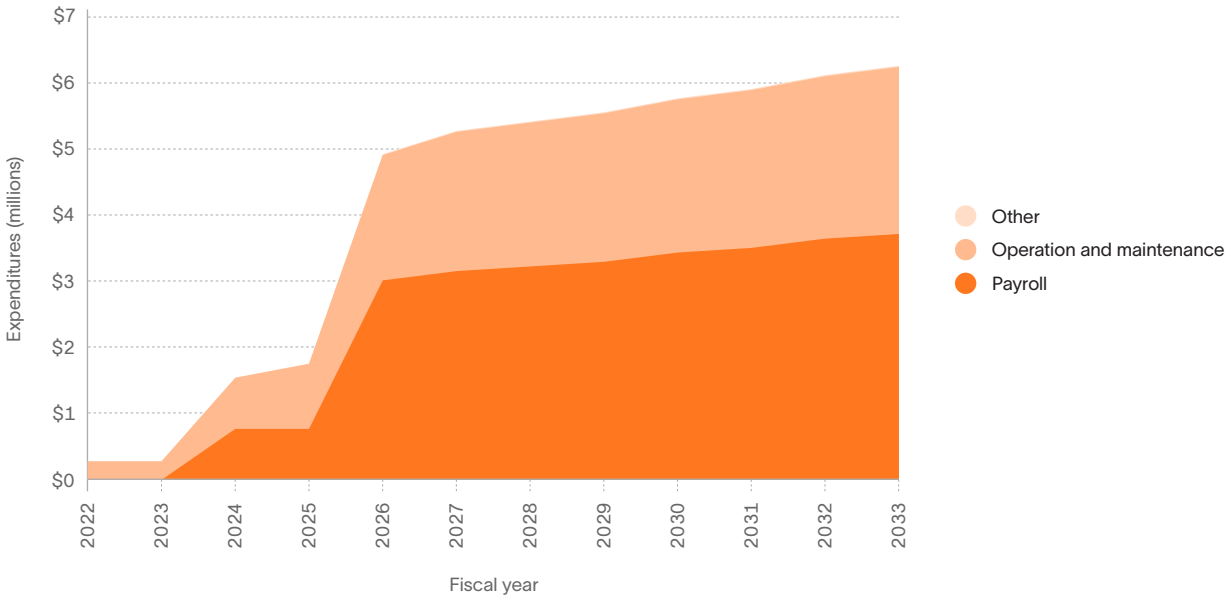
6 Note that revenues and expenditures start in different years because some Measure CC projects incur operational costs but do not generate revenue.

Figure 3: Revenue by year and source, undiscounted



Source: Data provided by SBCCD.

Figure 4: Expenditures by year and type (excluding depreciation & interest), undiscounted



Note: Expenses in the "other" category exist, although they may be too small to be visible in the graph above.

Source: Data provided by SBCCD.

The first step in estimating the operations spending impacts is to map these categories to the approximately 1,000 industries of the Lightcast MR-SAM model. Again, assuming that the spending patterns of the additional personnel approximately match those of the average consumer, we map payroll to spending on industry outputs using national household expenditure coefficients supplied by Lightcast's national SAM. For the other expenditure categories, we assume the spending patterns approximately match

national averages and apply the national spending coefficients for NAICS 903612 (Colleges, Universities, and Professional Schools (Local Government)).

We now have two vectors of expenditures: one for payroll and another for purchases of supplies and services. Using the RPCs, we estimate the portion of these expenditures that occur inside the region. The vectors of expenditures are multiplied, industry by industry, by the corresponding RPC to arrive at the in-region expenditures. 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 labor income, non-labor income, total added income, sales, and jobs.

Table 4 presents the economic impact of the additional operations because of Measure CC for the first year of increased operations, FY 2022, and the last year, FY 2033, whereas Figure 5 presents the impact every year. For each year, the top row shows the initial effects of Measure CC's operations in terms of labor income, non-labor income, total added income, and sales. However, the funding for these increased operations had to come from somewhere. Consequently, we must account for any alternate uses of these funds. This is similar to the counterfactual we considered in the short-run capital spending impacts section. The results of this exercise are shown as negative values in the row labeled "Less alternative uses of funds" in Table 4.

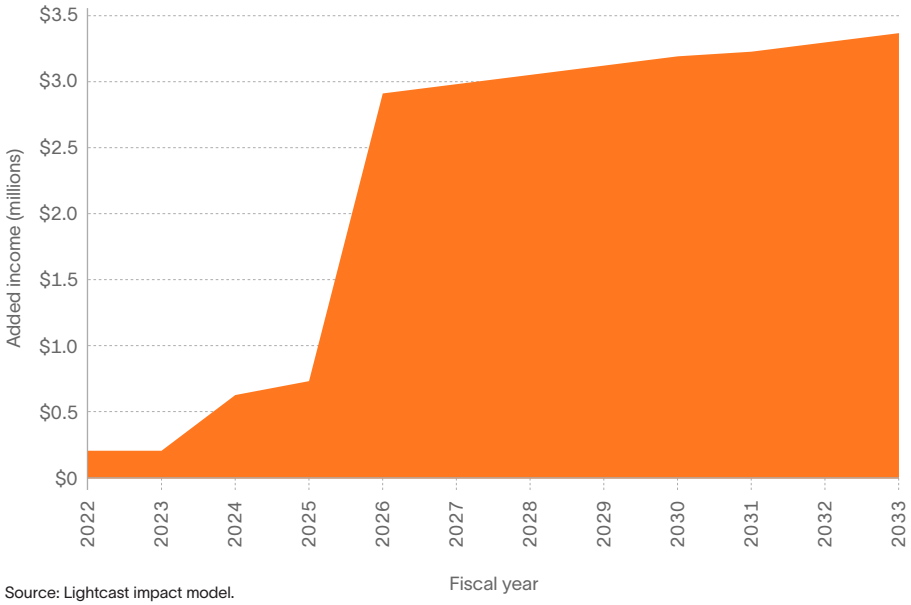
Table 4: Operations spending impacts, first and last year of analysis, undiscounted

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2022				
Initial effect	**$0**	**$0**	**$0**	**$284**
Multiplier effect				
Direct effect	$98	$27	$124	$242
Indirect effect	$25	$7	$32	$63
Induced effect	$34	$9	$44	$85
Gross impact	**$157**	**$43**	**$200**	**$674**
Less alternative uses of funds	$0	$0	$0	$0
Net impact	**$157**	**$43**	**$200**	**$674**
...				
FY 2033				
Initial effect	**$3,729**	**$0**	**$3,729**	**$6,262**
Multiplier effect				
Direct effect	$871	$238	$1,109	$2,158
Indirect effect	$225	$61	$286	$558
Induced effect	$1,032	$748	$1,780	$3,048
Gross impact	**$5,857**	**$1,047**	**$6,904**	**$12,027**
Less alternative uses of funds	-$1,851	-$1,692	-$3,542	-$7,930
Net impact	**$4,006**	**-$645**	**$3,362**	**$4,097**

Source: Lightcast impact model.

Because the district's operations are labor-intensive, whereas the adjustment for alternative uses of funds is not labor-intensive, the net non-labor impact by FY 2033 is negative. Nevertheless, the total net impacts are still positive.

Figure 5: Operations spending impacts by year, undiscounted



Source: Lightcast impact model.

Annual operations spending impacts

While the total impacts that occur from FY 2022 to FY 2033 are relevant because of the temporal nature of the additional operations spending due to Measure CC, it is critical to understand that there will be a recurring annual operations spending impact as long as the capacities created by Measure CC are utilized. These are the true long-run operations spending impacts. Without making any assumptions for growth beyond the last year of this analysis, the Inland Empire economy will enjoy an annual impact of **$3.4 million** in total added income. This is equivalent to supporting **27 jobs** every year.

Table 4 and Figure 5 present undiscounted year-by-year operations spending impacts. The total impacts, summed across FY 2022 to FY 2033 and discounted to 2023 dollars, are presented in Table 5. From FY 2022 to FY 2033, the present value of increased operations spending resulting from Measure CC will create $27.4 million in total added income.

Table 5: Present value of operations spending impacts, total from FY 2022 to FY 2033

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2022 – FY 2033				
Initial effect	**$29,026**	**$0**	**$29,026**	**$49,831**
Multiplier effect				
Direct effect	$7,152	$1,950	$9,102	$17,720
Indirect effect	$1,846	$504	$2,350	$4,581
Induced effect	$8,164	$5,860	$14,023	$24,050
Gross impact	**$46,188**	**$8,314**	**$54,502**	**$96,183**
Less alternative uses of funds	-$14,168	-$12,952	-$27,121	-$60,716
Net impact	**$32,020**	**-$4,639**	**$27,381**	**$35,467**

Source: Lightcast impact model.

Long-run student spending impacts

Students will contribute to the economic impact of Measure CC. Measure CC will add to SBCCD's capacity, allowing the district to serve more students. Once stabilized, of the 14,728 additional students served each year, an estimated 11,012 of them will be from the Inland Empire. However, not all of them will remain in the region if not for the added capacities created by Measure CC. We apply a conservative assumption that 10% of these students will leave the Inland Empire for other education opportunities if SBCCD does not expand its capacity to serve them. The money that these students, called retained students, will spend on groceries, accommodation, transportation, and so on will now remain in the region.

> Measure CC will add to SBCCD's capacity, allowing the district to serve more students.

The spending of these retained students while they attend the district can be attributed to Measure CC. The student spending impacts started in FY 2020, when the first additional students were served, and will last until FY 2033, the final year of this analysis. The

Table 6: Average annual student spending

Room and board	$12,072
Personal expenses	$2,663
Transportation	$2,041
Total expenses per student*	**$16,776**

* Numbers may not add due to rounding.

Source: Data provided by SBCCD.

average costs for students appear in Table 6, equal to $16,776 per student. Note that this table excludes expenses for books and supplies, since many of these monies are already reflected in the operations spending impact discussed in the previous section.

Table 7 outlines the total number of additional students SBCCD expects to serve each year because of Measure CC. By multiplying the expenses per student by the number of retained students and adjusting for monies paid to student workers, we arrive at a net total of $18.5 million in annual sales, once stabilized.[7] The student spending impacts continue until FY 2033, the cutoff date in this study's time horizon.

Table 7: Added students and total sales by year, undiscounted

Year	Additional students	Additional retained students	Net sales* (thousands)
FY 2020	254	19	$319
FY 2021	318	24	$398
FY 2022	397	30	$498
FY 2023	496	37	$622
FY 2024	871	65	$1,092
FY 2025	1,161	87	$1,456
FY 2026	2,522	189	$3,161
FY 2027	3,639	272	$4,561
FY 2028	12,000	897	$15,049
FY 2029	12,802	957	$16,055
FY 2030	13,562	1,014	$17,008
FY 2031	14,371	1,075	$18,023
FY 2032	14,728	1,101	$18,470
FY 2033	14,728	1,101	$18,470

* Adjusted to exclude monies paid to on-campus student workers since that activity was already captured in the operations spending impact.

Source: Data provided by SBCCD and the Lightcast impact model.

Estimating the impacts generated by the student spending follows a procedure similar to that of the other impacts previously described. We distribute the sales to the industry sectors of the MR-SAM model, apply RPCs to reflect in-region spending, and run the sales figures through the MR-SAM model to derive multiplier effects. 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 student spending thus falls entirely under the multiplier effect. Table 8 outlines the annual impacts for FY 2020, when the first additional students enrolled as a result of Measure CC, and FY 2033, the final year of our analysis. Figure 6 outlines the impact for every year of the analysis.

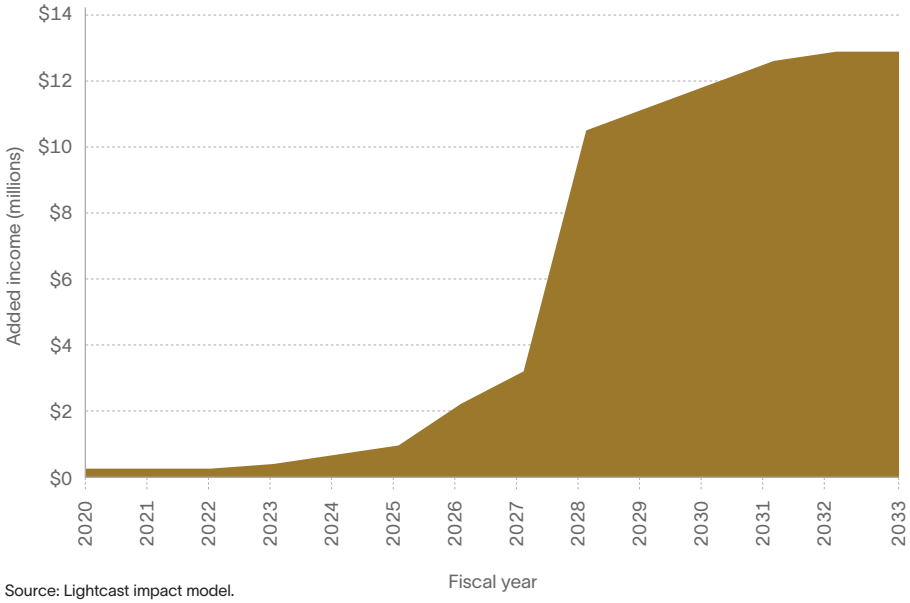
7 Numbers may not match by multiplying due to rounding.

Table 8: Student spending impacts, first and last year of analysis, undiscounted

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2020				
Initial effect	**$0**	**$0**	**$0**	**$319**
Multiplier effect				
Direct effect	$80	$53	$133	$235
Indirect effect	$20	$14	$33	$60
Induced effect	$33	$22	$55	$97
Total impact	**$134**	**$89**	**$222**	**$711**
...				
FY 2033				
Initial effect	**$0**	**$0**	**$0**	**$18,470**
Multiplier effect				
Direct effect	$4,667	$3,071	$7,737	$13,635
Indirect effect	$1,148	$787	$1,935	$3,503
Induced effect	$1,925	$1,288	$3,213	$5,611
Total impact	**$7,739**	**$5,145**	**$12,885**	**$41,219**

Source: Lightcast impact model.

Figure 6: Student spending impacts by year, undiscounted



Source: Lightcast impact model.

The total long-run student spending impacts, summed across those years and discounted to 2023 dollars, are presented in Table 9. From FY 2020 to FY 2033, the additional students will add $82.1 million in total added income for the Inland Empire economy.

Table 9: **Present value of student spending impacts, total from FY 2020 to FY 2033**

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2020 – FY 2033				
Initial effect	**$0**	**$0**	**$0**	**$117,659**
Multiplier effect				
Direct effect	$29,728	$19,561	$49,288	$86,861
Indirect effect	$7,314	$5,011	$12,324	$22,317
Induced effect	$12,260	$8,205	$20,465	$35,741
Total impact	**$49,301**	**$32,776**	**$82,078**	**$262,579**

Source: Lightcast impact model.

Annual student spending impacts

While the total impacts that occur from FY 2020 to FY 2033 are relevant because of the temporal nature of the student spending, there will be recurring annual student spending impacts as long as SBCCD serves additional students as a result of Measure CC. These are the true long-run student spending impacts. The Inland Empire economy will benefit from an annual impact of **$12.9 million** in total added income, which is equivalent to supporting **198 jobs** annually.

Long-run alumni impacts

While Measure CC will create economic impacts through capital, operations, and student spending, the real mission and purpose of Measure CC is to allow SBCCD to foster more human capital—i.e., knowledge, creativity, imagination, and entrepreneurship. The added capacities created by Measure CC will allow SBCCD to serve a larger student population. By FY 2033, an estimated 8,404 additional alumni will have graduated from the district as a result of Measure CC.[8] These are alumni who would have otherwise not graduated from SBCCD but for the increased capacity provided by Measure CC.

By FY 2033, an estimated **8,404 additional alumni** will have graduated from the district as a result of Measure CC.

Additional students attending SBCCD receive a wide range of knowledge, skills, and abilities that will 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, such as buildings, production facilities, and equipment, more productive too. The employers of SBCCD's alumni will enjoy the fruits of this increased productivity in the form of additional non-labor income (i.e., higher profits). In this section, we estimate the economic impacts stemming from the higher labor income of these alumni in combination with the increased productivity that will be enjoyed by their future employers. The time horizon for this portion of the analysis falls between FY 2021 and FY 2033—the earliest point in time when the additional alumni started working in the Inland Empire workforce and the final year of this analysis. Note that, unlike the alumni impact in the economic impact

8 Lightcast worked with SBCCD to determine the expected number of additional alumni.

study conducted by Lightcast for SBCCD for FY 2021, for this analysis, only those students who graduated with a degree are measured.

There is an important difference between the alumni impact and the impacts estimated in the previous sections. Whereas the short- and long-run spending impacts stem from an injection of new sales into the regional economy, the alumni impact stems from the increased human capital that will accumulate in the Inland Empire workforce as a result of Measure CC. The initial effect of alumni is comprised of two main components. The first and largest of these is the added labor income of SBCCD's additional graduates. The second component is the added non-labor income of the businesses that will employ these additional alumni.

To estimate the added labor income created each year, we use the number of additional alumni produced and their *incremental* added labor income stemming from their educations. The number of alumni is calculated using the enrollment as outlined in the student spending impact (Table 7) and multiplying them by each degree level's graduation rate. The incremental labor income is the difference between the earnings at each level of education of new graduates and the earnings at the level of education the students had when entering SBCCD. For example, since SBCCD will be serving additional students seeking an associate degree and the majority of these students will enter with a high school diploma, the incremental added labor income associated with an alumnus with an associate degree is the difference between the average earnings for someone with an associate degree and someone with a high school diploma. The average earnings in the Inland Empire associated with each level of educational attainment are found in Table 10 and Figure 7. The added labor income created each year is equal to the sum of the incremental earnings of each year's new alumni working in the regional workforce.

Table 10: Average annual earnings by education level in the Inland Empire

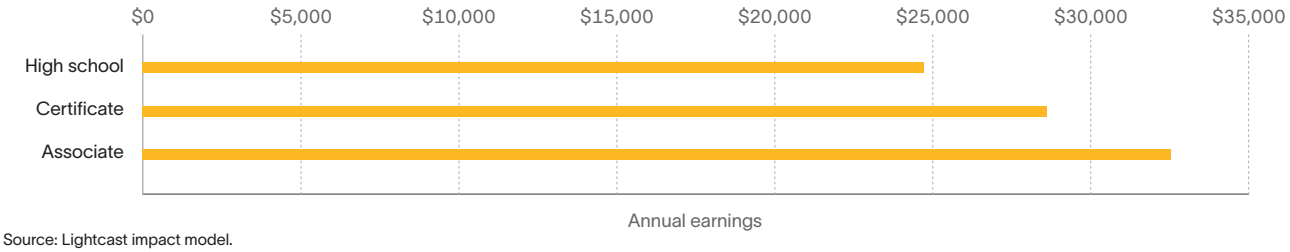
	Annual earnings	Increase in earnings	Once stabilized, annual graduates
High school or equivalent	$24,700	n/a	n/a
Certificate or workforce student*	$28,500	$3,800	255
Associate degree	$32,400	$7,700**	1,282

* Certificate earnings are adjusted to account for workforce students who do not necessarily complete a full certificate.

** Associate degree graduate earnings are compared to high school graduate earnings.

Source: Lightcast impact model.

Figure 7: Average annual earnings by education level in the Inland Empire



Source: Lightcast impact model.

Because we only want to consider alumni who would graduate as a result of Measure CC, there are two counterfactuals we must consider. First, there are alternative education opportunities. In the scenario where Measure CC does not exist, a portion of these additional alumni may receive an alternative comparable education elsewhere and work post-graduation in the Inland Empire. The incremental labor income that accrues to these students cannot be counted towards the added labor income created by Measure CC. We assume 15% of these alumni would receive an alternative comparable education and work in the Inland Empire post-graduation. This means that 15% of the added labor income from the additional alumni would be generated in the Inland Empire economy anyway, even without the added capacities from Measure CC.

Second, we need to account for the importation of labor. Suppose the Measure CC projects are not completed and the added capacities of SBCCD do not exist. These alumni would not graduate and there would be fewer skilled workers in the Inland Empire. However, businesses could still satisfy some of their need for skilled labor by recruiting from outside the Inland Empire. 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 be filled by workers recruited from outside the region.

As seen in Table 11, the weighted average wage increase per additional alumnus is $6,324. This differential was dampened to adjust for "ability bias" to account for other factors besides education that influence individual behavior. After accounting for the two above counterfactual scenarios, the net wage increase per alumnus is $2,213.

Table 11: Weighted earnings increase per additional alumnus

Average wage increase per alumnus	$6,324
Alternative education variable	15%
Labor import effect	50%
Net wage increase per alumnus	**$2,213**

Source: Lightcast impact model.

It is important to understand that the alumni impacts are cumulative as more alumni are produced. For example, the first alumni graduated at the end of FY 2020, one year after the first additional students were enrolled. The added labor income from the FY 2020 cohort of students began in FY 2021, when those alumni became active in the regional workforce. Alumni were also produced in FY 2021 from the second cohort of students, who were able to gain their certificate or degree as a result of the increased capacity at SBCCD. The total incremental added labor income in FY 2022 equals the sum of the alumni added labor income who graduated in FY 2020 and FY 2021. This continues until FY 2033, the cutoff date in this study's time horizon. These alumni are then adjusted for various measures of attrition such as unemployment and migration to determine how many are active in the regional workforce. Table 12 shows the accumulation of alumni. Using these active alumni, we then calculate added labor income by year.

Table 12: Additional alumni and labor income by year

Fiscal year	Graduates	Cumulative alumni working in region*	Added labor income, undiscounted (thousands)*
FY 2020	2	0**	$0
FY 2021	2	1	<$1
FY 2022	44	2	$1
FY 2023	48	24	$30
FY 2024	72	51	$66
FY 2025	58	93	$118
FY 2026	114	130	$165
FY 2027	161	195	$243
FY 2028	505	284	$353
FY 2029	652	544	$649
FY 2030	1,836	899	$1,079
FY 2031	1,710	1,859	$2,317
FY 2032	1,510	2,847	$3,664
FY 2033	1,515	3,814	$5,067
Total	**8,404**	**N/A**	**$13,752**

* The added labor income is calculated using the annual alumni after applying a graduation rate.

** Alumni will not receive most of the higher earnings until the next fiscal year when they become active in the regional workforce.

Source: Data provided by SBCCD and the Lightcast impact model.

Now that we have the labor income portion of our initial effect, we estimate the non-labor income portion of the initial effect. As discussed earlier in this section, businesses that employ alumni from SBCCD enjoy 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 to the six-digit NAICS industry sectors where students are most likely to be employed. We do so by using inverse staffing patterns, which break down the industries in which students are most likely to be employed. Finally, we apply a matrix of wages by industry and by occupation from the MR-SAM model to map the occupational distribution of the initial labor income effects to the detailed industry sectors in the MR-SAM model.[9]

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 the non-labor income attributable to SBCCD's additional alumni. Summing initial labor and non-labor income together provides the total initial effect of these additional alumni in the Inland Empire economy, as represented by the "Total added income" column. We now have a complete initial effect from which we can derive the multiplier effects. To do so, we convert the industry-specific income

9 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.

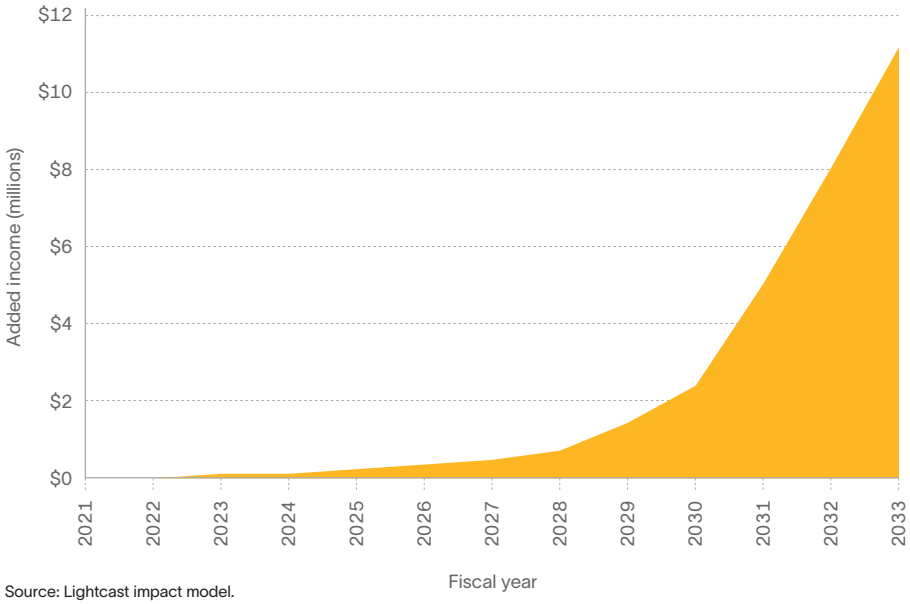
figures generated through the initial effect to sales using sales-to-income ratios from the MR-SAM model. We then run the values through the MR-SAM's multiplier matrix, as described at the beginning of this section. Table 13 outlines this process in detail for FY 2021, when the first additional SBCCD graduates as a result of Measure CC enter the regional workforce, and FY 2033, the final year of the analysis. Figure 8 presents the impacts each year of the analysis.

Table 13: Alumni impacts, first and last year of analysis, undiscounted

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2021				
Initial effect	**<$1**	**<$1**	**$1**	**$1**
Multiplier effect				
Direct effect	<$1	<$1	<$1	<$1
Indirect effect	<$1	<$1	<$1	<$1
Induced effect	<$1	<$1	<$1	$1
Total impact	**$1**	**<$1**	**$1**	**$2**
...				
FY 2033				
Initial effect	**$5,067**	**$1,617**	**$6,684**	**$15,738**
Multiplier effect				
Direct effect	$789	$286	$1,075	$2,282
Indirect effect	$236	$87	$324	$685
Induced effect	$2,371	$689	$3,060	$7,154
Total impact	**$8,463**	**$2,679**	**$11,142**	**$25,859**

Source: Lightcast impact model.

Figure 8: Alumni impacts by year, undiscounted



Source: Lightcast impact model.

Table 13 and Figure 8 present the undiscounted alumni impacts that accumulate year-by-year between FY 2021 and FY 2033. The total long-run alumni impacts, summed across those years and discounted to 2023 dollars, are presented in Table 14. From FY 2021 to FY 2033, the additional alumni will add $31 million in total added income.

Table 14: Present value of alumni impacts, total from FY 2021 to FY 2033

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2021 – FY 2033				
Initial effect	**$14,109**	**$4,501**	**$18,610**	**$43,821**
Multiplier effect				
Direct effect	$2,196	$796	$2,992	$6,354
Indirect effect	$658	$243	$901	$1,908
Induced effect	$6,602	$1,918	$8,521	$19,918
Net impact	**$23,566**	**$7,458**	**$31,024**	**$72,002**

Source: Lightcast impact model.

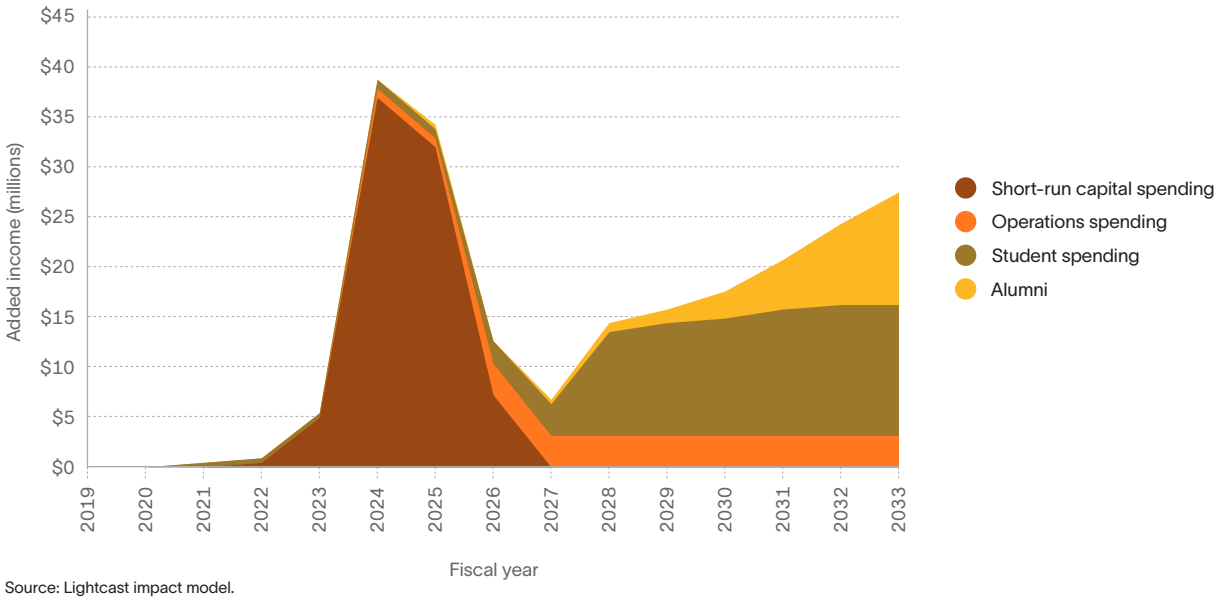
Annual alumni impacts

Similar to the long-run spending impacts, recurring alumni impacts will continue as long as SBCCD serves additional students as a result of Measure CC. However, unlike the long-run spending impacts, the alumni impacts will continue to accumulate as more and more alumni are produced and as long as these alumni remain in the Inland Empire workforce. By FY 2033, Measure CC will allow SBCCD to graduate around 1,500 additional alumni per year. Many of these students will work in the region. By 2033, the accumulation of alumni will create an annual impact of **$11.1 million** in total added income. This is equivalent to supporting **142 jobs** per year for the Inland Empire. This annual impact is expected to increase every year for several years as SBCCD continues to graduate more students because of Measure CC and they enter the regional workforce.

Total economic impacts from Measure CC

In this analysis, we estimate four types of economic impacts created by Measure CC: short-run capital spending impacts and long-run operations spending impacts, student spending impacts, and alumni impacts. Given each type of impact has different timelines, they occur at different points in time across our 15-year analysis timeframe of FY 2019 to FY 2033. Figure 9 presents the undiscounted year-by-year totals of the four impacts.

Figure 9: Total impacts by year, undiscounted



Source: Lightcast impact model.

To understand what these impacts mean in present value terms, we discount them back to 2023 dollars using a discount rate of -0.3%. From FY 2019 to FY 2033, the discounted short-run and long-run impacts created by Measure CC will provide a total economic impact on the Inland Empire economy of $222.4 million in total added income. Table 15 presents the present value sum of the total impacts from FY 2019 to FY 2033.

Table 15: Present value total impacts from FY 2019 to FY 2033

	Labor income (thousands)	Non-labor income (thousands)	Total added income (thousands)	Sales (thousands)
FY 2019 – FY 2033				
Initial effect	**$43,135**	**$4,501**	**$47,636**	**$660,957**
Multiplier effect				
Direct effect	$154,202	$62,460	$216,662	$403,086
Indirect effect	$39,027	$15,058	$54,085	$102,612
Induced effect	$67,880	$31,216	$99,096	$184,308
Gross impact	**$304,244**	**$113,235**	**$417,478**	**$1,350,963**
Less alternative uses of funds	-$101,898	-$93,153	-$195,051	-$436,665
Net impact	**$202,345**	**$20,082**	**$222,428**	**$914,298**

Source: Lightcast impact model.

Annual impacts

The economic impacts discussed thus far are those summed across the 15 analysis years of FY 2019 to FY 2033 and discounted to present value terms. However, each of the three long-run types of impacts will create an annual impact. These break down as follows:

- **Operations spending annual impact:** Measure CC will increase SBCCD's operational spending. By FY 2033, increased operations spending will add around **$3.4 million** in total income on an annual basis, equivalent to supporting **27 jobs** per year.
- **Student spending annual impact:** Once the additional number of students SBCCD is able to serve stabilizes at around 15,000 students, **$12.9 million** in income will be added per year, supporting **198 jobs** annually, as a result of spending from retained students in the region.
- **Alumni annual impact:** As a result of the expanded capacities made possible through Measure CC, SBCCD will produce more alumni every year, who will then accumulate in the regional workforce. By FY 2033, the last year of this analysis, alumni are estimated to add **$11.1 million** in total income to the economy per year, supporting **142 jobs** annually. This annual impact is expected to increase every year for several years as SBCCD continues to serve more students and they enter the regional workforce.

By FY 2033, the total annual impact from Measure CC will be at least **$27.4 million** in added income. This is equivalent to supporting **367 jobs** every year. For every job created by Measure CC for operations, by the student spending, and from the higher earnings of alumni, an **an additional four jobs will be created** throughout the regional economy.

Lightcast

Lightcast provides colleges and universities with labor market data that help create better outcomes for students, businesses, and communities. Our data, which cover more than 99% of the U.S. workforce, are compiled from a wide variety of government sources, job postings, and online profiles and résumés. Hundreds of institutions use Lightcast to align programs with regional needs, drive enrollment, connect students with in-demand careers, track their alumni's employment outcomes, and demonstrate their institution's economic impact on their region. Visit lightcast.io/solutions/education to learn more or connect with us.

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Appendix 1: SBCCD Measure CC project list

SBVC project list

- Technical Building Replacement (Career Pathway 1)
- M&O Repurposing
- Softball Field
- Student Services Building
- Administration & Campus Center Repurposing
- Career Pathways Phase 2
- Physical Sciences & Health and Life Science
- Campus-Wide Infrastructure (Approx. 20 sub-projects)
- Piping
- Library Roof
- Landscape (Arborist)
- Planetarium HVAC Replacement
- CC01-3610-06 Physical Science & Health Life Science Building – Mechanical Improvements
- Utility Upgrades (Earthquake Valves & Electrical Submeters)
- East Wing Mechanical Improvements
- Old Central Plant Repurpose
- Campus Roof Replacement
- Security Upgrades
- Greek Theater Shade Structure
- Business Quad Development
- Fiber Optic Termination & Testing
- Planetarium Flooring R&R
- Gym Lobby Flooring R&R
- Perimeter Fencing
- KVCR Improvements
- East Wing Improvements Phase 2
- Biology Garden Expansion

CHC project list

- Crafton Hall Renovation
- Student Support Building Renovation (SSB)
- Gymnasium Demolition
- East Valley Public Training Center (EVPSTC)
- Instructional Building
- Central Complex 2 Renovation (CC2)
- Child Development Center Renovation (CDC)
- New Performing Arts Center Building (PAC)
- Campus-Wide Infrastructure (Approx. 20 sub-projects)
- Exterior Lighting Improvements
- Campus Wide Irrigation Upgrades
- Campus Accessibility and Site Improvements
- Central Plane Controls Upgrades & Chillers
- Landscape (Arborist)
- Replacement of Existing Cooling Towers
- Wayfinding Signage
- Campus Wide Security
- New Metering
- New Gas Submeters
- Existing PMO Office Data/ Cable Upgrades
- LRC Generator & Equipment Upgrades
- Building 17 Water Main Repair
- M&O Office Trailer Upgrades
- Facilities Master Plan Addendum
- Solar PV
- BL 10 Third Floor Corridor Door Upgrade
- CCR Multi-Purpose Room Acoustical Improvements

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 district in order to obtain their education.

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

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

Counterfactual scenario: What would have happened if a given event had not occurred. In the case of this economic impact study, the counterfactual scenario is a scenario where the district's Measure CC do not exist.

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).

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 district 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.

Multiplier effect: Additional income created in the economy as the district 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 district 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).

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

Appendix 3: Example of sales versus income

Lightcast'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:

Income = Sales – 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:

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 4: Lightcast MR-SAM

Lightcast's MR-SAM represents the flow of all economic transactions in a given region. It replaces Lightcast'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 Lightcast 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.

Lightcast 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 Lightcast 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 Lightcast 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 Lightcast 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. Lightcast 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 Lightcast 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 Lightcast 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 Lightcast's gravitational flows model that estimates the amount of trade between counties in the country.

Overview of the MR-SAM model

Lightcast'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 Lightcast 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.

Lightcast'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 Lightcast'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 accounts for 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 Lightcast MR-SAM model

The Lightcast 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. Lightcast'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 Lightcast'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 Lightcast'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 Lightcast'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. Lightcast uses a modification of the "diagonal similarity scaling" algorithm to balance the national SAM.

Gravitational flows model

The most important piece of the Lightcast 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.