

# Exploring the Costs of California Community Colleges and Implications for Funding Equity

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Jesse Levin, Bruce Baker, Adam Hearn and Christopher Brooks

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## Introduction

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Community colleges play a crucial role in American higher education, serving as primary engines for social and economic mobility. They provide the most geographically accessible and affordable path to higher education for nearly 10.2 million students, including many who are economically-disadvantaged, minoritized, and adult learners (American Association of Community Colleges, 2024; Chetty et al., 2020). Students who complete a two-year degree have higher rates of employment and on average earn \$8,500 more per year than high school graduates (U.S. Census Bureau, 2022; Hilliard, 2011).

Despite the educational access and opportunity that community colleges offer, researchers have held long-standing concerns that community colleges do not have sufficient funding to meet objectives, such as levels of student persistence and completion of certificates or degrees (Baum et al., 2013; Kahlenberg et al., 2018; Baker & Levin, 2017). For example, community colleges receive fewer federal and state resources per full-time equivalent (FTE) enrollment than their four-year counterparts (Hillman, 2020; State Higher Education Executive Officers Association, 2023). Furthermore, a growing body of literature has suggested that students attending colleges with higher expenditures per student have both higher rates of college persistence and certificate or degree attainment, as well as faster time to degree (Bound et al., 2019; Chakrabarti et al., 2018; Cummings et al., 2021).

Given the research findings suggesting that community colleges may not be funded in a manner that is sufficient to allow states to meet their educational objectives, it is imperative to better understand how much funding each institution requires to produce desired student outcomes and mitigate any negative (inequitable) associations between student needs characteristics and student outcomes. While policymakers want to know the funding necessary for community colleges to provide students an affordable and accessible pathway to a postsecondary certificate or degree, the research literature to date has offered little in terms of an acceptable methodology for producing these estimates. This study aims to address this research gap by demonstrating a novel and methodologically rigorous approach to establishing cost-based estimates of the funding levels community colleges need to provide all students with an equal opportunity for postsecondary success.

Undergirding this work is an understanding that providing community colleges with the resources necessary to offer an equal educational opportunity for their students to meet a common outcome goal requires that funding be equitably allocated according to the factors that influence the cost of producing desired outcomes including different student needs and institutional contexts. This may require providing additional resources to institutions that serve

larger shares of students from families with low incomes or first-generation students, differentiating funding to account for colleges operating in higher or lower cost labor markets that affect the salaries levels required to attract and retain staff, etc. For community college funding systems to be equitable, they must account for the distinct levels of support needed to provide all students with an equal opportunity to succeed. In effect, our work seeks to determine how much it costs to provide an equal opportunity for all community college students to succeed, taking into consideration those factors that drive the cost of producing student outcomes.

Estimating appropriate funding levels requires a sophisticated and rigorous methodology. Following the suggested analytical approach put forth in Baker & Levin (2017), this study uses publicly available data in a cost-function modeling framework. Cost function modelling is a technique that has been used for decades in the K-12 funding adequacy literature to determine the level of funding necessary for each institution to provide an equal opportunity for the unique group of students served to achieve a common set of outcomes. To demonstrate the power and potential of this approach for estimating the cost of providing equal educational opportunity for all community college students, we conducted a case study on estimating the cost of equal opportunity for California community colleges, the largest system of community colleges in the United States, which serves approximately 1.9 million students across 116 colleges (CCC, n.d. -a; n.d. -b).

Four primary research questions guide our case study:

1. Which student needs are significantly associated with student persistence and completion outcomes produced by California community colleges?
2. Does institutional spending per student vary with respect to student needs and measures of local wealth across California community colleges?
3. To what extent are local wealth measures related to the distribution of local and state funding per student across California community college districts?
4. What spending levels are associated with producing outcomes for students with different needs attending California community colleges in different contexts?

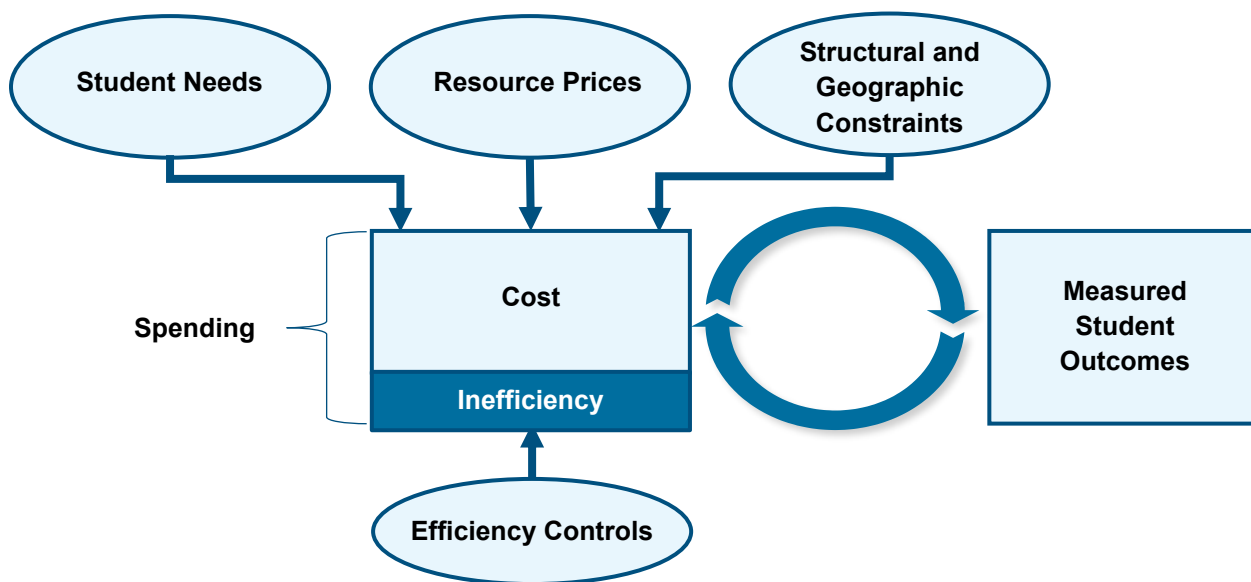
Importantly, the estimates produced in this study are meant to demonstrate that cost function models, previously developed and validated in K-12 school finance research, can be used to estimate the cost of providing adequate funding to community college systems. The estimates reported herein are not meant to be interpreted as actionable information for policy decision making at this time. Further refinement of modeling assumptions and access to data that is more detailed and complete than those that are available publicly would be needed before

these cost estimates can be used to make substantive policy decisions.<sup>1</sup> Nonetheless, this work represents one of the first studies to act on recent calls by higher education researchers and policymakers (Kahlenberg et al., 2018) to provide estimates of adequate and equitable funding in a postsecondary setting. This work demonstrates a rigorous and adaptable methodology for generating these estimates that may be applied broadly to other community college systems across the United States.

## Conceptual Framework

The conceptual framework for this study is grounded in the K-12 school finance literature focused on determining adequate and equitable funding through the use of an education cost function model. Illustrated in Exhibit 1, our framework adapts this established method to the unique context of community colleges, providing a structured way to understand the complex relationships between funding, costs, and student outcomes in higher education.

**Exhibit 1. Education Cost Function Model**



<sup>1</sup> An example of where a more in-depth analysis was performed that informed state community college funding policy can be found in Levin et al. (2022).

This framework identifies three primary factors that influence educational costs:

1. **Student Needs:** Encompasses a host of characteristics related to student populations that have traditionally been underserved or otherwise may require additional resources to have an equal opportunity to achieve, such as low socioeconomic status, lack of English language proficiency, or having a disability.
2. **Resource Prices:** Reflects the varying cost levels of securing educational inputs across different geographic areas, particularly compensation rates for faculty and staff.
3. **Structural and Geographic Constraints:** Includes factors such as institutional enrollment size and locale (urban, suburban, rural) that can affect operational costs.

These factors collectively influence the overall cost of education, which is represented as a combination of spending the model deems efficient (spending that directly contributes to the student outcomes included in the model) and potential inefficiency (spending that does not affect the student outcomes in the model). This framework recognizes a bidirectional relationship between costs and measured student outcomes, acknowledging that while desired outcomes drive spending decisions, spending also affects outcomes.

While the education cost function model from K-12 finance research provides a valuable starting point for examining community college funding, several key differences between the two contexts must be considered. These include the absence of legal funding obligations for community colleges in most states, the significant role of political influence in higher education funding, the prominence of state financial aid as a major funding source (separate from appropriations), the prevalence of outcomes-based funding, and the differing rationales behind funding K-12 versus higher education (Baker & Levin, 2017; Romano & Palmer, 2023). These factors contribute to the complexity of developing equitable and adequate funding models for community colleges.

This conceptual model guides our investigation through four interconnected analyses:

1. **Student Needs Analysis:** Building on the framework's emphasis on student needs, this analysis examines the degree to which specific student characteristics are related to student success in California's community colleges. By examining the relationship between outcomes and various student need factors, we identify which student populations may need additional support to have an equal opportunity to achieve. This information is vital for tailoring funding strategies to address the unique needs of California community college students, as represented in the "Student Needs" component of our conceptual model. Specifically, those measures of student need that prove to be most strongly related to outcomes should be considered for inclusion in the

cost function, which is used to determine the differential costs of generating outcomes for students from different backgrounds.

2. **Equity Analysis:** This analysis explores the current funding distribution among California's community colleges in relation to the factors in our framework. By investigating whether spending per-student tends to be higher or lower in community colleges with greater cost pressures (e.g., enrolling larger numbers of students who have been traditionally underserved and require additional support, facing higher resources prices, or operating at a smaller scale or in a more remote location) we are able to characterize the current funding system as relatively progressive, regressive or neutral. This evaluation allows us to understand how well California's funding model addresses the diverse needs of students and colleges represented across the state.
3. **Revenue Analysis:** This analysis complements the equity analysis by examining how local and state funding relate to indicators of fiscal capacity that measure the ability of communities to raise local revenues. This analysis helps to highlight the extent to which funding allocations may systematically advantage or disadvantage community college districts based on the wealth and income of the communities they serve.
4. **Cost Function Analysis:** The cost function analysis synthesizes the insights from the previous analyses and applies the conceptual framework to estimate the funding levels necessary for equitably producing student outcomes across California's community colleges. By considering all elements in our model – student needs, resource prices, structural and geographic constraints, and efficiency controls – this analysis addresses critical questions about the relationship between spending levels and student outcomes. It provides a clear picture of funding adequacy and potential gaps, allowing us to quantify the funding adjustments that need to be made to provide equitable opportunities for student success within California's community college system.

By applying this framework, we aim to provide an understanding of the complex community college funding landscape and inform policy recommendations to foster a more equitable and effective funding model that recognizes the diverse needs of students and institutions across the state. Subsequent sections will elaborate on the methodologies used in each analysis and present findings that can inform policymakers' efforts to refine and enhance California's community college funding model. Ultimately, our work seeks to advance a funding approach that both addresses existing inequities across California and proactively supports student by ensuring financial resources are strategically aligned with student needs and outcomes.

## How Community Colleges are Funded in California

In California, community colleges receive funding from a mix of state and local sources, federal support, tuition fees, and other revenues. The state is the largest contributor, providing 44% of total funding, while local sources account for about 24% (California Community Colleges, n.d. - a). Notably, tuition fees contribute less than 5% of the total revenues for the California Community College (CCC) system, underscoring the state's commitment to college affordability.

Since the 2018–2019 fiscal year, the primary method for distributing state and local funds to the CCC system is through the Student-Centered Funding Formula (SCFF), an outcomes-based approach (CCC, n.d. -c). The SCFF consists of three main components:

1. *Base Allocation (60-70% of funding)*: Includes funding per full-time equivalent (FTE) student and a fixed amount covering basic operational costs.
2. *Supplemental Allocation (10-20% of funding)*: Provides extra funds for colleges serving students from low-income households (Pell Grant recipients and College Promise Grant recipients), and undocumented students eligible for AB 540 tuition exemption.
3. *Student Success Allocation (10-20% of funding)*: Rewards colleges for achieving specific outcomes such as degrees and certificates attained, successful student transfers to universities, completions of certain courses or career education units, and attainment of a regional living wage. The Success Student Allocations are higher for students who are Pell Grant or California College Promise Grant recipients.<sup>2</sup>

The SCFF's supplemental allocation resembles "equity metrics" incorporated in other states' higher education funding models. It is designed to promote equity in funding by providing additional dollars for students with greater need. This approach aligns with a broader trend in performance-based funding models across the United States, where nearly three-quarters of states incorporate at least one equity metric (Rosinger et al., 2022).

Within the national context, California's SCFF represents a notable effort to address both student needs and institutional performance in community college funding. The inclusion of a supplemental allocation based on student characteristics aligns with practices observed in other states' funding models (Kelchen et al., 2019; TACC, 2023). However, like many other states, California's model may still have room for improvement in comprehensively addressing cost factors and specific student needs. Specifically, while California's approach may seem relatively progressive, the effectiveness of the SCFF in promoting equity and meeting the

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<sup>2</sup> Appendix A provides a detailed breakdown of the Student Success Allocation funding adjustments included in the SCFF.



diverse needs of its community college students remains an empirical question. By examining student needs, fiscal equity, and the costs associated with producing outcomes for differing student populations, we can assess how well the current funding model aligns with the actual needs and costs of serving California's diverse community college population.

The following sections present our analyses of California community college costs. These findings will help evaluate the effectiveness of the current funding model and inform potential refinements that ensure all students in California's community colleges have equitable access to the resources they need to provide an equal opportunity for their students to succeed.

## Student Needs Analysis

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For decades, policymakers and scholars have acknowledged that education funding should consider the specific needs of students (Berne & Stiefel, 1984). Efforts to account for these needs in how states allocate funds to community colleges are growing (Baker & Levin, 2017; Levin et al., 2022). Despite these efforts, most state funding models fail to address how the costs of achieving common educational goals may differ based on the backgrounds of students and the context of their institutions (Baker & Levin, 2017). This failure to account for cost differences may have significant consequences in terms of not providing all students with an equal opportunity to be successful. Without empirical evidence to draw upon, policymakers may either overlook important costs entirely or make arbitrary adjustments for "needs" that don't accurately reflect the true cost differentials.

To address these challenges, our study employs the principle of equal opportunity to identify the costs associated with achieving common goals among community colleges (Baker & Green, 2012). We start with a *needs analysis*, which examines how student outcomes are related to student and institutional characteristics. The goal of this analysis is to identify needs of students attending California community colleges and other factors that are associated with their educational outcomes, arguing that those that are strongly related to outcomes should be taken into account when determining the funding allocated to community colleges. That is, what characteristics of the population served and institutional structure are predictive of achieving outcomes and what measures of those characteristics prove to be the strongest predictors of outcomes? Although we focus on student-level needs factors such as socioeconomic status and race, we also acknowledge that these needs stem from broader societal issues, including housing segregation, racial discrimination, and their interaction.

Given the size and diversity of California Community Colleges, this system offers a unique opportunity to examine funding needs in relation to educational outcomes. This analysis sheds

light on the student needs characteristics most correlated with lower student outcomes while filling an important gap in the research literature on community college funding in California and beyond. Failing to adequately meet the diverse needs of students through community college funding not only undermines the potential of individual learners but also threatens to perpetuate systemic inequities, diminishing the broader societal benefits of higher education.

## Student Needs Analysis Methodology

Recognizing that student needs and institutional contextual characteristics may both be related to the outcomes, the student needs analysis employs regression techniques to simultaneously account for these factors.<sup>3</sup> These models were run at both the institution and community college district levels control for multiple student need factors as well as institutional structure, allowing for the determination of how strongly specific need factors are associated with the outcomes of interest. The needs analysis regression is specified as follows:

$$\text{Outcome} = f(\text{Student Needs, Institutional Contextual Factors})$$

In the model, Outcome represents an institution or community college district-level measure used to measure student success in the state of California: Integrated Postsecondary Education Data System (IPEDS) 200% Graduation Rate, 3-Year California Vision Goal completion rate, or Success Points per FTE (described below). These measures are tracked annually at both the individual college and community college district levels throughout the study period.

1. **IPEDS 200% Graduation Rate:** This measure indicates the percentage of a student cohort that finishes their program within 200% of the standard timeframe. For associate degree-seeking students, this represents completion within 4 years, whereas for certificate-seeking students, this represents completion within 2 years.
2. **3-Year California Vision Goal Completion Rate:** This rate refers to the percentage of students who earned one or more of the following: Chancellor's Office approved certificate, associate degree, and/or a CCC baccalaureate degree within 3 years of their enrollment.

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<sup>3</sup> Regression analysis is commonly used to isolate the separate relationship between multiple independent variables (e.g., student need factors) and a dependent variable (e.g., a given student outcome measure).

3. **Success Points per FTE:** This measure reflects Student Success Allocations included in the Student Centered Funding Formula (SCFF) that drive funding to community college districts and are based on a variety of student outcomes achieved.<sup>4</sup>

School finance literature classifies various measures of student need and institutional context as potential cost factors that may influence the cost of producing student outcomes.<sup>5</sup> The measures of student needs used in this analysis include the percentages of students who are female, Black, Hispanic, 25 years or older, Pell grant recipients, first-generation college students, U.S. military veterans, English learners, or foster youth. Institutional contextual factors include the percentage of undergraduate students who are full-time, and the share of completions awarded in health and science or technology.<sup>6</sup>

## Key Findings from the Student Needs Analysis

The results reported in Exhibit 2 summarize findings from both institution-level and district-level regression models, indicating clear (statistically significant) relationships between student outcomes and various student need factors. Statistically significant relationships are denoted by arrows (↑ and ↓) in the table cells, while insignificant relationships are denoted by a dash (–). Full regression results for both levels of analysis are provided in Exhibits C–1, C–2, and C–3 in Appendix C.

For IPEDS 200% graduation rates, both the institution-level and district-level models show that community colleges with higher percentages of female students, students who are 25 and older, and those who are Pell grant recipients tend to have lower rates, after controlling for other needs and contextual factors. Interestingly, the institutional-level model also suggests there is a significant positive relationship between IPEDS 200% graduation rates and the percentage of students designated as English learners. Regarding the 3-Year California Vision Goal completion rates, both the institution-level and district-level models show that colleges and districts with greater percentages of students who are 25 years or older, Pell grant

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<sup>4</sup> The Student Success Allocations represent funding for the number of students earning associate's degrees for transfer (\$1,760), the number of students earning associate's degrees not for transfer (\$1,320), the number of students earning bachelor's degrees (\$1,320), the number of students earning credit certificates (\$880), the number of students who complete 4-year college/university transfer-level math and English within their first year (\$880), the number of students transferring to 4-year colleges and universities (\$660), the number of students who complete nine or more career education units (\$440), and the number of students who have attained the regional living wage (\$440) [figures in parentheses represent allocations in 2018-19]. For the purpose of this study, these allocations are translated to points (\$440 represents 1 point). See Exhibit A-1 for a full breakdown of the Student Success Allocations in the SCFF.

<sup>5</sup> The study by Baker & Levin (2017) provides a detailed discussion of the various cost factors that should be considered in community college cost modeling (see pages 12-16). The cost analysis presented later in this study presents empirical estimates of the influences these factors has on the cost of producing outcomes for students attending California community colleges.

<sup>6</sup> See Appendix B for complete details on the data sources and sample used in our analyses.

recipients, and students who are English learners tend to have lower IPEDS 200% graduation rates.

## Exhibit 2. Relationships Between Student Outcomes and Student Needs

| Student need factor                                              | IPEDS 200% graduation rate | 3-Year California Vision Goal completion rate | Success Points per FTE student |
|------------------------------------------------------------------|----------------------------|-----------------------------------------------|--------------------------------|
| Percentage of students who are female                            | ↓                          | –                                             | –                              |
| Percentage of students who are Black                             | –                          | –                                             | ↓ <sup>a</sup>                 |
| Percentage of students who are Hispanic                          | –                          | –                                             | –                              |
| Percentage of students who are 25 years old or older             | ↓                          | ↓                                             | –                              |
| Percentage of students who received a Pell grant                 | ↓                          | ↓                                             | –                              |
| Percentage of students who are first-generation college students | –                          | –                                             | –                              |
| Percentage of students who are U.S. military veterans            | –                          | –                                             | –                              |
| Percentage of students who are designated as English learners    | ↑ <sup>a</sup>             | ↓                                             | ↓                              |
| Percentage of students who are designated as foster youth        | –                          | –                                             | –                              |

*Note.* ↓ denotes statistically significant *negative* relationship between student outcome and need factor; ↑ denotes statistically significant *positive* relationship between spending and student factor; – denotes statistically insignificant relationship between student outcome and need factor.

<sup>a</sup> Indicates estimated relationship between student need factor and outcome was only statistically significant at the 5%-error level in the community college institution-level model.

All estimated regression models were weighted by 12-month FTE student enrollment. Full regression results are in Appendix C.

Lastly, for Success Points per FTE student, the institution-level model shows that community colleges with higher percentages of Black and English learner students tend to earn fewer success points. In the district-level model, only the percentage of English learner students shows a statistically significant negative relationship with Success Points earned.

## Equity Analysis

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Education finance research has documented both disparities in community college spending as well as inequities in the distribution of community college funding. For example, California community colleges in the bottom 20% of ‘Education and Related Expenditures’ spent less than \$3,000 per student on average in 2020–21, while community colleges in the top 20% of spending spent more than \$7,000, per student in the category (You et al., 2022). Research further indicates that funding levels often correlate with the demographic characteristics of the student population, with colleges serving the neediest students typically receiving the least funding (Hillman, 2020; Kolbe & Baker, 2019; You et al., 2022). These disparities in funding can exacerbate educational attainment gaps, which may further contribute to social inequality (Chakrabarti et al., 2018).

Given these disparities, we conducted equity analyses focusing on variation in spending across California community colleges. Our first analysis assesses how per-student spending correlates with student needs, college characteristics, and local fiscal capacity. The goal of this analysis is to understand the extent to which variation in per-student spending across California’s community colleges is associated with these items. Ideally, most of the variation should be associated with differences in student needs and other cost factors, with very little driven by local wealth and income. Specifically, from an equity standpoint we would hope to observe spending increasing with greater levels of student needs and other cost factors, but not with the wealth of the local community.

### Spending Equity Analysis Methodology

Following conceptual frameworks from recent research on funding for both K–12 schools (Atchison et al., 2020, 2023; Baker et al., 2020; Kolbe et al., 2019) and community colleges (Baker & Levin, 2017; Kolbe & Baker, 2019; Levin et al., 2022), a regression analysis was used to evaluate the extent to which spending variation across institutions is a function of factors that arguably *should* explain spending variation. Notably, some of these factors that should be positively related to spending (student needs) may, in fact, be negatively related. When observed spending is positively associated with specific factors thought to put upward pressure on the cost of providing education services, we call this type of relationship *progressive*. In contrast, when observed spending is negatively associated with factors thought to exert upward cost pressure, we call this type of variation *regressive*.

The basic structure of the regression equation estimated at the institution level for this analysis is as follows:

**Per-Student Spending =  $f$ (Student Needs, Institutional Contextual Factors, Geographic Contextual Factors)**

In this equation, per-student spending refers to overall or instructional spending per 12-month headcount. Student needs includes the percentages of students who are female, Black, Hispanic, 25 years or older, Pell grant recipients, first-generation college students, U.S. military veterans, English learners, or foster youth. Institutional contextual factors refer to the percentage of undergraduates who are full-time, the share of community college completions awarded in health and science or technology, and college Carnegie classification. Lastly, geographic contextual factors include the Herfindahl-Hirschman index, which represents the degree of competition posed by institutions competing in the same geographic area or market. Additionally, geographic context includes a measure of the average annual faculty salary across surrounding colleges within the same Core Based Statistical Area (CBSA) defined by the U.S. Office of Management and Budget.

We also followed school finance literature that draws upon theories of voter demand for education in evaluating how local economic characteristics predict spending levels for community colleges (Duncombe & Yinger, 2011). This additional model considers factors such as measures of resident household income, which may influence community college revenues and consequently spending levels. Additionally, the taxable property wealth in a district affects the amount of local taxes that can be raised, potentially impacting community college revenue and spending.

The relationship between these contextual factors and spending patterns can be interpreted in two ways. If spending variations driven by these contextual factors align appropriately with variations in student needs and costs, this suggests that the funding system is responding effectively to local economic conditions while still addressing educational requirements. However, if spending is only weakly associated (or even negatively associated) with student needs and cost factors, but strongly positively associated with local economic and demographic conditions, this may indicate a misalignment between resource allocation and educational needs. Such a situation would warrant further investigation.

To examine these relationships, we employ the following regression model estimated at the institution level:

**Per-Student Spending =  $f$ (Fiscal Capacity, Institutional Contextual Factors, Geographic Contextual Factors)**

In this model, per-student spending again reflects overall or instructional spending per 12-month headcount. Fiscal capacity represents local wealth disparity as proxied by county assessed property value per capita and the county median household income. Both the

institutional contextual factors (percentage of undergraduates who are full-time, the share of completions awarded in health and science or technology, and the Carnegie classification) and geographic contextual factors (the Herfindahl-Hirschman index and the average annual faculty salary across the surrounding colleges within the CBSA) are the same as the preceding model described above.

## **Key Findings from the Spending Equity Analysis**

This section presents the results from the spending equity analysis, aimed at understanding how spending varies with respect to student needs and economic context using institution-level regression models.

The results reported in Exhibit 3 indicate statistically significant relationships between per-student spending and various student need factors (denoted by arrows in the cells). Specifically, community colleges with higher percentages of female students and foster youth are expected to spend more on instruction after controlling for other needs and contextual factors, indicating progressive spending patterns.<sup>7</sup> Similarly, community colleges with higher percentages of female students spend more per student overall. However, those with a greater proportion of Pell Grant recipients tend to spend less on instruction, suggesting a regressive relationship.

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<sup>7</sup> Exhibit C–4 in Appendix C provides complete output for the estimated regression models of instructional and overall spending per 12-month headcount on student needs and other cost factors.

### Exhibit 3. Relationships Between Spending Per Student and Student Needs

| Student need factor                                              | Instructional spending per 12-month headcount | Overall spending per 12-month headcount |
|------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------|
| Percentage of students who are female                            | ↑                                             | ↑                                       |
| Percentage of students who are Black                             | –                                             | –                                       |
| Percentage of students who are Hispanic                          | –                                             | –                                       |
| Percentage of students who are 25 years old or older             | –                                             | –                                       |
| Percentage of students who received a Pell grant                 | ↓                                             | –                                       |
| Percentage of students who are first-generation college students | –                                             | –                                       |
| Percentage of students who are U.S. military veterans            | –                                             | –                                       |
| Percentage of students who are English learner students          | –                                             | –                                       |
| Percentage of students who are foster youth                      | ↑                                             | –                                       |

*Note.* ↓ denotes statistically significant *negative* relationship between spending and student need factor; ↑ denotes statistically significant *positive* relationship between spending and student factor; – denotes statistically insignificant relationship between spending and student need factor. All estimated regression models were weighted by 12-month FTE student enrollment. Full regression results are included in Appendix C.

Exhibit 4 reports the results from the second equity analysis, which aims to understand how spending relates to economic context. Community colleges in areas with higher property values tend to spend more per student both on instruction and overall, indicating a regressive relationship between spending and local economic conditions.<sup>8</sup> However, those with greater median household income tend to spend less per student both on instruction and overall, suggesting a progressive relationship.

<sup>8</sup> Exhibit C–5 in Appendix C provides complete output for the estimated regression models of instructional and overall spending per 12-month headcount on local property wealth and household income.



Exhibit 4. Relationships Between Spending and Local Property Wealth/Household Income

| Fiscal capacity factor           | Instructional spending per 12-month headcount | Overall spending per 12-month headcount |
|----------------------------------|-----------------------------------------------|-----------------------------------------|
| County assessed value per capita | ↑                                             | ↑                                       |
| County median household income   | ↓                                             | ↓                                       |

Note. ↑ denotes statistically significant *positive* relationship between spending and wealth/income factor; ↓ denotes statistically significant *negative* relationship between spending and wealth/income factor; – denotes statistically insignificant relationship between spending and wealth/income factor. All estimated regression models were weighted by 12-month FTE student enrollment. Full regression results are in Appendix C.

Revenue Equity Analysis Methodology

We now shift to the revenue equity analysis, examining how local and state funding provided to districts align with indicators of fiscal capacity such as assessed value per capita and median household income. The intent is to understand whether community college districts in areas with higher fiscal capacity receive more state funding per student than those in areas with lower fiscal capacity, taking into consideration other observable factors such as institutional structure and geographic context. Recognizing potential implications for equity, the revenue equity analysis aims to highlight the extent to which funding allocations may systematically advantage or disadvantage community colleges based on the wealth and income of the communities they serve.

The district-level regression model for the revenue equity analysis is as follows:

$$\text{Funding Appropriation} = f(\text{Fiscal Capacity, Institutional Contextual Factors, Geographic Contextual Factors})$$

In this specification, funding appropriation represents the per-student amount of funding received by the community college district through local or state sources. Fiscal capacity again refers to local wealth disparities as proxied by county assessed property value per capita and the county median household income. Institutional structure refers to the percentage of undergraduates who are full-time, the share of completions awarded in health and science or technology, and the Carnegie classification. Geographic context includes the Herfindahl-Hirschman index and the average faculty salary across surrounding districts, both calculated within the CBSA.

Key Findings from the Revenue Equity Analysis

This section presents the results from the revenue equity analysis, aimed at understanding how variations in local and state appropriations per student are associated with fiscal capacity indicators such as assessed value per capita and median household income. The first row in Exhibit 5 shows that there is no statistically significant relationship between county assessed property value per capita and local appropriations or state appropriations per student provided to a community college district. In contrast, the results in the second row of the exhibit show that districts in counties with greater median household income tend to have higher local appropriations per student, while also tending to have lower state appropriations per student. This suggests that while local income may enable higher local appropriations per pupil, denoting a regressive funding pattern, state appropriations are progressive with respect to household income.

Exhibit 5. Relationships Between Local/State Appropriations and Local Property Wealth/Household Income

| Fiscal capacity factor           | Local appropriation per 12-month headcount | State appropriation per 12-month headcount |
|----------------------------------|--------------------------------------------|--------------------------------------------|
| County assessed value per capita | –                                          | –                                          |
| County median household income   | ↑                                          | ↓                                          |

Note. ↑ denotes statistically significant *positive* relationship between appropriation and wealth/income factor; ↓ denotes statistically significant *negative* relationship between appropriation and wealth/income factor; – denotes statistically insignificant relationship between appropriation and wealth/income factor. All estimated regression models were weighted by 12-month FTE student enrollment. Full regression results are in Appendix C.

Cost Analysis

Building upon insights gleaned from the needs and equity analyses, we now turn to the cost analysis. This component aims to quantify the resources required to mitigate the influence of student need characteristics on outcomes, while accounting for institutional and contextual differences. Whereas the student needs analysis identified student factors most strongly associated with outcomes, and the equity analysis revealed how current spending patterns align with these needs, the cost analysis seeks to bridge the gap between “what is” and “what should be,” in terms of necessary spending to provide an equal opportunity for all community colleges or community college districts to offer an education that allows their students to achieve at a target outcome level.

The cost analysis serves crucial functions in our examination of California’s community college funding system. First, it builds upon the student needs analysis by translating identified student needs into concrete funding requirements. Second, it extends the spending equity analysis by moving beyond current spending patterns to estimate optimal funding levels that are capable of supporting an equal opportunity for students to achieve the same level on a common outcome. As a result, this analysis offers policymakers a nuanced understanding of the financial implications of generating equitable outcomes for the diverse student populations and institutional contexts across California community colleges.

## Cost Analysis Methodology

Our analysis employs the education cost function, a statistical method widely used in educational finance research (Duncombe & Yinger, 1999, 2011). This approach allows us to estimate the relationship between educational outcomes and the spending required to achieve them, while accounting for various institutional and contextual factors. The education cost function is particularly well-suited to our study, as it allows for the incorporation of multiple factors identified in our conceptual framework, including student needs, resource prices, and structural and geographic constraints.

The primary aim of the cost function analysis is to identify the statistical relationship between spending and student outcomes, while accounting for differences in student needs and other factors thought to influence the cost of generating outcomes. With policy outcomes in mind, we leverage this information to ascertain the requisite spending levels for each institution or community college district to achieve standardized success metrics such as earning a degree or certificate within a specified timeframe while taking into account the unique student populations served and contexts in which they operate.

As with our needs and equity analyses, our models use institution and district level data on the following:

- **Outcome measures:** We focus on two key outcome measures to quantify student success – the IPEDS 200% graduation Rate and the California Vision Goal completion rate. These measures provide a robust picture of student success across different timeframes and state-specific goals.
- **Student needs characteristics:** Building on our student needs analysis, we incorporate factors such as the percentage of Pell Grant recipients, students from foster care backgrounds, and non-traditional students over 25 years of age.
- **Institution and district characteristics:** Drawing from our equity analysis, we include factors such as institution size and academic program mix.

- ***Geographic and economic context:*** We incorporate measures of local labor costs and economic conditions to account for regional variations in resource prices.

The dependent variable in our cost model is spending per FTE student enrolled. This measure represents the value of the resources used to provide a community college education on a per-student basis, including both expenditures that directly contribute to the outcomes included in the model and those that may not. We recognize that not all spending directly influences the measurable outcomes included in our models. In turn, some expenditures may be interpreted as “inefficient” with respect to the specific outcomes that are included in the model but nevertheless contribute to other important institutional goals that we do not observe. To account for this possibility, our model also incorporates variables (efficiency controls) that attempt to control for spending that may not directly influence the outcomes that have been included.

### ***Addressing Endogeneity: The Instrumental Variables Approach***

A key methodological challenge in cost function analysis is the potential endogeneity between spending and outcomes. This arises from the simultaneous determination of outcomes and spending decisions. Specifically, while desired outcomes drive spending decisions, we also recognize that spending can affect outcomes. When this simultaneity is not controlled for there is a potential for the model estimates to be biased. To address this issue and ensure unbiased estimates, we employ an instrumental variables (IV) approach.

The IV method requires identifying variables—referred to as instruments—that are strongly related to student outcomes but not directly related to spending. After careful consideration and statistical testing, we selected two instruments: the percentage of students eligible for free or reduced-price lunch in the K–12 districts within the county served by the community college, and the Stanford Education Data Archive (SEDA) outcome index, a nationally-normed measure of math and reading assessment scores for grades 3 through 8 in the county in which the community college is located.

These instruments meet the criteria of instrument strength (a strong association with community college outcomes) and instrument validity (no direct relationship with college spending). Our hypothesis is that community college outcomes are influenced by the academic preparation and socioeconomic background of incoming students, as reflected in these K-12 measures, while these factors do not directly determine college spending decisions. We conducted rigorous statistical tests to confirm the strength and validity of our instruments, including the Partial-F statistic for instrument relevance and the Hansen J statistic for

overidentification. These tests provided strong support for our instrument selection, ensuring the robustness of our cost function estimates.<sup>9</sup>

### **Model Specification**

We employed four distinct sets of models in our analysis, each utilizing a different outcome measure (IPEDS 200% graduation rate and 3-Year California Vision Goal completion rate) and a different level of observation (institution level and community college district level). While outcome measures and student characteristics vary across individual institutions, spending measures are consistent only within community college districts, reflecting the reality that districts typically operate as fiscal agents managing resource allocation across their constituent institutions.

Our basic model specification is as follows:

$$\text{Per-Student Spending} = f(\text{Outcome, Student Needs, Institutional Contextual Factors, Geographic Contextual Factors, Efficiency Controls})$$

In this equation, per-student spending refers to overall spending per FTE student. Outcome is the instrumented student outcome measure (IPEDS 200% graduation rate or California 3-Year Vision Goal completion rate),<sup>10</sup> student needs is the host of aforementioned student characteristics, institutional contextual factors includes program mix (percentages of students completing degrees/certificates in health, science or technology), geographic contextual factors account for regional variations in costs and economic conditions (faculty salaries), and efficiency controls such as the Herfindahl-Hirschman Index of market competition. By including this competition measure, we aim to control for factors that might influence spending levels beyond the direct costs associated with producing those outcomes directly observed in the model.

## **Key Findings from the Cost Analysis**

### **Outcomes**

The cost analysis results listed in Exhibit 6 show that there is a consistent statistically significant and positive relationship between student outcomes and spending per full-time equivalent (FTE) student across all four estimated models. For the IPEDS 200% graduation rate outcome

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<sup>9</sup> Tables C-7 and C-8 contain the results of the estimated first-stage regressions used to isolate exogenous variation in student outcomes (the IPEDS 200% graduation rate and the California 3-Year Vision Goal completion rate).

<sup>10</sup> That is, in line with the IV approach described above the outcome measures are predicted using an auxiliary model that includes the instruments as independent variables.

measure, our models estimate that it would require \$49,454 to \$52,427 per full-time equivalent (FTE) student to raise completion rates from 0% to 100%.<sup>11</sup> While these estimates are substantial, it is important to consider more realistic scenarios in terms of the range of completion rates observed across community colleges. For instance, increasing the completion rate from the 2020–21 statewide average of 45% to 55% would require about \$5,243 per FTE more for the typical community college institution, representing a 30% increase above the average actual per-FTE student spending of \$17,523 in the same year.

The 3-Year California Vision Goal completion metric, which is a more stringent measure of student success, shows even higher associated costs. Moving this metric from 0% to 100% would require an additional \$64,752 to \$65,292 per FTE student.<sup>12</sup> However, improving this rate from the 2020–21 statewide average of about 13% to 20% for the typical institution would cost \$4,533 per FTE more (a 26% increase above average actual spending). Both models demonstrate that raising outcome standards, regardless of the metric used, would indeed require significant additional investment. However, they also suggest that targeted increases in funding could yield substantial improvements in student success rates.

### ***Student Needs***

The cost analysis also explores the cost implications of serving students with various needs, building directly on the insights from our student needs analysis. The most pronounced effect is observed for students from a foster care background. Our models suggest that compared to an institution serving 0% students of its students who were in foster care, one with 100% of its students with a foster care background would require an additional \$70,791 to \$76,609 per FTE student in order to provide it with an equal opportunity to achieve when considering the IPEDS 200% graduation rate and \$56,009 to \$55,336 per FTE for the California 3-Year Vision Goal completion rate.

However, given that the average share of foster care students in 2020–21 across institutions was about 2%, with higher-need institutions serving around 4%, the practical cost differences between average and high-need institutions to provide an equal opportunity that accounts for foster care students in terms of the IPEDS 200% graduation rate and California 3-Year Vision Goal completion rate are \$1,049 and \$1,295 per FTE student (6% to 7% above average actual spending), respectively.

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<sup>11</sup> The range is taken from the regression estimates generated by the institution and community college district models listed in Exhibit C–8 in Appendix C.

<sup>12</sup> The range is taken from the regression estimates generated by the institution and community college district models listed in Exhibit C–10 in Appendix C.

The findings also show that the proportions of students who are older than 25 significantly increase the costs of attaining higher IPEDS 200% graduation rates and California 3-Year Vision Goal completion rates, regardless of whether the analysis was conducted at the institution or community college district level.<sup>13</sup> Finally, the results from both the institution- and district-level models suggest that the proportions of students who are female or qualify for Pell Grants also significantly impact the costs of attaining a higher IPEDS 200% graduation rate.<sup>14</sup>

#### Exhibit 6. Relationships Between Student Outcomes/Needs and Spending Per Student from Cost Function Models

| Student outcome or need factor                       | Total expenditures per full-time equivalent student |                |                                          |                |
|------------------------------------------------------|-----------------------------------------------------|----------------|------------------------------------------|----------------|
|                                                      | IPEDS 200% graduation rate cost model               |                | California 3-Year Vision Goal cost model |                |
|                                                      | Institution level                                   | District level | Institution level                        | District level |
| <b>Outcome</b>                                       |                                                     |                |                                          |                |
| IPEDS 200% graduation rate                           | ↑                                                   | ↑              | N/A                                      | N/A            |
| Vision Goal completion rate                          | N/A                                                 | N/A            | ↑                                        | ↑              |
| <b>Student need factor</b>                           |                                                     |                |                                          |                |
| Percentage of students who are female                | ↑                                                   | ↑              | –                                        | –              |
| Percentage of students who received a Pell grant     | ↑                                                   | ↑              | –                                        | –              |
| Percentage of students who are 25 years old or older | ↑                                                   | ↑              | ↑                                        | ↑              |
| Percentage of students who are foster youth          | ↑                                                   | ↑              | ↑                                        | ↑              |

*Note.* ↑ denotes statistically significant *positive* relationship between outcome or student need and spending; – denotes statistically insignificant relationship between student outcome and need factor. All estimated regression models were weighted by 12-month FTE student enrollment. Full regression results are in Appendix C.

<sup>13</sup> The range of costs moving from 0% to 100% of students who are 25 years or older is from \$32,840 to \$35,108 for the model of IPEDS 200% graduation rates and from \$19,580 to \$20,002 for the model of California 3-Year Vision Goal completion rates.

<sup>14</sup> Specifically, per the models using IPEDS 200% graduation rates estimate that institutions and community college districts serving 100% Pell Grant recipients would require an additional \$18,592 to \$19,455 per FTE student compared to an institution serving no Pell Grant recipients. The same models estimate the range of additional cost for an institution or district serving 100% female students compared to 0% to be \$19,192 to \$20,357 per FTE student.



### ***Additional Contextual Factors***

The findings of the cost analysis also revealed two additional contextual factors that had a positive influence on costs. The percentage of completions awarded in health proved to be statistically significant in the cost models run for both outcomes, while the average faculty salaries in other colleges offering associate degrees in the same market proved to be significant in the cost model using the California 3-Year Vision Goal completion rate as an outcome.

These findings have important practical implications. First, institutions with a higher percentage of health-related completions may require additional funding to maintain their programs and achieve similar completion rates as institutions with fewer health-related programs. This could be due to the higher costs associated with health programs, such as specialized equipment and facilities. For instance, our models suggest that for every 10 percentage point increase in health-related completions, the typical institution would require an additional \$1,616 to \$1,766 per FTE student to maintain the same IPEDS 200% graduation rate.

Second, the significance of average faculty salaries in nearby institutions suggests that community colleges in areas with higher overall faculty compensation levels may need additional funding to compete for instructor talent and maintain similar student completion rates. Specifically, for every \$1,000 increase in the average faculty salary at nearby institutions, a community college would need an additional \$477 to \$484 per FTE student to achieve the same California 3-Year Vision Goal completion rate. This highlights the importance of considering regional labor market conditions when determining funding allocations for community colleges.

### ***Visualizing Costs for Outcomes and Students Needs***

To better facilitate interpretation of our cost model findings, in Exhibits 7 and 8 report the additional cost per FTE student associated with one percentage point increases in the student outcomes, student needs, and other contextual factors estimated using the models that include as student outcomes the IPEDS 200% graduation rate and California 3-Year Vision Goal completion rate, respectively.

Both exhibits show that the estimated additional cost of a percentage point increase in each factor is relatively consistent across our institution-level (blue) and district-level (grey) models. This suggests that our cost findings are not sensitive to the level of aggregation in our data, a positive indicator for robustness. Given this consistency, in the remainder of this section we exclusively reference the institution-level model when citing specific figures.

The results show that certain factors are associated with greater additional cost of producing student outcomes than others. For example, Exhibit 7 shows that providing an equal



opportunity in terms of the IPEDS 200% graduation rate in institutions serving students who are older than 25 cost an additional \$351 per FTE student for each percentage point in the share of college enrollment belonging to this group. In contrast, the additional cost of providing a similar equal opportunity associated with each percentage point of student enrollment who is a Pell recipient rate is \$195 per FTE student.

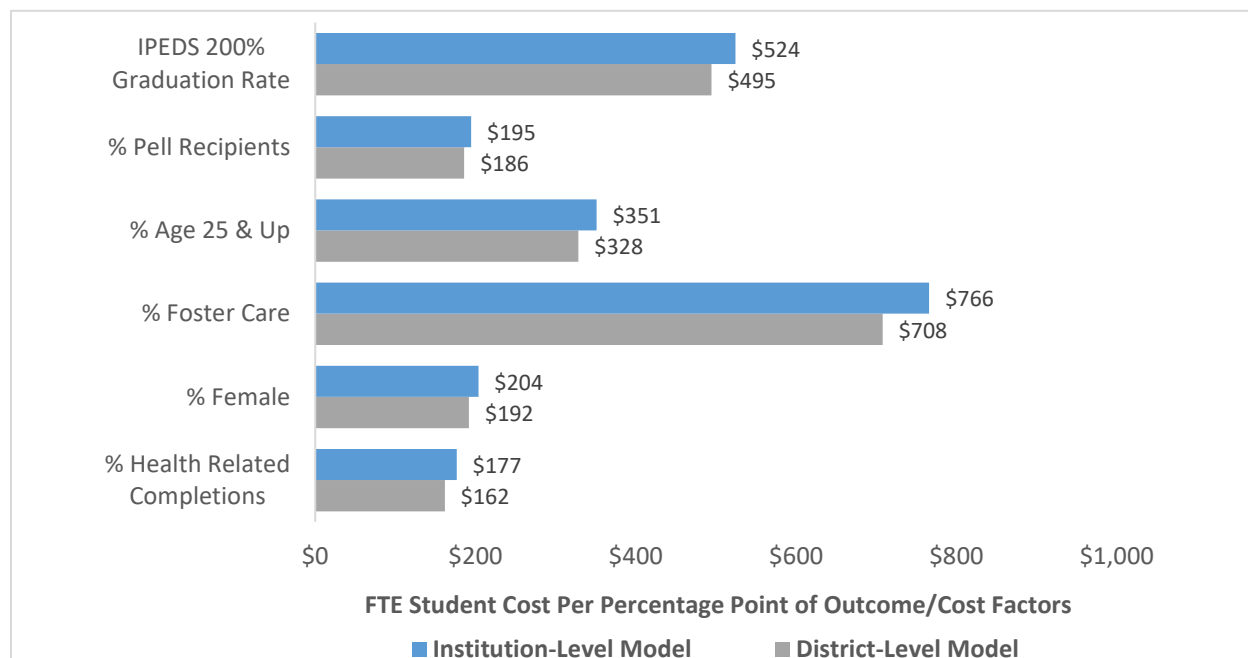
However, these percentage-point measures lack context for the magnitude of this difference (i.e., a one percentage point in the Pell recipient rate may not represent a meaningful change in this measure relative to its overall distribution?) To address this, we can use the means and standard deviations of the factors for the most recent year in the study period (2020–21) reported in Exhibit B-5 to further contextualize the practical meaning of the costs reported in percentage-point terms. For example, while we have already reported the additional cost of one percentage point of student enrollment who receive a Pell grant (\$195), it may be informative to consider the cost associated with a more realistic contrast in this student need measure. The descriptive statistics in Exhibit B-5 show that a one standard deviation of the institution distribution of the Pell grant recipient rate in 2020–21 is approximately 12%. In turn, providing an equal opportunity at a community college where the Pell recipient rate is one standard deviation above the statewide average of 41% would cost roughly \$2,340 more per FTE student (equal to  $12 \times \$195$ ).

The results reported in Exhibits 7 and 8 also suggest that raising IPEDS 200% graduation rates by one percentage point costs less than a one percentage point increase in the more stringent California 3-Year Vision Goal completion rate (\$524 versus \$648 per FTE). However, if we consider the cost of improving outcomes by one standard deviation for each of these measures, we observe the opposite pattern.<sup>15</sup> Raising IPEDS 200% graduation rates from the 2020–21 statewide average of 45% to 62%, roughly equal to a one standard deviation (17%) improvement, is estimated to cost \$8,908 per FTE student (equal to  $17 \times \$524$ ). Raising California Vision Goal completion rates from the 2020–21 statewide average of 13% to 18%, also a one standard deviation (5%) increase, is estimated to cost about \$3,240 per FTE student (equal to  $5 \times \$648$ ). Therefore, while on a per-percentage point basis, we estimate it is less costly to raise IPEDS 200% graduation rates than California Vision Goal completion rates, when we consider the cost of raising the outcome of an institution by one standard deviation we see that the 200% IPEDS graduation rate actually has the higher expected cost, on average.

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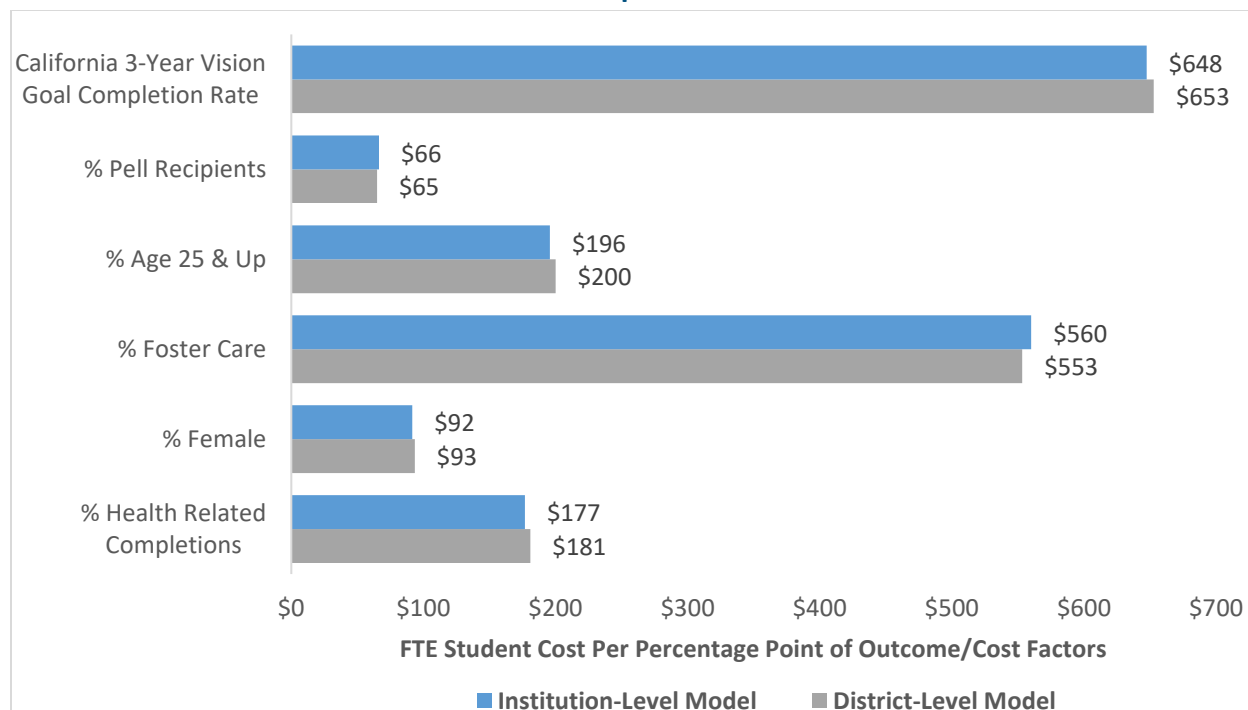
<sup>15</sup> To put this contrast in perspective, a one standard deviation improvement can be interpreted as an increase in the performance of an institution at the 50<sup>th</sup> percentile of the outcome distribution to the 84<sup>th</sup> percentile.

**Exhibit 7. Estimated Additional Costs Per FTE Student Associated with Percentage Point Increases in IPEDS 200% Graduation Rate and Other Cost Factors**



Note. Reported values derived from Exhibit C-8.

**Exhibit 8. Estimated Additional Costs Per FTE Student Associated with Percentage Point Increases in California 3-Year Vision Goal Completion Rate and Cost Factors**



Note. Reported values derived from Exhibit C-10.

Making similar comparisons using the data reported in Exhibits 7, 8, and B-5 can help further elaborate on the implications of our cost model findings.

## Discussion and Conclusion

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Our study demonstrates the potential of applying school finance methods that have been used in the K-12 sector for over two decades to investigate community college costs. Specifically, we bring to bear the application of cost-function techniques, to estimate the cost of producing community college student outcomes, including the IPEDS 200% graduation rate and 3-Year California Vision Goal. This novel application of the cost function approach is generalizable and addresses a long-standing need in higher education finance for robust techniques that can determine the levels of community college funding necessary to produce student outcomes associated with persistence and completion and to ensure that all students are provided with an equal opportunity to achieve these outcomes.

More specifically, we were able to provide a demonstration of how publicly available data on California's community colleges can be used to generate cost-based estimates for community college outcomes that vary according to student needs, and institutional, geographic, and economic contextual factors. The insights generated by this type of model may prove useful for developing a more equitable cost-based mechanism with which to distribute funding to California community colleges.

For example, we demonstrated that a cost function model can be used to estimate the cost of improving California community college outcomes to specific target levels. The findings suggest that raising California's statewide 3-Year Vision Goal completion rates from the 2020–21 average of 13% to 20% is projected to require an investment of approximately \$4,533 per FTE student, equal to a 26% increase above actual spending in that year. Similarly, raising the IPEDS 200% graduation rate from the 2020–21 statewide average of 45% to 55% is estimated to cost about \$5,243 per FTE student (equal to a 30% increase over actual spending). This demonstrates that improving student outcomes in community colleges requires more funding, and most importantly, that our model can provide policymakers with tailored insights into how much additional funding is required to produce specific outcome levels.

Likewise, we were able to estimate the incremental cost for colleges serving greater shares of students with various needs. For every one percentage increase in enrollment of students who are Pell grant recipients, the cost to a typical community college of producing student outcomes as measured by the IPEDS 200% graduation rate increases by \$195 per FTE student. For the share of students enrolled who are older than 25, the cost is \$351 per FTE student for

every percentage point increase. Finally, we estimate an additional percentage point of foster youth enrollment share is associated with an additional \$737 in cost per FTE student. Ensuring all students have an equal learning opportunity requires that community colleges are provided the funding to meet these costs. Our cost function approach provides an evaluative framework for understanding whether these costs are being met by the current funding system in California. It also offers a structure for a funding formula that could be developed to meet these needs.

Finally, we demonstrated that institutional and geographic contextual factors also influence the cost to community colleges of producing student outcomes. Specifically, we find that a one percentage point increase in the share of certificate or degree completions that are health-related is associated with a \$177 increase in cost per FTE student of producing IPEDS 200% graduation. Colleges that operate in areas with competitive faculty labor markets have higher costs as well. Once again, these numbers demonstrate the value of the cost-modelling approach, as we can identify the institution and geographic characteristics that drive costs for community colleges to generate student outcomes. These insights which can be used to ensure funding policies are designed to meet these costs and provide equal learning opportunities.

Note, our reliance solely on publicly accessible data leads us to urge caution that the specific findings should not be interpreted as precise or authoritative at this time. While the estimated relationships between college spending and outcomes, student characteristics, and contextual factors align well with our expectations, addressing data missingness and gaining access to additional data regarding student needs or other factors could provide additional determinants of cost and improve the precision of our estimates.

Nonetheless, our demonstration of the cost function method has important implications for the community college funding system in California. Specifically, the findings raise several questions that the state should consider and research further:

- Is current funding meeting the needs of the system as a whole?
- What factors should be used to adjust community college funding to meet these costs?
- To what extent do the student characteristics accounted for in the California Student Centered Funding Formula (AB540, California College Promise Grant, and Pell Grant Recipients) align with the factors identified empirically by the cost function findings as driving the differential costs of providing an equal educational opportunity to students with different needs?

- Does the Student Centered Funding Formula provide the funding necessary for all community colleges to have an equal opportunity to leverage the performance-based funding incentives?

Developing and implementing a community college funding system that (1) is sufficiently funded to meet desired student outcome goals and (2) distributes funding appropriately to address the differential costs associated with student needs and other contextual factors offers a transformative potential for and improving the efficacy and equity of community college education in California. The current study demonstrates the feasibility of a rigorous and innovative methodology that can be used to lead this crucial work and answer the questions raised by our findings.

We believe that the promise shown by the application of cost functions to better understand the true cost of community college in California indicates a need for a future study that leverages more nuanced and complete records on student needs and other institutional factors. The estimates produced by such a study could produce groundbreaking results and provide the best available evidence on the cost of improving student outcomes statewide and ensuring that all students are offered an equal opportunity to achieve.

## References

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- American Association of Community Colleges. (2024). *Fast Facts 2024*.  
[https://www.aacc.nche.edu/wp-content/uploads/2024/02/Fast\\_Facts\\_2024.pdf](https://www.aacc.nche.edu/wp-content/uploads/2024/02/Fast_Facts_2024.pdf)
- Atchison, D., Levin, J., Baker, B., & Kolbe, T. (2020). Equity and adequacy of New Hampshire school funding: A cost modeling approach. American Institutes for Research.  
[https://carsey.unh.edu/sites/default/files/media/2020/09/20-12685\\_nh\\_final\\_report\\_v10.pdf](https://carsey.unh.edu/sites/default/files/media/2020/09/20-12685_nh_final_report_v10.pdf)
- Atchison, D., Levin, J., Fatima, S., Trauth, A., Srikanth, A., Heberle, C., Gannon-Slater, N., Junk, K., Wallace, L., & Baker, B. (2023). *Assessment of Delaware Public School Funding*. Washington, DC: American Institutes for Research.  
[https://education.delaware.gov/wp-content/uploads/2023/12/23-22933\\_1\\_Delaware\\_Full\\_Report-FMT-ed103023-Version-2.pdf](https://education.delaware.gov/wp-content/uploads/2023/12/23-22933_1_Delaware_Full_Report-FMT-ed103023-Version-2.pdf)
- Baker, B. D., Di Carlo, M., & Weber, M. (2020). The adequacy and fairness of state school finance systems: Key findings from the School Finance Indicators Database. Albert Shanker Institute. [https://www.schoolfinancedata.org/wp-content/uploads/2020/02/SFID\\_AnnualReport\\_2020.pdf](https://www.schoolfinancedata.org/wp-content/uploads/2020/02/SFID_AnnualReport_2020.pdf)
- Baker, B. D., & Green, P. C. (2012). Conceptions, measurement, and application of educational adequacy and equal educational opportunity. In G. Sykes, B. Schneider & D. Plank (Eds.), *Handbook of Education Policy Research* (pp. 438–452). Routledge.
- Baker, B., & Levin, J. (2017). *Estimating the real cost of community college*. The Century Foundation. <https://tcf.org/content/report/estimating-real-cost-community-college/#easy-footnote-bottom-10-22636>
- Baum, S., Kurose, C., & McPherson, M. (2013). An overview of American higher education. *The Future of children*. <https://doi.org/10.1353/foc.2013.0008>
- Berne, R., & Stiefel, L. (1984). *The Measurement of Equity in School Finance: Conceptual, Methodological, and Empirical Dimensions*. Johns Hopkins University Press.
- Bound, J., Braga, B., Khanna, G., & Turner, S. (2019). *Public Universities: The Supply Side of Building a Skilled Workforce*. RSF: The Russell Sage Foundation Journal of the Social Sciences.
- California Community Colleges. (n.d. -a). *Student enrollment and demographics*.  
<https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Digital-Innovation-and-Infrastructure/research-data-analytics/data-snapshot/student-demographics>

- California Community Colleges. (n.d. -b). *Key facts*. <https://www.cccco.edu/About-Us/Key-Facts>
- California Community Colleges. (n.d. -c). *Student Centered Funding Formula*.  
<https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/College-Finance-and-Facilities-Planning/Student-Centered-Funding-Formula>
- Chakrabarti, R., Gorton, N., & Lovenheim, M. F. (2018, September). *The effect of state funding for postsecondary education on long-run student outcomes*. In IZA World Labor Conference, Institute of Labor Economics, Berlin, June (pp. 28-29).
- Chetty, R., Friedman, J., Saez, E., Turner, N., Yagan, D. (2020) Income Segregation and Intergenerational Mobility Across Colleges in the United States. *The Quarterly Journal of Economics*, 135(3), pp. 1567–1633. <https://doi.org/10.1093/qje/qjaa005>
- Cummings, K., Laderman, S., Lee, J., Tandberg, D., & Weeden, D. (2021). *Investigating the impacts of state higher education appropriations and financial aid*. State Higher Education Executive Officers Association.  
[https://sheeo.org/wpcontent/uploads/2021/05/SHEEO\\_ImpactAppropriationsFinancialAid.pdf](https://sheeo.org/wpcontent/uploads/2021/05/SHEEO_ImpactAppropriationsFinancialAid.pdf)
- Duncombe, W., & Yinger, J. (1999). Performance standards and educational cost indexes: You can't have one without the other. In H. Ladd, R. Chalk, & J. Hansen (Eds.), *Equity and adequacy in education finance* (pp. 260–297). National Academies Press.
- Duncombe, W., & Yinger, J. (2011). Are education cost functions ready for prime time? An examination of their validity and reliability. *Peabody Journal of Education*, 86(1), 28–57.  
<https://eric.ed.gov/?id=EJ912824>
- Hilliard, T. (2011). *Leaving no worker behind: Community colleges retrain the Michigan workforce — and themselves*. Boston: Jobs for the Future.
- Hillman, N. (2020). *Why rich colleges get richer & poor colleges get poorer: The case for equity-based funding in higher education*. Washington, DC: Third Way.
- Kahlenberg, R. D., Shireman, R., Quick, K., & Habash, T. (2018). *Policy strategies for pursuing adequate funding of community colleges*. The Century Foundation.  
<https://tcf.org/content/report/policystrategies-pursuing-adequate-funding-community-colleges/>
- Kelchen, R., Rosinger, K. O., & Ortagus, J. C. (2019). How to Create and Use State-Level Policy Data Sets in Education Research. <https://doi.org/10.1177/2332858419873619>, 5(3).  
<https://doi.org/10.1177/2332858419873619>
- Kolbe, T., & Baker, B. D. (2019). Fiscal equity and America's community colleges. *The Journal of Higher Education*, 90(1), 111-149.

- Kolbe, T., Baker, B., Atchison, D., & Levin, J. (2019). Pupil weighting factors report. University of Vermont. <https://education.vermont.gov/sites/aoe/files/documents/edu-pupil-weighting-factorsreport-act173-sec11-011820.pdf>
- Levin, J., Baker, B., Lee, J., Atchison, D., & Kelchen, R. (2022). *An examination of the costs of Texas community colleges* (REL 2023-142). Regional Educational Laboratory Southwest. <https://ies.ed.gov/use-work/resource-library/report/descriptive-study/examination-costs-texas-community-colleges>
- Romano, R. M., & Palmer, J. C. (2023). Funding adequacy and the community college. In D. A. Smith, C. M. Cain, & J. N. Friedel (Eds.), *Free college: Budgets, mission, & the future. New Directions for Community Colleges*, 203, pp. 165–172. John Wiley & Sons, Inc. <https://doi.org/10.1002/cc.20595>
- Rosinger, K. O., Ortagus, J., Kelchen, R., Cassell, A., & Brown, L. C. (2022). New evidence on the evolution and landscape of performance funding for higher education. *The Journal of Higher Education*, 93(5), 735-768.
- State Higher Education Executive Officers Association, 2023. *State Higher Education Finance (SHEF) FY23*. [https://shef.sheeo.org/wp-content/uploads/2024/04/SHEEO\\_SHEF\\_FY23\\_Report.pdf](https://shef.sheeo.org/wp-content/uploads/2024/04/SHEEO_SHEF_FY23_Report.pdf)
- Texas Association of Community Colleges. (2023). *What is HB 8?* <https://tacc.org/tacc/what-hb-8>
- U.S. Census Bureau. (2022). *Current Population Survey*. <https://www.census.gov/programs-surveys/cps.html>
- You, E., Hillman, N., & Colston, J. (2022). *Financial equity among California Community Colleges. Student Success Through Applied Research*. [https://sstar.wisc.edu/wp-content/uploads/2022/04/sstar\\_ccc\\_2022\\_reportfinal.pdf](https://sstar.wisc.edu/wp-content/uploads/2022/04/sstar_ccc_2022_reportfinal.pdf)



## Appendix A. California's Student-Centered Funding Formula

In 2018, California implemented the Student-Centered Funding Formula (SCFF) for its community college system, replacing the previous enrollment-based model. This reform aimed to improve student outcomes, increase equity, and enhance institutional performance across the state's 116 community colleges. The SCFF distributes state funding through a three-part formula: a base allocation (comprising 60-70% of funds), a supplemental allocation (10-20%), and a student success allocation (10-20%). The base allocation is primarily determined by enrollment, similar to the previous model. The supplemental allocation provides additional funding for colleges serving low-income students, including Pell Grant and California College Promise Grant recipients, as well as undocumented students eligible for AB 540 tuition exemption. The student success allocation rewards colleges for achieving specific outcomes such as degree and certificate completions, successful transfers to four-year institutions, completion of transfer-level math and English courses within the first year, and attainment of regional living wages. This comprehensive approach reflects California's commitment to balancing access, equity, and success in its community college funding strategy, while also maintaining a significant portion of funding based on enrollment to ensure institutional stability.

**Exhibit A–1. Student Success Allocations in the Student-Centered Funding Formula (SCFF) and Success Point Equivalents (in parentheses), 2018-19**

| <b>Outcome</b>                                                                                        | <b>Base Allocation for All Students</b> | <b>Additional Allocation for Pell Grant Recipients</b> | <b>Additional Allocation for California College Promise Grant Recipients</b> |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------|
| Associate degrees for Transfer (ADT) granted                                                          | \$1,760 (4.00)                          | \$666 (1.51)                                           | \$444 (1.01)                                                                 |
| Associate degrees granted (excluding ADT)                                                             | \$1,320 (3.00)                          | \$500 (1.14)                                           | \$333 (0.76)                                                                 |
| Baccalaureate degrees granted                                                                         | \$1,320 (3.00)                          | \$500 (1.14)                                           | \$333 (0.76)                                                                 |
| Credit certificates (16 units or more) granted                                                        | \$880 (2.00)                            | \$333 (0.76)                                           | \$222 (0.50)                                                                 |
| Completion of transfer-level mathematics and English courses within first academic year of enrollment | \$880 (2.00)                            | \$333 (0.76)                                           | \$222 (0.50)                                                                 |
| Successful transfer to four-year university                                                           | \$660 (1.50)                            | \$250 (0.57)                                           | \$167 (0.38)                                                                 |
| Completion of nine or more CTE units                                                                  | \$440 (1.00)                            | \$167 (0.38)                                           | \$111 (0.25)                                                                 |
| Attainment of regional living wage                                                                    | \$440 (1.00)                            | \$167 (0.38)                                           | \$111 (0.25)                                                                 |

*Note.* Exhibit derived from California Community Colleges (n.d. -c). Success Points in parentheses measured in \$440 increments of Student Success Allocations (i.e., 1 Success Point equals \$440 in Student Success Allocation).

# Appendix B. Data Sources and Methods

## Data

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The study team compiled publicly available data from 2014–15 to 2020–21 from the California Community Colleges Chancellor’s Office (CCCCO), the School Finance Indicators Database (SFID), and the Integrated Postsecondary Education Data System (IPEDS). The study team then combined the elements to create institution-level and community college district-level data sets. These integrated data sets cover areas including demographics to account for student needs (i.e., gender, race/ethnicity, age, first-generation status, financial need, English learner status, foster youth status, veteran status); institutional structure and economic setting (i.e., enrollment size, full-time student percentage, academic program focus, total spending per FTE); and student outcomes (i.e., 200% graduation rates, 3-Year California Vision Goal completion rates, and success points per FTE).

### Data Sources

**CalPassPlus.** CalPassPlus is a CCCCCO-vetted clearinghouse that provides data on various student outcomes and metrics for California community colleges, and includes information on enrollment, learning progress, momentum, success, employment, and earnings for different student types across multiple timeframes. The institution-level data collected through CCCCCO and used throughout this study include: Pell grant recipients, foster-youth enrollment, female enrollment, Black enrollment, Hispanic enrollment, nontraditional (age 25+) enrollment, and number of students in a given cohort who completed a Chancellor’s Office approved certificate, AA degree, or CCC bachelor’s degree within 3 years of entry.

**Integrated Postsecondary Education Data System.** The Integrated Postsecondary Education Data System (IPEDS) is a system of surveys conducted annually by the U.S. Department of Education’s National Center for Education Statistics. IPEDS gathers information from every college, university, and technical and vocational institution that participates in federal student financial aid programs. The institution-level data collected through IPEDS and used in this study include: unduplicated student enrollment, full-time equivalent enrollment, completions by program type (CIP), state appropriations, local appropriations, expenditures (instructional and total), latitude/longitude of institution, and Carnegie basic classification. These data elements were used to create two variables—the average faculty salary in the local labor market (at comparable schools within the same U.S. Office of Management and Budget Core Based Statistical Area or CBSA) and the Herfindahl-Hirschman Index (enrollment shares at comparable schools within the same CBSA)—described in the next section.

**School Finance Indicators Database.** The School Finance Indicators Database is a collection of school finance measures that include information on state and local revenue, wealth, income, and taxes. It is updated annually by a team of researchers at the Albert Shanker Institute by compiling publicly available data into district, county, and state-level measures to make school finance measures more accessible to researchers and policymakers alike. The study team used these data to capture measures of population density, median home values, household income, the percentage of authorized taxes levied, and the incidence of students in K–12 school districts receiving special education services.

## Data Preparation

The study team took the following steps to prepare the data for analysis.

**CalPassPlus.** To prepare the data for analysis, the study team downloaded the data from the source website (<https://www.calpassplus.org/LaunchBoard/Student-Success-Metrics.aspx>) at the institution level for each college. This data were cleaned to construct the success points measures and the student needs measures. These variables were rolled up to the district level using an institution-district crosswalk.

**Integrated Postsecondary Education Data System.** IPEDS data were merged with the study data using NCES identifiers (UnitIDs). The study team derived the Herfindahl-Hirschman index and input prices based on local faculty labor markets using the following process. First, the study team determined which colleges were within the same CBSA for each California community college to define the local competitive markets within which to calculate both the Herfindahl-Hirschman Index and local average faculty salary at comparable institutions. The study team then derived the Herfindahl-Hirschman index by summing the squared enrollment shares across colleges within a given local market and that were competitors, defined as those colleges offering similar credentials or degrees using Carnegie classifications. Finally, the study team derived the average faculty salary for those comparable institutions (defined as offering similar credentials or degrees using Carnegie classifications) within the local labor market (that is, within the same CBSA), not including the salaries paid to faculty members at the community college of interest. This data were rolled up to the district level, weighting by FTE enrollment.

**School Finance Indicators Database.** The School Finance Indicators data are reported at the K–12 district level, which were then mapped to the county and service areas for each California community college. The study team mapped the percentage of K–12 students receiving special education services or free lunch services to those communities contiguous to the community college of interest. As such, this variable represents the incidence of potential students participating in special education services or free-lunch services in neighboring communities.

## Exhibit B–1. Key Variables Used for Student Needs Analysis

| Variable                                                         | Source | Level                |
|------------------------------------------------------------------|--------|----------------------|
| <b>Student Outcomes</b>                                          |        |                      |
| IPEDS 200% Graduation Rate                                       | IPEDS  | Institution/District |
| California Vision Goal Completion Rate (3-Year)                  | CCCCO  | Institution/District |
| Success Points per FTE                                           | CCCCO  | Institution/District |
| <b>Covariates</b>                                                |        |                      |
| Percentage of students who are female                            | CCCCO  | Institution/District |
| Percentage of students who are Black                             | CCCCO  | Institution/District |
| Percentage of students who are Hispanic                          | CCCCO  | Institution/District |
| Percentage of students who are 25 years or older                 | CCCCO  | Institution/District |
| Percentage of students who received a Pell grant                 | CCCCO  | Institution/District |
| Percentage of students who are first-generation college students | CCCCO  | Institution/District |
| Percentage of students who are U.S. military veterans            | CCCCO  | Institution/District |
| Percentage of students who are English learner students          | CCCCO  | Institution/District |
| Percentage of students who are foster youth                      | CCCCO  | Institution/District |
| Full-time equivalent enrollment                                  | IPEDS  | Institution/District |
| Percentage of undergraduates who are full-time                   | IPEDS  | Institution/District |
| Percentage of completions awarded in health                      | IPEDS  | Institution/District |
| Percentage of completions awarded in science or technology       | IPEDS  | Institution/District |

## Exhibit B–2. Key Variables Used for Equity Analysis

| Variable                                                         | Source         | Level       |
|------------------------------------------------------------------|----------------|-------------|
| <b>Spending</b>                                                  |                |             |
| Total Spending per 12-month Headcount                            | IPEDS          | District    |
| Instructional Spending per 12-month Headcount                    | IPEDS          | District    |
| <b>Covariates</b>                                                |                |             |
| Percentage of students who are female                            | CCCCO          | District    |
| Percentage of students who are Black                             | CCCCO          | District    |
| Percentage of students who are Hispanic                          | CCCCO          | District    |
| Percentage of students who are 25 years or older                 | CCCCO          | District    |
| Percentage of students who received a Pell grant                 | CCCCO          | District    |
| Percentage of students who are first-generation college students | CCCCO          | District    |
| Percentage of students who are U.S. military veterans            | CCCCO          | District    |
| Percentage of students who are English learner students          | CCCCO          | District    |
| Percentage of students who are foster youth                      | CCCCO          | District    |
| Percentage of undergraduates who are full-time                   | IPEDS          | District    |
| Percentage of completions awarded in health                      | IPEDS          | District    |
| Percentage of completions awarded in science or technology       | IPEDS          | District    |
| Average Faculty Salary (CBSA) <sup>1</sup>                       | IPEDS          | Institution |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>                   | IPEDS          | Institution |
| Carnegie Classification 2005/2010                                | IPEDS          | Institution |
| Median Household Income                                          | Census/SFID    | County      |
| Assessed Property Value (per capita)                             | California BOE | County      |

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

### Exhibit B–3. Key Variables Used for Cost Analysis

| Variable                                                   | Source        | Level                |
|------------------------------------------------------------|---------------|----------------------|
| <b>Spending</b>                                            |               |                      |
| Total Spending per 12-month Headcount                      | IPEDS         | Institution/District |
| State Appropriations per 12-month Headcount                | IPEDS         | Institution/District |
| <b>Student Outcomes</b>                                    |               |                      |
| IPEDS 200% Graduation Rate                                 | IPEDS         | Institution/District |
| California Vision Goal Completion Rate (3-Year)            | CCCCO         | Institution/District |
| <b>Instruments</b>                                         |               |                      |
| SFID-NCES K-12 % Free Lunch                                | SFID/NCES     | County               |
| SFID-SEDA Outcome Index <sup>1</sup>                       | SFID/NCES     | County               |
| <b>Covariates</b>                                          |               |                      |
| Percentage of students who received a Pell grant           | CCCCO         | Institution/District |
| Percentage of students who are 25 years or older           | CCCCO         | Institution/District |
| Percentage of students who are foster youth                | CCCCO         | Institution/District |
| Percentage of students who are female                      | CCCCO         | Institution/District |
| Percentage of undergraduates who are full-time             | IPEDS         | Institution/District |
| Percentage of completions awarded in health                | IPEDS         | Institution/District |
| Percentage of completions awarded in science or technology | IPEDS         | Institution/District |
| Average Faculty Salary (CBSA) <sup>2</sup>                 | IPEDS/Derived | Institution/District |
| Herfindahl–Hirschman Index (CBSA) <sup>3</sup>             | IPEDS/Derived | Institution/District |

<sup>1</sup> This is a nationally normed grades 3 through 8 reading and math assessment score for the county in which the community college resides.

<sup>2</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>3</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

## Sample

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The study team examined the population of 113 public community colleges in California, which collectively serve roughly 1.9 million students (CCC, n.d -a).<sup>16</sup> The data used for this study span from the 2014–15 school year (the earliest year for which CCCCCO data are available) to the 2020–21 school year (the most recent year for which both the CCCCCO and IPEDS data are available). Exhibit B-4 provides descriptive characteristics of the samples of California community college institutions and districts used in study.

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<sup>16</sup> Three colleges (i.e., Madera College, West Valley College, and San Diego College of Continuing Education) had missing or incomplete data, resulting in their being dropped from the sample.



**Exhibit B–4. Descriptive Characteristics of Institution and District Study Samples, 2014–15 to 2020–21**

| Variable                                                         | Institution |                    |              | District  |                    |              |
|------------------------------------------------------------------|-------------|--------------------|--------------|-----------|--------------------|--------------|
|                                                                  | Mean        | Standard Deviation | Observations | Mean      | Standard Deviation | Observations |
| <b>Spending/Funding/Fiscal Capacity</b>                          |             |                    |              |           |                    |              |
| Overall spending per 12-month headcount                          | 13,902.450  | 3,687.798          | 789          | 8,600.682 | 2,443.702          | 802          |
| Instructional spending per 12-month headcount                    | 2,206.378   | 656.801            | 789          | 3,260.219 | 934.126            | 802          |
| Local appropriations per 12-month headcount                      |             |                    |              | 1,527.684 | 1,047.354          | 803          |
| State appropriations per 12-month headcount                      |             |                    |              | 1,575.759 | 844.913            | 803          |
| County Assessed Value per Capita (1,000s)                        |             |                    |              | 147.558   | 53.882             | 792          |
| County Median Household Income (1,000s)                          |             |                    |              | 74.767    | 18.334             | 792          |
| <b>Student Outcomes</b>                                          |             |                    |              |           |                    |              |
| IPEDS 200% Graduation Rate                                       | 0.373       | 0.088              | 714          | 0.362     | 0.088              | 740          |
| California Vision Goal Completion Rate (3-Year)                  | 0.106       | 0.044              | 789          | 0.106     | 0.044              | 803          |
| California Success Points                                        | 1.253       | 0.266              | 789          | 1.251     | 0.264              | 803          |
| <b>Instruments</b>                                               |             |                    |              |           |                    |              |
| SFID-NCES K-12 % Free Lunch                                      | 0.433       | 0.168              | 789          | 0.436     | 0.164              | 791          |
| SFID-SEDA Outcome Index <sup>1</sup>                             | -0.145      | 0.196              | 714          | -0.148    | 0.188              | 792          |
| <b>Covariates</b>                                                |             |                    |              |           |                    |              |
| Percentage of students who are female                            | 0.540       | 0.059              | 789          | 0.540     | 0.058              | 803          |
| Percentage of students who are Black                             | 0.068       | 0.064              | 788          | 0.069     | 0.063              | 802          |
| Percentage of students who are Hispanic                          | 0.463       | 0.168              | 788          | 0.459     | 0.168              | 802          |
| Percentage of students who are 25 years or older                 | 0.441       | 0.098              | 789          | 0.443     | 0.100              | 803          |
| Percentage of students who received a Pell grant                 | 0.401       | 0.115              | 789          | 0.400     | 0.115              | 803          |
| Percentage of students who are first-generation college students | 0.317       | 0.129              | 789          | 0.320     | 0.129              | 803          |
| Percentage of students who are U.S. military veterans            | 0.028       | 0.016              | 789          | 0.028     | 0.016              | 803          |
| Percentage of students who are English learner students          | 0.061       | 0.040              | 789          | 0.062     | 0.041              | 803          |
| Percentage of students who are foster youth                      | 0.018       | 0.017              | 789          | 0.018     | 0.016              | 803          |

<sup>1</sup> This is a nationally normed grades 3 through 8 reading and math assessment score for the county in which the community college resides.

**Exhibit B–4. Descriptive Characteristics of Institution and District Study Samples, 2014–15 to 2020–21 (continued)**

| Variable                                                   | Institution |                    |              | District   |                    |              |
|------------------------------------------------------------|-------------|--------------------|--------------|------------|--------------------|--------------|
|                                                            | Mean        | Standard Deviation | Observations | Mean       | Standard Deviation | Observations |
| <b>Covariates</b>                                          |             |                    |              |            |                    |              |
| Percentage of undergraduates who are full-time             | 0.305       | 0.077              | 788          | 0.306      | 0.077              | 802          |
| Percentage of undergraduates who are full-time             | 0.305       | 0.077              | 788          | 0.306      | 0.077              | 802          |
| <b>Covariates</b>                                          |             |                    |              |            |                    |              |
| Percentage of undergraduates who are full-time             | 0.305       | 0.077              | 788          | 0.306      | 0.077              | 802          |
| Percentage of completions awarded in health                | 0.077       | 0.057              | 789          | 0.078      | 0.056              | 803          |
| Percentage of completions awarded in science or technology | 0.199       | 0.087              | 789          | 0.198      | 0.086              | 803          |
| Average Faculty Salary (CSBA) <sup>2</sup>                 | 10,752.610  | 1,586.936          | 789          | 10,763.670 | 1,484.510          | 792          |
| Herfindahl–Hirschman Index (CSBA) <sup>3</sup>             | 0.208       | 0.292              | 789          | 0.212      | 0.277              | 792          |

**Exhibit B–5. Select Descriptive Characteristics of Institution Study Sample, 2020–21**

| Variable                                                   | Mean       | Standard Deviation | Observations |
|------------------------------------------------------------|------------|--------------------|--------------|
| <b>Spending</b>                                            |            |                    |              |
| Total Spending per 12-month Headcount                      | 17,523.370 | 4,785.199          | 113          |
| <b>Student Outcomes</b>                                    |            |                    |              |
| IPEDS Degree/Certification 200% Graduation Rate            | 0.449      | 0.172              | 113          |
| California 3-Year Vision Goal Completion Rate              | 0.132      | 0.047              | 114          |
| <b>Covariates</b>                                          |            |                    |              |
| Percentage of students who are female                      | 0.569      | 0.077              | 114          |
| Percentage of students who are 25 years or older           | 0.453      | 0.102              | 114          |
| Percentage of students who received a Pell grant           | 0.414      | 0.121              | 114          |
| Percentage of students who are foster youth                | 0.021      | 0.017              | 114          |
| Percentage of undergraduates who are full-time             | 0.304      | 0.083              | 113          |
| Percentage of completions awarded in health                | 0.069      | 0.055              | 113          |
| Percentage of completions awarded in science or technology | 0.182      | 0.082              | 113          |
| Average Faculty Salary (CBSA) <sup>2</sup>                 | 11,447.830 | 1,719.773          | 155          |
| Herfindahl–Hirschman Index (CBSA) <sup>3</sup>             | 0.273      | 0.435              | 155          |

<sup>2</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>3</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

## Appendix C. Supporting Analyses

This appendix provides supporting analyses for the findings in the report.

**Exhibit C–1. Relationships Between Student Need Factors, Institutional Contextual Factors and IPEDS 200% Graduation Rates in California Community Colleges, 2014–15 to 2020–21**

| Student need factor or institutional contextual factor           | IPEDS 200% graduation rate |                       |                |                       |
|------------------------------------------------------------------|----------------------------|-----------------------|----------------|-----------------------|
|                                                                  | Institution-level          |                       | District-level |                       |
|                                                                  | Coefficient                | Robust standard error | Coefficient    | Robust standard error |
| <b>Need factors</b>                                              |                            |                       |                |                       |
| Percentage of students who are female                            | -0.214*                    | 0.085                 | -0.209*        | 0.095                 |
| Percentage of students who are Black                             | -0.117                     | 0.065                 | -0.118         | 0.069                 |
| Percentage of students who are Hispanic                          | -0.000                     | 0.045                 | -0.023         | 0.039                 |
| Percentage of students who are 25 years or older                 | -0.307***                  | 0.063                 | -0.285***      | 0.079                 |
| Percentage of students who received a Pell grant                 | -0.427***                  | 0.067                 | -0.425***      | 0.084                 |
| Percentage of students who are first-generation college students | 0.002                      | 0.041                 | 0.027          | 0.044                 |
| Percentage of students who are U.S. military veterans            | 0.393                      | 0.290                 | 0.328          | 0.194                 |
| Percentage of students who are English learner students          | 0.262*                     | 0.124                 | 0.259          | 0.148                 |
| Percentage of students who are foster youth                      | -0.318                     | 0.254                 | -0.250         | 0.247                 |
| <b>Contextual factors</b>                                        |                            |                       |                |                       |
| Percentage of undergraduates who are full-time                   | 0.300**                    | 0.101                 | 0.319**        | 0.106                 |
| Percentage of completions awarded in health                      | -0.125                     | 0.084                 | -0.101         | 0.085                 |
| Percentage of completions awarded in science or technology       | -0.021                     | 0.064                 | -0.012         | 0.054                 |
| Constant                                                         | 0.670***                   | 0.069                 | 0.635***       | 0.077                 |
| Observations                                                     | 714                        |                       | 740            |                       |
| R-squared                                                        | 0.623                      |                       | 0.616          |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. Year fixed effects included. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

**Exhibit C–2. Relationships Between Student Need Factors, Institutional Contextual Factors and 3-Year Vision Goal Completion Rates in California Community Colleges, 2014–15 to 2020–21**

| Student need factor or institutional contextual factor           | 3-Year California Vision Goal completion rate |                       |                |                       |
|------------------------------------------------------------------|-----------------------------------------------|-----------------------|----------------|-----------------------|
|                                                                  | Institution-level                             |                       | District-level |                       |
|                                                                  | Coefficient                                   | Robust standard error | Coefficient    | Robust standard error |
| <b>Need factors</b>                                              |                                               |                       |                |                       |
| Percentage of students who are female                            | 0.001                                         | 0.056                 | 0.000          | 0.059                 |
| Percentage of students who are Black                             | -0.078                                        | 0.040                 | -0.080         | 0.060                 |
| Percentage of students who are Hispanic                          | -0.019                                        | 0.019                 | -0.019         | 0.023                 |
| Percentage of students who are 25 years or older                 | -0.080**                                      | 0.029                 | -0.081**       | 0.030                 |
| Percentage of students who received a Pell grant                 | -0.101**                                      | 0.033                 | -0.099**       | 0.038                 |
| Percentage of students who are first-generation college students | -0.009                                        | 0.018                 | -0.009         | 0.020                 |
| Percentage of students who are U.S. military veterans            | -0.230                                        | 0.121                 | -0.242         | 0.125                 |
| Percentage of students who are English learner students          | -0.106*                                       | 0.053                 | -0.106*        | 0.052                 |
| Percentage of students who are foster youth                      | -0.049                                        | 0.137                 | -0.037         | 0.158                 |
| <b>Contextual factors</b>                                        |                                               |                       |                |                       |
| Percentage of undergraduates who are full-time                   | 0.203***                                      | 0.037                 | 0.200***       | 0.044                 |
| Percentage of completions awarded in health                      | -0.127***                                     | 0.037                 | -0.128***      | 0.032                 |
| Percentage of completions awarded in science or technology       | -0.095***                                     | 0.024                 | -0.094***      | 0.025                 |
| Constant                                                         | 0.150***                                      | 0.037                 | 0.152***       | 0.041                 |
| Observations                                                     | 788                                           |                       | 802            |                       |
| R-squared                                                        | 0.620                                         |                       | 0.619          |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. Year fixed effects included. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .

**Exhibit C–3. Relationships Between Student Need Factors, Institutional Contextual Factors and the Number of Success Points Earned per Full Time Equivalent Student in California Community Colleges, 2014–15 to 2020–21**

| Student need factor or institutional contextual factor           | Success Points earned per full-time equivalent student |                       |                |                       |
|------------------------------------------------------------------|--------------------------------------------------------|-----------------------|----------------|-----------------------|
|                                                                  | Institution-level                                      |                       | District-level |                       |
|                                                                  | Coefficient                                            | Robust standard error | Coefficient    | Robust standard error |
| <b>Need factors</b>                                              |                                                        |                       |                |                       |
| Percentage of students who are female                            | -0.487                                                 | 0.541                 | -0.497         | 0.535                 |
| Percentage of students who are Black                             | -0.912**                                               | 0.319                 | -0.924         | 0.527                 |
| Percentage of students who are Hispanic                          | -0.263                                                 | 0.153                 | -0.268         | 0.182                 |
| Percentage of students who are 25 years or older                 | -0.062                                                 | 0.205                 | -0.086         | 0.210                 |
| Percentage of students who received a Pell grant                 | 0.039                                                  | 0.241                 | 0.052          | 0.264                 |
| Percentage of students who are first-generation college students | -0.026                                                 | 0.134                 | -0.018         | 0.157                 |
| Percentage of students who are U.S. military veterans            | 0.523                                                  | 1.289                 | 0.388          | 1.253                 |
| Percentage of students who are English learner students          | -1.123**                                               | 0.409                 | -1.161**       | 0.446                 |
| Percentage of students who are foster youth                      | 0.16                                                   | 1.188                 | 0.182          | 1.309                 |
| <b>Contextual factors</b>                                        |                                                        |                       |                |                       |
| Percentage of undergraduates who are full-time                   | -1.121***                                              | 0.279                 | -1.154**       | 0.353                 |
| Percentage of completions awarded in health                      | -0.157                                                 | 0.343                 | -0.169         | 0.314                 |
| Percentage of completions awarded in science or technology       | 0.104                                                  | 0.190                 | 0.110          | 0.174                 |
| Constant                                                         | 1.933***                                               | 0.327                 | 1.962***       | 0.361                 |
| Observations                                                     | 788                                                    |                       | 802            |                       |
| R-squared                                                        | 0.443                                                  |                       | 0.443          |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. Year fixed effects included. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

**Exhibit C–4. Relationships between Institutional Spending and Student Needs, 2014–15 to 2020–21**

| Student need factor or institutional contextual factor           | Instructional spending per 12-month headcount |                       | Overall spending per 12-month headcount |                       |
|------------------------------------------------------------------|-----------------------------------------------|-----------------------|-----------------------------------------|-----------------------|
|                                                                  | Coefficient                                   | Robust standard error | Coefficient                             | Robust standard error |
| <b>Need factors</b>                                              |                                               |                       |                                         |                       |
| Percentage of students who are female                            | 3,287.440*                                    | 921.491               | 5,102.157**                             | 1,875.827             |
| Percentage of students who are Black                             | 823.260                                       | 788.083               | 1,340.018                               | 1,803.076             |
| Percentage of students who are Hispanic                          | 694.928                                       | 404.370               | 777.104                                 | 967.234               |
| Percentage of students who are 25 years or older                 | 717.066                                       | 720.489               | 2,581.953                               | 2,015.460             |
| Percentage of students who received a Pell grant                 | -1841.352*                                    | 831.737               | 757.437                                 | 1,960.811             |
| Percentage of students who are first-generation college students | -23.847                                       | 326.971               | 77.258                                  | 885.284               |
| Percentage of students who are U.S. military veterans            | 838.730                                       | 2,562.625             | 3,032.126                               | 6,278.707             |
| Percentage of students who are English learner students          | 1,695.792                                     | 992.981               | 1,619.757                               | 2,628.611             |
| Percentage of students who are foster youth                      | 5,005.100**                                   | 1,650.227             | 11,924.730                              | 7,310.956             |
| <b>Contextual factors</b>                                        |                                               |                       |                                         |                       |
| Percentage of undergraduates who are full-time                   | 3,981.847***                                  | 790.683               | 12,422.381***                           | 2,371.325             |
| Percentage of completions awarded in health                      | 1,173.285                                     | 810.622               | 3,458.045                               | 1,943.236             |
| Percentage of completions awarded in science or technology       | 150.571                                       | 594.203               | 203.390                                 | 1,272.647             |
| Average Faculty Salary (1,000s, CSBA) <sup>1</sup>               | 0.055                                         | 0.037                 | 0.064                                   | 0.087                 |
| Herfindahl–Hirschman Index (CSBA) <sup>2</sup>                   | 53.941                                        | 215.737               | 99.588                                  | 398.280               |
| Carnegie: AA--Public Rural-serving Medium                        | 490.248*                                      | 236.934               | 497.752                                 | 739.680               |
| Carnegie: AA--Public Rural-serving Large                         | 512.992*                                      | 198.043               | 824.143                                 | 658.223               |
| Carnegie: AA--Public Suburban-Single Campus                      | 202.972                                       | 173.770               | 357.817                                 | 654.000               |
| Carnegie: AA--Public Suburban-Multicampus                        | 266.688*                                      | 116.438               | -138.659                                | 520.923               |
| Carnegie: AA--Public Urban-Multicampus                           | 266.69*                                       | 116.44                | -138.66                                 | 520.92                |
| Constant                                                         | -2,145.758**                                  | 718.154               | -5,227.835**                            | 1,813.656             |
| Observations                                                     | 788                                           |                       | 788                                     |                       |
| R-squared                                                        | 0.422                                         |                       | 0.531                                   |                       |

*Note.* Standard errors are robust and clustered at institution level. Coefficients weighted by 12-month FTE student enrollment. Regressions include fixed effects for years 2015 through 2020.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

**Exhibit C–5. Relationships between Institutional Spending and Local Property Wealth/Household Income, 2014–15 to 2020–21**

| Property wealth/household income or institutional contextual factor | Instructional spending per 12-month headcount |                       | Overall spending per 12-month headcount |                       |
|---------------------------------------------------------------------|-----------------------------------------------|-----------------------|-----------------------------------------|-----------------------|
|                                                                     | Coefficient                                   | Robust standard error | Coefficient                             | Robust standard error |
| <b>Property wealth/household income factors</b>                     |                                               |                       |                                         |                       |
| County Assessed Value per Capita (1,000s)                           | 7.19**                                        | 2.29                  | 19.71**                                 | 5.56                  |
| County Median Household Income (1,000s)                             | -14.91*                                       | 6.68                  | -46.87**                                | 14.89                 |
| <b>Contextual factors</b>                                           |                                               |                       |                                         |                       |
| Percentage of undergraduates who are full-time                      | 0.085*                                        | 0.04                  | 0.031                                   | 0.09                  |
| Percentage of completions awarded in health                         | 3,251.81***                                   | 620.77                | 11,275.74***                            | 1662.45               |
| Percentage of completions awarded in science or technology          | 1,592.17                                      | 807.67                | 3,989.70*                               | 1868.16               |
| Average Faculty Salary (1,000s, CBSA) <sup>1</sup>                  | -308.68                                       | 495.89                | 83.17                                   | 1092.02               |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>                      | 131.52                                        | 255.04                | 396.97                                  | 400.66                |
| Carnegie: AA--Public Rural-serving Medium                           | 386.59                                        | 195.23                | 251.60                                  | 599.41                |
| Carnegie: AA--Public Rural-serving Large                            | 326.85                                        | 220.71                | -262.16                                 | 602.49                |
| Carnegie: AA--Public Suburban-Single Campus                         | 406.52*                                       | 184.52                | 258.98                                  | 545.55                |
| Carnegie: AA--Public Suburban-Multicampus                           | 196.02                                        | 143.32                | -130.24                                 | 543.24                |
| Carnegie: AA--Public Urban-Multicampus                              | 221.34*                                       | 91.49                 | -341.60                                 | 454.62                |
| Constant                                                            | -222.10                                       | 342.63                | 1,213.77                                | 1038.70               |
| Observations                                                        | 788                                           |                       | 788                                     |                       |
| R-squared                                                           | 0.388                                         |                       | 0.527                                   |                       |

*Note.* Standard errors are robust and clustered at institution level. Coefficients weighted by 12-month FTE student enrollment. Regressions include fixed effects for years 2015 through 2020.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

**Exhibit C–6. Relationships between Local and State Appropriations Received by Districts and Local Property Wealth and Household Income, 2014–15 to 2020–21**

| Fiscal capacity or institutional contextual factor         | Local appropriations per 12-month headcount |                       | State appropriations per 12-month headcount |                       |
|------------------------------------------------------------|---------------------------------------------|-----------------------|---------------------------------------------|-----------------------|
|                                                            | Coefficient                                 | Robust standard error | Coefficient                                 | Robust standard error |
| <b>Fiscal capacity factors</b>                             |                                             |                       |                                             |                       |
| County Assessed Value per Capita (1,000s)                  | 4.19                                        | 3.17                  | 0.28                                        | 1.42                  |
| County Median Household Income (1,000s)                    | 28.69**                                     | 9.94                  | -33.67***                                   | 6.56                  |
| <b>Contextual factors</b>                                  |                                             |                       |                                             |                       |
| Percentage of undergraduates who are full-time             | 1,790.95                                    | 1030.59               | 2,363.03**                                  | 663.69                |
| Percentage of completions awarded in health                | 2,652.07                                    | 1369.53               | 987.54                                      | 926.55                |
| Percentage of completions awarded in science or technology | -531.10                                     | 596.99                | -7.02                                       | 579.82                |
| Average Faculty Salary (1,000s, CBSA) <sup>1</sup>         | -0.21                                       | 0.11                  | 0.09                                        | 0.05                  |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>             | -25.17                                      | 382.78                | -452.04                                     | 330.02                |
| Constant                                                   | -341.142                                    | (1,975.678)           | 753.605                                     | (1,709.232)           |
| Observations                                               | 791                                         |                       | 791                                         |                       |
| R-squared                                                  | 0.340                                       |                       | 0.408                                       |                       |

*Note.* Standard errors are robust and clustered at institution level. Coefficients weighted by 12-month FTE student enrollment. Regressions include fixed effects for years 2015 through 2020.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees the same Core Based Statistical Area (CBSA).



**Exhibit C–7. First-stage Regression Results for the IPEDS 200% Graduation Rate Cost Function Analyses in California Community Colleges, 2014–15 to 2020–21**

| Instrument, student need factor or institutional contextual factor | IPEDS 200% graduation rate |                       |                |                       |
|--------------------------------------------------------------------|----------------------------|-----------------------|----------------|-----------------------|
|                                                                    | Institution level          |                       | District level |                       |
|                                                                    | Coefficient                | Robust standard error | Coefficient    | Robust standard error |
| <b>Instruments</b>                                                 |                            |                       |                |                       |
| Percent of K-12 free or reduced priced lunch                       | 0.117***                   | 0.016                 | 0.129***       | 0.016                 |
| SEDA outcome index                                                 | 0.098***                   | 0.025                 | 0.095***       | 0.026                 |
| <b>Need factors</b>                                                |                            |                       |                |                       |
| Percentage of students who are female                              | -0.182*                    | 0.077                 | -0.158         | 0.083                 |
| Percentage of students who are 25 years or older                   | -0.381***                  | 0.040                 | -0.348***      | 0.052                 |
| Percentage of students who received a Pell grant                   | -0.349***                  | 0.049                 | -0.365***      | 0.057                 |
| Percentage of students who are foster youth                        | -0.495                     | 0.280                 | -0.398         | 0.289                 |
| <b>Contextual factors</b>                                          |                            |                       |                |                       |
| Percentage of undergraduates who are full-time                     | 0.277***                   | 0.069                 | 0.305***       | 0.073                 |
| Percentage of completions awarded in health                        | -0.119                     | 0.065                 | -0.094         | 0.071                 |
| Percentage of completions awarded in science or technology         | -0.006                     | 0.049                 | 0.007          | 0.038                 |
| Average Faculty Salary (1,000s, CBSA) <sup>1</sup>                 | 0.592*                     | 0.299                 | 0.008*         | 0.004                 |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>                     | 0.029*                     | 0.013                 | 0.028          | 0.016                 |
| Constant                                                           | 0.603***                   | 0.065                 | 0.525***       | 0.078                 |
| Observations                                                       | 713                        |                       | 728            |                       |
| Unique Institutions/Districts                                      | 113                        |                       | 70             |                       |
| Partial F (Instruments)                                            | 29.42                      |                       | 34.30          |                       |
| Hansen J Statistic (p-value)                                       | 0.66                       |                       | 0.77           |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees the same Core Based Statistical Area (CBSA).

**Exhibit C–8. Second-stage Regression Results for the IPEDS 200% Graduation Rate Cost Function Analyses in California Community Colleges, 2014–15 to 2020–21**

| Outcome, student need factor or institutional contextual factor | Total expenditures per full time equivalent student |                       |                |                       |
|-----------------------------------------------------------------|-----------------------------------------------------|-----------------------|----------------|-----------------------|
|                                                                 | Institution level                                   |                       | District level |                       |
|                                                                 | Coefficient                                         | Robust standard error | Coefficient    | Robust standard error |
| <b>Outcome</b>                                                  |                                                     |                       |                |                       |
| IPEDS 200% Graduation Rate                                      | 52,426.860***                                       | 10,205.600            | 49,453.620***  | 9,125.308             |
| <b>Need factors</b>                                             |                                                     |                       |                |                       |
| Percentage of students who are female                           | 20,357.470*                                         | 7,863.907             | 19,191.590*    | 7,742.445             |
| Percentage of students who are 25 years or older                | 35,108.120***                                       | 6,321.399             | 32,839.640***  | 6,749.395             |
| Percentage of students who received a Pell grant                | 19,455.010***                                       | 5,226.672             | 18,592.190**   | 6,014.924             |
| Percentage of students who are foster youth                     | 76,609.200**                                        | 22,711.450            | 70,791.310**   | 22,686.930            |
| <b>Contextual factors</b>                                       |                                                     |                       |                |                       |
| Percentage of undergraduates who are full-time                  | -3,018.206                                          | 6,956.928             | -3,612.898     | 7,312.144             |
| Percentage of completions awarded in health                     | 17,663.970**                                        | 6,114.147             | 16,163.940*    | 6,268.089             |
| Percentage of completions awarded in science or technology      | -2,394.622                                          | 4,004.718             | -2,595.076     | 3,091.278             |
| Average Faculty Salary (1,000s, CBSA) <sup>1</sup>              | 99.089                                              | 285.470               | 0.373          | 365.049               |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>                  | 855.897                                             | 1,132.962             | 1,201.931      | 1,279.670             |
| Constant                                                        | -41,780.94***                                       | 7,966.166             | -36,690.410*** | 7,701.798             |
| Observations                                                    | 713                                                 |                       | 728            |                       |
| Unique Institutions/Districts                                   | 113                                                 |                       | 70             |                       |
| R-squared                                                       | 0.912                                               |                       | 0.916          |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

**Exhibit C–9. First-stage Regression Results for the California 3-Year Vision Goal Completion Rate Cost Function Analyses in California Community Colleges, 2014–15 to 2020–21**

| Instrument, student need factor or institutional contextual factor | California 3-Year Vision Goal completion rate |                       |                |                       |
|--------------------------------------------------------------------|-----------------------------------------------|-----------------------|----------------|-----------------------|
|                                                                    | Institution level                             |                       | District level |                       |
|                                                                    | Coefficient                                   | Robust standard error | Coefficient    | Robust standard error |
| <b>Instruments</b>                                                 |                                               |                       |                |                       |
| Percent of K-12 free or reduced priced lunch                       | 0.098***                                      | 0.009                 | 0.100***       | 0.010                 |
| SEDA outcome index                                                 | 0.050**                                       | 0.015                 | 0.052**        | 0.017                 |
| <b>Need factors</b>                                                |                                               |                       |                |                       |
| Percentage of students who are female                              | 0.035                                         | 0.044                 | 0.034          | 0.047                 |
| Percentage of students who are 25 years or older                   | -0.082*                                       | 0.034                 | -0.081*        | 0.039                 |
| Percentage of students who received a Pell grant                   | -0.119***                                     | 0.030                 | -0.114***      | 0.030                 |
| Percentage of students who are foster youth                        | -0.060                                        | 0.129                 | -0.047         | 0.129                 |
| <b>Contextual factors</b>                                          |                                               |                       |                |                       |
| Percentage of undergraduates who are full-time                     | 0.223***                                      | 0.038                 | 0.230***       | 0.040                 |
| Percentage of completions awarded in health                        | -0.122**                                      | 0.041                 | -0.117**       | 0.040                 |
| Percentage of completions awarded in science or technology         | -0.087***                                     | 0.024                 | -0.085**       | 0.029                 |
| Average Faculty Salary (1,000s, CBSA) <sup>1</sup>                 | -0.001                                        | 0.002                 | -0.001         | 0.002                 |
| Herfindahl–Hirschman Index (CBSA) <sup>2</sup>                     | 0.013                                         | 0.008                 | 0.009          | 0.009                 |
| Constant                                                           | 0.107**                                       | 0.040                 | 0.104*         | 0.049                 |
| Observations                                                       | 787                                           |                       | 790            |                       |
| Unique Institutions/Districts                                      | 113                                           |                       | 70             |                       |
| Partial F (Instruments)                                            | 63.26                                         |                       | 48.89          |                       |
| Hansen J Statistic (p-value)                                       | 0.51                                          |                       | 0.75           |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

**Exhibit C–10. Second-stage Regression Results for the California 3-Year Vision Goal Completion Rate Cost Function Analyses in California Community Colleges, 2014–15 to 2020–21**

| Outcome, student need factor or institutional contextual factor | Total expenditures per full time equivalent student |                       |                |                       |
|-----------------------------------------------------------------|-----------------------------------------------------|-----------------------|----------------|-----------------------|
|                                                                 | Institution level                                   |                       | District level |                       |
|                                                                 | Coefficient                                         | Robust standard error | Coefficient    | Robust standard error |
| <b>Outcome</b>                                                  |                                                     |                       |                |                       |
| California 3-Year Vision Goal completion rate                   | 64,752.160***                                       | 9,773.764             | 65,291.760***  | 11,116.730            |
| <b>Need factors</b>                                             |                                                     |                       |                |                       |
| Percentage of students who are female                           | 9,168.921                                           | 5,949.073             | 9,349.491      | 6,121.642             |
| Percentage of students who are 25 years or older                | 19,580.030***                                       | 3,737.065             | 20,002.380***  | 4,365.518             |
| Percentage of students who received a Pell grant                | 6,639.778                                           | 3,827.064             | 6,484.251      | 4,193.464             |
| Percentage of students who are foster youth                     | 56,008.660***                                       | 15,677.080            | 55,335.600***  | 15,617.480            |
| <b>Contextual factors</b>                                       |                                                     |                       |                |                       |
| Percentage of undergraduates who are full-time                  | -2,908.742                                          | 4,546.190             | -3,451.892     | 4,946.320             |
| Percentage of completions awarded in health                     | 17,677.330**                                        | 5,407.557             | 18,098.050**   | 5,345.301             |
| Percentage of completions awarded in science or technology      | 3,745.469                                           | 2,714.681             | 3,852.340      | 2,716.897             |
| Average Faculty Salary (1,000s, CSBA) <sup>1</sup>              | 483.501**                                           | 145.876               | 477.363*       | 186.512               |
| Herfindahl–Hirschman Index (CSBA) <sup>2</sup>                  | 1,081.692                                           | 780.854               | 1,559.359      | 987.948               |
| Constant                                                        | -16,507.870***                                      | 4,352.901             | -16,695.600**  | 4,905.992             |
| Observations                                                    | 787                                                 |                       | 790            |                       |
| Unique Institutions/Districts                                   | 113                                                 |                       | 70             |                       |
| R-squared                                                       | 0.942                                               |                       | 0.942          |                       |

*Note.* Standard errors are robust and clustered at institution or district level. Coefficients weighted by 12-month FTE student enrollment. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .

<sup>1</sup> This is the average monthly faculty salary at other colleges in the market where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

<sup>2</sup> This is the Herfindahl–Hirschman index where the market is defined as all colleges offering AA degrees within the same Core Based Statistical Area (CBSA).

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