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Technical Appendices

Higher Education in California New Goals for the Master Plan

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with research support from Qian Li

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CA2025

Appendix A: Student Flow Model

To determine new eligibility goals for California, we developed a student flow model that projects student enrollment and degrees awarded for each year from 2005 to 2025. To develop the model, we first developed population projections for the state. We use a standard cohort component model in which the population is aged across time using age, ethnicity, gender, and nativity cohorts. For each cohort, historical trends in fertility, mortality, and migration were used to generate future fertility, mortality, and migration rates. Migration was separated into international migration and domestic (interstate) migration. We constrained our projections to be consistent in population totals with those produced by the California Department of Finance. An earlier application of our projections was used to generate projections of the state's population by educational attainment level.¹

Using our demographic projections, we developed projections of the number of high school graduates in California. These projections were constrained to be consistent with California Department of Finance projections through 2019, the final year of the Department of Finance projections. We then applied eligibility and enrollment rates to the high school graduate projections to generate projections of direct college enrollment from high school. Rates were applied separately for UC, CSU, the community colleges, and private institutions. Enrollment rates of adults at other ages, more common at CSU and the community colleges than at UC, were similarly developed and applied to the demographic projections. Students were aged through the higher education institutions by applying persistence rates (also known as grade progression ratios). For community colleges, transfer rates were applied to the enrollment projections. Those transfers were then added to the student flow model for UC, CSU, and private institutions. A baseline set of projections kept eligibility, enrollment, and transfer rates at current levels. Alternative eligibility, enrollment, and transfer rates were applied to the projections to identify a set that would close the education skills gap, identified in earlier PPIC work, and lead to substantial increases in the production of bachelor's degrees. Those alternative eligibility and transfer rates are reported in the text.

¹ See Johnson and Sengupta, *Closing the Gap: Meeting California's Need for College Graduates* (San Francisco: Public Policy Institute of California, 2009).

Appendix B: Other Data and Methods

We used a plethora of data sources to identify current trends and patterns with respect to higher education in California and to develop comparisons with other states. The most important data sources for summary-level data were obtained from data access tools at CPEC and at the Integrated Postsecondary Education Data System (IPEDS). We relied on CPEC for summary-level data on high school graduates, college enrollment, transfer, degree completion, student characteristics, finance, and institutional detail. Those data are available through interactive applications on the web.² In addition, we used CPEC reports to identify trends in eligibility at UC and CSU. Other summary-level data were derived from data access tools at IPEDS. IPEDS serves as the core data collection system for the National Center for Education Statistics (NCES), a part of the U.S. Department of Education. Online interactive data access was used to generate state comparisons for information on college enrollment, student characteristics, degree completion, financial data, and institutional characteristics.³

We used individual student records from three datasets. To evaluate the college-readiness of high school graduates in California, we analyzed microdata from the High School Transcript Study (HSTS). NCES has been collecting high school transcript data since the 1980s. The data include information on course offerings and students' course-taking patterns in secondary schools across the United States. The most recent HSTS was conducted in 2005. The HSTS makes it possible to examine high school graduates' average GPA in the context of the rigor of the classes they take. Transcripts from 12th-grade students are collected beginning in the summer and continuing into the fall of the year for those who graduated from public and private high schools that were sampled in the NAEP assessments. About 640 public and 80 private schools are in the 2005 HSTS, which samples about 26,000 high school graduates in order to represent the approximately 2.7 million 2005 high school graduates.

The 2005 HSTS file STUDENT was first merged with the file SCHOOL using variable SCHOOLID to obtain the state of residence associated with each student record. Students in HSTS were evaluated using a combination of their GPA (for which the variable TGPA:Overall Grade Point Average—Computed was used) and the level of their curriculum (CURRIC) ranging from below standard, standard, and midlevel to rigorous. Those students with missing or incomplete transcripts or missing GPA scores were excluded from the analysis. GPA scores were first adjusted for the curriculum level: 1.0 was added to those GPAs achieved under the most rigorous curricula; 0.5 was added to those under midlevel curricula, and 0.5 was subtracted from GPAs achieved under below standard curricula. Finally, the curriculum-level weighted GPA scores were then grouped into 10 categories based on their percentile rank across all students in the nation and incorporating the weight (FINSTUWT) of each student record.

Using HSTS, we ranked high school graduates in the nation using their course-taking behavior and grades. In California, only about 40 percent of students ranked above the national median, indicating worse overall high school performance than among students in the rest of the country. The state's college enrollment rates, however, were lower than those of most other states whose students were no more college-ready, at least by

² Available at <http://www.cpec.ca.gov/OnLineData/OnLineData.asp>.

³ Available at <http://nces.ed.gov/IPEDS/datacenter/>.

this measure, than those in California. Of the 11 states where students performed similar to or worse in math than students in California, 10 had higher direct enrollment rates into college (including community colleges). For example, Colorado had a similar share (45%) of students completing high-level math courses as California (44%), but it had substantially higher college enrollment rates (63% versus 56%); Georgia had far lower shares completing high-level math (33%) but an even greater share going to college (68%).

We used the Beginning Postsecondary Students Longitudinal Study (BPS) to evaluate the persistence and completion of students in college. That study includes students of all ages who enrolled in postsecondary education for the first time in 1995–1996. The sample is nationally representative, surveying 12,085 students again in 1998 and for the last time in 2001, about six years after their initial college entry. Of those who were initially sampled in the 1990s, 9,132 students have six years of longitudinal data. Using the nationwide data, we developed a model to evaluate persistence and degree completion differences between students. We examined students’ postsecondary outcomes by institution type (community college, public four-year college, etc.), controlling for course-taking behavior (based on the a–g course requirements), state, and GPA.

Finally, we used the Education Longitudinal Study (ELS) of 2002 and follow-up surveys in 2004 and 2006 to evaluate the college-readiness and postsecondary choices of California’s high school graduates relative to high school graduates in the rest of the nation. The ELS follows students beginning as sophomores in high school through their postsecondary education choices and possible entry into the workforce. Follow-up surveys were conducted in 2004 and 2006. The ELS collects data on educational processes and outcomes. There are 16,197 students in the survey altogether and 1,871 or 11.6 percent of the unweighed sample is based in California.

California’s high school graduates go on to postsecondary education at lower rates than their peers from other states. NCHEMS estimated that in 2006, 56 percent of California’s high school graduates enrolled directly in college; this ranks California 39th of the states.⁴ We find that Californians’ lower participation in higher education is reflected in the ELS sample as well. Of the cohort in the base year 2002, most of whom would have graduated from college by 2005–2006, 54 percent of those based in California went on to a postsecondary institution directly, compared to the rate calculated by NCEHMS for California in 2006, which is 56 percent. Moreover, California’s students pursuing higher education are much more likely than students from other states to attend a two-year rather than a four-year institution. Although Californians make up 10 percent of the direct-to-college ELS sample nationwide, they represent 16 percent of the total enrollees in two-year institutions. Additionally, in our regression analysis, we find that even after controlling for academic performance, race, sex and familial socioeconomic factors, Californians are still 73 percent more likely to attend a two-year institution.

Not only is the ELS a comprehensive dataset on high school students and their schools, it also includes the students’ demographic information and their families’ socioeconomic indicators. Using a combination of these variables, we investigate whether Californians enroll in higher education in lower numbers because they are less academically prepared or if there are other factors behind the statistic. First, we looked at a student’s likelihood of attending any postsecondary institution⁵ after graduating from high school through a series of logit analyses (Table B1).

⁴ Source: <http://www.higheredinfo.org/dbrowser/index.php?measure=32>.

⁵ Institutions include four-year, two-year and less-than-two-year programs in both the public, private not for profit, and private for profit sectors.

TABLE B1
Logit analysis of whether a high school graduate enrolls in postsecondary education

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Obs	16,197	14,784	14,784	14,784	14,784
Intercept	0.2896**	-2.9996**	-2.894**	-2.8179**	-3.4459**
California dummy	-0.1278**	-0.0558	0.0833	0.0853	0.1073
GPA		1.1622**	1.1544**	1.1404**	1.0915**
Has taken advanced math		0.8569**	0.8602**	0.8707**	0.7809**
Number of AP exams passed		0.1032**	0.1001**	0.1027**	0.0598
Black			0.0774	0.0689	0.2341**
Latino			-0.3572**	-0.3633**	-0.1802**
Asian			-0.1163	-0.1146	0.0221
Other			-0.4791**	-0.4805**	-0.3352**
Male				-0.085*	-0.1348**
Income level 2					-0.0534
Income level 3					0.1981
Income level 4					0.2055
Income level 5					0.4126
Income level 6					0.7769**
Income level 7					0.8274**
Has at least one parent with a bachelor's degree					0.4363**

* Indicates significance at the 95 percent level.

** Indicates significance at the 99 percent level.

In Model 1, we find that California’s high school graduates are slightly less likely to enroll in postsecondary education than graduates in the rest of the country but this result is diminished in Model 2 after we control for graduates’ high school academic performance. Measures of high school performance include high school GPA, whether the student has taken an AP math courses (i.e., trigonometry or beyond),⁶ and the number of AP exams taken and passed.⁷ In Model 3, we incorporate race and ethnicity dummy variables into the regression. We add sex in Model 4. And, finally, Model 5 controls for the above-mentioned variables as well as family income level and an indicator if one or both of the students’ parents holds a bachelor’s degree. In Model 5, we see that even after controlling for demographic and family background factors, students with higher GPAs are much more likely to go on to postsecondary education. Black students are 26 percent more likely and Latino students 16 percent less likely to go directly to college, holding academic performance and socioeconomic factors at fixed values. Last, higher family income levels are associated with higher rates of college-going and having one or both parents graduate from college bumps up a student’s likelihood of attending college by 54 percent.⁸

⁶ We use the level of mathematics taken in high school as a proxy for the rigor of the student’s curriculum.

⁷ Students who score a 3 (out of 5) or higher on an AP test can usually receive college credit.

⁸ $\text{Logit}(p)=\log(p/(1-p))=\beta_0+\beta_1*x_1+\dots+\beta_k*x_k$

We next looked at what factors determine whether the student attends a four-year or a two-year institution (Table B2).

TABLE B2
Logit analysis of whether a high school graduate enrolls in a four-year institution

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Obs	16,184	14,774	14,774	14,774	14,774
Intercept	-0.4202**	-4.6346**	-4.6865**	-4.7833**	-5.599**
California dummy	-0.5589**	-0.7595**	-0.5778**	-0.5797**	-0.5664**
GPA		1.3088**	1.3405**	1.359**	1.3184**
Has taken advanced math		1.2224**	1.2222**	1.21**	1.1136**
Number of AP exams passed		0.281**	0.2853**	0.2825**	0.2226**
Black			0.4088**	0.42**	0.6168**
Latino			-0.4518**	-0.4441**	-0.2138**
Asian			-0.2605**	-0.2617**	-0.1036
Other			-0.2934**	-0.2925**	-0.072
Male				0.1028*	0.0453
Income level 2					-0.1068
Income level 3					0.2833
Income level 4					0.2014
Income level 5					0.4096
Income level 6					0.7509*
Income level 7					1.064**
Has at least one parent with a bachelor's degree					0.6154**

* Indicates significance at the 95 percent level.

** Indicates significance at the 99 percent level.

The independent variables used in the four-year enrollment analysis are the same as the ones in the overall postsecondary enrollment analysis. Not surprisingly, the better the student does in high school (in terms of GPA, level of math classes taken, and AP exams passed), the more likely he or she will enroll in a four-year program. Higher income levels are also associated with higher enrollment rates, which make sense because of the greater tuition costs associated with four-year institutions. Last, children of parents who hold bachelor's degrees from a four-year program are 85 percent more likely to enroll in the same type of program themselves. One of the most interesting results here is that in Model 5, after controlling for academic performance, race/ethnicity, sex, and socioeconomic factors, California high school graduates are still 43 percent less likely than those in the rest of the country to enroll in a four-year institution. One reason for the low enrollment rates in four-year institutions in California is that the California Community College system enrolls a disproportionately high share of high school graduates, at least in comparison with other states. Table B3 shows that California high school graduates are substantially more likely to enroll in two-year postsecondary institutions than are high school graduates in the rest of the country.

TABLE B3

Logit analysis of whether a high school graduate enrolls in a two-year institution

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Obs	16,184	14,774	14,774	14,774	14,774
Intercept	-1.6216**	-1.7236**	-1.5748**	-1.4253**	-1.5732**
California dummy	0.5597**	0.554**	0.531**	0.5363**	0.5508**
GPA		0.1608**	0.1282**	0.1**	0.1046**
Has taken advanced math		-0.5011**	-0.5024**	-0.4833**	-0.4701**
Number of AP exams passed		-0.6689**	-0.6794**	-0.6764**	-0.6586**
Black			-0.2813**	-0.2961**	-0.2626**
Latino			-0.0786	-0.09	-0.0785
Asian			0.1605*	0.1629*	0.1927*
Other			-0.3042**	-0.3072**	-0.3149**
Male				-0.1679**	-0.1705**
Income level 2					-0.0881
Income level 3					-0.0461
Income level 4					0.1049
Income level 5					0.1974
Income level 6					0.3045
Income level 7					-0.1028
Has at least one parent with a bachelor's degree					-0.091

* Indicates significance at the 95 percent level.

** Indicates significance at the 99 percent level.



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