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# Higher Education as a Driver of Economic Mobility

## Technical Appendix

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## Wage Premiums Methods

For our analysis of wage premiums we rely on Mincer’s human-capital wage equations. Specifically, wage premiums were estimated using regressions of log of real annual wages on education categorical variables (less than high school, some college, associate degree, bachelor’s degree, master’s degree, professional degree, and doctorate, with high school omitted), age, age squared, categorical variables for race/ethnicity (Hispanic, African American, Asian, and other, with white omitted), and dummy variables for marital status and citizenship status. We ran separate regressions by year and gender, limiting our sample to full-time and year-round workers 25-to-64-years-old employed in the public or private sector. Workers in the military and institutionalized or unincorporated self-employed workers are excluded. Annual wages below \$1,700 are also dropped. For comparative purposes, we ran all our specifications for both California and the rest of the nation. Data to estimate these equations are from the public use files of the American Community Survey and the decennial censuses.

Regression-adjusted wage premiums take account of the differing age and racial/ethnic distribution of each educational group; consequently, it is a better measure than a “wage premium” computed by simply dividing college-graduate wage by the high-school-only wage, for example. Although we controlled for personal characteristics to make comparisons between individuals who are as similar as can be observed, we do not have quasi-experimental variation concerning who goes to college. Thus, caution is necessary in making causal interpretations of the estimated wage premiums, since the potential problem of selection bias from nonrandom sorting on unobservables remains.

A critical question is whether the wage gains enjoyed by college graduates would have occurred for those individuals even if they did not attend college. One argument in the debate over the causality between schooling and earnings is that colleges select individuals who would have succeeded in the labor market even if they did not attend college (known as the selection effect). The other argument is that the skills and knowledge acquired in college lead to better labor market outcomes, including higher wages.

The best research suggests that the college wage premium, as estimated in our standard wage models, is an accurate measure of the causal effect of college. In a thorough review and analysis of the extensive literature on wages and education, David Card (1999) concluded that the selection effect does not exceed 10 percent of the estimated schooling coefficient. That estimate is derived from studies of twins with different educational attainment. Other approaches, including instrumental variable (IV) estimates, are often higher than classic ordinary least squares (OLS) estimates from standard human capital earnings functions. Although it is unclear to what extent this is due to measurement error or inadequate instrumentation, Card notes that one possibility is that OLS approaches actually understate the causal value of a degree (see Trostel et al. 2002).

## The Role of Colleges in Intergenerational Mobility

Research from the Equality of Opportunity Project has found that some colleges are more successful than others in producing high earners from economically diverse student bodies. Specifically, they find that a group of mid-tier non-selective institutions are important contributors to economic mobility, both because their graduates earn incomes similar to those who emerge from more selective universities and because these mid-tier institutions enroll many students from low-income families. The good news is that many California institutions top the list of colleges that have the highest upward mobility rates: California State University at Los Angeles (CSULA), Cal Poly-Pomona, and Glendale Community College are in the top 10 out of over 2,400 institutions nationwide. Also, five UC campuses are ranked in the top 50 colleges with the highest economic mobility: Irvine (#12), Riverside (#19), Los Angeles (#24), Berkeley (#39) and San Diego (#41). For almost all UC campuses, more than half of alumni whose parents come from the bottom income quintile move to the top income quintile in adulthood. On average, private nonprofit institutions and community colleges have lower mobility rates relative to CSU and UC

but for very different reasons. In the case of the private nonprofit colleges this result is driven by low access rates (measured as the share of students with parents in the bottom quintile of the income distribution) while in the case of the community colleges it is driven by low success rates (measured as the share of those students who reach to the top quintile of the income distribution by age 34).

## Additional Tables and Charts

The tables and charts below provide additional, detailed information about the distribution of wages by educational level and major, wage premiums over time, employment and other outcomes by educational level, and shares of students enrolled in two-year colleges by income level.

**TABLE A1**

Median wages by educational level

	1990	2000	2010	2016	Growth between 1990 and 2016
Less than high school	28,916	27,933	25,358	26,000	-10
High school	42,355	41,899	38,589	36,000	-15
Some college	48,214	48,883	48,512	45,000	-7
Associate degree	51,786	54,469	55,127	50,000	-3
Bachelor's degree	62,500	69,832	71,665	71,000	14
Graduate degree	80,357	87,989	93,716	96,000	19

SOURCE: Authors' calculations based on the 1990 and 2000 Decennial Census and 2010 and 2016 American Community Survey one-year estimates.

NOTE: Full-time, year-round workers ages 25 to 64.

**TABLE A2**

Wage premium relative to workers with a high school degree (percent)

	1990	2000	2010	2016	Change 2000–2016 (percentage points)
<b>California</b>					
Less than high school	-19.3	-22.3	-25.1	-22.4	0
Some college	13.0	16.5	19.2	20.6	4
Associate degree	18.3	23.5	29.4	28.7	5
Bachelor's degree	38.4	50.1	57.7	62.1	12
Graduate degree	58.5	72.2	84.7	90.7	19
BA plus	45.3	57.9	68.2	73.1	15
<b>Rest of US</b>					
Less than high school	-19.8	-17.7	-19.6	-16.4	
Some college	15.2	16.2	17.4	17.0	1
Associate degree	21.7	23.5	27.3	24.6	1
Bachelor's degree	44.1	49.8	56.2	57.4	8
Graduate degree	62.1	70.2	83.1	83.3	13
BA plus	50.5	57.1	66.6	67.6	11

SOURCE: Authors' calculations based on the 1990 and 2000 Decennial Census and 2010 and 2016 American Community Survey one-year estimates.

NOTE: Full-time, year-round workers ages 25 to 64. These estimates are regression adjusted for age, race/ethnicity, gender and citizenship.

**TABLE A3**

Wage distribution by educational level, 2016

	Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
Less than high school	32,503	14,400	19,600	26,000	39,000	55,000
High school	44,148	18,000	25,000	36,000	52,000	78,000
some college	55,982	20,000	30,000	45,000	70,000	100,000
Associate degree	60,870	23,000	34,000	50,000	77,000	110,000
Bachelor's degree	90,526	30,000	45,000	71,000	107,000	155,000
Graduate degree	126,535	42,000	65,000	96,000	149,000	225,000

SOURCE: Authors' calculation based on 2016 American Community Survey one-year estimates.

NOTE: Full-time year-round workers ages 25 to 64.

**TABLE A4**

75th/25th wage differential

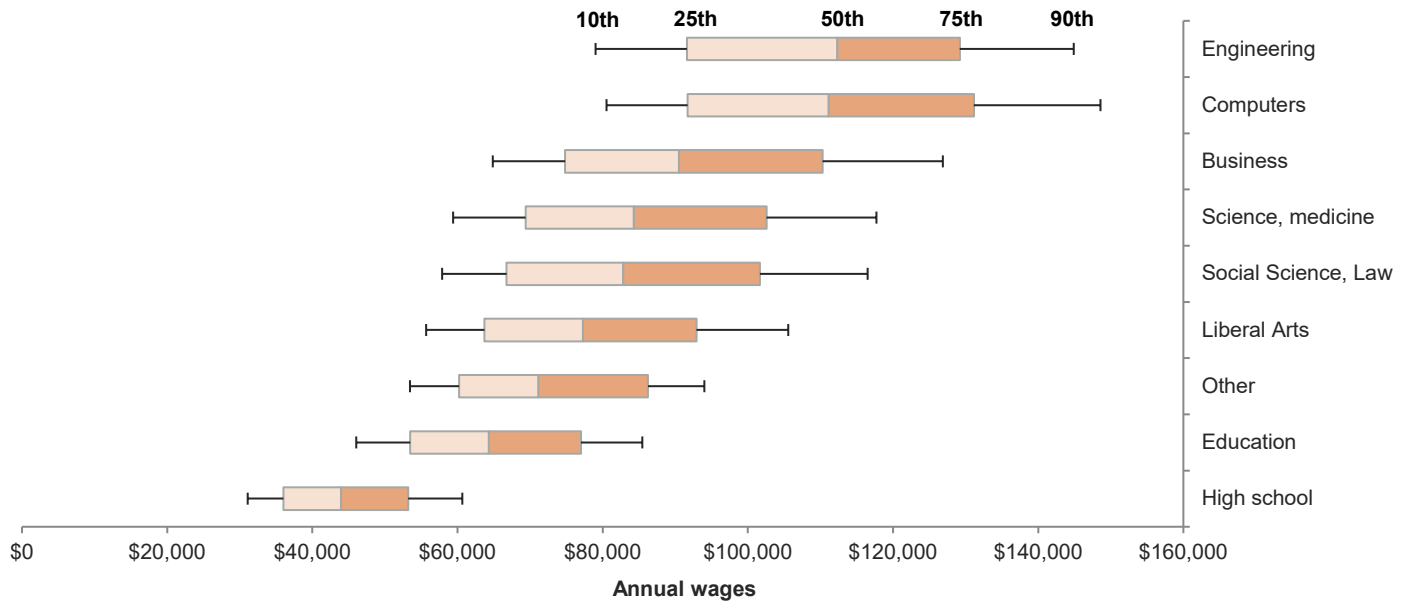
	1990			2016			Increase in the 75th/ 25th gap
	25th percentile	75th percentile	75th/25th gap	25th percentile	75th percentile	75th/25th gap	
Less than high school	19,643	44,643	25,000	19,600	39,000	19,400	-22
High school	28,571	57,143	28,571	25,000	52,000	27,000	-6
some college	34,059	66,607	32,548	30,000	70,000	40,000	23
Associate degree	35,714	71,429	35,714	34,000	77,000	43,000	20
Bachelor's degree	44,643	86,071	41,429	45,000	107,000	62,000	50
Graduate degree	57,143	114,286	57,143	65,000	149,000	84,000	47

SOURCE: Authors' calculations based on the 1990 Decennial Census and 2016 American Community Survey one-year estimates.

NOTE: Full-time year-round workers ages 25 to 64.

**FIGURE A1**

Wage distribution within majors



SOURCE: Authors' calculations based on 2016 American Community Survey one-year estimates.

NOTE: Full-time, year-round workers ages 25 to 64. Sample restricted to workers with a bachelor's degree or less. Predicted wages from OLS regressions.

**TABLE A5**

Variable definitions and sources for Figures 3 and 4 in the report

	Measure	Source
Poverty rate	The California Poverty Measure (CPM) accounts for the cost of living and a range of family needs and resources, including social safety net benefits.	Using the CPM, which is based on ACS data from IPUMS, but available only at PPIC
Social safety net recipients	Refers only to CalWORKs, General Assistance, CalFresh, Supplemental Security Income, and federal housing subsidies.	Using the CPM, which is based on ACS data from IPUMS, but available only at PPIC
Wage premium	Regression-adjusted wage premium relative to high school graduates	Authors' calculations based on 2016 ACS 1-year estimates
Unemployment rate	Adults age 25–64, not enrolled in college, excludes armed forces	Authors' calculations based on 2016 ACS 1-year estimates
Labor force participation	Adults age 25-64	Authors' calculations based on 2016 ACS 1-year estimates
Full-time employment	Workers age 25-64 working 35 hours or more	Authors' calculations based on 2016 ACS 1-year estimates
Health Insurance through Employment	Full-time year-round workers age 25-64	Authors' calculations based on 2016 ACS 1-year estimates
Retirement Plan through Employment	Full-time year-round workers age 25-64	Authors' calculations using 2017 CPS
Homeownership rate	Educational attainment of the head/householder, age 25 and older	Authors' calculations based on 2016 ACS 1-year estimates
Marital status	Adults age 25-64	Authors' calculations based on 2016 ACS 1-year estimates

**TABLE A6**

Measures of well-being by educational attainment.

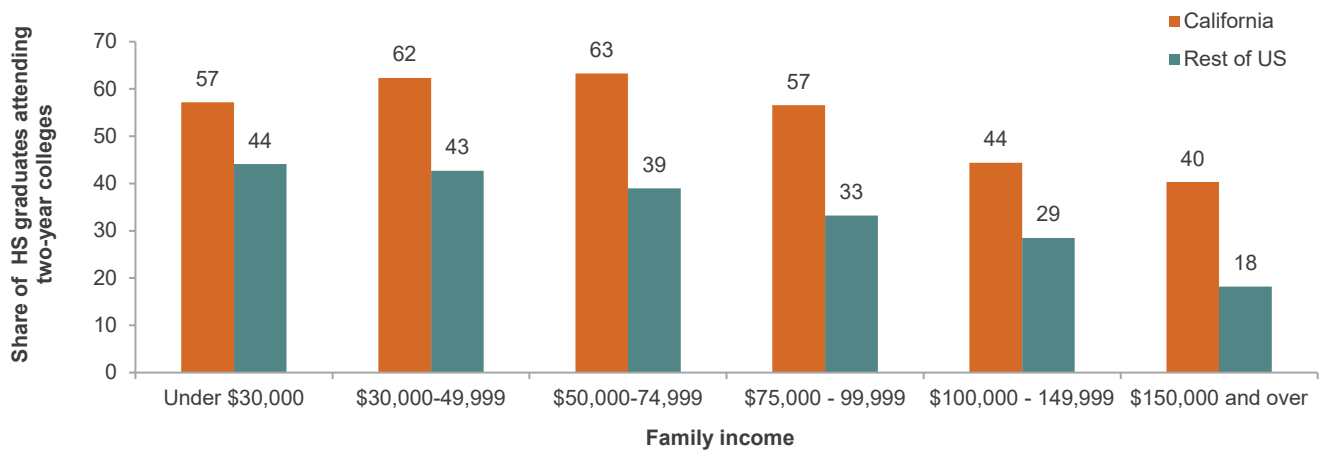
	Less than high school	High school	Some college	Associate degree	Bachelor's degree	Advanced degree
Poverty	35	21	16	14	9	7
Welfare recipients	44	33	24	19	10	7
Unemployment rate	8	7	6	4	4	3
Labor force participation	66	73	78	79	85	88
Health insurance through employment	44	66	76	77	81	87
Retirement plan through employment	17	32	40	44	46	53
Full-time employment	52	58	63	64	73	77
Homeownership rate	39	49	53	60	61	68
Share married	55	50	51	55	58	66

SOURCES: See Table A5.

NOTE: All values are expressed in percentage terms.

**FIGURE A2**

Students from low-income families are more likely to attend a community college



SOURCE: Author's calculations based on October Current Population Survey 2007–2016.

NOTE: Restricted to recent high school graduates.



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