

The **public economic quadrant** represents financial outcomes related to the public good. The contribution of college graduates can be measured through taxes paid, consumer spending, increased productivity, entrepreneurship, job creation, and fulfilling workforce needs. Together these aspects support the local, state, or federal economy.

Additionally, value may be measured in the reduction of costs to the local, state or federal government for lower utilization of social assistance programs (such as Medicaid, SNAP or housing assistance), reductions in incarceration, or reduced labor costs through donated volunteer hours.

The following brief examines the contributions to the economy and reduction in costs to the government for UC and colleges graduates at large.

Contributions to the economy

Personal spending and taxes

A 2011 report by Economic Planning Systems, Inc. estimated that the University of California

contributes about \$32.8 billion dollars, or about 1.8%, of California's gross domestic product (GDP). The report focused on direct effects such as the spending of employees, retirees and students and employment offered by UC, and indirect effects such as industries UC uses for products and services. It also considered induced effects attributable to UC spending. The report did not consider the contribution of UC alumni to the GDP.

UC public economic value highlights:

- UC alumni contribute about \$15,500 more per year to the GDP than alumni of other 4-yr CA institutions.
- By fifteen years after graduation, UC graduates are contributing on average \$30K in federal taxes and \$7.6K in state taxes per year, twice as much as the average Californian.
- Five of UC campuses ranked in the top 50 for producing venture capital backed entrepreneurs, creating over 2.3K companies and raising \$47 billion in funding
- 102 UC alumni hold C-Suite positions at the top 500 largest revenue generating companies
- Bachelor's degree earners cost the state of California \$1.8B less in public assistance cost than high school graduates.
- UC research based education spurs economic growth and increase efficiencies, alumni start companies like Lyft, Indiegogo, Fulcrum Bioenergy and Quantumscape.

While a per capita analysis of alumni to the GDP is not possible given available data, an estimate of some of the components is possible. Gross Domestic Product (GDP) is given by the equation:

$$\text{GDP} = \text{Consumption} + \text{Investment} + \text{Government spending}$$

To estimate an individual's contribution to GDP, consumption can be replaced by personal spending, investments by personal savings and government spending by taxes paid by the individual.

$$\text{GDP}_{\text{Individual}} = \text{Spending} + \text{Savings} + \text{Taxes}$$

The proportion of income that goes to taxes, spending (expenditures) and savings varies by education level and income. As income and education increases, the proportion of household income that goes to taxes and savings increase and the proportion towards personal spending decreases.

Figure 1. Expenditures, savings and taxes by education level

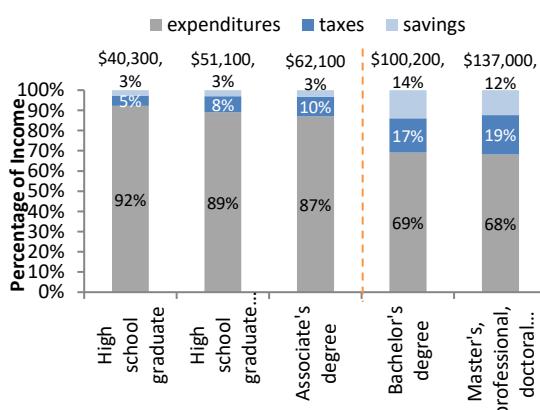
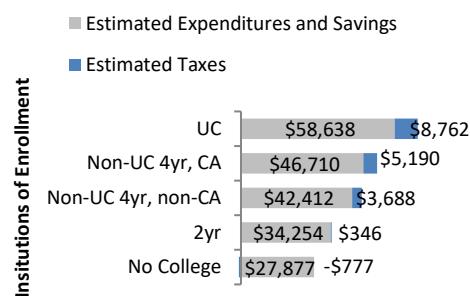


Figure 1 shows Bachelor's degree earners contribute about 17 percent of their incomes to

taxes, whereas high school graduates contribute about 8 percent to local, state, and federal taxes.¹ It is not clear if the different proportions of income devoted to expenditures and savings is due to education or income level, more research is needed in this area. However, it may be assumed that the proportion of income that goes to taxes is largely based on income.

Using the proportion of taxes paid by income level² and the median income of alumni from different institution types³, figure 2 shows estimates of individual contribution to taxes, savings and spending for students for alumni from different institution types. Using these proportions, students who attended UC would contribute about \$8,700 per year in taxes at fifteen years after entry compared to \$5,200 for students who attended another four-year institution in California and \$346 per year for those who attended a two-year college.

Figure 2: GDP and tax contribution estimates based on income and institution type, fifteen years after entry



Because UC alumni earn more, the estimated GDP contribution (spending, savings and taxes) for a student who attends UC is \$67,500 per year compared to \$52,000 per year for a

¹ Source: Survey of Consumer Expenditures (2016), Average expenditure, share, and standard error tables. <https://www.bls.gov/cex/tables.htm>

² Consumer Expenditures Public Use Microdata

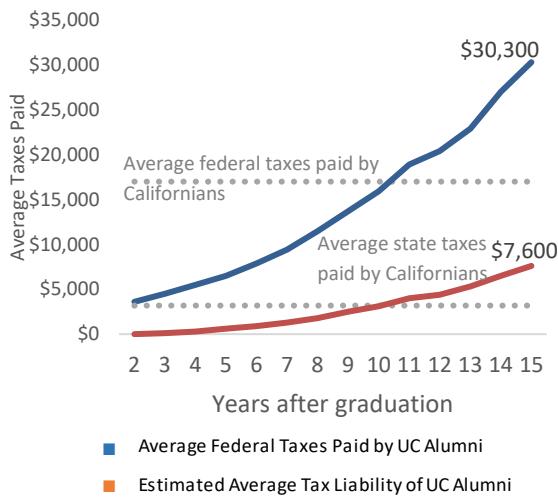
³ Source: Equality of Opportunity CLIMB initiative

student who attended another 4 year California institution or about \$34,000 for a student who attended a community college.⁴

Extending the analysis of tax contribution, students who graduate from UC contribute even more, IRS data show the median taxes paid by UC graduates is \$13,200 in federal taxes and \$3,400 in State taxes per year⁵ by fifteen years after graduation.

To put these tax contributions in perspective, average tax (instead of median) contributions of UC graduates are compared to the average tax contributions of other Californians. Figure 3 shows that by 11 years after graduation, UC graduates contribute more in state (\$3183) and federal taxes (\$16,992) than the average Californian and contribute double that amount by fifteen years after graduation.

Figure 3: Actual federal and estimated state taxes paid by UC graduates with CA averages, by years after graduation



⁴ GDP estimates do not incorporate whether a student graduated, and therefore underestimate GDP contributions for college graduates.

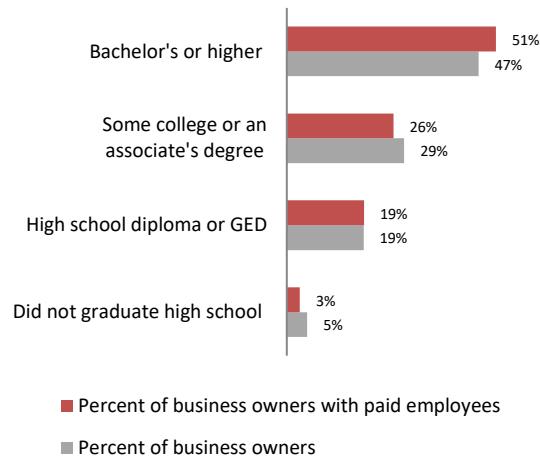
⁵ Source: Equality of Opportunity CLIMB initiative

⁶ Per the 2012 American Community Survey, 28.5% of the population 25 and older has a BA or higher.

Entrepreneurship and job creation

As of 2012, over 22 million Americans, or 9 percent of the adult U.S. population, were business owners. Educational attainment isn't a barrier to business ownership, as over half of all business owners do not have a bachelor's degree or higher. However, educational attainment appears to play more of a role in the ability of business owners to employ others (Figure 4).

Figure 4: Percent of business ownership and percent of business owners with paid employees by educational attainment⁶



Half of all business owners with paid employees have at least a bachelor's degree.

UC alumni start companies (see figure 5). In 2018, Pitchbook ranked five UC campuses (Berkeley, UCLA, San Diego, Santa Barbara, and Davis) in the top 50 for producing venture-capital (VC) backed undergraduate alumni

However, as the 2012 Survey of Business Owners does not give data with regards to the age of the sample, a comparison in educational attainment between business owners and the general population was not done.

entrepreneurs. Since 2006, undergraduate alumni from these campuses created 2,270 companies and rose over \$47 billion in capital. Berkeley and UCLA were also ranked on the top 25 for greatest numbers of female founders and for most VC raised by MBA program alumni. Of these companies, the top 10 VC-backed companies founded by UC alumni employed between 11 and 25,000 individuals. For a full list of companies see the appendix.

Figure 5: Number of employees at top 10 VC backed companies founded by UC alumni by program type

Top 10 VC-backed companies founded by UC alumni				
Number of employees	UG	MBA	Female - UG	Female - MBA
11 to 101	2	3	3	3
101 to 500	4	6	5	4
501 to 1000	1		1	
1001 to 5000	3			
20000 to 25000		1		
Unknown			1	3
Total	10	10	10	10

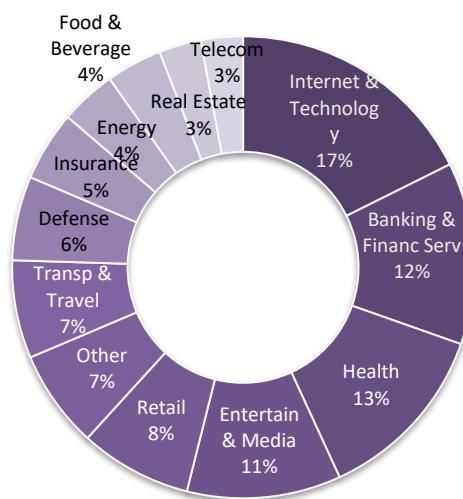
Source: Pitchbook, 2018

In early 2018, Crunchbase News identified CEOs of U.S. companies that have raised at least \$100 million in total venture financing in last three years, revealed that 44 of those CEOs have attended UC Berkeley and 27 CEOs attended UCLA.

In addition to founding companies, UC graduates obtain executive level positions in some of the nation's largest corporations. The term "C-Suite" describes the most senior positions within a corporation (e.g., chief financial officer, chief executive officer). Currently, 102 UC alumni hold a C-Suite level

position at one of the top 500 largest revenue generating corporations. Seventeen percent work in the internet and technology sector, while 12 percent work in banking and financial services (*figure 6*).

Figure 6: UC alumni classified as C-suite executives by sector

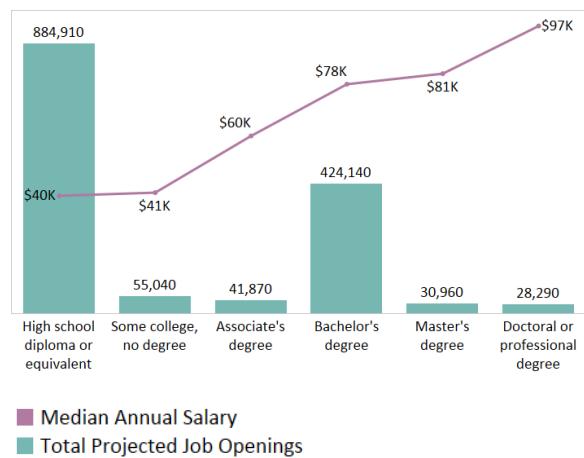


Source: Derived from data queried from the Leadership Directory on UC alumni in C-Suite roles.

Fulfilling state workforce needs

Aside from job creation and entrepreneurship UC alumni help fulfill workforce needs, by joining California's workforce. In 2015-16, UC contributed about 50,000 bachelor's degree recipients, 11,800 master's degrees and 3,700 doctoral degrees to the workforce, representing 25%, 15%, and 51% of degrees conferred in California, respectively.

Figure 7. Projected occupations by entry education level, California (2019)



Source: CA Employment Development Department

Short-term employment projections show about 424,000 job openings in California will require a Bachelor's degree by 2019. While there are more predicted openings for High school graduates, the estimated annual earnings are much higher for occupations that require a Bachelor's degree or higher.

Reductions in cost

Incarceration and Public Assistance Programs

Research shows an association between increased educational attainment, lower rates of incarceration, and lower utilization of social assistance programs. A 2005 report from UC Berkeley's Survey Research Center estimated that even some college cuts the probability of incarceration in half. Furthermore, the likelihood of incarceration decreases by 85 percent for those with a college degree.

Given the high—and increasing—costs of incarcerating individuals, even small decreases in incarceration can yield large savings in public expenditures. The California Legislative Analyst's Office estimated the 2016-17 cost per inmate at over \$70,000. Given average lengths of incarceration, this equates to an average cost of more than \$200,000 per individual. Between 2010 and 2015 California incarceration spending had increased⁷ approximately 6.2 percent annually, whereas there was virtually no change in total UC cost of attendance for CA resident undergraduates.

Public assistance

Adults with a college degree or some college education rely less on public assistance programs, such as Medicaid, housing assistance, foods stamps, than adults with only a high school diploma or less. According to a Lumina report, 47 percent of adults with less than a high school diploma live in households that rely on Medicaid, while only 12 percent of adults with a college degree or higher live in households that rely on Medicaid.⁸

The difference in reliance on public assistance between high school graduates and college graduates holds true for other government-funded social programs, including housing assistance and food stamps. The public economic value of a college degree in terms of reliance on public assistance programs is in the billions of dollars, and amounts to an enormous return on investment for taxpayers and the state.

⁷ Calculated based on increased in incarceration costs from the Vera Institute of Justice Report

⁸ College Board. Education Pays 2016. Ma, Pender, & Welch. Page 35.

Figure 8: Estimated costs in California for administration of public assistance programs by level of education

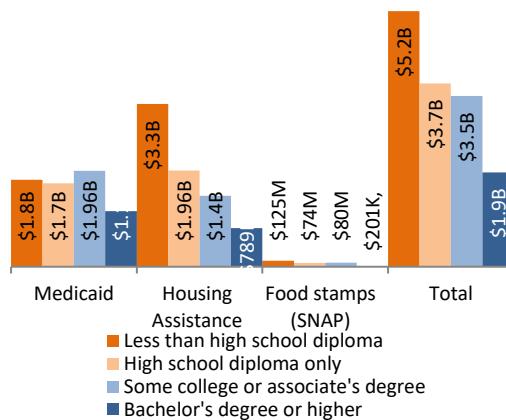


Figure 8 estimates the costs of public assistance in California for residents age 25 to 54 by level of education. For example, the total cost of public assistance (from Medicaid, housing assistance and food stamps) for recipients with only a high school diploma only is \$3.7 billion, while those with a college degree cost the state \$1.9 billion. The difference in savings amounts to \$1.8 billion. This difference is not due to larger percentages of the population without college degrees; 32 percent of California's population age 25-64 has at least a bachelor's degree, and only 20 percent have a high school diploma only.

In 2016, approximately \$1.7 billion was spent on Medicaid recipients with a high school diploma, which is \$800 million more than recipients with a college degree or higher. While, housing assistance recipients with only a high school diploma received \$1.9 billion in assistance while recipients with a college

degree received \$790 million. Furthermore, in 2017 food stamp recipients with a high school diploma received \$73 million in benefits while food stamp recipients with a college degree or higher received \$201,000.

Volunteer labor

In the 2016 UC Undergraduate Experience Survey, over 89 percent of the respondents indicated that participation in community-focused activities at the campus influenced their desire to continue community-focused activities after their graduation. Using data from the Current Population Survey, the Lumina Foundation found that those who volunteer spend about the same number of hours a year volunteering (122 hours) regardless of educational attainment. On the other hand, the percentage of people who volunteer increases with education.⁹ Incorporating both the likelihood to volunteer and the average volunteer hours, people with bachelor's degrees volunteer an average of about 46.5 hours a year, while those with graduate degrees volunteer 59.5 hours a year.

From this data, we estimate for the UC graduating classes of 2000 to 2010 that the 437,000 alumni are responsible for about 22.3 million volunteer hours annually, or the equivalent of 11,200 full time workers. If we extend this methodology to all 2 million UC alumni, the number of volunteered hours equates to 50,000 full time workers.

⁹ Trostel, P. (2015). It's Not Just the Money: The Benefits of College Education to Individuals and to Society.

Improved efficiencies and productivity

College graduates can benefit the economy around them. One framework from Lundvall (2008) is that higher education graduates act as both *innovators* and *equilibrators*. Innovators bring new ideas into a marketplace, and the effect has been shown most clearly for engineering graduates.

One could also think about management and social science graduates as equilibrators, who can adapt and promote the use of techniques more widely to encourage economic growth.

Historically UC alumni have contributed as equilibrators, for example William Vere Cruess, chair of the Division of Fruit Products at UC Berkeley and inventor of the fruit cocktail, established the technology of fruit dehydration and pioneered the uses of fruits in juices, syrups, and canned products. These innovations greatly expanded the market for these products and created value out of fruit that would previously have been wasted and creating numerous jobs in the picking and packing industries. On the equilibration side, UC runs a network of over 100 highly trained cooperative extension specialists that train farmers across the state of California in best practices coming out of cutting-edge research for pest management, crop yield, water usage and more.

More modern day examples of increased efficiencies from UC alumni come from products produced by companies such as Quantumscape, a manufacturer of vehicle batteries with high energy and power densities and higher life cycle than standard lithium ion batteries, or Fulcrum Bioenergy , a provider of

facilities to convert municipal solid waste products into renewable transportation fuels intended to reduce reliance on imported oil and Auris Surgical robotics, a developer of robotic microsurgical devices designed for surgical applications that require very fine movements, improving healthcare for all patients who need medical intervention.

Finally, UC alumni start companies like, Indiegogo, a crowdfunding platform that empowers others to run short-term fundraising campaigns to raise funds for an idea, charity or startup. Companies like Lyft (led by UC Santa Barbara alum - Logan Green) create more social, sustainable and affordable transportation systems while offering providing jobs to those who may otherwise be unemployed and Grail (led by UC Berkeley alumna - Jennifer Cook) aims to develop a blood test to detect cancer early before symptoms appear offering higher survival rates compared to late-stage diagnosis.

In conclusion, there are many ways to consider the effects of both UC graduates and other college graduates on the public economic good. Those impacts might come in the form of contributions like increased tax revenues at the local, state or federal level, in personal spending, creation of job opportunities, improved efficiencies or as reductions in costs such as decreased utilization of public assistance programs, decreased incarceration costs, or labor costs filled by volunteer hours.

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