

Approaching a Tipping Point?

A History and Prospectus of Funding
for the University of California

John Aubrey Douglass and Zachary Bleemer

August 2018

Embargoed until August 20 - Not for Distribution

Berkeley Center for Studies
in Higher Education



Approaching a Tipping Point?

A History and Prospectus of Funding for the University of California
Center for Studies in Higher Education - Goldman School of Public Policy - UC Berkeley

About this report

This year marks the University of California's (UC) 150th anniversary. In part to reflect on that history, and to provide a basis to peer into the future, the following report provides a history of the University of California's revenue sources and expenditures. The purpose is to provide the University's academic community, state policymakers, and Californians with a greater understanding of the University's financial history, focusing in particular on the essential role of public funding.

In its first four decades, UC depended largely on income generated by federal land grants and private philanthropy, and marginally on funding from the state. The year 1911 marked a major turning point: henceforth, state funding was linked to student enrollment workload. As a result, the University grew with California's population in enrollment, academic programs, and new campuses. This historic commitment to systematically fund UC, the state's sole land-grant university, helped create what is now considered the world's premier public university system.

However, beginning with cutbacks in the early 1990s UC's state funding per student steadily declined. The pattern of state disinvestment increased markedly with the onset of the Great Recession. As chronicled in this report, the University diversified its sources of income and attempted to cut costs in response to this precipitous decline, while continuing to enroll more and more Californians. Even with the remarkable improvement in California's economy, state funding per student remains significantly below what it was only a decade ago.

Peering into the future, this study also provides a historically informed prospectus on the budget options available to UC. Individual campuses, such as Berkeley and UCLA, may be able to generate other income sources to maintain their quality and reputation. But there is no clear funding model or pathway for the system to grow with the needs of the people of California. UC may be approaching a tipping point in which it will need to decide whether to continue to grow in enrollment without adequate funding, or limit enrollment and program growth to focus on quality and productivity.

Funding support was provided by the Center for Studies in Higher Education of the Goldman School of Public Policy, Speaker Emeritus John A. Pérez, and UC Berkeley Deans Henry E. Brady and Bob Jacobsen. The views expressed are those of the authors.

John Aubrey Douglass, CSHE UC Cliometric History Project Principal Investigator, Senior Research Fellow Public Policy and Higher Education, Center for Studies in Higher Education, UC Berkeley

Zach Bleemer, UC Cliometric History Project Director and Lead Researcher, Center for Studies in Higher Education and Department of Economics, UC Berkeley



Approaching a Tipping Point?

A History and Prospectus of Funding for the University of California
Center for Studies in Higher Education - Goldman School of Public Policy - UC Berkeley

Table of Contents

SUMMARY of FINDINGS	4
A. The University’s Social Contract	7
B. A Brief History of UC Funding – the Critical Role of the State	9
The Search for Stable State Funding (1868-1900)	9
The Advent and Success of a Workload-Based Funding Model (1900-1960)	10
Ambitious Enrollment and Program Growth (1960-1990)	11
Declining State Investment and a Volatile Funding Model (1990-2015)	12
C. The Story of the State Budget and Rising Costs	15
Rising Pension Costs	16
Loss of Capital Funding	17
D. Searching for Other Sources of Income	19
A Diversifying Funding Portfolio	19
A Case Study of UC Berkeley	21
Growing Federal Research Funding	24
The Role of Philanthropy	25
E. Measuring the Impact on Students and Faculty	27
Indirect Measures of Educational Quality	27
Direct Measures of Institutional Quality	29
F. A Revised Funding Model – Exploring Options	32
Big Picture Variables	32
Seeking New Funding Streams	35
Management Efficiencies and Innovation	40
G. Conclusion — Something Is Going to Give	43
APPENDIX	
1. Reference and Data Sources	46
2. About the UC Cliometric History Project	47



Approaching a Tipping Point?

A History and Prospectus of Funding for the University of California
Center for Studies in Higher Education - Goldman School of Public Policy - UC Berkeley



Summary of Findings

The story of the University of California (UC) is not only its emergence as an innovative multi-campus university system of high quality and international reputation, but also how it managed to grow in pace with California's burgeoning population and increasingly complex social and economic needs. From its start in 1868, first in Oakland and then with a campus in the Berkeley hills, UC grew with the state's population. With 10 campuses that enroll some 273,000 students and annual revenues of more than \$35 billion, today, as in the past, UC remains a significant actor in California's economy and social and cultural life. In no small part, the state's broadly accessible and famed public higher education system—including UC, the California State University, and the California Community Colleges — helped define what it means to be a Californian.

This study provides a history of the vital role of state funding for the University of California for most of the 20th century. It then tells the story of the subsequent pattern of substantial state disinvestment over the last 30 years. Despite a decline in per-student funding from the state, this occurred in the midst of dramatic enrollment growth. The University community has sought alternative revenue resources to maintain the quality of UC's academic programs and research productivity. Additional income has been generated by successfully competing for federal research dollars, increasing tuition income generated largely by non-resident undergraduate and masters-level enrollments, and through increases in private philanthropy.

Yet even with a more diversified funding portfolio, UC has not made up for the dramatic decline in direct state funding relative to student enrollment. Unlike in the past, it must now bear the burden of most capital construction and maintenance costs, as well as growing pension costs, without significant assistance from state funding.

Among our major findings:

1. **A Long-Term and Irreversible Trend?** – From 1900 through the 1990s, between 40 and 80 percent of the University's budget was provided by the state legislature. Declines in state allocations for UC's budget accelerated significantly in the last two decades.

Despite UC's central contributions to California's economic growth and its ongoing access to Californians, state funding declined proportional to California's gross state product.

2. **Despite State Disinvestment, UC Maintained Access by Growing in Enrollment** – In the midst of declining state investment in public higher education, UC maintained access to undergraduates, accepting freshmen students from more than the top 12.5 percent of high school graduates and growing numbers of transfer students at the junior year.

With the onset of the recession in the early 1990s and subsequent downturns in 2001 and 2008, the most significant decline in state investment ensued. This occurred in a time in which California's demography had become increasingly diverse, the need for college graduates grew, and the value of UC's research and public service programs had never been more important.

State disinvestment essentially severed the historic link between state funding and enrollment workload, ending the incentive and ability for UC to expand academic programs and enrollment in pace with the labor needs of California's growing population.

Between 1990 and 2015 total enrollment grew from 166,500 to 257,400 – a staggering 90,900 students, mostly at the under-graduate level. Today the University enrolls 273,000 students.

- 3. UC Maintained Access for Low-Income and First-Generation Students** – At the undergraduate level, 42 percent of UC’s students are first generation and 38 percent are Pell Grant eligible. Many of these students require more support and services than their wealthier counterparts (e.g., tutoring, health care, housing, emotional support, taking summer classes.). Despite significant concerns regarding increasing tuition, in-state undergraduate tuition increases have been largely revenue neutral because UC’s high “return-to-financial aid” policies currently redirect more than 33 percent of tuition income to financial aid for lower- and middle-class Californians.

- 4. Seeking a Diversified Funding Portfolio and Cutting Costs** – UC successfully developed new funding streams, including tuition income largely from non-Californians, federal research grants, and philanthropy. The University has also pursued a series of significant cuts in academic and administrative staffing and reduced operational costs. But there are limits to further reductions, which will likely affect quality and the means to enroll new students.

Increases in funding sources and reductions in some operating costs have not made up for the scale of state educational disinvestment on a per-student basis nor provided the additional funds needed to adequately serve the university’s growing student population.

- 5. Coping Thus Far: Looking at Markers of Quality and Productivity** – By giving priority to undergraduate teaching and pursuing cutting-edge research, UC has, thus far, generally mitigated the impact of state disinvestment on its academic programs. For example, over the past decade the number and percentage of low-income undergraduates enrolled increased, student graduation rates are up, and research income rose, overtaking state funding as the largest single source of UC’s income.

But there are worrying trends, including rising student-to-faculty ratios, larger undergraduate classes, and inadequate enrollment and funding support for graduate students to help sustain UC’s teaching and research mission.

- 6. Approaching a Tipping Point: Something is Going to Give** – It is not clear that UC can continue to grow in enrollment and academic programs and sustain its teaching and research mission at the quality and productivity levels the state has enjoyed in the past. Individual campuses, such as Berkeley and UCLA, may be able to generate other income sources to maintain their quality and reputation. But there is no clear funding model or pathway for the system to grow.

Without a significant increase in state investment, UC may be approaching a tipping point at which the University community will need to decide whether it has the resources to continue to grow in enrollment, academic programs, and services, or not to grow and focus on maintaining quality and productivity.

Approximately 33 percent of all undergraduate tuition is all reallocated to fund financial aid – about \$700 million. The net result has been that increases in tuition have been at best revenue neutral – failing to offset the decline in state funding.

UC has coped and continues to seek alternative funding sources. But there are political and other limits that exclude generating the level of additional income needed to maintain important markers of quality – like student-to-faculty ratios, class size, and maintenance of facilities.

... we find little statistical evidence that declining state support reduced educational quality at the University of California’s teaching programs. While the yield rate for admissions declined and course sizes have increased, the number and proportion of California-resident applicants has never been higher; most students are in classes taught by ladder-rank faculty, and graduation rates and post-graduate earnings continue to substantially (and increasingly) outpace those of other universities.

It is important to note that our analysis does not gauge the human toll that decreased state funding has had on the UC system. . .

UC’s network of premier universities has managed to do more with less state funding. This may have created a false sense, among lawmakers in particular, that it can continue to crowd more and more students onto its campuses without a significant boost in funding for operational costs or capital funding.

Particularly in societies with substantial disparities between the rich and poor, such as in California, a low tuition rate represents a substantial subsidy for more wealthy students. Tuition fees and UC’s financial aid model should be revisited.

The University of California is a complex academic ecosystem that includes, for instance, the need for additional faculty and sufficient numbers of graduate students, along with facilities and support services, to support high-quality undergraduate education.

7. Paths Toward a Revised Funding Model – With or without reinvestment by the state, UC needs to seek new funding streams and operational efficiencies. Informed by our historical analysis, we briefly explore options, some of which are politically challenging:

- **Seek New Revenue Streams:** Raise undergraduate tuition and fees that could include establishment of a new tuition pricing model tiered by student family income, explore differential fees by field, and reduce the percentage of UC undergraduate tuition income that is “returned-to-aid” in favor of increased fundraising for financial aid.

UC could revise its out-of-state and international student targets to generate additional revenue and fund enrollment of more Californians. It could also continue to grow in professional degree programs, expand Extension and Concurrent Enrollment programs to new markets, seek strategies to grow extramural research grants and contracts, attempt to renegotiate indirect cost recovery rates for research, and seek new avenues for fund raising and building endowments.

- **Seek Management Efficiencies:** UC should continue to seek administrative and academic efficiencies, including improving graduation rates, expanding summer sessions, and considering a model of larger classes and greater dependence on instructional technologies that could compliment current undergraduate enrollment, or create a new class of off-campus UC undergraduates.

Further reductions in staff and faculty relative to student enrollment may seriously challenge the UC teaching, research, and public service model, even with technological enhancements. With increased pressure on campuses to generate income, UC should also consider organizational changes, including the establishment of campus boards that focus on local management and revenue generation.

UC faces a myriad of budgetary challenges related to operating in a state with a booming economy, rising living costs, and significant income inequality. For example, enrolling a high percentage of disadvantaged and first-generation college students means spending more not just on financial aid, but also on campus support services.

No other university reaches out beyond the borders of its campuses so extensively via its University Extension programs, University Cooperative Extension, research stations, and management of its Natural Reserve System. As in the past, UC’s mission is to touch and support, in some way, every Californian in every part of the state.

If UC does not gain significant increased state investment, or other sources of additional income, a further exploration of alternative paths to providing a UC education is important.

Governors in the past have been key players for building California’s pioneering higher education system. A new governor should have ambitions for higher education that match those of Californians.



In the short run, UC may be able to generate new revenue streams to maintain its quality and productivity, and, for example, reduce student-to-faculty ratios. But it is difficult to imagine a scenario where UC can generate sufficient funding for its long-term operational and capital costs that will allow the UC system to expand its enrollment capacity and academic programs in pace with California’s growing population and economic needs. California state government and the University share a history of under-predicting enrollment demand and the growing desire of California stakeholders for its scientific discoveries, expertise, and public services – including its medical centers.

UC is a network of campuses that were largely established in the 1950s and 1960s. Most have reached or are nearing their enrollment capacity. California is projected to grow from 40 million residents today to nearly 49 million by 2040. Unless there are substantial unexpected demographic changes, UC would need to grow at a similar rate as in the past to maintain its social contract. This is particularly important if California hopes to mitigate growing income inequality and to expand access to underrepresented minorities.

There is a tremendous opportunity for a renewed collaboration among lawmakers, local communities, the business sector, and public higher education in California to update and enhance the state’s network of colleges and universities for the twenty-first century. But failing that, there are significant choices confronting the University community, with consequences for California’s once robust promise of access to one of the world’s great universities. The University of California needs to study and explore these alternative pathways, their costs and benefits, and engage with lawmakers and the public on the stakes involved for California.

A. THE UNIVERSITY'S SOCIAL CONTRACT

The University of California (UC) plays an essential and unique role in California's pioneering public higher-education system. Since its establishment in 1868, UC has acted as the primary state-sanctioned institution to grant doctorate and professional degrees and to pursue research that ranges from "blue sky" explorations to practical applications. Over its 150 years as the state's public land-grant university, UC's campuses have promoted socioeconomic mobility and enabled California's emergence as the world's fifth largest economy.

The University of California has consistently been an innovator in promoting higher educational attainment rates in California. It became the nation's first multi-campus university system, beginning with the establishment of UCLA in 1919. UC then added new campuses and research stations based on the understanding that the strategic geographic location of its programs was essential to expand access to its educational services throughout California.

UC faculty also played an essential role in establishing the nation's first network of community colleges, beginning in 1907 with the creation of the Associate of Arts degree as equivalent to the first two years at Berkeley, and providing a pathway for students to matriculate to a four-year degree at UC. This innovation, combined with the development of the California State University, created a pioneering tripartite public system of higher education known throughout the world.¹

UC's teaching, research, and public service mission within California's larger public and private higher-education system helps explain its budget history and its contemporary needs, including its operational and capital requirements. In 1911, the state of California made a commitment to fund UC enrollment growth, making it possible for the University to grow in campuses and academic programs to meet the burgeoning needs of California's expanding population.

With reliable state funding, from 1920 until 1960 UC accepted approximately the top 15 percent of high school graduates as freshmen and enrolled a high percentage of transfer students. After 1960, and as part of the California Master Plan for Higher Education, UC agreed to enroll students from the top 12.5 percent as determined largely by high school grades and test scores. No other state university made such a commitment and no other state reaped the benefits of such a productive higher education system.

Today, under a social contract to serve the people and economy of California, and the needs of the nation, UC



enrolls some 273,000 students on 10 campuses located in major or growing population centers of the state, while also managing five medical centers and three national laboratories.

Reflecting its historical mission as the primary research university system in California, UC's contemporary social contract with the people of California includes:

- **Meeting the California Master Plan for Higher Education Agreement to Enroll All Eligible Californians** – At the undergraduate level, 42 percent of UC's students are first generation and 38 percent are Pell Grant eligible. Many of these students require more support and services than their wealthier counterparts (e.g., tutoring, health care, housing, emotional support, taking summer classes.). Despite significant concerns regarding increasing tuition, in-state undergraduate tuition increases have been largely revenue neutral because UC's high "return-to-financial aid" policies currently redirect more than 33 percent of tuition income to financial aid for lower- and middle-class Californians.

Even with this increase in out-of-state students, who pay higher tuition to help fund UC's operations, UC continues to enroll a relatively high percentage of in-state students compared to other major research universities in California and in other states. In 2016, 84 percent of UC's undergraduates were Californians. At

At the undergraduate level, the University awards nearly one-third of California's bachelor's degrees. . . . UC produces 75 percent of life science and 65 percent of engineering and computer science doctoral degrees in California, about half of the state's medical students and residents, and 20 percent of faculty at the California State University have Ph.D.'s from a UC campus.

¹ For an analysis on how California developed its pioneering higher education system, see John Aubrey Douglass, *The California Idea and American Higher Education* (Stanford University Press, 2000).

the University of Southern California, for example, the percentage of Californians is only about 44 percent, and at Stanford only about 38 percent. Many other leading state universities enroll 70 percent or fewer of their students from in-state (e.g., University of Michigan, 49 percent; University of Wisconsin, 61 percent; and University of Virginia, 70 percent).

- **Providing Access to a High Percentage of Low-Income and First-Generation Students** – UC awards nearly one-third of all bachelor's degrees in California. Among research universities that are part of the American Association of Universities, UC enrolls the highest percentage of Pell Grant recipients and first-generation students. These students graduate at rates that are among the highest in the nation and similar to upper-income students.

UC is an engine of social mobility: Forty-two percent of its undergraduates are from households in which neither parent holds a four-year degree. Four individual UC campuses each enroll more low-income students (as measured by Pell Grant recipients) than all the Ivy League universities combined. UC's low-income students graduate at rates comparable to all other students, and on average earn more than their families soon after graduation. According to the College Access Index, which ranks highly successful colleges according to the number of lower-and middle-income students enrolled and the price these students are charged, all five of the top colleges in the entire country are UC campuses.²

Educating the Vast Majority of Ph.D. and Professional Degree Students in California - UC produces 75 percent of life science and 65 percent of engineering and computer science doctoral degrees in California. About half of the state's medical students and residents are at a UC campus, and 20 percent of California State University faculty have Ph.D.'s from UC.

UC doctoral programs rank among the best in the nation and the world: The National Research Council ranked 322 of UC's research doctoral programs and found that 141 were ranked in the top 10 in the US. In addition, more than 20 UC Ph.D. recipients have won a Nobel Prize.

- **Shaping and Supporting California's Modern Economy** – With 10 campuses, the University of California is a major actor in the state's economy and social and cultural life. With expenditures of about \$35 billion, much of that in the form of salaries, wages, and benefits, UC is the state's third-largest employer, with more than 190,000 employees.

UC faculty and researchers secure nearly nine percent of all academic research and development grants coming from the federal government. UC is also a major source of start-up businesses and other economic activity, as well as a catalyst for inventions and innovations stemming in part from UC research.³

SUMMARY: UC maintained and strengthened its social contract even in the midst of declining state investment. The University provides a place at the freshman level for every UC-eligible Californian. The University also continues to be an integral part of California's innovation economy by producing talent for the state's labor market, conducting research that produces a growing portfolio of patents and licenses, supporting the development of new businesses and job growth, and providing public services that support distinct sectors of the state's economy. As a result, UC generates substantial returns for every tax dollar the University receives.

² See the College Access Index, May 2017 that ranks universities with five-year graduate rates of at least 75 percent, and based on their commitment to economic diversity.

³ According to a 2011 report on UC's economic impact, "Every \$1 that the California tax-

payer invests in UC and its students results in \$9.80 in gross state product and \$13.80 in overall economic output." See: Final Report of The University of California's Economic Contribution to the State of California, Prepared for The University of California Office of the President by Economic & Planning Systems, Inc. September 12, 2011.

**Figure 1 -
Sample Measures of UC Research
and Public Service Impact**

In 2014-15, UC generated and spent \$4.3 billion on research with 80 percent from federal and other funding sources.

UC research funding supported over 27,000 researchers, graduate students and post-doctoral employees and resulted in over \$1 billion in the purchase of goods and services in California.

UC researchers generated 5 inventions a day, leading to approximately 500 patents a year and 2,400 technology licenses.

In 2014, California based start-ups based on UC technology licenses employed some 19,000 workers and generated nearly \$14 billion in revenue.

UC operated 17 health professional schools and ten hospitals and is the primary generator of doctors and health medicine researchers in California with a total budget of \$10.9 billion.

Across the state, UC operates 58 Cooperative Extension Centers that support local economies, and some 21,000 community-based programs.

UC's Natural Reserve System, the largest university-administered in the world, comprises 39 sites with more than 756,000 acres across California.

B. A BRIEF HISTORY OF UC FUNDING – the Critical Role of the State

The following provides a brief summary of UC’s budget history in four eras. California’s history is one of constant population growth and increasing demand for access to higher education. Since its establishment in 1868, UC steadily expanded in enrollment, academic programs, and public services to keep pace with California’s burgeoning population and its increasingly complex social and economic needs.

1. The Search for Stable State Funding (1868-1900)

Initially, UC’s funding came largely from federal sources. In 1862 Congress passed and President Abraham Lincoln signed the Morrill Act (also known as the Land-Grant College Act) to promote the development of universities to serve states’ regional economic needs and promote educational attainment. Each state that applied for funding under the grant would be provided federal lands to be sold, thereby creating an endowment for selected institutions.

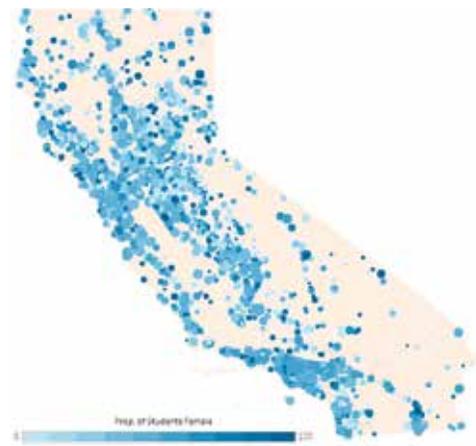
California lawmakers eventually passed the 1868 Organic Act to establish the University of California and to meet the requirements of the federal act.⁴ Lawmakers incorrectly thought that the funds generated by the resulting sale of land, and resulting endowment, would be adequate for funding the new university that began operations 1872 in the Berkeley hills. Funding for California’s sole Land-Grant university was sparse, made even more unpredictable by a decade of severe drought, a deep recession, and rampant corruption in Sacramento.

In the midst of this period of instability, California convened its second constitutional convention and, in part to protect the University from repeated political attacks, proposed that UC become a “public trust” under a new California Constitution. Voters passed the new constitution in 1879. The UC Regents gained a significant new level of autonomy to manage the University’s finances and academic activities. The eventual result was an internal academic organization and culture that would help create one of the world’s premier research universities. But to do so would require increased state funding.⁵

By the 1890s, a state tax on property also generated limited state funding for UC, but it was unrelated to the University’s enrollment. This led to tremendous financial strain. California’s population growth was fueled largely by migration from the American Midwest, which settled largely in the Bay Area and in Los Angeles, and many who wanted a college education and viewed the University of California as a salve for the state’s political and economic problems.

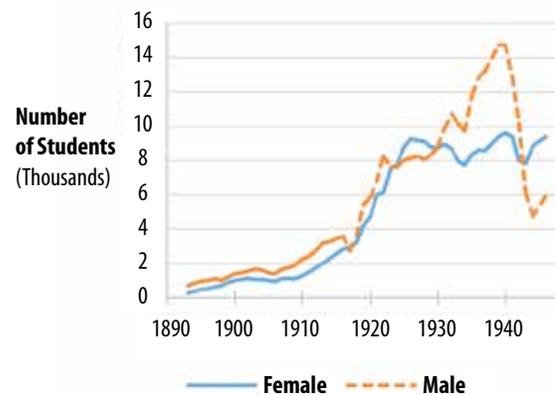
In 1899, Benjamin Ide Wheeler left Cornell to become UC’s new president (1899-1919).

Figure 2 - UC Students by Home Town and Gender: 1893-1946



Note: Circle size is log-proportional to the number of students from each town. Source: CSHE UC Cliometric History Project, Annual UC Registers. Data currently only available up to 1946.

Figure 3 - UC Enrollment Growth by Gender 1890 – 1950



⁴ The 1887 Hatch Act and the 1890 Second Morrill Act, which supported agricultural research and extension programs, later complemented these funds.

⁵ John Aubrey Douglass, “How and Why the University of California Got Its Autonomy,” Center for Studies in Higher Education, Research and Occasional Papers Series (ROPS).



In 1899, Benjamin Ide Wheeler left Cornell to become UC's new president (1899-1919). Wheeler thought Berkeley's problems acute: "Its equipment and income have been steadily outgrown in its rapid development; its buildings are entirely unworthy of its standing and its work."⁶ Only three other states exceeded California in the number of high school graduates who went on to college, noted Wheeler: Massachusetts, Connecticut, and Maryland.

Wheeler appealed to lawmakers that no institution in the nation was forced to educate so many students with so few resources: "the estimated income for the present year provides for the 2,300 students entrusted to our care an average of \$134 per student—the cheapest education per capita attempted by any university in the country of like, or approximately like, standing."

Wheeler was also appalled at the large classes and the heavy workload faced by faculty. "The situation here at present is, I sometimes think, pathetic, and sometimes ludicrous," Wheeler wrote to the governor: "The students have come down like an avalanche. We have no elasticity in our budget by which to provide for them. We are doing our best, but it is only by a miracle that the multitude can be fed with the seven loaves."⁷

2. The Advent and Success of a Workload-Based State Funding Model (1900-1960)

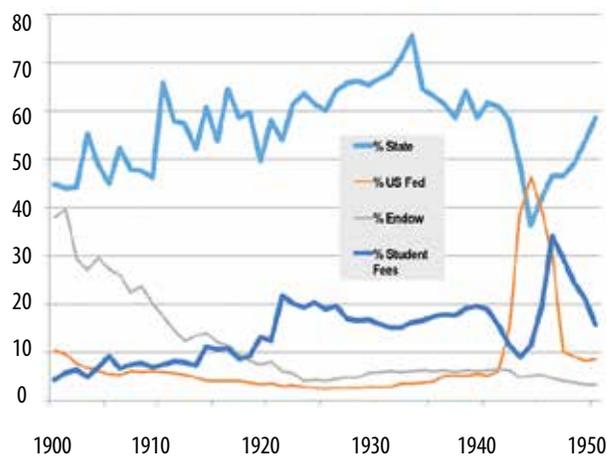
Initially, Wheeler successfully gained new funding from the state and through philanthropy. But there remained no link with the University's actual enrollment. This changed in 1911 when reform governor Hiram Johnson and the legislature agreed to create an enrollment-based funding model. Progressives like Johnson valued the University and higher education in general and saw expanding access and adequate state funding as the key to a progressive and competitive California society.

By 1920, the Berkeley campus had become one of the largest universities in enrollment in the nation. In 1919, the University absorbed the teacher's college in Los Angeles, later building a new campus in Westwood that would become UCLA. In the following decade, UC also developed a social contract whereby the University cal-

ibrated freshman admissions standards to ensure a reasonable chance the student would graduate. This was assessed as approximately the top 15 percent of California's high-school graduates (based on grades) who had graduated from high schools accredited by the University's faculty. UC set standards for California's growing number of high schools located throughout the state. As a result, it drew students from every corner of California (see Figure 2). UC also enrolled a high percentage of female students, more than any other major public university – although the onset of the Great Depression temporarily slowed their enrollment (see Figure 3).

Fueling access to higher education, UC faculty helped conceptualize the idea of the "junior college" in 1907 (as noted previously), assisting in the establishment of the nation's first network of community colleges. UC established the two-year Associate of Arts degree and accredited all community colleges. In turn, and beginning in 1910, the AA degree allowed students to transfer before their junior year to Berkeley and subsequently to the other UC campuses to earn bachelor's degrees.⁸ It was a revolutionary idea that helped California's achieve educational attainment rates unmatched by any other state. Between 1910 and 1960, nearly two new UC accredited community colleges opened each year. By 1930, approximately 30 percent of all undergraduates at the Berkeley and Los Angeles campuses were transfer students; by 1935, nearly 45 percent were transfer students.⁹

Figure 4 - UC Budget History: Major Funding Sources as a Percentage of Expenditures: 1900 – 1950



Source: UC Centennial Report

⁶ See John Aubrey Douglass, *The California Idea and American Higher Education* (Stanford University Press, 2007).

⁷ Ibid.

⁸ Ibid.

⁹ See John Aubrey Douglass, *The Condition for Admissions: Access, Equity, and the Social Contract of Public Universities* (Stanford University Press, 2007), p. 89.

Between 1911 and 1960, as the University grew with the state's population, funding came mostly from state coffers, with some modest amounts from student fees (see Figure 4). During this period, state support was typically 55 to 70 percent of the University's total budget. UC grew dramatically in enrollment, academic programs, and number of campuses; its research stations, extension and public service programs meant that UC had a presence or influence in every corner of the state. The Santa Barbara campus, once a teacher's college like the Los Angeles campus, was established as part of UC in 1944. Research centers at Davis and Riverside became new campuses in 1951 and 1954, respectively, and UC San Diego was established in 1959, building on the Scripps Institute of Oceanography, started in 1903.

3. Ambitious Enrollment and Program Growth (1960-1990)

In the two decades after World War II, state funding for UC continued to increase, supporting enrollment growth and the establishment of new campuses. In the 1960s, two new campuses were started, in Irvine and Santa Cruz. Beyond the medical campus in San Francisco, UC established four medical centers in the post-War period.

The University also received a dramatic increase in federal funding for academic research and the growth of graduate education, reflecting a post-war consensus between state and federal government on the importance of investment in higher education. Growing federal funding meant that state funding declined as a percentage of UC's overall income – reflecting an increasingly diversified income portfolio (see Figure 5). UC had become a major center for federally funded research, transforming and elevating UC's role in developing human capital and shaping California's emerging technology and business sectors.

The 1960 California Master Plan for Higher Education is often credited with establishing the distinct missions of California's three public college and university segments: the University of California, the California State University, and the California Community Colleges. But in reality, these missions were already established in California's education code prior to 1960; the Master Plan was more important for preserving California's pioneering system of higher education and outlining a pathway for growing that system. This included a revised funding model that created greater stability in state investment for UC and CSU as they opened new campuses and academic programs.

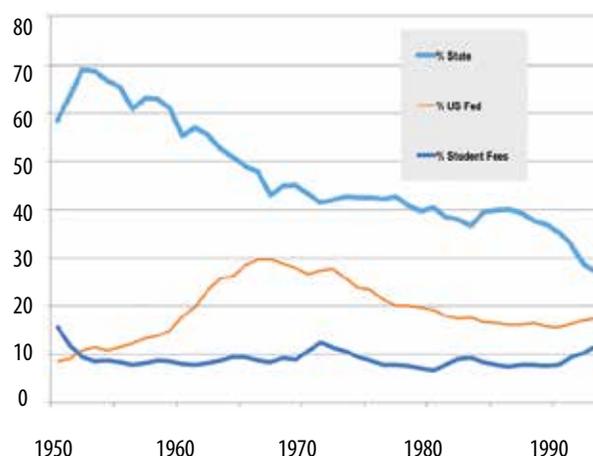
When the 1960 Master Plan was negotiated, UC had a total enrollment of 55,900. Reflecting the workload model first established in 1911, the state agreed to fund one faculty position for every 14.5 students as UC grew in en-



rollment and campuses. With fiduciary oversight by the Regents of the University of California, UC's Office of the President, then led by Clark Kerr, dispersed state funding to the campuses largely based on enrollment workload. State funding for capital expenses (buildings and special allocations for maintenance)—for classrooms, offices, laboratories, and even student housing—was separately funded via general obligation bonds or direct allocations from state coffers.

Into the mid-1960s, led in part by the leadership of Governor Pat Brown (1958-1966), the relationship between state lawmakers and state agencies was characterized by mutual trust and a desire to continue to build one of the world's great higher education systems. The election of Ronald Reagan as California's governor, in 1966 and 1970, along with the Free Speech Movement and Vietnam War protests, marked a shift in the relationship between California's higher education community and the state. Reagan's 1966 campaign included the promise to "clean up the mess at Berkeley" and, once in office, he promptly

Figure 5 - UC Budget History: Major Funding Sources as a Percentage of Expenditures: 1950 – 1995



Source: UC Centennial Report and UCOP

successfully lobbied the Regents to fire UC President Clark Kerr (1958-1967). He also attempted to make large cuts to public higher education and proposed the imposition of tuition fees at UC. Reagan later became more supportive of funding for UC, but his arrival marked the beginning of a sometimes-contentious relationship between successive governors and the University.

The erosion in the historic compact of state funding for UC enrollment and program growth extended into the 1970s and the governorship of Jerry Brown (1974-1982) who did not share the commitment to public higher education that marked his father's tenure as governor. Fluctuations in California's economy, growing government costs, and the 1978 tax revolt that resulted in Proposition 13 brought greater competition for state funds and a decline in state investment for California's network of public colleges and universities. In a trend that would accelerate in the 1970s, UC kept to its Master Plan target of enrolling more and more students. But state investment in new buildings and maintenance (for example) was minimal, resulting in a large backlog of infrastructure costs.

After a decade of declining state funding for public higher education, in the 1980s newly elected Governor George Deukmejian (1982-1990), a Republican, became convinced that an underfunded UC would erode its quality and productivity, which in turn would hinder technological innovation, cost the state in economic activity, and potentially reduce its ability to maintain historic levels of access. Deukmejian worked with state lawmakers and UC's then-president David Gardner to re-invest in UC, creating an important but short-lived reprieve to the long-term trend of declining state investment.

4. Declining State Investment and a Volatile Funding Model (1990 - 2015)

With the onset of the recession in the early 1990s and subsequent downturns in 2001 and 2008, the most significant decline in state investment ensued. This occurred in a time in which California's demography had become increasingly diverse, the need for college graduates grew, and the value of UC's research and public service programs had never been more important. Despite the increased value of UC for California, and as discussed more fully in the following sections of this report, state funding as a percentage of UC's operating budget plummeted from 24 percent to approximately 10 percent between 2000 and 2014.

At the same time, UC kept to its Master Plan pledge to accept California high school students among the state's top 12.5 percent and community college students meeting the eligibility requirements. Between 1990 and 2015, total enrollment grew from 166,500 to 257,400 – a staggering 90,900 students, mostly at the undergraduate level. Figure 6 provides student enrollment and faculty numbers over time and the growing student-to-faculty ratio, an indicator of declining state investment.

With the onset of the recession in the early 1990s and subsequent downturns in 2001 and 2008, the most significant decline in state investment ensued. This occurred in a time in which California's demography had become increasingly diverse, the need for college graduates grew, and the value of UC's research and public service programs had never been more important.

Figure 6 - Growth in UC Enrollment and Faculty Ranks – 1870 to 2015 (headcount)

	Undergraduates	Graduate Students	Total Students	% UG	Ladder-Ranked Professors	Lectures / Other	Total Faculty	Student to Ladder-Ranked Faculty Ratio
1870	90	3	93	97%	16	1	17	5.8
1890	432	25	684	63%	66	31	97	10.4
1910	3,272	501	4,314	76%	231	139	370	18.7
1950	32,619	10,744	44,332	74%	2,039	1,223	3,262	21.7
1960	37,897	17,295	55,887	68%	3,218	899	4,117	17.4
1970	73,824	31,511	105,335	70%	5,534	1,609	7,143	19.0
1975	89,096	35,178	124,274	72%	6,174	1,894	8,068	20.1
1980	97,102	38,719	135,821	71%	6,297	2,304	8,601	21.6
1990	125,458	41,089	166,547	75%	8,466	3,057	11,523	19.7
2000	140,937	42,416	183,353	77%	7,842	4,916	12,758	23.4
2010	179,245	55,219	234,464	76%	9,216	6,756	15,972	25.4
2015	198,866	58,572	257,438	77%	9,615	8,357	17,972	26.8

Today, as noted, UC enrolls 273,000 students.¹⁰ The last published long-range enrollment plan by the UC Office of the President was completed in 2008 and projected that total enrollment in 2020-21 would be 264,500 students.¹¹ UC has obviously already exceeded that total, in large part to enroll more Californians, but also to enroll non-resident domestic and international students – a response related to continuous state disinvestment. California state government and UC have a history of under-predicting future enrollment demand and often focused on projections that expect stagnant high school graduation rates among disadvantaged groups and conservative estimates of their college desires and enrollment and that of a larger public.

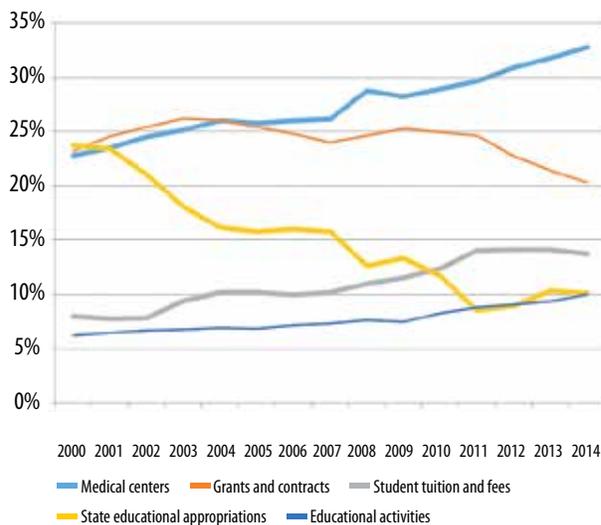
At the same time, it is important to note that UC today enrolls a remarkably low percentage of its students at the graduate level when compared to other public research universities: 22 percent, down from 30 percent in the 1960s and 1970s. In comparison, the average percentage of graduate student to all enrollments in the AAU public institutions is about 30 percent, and graduate enrollment at private AAU institutions is closer to 50 percent. In short, UC used scarce and declining public dollars to grow undergraduate enrollment in order to meet its social contract. But this comes at a cost of not

enrolling enough graduate students to help meet California’s growing need for researchers and highly skilled workers. It also fails to support the academic ecosystem that supports teaching, research, and innovation.

Figure 7 shows the decline in state funding as a percentage of UC’s overall operating budget. Figure 8 displays the decline in funding per student for the UC system in comparison with the California State University (CSU) system. There are major differences in the missions of UC and CSU, in part reflected in UC’s much broader teaching, research, and public services activities. This is reflected in their funding sources and total budgets. UC’s total operating budget is now close to \$35 billion, while CSU, a teaching-intensive university with only a few professional doctoral programs, has a budget of about \$10.3 billion in 2017-18.

There are major differences in the missions of UC and CSU, in part reflected in UC’s much broader teaching, research, and public services activities. This is reflected in their funding sources and total budgets. UC’s total operating budget is now close to \$35 billion, while CSU, a teaching-intensive university with only a few professional doctoral programs, has a budget of about \$10.3 billion in 2017-18.

Figure 7 - UC Budget History: Major Funding Sources as a Percentage of Expenditures: 2000 – 2014



Source: UC Centennial Report and UCOP

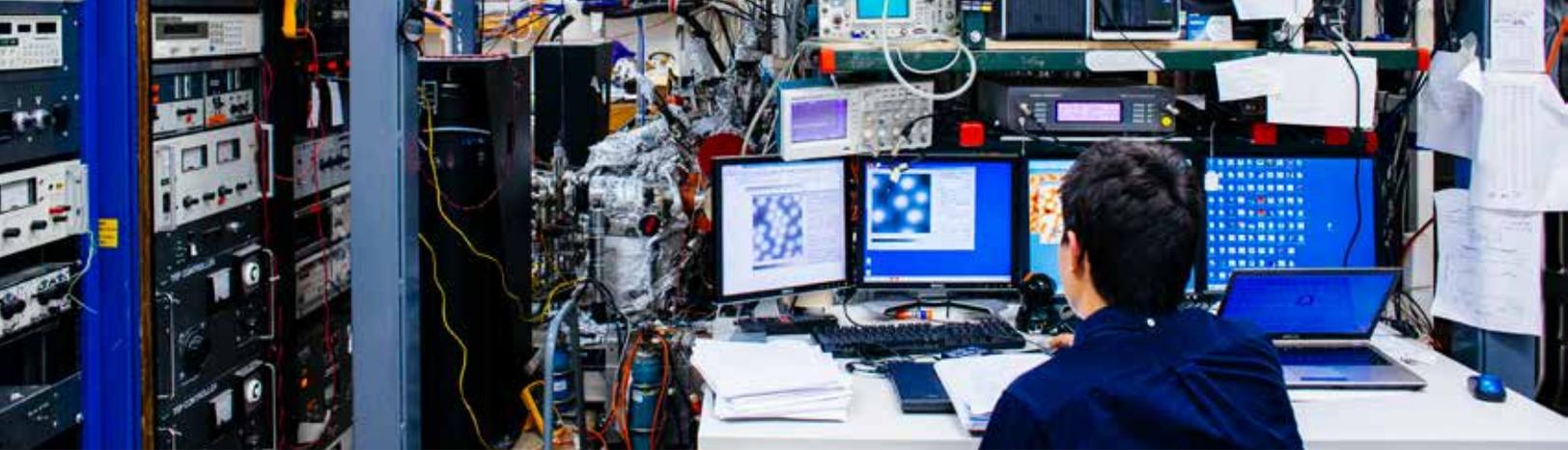
Figure 7 - State Funding for UC and CSU per Student: 1981 – 2013 (Adjusted for Inflation)



Source: CPEC, UCOP, and CSU Budget Office

¹⁰ Note that in Fall 2017, nearly 17 percent of UC’s total undergraduate enrollment was international students (11.5 percent) and non-resident domestic (5.7 percent), for a total of 28,500 students. UC increased non-resident student enrollment in part to generate additional income. Between 2000 and 2017, UC enrolled an additional 47,000 Californians at the undergraduate level.

¹¹ University of California System-wide Enrollment Projections: Undergraduate and Graduate Enrollment Through 2020-21, Phase I Report. UC Office of the President. March 2008.



As shown in Figure 8, the more severe decline in per-student state funding is at UC. At the same time, as detailed later in this report, UC has generated other funding sources to partially mitigate the large decline in financial support for its teaching, research, and public service programs. These include increases in tuition and fees that have been accompanied by a robust “return-to-aid” policy for low- and middle-class students in the form of nearly \$1 billion of tuition discounts, fee waivers, and scholarships to help cover living costs, a policy choice that supported an increase in the number and percentage of low-income and first-generation students over the past decade or more.¹²

As California’s demography changed, with greater income disparity, UC’s financial aid policies have been adjusted to help maintain access for students from different income groups. Approximately 33 percent of all undergraduate tuition is reallocated to fund financial aid – about \$700 million. The net result is that rising tuition has been largely revenue neutral – failing to offset the decline in state funding.

In addition, while lawmakers have chosen to reduce direct funding to UC on a per student basis, they have expanded funding for the Cal Grant program, a supplemental financial aid program that eligible lower-income students use toward tuition and living costs. But because

of a political deal with the current governor, UC chose to freeze tuition between 2013 and 2017, reducing possible income to UC.

The scale of UC’s recent enrollment growth relative to earlier decades is substantial and helps provide perspective on the challenges that lay ahead for a network of campuses largely established in the 1950s and 1960s. Most are at or near their enrollment capacity. UC Merced is the one campus with a substantial ability to accommodate increasing demand for a UC education, but even at Merced, there are limits to yearly increases in enrollment, including the building of facilities and hiring top-quality faculty. During the next two decades, California’s population is projected to grow 22.5 percent, from 40 million to nearly 49 million, by 2040. Unless there are substantial unexpected demographic changes, UC should grow at a similar rate as in the past, assuming a funding model is found to grow with enrollment demand.

The following sections of the report provide more detail and data on UC’s funding challenges, focused on the last three decades. They describe UC’s successful efforts to decrease operating costs and increase out-of-state sources of revenue. These sections also provide an outline of the stark options that UC, and Californians, face without a renewed state investment plan for public higher education in the state.

SUMMARY: California’s consistent and generous state support for the University of California allowed UC to evolve into a multi-campus system that bolstered socioeconomic mobility and provided a building block for the state’s economy. Historically, state funding was based on an enrollment workload model, providing the means and incentive for UC to grow and maintain its social contract with the people of California. Since 1990, however, California struggled with three recessions and increasing demands for state funding for health care, corrections, and K-12 education. During this period, per student state funding for UC dropped dramatically, and increases in tuition have, at best, simply offset these cuts. The workload-funding model largely disappeared in favor of political deals for short-term funding with state lawmakers. We may be at the end of California’s once coherent effort, from 1910 to approximately 1990, to provide resources for UC to grow with California’s population and help meet the state’s labor and research needs and desire to mitigate inequalities in our society. As we shall show, there are some worrisome signs that the result could be a decline in the quality and pre-eminence of the UC system and in its ability to serve California’s students.

¹² See Figure 13, California Legislative Analyst’s Office, “The 2018-19 Budget: Higher Education Analysis,” February 15, 2015.

C. THE STORY OF THE STATE BUDGET AND RISING COSTS

During the second half of the twentieth century, the most dramatic change in the University of California's sources of income relates directly to the slow and then precipitous decline in state funding. In response, the University began to intermittently raise tuition. The proportion of the UC budget provided by the state of California throughout the late twentieth century decline from 67 to 33 percent between 1950 and 2000.¹³

These changes in UC's budget portfolio can be confusing. Because of UC's success in generating new income its overall budget has grown dramatically, despite shrinking funding from the state. While additional funding for research and medical services means that UC is doing more for California, the funds for these activities are usually not directly available for teaching students.

The sharpest cuts in state funding occurred in 2003, 2008, and 2011, corresponding with substantial state budget shortfalls in the wake of the dot-com bust and the onset and aftermath of the Great Recession, respectively. Figure 9 outlines the consequences of state disinvestment for the UC system and for the Berkeley campus between 2009 and 2010. Economic recoveries failed to restore even half of each single-year cut.¹⁴ Due to California's heavy reliance on the Personal Income Tax, state revenues are extremely volatile – one outcome of Proposition 13, passed in 1978.¹⁵

While the sharpest declines in funding per UC student occurred during years of substantial California state budget shortfalls, fluctuations in the state budget cannot fully explain the decline in UC's state support. Increased competition for state funding is also a factor, including:

- Significant increases in state funding obligations for public schools dating back to the requirements for funding equity for schools incorporated in the court decisions of *Serrano v. Priest* (1971, 1976, 1977); the passage of Proposition 13, in 1978; and the addition of Proposition 98 in 1988 stating that at least 40 percent of the state budget should go to K-12 and community colleges.

- Increased state costs for health care – specifically for Medi-Cal (a shared obligation with the federal government).
- Dramatic growth in state-funded pension obligations for public employees.
- A resulting reduction in the discretionary funding for higher education and other public services available in the state budget to less than eight percent of the total state budget.
- Competitors in this portion of the budget include prisons with strong union influence in Sacramento. Corrections has increased from less than 4% in 1978 to nearly 9% of the State General Fund in 2015.¹⁶

Figure 9 - UC and the Great Recession 2009-2010

University of California (10 campus) system impact:

- Cut of \$813 million in state funded operating budget (or approximately 20% over UC's 2008-09 budget)
- Loss of 2,400 freshmen positions
- Salary cuts for academic and administrative staff of four to 10 percent
- Hiring freeze
- Restricted travel and equipment purchases
- Lay-off of 1,900 employees
- Elimination of 3,800 faculty positions
- Deferred hiring of 1,600 academic positions
- Student fee increases of approximately 32 percent over 2008

Berkeley Campus Example:

- Cutting approximately \$80 million to the campus' operating budget
- Increasing class size and reducing course offerings by eight percent
- Freezing hiring of new faculty
- Increasing student-faculty ratios
- Cutting faculty, lecturer, and graduate student assistant positions by as much as 20 percent in some departments
- Cutting student services
- Reducing hours of operation of the campus

¹³ Due to their independent funding structure, we exclude the UC national laboratories from aggregate UC budgets wherever possible.

¹⁴ State educational appropriations have fallen even in non-inflation-adjusted terms. When dollar amounts are inflation-adjusted using higher-education-specific changes in prices over the 2000s, which have risen faster than consumer prices throughout the 21st century, the decline is even starker. According to the Commonfund Institute, which calculates the Higher Education Price Index (HEPI), University operation prices have increased by 159 percent since 1987, whereas consumer prices (as measured by the CPI) have increased 112.8 percent. Using the HEPI inflation measure, state educational appropriations for UC have fallen 65 percent since 1987, and 58 percent since 2000. See Commonfund (2015).

¹⁵ In the most recent budget, Personal Income Tax makes up nearly 70 percent of state revenues. PIT is increasingly weighted to higher income levels and disproportionately on capital gains. It is much more volatile than other taxes, such as sales taxes, corporation taxes, and property taxes. One extreme example of this happened in the 2008-09 recession, when State GDP fell by four percent and the State budget revenues fell by almost 20 percent. UC is pinned on both sides, through volatile revenues and a rigid expenditure structure.

¹⁶ The growth in corrections spending mirrors increases in California's prison population – a result of stringent criminal policies like the three strikes law. Beginning in the 1980s, those laws resulted in a sharp increase in the number of prisons and prisoners in California, with the state leading all others in prisoner growth. See State Spending on Corrections and Education website.

A shrinking state discretionary budget correlates with declining funding to UC on a per student basis. In 2015, UC received 2.39 percent of the California state general fund budget, down from 3.7 percent in 2000 and 7.5 percent in the late 1960s (see Figure 10). Although state funding cuts to UC go back three decades, they accelerated greatly during the Great Recession. UC campuses implemented administrative staff cuts and froze the hiring of ladder-ranked faculty. In 2009-2010 alone UC suffered a 20 percent cut in its state budget.

Despite UC's central contributions to California's economic growth, and its maintaining access for Californians, state funding declined proportional to California's gross state product (GSP).¹⁷ The total magnitude of the state's economy grew (in nominal terms) in all but one of the past 50 years, due to both population growth and increased productivity, but the share of that economic activity that translates into state appropriations for the University fell in 40 of those 50 years.

As shown in Figure 11, state funding declined 52 percent in terms of California GSP since 2000, continuing a decades-long decline as the state's economic success outpaced its public commitment to higher education. Relative funding per student fell even faster. The state's annual contribution toward each UC student as a fraction of gross state product declined by two-thirds since 2000, a substantial public educational disinvestment over a 15-year period.

In the midst of declining state investment, UC faces a myriad of budgetary challenges related to operating in a state with a booming economy, rising living costs, and significant income inequality. For example, enrolling a high percentage of disadvantaged and first-generation college students means spending more not just on financial aid, but also on campus support services. Employing a highly skilled workforce requires competitive salaries that help cover the cost of living in one of the most expensive states in the Union. And most of UC's campuses have depreciating capital assets and costs for retrofitting related to operating in some of the most active seismic zones in North America.

The following briefly discuss two areas of particular concern – rising pensions and the loss of state funding for capital projects.

1. Rising Pensions Costs

In addition to these declines in general fund allocations to UC, the state also withdrew from providing subsidies for pensions and health benefits for UC employees during the early 1990s Recession, leaving the University on its

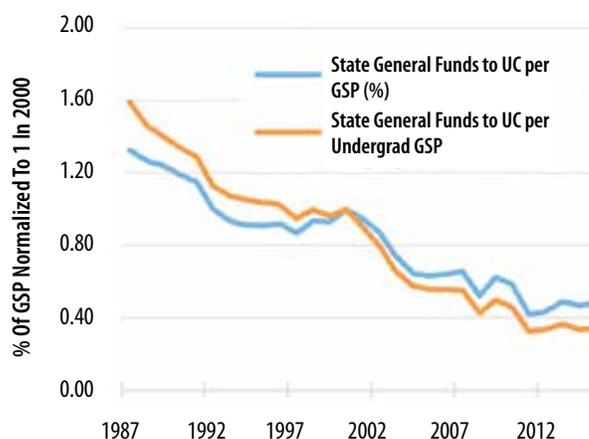
own. UC had no choice but to pick up full pension funding. In addition, the University employs among the most talented faculty in the world to teach, do research, and contribute to UC's public service mission. Most UC campuses are in high cost-of-living areas (Bay Area, Los Angeles-Orange County, Santa Barbara, and San Diego), with competitive and expensive labor markets.

Figure 10 - UC Share of State General Fund: 1987 – 2015



Note: UC funding steadily declined from 7.5% to 2.6% of the California state budget over the past 50 years. Source: CPEC, Governor's Budget, and UCOP

Figure 11 - State General Funds to UC per California Gross State Product (normalized to 1 in 2000) - 1967 - 2012



Note: As a proportion of California Gross State Product, state funding for UC declined by more than 80% in the past 50 years, and more than 50% in the past 20 years. Sources: General Funds CPEC (1987-2000) and UC Office of the President (2000-2015); GSP BEA (1987-2015)

¹⁷ It should be noted that most of UC's campuses are at or near their enrollment limit – often determined by agreements with local communities. Competition for access campuses such as Berkeley, UCLA, and San Diego, as well as Santa

Barbara and Davis, grew significantly. UC continues to promise access to all UC eligible students, but not necessarily to their first choice of campus.

The Great Recession era rollback of state funding to UC, including pensions, contributed significantly to UC's overall financial instability. While the state continues to fund the California State University's pension costs, lawmakers have not done the same for UC. Recent state budgets have offered token contributions to UC's pension liability, but no promise of systematic annual funding support crucial to the University's financial health.¹⁸

Today, UC's retirement system has a deficit in unfunded liabilities of approximately \$7.6 billion. UC employees now contribute about nine percent of their salaries to the pension program, up from two percent as recently as 2010. UC contributes approximately 15 percent of an employee's salary toward the pension fund. For a campus like Berkeley, pension costs are estimated to be about \$120 million, which must now be covered in its operating budget.¹⁹ UC recently altered its pension program for new employees, but the reduced pension pay-out costs will be many decades off.

2. Loss of Capital Funding

State funding for capital outlay declined over the past 40 years. State support, largely through bond acts, historically was the primary source of funding for the construction and maintenance of core academic facilities, while out-of-state sources fund self-supporting enterprises, such as housing, parking, athletics, and medical enterprises.

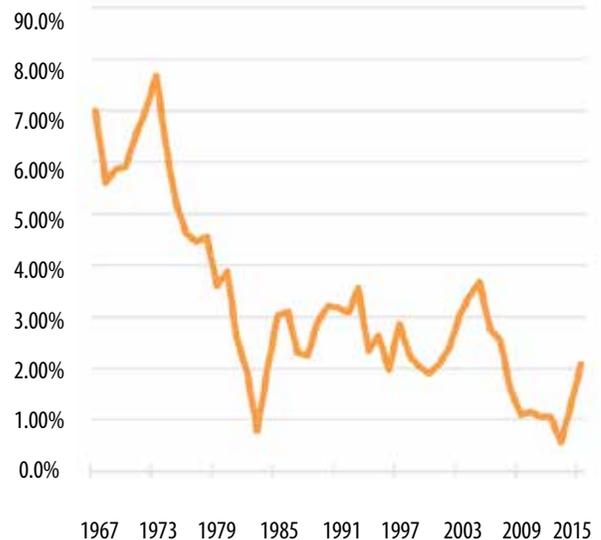
In 2011, in the midst of the Great Recession, California lawmakers decided to no longer fund UC's capital budget with state bonds or other sources. Since 2013, UC is expected to fund its capital needs out of its general operating funds and to seek private partners or use its own authority to issue bonds (as noted previously).²⁰

To make this feasible, the Education Code was amended to stipulate that UC may spend more than 15 percent of its annual state General Fund allocation for debt service for capital expenditures, but UC's general fund allocation increase was not commensurate with this new responsibility. Hence, UC is faced with calculating the tradeoff of funding faculty positions and supporting academic programs versus covering increasing needs for maintenance and capital investment, including seismic retrofitting or replacing buildings.

Most of UC's facilities are more than 30 years old. UC's current Capital Financial Plan details \$27.6 billion in overall capital needs over the next six years, of which \$13.3 billion will support academic programs and enrollment growth.²¹

... UC faces a myriad of budgetary challenges related to operating in a state with a booming economy, rising living costs, and significant income inequality. For example, enrolling a high percentage of disadvantaged and first-generation college students means spending more not just on financial aid, but also on campus support services.

Figure 12 - Proportion of UC Capital Outlay Funded by the State of California – 1967-2015



Note: After decades of substantial (if volatile) state capital support, averaging more than \$500 million per year (CPI-Adj.) in the early 2000s, total state capital funding averaged only \$100 million annually since 2009. Due to high volatility, this chart presents the three-year moving average of its series. Recent years' General Fund allocations directed toward capital projects are included here as capital allocations. Source: 2010 CPEC Fiscal Profile and 2017 UC Accountability Report

¹⁸ In the 2015 fiscal year, California Governor Brown and lawmakers did agree to allocate \$436 million in one-time Proposition 2 funding [over 3 years] to help address the UC Retirement Plan (UCRP) unfunded liability. The last year was 2017-18, with no promise of renewal.

¹⁹ See Part 1 of John Wilton's two-part analysis of UC Berkeley's finances, "Time is Not on Our Side," Office of Administration and Finance, UC Berkeley, September 27, 2013.

²⁰ In the 2015 fiscal year, California Governor Brown and lawmakers did agree to allocate \$436 million in one-time Proposition 2 funding [over 3 years] to help address the UC Retirement Plan (UCRP) unfunded liability. The last year was 2017-18, with no promise of renewal.



These costs will now need to be financed by the University (including entering new partnerships with the private sector) and constitute a relatively new and major financial burden, unless there is a change in state policy.

Figure 12 shows that the state routinely funded more than 60 percent of UC's capital expenditure in the late 1960s, but by the early 1980s the state's contributions declined to 30 percent, or about \$250 million per year. Despite the increasing cost of seismic compliance and retrofitting many UC campuses' aging infrastructure, UC's most recent general obligation bond was funded over a decade ago, in November 2006, when nearly all state capital funding disappeared during the Great Recession.

The decline in the state's investment in capital projects was partially replaced by gifts, grants, UC-issued bonds, and other sources, which now accounts for approximately 85 percent of UC's capital program funding.

State disinvestment essentially severed the historic link between state funding and enrollment workload, ending the incentive and ability for UC to expand academic programs and enrollment apace with the labor needs of California's growing population.

SUMMARY: State funding for UC's operations declined precipitously in the past 30 years. State disinvestment essentially severed the historic link between state funding and enrollment workload. This erodes the incentive and ability for UC to expand academic programs and enrollment in pace with the labor needs of California's growing population. Although UC took on new responsibilities for research and medical services that have increased its revenues, these activities provide only nominal funding for its educational mission, which must be covered mostly by state funding per student and by tuition. Because of its high return-to-aid of one-third or more for each tuition dollar, UC has not fully replaced state funding cuts per student with its increased tuition. Moreover, direct state funding for faculty and staff pensions and capital projects disappeared, requiring UC to cover these costs from its general fund allocation. This hardship puts further strain on an already diminished pool of funds. Increasingly, UC is being asked to do more to educate the students of California with fewer and fewer resources.

²¹ See University of California Office of the President, Capital Financial Plan 2017-27. In addition, The College Futures Foundation estimates \$14.6 billion in current facility maintenance and improvement – not including capital needs for

additional enrollment and program growth. Patrick J. Lenz, *Paying for Space: A Brief Framing the Issues of Opportunities in Capital Finance for Higher Education in California*. College Futures Foundation 2017.

D. SEARCHING FOR OTHER SOURCES OF INCOME

The following discusses the search for additional sources of income as state funding declined, first focusing on the UC system as a whole, and then providing a brief case study of the Berkeley campus.

1. A Diversifying Funding Portfolio

Since the late 1990s UC pursued an increasingly diversified funding portfolio. This reflects the expanding nature of the UC campuses' activities and an effort to secure additional funding in the wake of the state's fluctuating allocations and overall downward investment. There is no doubt that seeking other sources of funds can strengthen UC, but it is worth noting that many of these strategies only indirectly help to preserve the basic teaching and educational function of the University of California.

Instead, these strategies mostly enhance the research and service functions of UC via federal, corporate, or foundation grants for research or by enlarging the service function of the University by providing medical or other services to the state. The funds obtained for these purposes typically cannot be used to directly support classroom teaching, although they may enlarge the experiences of students by allowing them to engage in research or the provision of medical services.²²

Even when a strategy is designed to enhance teaching programs, such as the creation of self-supported professional master's programs, the result primarily enlarges the menu of educational programs rather than supporting existing ones. Finally, obtaining these resources puts a substantial burden on the faculty and administrators, who must write grant proposals, run service programs, design new degree programs, and divert their efforts from doing direct teaching, research, and service.

Increasing tuition, of course, directly helps to support the educational mission of the University, but it also requires the return of a substantial portion of the tuition to those who could not otherwise afford UC and puts an increasing burden on those students who are not eligible for full financial aid. Beyond increases in resident undergraduate tuition, UC pursued four program areas to increase income:

- Increase the number of non-resident students, whose higher tuitions can support in-state students.
- Charge an additional Professional Degree Supplemental Tuition (PDST) in existing professional degree programs to provide the services demanded by students and perhaps allow the diversion of some resources to undergraduate programs.
- Expand Extension and Concurrent Enrollment programs to serve those not enrolled in UC's degree programs.
- Expand philanthropic income. Although donors typically shy away from contributing for core educational functions, there are opportunities to seek funding for faculty positions (endowed chairs), student scholarships, and corporate giving to help expand the program and enrollment capacity in areas such as engineering and professional fields – academic programs that feed directly to labor markets.

Some of these strategies to support the educational mission and recoup the declines in state support have proven highly unpopular with students and lawmakers. Increases in tuition and the number of non-resident students have elicited substantial criticism. Increases in PDST's have been somewhat less controversial, but in many cases, have reached their limits, with prices comparable to similar-quality private universities. Extension and Concurrent Enrollment programs appear to be popular, but they require substantial entrepreneurial and management effort to be successful.



²² It should be noted that UC campus medical centers contribute to general campus operations, both through direct purchases of services and unallocated transfers to the Chancellor's budget, the methodology for which varies among each campus. It is one significant reason that the medical center campuses have

fared better than campuses without them in recent years. But their continued financial health, and support of campus operating budgets, may be impacted by health care reforms, including Medicare and Medicaid, and federal research funding largely through the NIH.

The largest single source of revenue remains UC’s medical centers, providing nearly a third of all revenue.²³ UC also manages three Department of Energy National Laboratories, though privatization during the mid-2000s removed most of the labs’ revenue and expenditure from the University’s income statements. Revenues generated by medical centers and management of the national labs generally does not contribute to UC’s teaching, research, and non-medical public service activities – henceforth we exclude them from UC’s Revenue and Operational costs discussed below.

Figure 13 shows the sources of UC’s funding revenue in the 2000 and 2015 fiscal years, excluding medical centers and the National Laboratories.²⁴ Reflecting both enrollment and program growth, and significant success in securing funding for research and public service activities, total revenues grew in constant dollars from \$13.9 billion to nearly \$20 billion over 15 years. Over that same period, enrollment dramatically increased from 183,000 to just over 257,000 students.

In 2000, state contributions and income from research grants and contracts contributed similar levels of UC funding. By 2015, such research funding secured by faculty had become the largest source of income, generating \$5.7 billion. About two-thirds of that funding comes from the federal government, with the rest split among private firms and state and local governments.

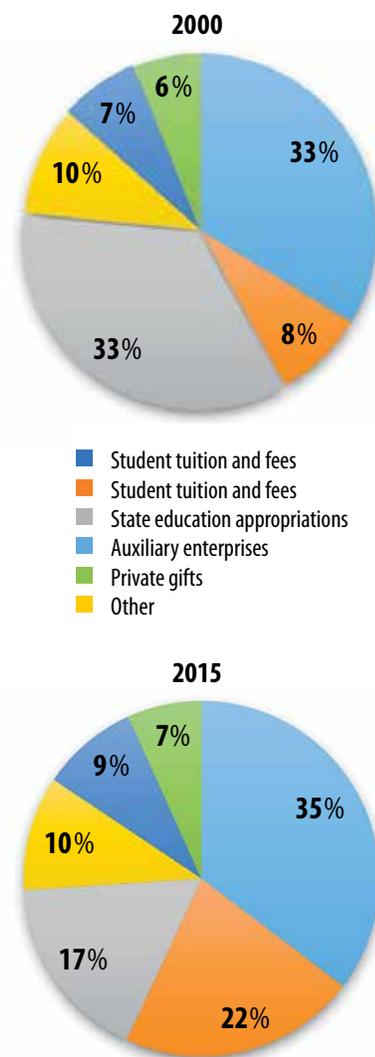
In 2015, philanthropy and UC’s endowments generated about \$1 billion, or seven percent of total revenue (about the same as in 2000). Other revenue sources, from housing, dining, and parking, book sales, athletics, intellectual property, and state capital appropriations, add about 20 percentage points to the annual budget.

State appropriations and student tuition and fees generate the remainder of revenue. In 2000, state funding represented 35 percent of non-medical UC revenues; 15 years later, it dropped to 17 percent, despite huge growth in enrollment and programs. During that same period, tuition and fee income grew from \$1.4 billion to over \$4 billion, or from approximately 8 to 22 percent of non-medical revenue sources. More than one-third of gross tuition and fee revenue is returned to undergraduate and graduate students (return-to-aid) in the form of financial aid and scholarships, substantially subsidizing the educational costs for low- and middle-income students. Large scholarship programs such as Pell and Cal Grants also increasingly subsidize tuition. As a result of these and other

policies, approximately 57 percent of California undergraduates at UC pay no tuition.

Much of the increase in tuition and fees income was generated by non-resident undergraduate students and the growing number of graduate level professional school students. Non-resident undergraduate students currently represent 16.5 percent of the undergraduate population compared with the average of 28 percent at the other public AAU campuses. Out-of-state and international students do represent a relatively new source of substantial income; they also bring diversity to the student body, which studies indicate has a positive educational effect on

Figure 13 - Total UC Funding Revenue (Systemwide) 2000 and 2015



Note: At the system-wide level, reductions in state appropriations have coincided with proportional increases in tuition and fees as a proportion of the UC budget, omitting medical center and National Laboratory revenue. Auxiliary Enterprises includes income from patents and licenses. Source: UCOP

²³ Approximately 10-15 percent of the revenues at medical centers derive from “educational activities,” the large majority of which are patient fees from medical services provided by students and faculty at UC hospitals and other medical facilities.

²⁴ Income earned by UC for managing the National Laboratories is included in the revenue figures below, as part of the ‘Other’ category.

Californians.²⁵ Many of these talented students also stay in California and are employed in fields where there are labor shortages such as engineering, helping California to be a “brain-gain” state that attracts talent from throughout the world.

UC also generated increased income through UC Extension programs, which enroll, in total, some 400,000 Californians each year in continuing education programs offered at UC campuses and in centers located throughout the state. (Extension enrollments are separate from regular undergraduate and graduate enrollment.)

Figure 14 illustrates a profound long-term shift in inflation-adjusted educational funding per student (undergraduate and graduate), featuring two major sources: declining state funding and the net increase in tuition and fee revenue (after UC financial aid). Net tuition revenue has consistently increased over the past 15 years, corresponding with the decline in state educational allocations that accelerated with the onset of the Great Recession. Periods of stagnant or increasing state support are met with stable tuition revenue, often as part of a political deal with lawmakers who offer state funding only if in-state tuition is capped or, sometimes, reduced. On a per student basis, 2011 was the first year in UC’s nearly-150-year history in which the University earned more revenue from net tuition than from state allocations.

Finally, UC pursued a policy of “financial asset optimization.” Beginning in 2008, the Board of Regents approved the establishment of a Total Return Investment Pool to invest working capital not needed for in-year liquidity. Since inception, TRIP averaged seven percent in annual returns, which led to hundreds of millions of dollars of discretionary revenues flowing to the campuses for general operating costs.²⁶

2. A Case Study of UC Berkeley

To help illustrate the changes in Core revenue and operation costs within the UC system, we provide a brief analysis of the Berkeley campus. Figure 15 shows changes in UC Berkeley’s distribution of Core funding since 2003, currently the earliest available year with comparable information. UC Berkeley does not have a hospital or medical school, so it obtains no funding from medical centers (though it does collect funding for “educational activities” from its Optometry clinic and a joint medical program with UCSF).

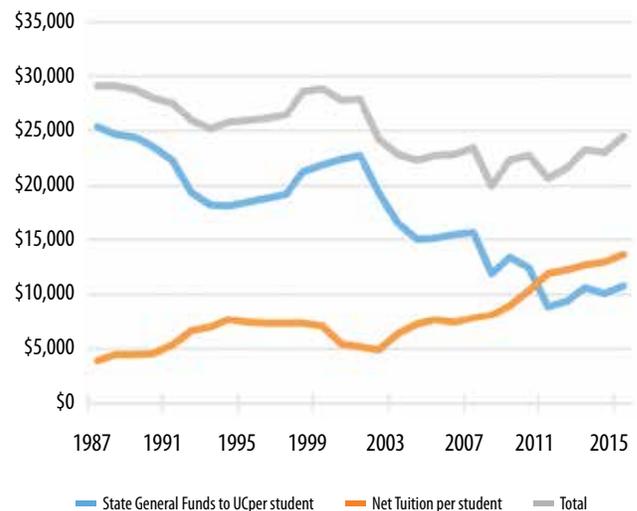
As a result, UC Berkeley receives somewhat more of its revenue from tuition and fees, and somewhat less from

John Aubrey Douglass, “International Berkeley: Enrolling International Students Yesterday and Today, Debates on the Benefits of Multicultural Diversity, and Macros Question on Access and Equity.” Research and Occasional Papers Series (ROPS). Center for Studies in Higher Education. CSHE 3.14 (March 2014).



grants and contracts, than the UC system as a whole. It also receives a greater share of philanthropy and a smaller share of state appropriations than other UC campuses; nevertheless, Berkeley’s macro-level educational financial distribution is similar overall to that of the broader system. The distribution of Core campus funding between state appropriations and tuition and fee payments has shifted drastically since the early 2000s; state appropriations made up three-quarters of Core funding in 2003 but only one-third of that funding in 2015.

Figure 14 - UC Core Funding from State versus Net Tuition Income per Student (CPI Adjusted Core Funds) 1987 – 2015



Note: Core funding sources include including State General Funds, student tuition and fee revenue, and UC General Funds. Net tuition revenue began to increase from its long-time average following the state’s large 2001 budget cut and nearly tripled in per-student terms in the 15 years since. However, tuition revenue has not increased fast enough to preserve Core funding levels, which declined substantially during the 2000s and remain 16 percent below their inflation-adjusted 1987 level, despite steady increases since 2011. **Source:** CPEC and UCOP

²⁶ Correspondence with Nathan Brostrom, Executive Vice President and Chief Financial Officer, University of California Office of the President, February 13, 2018: he states, “These have been extraordinary years, so when we forecast, we count on TRIP averaging about 2.5% to 3.0% more than STIP, but on \$9 billion, that still yields roughly \$250 million in additional unrestricted revenue.”

Increases in Overall Tuition Revenue at UC Berkeley

- Between the 2003 and 2015 academic years, total UC Berkeley tuition revenue increased by \$408 million in CPI-adjusted terms, net of financial aid, fee waivers, and other university-funded scholarships and fellowships. Had that entire increase been borne by Berkeley's 20,000 California-resident undergraduates, this would imply an additional \$20,000 per year in tuition paid by those students.

Such a calculation, however, ignores many other changes to the University's tuition structure over the past 15 years, including increased tuition for non-resident students, increased tuition for professional Masters-level graduate programs, and a large number of brand new master's programs. In fact, very little of the increased tuition revenue is generated by California-resident undergraduates.

Consider, for example, Berkeley's Haas School of Business. In the spring of 2000, Haas taught a total of 550 students in their two-year Master of Business Administration (MBA) program and 275 students in their three-year evening and weekend MBA program. By 2003, the campus had created a new Master of Financial Engineering (MFE) program that taught an additional 60 students. But in the 2015 academic year, while their MBA and MFE programs had stayed roughly the same size (552 and 69, respectively), the evening and weekend MBA program had grown to 709 students, and a new Executive MBA program brought in an additional 68 students.

Moreover, MBA tuition rose substantially, from \$21,000 to \$60,200 per year for both residents and non-residents, and to about \$48,000 for evening and weekend MBA students; executive MBA students pay \$185,000 in tuition for the 19-month program. Grant and scholarship financial aid covers about 15 percent of tuition; the rest, \$60.5 million in the 2016-2017 academic year, constitutes nearly 10 percent of all UC Berkeley tuition revenue, and makes up more than 10 percent of the growth in net tuition and fee revenue since 2003.

In an effort to meet demands for new programs and serve California students, UC Berkeley created a number of new professional masters-level programs since 2003. These programs include the Master of Law (founded 2006; 196 students in 2016; \$57,471 per year), the online Master of Public Health (founded 2012; 179 students in 2016; \$25,000 per year), and the online Master of Information and Data Science (founded 2013; 376 students in 2016; \$33,000 per year), among many others. These new programs do not draw upon state support and must cover their costs with tuition revenue.

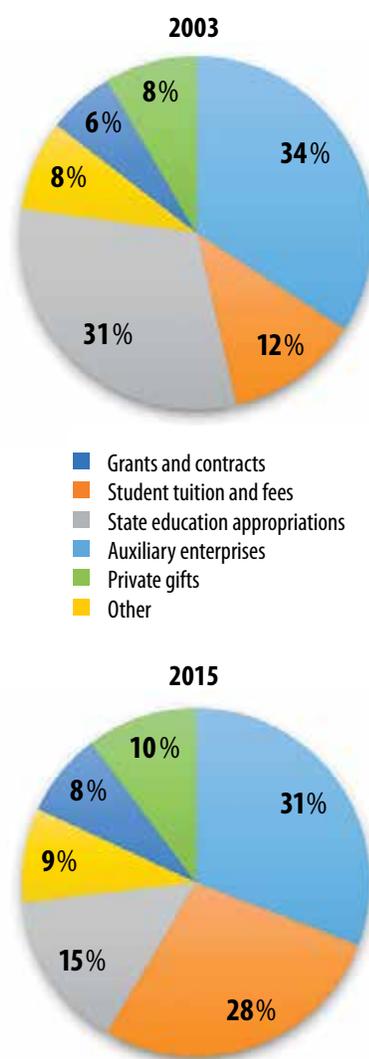
Moreover, in CPI-adjusted terms, tuition at the Berkeley School of Law increased for California residents from \$21,000 to \$48,700 since 2003, with similar increases in the Masters of Engineering programs, the Masters in Statistics program, and more. A large proportion of increased tuition revenue since the early 2000s can be explained by

supplemental tuition fees charged by professional masters-level Berkeley graduate students, though such fees usually remain somewhat lower than those charged by similar private institutions.

Increases in Tuition Borne by UC Berkeley Resident Undergraduates

- To estimate the increase in net tuition paid by UC Berkeley undergraduates it is sufficient to measure the average net tuition paid by full-time in-state undergraduates in 2016. The total tuition and fee price to attend UC Berkeley for the 2016-2017 academic year was \$13,623, a striking increase from the \$5,900 tuition level in 2003 (and \$4,050 in 2000).

Figure 15 - Total UC Berkeley Campus Funding Revenue 2000 and 2015



Note: At UC Berkeley, as across the UC system, tuition and fees have largely replaced declines in state appropriations. Auxiliary Enterprises includes income from patents and licenses. Source: UCOP



However, UC Berkeley also awarded \$230 million in grant or scholarship financial aid to California residents (including scholarships and grants awarded by the federal and state governments as well as institutional and outside sources), bringing their average net annual tuition and fees to only \$2,276. Even if no tuition was charged in 2003, such an increase could only contribute a maximum of 11 percent of the increase in tuition revenue since that year, about as much (in total dollars) as the graduate business school programs garner in tuition income. In sum, UC Berkeley replaced state funding by increasing tuition revenue, but almost none of that revenue comes from California-resident undergraduate students.

Increases in Tuition Borne by UC Berkeley Non-Resident Undergraduates - Finally, consider non-resident UC Berkeley undergraduates. While the number of resident undergraduates remained constant at around 20,000 since 2000 (with 20,577 in spring 2017), the number of non-resident students increased threefold, from 2,269 in spring 2003 to 7,200 in spring 2017.

CPI-adjusted non-resident tuition, meanwhile, increased from \$26,000 to \$40,000, with only about 15 percent covered by grants and scholarships (leading to an average net price of \$33,600 in the 2016 academic year). We estimate that since 2000 the increase in non-resident undergraduates contributed about \$60 million in increased net tuition revenue for UC Berkeley, far more than the contribution of the California residents, who outnumber them by three-to-one. In total, UC Berkeley annually collects about \$240 million, or almost 40 percent of all tuition and fee collection, from tuition paid by the families of non-resident undergraduates.

Increases in Revenues from Other Sources - A number of additional sources have also contributed to UC Berkeley's increase in tuition revenue. The number of courses taken at UC Berkeley Extension rose, and undergraduate applications have increased by 60,000 (most of whom pay a \$70 fee)—although limited data accessibility prohibits estimation of the magnitudes of these increases.

Net Result of Declines in State Funding and Tuition Increases for UC Berkeley Undergraduates - Not only has the sum total of net tuition per student and state general funds gone down over time in real terms, but a significant amount of the tuition income collected went to specific programs – often costly professional masters' education. As a result, the burden of tuition increases instigated by substantial cuts in state appropriations to UC did not fall on California resident undergraduates, who continue to pay extraordinarily low tuition and fees compared to private universities and even many public universities.

One caveat to these findings is the increasing cost of housing near all UC campuses, and particularly UC Berkeley. This increased cost is passed directly to both undergraduate and graduate UC students, and it is not reflected in changing levels of tuition and fees (which exclude room and board). However, while little information about housing prices faced by UC students exists before 2008, the best available evidence suggests that housing costs have not increased the net cost of UC attendance for low- or middle-income California-resident students in the past 10 years, although this is not the public perception. Figure 16 displays the average total net cost of UC attendance for low-income UC students (annual parental earnings below \$30,000)—including annual tuition and fees, room, and board—along with net costs for four comparable public universities (adjusted for CPI).²⁷ Data are from the Integrated Postsecondary Education Data System (IPEDS) of the US Department of Education and are estimates produced by university administrators using the UC Cost of Attendance Survey (COAS) and other available data.

Net total costs across UC have slightly declined since 2008, as a result of campus financial aid programs and despite substantial increases in California house prices and remain within the range of net total costs at similar universities. Net total costs for low-income undergraduates at UC Berkeley are even lower, at \$7,440 in 2014 (an 18 percent decline since 2008).

²⁷ These are the four public universities in the "Comparison Eight," a group used by the California State Department of Finance and UC as comparison schools

for the University of California for analyzing faculty salaries and other benchmark measures.

Figure 16 - Net Cost for Low-Income Students (\$0-\$30K)

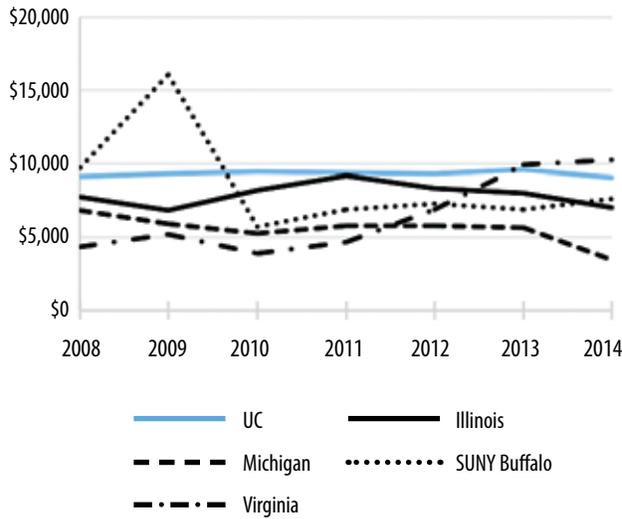
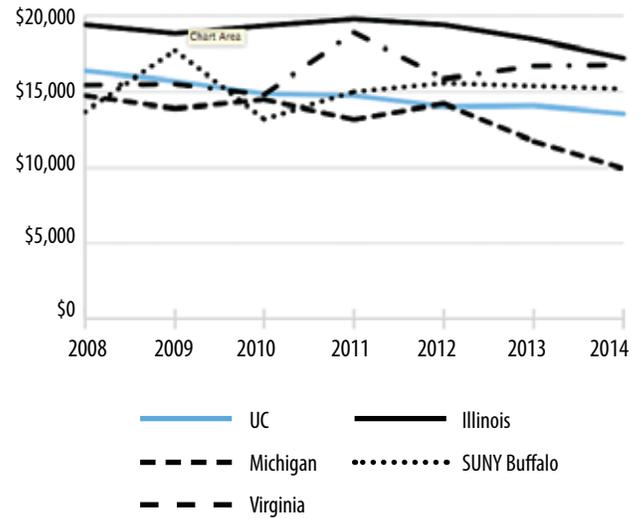


Figure 17 - Net Cost for Middle-Income Students (\$48 - \$75K)



Note: The average CPI-adjusted net cost (including room, board, and tuition) for low-income UC students remained constant since 2008 and remains at a similar level to comparable public universities (somewhat inflated due to high California housing costs). For middle-income students, the average CPI-adjusted net cost (including room, board, and tuition) for middle-income UC students fell since 2008, and is below those of most comparable public institutions, standing at around \$14,000 per year after federal, state, and university financial aid. **Source:** IPEDS

Figure 17 shows a similar pattern for middle-income students (annual parental earnings between \$48,000 and \$75,000). Net total costs for middle-income California-resident undergraduates at UC steadily declined by 17 percent (in inflation-adjusted terms) between 2008 and 2014 and are within the range of costs at similar public universities.

In short, while housing remains costly around many UC campuses, grant and scholarship financial aid to low- and middle-income University of California undergraduates helped mitigate, but not completely cover, increases in housing costs since 2008. UC Berkeley embarked upon an ambitious program to build housing for undergraduates and other students to help with the costs of housing, and the UC system is supporting increased student housing for the entire system. Housing is often the most significant cost facing students.

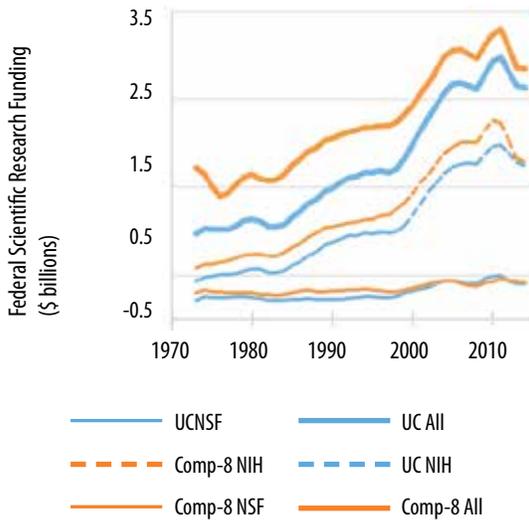
3. Growing Federal Research Funding

In addition to increased tuition revenues from non-resident and masters-level students, UC increased its research funding (as well as revenues from its hospitals and philanthropy) to offset declines in state support. It is important to note, however, that this research funding provides resources to support faculty and student research and mentoring; it does not directly provide resources to support classroom teaching.

Figure 18 shows the total federal scientific research funding provided to University of California researchers (excluding the UC-managed National Laboratories) annually from 1974 to 2014, along with annual funding provided by the National Science Foundation (NSF) and the National Institutes of Health (NIH), the two largest federal scientific research funding agencies. In agreement with California's Department of Finance, UC uses a comparative group of eight universities for various forms of analysis, including faculty salaries: MIT, Stanford, Harvard, Yale, Michigan, Virginia, Illinois, and SUNY Buffalo. Aggregate funding provided to the Comparison Eight institutions is displayed also in Figure 18. Total federal scientific research funding to UC tripled in CPI-adjusted terms since the mid-1970s and increased by \$500 million per year since 2000.

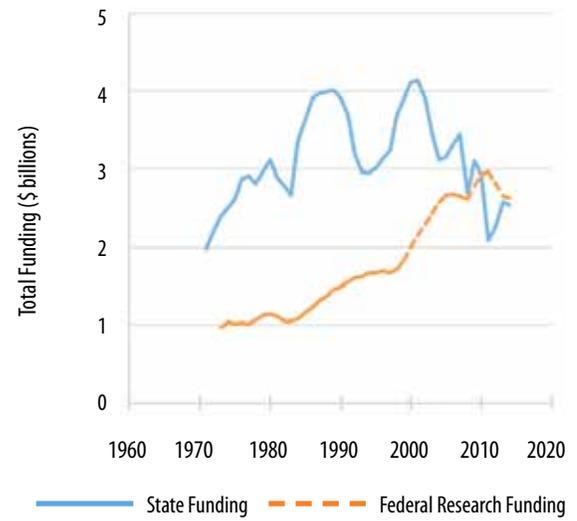
The NIH is the largest provider of federal scientific research support, as well as the source of its largest increases, and much of this funding went to UC medical centers. Federal scientific research funding increased slightly faster at UC than among the Comparison Eight universities, with the 27 percent gap between the two in 1990 shrinking to a 13 percent gap in 2014. When compared to an alternative group of comparison universities - the eight-university Ivy League in aggregate - UC once lagged in research funding. Since 2013, however, UC surpassed the Ivy League's aggregate federal research funding.

Figure 18 - Federal Scientific Research Funding to UC and its Comparison 8 Campuses – 1970 - 2015



Note Figure 18: Total CPI-adjusted federal research funding at UC eclipsed that of the aggregate Ivy League and is nearly on par with the aggregate ‘Comparison Eight’ universities (MIT, Stanford, Harvard, Yale, Michigan, Virginia, Illinois, and SUNY Buffalo). **Sources:** National Science Foundation. **Note Figure 19:** In the past several years, total state appropriations have declined to below rising federal research funding, let alone additional federal funding. Research funding is presented as a three-year moving average to smooth volatility; state funding volatility occurs at a longer bandwidth. **Sources:** State Funding: CPEC and UCOP. Research Funding: National Science Foundation

Figure 19 - Federal vs State Funding for the UC System – 1970 - 2015



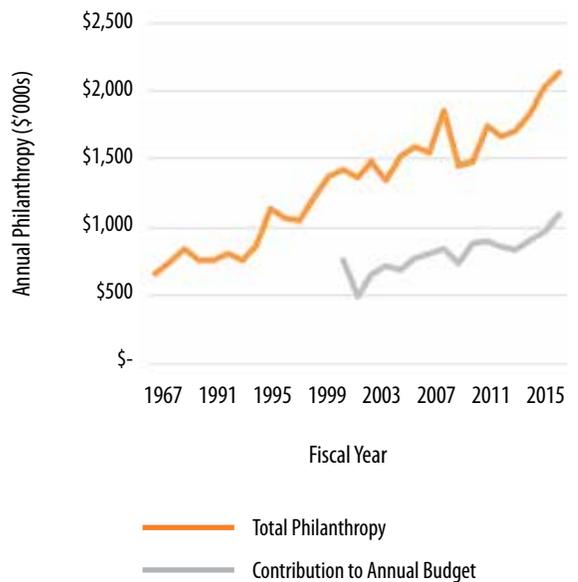
Another way to measure the role of increased federal scientific research funding in the UC budget is to compare it to UC’s steadily declining state appropriations (see Figure 19). While UC received twice as much state support as federal scientific research funding as recently as 2000, by 2009 the two were equal. The University of California received more funding from the federal government for scientific research—not including other sources of federal funding such as Pell Grants and funding for non-scientific research—than it received in California educational appropriations in every year since 2010. The comparison also highlights the substantial volatility of annual state appropriations relative to the steady increase in scientific research funding provided to the UC system.

Intellectual property generated by the research activity of faculty, post-docs, and students resulted in increased patent and licensing income to the University. However, as discussed later in this report, it has not, thus far, generated significant additional income for UC’s operating budget.

4. The Role of Philanthropy

Philanthropy to the UC system and its campuses rose by 50 percent since 2000, and now totals more than \$2 billion per year (see Figure 20). Most of these funds are restricted and not available to support general operating

Figure 20 - Philanthropic Gifts to the University of California 1987 - 2015



Note: Philanthropy to UC from individuals and organizations has been steadily rising, and reached over \$2 billion per year, though its contribution to UC’s annual budget is about half that amount, with the rest going toward endowment and future expenses. Source: UCOP Public Affairs



costs. In addition, approximately \$480 million was designated for various UC campuses and Regent managed endowments, so only endowment-generated income is available for expenditures. However, campuses are increasingly seeking funding for faculty positions via endowed chairs. There may also be opportunities to increase private sector gifts for specific academic programs that meet specific labor needs and for capital construction that may enhance enrollment capacity.

The combination of increased federal scientific research funding and increased philanthropy added about \$690 million to UC's annual budget between the 2000 and

2014 academic years, or about \$2,800 per student. While this additional funding is far smaller than that provided by increased tuition revenue (which totals \$2.4 billion), it nominally offsets the remaining decline in Core funding per student displayed in Figure 19.

One result of declining state support, paired with limited increases in tuition revenue, is increased reliance on research funding and alumni and corporate support. It is our assessment that none of the additional income streams can fully replace the state funding that allowed the University to support enrollment growth and a broad spectrum of academic programs.

SUMMARY: UC's revenues have increased over the past two decades, but most of this increase is via its medical centers and its grants and contracts for research, revenues that are not available for teaching. With cuts in state funding, tuition revenues have increased, but these increases in tuition have not fully replaced the decrease in state funds for several reasons, and the increases have had a much smaller impact on California undergraduate students than the aggregate increase in tuition would suggest. First, at least 33 percent (closer to 40 percent) of tuition is returned to students in the form of financial-need-based grant aid. Second, most of this increase in tuition is from out-of-state students who pay a higher tuition than in-state students and from students enrolled in master's programs. The tuition from master's students increased because of the increase in the number of and enrollment in these programs and from the increase in PDST (Professional Degree Supplemental Tuition) for many of these programs. As a result, professional programs are increasingly paying for themselves and providing funds for other programs such as undergraduate teaching. The net result is that the impact of tuition increases on California resident undergraduate students is much smaller than the aggregate impact of the increases—or the increased sticker price of UC undergraduate tuition—would suggest.

E. MEASURING THE IMPACT ON STUDENTS AND FACULTY

What is the impact of declining state investment and a modified funding model for UC? In a number of areas, we find that UC is maintaining its mission and the quality of its teaching, research, and public service enterprise. UC continues to grow in enrollment demand and maintain access. It has among the highest graduation rates among American public and private universities and continues to attract research grants. Its campuses rank among the best universities in the world—an indicator of the quality of the faculty.²⁸ Yet there are also signs of significant challenges facing UC. The average class size is growing, UC must hire more temporary faculty, and student to ladder-ranked faculty ratios are going up.

It is our general assessment that by increasing revenue from masters and non-resident undergraduate tuition, federal scientific research, and the other sources described previously, the University of California mitigated but did not completely overcome declines in educational quality and productivity. The following provides a data-driven analysis that further discusses these observations according to indirect and direct measure of quality. A qualitative analysis would help better understand the full impact of UC's shifting finances, but it is outside the scope of this study.

1. Indirect Measures of Educational Quality

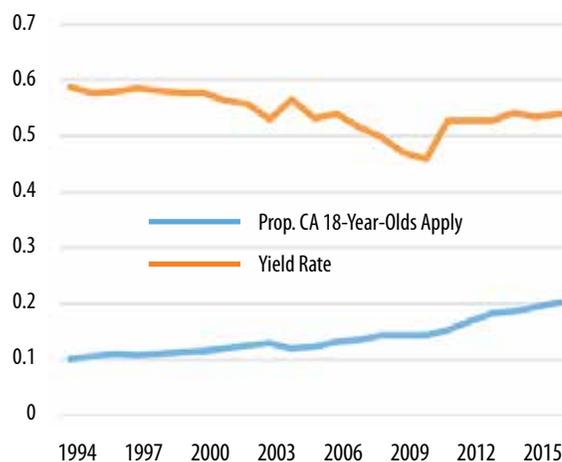
We employ a number of heuristics to indirectly estimate the quality of education at UC over time, including student demand for admission to the University, student-to-faculty ratios, and average class size.

Student Demand The proportion of 18-year-old Californians who apply to at least one UC campus provides a straightforward measure of California students' perceptions of the quality of the University of California. If the changes in the distribution of UC's funding sources have decreased its educational quality, one might expect a smaller proportion of California high school graduates to be interested in attending the University as freshmen. Instead, the opposite occurred: since 1994 that proportion doubled, to 20 percent of all 18-year-olds in the state. These 105,000 applicants do not include the additional applicants applying to attend the University after completing a degree at a community college.

Meanwhile, despite large increases in non-resident tuition, the number of non-Californian Americans who applied to UC as freshmen increased substantially, from 1,200 to nearly 28,000, and the number of international applicants increased eight times, to 33,000. All of these figures suggest that, if anything, UC's reputation for academic excellence only grew over the past 20 years, despite the decline in state educational allocations.

Figure 21 provides the proportion of 18-year-olds who apply to UC (almost all of whom are UC eligible as determined by high school grades and test scores), and also shows the "yield rate" among California residents admitted to UC, defined as the proportion of admitted applicants who ultimately choose to enroll at the University. UC's yield rate declined since 1994, and its sharp partial recovery in 2011—the same year that the UC Regents and Governor Jerry Brown agreed to what was ultimately a six-year resident tuition freeze—suggests that a large part of the decline can be explained by increases in undergraduate resident tuition.

Figure 21 - Proportion of California 18-Year-Olds Applying to UC and the Admissions Yield Rate 1994 - 2015



Note: The proportion of California 18-year-olds who apply to UC doubled in the past 20 years, while the proportion of admits who enroll in the University slightly declined. Source: UCOP and the US Census.

²⁸ In the 2017 Shanghai Rankings of World Universities, 8 of the 10 UC campuses ranked in the top 100: Berkeley was ranked number 5, UCLA number 12; UCSD number 15; UCSF number 21; UCSB number 45; UCI number 64; UC Davis number

85; and UC Santa Cruz number 98. However, it is worth noting that these placements were on average almost five places lower in 2017 than in 2016 – suggesting a slow fall in the prestige of the UC system.

In 2016, UC's yield rate was 54 percent; five percentage points lower than it was in 1994. Nevertheless, in tandem with substantial increases in application rates, this small decline is unlikely to reflect changes in educational quality as much as dissatisfaction with increased costs for largely upper-income and some middle-class students relative to alternative options, such as the attending one of the California State University campuses.

Student-to-Faculty Ratios - Another measure of the university's quality is student-to-faculty ratios, where faculty include ladder-ranked professors and lecturers, adjunct professors, and other educational professionals employed by UC. Figure 22 shows that while the ratio increased in the past 20 years by about 10 percent (to almost 25 students, undergraduate and graduate, per faculty member), this slow rise hides an important trend toward lecturers and non-ladder-ranked faculty, as is the case across the United States.

Lecturers and adjunct professors are less costly to the University than ladder-ranked faculty, but they do not contribute to the University's research and public service missions, mentor students as authoritatively, or provide other tangibles that full-time faculty offer.

Figure 22 also shows the student-to-staff ratio since 2007, where staff excludes UC health workers and student staff (such as undergraduate federal work-study recipients) but includes managers and all administrative support staff. Unlike faculty and students, for whom historical measures are only available as head-counts, staff is measured as full-time-equivalents (FTE). The student-to-staff ratio increased by 15 percent in the past 10 years, to 6.3 students for every staff member. This increase suggests that UC substantially increased its administrative efficiency throughout the period of declining state educational allocations, though there is no evidence that years of draconian state cuts were met by large employment changes.

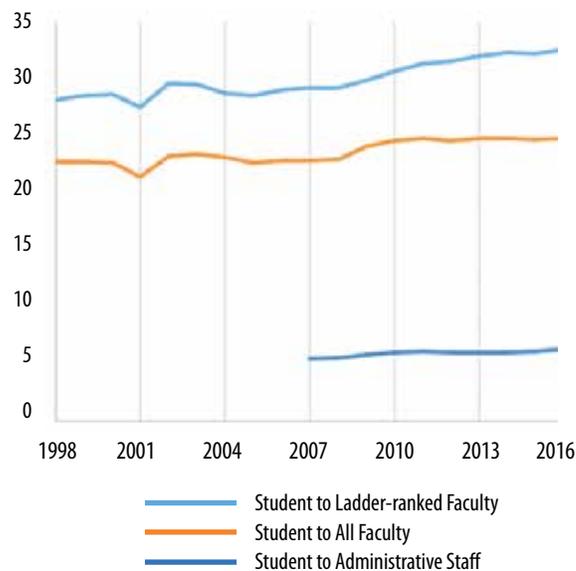
Instead, UC's administrative staff grew slower than its student population, likely leveraging economies of scale but also likely leading to a decline in administrative service quality.

Average Class Size - UC faculty members have an average teaching load of about four to five courses a year (depending upon the academic area) under a quarter system, up a bit from a decade ago. However, undergraduate class sizes have increased over the same period (see Figure 23).

Rather than providing statistics to describe the number of courses of various sizes, we report the distribution of courses weighted by the aggregate number of student

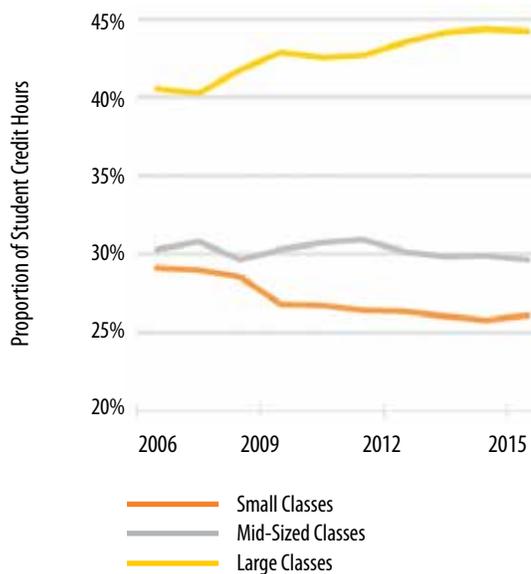
credit hours provided by the course. Only 26 percent of UC undergraduates' courses have fewer than 50 students, down from 29 percent in 2006, and 44 percent of their courses have at least 150 students (up from 40 percent in 2006).²⁹

Figure 22 - UC Student-to-Faculty and Student to Administrative Staff Ratios 1998 - 2015



Students and All Faculty does not include medical schools; Administrative Staff does not include researchers; Student measures as head-counts; faculty and staff measure as FTE. **Source:** UCOP

Figure 23 - Average Undergraduate Class Sizes across UC Campuses 2008 - 2015



Source - UCOP

²⁹ The proportion of small (1-49 students) classes has fallen since 2006, while that of large (>150 students) classes rose. **Source:** UCOP



Though it depends on the course's department and level of instruction, there is widespread agreement that smaller courses provide higher educational quality, suggesting that these trends manifest a 10-year decline in the quality of undergraduate education provided by UC. There is no change in the distribution of course sizes for graduate students, the majority of whom take only courses with fewer than 50 students.

We do see evidence that high ladder-ranked faculty-to-student ratios mean larger and larger classes, difficulties for students to get classes for their major in a timely fashion, and increasingly crowded campuses. Since the 2013-14 academic year, for example, the Berkeley campus grew by 4,700 students, or a 13 percent increase, as part of UC's effort to enroll all UC eligible students. As UC Berkeley Chancellor Carol Christ recently testified to the Board of Regents,

To meet the challenge of increasing enrollments without sufficient funding, we have held the number of ladder-ranked faculty flat, thereby increasing the student/faculty ratio from 23 to 1 to 26 to 1. Let me provide a concrete example of what this means. The average lower division lecture size in our department of Electrical Engineering and Computer Science has gone from 65 students in 2011-12 to 227 in 2016-17, the number of students taught from 7,986 to 15,470. If the faculty had grown at the same rate as the teaching workload, we would have added over 50 new computer science faculty.³⁰

Systemwide faculty to student ratios, class sizes, and faculty course credits only partially explain the impact of insufficient funding. For example, there are significant differences between disciplines and majors, with certain departments able to garner greater resources through grants and philanthropy. There is also growing concern that the University cannot compete with other major research universities in providing financial support for prospective and current graduate students. The quality

of graduate education, and the ability to compete for top talent, is an absolutely key component for maintaining the productivity of UC.

2. Direct Measures of Institutional Quality

Student-to-faculty ratios and average course sizes are indirect measures of educational quality. We explore a number of direct measures, including whether there is evidence of decreased selectivity in admissions (e.g., declining demand due to costs), greater time-to-degree, or lower post-graduation wages. We also briefly examine trends related to research productivity.

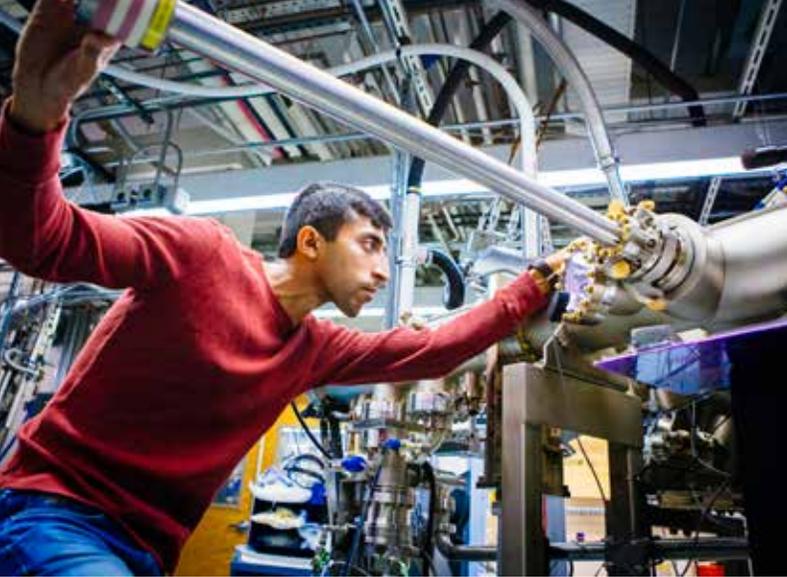
Graduation Rates - While we have presented some indirect evidence of declines in administrative and academic support for UC students, we find no direct evidence of diminished quality when examining student outcomes over the past two decades. Only 59 percent of students who enroll at four-year public universities in the United States earned a college degree from that university within six years.³¹ By contrast, the six-year graduation rate at UC stands at 85 percent and increased by four percentage points since 1999 — testament to UC's selectivity and efforts to protect undergraduate education from financial cuts.

The four-year graduation rate consistently increased at an even faster rate, from 50 percent in 1999 to 64 percent in 2016. An average student who enrolled in UC as a freshman in 2009, in the midst of the Great Recession, and stayed at UC received their degree in 4.14 years, down from 4.27 years for those who enrolled in 1999.³² Many of the students who choose to leave UC or are placed on academic probation and do not return, graduate from another institution, raising the graduation rate to 90 percent in six years. For transfer students, who typically enter the University in the junior year and come from a community college, the two-year graduation rate increased from 37 percent for the 1997 entering cohort

³⁰ UC Berkeley Chancellor Carol Christ Testimony to the UC Board of Regents, January 24, 2018.

³¹ See, *The Condition of Education*, published in April 2017 by the National Center for Education Statistics.

³² See UCOP online report on graduate rates at the University of California. graduation rates.



As a result, there is nothing to suggest a correlation of state funding cuts with undergraduate graduation rates – thus far.

It might be thought that increased tuition costs, especially for universities with large numbers of low-income students, would decrease completion rates, but research indicated that increased tuition costs combined with financial aid leads to higher graduation rates among colleges and universities with highly selective admissions, like UC. Despite having a high percentage of low-income and first-generation students, the number and percentage of low-income undergraduate students actually increased at UC over the past decade, in spite of rising tuition.

Figure 24 shows that graduation rates are similar for the 33 percent of students who enter UC as junior transfers—largely from community colleges—and for students who enter the university as freshmen. It also shows that six-year graduation rates at UC Berkeley have been rising since at least 1983, again exhibiting little correlation with state appropriations.

While Berkeley graduation rates have stabilized in recent years at around 93 percent, this rate is approaching the upper boundary achievable by a large public university, and rates do not appear to be falling. This is due to a variety of factors: many UC students are from low-income families; many use the summer to work or for internships, or to meet family obligations; students also sometimes take longer to graduate because they change their majors or seek double-majors; and some students choose to leave the University before graduating to enter the job market or transfer to another college or university.

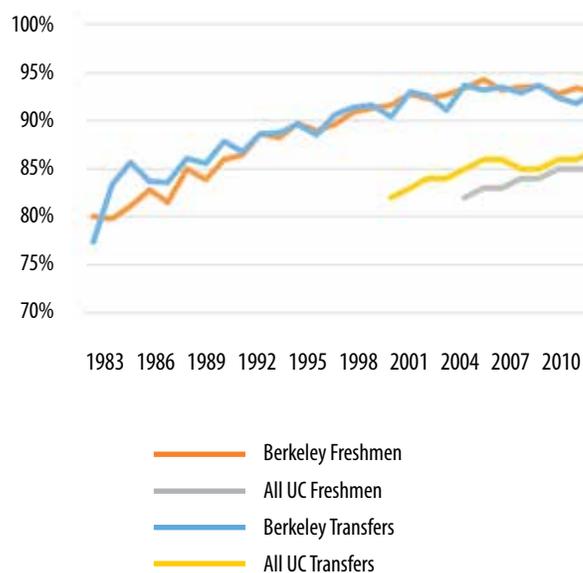
Post-Graduation Wages - Figures 25 and 26 display the median wages earned by UC graduates employed in the state of California two and five years after graduation, as well as comparable wages earned by all employed four-year college graduates residing in Califor-

nia. If changes in the University's distribution of funding caused a decline in UC's educational quality, or if the changes led to less selective UC admissions, then wage outcomes for UC graduates would be expected to regress towards statewide averages. As with many of the indicators above, the opposite appears to be the case.

Median wages of UC graduates two years after graduation remain significantly higher than those of their non-UC peers. Indeed, a relative increase in 75th-percentile UC wages suggests that wages have improved even further on the high end in the past several years. This pattern is even stronger for five-years-out wages. While inflation-adjusted wages of 27-year-old college-educated Californians have persistently declined for the past 10 years, UC graduates' wages have rebounded; the latter now earn about \$10,000 more at every quartile than non-UC college graduates.

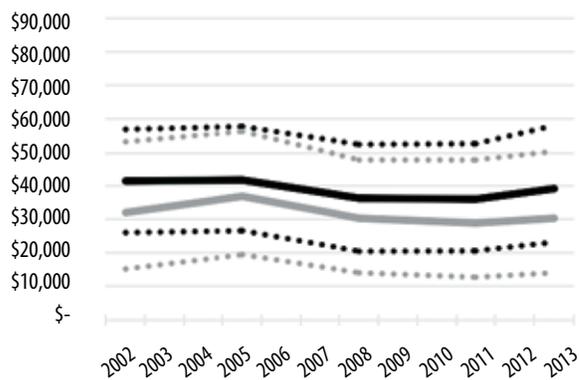
Since the comparison group also comprises Californians, it is unlikely that these wage gaps can be explained by differences in local costs of living. Instead, it appears that UC graduates have improved their wage-related quality of life over that of other college graduates over the past 10 years.

Figure 24 - Six-Year Graduation Rates for California-Resident UC Students by Entry Type



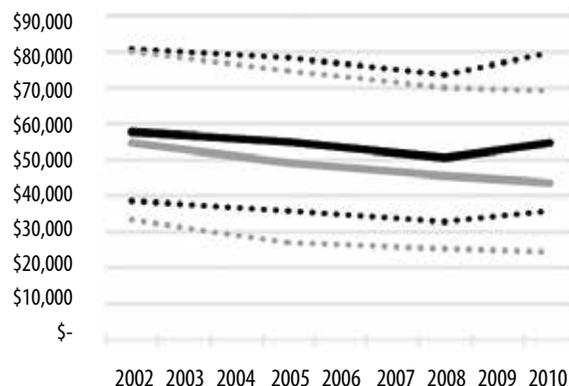
Note: Graduation rates have been consistently increasing at UC for the past 30 years, though they appear to have peaked at UC Berkeley. Rates are similar for students who enter UC from high school or community college. **Source:** CalAnswers and UCOP

Figure 25 - Two Years after Graduation



..... 25th — UC Graduates 75th
 25th — All CA Graduates 75th

Figure 26 - Five Years after Graduation



Note: The distribution of wages of UC graduates working in California continues to exceed state averages. While inflation-adjusted median wages have slightly declined in the past years, the decline is similar to that being experienced by all young college graduates in California, and by all workers nationwide. The positive gap in five-year wages between UC graduates and all California college graduates increased for all quartiles in the most recently estimated cohort. Source: UC Information Center and American Community Survey. "All CA Graduates" includes ACS survey respondents residing in California with four-year college degrees between ages 24-25 (2 years after grad.) or 27-28 (5 years after grad.).

Research Productivity - It is more challenging to evaluate the impact of state cuts on UC's research quality—its other predominant mission. The Accountability Report published by the UC Office of the President points out that UC research expenditures per ladder-rank faculty member exceed, and have grown faster than, similar expenditures at comparable universities since 2005; that UC faculty salaries have grown faster than those of faculty at comparable public universities since 1997; and that,

as we discussed in the past section, UC federal research funding grew much faster than at comparable universities since 2000.

These are all indirect measures of research quality, focusing on the inputs to research production rather than the quality of the output, but no direct measures stand out as viable alternatives. We leave more comprehensive analysis of the impact of the state's disinvestment from UC on UC's research quality to future studies.

SUMMARY: Considering the measures discussed in this section of the report, we find little statistical evidence that declining state support reduced educational quality at the University of California's teaching programs. While the yield rate for admissions declined and course sizes have increased, the number and proportion of California-resident applicants has never been higher; most students are in classes taught by ladder-rank faculty,³³ and graduation rates and post-graduate earnings continue to substantially, and increasingly, outpace those of other universities. The University of California appears to have been successful in preserving its educational mission through the collection of tuition and other alternative funding sources in the face of state cutbacks. Yet there are some worrisome trends. The increase in class sizes and the increase in non-ladder-ranked faculty suggest that UC may be attaining the limits of what it can do with reduced resources.

³³ In the lower division, full-time permanent faculty generally teach large lecture classes; nonpermanent faculty, such as lecturers, generally teach lecture sec-

tions and smaller classes. In the upper-division, student contact with full-time permanent faculty is fairly evenly distributed across classes of all sizes.

F. A REVISED FUNDING MODEL – Exploring Options

Like many other public universities, the University of California is transitioning from an era with relatively robust state subsidization and low tuition and housing costs to the new world of public disinvestment, increasing operating costs, and a focus on funding from students and their families and relatively new income sources. The ability of research-intensive universities to cope with this paradigm shift will significantly influence the nation's socioeconomic mobility rates and economic strength.

In the post-Great Recession era, some states may find that their economic competitiveness depends on a return to greater levels of public investment in their higher education systems. Some states will never return to that model, convinced that education is more a private than a public good, or a cost they can no longer afford to fund at historical levels. Which path will California take?

Informed by our historical analysis, we offer a series of policy options for contemplation by the University community, some of which are politically challenging. All relate to two central questions: a) can UC afford to grow in its enrollment and academic programs with the state's population and needs? and b) how to identify new sources of revenue and pursue management efficiencies to reduce operating and capital costs? The following is not an exhaustive list, but an exploration of multiple options. Underlining all of them is the concept that the UC system, and each of its campuses, will need to envision and develop a substantially revised funding model and greater administrative freedom to pursue it.

Big Picture Variables

1. A Renewed State Budget Funding Commitment – UC Continues Enrollment and Program Growth to Match California's Population and Economic Needs

The University of California is a complex academic ecosystem that includes, for instance, the need for additional faculty and sufficient numbers of graduate students, along with facilities and support services, to support high-quality undergraduate education. Faculty and graduate students, along with staff, also form the nucleus for UC's robust research productivity, which translates into



cutting-edge undergraduate programs and bolsters the University's public service activities. Undergraduates are exposed to faculty research (particularly at the upper division level) and have opportunities to engage in faculty- and graduate student-led research, which they value highly.³⁴ UC's academic ecosystem is under severe strain, coping remarkably well with the realities of a long-term decline in public funding per student and increasing concerns about real declines in quality and productivity.

How can this academic ecosystem be maintained and improved while continuing to grow in enrollment and academic programs? A preferable option from the viewpoint of the academic community is a resurrection of a systematic and increased rate of investment by California taxpayers in the University's operating and capital budgets. This public investment would be balanced with options for securing other revenue sources and a measurable improvement in educational quality. State bonds traditionally funded capital costs, including new academic buildings and student housing, maintenance, and seismic retrofitting. Renewal of capital funding focused on expanding enrollment capacity and increasing the stock of housing near campuses, combined with a return to workload funding, would help UC maintain its Master Plan-era admissions policies and continue to grow with California's labor and socioeconomic mobility needs.

The University of California is a complex academic ecosystem that includes, for instance, the need for additional faculty and sufficient numbers of graduate students, along with facilities and support services, to support high-quality undergraduate education.

³⁴ See results of the 2016 University of California Undergraduate Survey (UCUES) and student responses on their academic experience and learning outcomes –

part of the Student Experience in the Research University Consortium surveys based at the Center for Studies in Higher Education, UC Berkeley.

The University, and prospective students, already experience significant supply and demand problems, restricting the choices students have to apply and be admitted to the UC campus of their choice. All but two of the University's undergraduate campuses have or have nearly reached their enrollment capacity and must reject a significant number of UC eligible students. UC remains committed, for the time being, to provide access to at least one of its campuses for all UC eligible students. But this commitment is under severe strain, with no clear funding pathway or expansion plans to accommodate long-term enrollment demand.

In the late 1980s, UC planned for three additional campuses with the understanding that geographic location in growing population centers was a key strategy for expanding access, academic programs, and public services to Californians. Politics and state funding challenges led to only one new campus: UC Merced. While not discounting the potential role of instructional technologies, and achieving efficiencies noted later in this section of the report, state reinvestment could include:

- **Maximizing and expanding enrollment capacity at existing UC campuses** past their Long-Range Development (LRDP) agreements with local communities – contingent on both a sufficient funding model, negotiations with local governments, and an analysis of the cost efficiencies related to campus enrollment and program size.³⁵ Most UC campuses already exceed their LRDP's in their effort to enroll students and to retain UC's commitment to the California Master Plan. There is no contemporary analysis of the cost efficiencies, or impact on academic culture, related to campus enrollment and program size.
- **Exploring strategic geographic location of new UC campuses.** Geographic expansion of UC campuses was a key driver for increasing educational attainment rates, bolstering regional economies, and fostering political support for the University. At the same time, planning new campuses is a much longer process than it was in the 1960s.

Both options would require significant additional funding for operating and capital expenses, including a major bond initiative for capital construction. However, there appears to be no significant interest in the current governor's office, or among lawmakers, to return to the level of state funding needed for UC to rejuvenate itself and grow. As discussed previously, state coffers remain constrained by rising entitlement costs and an inadequate tax structure relative to the size of California's

³⁵ In the 1960s, UC originally planned for no campus to be larger than 25,000 students. Today the largest campus is UCLA with just over 44,000 students (fall 2017). The 1960 Master Plan, for instance, assumed that there is no significant economies of scale once a UC campus exceeded the 25,000 student enrollment level.

population and public service needs – in part a legacy of Proposition 13. Barring some significant tax reform and increased state revenues and, for example, an unlikely reinvestment by the federal government in health care and the like, it seems that some form of reinvestment might only come via state issued bonds and through Cal Grants.

If UC were to raise tuition, the state could provide additional indirect funding for operational costs by expanding Cal Grants A and B targeted to supporting low-income and middle-income students. California already offers a fairly robust level of state financial aid when compared to other states, one of the reasons why UC sets the standard for inclusion of low-income students.³⁶ But some combination of increased tuition and an increase in Cal Grants would provide a path of increased funding support for UC while maintaining access for lower and middle-class students (see the discussion of tuition fees below).

2. Steady State or Further Decline in State Funding – UC No Longer Grows in Enrollment and Programs with California's Population, Economic Needs, and Enrollment Demand Under the Master Plan

There is a real possibility that the financial resources to maintain access, expand academic and public service programs, and sponsor innovation will be elusive. As stated throughout this report, UC needs to consider if it should, or can, grow in the long-term to match California's population and its economic needs if the state will not reinvest at a significant level.



³⁶ C. Eaton, S. Kulkarni, R. Birgeneau, H. Brady and M. Hout, "Affording the Dream: Student Debt and State Need-Based Grant Aid for Public University Students," Center for Studies in Higher Education, Research and Occasional Paper Series. CSHE 4.17 (February 2017)

A choice not to grow in enrollment and programs would have a detrimental impact on access to four-year degree programs for a state undergoing a dramatic demographic shift, with a significant impact on underrepresented minority groups and the labor market for college graduates.

To grow without significant additional state investment, and resources from other sources, would mean continued erosion in faculty to student ratios, larger classes, inadequate capital financing, and possible declines in federal funding support if faculty cannot compete for research funding. It would also mean a decline in the University's ability to attract and retain the best faculty and graduate students.³⁷ Not to grow might maintain the quality of UC's academic programs but would have an impact on California's economic competitiveness and reduce the University's role as a path for socioeconomic mobility.

3. An Alternative Path to Grow – Using Technology or Partnerships with Other Higher Education Providers to Create Another Class of UC Undergraduates

One alternative, with or without significant increases in state investment, is to more fully explore a significant expansion of UC's online course and degree programs at the undergraduate level, essentially providing an alternative path to a UC degree and credentials built on a model of revenue generation and the assumption of lower operating costs per student. This is a path taken by Arizona State University, in part as a reaction to large-scale disinvestment by its state government.

The UC system explored a version of this option in earlier years, but serious questions arose regarding the quality and organizational challenges for such an enterprise. Campuses have a growing array of fully or "hybrid" online degree programs for non-traditional students, but the scale is relatively small. Most online efforts at UC have focused at the graduate and professional level, and on offering individual courses but not degree programs. In earlier debates, the University community voiced concern that online degree programs cannot match the quality of on-campus courses and, just as important, the overall educational experience, the expectations of students, and the personal connections and community opportunities offered by enrollment on a campus.

More generally, the initial infatuation with online courses led to a more sober assessment: they are considered a useful tool for increasing outreach and serving under-served populations, but not a panacea for reducing

costs given the investment needed to develop and sustain high-quality online courses. Previous initiatives orchestrated by UC's Office of the President, supported by the current governor due to the promise of large-scale private investment, were poorly conceived, not grounded in extensive research on markets and feasibility, and failed to integrate faculty and the Academic Senate in the early stages of its development.

At the same time, there are significant policy questions related to creating essentially two Universities of California – the on-campus undergraduate programs and degrees, which include highly selective admission and a holistic approach to human talent development with mentorship and peer-group opportunities, and an on-line student population that will likely be less selective, lower-income, and less likely to graduate. Particularly among 19- to 24-year-olds, the attrition rates for on-line courses and degree programs are extremely high. It would also require a substantial up-front investment to create new courses.

Faculty workload is also an important consideration. As noted, tenured faculty already have broad teaching, research, and public service responsibilities. How could they be appropriately integrated into such an expansionist effort? It might require, or result in, a further expansion of teaching-only faculty, significantly changing UC's extremely successful model of high-performing research faculty essential both for shaping the educational experience of students and bolstering California's economy.



³⁷ For a review of policy choices, see John Aubrey Douglass, "Funding Challenges at the University of California: Balancing Quantity with Quality and the Prospect

of a Significantly Revised Social Contract," *California Journal of Politics and Policy*, Vol 7 Issue 4, 2015.

California not only needs UC to expand its enrollment capacity, it also needs the University to train researchers, expand the frontiers of knowledge, and maintain and enhance its public service mission in the state. It is important to remember that, historically, California's robust rates of socioeconomic mobility and economic growth related directly to the geographic expansion of UC campuses, which acted as anchor institutions for regional economic innovation systems.

Nevertheless, technology offers an enhancement, if not a replacement, to UC's vital role in California. If UC does not gain significant increased state investment, or other sources of additional income, a further exploration of alternative paths to providing a UC education is important. Per previous proposals, this also might mean partnering with other existing college and universities or private entities. UC experimented with "dual" enrollment schemes, in which students enrolled in a community college are also technically enrolled at a UC campus.³⁸ Shifting some enrollment demand to other institutions is possible, including online degree programs via private institutions or providers. In some configuration, UC will need to innovate to meet the needs of Californians while also increasing its income. University Extension also offers a platform for providing a UC education to a wider population – this policy option is discussed later in this section of the report.

Seeking New Funding Streams

4. Reconsider Tuition and Fees

What should students and their families pay in tuition and fees to help partially cover the cost of a UC education? There remain significant concerns regarding the impact of rising tuition and student debt levels. But there are also misunderstandings about the relation of the "sticker" price at a UC campus and what students actually pay. The counter-intuitive fact is that increasing tuition at UC did not lead to decreased access for low-income students. The ability to increase tuition will likely be a decisive factor in UC's ability to create a more stable funding model and grow in enrollment and programs.

UC has pursued a "progressive tuition model" that raised tuition but provided significant financial aid to low-income and middle-class students. This approach was disrupted when UC entered a political agreement with the current governor for a five-year freeze of in-state undergraduate tuition beginning in 2014, and then only al-

³⁸ For example, see Saul Geiser and Richard Atkinson, "Beyond the Master Plan: The Case for Restructuring Baccalaureate Education in California," *California Journal of Politics and Policy*, vol. 4, 67-123 (January, 2013).



lowing for UC to increase tuition at the rate of inflation beginning in 2017-18. The governor's assumption was, in part, that higher tuition makes a UC education unaffordable for the economically disadvantaged, even though the number and graduation rate of low-income students increased during the period of rising tuition following the 2008 financial crisis.³⁹

Particularly in societies with substantial disparities between the rich and poor like California, a low tuition rate represents a substantial subsidy for more wealthy students. Tuition fees and UC's financial aid model should be revisited. The lack of a coherent and long-term approach to tuition and fees is a major political and financial obstacle for developing appropriate funding model for UC. With the breakdown in the historical workload funding model that helped to build and grow UC, university administrators, and the Regents, resorted largely to short-term, year-to-year negotiations with lawmakers on tuition and fees. In the current era, the usual pattern is that the university proposes a marginal increase in tuition and then attempts to bargain with lawmakers to buy-out tuition increases. The record is mixed regarding this tactic; the result is often volatile tuition rates and income for the university and unpredictable costs for students and their families. A more recent deal with the current governor resulted in a five-year freeze on under-graduate tuition and a promise of a percentage increase each year in state funding. In both cases, lawmakers have viewed tuition and fees as a political issue that equates tuition with affordability and as a way to gain favor with voters.

Particularly in societies with substantial disparities between the rich and poor, such as in California, a low tuition rate represents a substantial subsidy for more wealthy students. Tuition fees and UC's financial aid model should be revisited.

³⁹ Patrick A. Lapid and John Aubrey Douglass. "College Affordability and the Emergence of Progressive Tuition Models: Are New Financial Aid Policies at Major Public Universities Working?" Center for Student in Higher Education, Research and Occasional Paper Series (ROPS): CSHE 7.16 (June 2016).

How to change this dynamic and progressively seek additional tuition revenue?

Differential Tuition by Field – One possibility is the development of a differential tuition and fee structure for upper division students in certain fields (STEM fields) where expenses and projected lifetime incomes are higher. Many universities in various parts of the world are already setting tuition rates in this manner, though there are concerns that by distorting student incentives.

Differential Tuition by Campus – The university community has debated the idea of allowing different tuition fees among the UC campuses as a path to relieve the system’s financial strains. There is already differential tuition among the professional schools, but the university generally retained the same tuition fee structure for all undergraduate, masters and doctoral programs. One argument for differential campus tuition rates is that the market demand, and value in the labor market, would allow higher tuition rates at, for example, Berkeley and UCLA. But this option would raise serious policy issues related to UC’s “one-university” model and potential inequities, and prestige, among the various campuses. UC’s historical strength is the unity of the various campuses in policy areas such as admissions, tuition and fees, and academic personnel policies. Moving toward a differential fee structure among the campuses would pose large challenges to this model that might only be mitigated by an agreement on revenue sharing among the campuses.

Explore a New Pricing Model - Tuition rates might be more clearly stated for middle- and lower-income undergraduate students (under the university’s Blue and Gold Opportunity Plan, students with family incomes below \$80,000 pay no tuition or fees). For this reason, UC should consider a revised tuition pricing model that offers four (or so) tiered tuition rates for students depending on their family income, with university-sourced financial aid directly reflected in the pricing. The purpose is to clearly state the cost of tuition to prospective students and to be able to charge differential rates to high-income students to generate additional income.

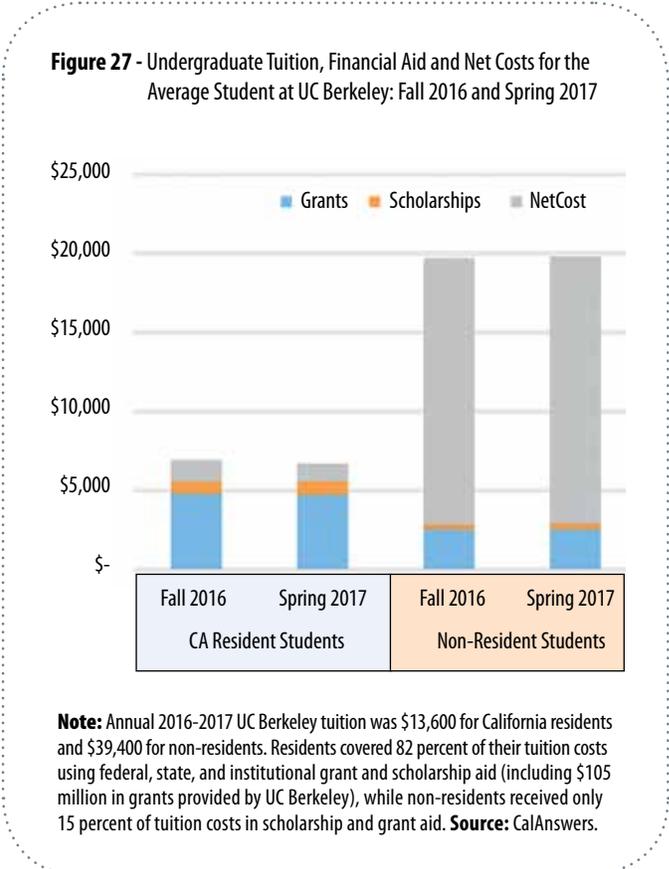
Clarity of costs could enhance access to disadvantage groups who, like all students, are often confused by complicated sticker price tuition, which can only be mitigated by complicated pathways for financial aid. It could also change the dynamics of often misinformed debates on the real impact of tuition on students and affordability.

Because of the UC’s high return-to-aid rate, when an increase in tuition and fees is proposed, there is an assumption that it is an increase for all students, when only about 50 percent of students are affected. Explicitly raising tuition for high-income groups while, for example, maintaining costs for middle and lower-income students,

would change the contentious politics and symbolisms of the tuition debate in California.

Reduce Return-to-Aid Rates to Boost Operating Income - Another less desirable option is to reconsider UC tuition and return-to-aid program. As noted previously, more than 33 percent of all tuition is funneled into grants to lower- and middle-income students. Within the UC system, this amounts to an estimated \$700 million a year of financial aid at the undergraduate level. If one includes other sources of UC funding, including scholarships, the return to aid rate is closer to 41 percent (as measured at UC Berkeley). As noted previously, and illustrated in Figure 27, in-state students (at UC Berkeley, and likely similarly on other campuses) pay a net cost of only about \$2,500 each academic year, and almost half of all UC resident undergraduates pay no tuition at all.

Clarity of costs could enhance access to disadvantage groups who, like all students, are often confused by complicated sticker price tuition, which can only be mitigated by complicated pathways for financial aid. It could also change the dynamics of often misinformed debates on the real impact of tuition on students and affordability.



If UC is faced with continued disinvestment from state coffers, one policy option is to reduce this very high return-to-aid rate to, for example, 28 percent of undergraduate tuition income. This would generate more than \$100 million for UC's operating costs to support lower student-to-faculty ratios and a specific set of programs that support undergraduate education. To help mitigate this redirection of income to academic operating costs, UC could seek other sources for undergraduate financial aid. This could include fundraising and possibly the creation of an endowment fund for this explicit purpose. As noted previously, lawmakers could also be persuaded to increase funding for California's Cal Grant Program and increase the total individual grant limit to mitigate tuition increases – essentially providing an indirect increase in funding to UC.

Again, housing and living costs pose one of the greatest challenges to middle- and lower-income students and their families – a much more significant policy issue than tuition and fees. In modifying UC's return-to-aid policies, it would be vital to secure additional and new sources to support the housing and other living expense for students. The state should find the political will to pass a bond act to specifically fund student housing or mixed housing near UC campuses.

5. Revise Non-Resident Domestic and International Student Enrollment Targets

For many public research-intensive universities, out-of-state tuition for undergraduate and graduate students became a major component of their revised funding models (e.g., Michigan, Virginia, Wisconsin, and now many others). Out-of-state and international undergraduate students also provide a more diverse body and a richer intellectual experience for California students.⁴⁰ Moreover, these students often stay in California, start businesses, and enrich the state. But the admission of out-of-state and international undergraduate students also raises important questions related to the perceived and real displacement of Californians students. What percentage of students should or might be enrolled at UC, and at Berkeley, and how might their enrollment generate financial aid for native students and enrich the academic environment of UC?

UC needs a way to enroll all UC-eligible students and expand the number of out-of-state and international students. Attracting talent in a global market and increasing



degree attainment rates of the domestic population are not mutually exclusive goals. Indeed, they are both hallmarks of the most competitive economies.⁴¹ This would require a long-range enrollment plan linked to a significant increase in UC's enrollment capacity.

6. Grow Professional Degree Programs

UC campuses must continue to develop professional programs at the graduate-degree level that provide positive rates of financial return. In the “knowledge society,” demand for graduate education is increasing, and not just in STEM fields. UC has the capacity to selectively develop or further expand enrollment in high-quality programs that include significant tuition income. By doing this, many professional schools could become self-supporting, and their current state support could be diverted to undergraduate programs and to doctoral education in selected fields with employment opportunities. Revenue sharing helped build the University in the past, and it will remain key to maintaining the overall quality of the UC campuses.

... housing and living costs pose one of the greatest challenges to middle- and lower-income students and their families – a much more significant policy issue than tuition and fees. ... the state should find the political will to pass a bond act to specifically fund student housing or mixed housing near UC campuses – a proposal already being floated in Sacramento.

⁴⁰ See “The International Student Diversity Effect: A Profile of a Global Movement of Talent at a Group of Major US Universities.” Chun-Mei Zhao and John Aubrey Douglass. *Higher Education Forum*, Vol. 9, pp. 29-44. March 2012; Irina Shcheglova, Gregg Thomson, and Martha C. Merrill “Fostering Global Competence Through Internationalization at American Research Universities.” *Research and Occasional*

Papers (ROPS). Center for Studies in Higher Education. CSHE 10.17. October 2017.

⁴¹ John Aubrey Douglass, Richard Edelstein, Cecile Haoreau, “Seeking Smart Growth: The Idea of a California Global Higher Education Hub,” *California Journal of Politics and Policy*, Vol 5 Issue 1, 2013.

To help accomplish growth in graduate education, the University needs to consider increasing Professional Degree Supplemental Tuition (PDST) relative to market demand and seek new self-supported degree programs that provide net revenues. There must also be some consideration of those professional degree programs such as social welfare, public policy, or public health where graduates' wages are well below those of law or business school graduates.

More generally, there must be some way to allow law, business, or other professional degree graduates to enter public service work that pays less than the private sector. One approach: provide these students with UC-managed loan forgiveness programs or with a requirement to provide only a fixed portion of their income to loan repayment for 20 years. But this would cost money and be logistically complicated. There are some professional degree programs that appear to be at saturation – law school applications, for example, are down at UC and nationwide. But the quality of a UC education, and the University's brand, will continue to provide a market advantage that should be leveraged as part of the University's evolving financial model.

7. Expand University Extension and Concurrent Enrollment

University Extension provides an avenue for increased campus revenue, for helping the University produce more degrees, and for improving the alignment of UC's

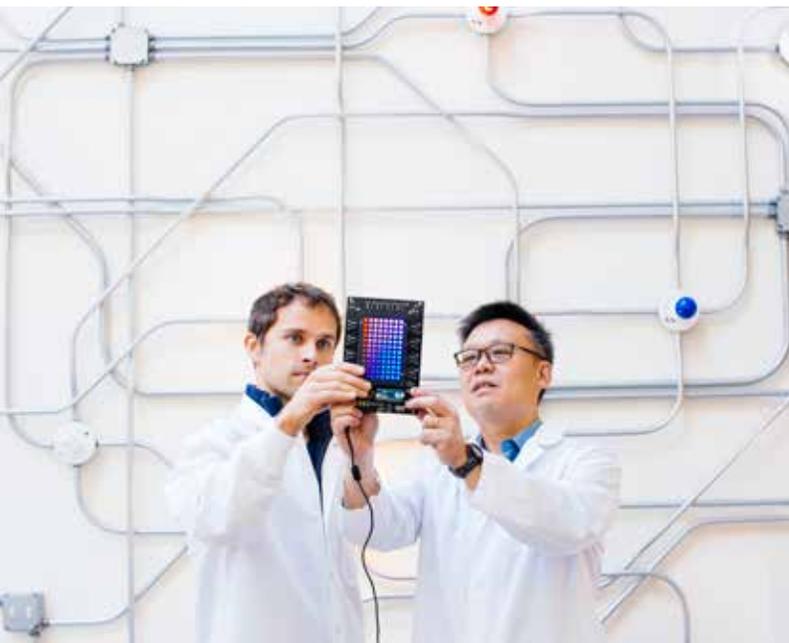
educational offerings with California's workforce needs. Extension includes continuing education outside the regular offerings of the University. Concurrent Enrollment is a program that enrolls students from outside the University to pay fees and participate in existing University courses. Both no longer receive any funding support from the state, another indicator of declining state funding support for UC; instead they must generate revenue by charging student fees and drawing income from contracts and grants.

Californians enroll in Extension for the purpose of continuing education or life-long learning, with courses leading often to a credential or certificate. In the 2017 fiscal year, UC Extension programs on all campuses reported enrollment of 400,000 students and close to \$280 million in revenue. Even with this substantial gross revenue, many campuses report net income in fiscal year 2016-17 ranging from nearly \$4 million to deficits close to \$1 million.⁴² Both Extension and Concurrent Enrollment already raise significant revenues for UC campuses; could they be strategically expanded and marketed to raise more income and to boost UC's production of degrees and credentials needed in California's labor market?

Thus far, UC has not followed the path of other institutions that provide Extension courses leading to a degree, such as Columbia University's Liberal Studies program. With an increasing interest in short-term professional programs and credentials, UC Extension represents a major brand with growing market opportunities. For example, Extension programs could provide an alternative online or hybrid pathway for providing UC courses for the large number of Californians who have some college and have a desire to complete their bachelor's degree. In turn, this could be part of UC's effort to help the state meet the growing demand for those with bachelor's degrees in the labor market.⁴³ Short-term and sequential Extension courses and credentials focused on professional development might also be integrated in both undergraduate and graduate education at each of the UC campuses.

8. Research Funding and Renegotiating Indirect Recovery Cost Rates

UC's research activities are a fundamental part of its mission and service to society, and a large provider of operating and sometimes capital funds. As noted previously, UC conducts nearly one-tenth of all academic research and development in the United States, totaling an estimated \$516,000 in research expenditures per tenured and tenure-track faculty, compared to \$413,000 for AAU private and \$283,000 for AAU public peers.



⁴² University of California Extension and Statewide Programs: Statistical and Financial Report 2016-17.

⁴³ Gary W. Matkin, "Alternative Digital Credentials: An Imperative for Higher Education," Center for Studies in Higher Education, Research and Occasional Paper Series (ROPS), CSHE 2.18. (February 2018).

UC's current indirect cost rate for federal grants, the primary source of extramural funds, is about 57 percent. The rate charged for state-funded research is about 25 percent — much lower than the federal rate — under the historical assumption of substantial state operating and capital investment in UC. The true indirect costs of research are typically much higher than research sponsors are willing to pay. Actual indirect cost recovery rates vary according to the type of research but are typically over 70 percent. Both the federal and state indirect cost rates should be revisited, although it is unlikely that there will be much change with the current administration in either Washington or Sacramento.⁴⁴

9. Patent and Licensing Income

UC's research activity and the interaction of faculty, graduate students, and undergraduates to develop new technologies results in the generation of intellectual property (IP) and expertise of high value in the private sector. California start-ups based on UC technology licenses generate nearly \$14 billion in annual revenue in the private sector. As a result, UC patents and licenses do provide additional income to the campuses and to academic departments. In 2015, UC earned a total of \$158 million in patent and fee income. After accounting for legal and administrative costs, and distributions to the generators of Intellectual Property (generally about one-third of total income), the annual contribution to UC's general fund is about \$26 million.

There is the possibility of a significant increase in output of patents and licenses with the hope for more “home runs” — that rare occasion when UC-generated intellectual property creates a highly profitable application or drug. The CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats) gene editing technology may provide just such an infusion of funding, although most new revenue will go to the inventors and the home campus. In general, there is volatility in the year-to-year generation of patent and licensing income related to legal cases that have, in the past, involved large technology companies, such as Genentech, or the development of breakthrough technology.⁴⁵ UC can hope to generate additional income through its generation of IP, but it appears unlikely to make a dramatic contribution to the University's operational costs.

10. Fund Raising and Endowments

Philanthropic gifts to the UC system and its campuses have risen by a dramatic 50 percent since 2000 and now

⁴⁴ For more information, see, “Indirect Costs at Berkeley: A Primer,” November 16, 2004; GAO Report: Policies for the Reimbursement of Indirect Costs Need to Be Updated: US Government Accountability Office, Report to Congressional Committees, September 2010.



totals more than \$2 billion per year. Virtually all of these funds are restricted and are not available to support general operating costs. Even if philanthropy to UC were to double in the next 10 years, the increase would nominally offset only a quarter of the decline in state funding per student since 2000. Fundraising may help with capital costs, but it is less likely to be a significant income source for ongoing educational costs.

Yet fundraising must be part of a larger funding model for UC. There may be opportunities to focus more on corporate gifts that relate to expanding UC's significant role in educating engineers and other professionals, mindful of the University's policies to retain its institutional autonomy. A stronger link among the University's enrollment capacity and range of high-quality academic degree programs, and the state's labor needs, appears to be one avenue to expand the revenue stream to the campuses.

UC's growing ranks of alumni also offer an opportunity for increased fundraising. In 2016, the University raised in excess of \$320 million from individual alumni and alumni foundations, and over the last decade the total dollars raised from individual alumni increased by 26 percent. Yet UC's 10 campuses lag behind the public members of the Association of American Universities in the percentage of alumni who give to their university (7.2 percent versus 11.2 for the public AAUs).⁴⁶ There is room for growth. Besides general contributions to specific academic departments, scholarships, and selected units (like athletics), endowed faculty chairs also provide a path for enhancing operating costs and attracting and retaining talented faculty.

⁴⁵ See the UCOP website UC Inventions at a Glance.

⁴⁶ UC Office of the President, UC Regents Discussion Item, “University of California Alumni Relations Overview,” May 17, 2017.

Management Efficiencies and Innovation

11. Academic Efficiencies

Higher education is a labor-intensive endeavor, highly dependent on professionals who have teaching, research, and public service responsibilities. The search for efficiencies generally means lowering labor costs by increasing teaching workloads or reducing the academic labor force. Many observers of higher education predict a significant disruption of how universities and colleges, and more generally “educational services,” are delivered. This disruption model focuses almost exclusively on course delivery and the structure of the curriculum, and not on the research and public service mission of major research universities, and how they interact with a university’s teaching role. Previously, we outlined the potential use of online degree programs to create an alternative path to a UC degree. Here we explore six additional options, most related to the disruption model, without an attempt to fully gauge their impact on the quality of a UC education.

Increased Student-to-Faculty Ratios – A major concern is the growing student-to-ladder-ranked faculty ratios, perhaps the best single benchmark of the significant decline in overall resources for UC. It is also a measure of the quality of an institution (these ratios are a factor in college rankings). UC has higher ratios than all its major competitors. What should be the goal of UC regarding student-to-faculty ratios (ladder-ranked and

otherwise)? Can UC achieve its teaching and mentoring goals with fewer faculty?

In the 1960s, the ratio was approximately 14 to one (including all ranks); significant erosion in the ratio began in the 1990s. Today, according to our estimate, the ratio is 25 students to one faculty member – including lecturers and adjunct professors. What would be the consequences if the ratio grew from around 28 to one, or even 30 to 1? The push toward fewer faculty while enrolling more students has, in fact, been the approach taken by recent governors who care more about greater student access and lower state costs than measures of quality or the robust outputs by UC faculty. One drawback of this approach, of course, is that many students may never be able to take a small seminar class in which they get to know a professor and their fellow students; there are also challenges to provide a sufficient number of courses to ensure students can progress toward their degree.

Larger Classes and More Credit Hours Per Faculty Member – Fewer faculty per student means increasing faculty teaching workload (credit hours per student, not necessarily more courses) and, therefore, large increases in class sizes. For that scenario to continue, many campuses will require new and larger classroom facilities and enhanced technology. Another consideration is that the attraction for future faculty to come and stay at UC may decline. Some may find lower teaching loads, smaller classes, and the larger number of talented graduate students at other universities more attractive. This points to a further decline in UC’s academic ecosystem.

Instructional Technology to Gain Efficiencies in Current Academic Programs – As noted previously, online and hybrid courses (now nearly the norm) offer some hope for economies of scale and methods to manage larger and larger classes and workload for faculty. The reality is that online education, as currently conceived, is a needed supplement but not always a reliably transformative tool for current UC students—or for large public research universities—in general.

It is hard to beat the inexpensive model of large classroom courses (using technology as an additive) in terms of outcomes and costs. A teaching model that requires undergraduates to take most freshman and sophomore courses online might result in greater course attrition rates, a longer time-to-degree, and a higher percentage of dropouts.⁴⁷ UC must further explore how instructional technology can improve undergraduate education and make it more efficient, but it requires an understanding of student behaviors and the real costs and benefits of a significant scaling of, for example, fully online courses and degree programs.



⁴⁷ Bettinger, Eric, Lindsay Fox, Suzanna Loeb, and Eric Taylor. “Virtual Classrooms: How Online College Courses Affect Student Success.” *American Economic Review*, Vol 109 Issue 9, September 2017.

Accelerated Graduation Rates – As noted previously, graduation rates for those receiving a bachelor's degree have increased even in the midst of state disinvestment and increased enrollment. This is in part because of a concerted effort to protect undergraduate education from financial cuts, better coordinate course offerings toward the major, and new investments in student advising, including personalized on-line platforms that chart a student's progress toward their degree. UC's current six-year graduation rate stands at 85 percent and increased by four percentage points since 1999. But there is variation among the campuses: Berkeley's graduation rates have stabilized at 93 percent.

The UC Office of the President estimates that a significant increase in the four-year graduation rate, plus much more robust summer session enrollment (see below), might provide enough additional capacity to enroll some 12,000 additional students. This may be an important path for enhancing enrollment capacity. But there are many variables that suggest a significant increase in graduation rates may be elusive.

As noted previously, many UC students are from low-income families, are the first generation to enroll in college, and use their summers to work or for internships, or to meet family obligations. Students also sometimes take longer to graduate because they may change their majors or seek double-majors; others choose to leave the University before graduating to enter the job market or to transfer to another college or university. And there is the growing concern for students in "impacted majors" – majors with high demand and few faculty – that they cannot get the courses they need to graduate in a timely manner. Additional resources, including student support services and additional faculty and lecturers, would likely be required to successfully improve graduation rates further.

There may also be limits to significant increases for transfer students who enroll at UC typically at the junior year and currently have a two-year graduation rate of only 55 percent. Any further increase in the four-year and two-year graduation rates for these students would be an important way to improve efficiencies. The following two policy options also focus on ways to accelerate graduation rates.

Expand Summer Session Enrollment – The 1960 Master Plan envisioned summer as a regular quarter or semester, with enrollment equivalent to the other periods in the academic year. But the enrollment demand for summer sessions never materialized. Instead, students use the summer to work, gain job experience, take courses at community colleges often near their family homes, or take short-courses or credential programs. Summer is also increasingly a period in which universities provide Continuing Education courses for non-traditional students, and host conferences and outreach pro-

grams – many of which generate income and create competition for classroom facilities.

UC could attempt to expand its own summer session enrollment and also further encouraging their students to take courses to fulfill general education requirements at other institutions (such as local community colleges). Under formal agreements, private institutions could enroll students in UC-accredited courses, if they are affordable. For low-income students, extension of the Cal Grant program to cover the costs of summer sessions would be critical.

Three-Year Bachelor's Degree – Decreasing the number of years it takes to earn a degree may be a pathway to expand enrollment capacity. The UC Davis campus already offers three-year degree programs in 13 majors for "students who are highly focused on graduating early and moving on to graduation school and their careers . . ." Other campuses are experimenting with "accelerated degree plans." But here too there may be significant limits to scaling these programs.

First, there are issues regarding the quality of academic programs with reduced major requirements or lacking the general education courses which are a fundamental component of a liberal arts education. Second, the actual number of students who are attracted to a more intensive curriculum, and what may seem like an abbreviated degree program, may be relatively small. Students come to the University of California not simply to attend classes, but to build social networks, participate in extracurricular activities and engage in other on-campus opportunities as they transition from the campus to the workplace. They seek mentorship opportunities and, increasingly, research experience with faculty and graduate students. Most undergraduates at UC are 18-24 year olds, with very different needs than older students who tend to be more focused on direct career goals and might be more attracted to shorten time-to-degree. In short, the market for the three-year degree is complex. Any concerted effort to improve academic efficiencies, the academic goals of the University and the behaviors and needs of students must be considered in order to succeed.

12. Administrative Efficiencies

There are generally three drivers for administrative costs: a) growth in the research enterprise (which also generates significant income and overhead revenue); b) the need for student support services, particularly as the student population become more socioeconomically diverse and requires further institutional effort to guide them through their university experience; and c) federal and state regulatory requirements.

In the past 10 years, the University's administrative staff grew significantly slower than the student population; the number of students to each UC staff member in-

creased from 5.5 to 6.3 between 2007 and 2016.⁴⁸ Many campuses have pursued reforms in administrative costs that focus on eliminating staff positions and include significant efforts to centralize services, often with mixed results in cost savings and with concerns about the quality of campus support services.

Technological innovations appear to offer paths for efficiencies and cost savings, but they often require significant up-front costs and often do not result in improved services. It is unlikely that UC will be able to significantly cut its costs further by eliminating administrative staff. Yet this remains an area of university operations that offers some hope for reducing operating costs. Some reform of federal regulatory rules now being debated in Washington may provide marginal reductions in administrative costs. At the same time, the UC campuses have an administrative culture and operating rules that still reflect its historical roots as a state agency. Although the University achieved a high level of autonomy from state lawmakers in 1979, its internal financial practices and bureaucracy that reflect its origin as a state entity, despite reforms, remain complex and arguably a hindrance to innovative approaches to new revenue generation.

13. UC Governance and Management Structure

Without a large-scale reinfusion of funding from the state that approximates previous levels of investment, UC may need to consider options that provide greater autonomy

to the campuses to expand their management capacity and pursue additional revenue streams. While UC's one-university model in which certain policy realms are uniform across all campuses (including undergraduate admissions standards and policies for the hiring and promotion of faculty) continues to serve UC well, some reconsideration of its organization seems inevitable.

One proposal is an "evolution" in UC management that includes the addition of campus governing boards that have a level of authority that enhances local decision-making and regional and alumnities to each campus.⁴⁹ The Board of Regents would retain broad policymaking and fiduciary responsibilities, but the campus boards could have authority over tuition rates (within limits set by the Regents), allocations of financial aid, investments of campus-based endowments, and provide a closer link to its donors and surrounding regional communities. Many other multi-campus systems have campus-based governing boards that could inform UC.

A decentralization of authority in some financial and program areas to campuses may be required for UC to maintain quality and productivity if public investment and the fiscal health of the UC system further declines. Campus boards are one possible management innovation, but one with many important policy questions. What is clear is that the erosion in a coherent approach by state government to fund UC and CSU is leading to a devolution in which campuses, and even academic departments and schools, must seek their own financial solutions.⁵⁰

SUMMARY: There are multiple pathways for UC to increase its income and to possibly cut operating costs. In forming a revised funding model, most will need to be employed in some form, even if the state of California attempts to reinvest in the University, and public higher education in general. There are other avenues for raising funds, such as increasing income from auxiliary enterprises (e.g., housing, food services, and other campus services) or partnerships with local businesses. Without a substantial boost in income from the state or other sources, UC may be approaching a crossroads, where it continues to grow in enrollment without adequate funding, or where it instead chooses to halt growth to focus on maintaining quality and productivity, but with serious consequences for California. Expanding enrollment via purely online degree programs may enhance enrollment capacity but has significant implications for students. It also presents difficult policy choices regarding the true meaning of a UC education and unknown financial implications. These are among the choices facing lawmakers, the university community, and Californians.

⁴⁸ Data from the UC Information Center. There is currently a 26 percent federal cap on reimbursement of the administrative portion of overhead costs. True administrative indirect costs are in fact higher.

⁴⁹ See Robert Birgeneau, George Breslauer, Judson King, John Wilton, and Frank Yeary, "Modernizing Governance at the University of California: A Proposal that the Regents Create and Delegate Some Responsibilities to Campus Boards,"

Center for Studies in Higher Education, Research and Occasional Paper Series (ROPS), CSHE.4.12 (April 2012)

⁵⁰ John Aubrey Douglass, "Tales of University Devolution: Organizational Behavior in the Age of Markets," Center for Studies in Higher Education, Research and Occasional Paper Series (ROPS), CSHE.6.12 (April 2012)

G. CONCLUSION – Something is Going to Give

Public universities are the bulwarks of America’s famed higher education system.⁵¹ Among all research universities in the United States, the University of California stands alone in its role in educating a state’s future professionals, entrepreneurs, researchers, and citizens. UC is an engine of social mobility through both its education of low-income students; No other university produces as many patents and licenses or generates as many start-ups, fueling innovation and economic growth. No other university reaches out so extensively beyond the borders of its campuses via its University and Cooperative Extension programs, research stations, and Natural Reserve System. As in the past, UC’s mission is to touch and support, in some way, every Californian in every part of the state.

But the story of the University of California is not only its emergence as a multi-campus university of high quality and with an unparalleled international reputation. With systematic funding support by the State of California, UC has also managed to grow in pace with California’s burgeoning population and its increasingly complex social and economic needs. Can UC maintain its historical role in the most populous state in the nation?

UC is a network of campuses that were largely established in the 1950s and 1960s. Most have reached or are nearing their enrollment capacity. Demand for access is already outpacing the University’s capacity to enroll more Californians, and there is no clear funding model. California is projected to grow from 40 million to nearly 49 million residents by 2040. Unless there are substantial unexpected demographic changes, UC would need to grow at a similar rate as in the past to maintain its social contract in admissions. This is particularly important if California hopes to mitigate growing income inequality and to expand access to underrepresented minorities.

As we have shown, past governors and lawmakers understood the value of UC and supported its broad mission and geographic expansion with consistent and predictable funding. In turn, UC helped shape California’s spectacular rise as one of the world’s most innovative economies. Clearly, that historical pattern of investment and support dissipated. Workload funding and paying for capital costs and ongoing operational costs have been replaced by year-to-year deals reflecting the temporal political priorities of lawmakers and, to some degree, state fiscal constraints.

A major conundrum for UC is that it has, so far, navigated its financial troubles despite massive state disinvestment. UC’s network of premier universities has managed to do more with less state funding. This may have creat-

ed a false sense, among lawmakers in particular, that it can continue to crowd more and more students onto its campuses without a significant boost in funding for operational costs or capital funding.

No other university reaches out beyond the borders of its campuses so extensively via its University Extension programs, University Cooperative Extension, research stations, and Natural Reserve System. As in the past, UC’s mission is to touch and support, in some way, every Californian in every part of the state.

Figure 28 - A Revised Funding Model - Exploring Options

Big Picture Approaches

1. Significant State Reinvestment = enrollment and program growth with needs of California
2. Steady State or Further Decline in State Investment = end of enrollment and program growth – seek stabilization
3. Alternative Paths – online degrees and partnerships with other higher education providers, but with limits and policy implications

Seeking Funding Streams

4. Reconsider Tuition and Fees
 - Increase Tuition and Financial Aid
 - Differential Tuition by Field
 - Differential Campus Tuition
 - New Pricing Model – tiered tuition rates by family income
 - Reduce Return-to-Aid Percentage
5. Revise Non-Residential and International Enrollment Targets
6. Grow Professional Degree Programs
7. Expand Extension and Concurrent Enrollment
8. Research Funding and Raise Indirect Recovery Rates
9. Patent and Licensing Income
10. Fund Raising and Endowments – target program areas such as student financial aid

Management Efficiencies and Innovation

11. Academic Efficiencies
 - Higher Student-to-Faculty Ratios
 - Larger Classes
 - Uses of Instructional Technology
 - Accelerated Graduation rates
 - Summer Session Enrollment
 - Three-Year Bachelor’s Degree
12. Administrative Efficiencies
13. Revise UC’s Management Structure – including establishment of campus governing boards

⁵¹ Public research universities educate about 20 percent of all students nationwide; they award 65 percent of all master’s degrees and 68 percent of all research doctorate degrees. They enroll 3.8 million students, including almost 900,000

graduate students, annually. See “Public Research Universities: Serving the Public Good,” part of a four-part series of reports by the Lincoln Project, and funded by the American Academy of Arts & Sciences, 2016.

In this report, we have presented and explored a number of options for generating addition revenue. Not all are intuitive and many have substantial political risks. We also briefly note ways to achieve efficiencies (which usually means reducing labor costs). Figure 28 provides a summary of our incomplete list of options.

In the short run, UC may be able to generate new revenues streams to maintain its quality and productivity, and, for example, reduce student-to-faculty ratios. But it is difficult to imagine a scenario where UC can generate sufficient funding for its long-term operational and capital costs that will allow the UC system to expand its enrollment capacity and academic programs in pace with California's growing population and economic needs. California state government and the University share a history of under-predicting enrollment demand and the growing desire of California stakeholders for its scientific discoveries, expertise, and public services, and medical centers.

UC faced a less severe yet significant decline in state funding and challenges to its funding model in the mid-1980s. After years of declining state funding for public higher education, Governor George Deukmejian, a Republican, became convinced that an underfunded UC would erode its quality and productivity, hinder technological innovation, cost the state in economic activity, and potentially reduce its ability to maintain traditional levels of access to a growing population. Deukmejian worked with state lawmakers, and UC's then president, David Gardner, to re-invest in UC.

A similar but greater pattern of disinvestment with real consequences now faces Californians. In part because it places so many students into community colleges (some

75 percent of students are in two-year institutions) and not in four-year degree-granting universities, California now ranks among the bottom 10 states awarding bachelor degrees per capita.

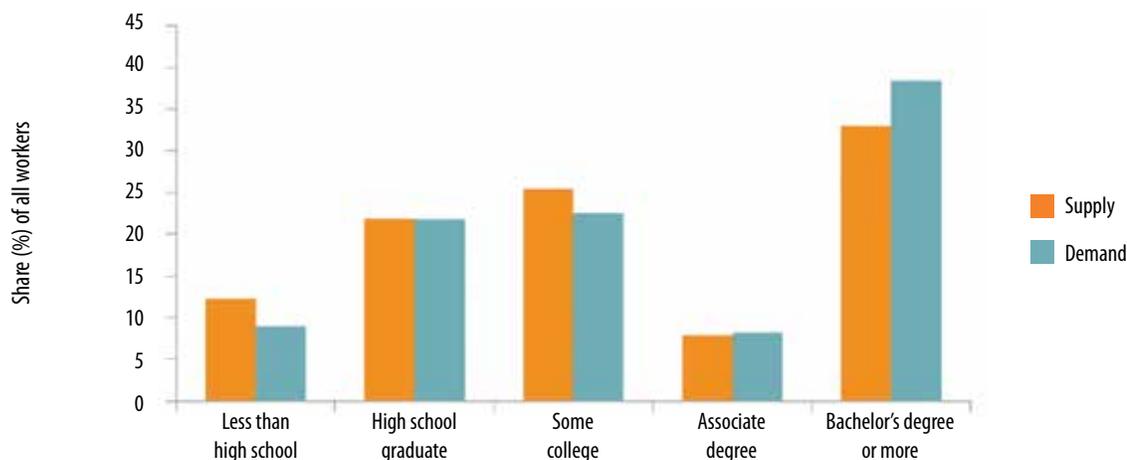
California also has a growing labor shortage and ever-increasing research needs driven by a burgeoning tech- and knowledge-based economy. As a result, the state must expand access to high-quality bachelor's degree programs (see Figure 29). A recent study by the Public Policy Institute of California states that:

California faces a shortage of highly educated workers. Specifically, economic projections to 2030 show that about two in five jobs will require at least a bachelor's degree, while demographic projections suggest only about one in three Californians will have at least a bachelor's degree. This shortfall equates to 1.1 million workers . . . UC will play a central role. In our scenario, UC would need to award approximately one-quarter of the additional degrees necessary to close the gap.⁵²

This may underestimate California's future need for college-educated citizens. Beyond labor needs, California must seek paths for improving socioeconomic mobility

UC's network of premier universities has managed to do more with less state funding. This may have created a false sense, among lawmakers in particular, that it can continue to crowd more and more students onto its campuses without a significant boost in funding for operational costs or capital funding.

Figure 29 - Supply and Labor Market Demand for California Workers by Degree Achieved by 2030



Source: Public Policy Institute of California 2015

⁵² Public Policy Institute of California, Will California Run Out of College Graduates? October 2015.

and reducing the number of people in poverty. California's demography is undergoing a profound change, including the steady growth in minority populations, many who desire access to four-year degree programs and graduate education. For the California of tomorrow, the state's residents need more access to quality public higher education, not less.

Proposed federal limits on immigration could also significantly affect California, which has been a magnet for attracting international students and foreigners with advanced degrees, in part making up for the state's overall low higher-education degree output. The most competitive economies and higher education systems will serve both the needs of their own citizens and attract talent from throughout the world.⁵³

All of these facts and variables lead us to conclude that UC requires renewed long-term state public investment (both operating and capital) and, at the same time, an even more diversified income portfolio. Lawmakers, and the next governor in particular, should assess the challenges facing public higher education in California and the stakes involved.

Governors in the past have been key players in creating and building California's pioneering higher education system. A new governor should have ambitions for higher education that match those of Californians. In a December 2016 Public Policy Institute of California poll, almost two-thirds of Californians said that UC was doing

an excellent or good job, but an equal number also thought that the state's funding for higher education was inadequate. UC has enabled California to emerge as the fifth largest economy in the world. It seems a matter of political will to return to past investment patterns in higher education that can sustain access and research productivity.

There is a tremendous opportunity for a renewed collaboration among California's lawmakers, local communities, the business sector, and public higher education to update and enhance the state's network of colleges and universities for the 21st century. But failing that, there are significant choices that will confront the University, with potentially disastrous consequences to California's once robust promise of access for its citizens to one of the great universities of the world.⁵⁴

To reiterate the central theme of this report, UC may be approaching a tipping point beyond which it can no longer sustain enrollment and program growth without severely eroding the quality of its academic programs and mission to serve Californians.

Governors in the past have been key players for building California's pioneering higher education system. A new governor should have ambitions for higher education that match those of Californians.

⁵³ John Aubrey Douglass and Richard Edelstein, "The Global Competition for Talent: The Rapidly Changing Market for International Students and the Need for a Strategic Approach in the US," Center for Studies in Higher Education, Research and Occasional Paper Series (ROPS. CSHE 8.09 (October 2009).

⁵⁴ The University of California has an unusual level of autonomy from state government as a "public trust" in the state constitution. The UC Regents have the authority to make this choice, with the input and recommendations of the UC President and the Academic Senate. The California State Constitution states:

"The University of California shall constitute a public trust, and its organization and government shall be perpetually continued in the form and character prescribed by the organic act creating the same...subject only to such legislative control as may be necessary to insure compliance with the terms of its endowments, and the proper investment and security of its funds. It shall be entirely independent of all political or sectarian influence and kept free therefrom in the appointment of its regents and in the administration of its affairs..." California State Constitution of 1879, Article IX. UC History Digital Archives.

APPENDIX 1 – REFERENCES and DATA SOURCES

This study is part of a larger UC ClioMetric History Project based at the Center for Studies in Higher Education at UC Berkeley. The UC-CHP is pursuing a Big Data approach to exploring the history and role of the UC campuses in the state of California.

The following list contains most sources used to produce this report. Nearly all are publicly available.

- UC ClioMetric History Project Student Database: <http://ucclioMetric.org/students/>
- The Centennial Record of the University of California, 1868-1968. By Verne Stadtman. (University of California Press, Berkeley, 1967)
- University of California Information Center: <https://www.universityofcalifornia.edu/infocenter>
- California Postsecondary Education Commission Fiscal Profiles 2006 (<https://files.eric.ed.gov/fulltext/ED495118.pdf>) and 2010 (<https://files.eric.ed.gov/fulltext/ED516151.pdf>)
- CSU Budget Office Reports: <https://www2.calstate.edu/csu-system/about-the-csu/budget>
- Annual California Budgets, 1965-2017. Recent years: <http://www.ebudget.ca.gov/>
- UC Budget for Current Operations (1997-2017): <https://www.ucop.edu/operating-budget/budgets-and-reports/current-operations-budgets/index.html>
- Bureau of Economic Analysis Regional Economic Accounts: <https://www.bea.gov/regional/>
- University of California Accountability Report 2017: <https://accountability.universityofcalifornia.edu/2017/>
- Integrated Postsecondary Education Data System: <https://nces.ed.gov/ipeds/use-the-data>
- National Science Foundation Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: <https://ncesdata.nsf.gov/webcaspar/index.jsp>
- California Student Aid Commission CalGrant Reports: <http://www.csac.ca.gov/doc.asp?ID=1162>
- UC Office of the President Institutional Advancement Annual Reports on University Private Giving: <https://www.ucop.edu/institutional-advancement/reports/index.html>
- US Census Demographic Estimates: <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/> and the PEPASYSEX series on American FactFinder (2010-Present)
- Berkeley CalAnswers system (not publicly available): <https://calanswers.berkeley.edu/>
- Minnesota Population Center's Integrated Public Use Microdata Series, American Community Survey: <https://usa.ipums.org/usa/>

The following sources were used to construct each figure or table in the narrative:

Figure Source

1. UC Research Impacts on California, University of California Office of the President
2. UC ClioMetric History Project Student Database
3. UC ClioMetric History Project Student Database
4. The Centennial Record of the University of California
5. The Centennial Record of the University of California
6. The Centennial Record of the University of California; University of California Office of the President
7. UC Information Center (Revenue and Expense Data table). NOTE: General Fund Allocations are adjusted for expectations of capital expenditure from allocation beginning in 2013; those funds are attributed to state capital allocations.
8. CPEC Fiscal Profiles 2006 (1980-2006), CSU Budget Office Reports (2007-2015), UC Information Center (2007-2015)
9. John Aubrey Douglass, "Higher Education Budgets and the Global Recession," Research and Occasional Paper Series, Center for Studies in Higher Education. CSHE 4.10 (February 2010)
10. Annual California Budget, CPEC Fiscal Profiles, and UC Information Center
11. CPEC Fiscal Profiles 2006, UC Information Center, BEA Regional Economic Accounts
12. CPEC Fiscal Profiles 2010 and UC Accountability Report 2017. NOTE: As above, General Fund Allocations intended for capital projects counted as funding for capital outlay instead of general allocation
13. UC Information Center (Revenue and Expense Data table)
14. CPEC Fiscal Profiles 2006 and UC Information Center
15. UC Information Center (Revenue and Expense Data table)
16. IPEDS
17. IPEDS
18. National Science Foundation Survey
19. National Science Foundation Survey, CPEC Fiscal Profiles 2006 and UC Information Center
20. UCOP Institutional Advancement
21. UC Information Center and US Census
22. UC Information Center (UC Employees, Full-Time Equivalent (FTE) data table and Fall enrollment headcounts data table)
23. UC Accountability Report, Chapter 8
24. UC Accountability Report, Chapter 3, and CalAnswers
25. UC Information Center (UC alumni at work dashboard) and the American Community Survey
26. UC Information Center (UC alumni at work dashboard) and the American Community Survey
27. CalAnswers



Approaching a Tipping Point?

A History and Prospectus of Funding for the University of California
Center for Studies in Higher Education - Goldman School of Public Policy - UC Berkeley

APPENDIX 2

About the UC Cliometric History Project

The year 2018 marks the 150th anniversary of the chartering of the University of California, the most prestigious university system in the world. This milestone year provides an opportunity to reflect on the history of the University and contemplate its future.

Based at the Center for Studies in Higher Education at UC Berkeley, the University of California Cliometric History Project (UC-CHP) is taking a Big Data approach to exploring the history and role of the UC campuses in the state of California. Clio was the muse of history in Greek mythology; the term cliometric refers to the use of data and quantitative methods to explore history.

The project is producing an unprecedented large-scale empirical examination of the University's funding, students, professors, institutional structure, and impact on socioeconomic mobility and economic development. Public and restricted-access databases will include comprehensive student and faculty records, course catalogs, Regents' and campus budget reports, and similar institutional records and documents from 1900 to the present. We will also present novel statistical analysis of these databases through blog posts, topic briefs, and academic working papers.

The scope and magnitude of UC Cliometric History Project is enabled by modern computational technology—allowing the digitization and statistical analysis of massive amounts of administrative data presently archived on paper records. In its first phase, UC-CHP is collecting, digitizing, and analyzing complete UC student records from the first half of the twentieth century and UC faculty, course, and budget data covering the past 100 years.

John Aubrey Douglass, CSHE UC Cliometric History Project Principal Investigator, Senior Research Fellow Public Policy and Higher Education, Center for Studies in Higher Education, UC Berkeley

Zach Bleemer, UC Cliometric History Project Director and Lead Researcher, Center for Studies in Higher Education and Department of Economics, UC Berkeley



.....

GOLDMAN SCHOOL
OF
PUBLIC POLICY
UNIVERSITY OF CALIFORNIA BERKELEY

.....

Berkeley Center for Studies
in Higher Education