The Consequences to the California Economy of Lost University Research Funding

FINAL REPORT

Prepared for

United Auto Workers

Prepared by

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

While the private sector conducts 77 percent of all research and development (R&D) in the nation, this activity is heavily dependent on the "basic research" and skilled workforce pipeline provided by top-tier universities such as Stanford, Caltech, and the UC system.[1] R&D support in the state of California reached a total of $14.4 billion in 2024, consisting of $7.8 billion in federal grant funding and $6.6 billion in funding from nonfederal sources.

Basic research provides the "raw materials"—the fundamental scientific breakthroughs—that corporations then refine into commercial products. Cutting basic research would effectively "starve" the private sector of the high-risk, high-reward discoveries it is not designed to fund itself. Losing this competitive advantage risks stifling the innovation economy that has been instrumental to California's growth trajectory over the last several decades.

California accounts for approximately 30 percent of all R&D activity in the United States, creating a unique "innovation density" that is difficult to replicate elsewhere. California's leadership in sectors like biotechnology, aerospace, and artificial intelligence (AI) is rooted in the steady flow of patents and intellectual property coming out of research institutions. Sustained cuts would lead to an "innovation drought," where the lack of new foundational discoveries results in fewer tech transfers and, subsequently, a decline in new startup formations. R&D investments have a multiplier effect: they attract venture capital, create high-paying jobs, and build a specialized workforce.[2]

California's standing as the fifth largest economy in the world is largely due to its unique role as a center for invention and innovation. With a Gross Domestic Product exceeding $4 trillion as of 2026, it is fundamentally anchored in an innovation ecosystem that relies on consistent investment in basic research.[3] For instance, the University of California system alone leads the nation in patent production, securing 540 utility patents in a single year, underscoring the state's unparalleled inventive capacity.[4] When cuts to this foundational research are made and sustained, the immediate result is a thinning of the intellectual "topsoil" from which new technologies and startups emerge.

The threat of sustained funding cuts is not merely theoretical. Recent fiscal projections suggest that such disinvestment can lead to a significant decline in economic activity.

[1] "Fostering innovation through research & development investment," *California Chamber of Commerce*, June 7, 2024, https://cfce.calchamber.com/wp-content/uploads/2024/12/240607-R-D-Memo-26.pdf
[2] *Ibid.*
[3] "California's economy leads again, grows another 5% in 2025 to record $4.25 trillion GDP", *Office of Governor Gavin Newsom*, Apr 9, 2026, https://www.gov.ca.gov/2026/04/09/californias-economy-leads-again-grows-another-5-in-2025-to-record-4-25-trillion-gdp/
[4] Ozkan, Mihrimah, and Paul R. Sanberg, "Bridging innovation: Mapping the impact of California universities in translational research and technology", Technology and Innovation, March 30, 2026, https://www.tandfonline.com/doi/full/10.1080/19498241.2026.2634609

The Impact of Spending Cuts on the California Economy

Research and development activity at California institutions of higher education play a large role in propelling the state economy forward. They are a significant source of jobs, worker income, economic output, and tax revenues. Moreover, their economic impact is magnified because of their supply chain linkages throughout the state economy. As such, cuts to federal R&D funding research and development will have a contractionary effect on the state economy.

We compared the economic impact of potential federal R&D spending cuts under various scenarios to a baseline scenario which assumed that spending would grow at its recent average annual growth rate of seven percent. Assuming federal R&D funding would grow at that rate, it would rise from $8.9 billion in 2026 to $11.0 billion in 2030. After accounting for the multiplier effect, the total economic impact of federal R&D funding on the California economy (the sum of direct, indirect, and induced impacts) is estimated to be:

- Output: $21.4 billion in 2026, rising to $26.7 billion in 2030
- Jobs: 139,600 jobs in 2026, rising to 166,600 in 2030
- Taxes: $4.4 billion in local, state, and federal tax revenues in 2026, rising to $5.5 billion in 2030

Three “funding cut” scenarios were analyzed over a five year period from 2026 through 2030. Given potential one-time cuts of 10%, 20%, and 40%, funding levels in 2026 would fall from $8.9 billion to $7.9 billion, $7.0 billion, and $5.3 billion, respectively. The following table summarizes estimated losses after accounting for inflation.

Economic Impact of Lost Federal R&D Funding Under Different Scenarios

	Annual Losses with 10% Cut			Annual Losses with 20% Cut			Annual Losses with 40% Cut		
	Output $B	Jobs	Taxes $M	Output $B	Jobs	Taxes $M	Output $B	Jobs	Taxes $M
2026	-$2.1	-13,960	-$440.7	-$4.3	-27,920	-$881.5	-$8.6	-55,840	-$1,763.0
2027	-$2.2	-14,429	-$461.7	-$4.5	-28,857	-$923.4	-$8.9	-57,714	-$1,846.7
2028	-$2.4	-15,242	-$494.2	-$4.8	-30,483	-$988.5	-$9.6	-60,966	-$1,976.9
2029	-$2.5	-15,998	-$525.7	-$5.1	-31,995	-$1,051.3	-$10.1	-63,991	-$2,102.6
2030	-$2.7	-16,662	-$554.7	-$5.3	-33,324	-$1,109.4	-$10.7	-66,648	-$2,218.8

In 2026 alone, output losses relative to the baseline could range between $2.1 billion and $8.6 billion depending on the size of the cut. This would be accompanied by job losses estimated to fall between 13,860 and 55,840, and estimated losses of tax revenues between $440.7 million and $1.8 billion. Estimated losses would grow in subsequent years, even under the assumption that funding would return to its trend growth rate of seven percent annually.

The environment for federal research grants has become highly uncertain, with sizable cancellations and freezes now a realistic risk even after awards are made. Recent analyses of data at the national level show that in 2025 NIH froze or terminated more than 5,800 grants and NSF nearly 2,000, leaving roughly 2,600 grants un-reinstated and about 1.4 billion dollars in unspent funding stranded; separate estimates put the total unspent funds affected at approximately $2.3 billion at NIH and $700 million at NSF. In addition, NIH and NSF together funded roughly 6,500 fewer projects in 2025 than the typical annual average over the previous decade, despite similar overall budget levels, indicating that risk is manifesting through both outright cancellations and a reduction in the number of active awards.

These disruptions have forced investigators to scale back or abandon work: survey data indicate that more than forty percent of researchers cancelled planned projects, over half reduced scope or diverted funds from other studies, and a similar share advised trainees to consider opportunities outside the United States, *reflecting how pervasive funding uncertainty has become in day-to-day research planning.*[5]

Looking specifically at California, the NIH and NSF, the two largest sources of research funding in 2024, have both cut their funding to research dramatically over the last two years.[6] NIH funding fell by 25% or $490 million from $1.96 billion in 2024 to $1.47 billion in 2026, second only to North Carolina which lost $505 million. NSF funding fell by 70% or $175 million from $250 million in 2024 to $75 million in 2026, the largest loss among the states.

The Research Ecosystem

The industry ecosystems that propel California's growth—ranging from biotechnology and clean energy to aerospace and artificial intelligence—are built on the proximity of research clusters that foster "R&D spillovers." These ecosystems are maintained by a high density of higher education institutions, with California producing more engineers than any other state.

Sustained cuts to basic research funding would likely trigger a "brain drain," as top-tier researchers and budding entrepreneurs migrate to regions with more robust support systems, thereby eroding the specialized workforce that global tech leaders rely upon for their California-based operations. Without a steady supply of fundamental discoveries, the state's ability to "outgrow" major global economies like Germany and China would be significantly compromised, potentially ending a 16-year streak of uninterrupted economic expansion. [5]

The economic implications of stifling the innovation ecosystem are structural rather than merely cyclical. Institutional research suggests that California's high cost of doing business makes private sector R&D highly dependent on public incentives and a robust research infrastructure to remain viable.[7] Without stable public funding to de-risk early-stage research, the "valley of death" between discovery and commercialization widens, making it difficult to attract the local investment necessary to sustain high-wage job growth.[8]

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[5] https://www.sciencenews.org/article/nih-nsf-cuts-2025-data
[6] Based on data gathered from individual agencies and compiled by UAW researchers.
[7] "Tax Tools for Business", *California Chamber of Commerce*, February 2025, https://advocacy.calchamber.com/policy/issues/tax-tools-for-business/
[8] "The Future of Advanced Technology and Basic Research: Issue Report", *California 100*, https://california100.org/wp-content/uploads/2023/09/The-Future-of-Advanced-Technology-and-Basic-

There are also significant fiscal implications associated with the role of basic research in supporting the innovation ecosystem. Recent fiscal analyses highlight that during tech booms, such as the current surge in AI, capital gains and stock option exercises can contribute upwards of 20 percent of sector-related tax receipts.[9] However, if the underlying research environment is degraded, the state loses its ability to capture these "one-time windfalls" that are essential for balancing the budget during economic downturns.

Reductions in research funding may very much hide a larger long-run cost than we can currently measure. We do not know how many future Genentechs, Googles, Kites, or Sun Microsystems will never be born because the underlying discoveries, labs, trainees, and university-industry linkages are not funded today. We can measure today's budget reduction, but we cannot directly measure the set of future firms, jobs, patents, and public revenues that never materialize because the seed-stage research was never done.

Research-ISSUE-REPORT-Single-pages-Round-3-2.pdf

[9] Sumagaysay, Levi, "California tax revenue getting a boost from AI boom — but for how long?", *CalMatters*, January 6, 2026, https://calmatters.org/economy/technology/2026/01/california-tech-tax-revenue/

INTRODUCTION AND PURPOSE OF STUDY

California has long been known as one of the most dynamic economies among the U.S. states and the regions of the world. The state's growth trajectory in recent decades has derived in part from large investments in research and development activities at its academic institutions. The results of these research efforts have spawned significant commercial activity over time, driving still more growth in the state economy.

Federal grants and contracts have been a significant source of research support for decades. Academic institutions in California received an average of $6.2 billion per year in research funding from federal grants between 2018 and 2024, but this source of research support has become imperiled by recent priorities of the Trump administration.[10] In the absence of such funding, research activity would be curtailed or eliminated, as would the workforce of researchers and graduate students. There are spillover effects as well: Classes and student services would be reduced, patients would be turned away, and faculty and staff jobs would be diminished.[11]

Our previous study estimated the economic impact of $23 billion[12] in research support to the UC system over a five-year time horizon. Looking exclusively at direct expenditures made by the UC institutions, it was estimated that more than 50,000 jobs were supported annually, generating labor income in excess of $6 billion per year, resulting in a total of $52.1 billion in output or economic activity over the five-year period.

While the economic impact estimates cited in the previous study clearly demonstrate the economic contribution made by UC basic research, it does not account for the royalties, patents and other income streams that may emanate from commercial applications of basic UC research. Nor did it examine additional leveraging contributions in the form of co-funding, partnership funding, follow-on funding, and possibly other sources of support that accompany basic research grants.

The purpose of this study is to augment the findings of the first study by documenting the contributions of basic scientific research on the California economy and assessing the potential short-term and long-term consequences of losing funding that supports research activities at academic and other institutions. The study will also evaluate the potential to use technology transfer related royalties and other income to offset the costs to the State of California of issuing $12 billion in bonds to support academic research within the state.

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[10] Data from National Center for Science and Engineering Statistics (NCSES). The administration has prioritized significant downsizing of federal expenditures through aggressive staff reductions, agency restructuring, and funding cuts to programs, including the National Science Foundation.

[11] "University of California would need $5B if it lost federal funding, leader says," Higher Ed Dive, by Ben Unglesbee, September 5, 2025, https://www.highereddive.com/news/university-of-california-president-5-billion-Trumpadministration/759316/#:~:text=Dive%20Insight:,to%20the%20latest%20system%20financials

[12] SB 895 initially sought $23 billion in appropriations, but this was subsequently reduced to $12 billion.

The three objectives of this study are as follows:

- Determine the **short-term losses** that cuts to research will impose on university research and the broader economy, both quantitatively and qualitatively. Short-term budget cuts are magnified as they trigger a contractionary multiplier process across the economy, meaning that the impact of cuts will go well beyond research, causing job and payroll losses and a decline in economic activity. Moreover, The "human" impact of these losses will be documented qualitatively. This includes job losses among researchers and graduate students, and impacts on others such as patients who rely on these institutions for services who will suffer from reduced or eliminated services. Finally, the cuts will lead to a decrease in tax revenues through two channels. First, the contractionary multiplier effect of the cuts leads to a decline in tax revenues that are associated with the research expenditures themselves. Second, as cuts to basic research limit the potential for innovation and invention, there will be fewer start-up enterprises, and as a result, there will be fewer initial public offerings (IPOs) that have historically been critical to State of California income tax revenue.

- Describe how university research has contributed to the **long-term** growth trajectory of California over the last several decades and explain how loss of funding may jeopardize that trajectory. University research is an economic engine that gives rise to agglomeration benefits in the form of industry ecosystems or clusters that are anchored to the university research itself. The ecosystems attract talent including researchers and graduate students, start-ups, and if successful, new companies that hire workers and expand over time. Cuts to basic research on a sustained basis will stifle innovation and invention, limiting opportunities for new start-ups, and endangering the industry ecosystems that have propelled economic growth and enabled California to become the fifth largest economy in the world. This also has implications for the long-term fiscal health of the State, given how reliant income tax revenues are on capital gains taxes of high income taxpayers.

- Evaluate the potential of research-related income streams to recover some or all of the borrowing costs associated with providing State support of research in California.

GENERAL IMPLICATIONS OF CUTS TO UNIVERSITY RESEARCH FUNDING

The economic impacts that result from spending cuts can be best understood as (1) short run contraction and (2) long run diminished growth. Cuts in funding incur impacts that matter regionally and nationally.

NIH and NSF funding cuts appear to have several economic effects: job losses, lower local spending, reduced university research activity, weaker commercialization, and slower long-run growth in innovation. The strongest evidence shows that a proposed NIH indirect-cost cut could cause about $16 billion in economic loss and 68,000 jobs lost nationwide, and the SCIMaP project says it will also assess major NSF reductions.[13]

The United for Medical Research coalition estimates that every $1 invested in scientific research through the NIH produces $2.56 in new economic activity, a more than 250 percent gain in investment. Further, NIH research supports over 400,000 jobs across the U.S. Research funded by the NIH has led to major breakthroughs, including the prevention, treatment, and cures for cancer, heart disease and Type 1 diabetes.[14]

FY2027 budget cuts proposed for NIH, NSF, and other key agencies would reduce grant dollars flowing to universities, hospitals, contractors, and staff, so the first impact is usually lower payrolls and less spending in local economies. Brookings estimates that NIH cuts would produce meaningful employment losses in affected regions, especially research-heavy college towns.[15]

Funding cuts can also trigger hiring freezes, fewer graduate slots, canceled projects, and delayed or abandoned clinical trials. Those changes reduce the research pipeline and can weaken the broader scientific infrastructure that supports patents, startup formation, and future grants. There are also broader effects across universities and their facilities: classes and student services would be reduced, faculty and staff jobs would be diminished, and patients and users of university-related services would be turned away.

Long-Term Economic Effects

When cuts to foundational research are made and sustained, the immediate result is a thinning of the ecosystem from which new technologies and startups emerge. The threat of sustained funding cuts is not merely theoretical. Recent fiscal projections suggest that such disinvestment can lead to a significant longer term decline in economic activity.

Analysis of research and development (R&D) spending models indicates that every dollar invested in nondefense federal R&D generates approximately $2.64 in broader economic activity, meaning that multi-

[13] Science & Community Impacts Mapping Project, College of Computer, Mathematical & Natural Sciences, Data-Driven, Interactive Map Shows Local Economic Impact of Cuts to Federal Funding for Health Research, April 3, 2025, https://cmns.umd.edu/news-events/news/joshua-weitz-science-impacts-map
[14] *Ibid*.
[15] Levine, Phillip and Robin McKnight, "NIH funding and local employment." Brookings, August 28, 2025, https://www.brookings.edu/articles/nih-funding-and-local-employment/

billion-dollar cuts to research foundations could result in nearly $17 billion in lost economic productivity nationwide.[16] In California, where technology firms drive over 40% of the nation's growth in publicly traded equities, any disruption to the flow of new scientific knowledge directly endangers the state's competitive edge.[17] Because California captures nearly two-thirds of all venture capital in the United States, its startup ecosystem is uniquely sensitive to the health of the research institutions that provide both the talent and the technological breakthroughs required for seed-stage investment.[18]

It has been shown by a number of macroeconomic studies that cuts to university R&D funding would unequivocably reduce future U.S. economic growth.[19] The American Association of Universities cite research as the most important component of long-term economic growth:[20]

- Universities were responsible for innovations that led to more than 600 startups and nearly 5,000 patents in 2022. The University of California system alone was responsible for 78 startups, 179 inventions, and 486 patents in 2023.

- The Institute for Macroeconomic and Policy Analysis at American University found that a 50 percent cut to research could negatively impact GDP by 7.6 percent, private investment by negative 8.6 percent, and tax revenue by a negative 8.6 percent.[21]

Over time, cuts to R&D funding result in slower innovation and weaker productivity growth, because NIH and NSF funding often supports foundational research that private firms are less likely to finance on their own. That means the cost is not just immediate job loss, but also fewer breakthroughs and less commercial spin-off activity over time.[22]

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[16] McFarland, Pam, "Fed science board firings will weaken research that supports engineering, critics say", *Engineering News*-Record, May 1, 2026, https://www.enr.com/articles/62917-fed-science-board-firings-will-weaken-research-that-supports-engineering-critics-say

[17] "California's economy leads again, grows another 5% in 2025 to record $4.25 trillion GDP", *Office of Governor Gavin Newsom*, Apr 9, 2026, https://www.gov.ca.gov/2026/04/09/californias-economy-leads-again-grows-another-5-in-2025-to-record-4-25-trillion-gdp/

[18] Ozkan, Mihrimah, and Paul R. Sanberg, "Bridging innovation: Mapping the impact of California universities in translational research and technology", Technology and Innovation, March 30 2026, https://www.tandfonline.com/doi/full/10.1080/19498241.2026.2634609

[19] House Budget Committee, "New CBO Analysis Shows Trump Cuts to R&D Programs will Harm the U.S. Economy, July 30, 2025, https://democrats-budget.house.gov/news/press-releases/new-cbo-analysis-shows-trump-cuts-rd-programs-will-harm-us-economy ,Ostertag, Meghan, Information Technology & Innovation Foundation, "How Reducing Federal R&D Reduces GDP Growth, September 15, 2025, https://itif.org/publications/2025/09/15/how-reducing-federal-rd-reduces-gdp-growth/ , "Preliminary Estimates of the Macroeconomic Costs of Cutting Federal Funding for Scientific Research," American University Institute for Macroeconomic & Policy Analysis

[20] *op.cit.,* "Federal Research Cuts Threaten U.S. Innovation and Leadership, Association of American Universities, and UC Research,

[21] op.cit., "Preliminary Estimates of the Macroeconomic Costs of Cutting Federal Funding for Scientific Research."

[22] Drake, John, "Trump's NIH and NSF Cuts Estimated to Cost the U.S. Economy $10 billion Annually," Forbes, Innovation-Science, May 19, 2025, https://www.forbes.com/sites/johndrake/2025/05/19/trumps-nih-and-nsf-cuts-could-cost-the-us-economy-10-billion-annually/

Federal spending represents 55 percent of all research and development funding to higher education institutions in the U.S.[23] In 2024, total funding was $65 billion. A critical question is whether federal spending cuts would be offset with private sector or State and Local R&D Investment. In fact, it is highly unlikely that other sources of research funding would be boosted or infill federal research spending cuts, The primary reason is that public and private R&D serve different, largely complementary roles, rather than being direct substitutes for each other.

Because federal funding mostly supports basic research---the fundamental long term high risk discovery phase---while the private sector, institutional, and other public investment into research focuses on applied research funding tend to avoid high-risk, long-term "basic research" because it is seldom profitable to pursue unless a clear product or process is identified. **If federal funding stops, it is more likely that basic research *just stops*.**

Furthermore, other sources of funding constitute so much less of the total research funding environment. In 2024, state and local government accounted for 5 percent; the business sector 5 percent, and institutional funding: 26 percent. These percentages have shown little variation over the last ten years.

Institutional funding is essentially the university or college itself providing internal support for R&D. That percentage will not change unless windfall revenues from existing or new income streams are received, principally from philanthropy with aggressive fundraising campaigns targeting alumni and donors for research endowments, a very unlikely prospect.

Consequently, it is more plausible that, if federal cuts make the overall research environment more uncertain or less viable for certain projects, other funders may not fully step in, and philanthropic, and business monies could actually shrink if universities reduce staff, labs, and proposal activity.

The Leverage Effect

Federal research grants are often the primary source of funding that provides project creditability, which enables it to attract additional support from other sources. Cuts to federal research support would lead to graduate student reductions, closures of labs, loss of matching funds and these conditions would collectively weaken the ability to attract alternative funding.

State, institutional and industry funding is often unlocked by federal grants, relying on federal funding to leverage their own:

- Institutional funding: Universities often provide matching funds or infrastructure support specifically *because* a project has won a competitive federal grant, viewing it as a stamp of approval from a prestigious agency like the NIH or NSF.

[23] National Center for Science and Engineering Statistics, Higher Education Research and development Survey, various years, https://ncses.nsf.gov/surveys/higher-education-research-development/2024

- Industry (private) funding: Companies are more willing to invest in university research when a project has already passed the rigorous merit review process of a federal agency. The federal grant lowers the perceived risk for private partners, proving the research has scientific and technical validity.
- State and Local Funding: State governments often use federal grants to benchmark their own investments, preferring to fund projects that have already demonstrated the ability to secure federal resources.

In summary, federal grants act as a signal of high quality and scientific importance, which helps researchers secure the full "stack" of funding needed for complex or long-term projects.

Uncertainty in the Research Grant Environment

Operational aspects of the processes associated with federal grants programs have changed under the present Administration. This includes review, award decisions, and disbursement practices. These changes have resulted in grants that have been terminated early, delays in award announcements, stalled funding, a reduction in the number of grant awards over time, changed timing of disbursements from paying one year at a time to multi-year disbursements, and targeted projects that were in conflict with the Administration goals.[24]

There is substantial, documented evidence that federal grant operations have changed under the current Trump Administration (since January 2025), including pauses, early terminations, altered review criteria, and changed disbursement practices tied to administration priorities.[25] More than 5,000 grants have been frozen or terminated by NIH and more than 2,000 were terminated in early 2025 alone. At NSF, 1,752 grants were terminated totaling $1.4 billion.

These changes have increased uncertainty and upheaval in the basic research arena, one which requires significant resources, a stable environment, and patience. These changes can potentially jeopardize an important engine of growth to the California economy.

For more details on Administration actions and changes to grants, funding, and research, please see report Appendix.

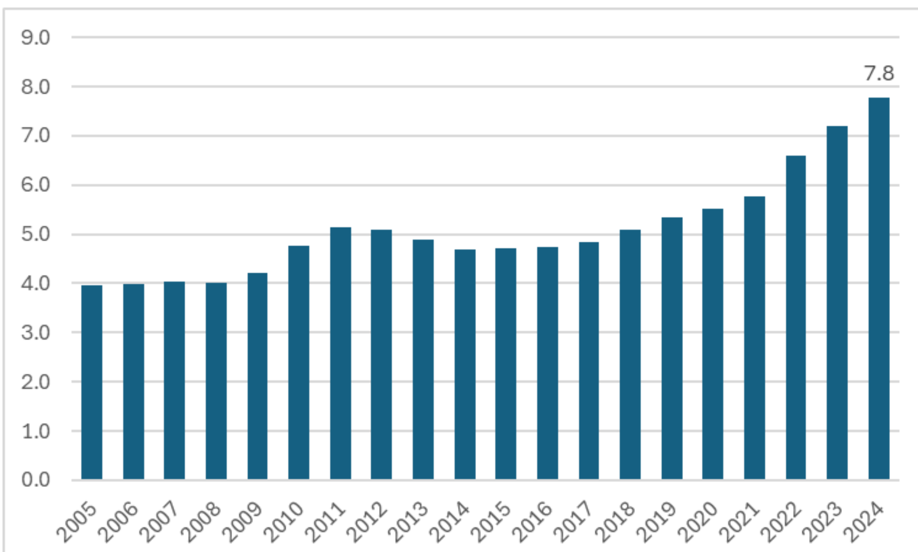
[24] The U.S. is Funding Fewer Grants in Every Area of Science and Medicine, A quiet policy change means the government is making fewer bets on long-term science," New York Times, December 2, 2025, https://www.nytimes.com/interactive/2025/12/02/upshot/trump-science-funding-cuts.html
[25] Federal Grant Freezes, Terminations, and Cuts in 2025, North Carolina Center for Nonprofits, https://ncnonprofits.org/public-policy-blog/federal-grant-freezes-terminations-and-cuts-2025

SHORT-TERM CONSEQUENCES OF CUTS TO RESEARCH GRANTS IN CALIFORNIA

Cuts to research support affect the California economy in a number of ways. In this section, we determine the **short-term losses** that may occur as a result of potential federal cuts to research funding. These include economic losses that can be quantified, including job cuts and associated losses in wages, reduced output or economic activity, and a reduction in tax revenues to the state. Beyond that, there are qualitative impacts that shed light on the quantitative impacts by offering insights to the broader consequences experienced by the state.

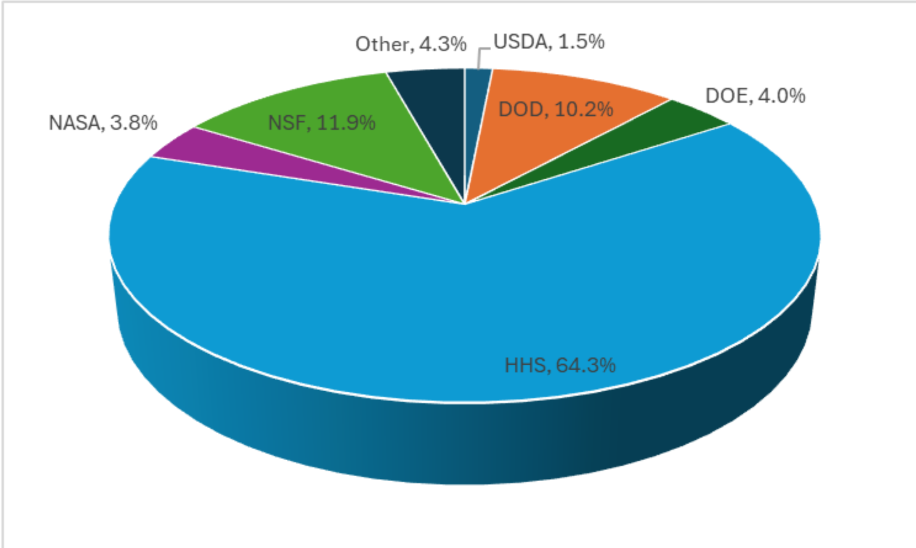
Data from the National Center for Science and Engineering Statistics (NCSES) show the level of research and development funding to academic institutions over time, as well as the mix of funding across federal government agencies. In the state of California, federal awards to all institutions totaled $7.8 billion in 2024. The level of awards has increased steadily since the middle of the last decade, increasing by an average of seven percent per year between 2018 and 2024 (Figure 1).

Figure 1 Federal R&D Grants to California Institutions ($ Billions)



Funding has nearly doubled over the twenty-year period from 2005 to 2024, increasing from $4.0 billion in 2005 to $7.8 billion in 2024. From 2005 through 2009, funding remained steady at approximately $4 billion, rising to a new plateau of approximately $4.8 billion in the middle of the last decade. Funding surpassed the $5 billion mark in 2018, increasing at an average annual rate of 7.1% to nearly $8 billion in 2024.

Figure 2 Distribution of R&D Funding in California by Agency



The distribution of funding in 2024 across federal agencies appears in Figure 2. Most of the funding comes from the National Institutes of Health within the Department of Health and Human Services (HHS), accounting for nearly two-thirds (64.3%) of the award total. This was followed by the National Science Foundation (NSF) with 11.9%, the Department of Defense (DOD) with 10.2%, and other agencies rounding out the total.

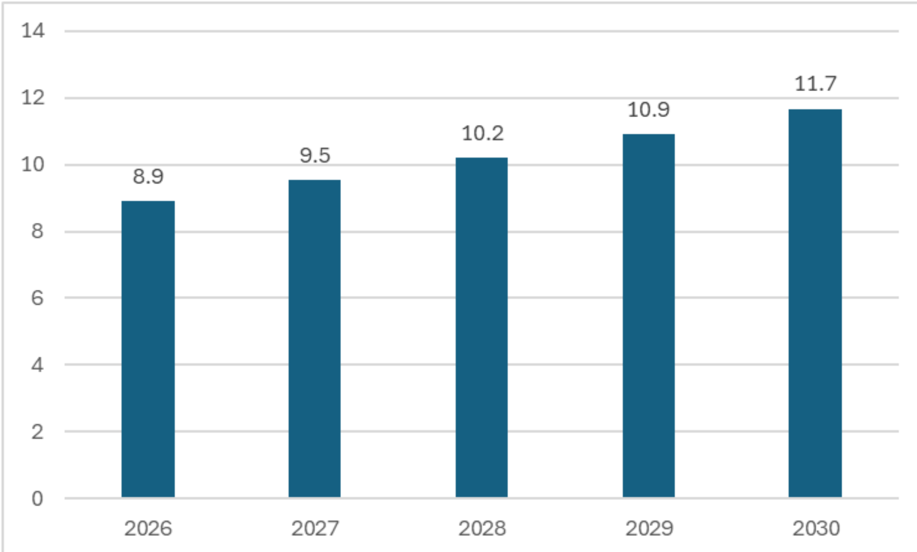
R&D activities have other sources of support beyond federal government agencies. Non-federal include business, nonprofits, institutional funds, and state and local government. These funding sources accounted for $6.6 billion in funding support in 2024, two-thirds of which came from institutional support and nonprofit sources.

Baseline Economic Impact

The following economic impact analysis was based on federal funding received by all academic institutions in California. Federal funding to these institutions was $7.8 billion in 2024. It is not possible at this time to know the magnitude of potential cuts to federal R&D support in the coming years. This analysis considers a set of scenarios that range from no cuts (baseline) up to cuts of 40%, which is viewed as the worst-case scenario.

The first of these scenarios is the baseline, to which the remaining scenarios are tied. It was assumed that baseline funding would increase by seven percent per year in nominal or current dollars through 2030, consistent with the recent trajectory since 2018, reaching a total of $11.5 billion by 2030 (Figure 3).

Figure 3 Projected Baseline Federal Funding by Year (Billions of Current Dollars)



These current dollar figures were converted to inflation-adjusted or real dollar figures using forecasts of inflation over the next several years, then allocated to four categories:

- Research and development expenditures
- Subcontractor expenditures
- Equipment purchases
- Administrative expenses

Economic impacts were estimated for the period from 2026 through 2030. Economic impacts are measured in terms of jobs, income, and economic activity or output. In addition, fiscal impacts are measured in terms of tax revenues at the federal, state, and local level.

The economic impacts themselves derive from three sources:

- Direct impact which relate to the initial R&D expenditures by the academic institutions
- Indirect impact that relate to expenditures by the suppliers that are a part of the supply chain in the state
- Induced impact that relate to spending out of wages earned by workers employed in both the direct and the indirect stages above

Taken together, these add up to the total economic impact. Figure 4 shows the total economic impact of baseline R&D funding on the California economy over the period from 2026 through 2030, with the associated dollar figures shown in Figure 5.

Figure 4 Baseline Economic Impact by Year: Output in $ Billions

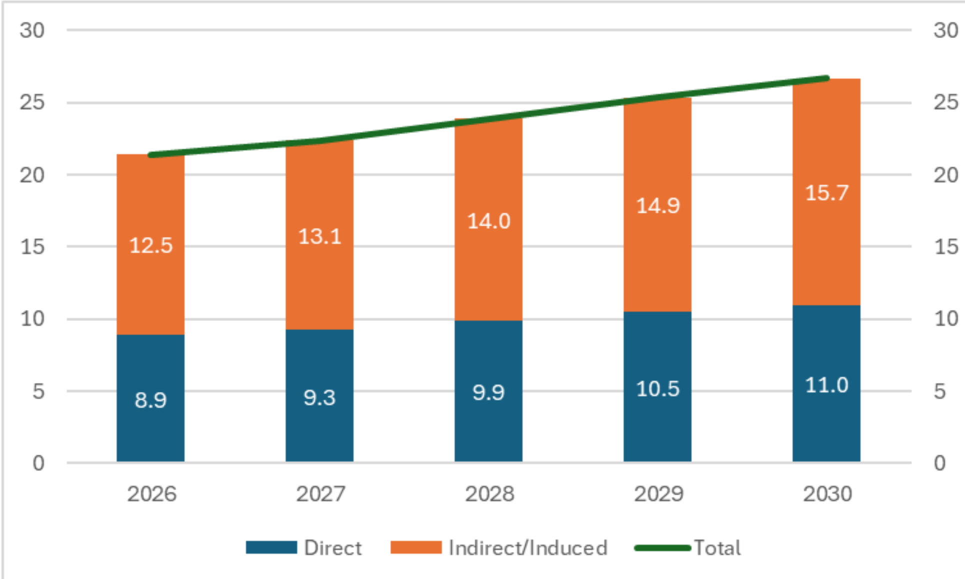


Figure 5 Baseline Economic Impact by Year: Output in $ Billions

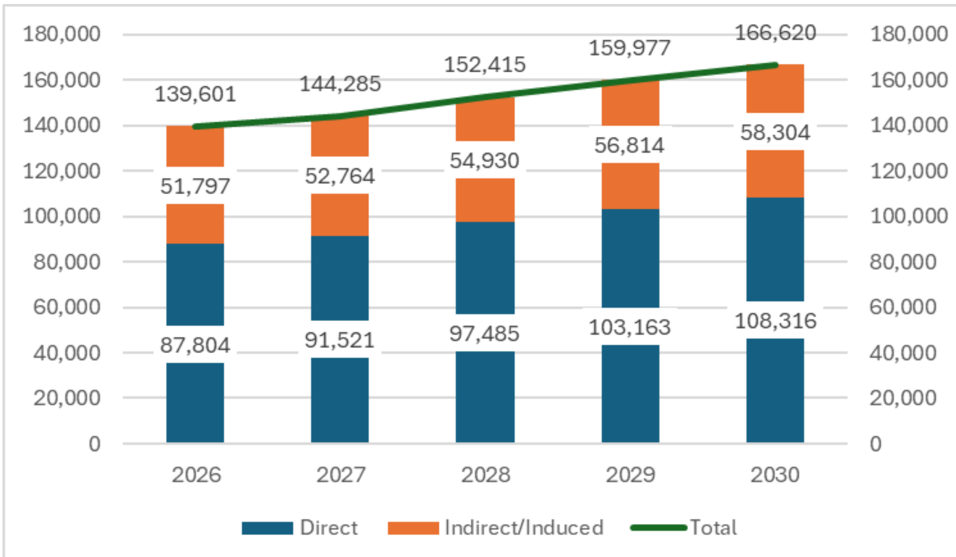
Year	Direct	Indirect/ Induced	Total
2026	$8.9	$12.5	$21.4
2027	$9.3	$13.1	$22.4
2028	$9.9	$14.0	$23.9
2029	$10.5	$14.9	$25.3
2030	$11.0	$15.7	$26.7

As stated above, direct expenditures represent initial estimated baseline R&D funding by federal agencies in each year, adjusted for inflation. Their ripple or multiplier effects on the California economy are represented by the indirect and induced impacts. Taken together, they are 40% larger than the direct expenditures. Moreover, nearly three-fourths of the combined indirect/induced impacts are due to induced effects, that is, spending out of wages that are earned by workers throughout the supply chain. These induced impacts can easily be overlooked in the absence of a true economic impact analysis, but represent a substantial increase over the impacts of the “more obvious” direct expenditures. This not only has implications for economic output, but also for tax revenues as described below.

Overall, the output multiplier associated with federal support of academic R&D activity in California is 2.4. That is, every $100 million of federal research support results in $240 million in total economic activity.

R&D research activity generates substantial employment, both at academic institutions and throughout their supply chains. Figure 6 shows the employment impacts associated with the baseline scenario over the years 2026 through 2030. Total employment climbs from just under 140,000 to 166,000 over the five-year horizon shown, equivalent to an increase of 19%. Direct impact jobs increase over the five-year period from nearly 87,800 in 2026 to 108,300 in 2030. Indirect/induced jobs increase from nearly 51,800 to 58,300 over the same period. The average wage across all jobs in 2026 is estimated at $96,100, slightly higher than the average wage for all workers which was $94,400.[26]

Figure 6 Baseline Economic Impact by Year: Employment



Substantial taxes are generated at the federal, state, and local level by virture of R&D activity at academic institutions. The types of taxes at each level of government mainly include:

- Local sales, property, and business permits
- State sales, property, personal income, corporate profits, and vehicle fees
- Federal personal income, corporate profits social insurance, excise, and special taxes

Figure 7 shows the breakdown of the total economic impact of tax revenues for the period from 2026 through 2030 by level of government under the baseline level of R&D expenditures. Overall, tax revenues increase from $4.4 billion to $5.5 billion over the five-year period. Most of the tax revenues shown flow to the federal government in the form of personal income, corporate profits, and social insurance tax revenues. County and local tax revenues increase from $428.5 million to $539.1 million over that period, state taxes increase from $933.4 million to $1.17 billion, and federal revenues increase from $3.0 billion to $3.4 billion.

[26] Average wage for all workers in California in the third quarter of 2025 (latest available) was $94,400, based on the BLS Quarterly Census of Employment and Wages (QCEW).

Figure 7 Tax Revenues Under Baseline ($ Millions)

	County	State	Federal	Total
2026	$428.5	$933.4	$3,045.5	$4,407.5
2027	$448.8	$977.8	$3,190.3	$4,616.9
2028	$480.4	$1,046.7	$3,415.3	$4,942.4
2029	$510.9	$1,113.2	$3,632.5	$5,256.6
2030	$539.1	$1,174.6	$3,833.2	$5,547.0

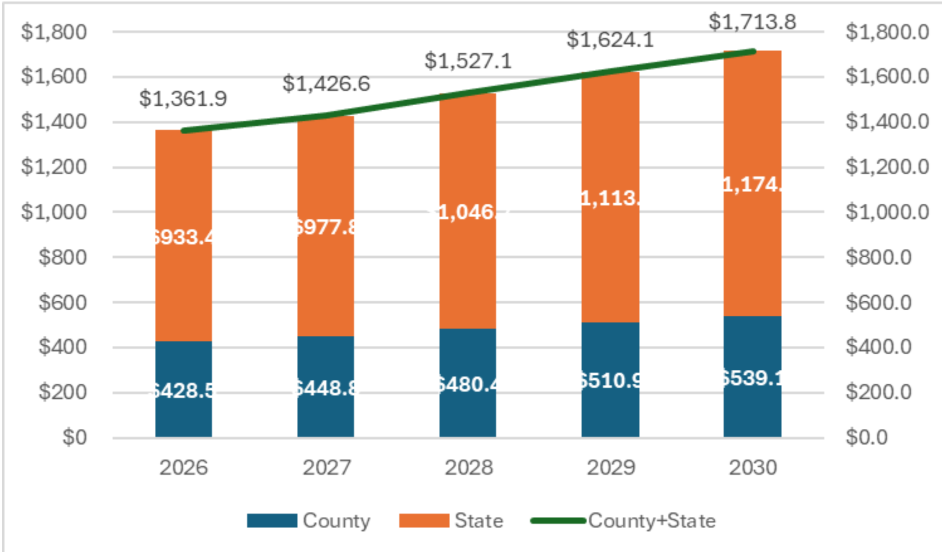
As stated earlier, economic impact analysis breaks down total impacts into direct, indirect, and induced impacts. This includes taxes generated through R&D activity. Figure 8 shows that direct impact taxes account for the largest share of state and federal revenues in 2026, but in the case of local government, induced taxes far exceed direct and indirect impacts. Again, induced impacts are often overlooked, but are significant, both in terms of the economic impact, and as shown here, in terms of their potential to contribute to state and local tax revenues.

Figure 8 Baseline Tax Revenues in 2026 by Impact Source

Impact	Local	State	Federal	Total
1 - Direct	$90,000,871	$456,248,102	$1,993,012,353	$2,539,261,326
2 - Indirect	$48,608,031	$101,943,622	$292,531,688	$443,083,341
3 - Induced	$289,901,166	$375,246,582	$759,975,491	$1,425,123,239
Total	$428,510,068	$933,438,306	$3,045,519,532	$4,407,467,906

Over time, local and state tax revenues would be expected to grow under the baseline scenario, as shown in Figure 9. Combined state and local tax revenues amount to nearly $1.4 billion in 2026 and increase to $1.7 billion by 2030, measured in today's (2026) dollars. Both state and local revenues are expected to increase over time.

Figure 9 County and State Tax Revenues Under Baseline ($ Millions)



Alternative Scenarios and Impacts

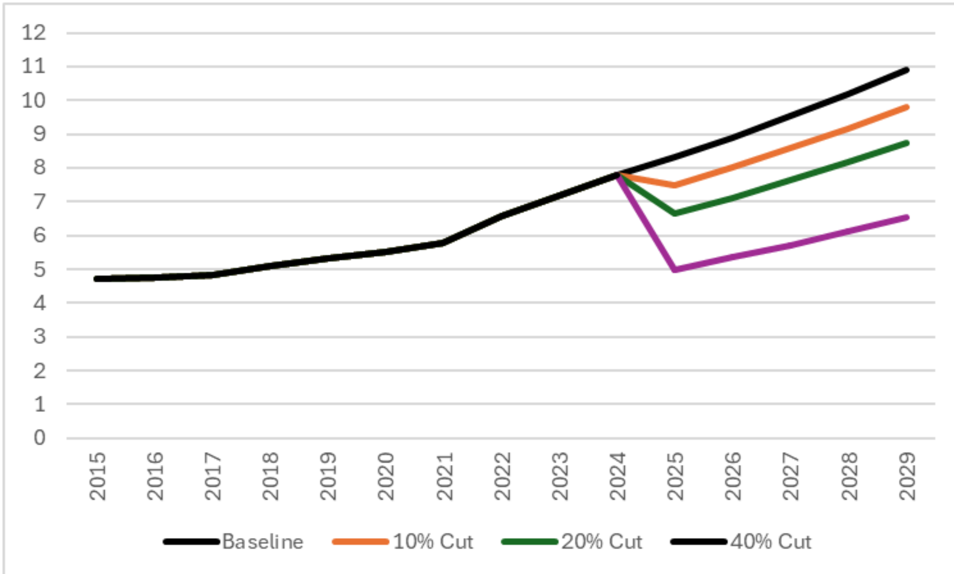
The baseline analysis presented in the preceding section forms the basis for the following alternative scenarios that demonstrate the economic impact of cuts to federal sources of R&D funding. Three scenarios are analyzed, based in part on the President's budget request for R&D funding by agency at the national level that was submitted in early April 2026[27] [28]: (see Figure 10)

- A 10% cut in 2026 followed by a return to trend growth of seven percent annually for the remaining years. This scenario approximates the average percentage cut in funding (10.6% decrease) that was requested by the administration for the 2026-27 federal fiscal year as of April 22, 2026.
- A 20% cut in 2026 followed by a return to trend growth of seven percent annually for the remaining years. This scenario is based on the average percentage cut across agencies for which a cut was requested by the administration for the 2026-27 federal fiscal year, omitting DOD and DOE budgets (18.7% decrease), for each of which the administration requested increases in funding.
- A 40% cut in 2026 followed by a return to trend growth of seven percent annually for the remaining years. This "worst case" scenario may occur if California projects and researchers face steeper cuts than those expected at the national level. For example, as stated elsewhere, NIH funding in California fell by 25% from 2024 to 2026 on a year-to-date basis, while NSF funding was cut by 70% over the same period.

[27] https://www.aaas.org/news/fy-2027-rd-appropriations-dashboard

[28] It is an open question at this time as to whether further cuts will be requested in future federal budget cycles.

Figure 10 Baseline Federal R&D Funding Trajectory and Funding Cut Scenarios in Current Dollars



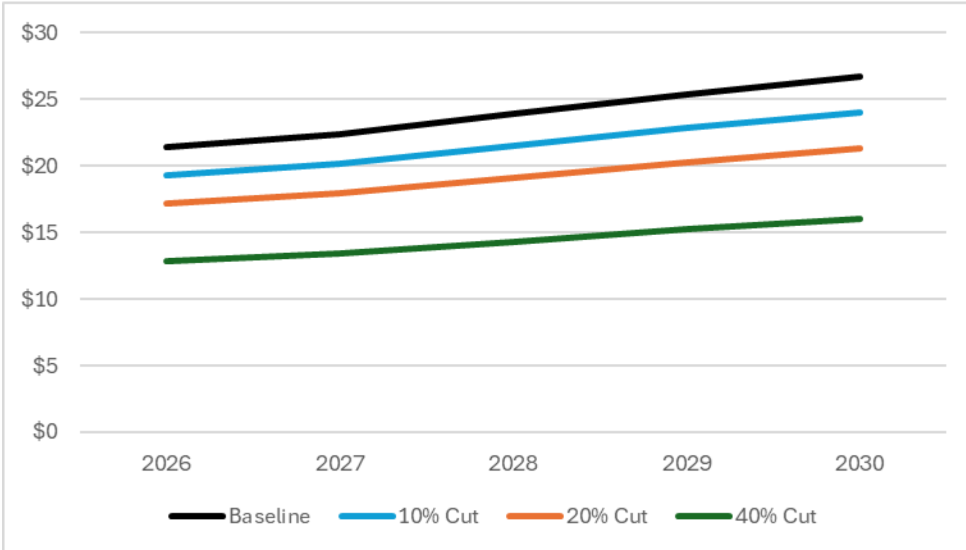
Under the baseline presented above, federal R&D expenditures are estimated to be $8.9 billion in 2026. The corresponding expenditures under each of the above scenarios are as follows:

- 10% Cut: $8.0 billion, a reduction of $900 million in 2026
- 20% Cut: $7.1 billion, a reduction of $1.8 billion in 2026
- 40% Cut: $5.3 billion, a reduction of $3.6 billion in 2026

The trajectory of total output over the five-year time horizon of analysis is shown in Figure 11. Given baseline initial expenditures of $8.9 billion, and adjusting for inflation over the five year period, the total economic impact of federal R&D support is estimated to be $21.4 billion in 2026, rising to $26.7 billion by 2030 for a total of $119.7 billion. The high-level results for each of the alternative scenarios are as follows:

- 10% Cut: $8.0 billion in initial expenditures results in a total impact of $18.9 billion in 2026, rising to $23.6 billion by 2030, for a total of $107.7 billion over the five-year horizon
- 20% Cut: $7.1 billion in initial expenditures results in a total impact of $16.8 billion in 2026, rising to $21.0 billion by 2030, for a total of $95.7 billion over the five-year horizon
- 40% Cut: $5.3 billion in initial expenditures results in a total impact of $12.6 billion in 2026, rising to $15.7 billion by 2030, for a total of $71.8 billion over the five-year horizon

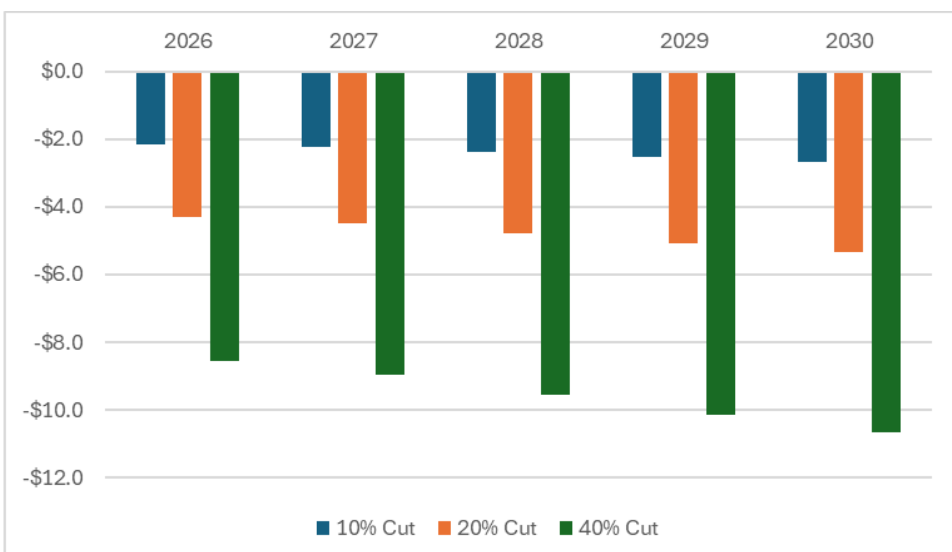
Figure 11 Total Output by Scenario ($ Billions)



Even with a one-time cut in funding, the resulting loss in economic output under each alternative scenario is substantial and increases over time when compared with the baseline scenario (Figure 12):

- 10% Cut: Loss of $2.1 billion in 2026 rises to $2.7 billion in 2030
- 20% Cut: Loss of $4.3 billion in 2026 rises to $5.3 billion in 2030
- 40% Cut: Loss of $8.6 billion in 2026 rises to $10.7 billion in 2030

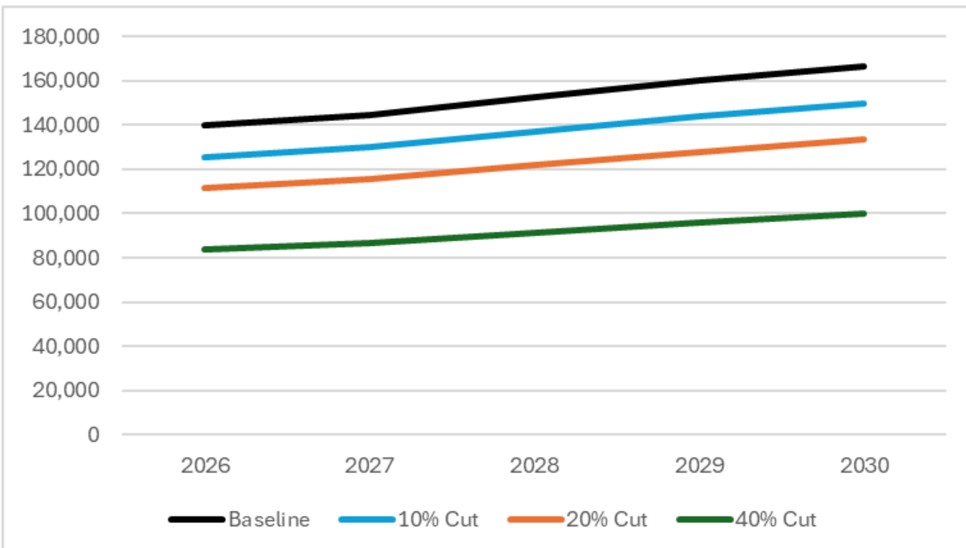
Figure 12 Output Losses by Scenario ($ Billions)



Given the reduction in funding envisioned by each of these scenarios, the level of employment that is associated with R&D in California will also be reduced. As shown in Figure 13, the effect of one-time cuts in R&D funding in 2026 will lead to permanently lower employment levels through 2030. Under the baseline scenario, total employment rises from 139,600 in 2026 to 166,600 by 2030. Employment levels for each of the alternative scenarios are as follows:

- 10% Cut: employment rises from 125,600 in 2026 to 150,000 by 2030
- 20% Cut: employment rises from 111,700 in 2026 to 133,300 by 2030
- 40% Cut: employment rises from 83,800 in 2026 to 100,000 by 2030

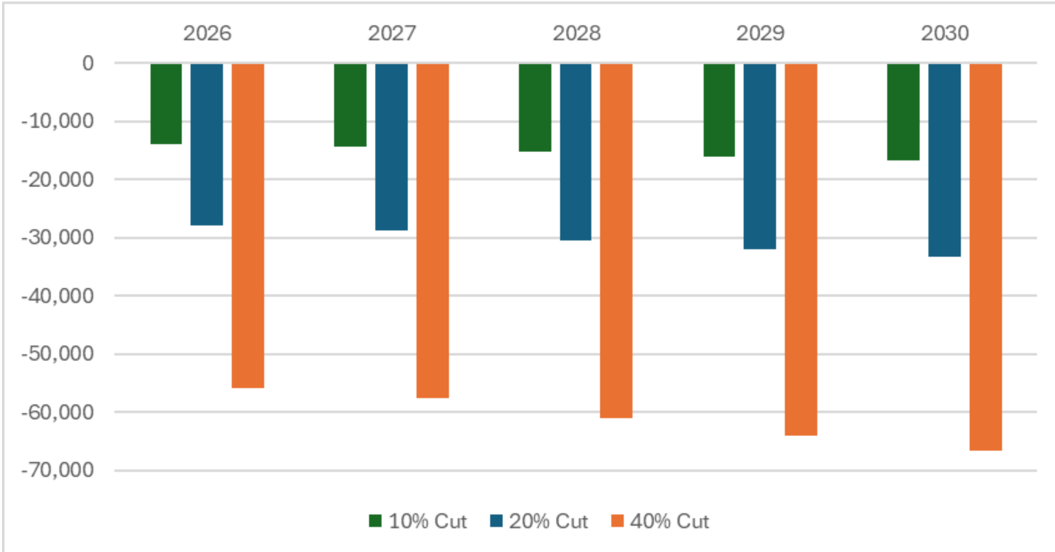
Figure 13 Total Employment by Scenario



Similar to the output trajectory detailed above, a one-time cut in funding will cause employment levels to be permanently lower when compared to the baseline (Figure 14):

- 10% Cut: Loss of 14,000 jobs in 2026 rises to 16,700 in 2030
- 20% Cut: Loss of 27,900 jobs in 2026 rises to 33,300 in 2030
- 40% Cut: Loss of 55,800 jobs in 2026 rises to 66,600 in 2030

Figure 14 Employment Losses by Scenario



Finally, the effect of reduced support for R&D activity will show up in permanently lower tax revenues when compared with the baseline (Figure 15). Under the baseline scenario, total tax revenues rise from $4.4 billion in 2026 to $5.5 billion by 2030. Tax revenues for each of the alternative scenarios are as follows:

- 10% Cut: tax revenue rises from $4.0 billion in 2026 to $5.0 billion by 2030
- 20% Cut: tax revenue rises from $3.5 billion in 2026 to $4.4 billion by 2030
- 40% Cut: tax revenue rises from $2.6 billion in 2026 to $3.3 billion by 2030

Figure 15 Total Tax Revenues by Scenario ($ Millions)

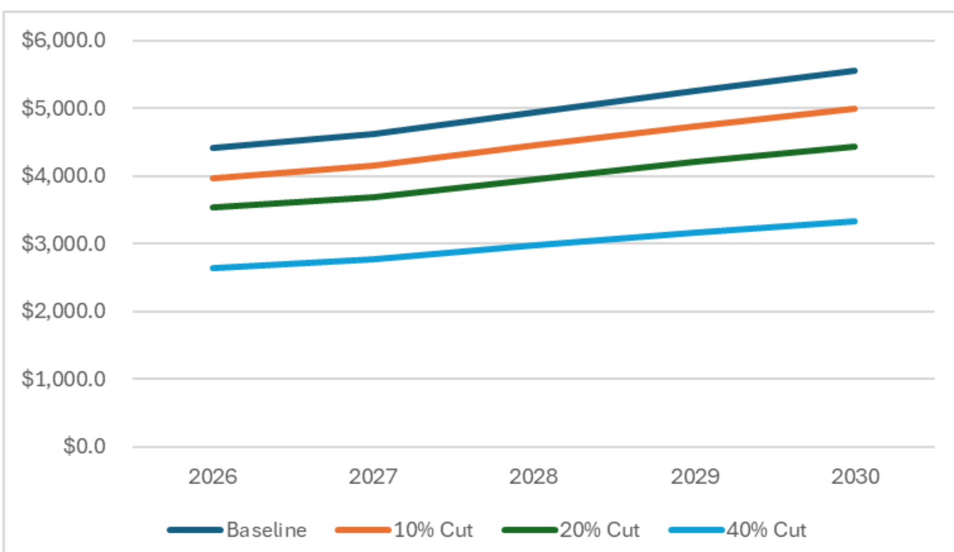
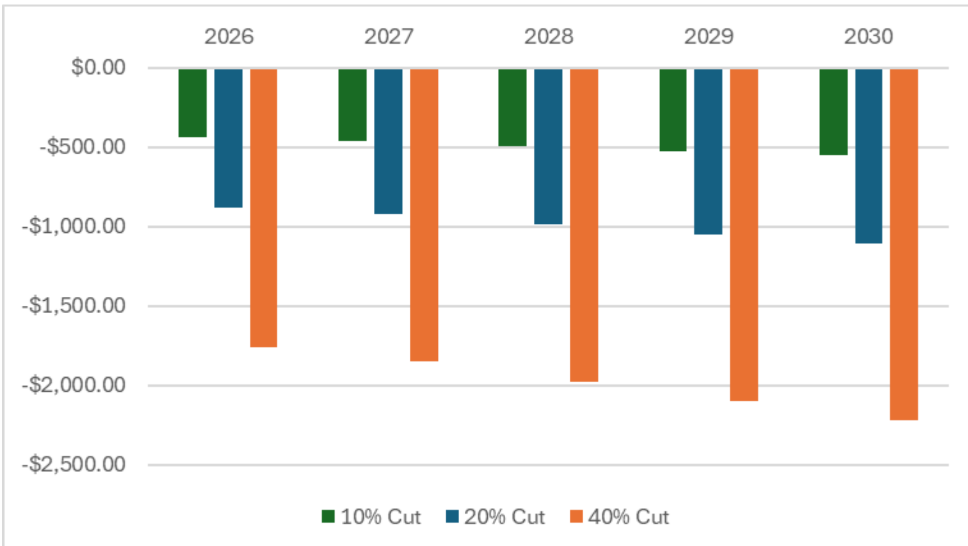


Figure 16 shows the combined losses across all levels of government over the period from 2026 through 2030:

- 10% Cut: Loss of $441 million in 2026 rises to $555 million in 2030
- 20% Cut: Loss of $881 million in 2026 rises to $1.1 billion in 2030
- 40% Cut: Loss of $1.8 billion in 2026 rises to $2.2 billion in 2030

Figure 16 Tax Revenue Losses -Federal, State, and Local ($ Millions)



To summarize, a one-time 10% cut in federal support can give rise to modest loss of economic activity, employment, and tax revenues over the five-year time horizon analyzed here, when compared with the baseline scenario, which represents the recent trend trajectory of federal support for R&D activity at California's universities. Larger cuts of 20% or 40% will have much more substantial negative impacts when compared with the baseline.

The potential for a 40% cut in funding should not be discounted. NIH funding fell by 25% or $490 million from $1.96 billion in 2024 to $1.47 billion in 2026, second only to North Carolina which lost $505 million. NSF funding fell by 70% or $175 million from $250 million in 2024 to $75 million in 2026, the largest loss among the states. These changes increase uncertainty in the basic research arena, which can jeopardize an important source of growth to the California economy.

R&D PROJECTS THAT HAVE LOST FEDERAL FUNDING SUPPORT

Seventy percent of research dollars from federal agencies flow to universities, labs, training Ph.D. candidates, and attracting top talent. Absent these dollars which comprise 54 percent of all university, college, and scientific institute R&D funding, there would be substantial program reductions and shutdowns. Already during 2025, NSF has awarded hundreds of fewer graduate researcher fellowships than in 2024. Doctoral student admissions are being materially reduced due to federal cuts.[29]

Actual Cancellations of Specific Research

Nature reported that in 2025 there were about 5,844 NIH grants and 1,996 NSF grants cancelled or suspended, with especially heavy cuts to projects on misinformation, vaccine hesitancy, and infectious diseases.[30] According to Scientific American, 383 NIH-funded clinical trials lost funding between late February and mid-August 2025, affecting more than 74,000 participants.[31]

The states facing the biggest losses from the administration's research grant cuts are California, New York, Maryland, Massachusetts (Boston/Cambridge), North Carolina and Pennsylvania, all where major research universities cluster. Here are examples of California-based researchers and projects that lost funding since early 2025.

Dr. David Eisenman of Center for Public Health and Disasters at the University of California, Los Angeles. UCLA[32]

Dr. Eisenman studies public health and the health impacts of disasters, including mass violence. One study that was funded by the Department of Homeland Security looked at potential ways to intervene and prevent a targeted mass violent attack such as a school shooting or terrorist attack. Project funding was terminated in March 2025, at which time all work on the project ceased, all staff were laid off, and research as well as writing stopped.

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[29] "Federal Research Cuts Threaten U.S. Innovation and Leadership, Association of American Universities, July 23, 2025, https://www.aau.edu/key-issues/federal-research-cuts-threaten-us-innovation-and-leadership

[30] Kozlov, Max and Jeff Tollefson, "US science after a year of Trump," Nature, January 20, 2026, https://www.nature.com/immersive/d41586-026-00088-9/index.html

[31] Bergeson, Laine, "NIH grant terminations disrupt hundreds of clinical trials, affecting more than 74,000 participants, University of Minnesota, CIDRAP, November 21, 2025, https://www.cidrap.umn.edu/public-health/nih-grant-terminations-disrupt-hundreds-clinical-trials-affecting-more-74000

[32] https://www.nytimes.com/2026/04/17/science/lost-science-eisenman-violence.html

Erin McGuire, Former Director of the Horticulture Innovation Lab at the University of California, Davis.[33]

Dr. Erin McGuire oversaw the Horticulture Innovation Lab, which conducted focused research on fruits and vegetables under funding from the U.S. Agency for International Development. The lab's mission involved work with farmers in Africa and Central America to develop ways to increase production, but also to develop low cost sustainable storage solutions. The lab was shut down as a result of funding cuts, resulting in layoffs of the entire staff of 10 at UC Davis. In addition, 200 scientists in the U.S. and elsewhere who worked in conjunction with the lab lost funding as well.

Dr. Brenna Hen, a Geneticist at UC Davis.[34]

Dr. Brenna Hen was engaged in research to expand the potential personalized genetic medicine to extend beyond more commonly targeted populations such as U.S residents of European descent to descendants from Africa. NIH grant in 2019 enabled the researchers to assemble a database of genomes from populations of African Descent for use by biomedical researchers. The project was suspended due to non-renewal of the federal grant.

These cuts have impacts that reach beyond the lab or research facilities across the state, often causing hardships among the state's residents who rely on these facilities, their treatments, clinical trials, and the care offered by their staff. A recent report released by the U.S. Senate analyzes data from the NIH and interviews researchers and workers.[35] The study reports that NIH terminated or froze over $500 million in research on four of the leading causes of death in the U.S.:

- $273 million for cancer research (116 grants)
- $111 million for heart disease research (71 grants)
- $94 million for Alzheimer's research (65 grants)
- $83 million for diabetes research (68 grants)

This study did not focus specifically on California or California researchers, but it illustrates that cuts in funding have impacts that go beyond the lab, and go beyond the economic impact as measured in terms of jobs, economic output, and tax revenues.

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[33] https://www.nytimes.com/2026/03/12/science/her-lab-worked-to-future-proof-fruits-and-vegetables.html

[34] https://www.nytimes.com/2026/01/02/science/trump-lostscience-genetics-henn.html

[35] https://www.help.senate.gov/dem/newsroom/press/news-sanders-report-details-how-trump-broke-promises-to-patients-cut-561-million-from-lifesaving-research-while-failing-to-lower-prescription-drug-prices

Summary

This section of the study quantifies the short-term consequences of federal funding cuts to the California economy. As the results of the baseline economic impact analysis show, the federally funded R&D research at California's academic institutions supports significant numbers of jobs and economic activity. Moreover, because of the large, induced multiplier effect, significant income is generated among workers that, in turn, creates significant tax revenues for state and local governments in the form of property taxes, sales taxes, and other taxes.

However, these potential gains to the California economy are cut short under each of the spending cuts scenarios analyzed here. The negative consequences of spending cuts extend beyond the campus to workers, suppliers, and tax revenues. Moreover, loss of funding jeopardizes scientific research endeavors that may have taken many years to build up and whose potential benefits may never be realized.

In early 2026, Congress passed legislation covering budgets for the NIH, the NSF, and several other agencies discussed here. Agency budgets were frozen or subject to smaller cuts than called for by the administration. The website, grant-witness.us, reports the number of grants "disrupted" by federal agency cuts, the number that had their funding reinstated, and the net loss by agency. In California, 762 NIH grants were disrupted, 690 were reinstated, and the net loss as of early May 2026 was estimated at $20 million.

There were also several court challenges to R&D funding, which turned on three recurring issues: whether the agencies followed proper procedures, whether the cuts were actually authorized by law, and whether the plaintiffs were asking for money damages or injunctive relief. The Supreme Court's intervention did not end the litigation, but it did make it harder to get some grants restored quickly in district court.

Ultimately, the court challenges have produced a split outcome: **some** early wins for universities and researchers, some later losses or limitations after the Supreme Court ruling, and ongoing litigation over whether NSF and NIH can impose these cuts and where plaintiffs must sue to recover the money. These actions add to the uncertainty of the situation and may make it more difficult to receive funding going forward.

Of the NSF grants awarded in California, 467 grants were disrupted, 386 were reinstated, and the net loss as of early May 2026 was estimated at $45 million. Although the numbers apparently show that a significant amount of research funding was restored, the Administration continued to suspend grants as of late April.[36] The NIH and NSF, the two largest sources of research funding in 2024, have both cut their funding to California researchers dramatically over the last two years.[37] NIH funding fell by 25% or $490 million from $1.96 billion in 2024 to $1.47 billion in 2026, second only to North Carolina which lost $505 million. NSF funding fell by 70% or $175 million from $250 million in 2024 to $75 million in 2026, the largest loss among the states.

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[36] https://www.latimes.com/world-nation/story/2026-05-10/trump-administration-again-suspends-uc-berkeley-research-grants

[37] Based on data gathered from individual agencies and compiled by UAW researchers.

Even if cuts are ultimately restored, both the cuts and the uncertainty created by the on-off nature of the cuts can have a lasting adverse impact on R&D in California, not just on the academic institutions and their researchers, but on the California economy as a whole.

Administration again suspends research grants at UC Berkeley

National Science Foundation's action comes despite a court injunction.

A UC BERKELEY spokesman declined to discuss the types of grants affected or the amounts at stake. (Christina House Los Angeles Times)

BY FELICIA MELLO

The National Science Foundation suspended at least 18 research grants to UC Berkeley last month despite a court injunction restricting such suspensions, according to an attorney representing university scientists in a class-action lawsuit.

Los Angeles Times, May 11, 2026

LONG-TERM CONSEQUENCES OF CUTS TO RESEARCH GRANTS IN CALIFORNIA

University Technology Transfer and the Innovation Ecosystem

Universities are currently allowed to patent the discoveries that their researchers make with the help of federal grants. Those patents can then be licensed to private companies in exchange for royalties that promote further discoveries.

This "technology transfer" system — created by the landmark 1980 Bayh-Dole Act — was designed to encourage this licensing. Prior to that law, universities had little incentive to patent or license the discoveries made by their researchers with federal funding, since the government controlled the intellectual property rights on those discoveries. In other words, taxpayers were pouring money into scientific research. University labs were making impressive discoveries, but those discoveries were not transformed into useful products for taxpayers.

Technology transfer supports entire innovation ecosystems — startups, incubators, venture funds, and research parks — that grow up around major research university parks. They also attract private capital at scale. In 2025, university-driven research produced approximately $33 billion in federal tax revenue. This is an order of magnitude more than universities earn from licensing patents ($4 billion).[38]

Royalty income is a high profile component of technology transfer emanating from Research Grants, but it is a secondary revenue stream that is dwarfed by federal research funding, state funding or even tuition.

University Research Funding

Total university research funding from all sources that has contributed to inventions, innovations, patents, start-up companies, and patent licensing revenues has grown steadily over the years, reaching $117.7 billion in 2024. Growth of funding has been especially rapid since 2016, averaging 8 percent per year (Figure 17).

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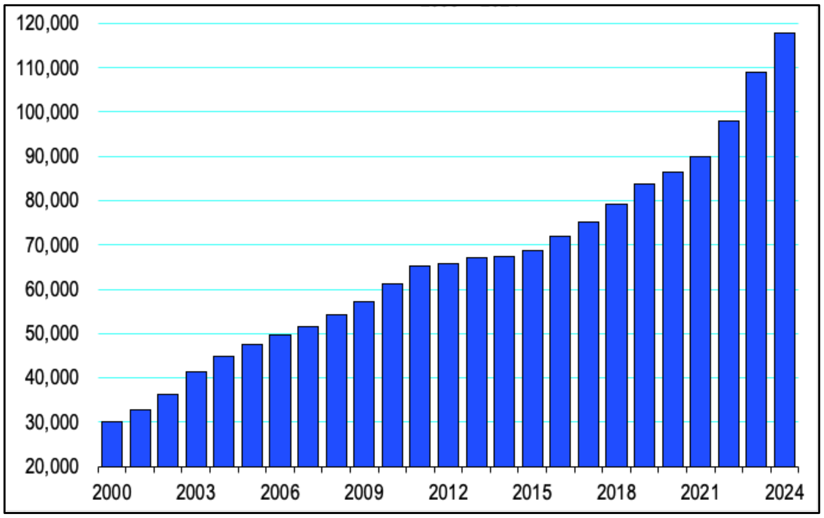
[38] Association of University Research Parks, "The Power of North American Research Parks," Economic Impact Report 2025, https://aurp.org/wp-content/uploads/2025/09/AURP2025_Stiletto_Econ_Impact_RE_FINAL.pdf#page=7

Figure 17 Total Higher Education Research Funding from all Sources, US ($ Millions)



California Institutions

California institutions dominate U.S. higher education R&D funding, capturing 12 percent ($14.4 billion of $117.7 billion total) in FY 2024 (Figure 18). Of that total $7.8 billion was in the form of federal funding, and $6.6 billion came from other sources. Growth in recent years has been driven by elite research powerhouses. Within the University of California (UC) system, research funding is nearly $10 billion, led by UCLA, UCSD, UCSF, UC Berkeley, and UC Davis. Stanford University and the University of Southern California each receive in excess of $1 billion as well. Together, these institutions receive more than $12.5 billion of the $14.4 billion in awards to California institutions (Figure 19).

Figure 18 Federal, Non-Federal and Total Research Funding to Universities in California

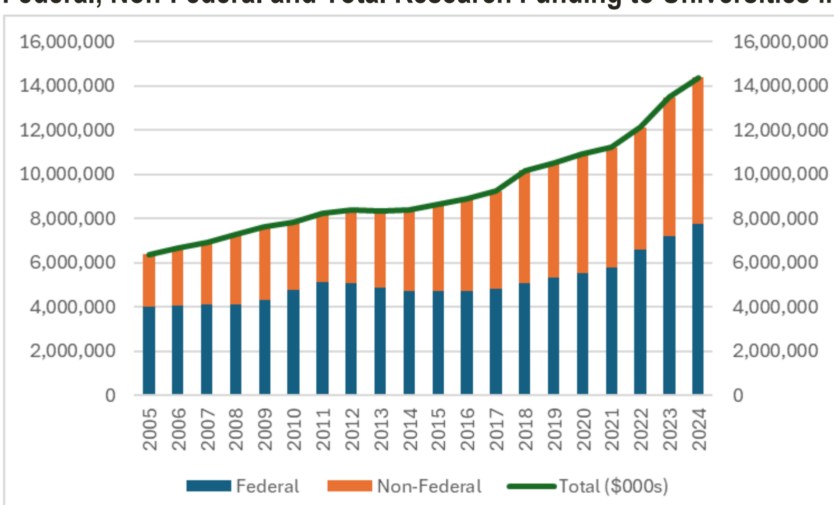


Figure 19 Principal Institutions in California Receiving Research Funding ($000s) FY2024

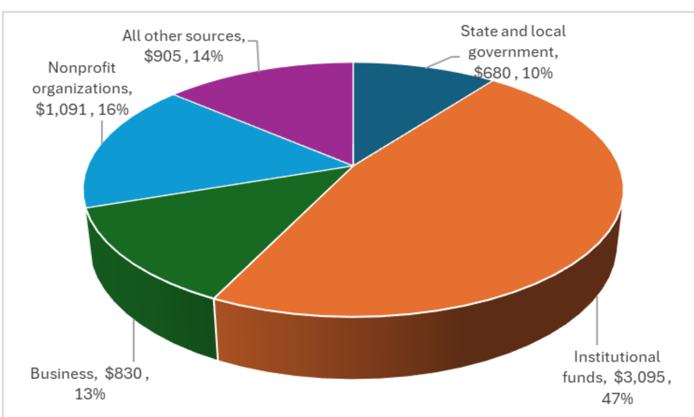
Institution	Funded R&D Expenditures
UC System	$9,592,634
Stanford University	$1,641,961
U. Southern California	$1,264,197
California State University System	$628,881
Scripps Research Institute	$501,468
California Institute of Technology	$445,173
Total	$14,074,314
Total All Institutions in California	**$14,378,752**
Percent of total received by these top 6 institutions	97.9

A significant amount of funding is driven by the medical schools, the tech hubs, and industry cluster ecosystems in the Bay Area. UCSF received the most R&D funding among California's universities, and third highest amount nationally with $3.3 billion.

California institutions rely heavily on R&D funding sources outside of the federal government. At $6.6 billion in 2024, nonfederal source of funding account for 48% of all research support. This source of funding has grown over time.

Figure 20 shows the non-federal sources of R&D support as of 2024. The largest contribution comes from the institutions themselves at $3.1 billion, followed by nonprofit organizations at $1.1 billion, state and local government, businesses, and other sources. These funding sources often rely on federal funding to signal that is sufficiently viable ("proof of concept") to justify support. They also seek to leverage their own limited funds with federal dollars for the research projects they support.

Figure 20 Non-Federal Sources of R&D Support 2024 ($6.6 Billion)



The university ecosystems have evolved over time, and now California is home to some of the world's most successful "innovation clusters," where the proximity of research universities creates a specialized labor pool and knowledge spillovers.

- Silicon Valley (Stanford/UC Berkeley/UC San Francisco): Centered on semiconductors, software, and now AI. This cluster has created a density of venture capital where California captures nearly two-thirds of all U.S. VC funding.

- San Diego Biotech Cluster (UC San Diego/Scripps/Salk): A world-leading life sciences hub. The UCSD-anchored ecosystem contributes over $16.5 billion in annual economic impact to the region alone, supporting hundreds of thousands of high-wage jobs.

- Southern California Aerospace Cluster (Cal Tech/JPL, UCLA, USC, CSU Long Beach): The Southern California aerospace ecosystem is a rich industry cluster that includes Los Angeles and Orange counties. It extends beyond one school to a whole Southern California network: Caltech/JPL in Pasadena, UCLA and USC on the west side, CSULB in the South Bay, and local technical programs. These institutions feed employers such as SpaceX, Northrup Grumman, Raytheon, Lockheed-Martin, and Boeing, along with numerous smaller startups and established companies.

The sheer scale of these ecosystems allows California to outpace the growth of major global economies like Germany. The "innovation density" makes it difficult for firms to leave, despite high costs, because the talent they need is anchored to the local university research labs.[39]

Several seminal studies demonstrate that public investment in university labs directly stimulates private-sector innovation:

- Study found that a 10 percent increase in federal university research funding leads to a 2.3 percent increase in local corporate patenting within the same industry[40]

- Study analyzed over 100,000 NIH grants and found that 31 percent of NIH-funded grants directly contribute to a private-sector patent.[41]

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[39] Ozkan, Mihrimah, and Paul R. Sanberg, "Bridging innovation: Mapping the impact of California universities in translational research and technology", Technology and Innovation, March 30 2026, https://www.tandfonline.com/doi/full/10.1080/19498241.2026.2634609

[40] Azoulay, Pierre et al. "Public R&D Investments and Private-sector Patenting: Evidence from NIH Funding Rules", *National Library of Medicine,* October 29, 2019, https://pmc.ncbi.nlm.nih.gov/articles/PMC6818650/

[41] Dizikes, Peter, "Study: NIH funding generates large numbers of private-sector patents", *MIT News*, March 30, 2017, https://news.mit.edu/2017/study-nih-funding-generates-large-numbers-private-sector-patents-0330

Patents and royalties from California universities, particularly the UC system, have driven massive economic impact, yielding over $1.9 trillion in economic output and supporting 6.5 million jobs. UC, the top U.S. university patent holder, uses these revenues to fund research, support technology transfer offices (TTOs), and launch over 19,000 startups, notably in biomedicine, agriculture, and clean energy.[42]

University Technology Transfer / Commercial Spin-off activity

Key to technology transfer and generating revenue through deals with private companies is intellectual property (IP) created at universities. IP includes inventions, patents, copyrights, and trade secrets developed by faculty, staff and students from funded research grants.

Commercial spin-off activity from university R&D is not a significant immediate revenue source for institutional funding, as it generates modest overall income compared to total R&D budgets. Universities in the United States earned $3.2 billion in total licensing revenue (including spin-offs) in 2022, versus $108.8 billion in total R&D expenditures in FY 2023.

Spin-offs (or startups commercializing university intellectual property) number around 900 new firms annually, with 4,688 active (as of 2024).However, only about 20 percent of inventions lead to patents or companies, and revenue is concentrated at top institutions like Stanford, MIT or the UC System.

The full commercialization timeline typically takes 5 to 10 years from initial research funding to meaningful revenue or market impact. Total revenue generated from tech transfer is a small fraction of total university research funding but the longer run effects can be much greater.

Spin-offs occasionally result in mega-sized wins (such as Google, Genetech, and Boston Dynamics). They do not represent a quick infill for federal research funding cuts. They do, however, drive economic growth and we have witnessed this close-up from firms like Google, Facebook, Genentech, Cisco, Yahoo, Sun Microsystems and LinkedIn in California. Figure 21 shows the top 15 companies with billion dollar market capitalizations that are spin-offs from universities in the United States. California institutions are well-represented on the list and have contributed significantly to employment activity in the state.

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[42] Schelenz, Robyn, "UC is No. 1 in patents in new U.S. ranking", *University of California*, March 19, 2026, https://www.universityofcalifornia.edu/news/uc-no-1-patents-new-us-ranking

Figure 21 Honor Roll of Spin-Offs[43]

Company	Institution	Year	California workforce estimate	Share of total workforce	Principal California city
Google	Stanford	1998	35,000–45,000	45%–55%	Mountain View / San Francisco
Meta / Facebook	Harvard	2004	20,000–30,000	25%–35%	Menlo Park
Genentech	UCSF	1976	9,000–12,000	65%–80%	South San Francisco
Netflix	Stanford	1997	8,000–12,000	70%–90%	Los Gatos
Cisco	Stanford	1984	5,000–10,000	15%–25%	San Jose
LinkedIn	Stanford	2003	5,000–10,000	50%–70%	Sunnyvale
Hewlett-Packard / HP	Stanford	1939	1,000–5,000	15%–35%	Palo Alto / San Jose area
Yahoo	Stanford	1994	1,000–4,000	20%–40%	Sunnyvale
Symantec	Stanford	1982	500–2,000	10%–30%	Mountain View / Santa Clara area
Moderna	Harvard	2010	500–2,000	5%–15%	South San Francisco
Akamai Technologies	MIT	1998	200–1,000	2%–8%	San Francisco / Santa Clara
Boston Dynamics	MIT	1992	0–200	0%–2%	Los Angeles area, if any
Biogen	Harvard	1978	0–500	0%–5%	San Diego / Bay Area, limited
Lycos	Carnegie Mellon	1994	0–100	0%–2%	None meaningful today
Sun Microsystems	Stanford	1982	0	0%	Acquired, no longer independent or local

43 Source: "30 years of Game-Changing University Spinoffs, Vik Chadha, July 20, 2024, https://commercify.com/blog/university-tech-commercialization-30-years

Case Studies of Successful Start-Ups that Contribute Substantial Tax Revenue Today

Genentech

The classic example of university research spinning off a major company is Genentech. Its commercialization of early biotechnology discoveries created a major California company, returned substantial licensing and settlement income to the University of California, and generated ongoing state and federal tax revenues through jobs, profits, and operations.

Genentech became a major biotechnology firm, and the UC system's settlement with the company totaled **$200 million**, with money going to the university system, UCSF, and the inventing scientists. This is one of the best illustrations of the two-way value chain: university research created commercially valuable intellectual property, the startup scaled that science into a product business, and the resulting company activity generated taxable income and settlement/licensing revenue.

During the company's lifecycle: payroll taxes, corporate income taxes, sales taxes, local property taxes on facilities, and taxes paid by employees and suppliers has been prolific. In the broad university-spinout ecosystem, University of California-related spinouts have been credited with generating jobs, GDP, and tax revenue at the state and federal levels.

As of March 2009, Genentech is a wholly owned subsidiary of Roche Holding AG, the Swiss healthcare company. The market capitalization of Roche is $225 billion. The stock price last reached an all-time high in February 2026.

Google

Google is a landmark university spin-off rooted in Stanford research. Stanford licensed the core search technology and received equity in the company, turning academic research into a major commercialization success that produced large university returns and substantial tax revenue through the company's growth, payroll, and operations.

Google emerged from Stanford University research and became one of the most consequential university-linked startups in U.S. history. Stanford licensed the search technology and initially received about 1.8 million shares in Google in exchange for the patent rights, creating a major university windfall once the company grew.

Stanford's licensing deal became unusually valuable because the company scaled so dramatically, showing how a single spin-off can generate far more economic value than the original research budget that helped create it. The 1.8 million shares are worth $738 million today.

Since 2020, the stock value of Alphabet (Google) has increased by a factor of 6. As of May 8, 2026, total shares outstanding number 12.2 billion with the market capitalization at $4.8 trillion.

A company like Google generates payroll taxes, corporate taxes, employee income taxes, and downstream local and state tax revenue through its workforce, vendors, and facilities. The broader literature on university spin-offs also notes that such firms create jobs and local tax bases, and Stanford is often used as the canonical example of that effect.

Sun Microsystems

The story of Sun Microsystems shows how a university research environment can seed a major commercial company. Sun's early products were aimed at universities and technical users. The company was founded in 1982 by Stanford graduates **Andy Bechtolsheim, Vinod Khosla, and Scott**

McNealy. Stanford was central in three ways: the technology originated there, the founders came from there, and the early workstation concept was built around the Stanford network environment.The name itself is a reminder of the Stanford connection: Stanford University Network**.**

Sun Microsystems was essentially a Stanford-born startup. The core idea came from Andy Bechtolsheim's Stanford graduate work, where he built the SUN workstation for the Stanford University Network project; the "Sun" name itself came from that acronym.

Stanford benefited from technology transfer and licensing potential, for stronger industry ties and visibility in Silicon Valley, attracting partners, students and research support. Sun was acquired by Oracle Corporation in 2010 for $7.4 billion.

Kite Pharma

Kite Pharma is a UCLA-origin biotechnology company that emerged from campus discoveries and later became a multibillion-dollar firm. Its growth illustrates how university research can generate startup formation, university commercialization value, and downstream tax revenue through employment and business activity.

UCLA said Kite was one of three biopharmaceutical companies rooted in campus discoveries that were each valued at more than $1 billion, showing how university research can turn into a major commercial company.

It became a high-value biopharma company within the UCLA research ecosystem which includes more than 100 active startup companies based on student and faculty-led discoveries, plus nearly 700 active patents.[1]

A company like Kite does not just generate returns for the university; it also creates jobs, payroll, supplier spending, and taxable corporate activity as it scales. That is the main way a university-origin company contributes to state and federal tax revenue over time. In Ocober 2017, it was acquired by Gilead Sciences for $11.9 billion and now operates as a wholly owned subsidiary. Since 2017, the stock price of Gilead Sciences has doubled.

Implications

Reductions in research funding may very much hide a larger long-run cost than we can currently measure. We don't know how many future Genentechs, Googles, Kites, or Sun Microsystems will never be born because the underlying discoveries, labs, trainees, and university-industry linkages are not funded today.

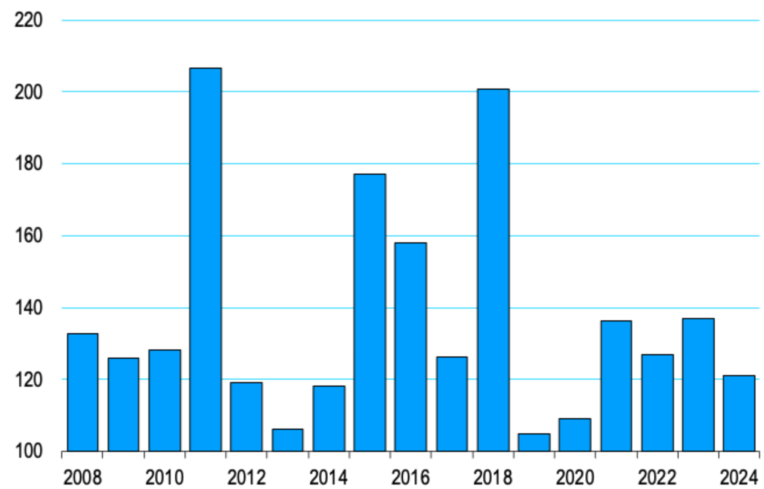
The point is not just that fewer grants mean less published research. It is that early-stage university research creates a pipeline of optionality—ideas, patents, methods, prototypes, and people—that later becomes startup formation, licensing, venture-backed scaling, and ultimately tax revenue. If the upstream pipeline shrinks, the downstream count of major startups could fall in ways that are impossible to observe immediately.

That is why the economic harm of research cuts is partly invisible ex ante. We can measure today's budget reduction, but we cannot directly measure the set of future firms, jobs, patents, and public revenues that never materialize because the seed-stage research was never done.

Maximizing Revenues from University Research: A Case Study of the UC System

UC System-wide technology-commercialization reports that are prepared annually, aggregating examples from across campuses in medical devices, therapeutic platforms, ag-tech, energy, and software. Commercialization of these inventions and innovations demonstrate a consistent pattern in which federally and state-funded UC research yields patented inventions, which in turn are licensed into California-based startups that raise external capital and contribute to the state's life-science and deep-tech clusters (Figure 22).[44]

Figure 22 Royalties, Fees, and Other Income, UC System 2008-2024 ($ Millions)

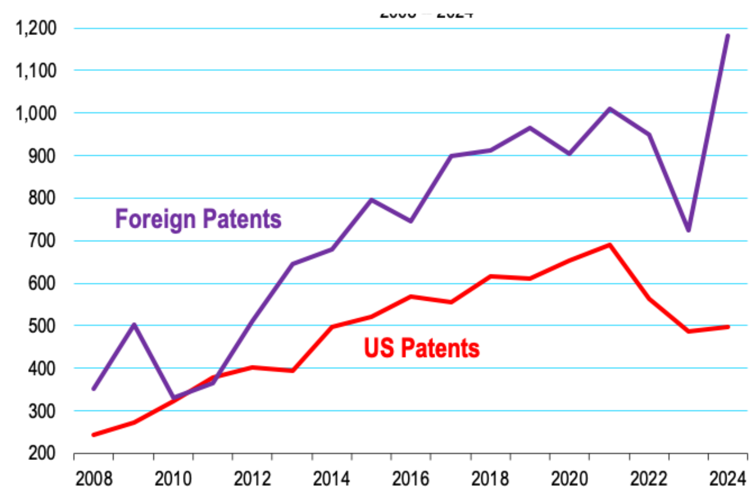


In the Rand Journal of Economics, Lach and Schankerman presented statistical evidence that "high-powered, pecuniary (income) incentives strongly affect university research and licensing outcomes."[45]U.S. universities that give higher royalty shares to faculty scientists appear to generate greater license income. Scientists respond both to royalties (cash) and research lab support. Therefore, royalty sharing arrangements and incentives within universities significantly influence commercialization performance. Within the UC system, the number of patents has increased substantially since 2008 (Figure 23).

[44] World-changing UC innovations that emerged from federal research funding, https://www.universityofcalifornia.edu/news/7-world-changing-uc-innovations-emerged-federal-research-funding

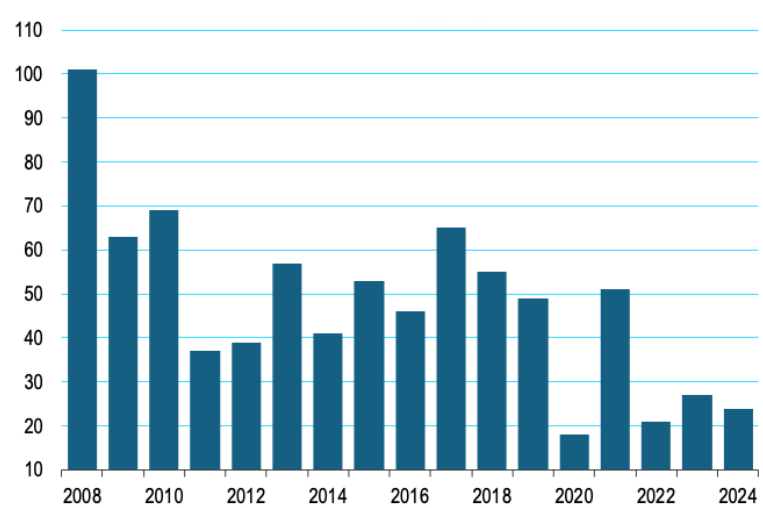
[45] Lach, S, and Schankerman, M., "Incentives and invention in universities," RAND Journal of Economics, v 39, no 2, Summer 2008, pps 403-433.

Figure 23 Patents Issued UC System 2008-2024 (Number of Patents/Year)



There have been 2,065 UC-affiliated startup businesses generated between 1968 and 2024 with 98 percent of them formed after 1980, the year that Bayh-Dole was enacted by Congress (Figure 24). See Implications section below for discussion regarding Bayh-Dole. The data for 2022 to 2024 are incomplete because patents and start-up designation is a lagged process and is still being applied for or counted.

Figure 24 New Business Startups, UC System, 2008-2024



The Empirical Extent of Royalty Income

A long-run look at “20 years of academic licensing” finds that royalty income for U.S. academic institutions rose from about **$7 million to over $1 billion** over that period, but averaging **only approximately 3 percent of total sponsored research funding** at the 171 reporting institutions.[46] The authors conclude:

> “ . . . the impact on the overall economy is much more important. Academic royalty rates are typically in a range of from 2% to 5%, which means that 95 to 98 percent of the economic impact remains in the economy external to the university.”[47]

Because a single patent or license often builds on **mixed funding sources** (federal, industry, state, institutional), and over time, there is not a clean, official correlation like “federal research generates exactly $X billion per year in licensing revenues.” What is known from the myriad of studies in the literature is that royalty income, license fees, and other related income has increased over time and is currently estimated at up to $4 billion annually.[48] Furthermore, Chiang (2013) found that a 2 to 3 year temporal lag was present between research expenditures and executed licenses that generated revenues.[49]

Implications

From a policy point-of-view, research funding to UC campuses in the areas of medicine, biotechnology, aerospace, and other life-sciences financed by State of California bond indebtedness could be offset with revenue distributions forthcoming from commercialization activities, principally royalty income.

Royalty income is the amount received through a licensing or rights agreement for the use of copyrighted works, or intellectual property like patents, Clearly, revenue generation has become a large part of UC innovations and inventions from research financed previously by federal grants and private foundations.

The Bayh-Dole Act of 1980 enables universities to retain title or ownership, patent, and commercialize inventions developed under federally funded research programs. Previously, inventions from federal research were owned by the government, and this hindered their development, along with the realization of commercialized revenue.[50]

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[46] Stevens, A, and D. Phil, “20 Years of Academic Licensing—Royalty Income and Economic Impact, Les Nouvelles, September 2003. https://lesi.org/wp-content/uploads/2024/04/20-years-of-academic-licensing-royalty-income-and-economic-impact.pdf

[47] *Ibid*., page 140

[48] AUTM’s most recent U.S. licensing survey (covering universities, hospitals, and research institutes) reports about $3.6–3.8 billion per year in gross license income (royalties, milestone payments, equity cash-outs, etc.). University of Pennsylvania is ranked first, followed by the UC System.

[49] Chiang Trent, “Research Expenditures in Higher Education Institutions and University Technology Transfer Licensing,” Duke University working paper, 2013, https://sites.duke.edu/djepapers/files/2016/10/chiang-dje.pdf

[50] Chiang (2013), *op. cit*., reported that prior to the passage of Bayh-Dole, studies found that federal-funded research was not fully commercialized and thus implementation required incentives for academic inventors to commercialize the research. Bayh-Dole requires that royalties retained by universities be reinvested in science research and education.

Hausman (2022) further found statistically strong correlations between companies connected to universities after Bayh-Dole went into effect, and more intellectual property (IP) production and technology transfer in industries, presumably as a result of Bayh-Dole encouraging this technological connection. These firms "produced more patent applications, granted patents, new goods, new services, and new manufacturing methods, and they are more likely to either transfer IP to a spin-out or receive IP as a spin-out."[51]

COGR found that university received royalty income is principally reinvested to foster research and innovation, funding graduate students, supporting new faculty, and providing seed monies for research projects, not to mention significant income to inventors.[52]

Add to this the conclusion by Hausman (2022) that since Bayh-Doyle went into effect, there is a strong correlation between firms connected to universities and "more IP production, transfer and innovation in industries connected to the local university.

> "While governments are often tempted to maintain rights and return finances to government coffers, these results suggest substantial economic benefits to granting property rights to inventors to encourage commercialization. Because these incentives may also spur additional innovation and because knowledge builds on itself, the local economic benefits measured in this paper are clearly a lower bound on the national benefits. . . . "[53]

Consequently, it is imperative that a distribution mechanism be devised to (1) adequately reimburse the state for bond indebtedness, while (2) maintaining rights of inventions to inventors along with incentive funding to inventers and for subsequent university research.

University of California technology transfer offices (TTOs) can also be more effective in generating revenue by more aggressively moving university research from lab to marketplace. Programs to provide early-stage funding and foster partnerships between academic institutions and small businesses could jump start revenue generation sooner.

Rutgers University developed a patent policy where five percent is earmarked for internal commercialization programs. Because the allocation is drawn from overall technology transfer revenue from all research projects, a predictable steady stream of funding is enabled.

This revenue is reinvested into early-stage research, effectively creating a self-funding loop between research funding and subsequent royalty income.[54] Similar programs adopted by TTOs at each of the UC

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[51] Hausman, Naomi, "University Innovation and Local Economic Growth," The Review of Economics and Statistics, July 2022, 104(4): 718–735
[52] Council on Governmental Relations, Summary Points on University Use of Royalty Income, July 2001. https://www.cogr.edu/sites/default/files/SUMMARY_POINTS_ON_UNIVERSITY_USE_OF_ROYALTY_INCOME.pdf
[53] *op cit*., Hausman (2022), page 734
[54] "Sustainability of gap funding programs aimed at commercializing academic innovation," Nature Biotechnology, Careers & Recruitment, vol 44, January 2026, pp 155-159.

campuses would duplicate sustainability of commercialization and revenue generation from research funding.

Undervalued Commercialization

There is evidence in a study by Hsu, Hsu and Ziedonis (2021) that **university patents appear at least as valuable on patent-quality metrics as private company patents, but universities capture only a small share of that value in licensing income.**[55]

Methodologically, the authors match each university patent to “similar” patents held by U.S. public firms (same tech class, filing year, etc.) and infer a “potential value**”** for the university patent from stock-market reactions to those corporate patents.

Their methodology demonstrates that university patents actually score higher on several standard “quality” indicators: more forward citations, more general and original, more basic science, and more claims than the matched public-firm patents.

Their main quantitative result is that, when they compare this estimated potential economic value of a university’s patent portfolio to its actual licensing income, universities on average only realize about 5 to 9 percent of that potential value through licensing.

The authors conclude that university patents appear to embody high potential value comparable to or greater than similar corporate patents, yet universities capture only a small fraction of that value in the form of license revenue. The key finding is that, across the Association of University Technology Managers (AUTM) universities, institutions realize only about 7–16 percent of the estimated market value of their patents through licensing income

The strongest quantitative evidence supports the proposition that university patent portfolios, on average, generate licensing income that is substantially below the estimated economic value those same inventions would command in the hands of public companies.

The policy implications of this research are significant. Knowing this, TTOs should work to more accurately “price” patent value, thereby meaningfully increasing royalty and licensing revenues (which would be invaluable in the support of SB 895).

The extent of royalty income from university research in California is generally modest compared to the massive scale of university funding and total R&D activity. For the UC systems, patent royalty income is a small portion of core funding. Ditto other California research universities. Powerhouse campuses such as

[55] David H. Hsua, Po-Hsuan Hsub, Tong Zhouc, Arvids A. Ziedonis, “Benchmarking U.S. university patent value and commercialization efforts: A new approach,” Research Policy 50 (2021) 104076, https://faculty.wharton.upenn.edu/wp-content/uploads/2016/11/Benchmarking_US-University.pdf

UCLA, Berkeley, or Stanford can earn significant income, but total amounts are small relative to multibillion-dollar annual operating budgets and total funding received for the research endeavors that generated the royalty income received today.

For the UC System, UC policy states that after costs, net income is typically shared with 35 percent going to the inventor, a portion returned back to the campus for research and a percentage (such as 25 percent at UC Davis) contributed to a central pool that supports academic salaries or other general expenditures of the university.

Royalty income is not meant to replace state or federal funding; it augments existing funds to support further research, education, and academic positions.

Impact on California's Long Term Fiscal Health: Tax Revenue from Start Ups

The more significant revenue generated as a result of patents and inventions generated by research funding is the tax revenue from spin-off companies and the broader innovation ecosystem which can be an order of magnitude larger than royalty income received by the university itself.

The industry ecosystems that propel California's growth—ranging from biotechnology and clean energy to aerospace and artificial intelligence—are built on the proximity of research clusters that foster "R&D spillovers." These ecosystems are maintained by a high density of higher education institutions, with California producing more engineers than any other states. [56]

Sustained cuts to basic research funding would likely trigger a "brain drain," as top-tier researchers and budding entrepreneurs migrate to regions with more robust support systems, thereby eroding the specialized workforce that global tech leaders rely upon for their California-based operations. Without a steady supply of fundamental discoveries, the state's ability to "outgrow" major global economies like Germany and China would be significantly compromised, potentially ending a 16-year streak of uninterrupted economic expansion.[57]

California's long-term fiscal health is fundamentally linked to its status as a global hub for innovation, with personal income tax (PIT) historically accounting for approximately 66 percent of General Fund revenues.[58] This revenue stream is highly volatile because it relies heavily on the "taxable events" of high-income

[56] "California's economy leads again, grows another 5% in 2025 to record $4.25 trillion GDP", *Office of Governor Gavin Newsom*, Apr 9, 2026, https://www.gov.ca.gov/2026/04/09/californias-economy-leads-again-grows-another-5-in-2025-to-record-4-25-trillion-gdp/

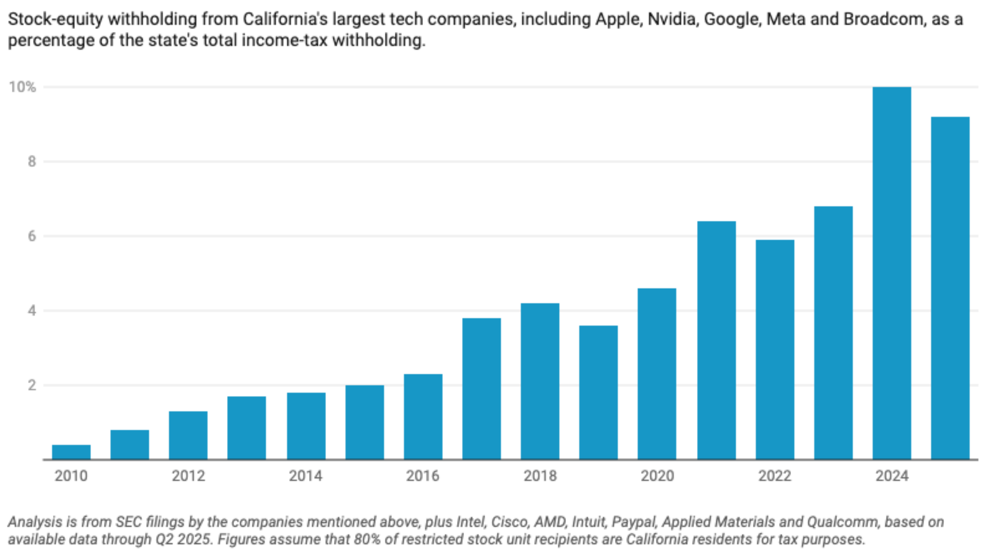
[57] *Ibid.*

[58] "The Future of Advanced Technology and Basic Research: Issue Report", *California 100*, https://california100.org/wp-content/uploads/2023/09/The-Future-of-Advanced-Technology-and-Basic-Research-ISSUE-REPORT-Single-pages-Round-3-2.pdf

taxpayers, **specifically capital gains from technology initial public offerings** (IPOs), stock-based compensation, and the sale of equity in biotech and defense startups (Figure 25). [59]

If basic research funding is cut and sustained, **the state risks disrupting the primary mechanism that generates these gains**: the commercialization of scientific breakthroughs. Research from the University of California indicates that every $1 billion lost in research funding could lead to an estimated $3 billion loss in potential tax revenue and a staggering $20 billion decrease in overall economic activity, as the pipeline from university laboratory to private-sector startup is severed.[60]

Figure 25 California Tax Revenue from Tech Stock Options Withholding[61]



The implications of stifling the innovation ecosystem are structural rather than merely cyclical. Institutional research suggests that California's high cost of doing business makes private sector R&D highly dependent on public incentives and a robust research infrastructure to remain viable.[62] Without stable public funding to de-risk early-stage research, the "valley of death" between discovery and commercialization widens, making it difficult to attract the local investment necessary to sustain high-wage job growth.[63] Recent fiscal

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[59] *Ibid.*

[60] "What's at Stake if the University of California Loses Federal Funding", *University of California*, https://ucop.edu/communications/_files/why-uc-funding-matters.pdf

[61] Source: CalMatters: https://calmatters.org/economy/technology/2026/01/california-tech-tax-revenue/

[62] "Tax Tools for Business", *California Chamber of Commerce*, February 2025, https://advocacy.calchamber.com/policy/issues/tax-tools-for-business/

[63] The "valley of death" is the funding and execution gap between an early research discovery and a commercially viable product. In that gap, the science may work in the lab, but the project still needs expensive proof-of-concept work, prototyping, regulatory steps, market validation, and scale-up before private investors or customers are willing to support it. See "The Future of Advanced Technology and Basic Research: Issue Report", *California 100*, https://california100.org/wp-content/uploads/2023/09/The-Future-of-Advanced-Technology-and-Basic-Research-ISSUE-REPORT-Single-pages-Round-3-2.pdf

analyses highlight that during tech booms, such as the current surge in Artificial Intelligence, capital gains and stock option exercises can contribute upwards of 20 percent of sector-related tax receipts and ten percent of all income tax withholdings.[64] However, if the underlying research environment is degraded, the state loses its ability to capture these "one-time windfalls" that are essential for balancing the budget during economic downturns.

Ultimately, a sustained reduction in research funding threatens to trigger "capital flight" and a permanent erosion of the state's narrow tax base. When the commercialization environment is stifled, the high-income individuals who found and lead these companies often relocate to jurisdictions with more favorable investment climates, taking their personal income, sales, and real estate tax contributions with them.[65] For a state that already faces recurring structural deficits, the disruption of the innovation-fueled economy represents a significant risk to its ability to fund essential public services like education and healthcare in the coming decades.[66]

Conclusions Regarding Tech Transfer and Commercialization of University Research

Royalties received by universities from federally funded inventions are required by the Bayh-Dole Act to be reinvested for research and education purposes, after payment of a share to the inventor and payment of incidental legal expenses associated with patenting and licensing of the invention.

For most universities royalty income does not represent a significant source of revenue when compared with their federal funding or sponsored research expenditures. Overall, the aggregate university share of royalty revenues is in the range of 3 percent of total federal funding and of total research expenditures.

For those universities that derive substantial income from royalties, that success often tends to be associated with one particular invention. There is considerable annual fluctuation in income received, and one-time occurrences (e.g., settlement of a legal dispute over rights to an invention) can result in very large perturbations in income amounts.

This can clearly be observed in a chart of royalty and license fee income over time. (See Figure 22 above) There were legal disputes settled in 2011 and 2018.

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[64] There was a substantial boost to income-tax receipts in 2025 due to the performance of the state's five most valuable tech companies by market value: Apple, Google, Nvidia, Broadcom and Meta. See Sumagaysay, Levi, "California tax revenue getting a boost from AI boom — but for how long?", *CalMatters*, January 6, 2026, https://calmatters.org/economy/technology/2026/01/california-tech-tax-revenue/

[65] Coyne, Katie, "What California's Billionaire Tax Act Reveals About Its Larger Fiscal Problem", *Davis Political Review*, March 27, 2026, https://www.davispoliticalreview.com/article/what-californias-billionaire-tax-act-reveals-about-its-larger-fiscal-problem

[66] "Governor's Budget Summary: Revenue Estimates", *Legislative Analyst's Office*, 2025-26, https://ebudget.ca.gov/2025-26/pdf/BudgetSummary/RevenueEstimates.pdf

Inventions typically represent the culmination of research conducted over many years, often with the support of multiple sponsors. The primary mission of universities is knowledge, rather than product creation. For these reasons, it is inherently problematic to attempt to relate specific federal agency investments in university research to returns resulting from that investment in the form of *royalties paid on inventions developed many years later*.

The implications of stifling innovation ecosystem are structural rather than merely cyclical. California's high cost of doing business makes private sector R&D highly dependent on public incentives and a robust research infrastructure to remain viable.

Without the stability of public funding to de-risk early-stage research, the time lag between discovery and commercialization broadens, making it difficult to attract the local investment necessary to sustain professional and scientific employment and high-wage job growth. During tech booms, such as the current surge in Artificial Intelligence, capital gains and stock option exercises can contribute upwards of 20 percent of sector-related tax receipts. But if the underlying research environment is degraded, the state loses its ability to capture these "one-time windfalls" that are essential for balancing the budget during economic downturns.

APPENDIX – RECENT ADMINISTRATION ACTIONS AND THEIR EFFECTS

Documented cases of early terminations:

- In March 2025, EPA Administrator Lee Zeldin announced termination of the Biden-era Greenhouse Gas Reduction Fund grants, explicitly citing "misalignment with agency's priorities" and alleged program integrity concerns.

- Advocacy groups have documented that the Department of Justice abruptly terminated roughly **$500 million** in grants, including programs on overdose reduction, sexual abuse in prisons, and juvenile justice reform.

- A 2025 analysis in *STAT* notes that the administration "began to terminate science and medical research projects deemed incompatible with White House priorities," and cites an independent database (Grant Witness) tracking more than **5,000 NIH** grants frozen or terminated, although about 3,000 were later reinstated.[67]

Pauses and delays in award disbursements:

- On January 27, 2025, OMB ordered a nationwide pause on disbursement of federal grants and loans, starting January 28, 2025, to review whether funding supported DEI programs or other disfavored priorities.
- A 2025 Urban Institute-cited review summarized by the North Carolina Center for Nonprofits reports that about one-third of nonprofits experienced some type of federal funding disruption (freezes, delayed awards, terminations) in the first months of 2025 after new executive actions on grants.[68]

- FEMA officials were instructed to "put financial holds on all of your awards—all open awards, all years (2021–2024)," despite court orders restraining such freezes.

- Penn State's research office notes that a February 26, 2025 Executive Order required all federal agencies to withhold issuance of new awards for 30 days while reviewing existing grants and contracts for possible termination, explicitly warning researchers to expect delays and pauses in new awards and funds.[69]

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[67] Weitz, Joshua, "What I've learned by mapping the impacts of NIH cuts," STAT, December 18, 2025, https://www.statnews.com/2025/12/18/nih-cuts-impacts-future-analysis/
[68] North Carolina Center for Non-profits, https://ncnonprofits.org/public-policy-blog/federal-grant-freezes-terminations-and-cuts-2025
[69] Impact of Executive Orders on Federal Funding, Penn State Office of the Senior VP for Research, April 22, 2026, https://researchsupport.psu.edu/federal-funding-updates/

Reduction in number of awards and targeted cutting of specific topics

- The *STAT* analysis describes NIH cuts framed as "restoring gold-standard science," where the Administration terminated projects deemed incompatible with its priorities; new award terms were changed to allow termination whenever a project "no longer effectuates the program goals or agency priorities."[70]
- A 2025 Urban-Institute-summarized policy review notes Executive Orders (e.g., EO 14222 and 14332) directing agencies to:
  - Review every federal grant to terminate or modify those inconsistent with Trump Administration priorities, and
  - Designate political appointees to oversee grant processes to ensure alignment with those priorities.
- The University of Michigan's federal funding office explains that, following Supreme Court decisions and executive orders, agencies are adding "an extra layer of review to ensure that funding opportunities prohibit this kind of research," and that certain NIH grants (e.g., on topics like DEI or reproductive health) have been terminated or are at particular risk of cancellation.[71]

Grant terminations NIH and NSF

- Science News–type reporting based on Grant Witness data estimates that in 2025, more than 3,800 NIH and NSF grants were frozen or terminated, with NIH losing about $2.3 billion in unspent funds across nearly 2,500 grants and NSF losing over 1,300 grants with about $700 million in unspent funds.
- The Association of American Medical Colleges (AAMC) reports that "This year's terminations of biomedical research grants funded by the National Institutes of Health (NIH) is unprecedented in the history of the agency."[72] For 2025, just over $1 billion in lost funding was estimated for all US Medical Schools and Hospitals.
- A UC San Diego–led study found that NIH terminated more than 2,000 research grants between January and May 2025 after shifting agency priorities, and surveyed 941 affected investigators[73]
- The largest NIH freeze cited was a grant supporting Northwestern's Lurie Cancer Center, with approximately $77 million in remaining funds frozen.[74]

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[70] STAT (2025)
[71] Federal Funding Updates, Michigan Research, May 2026, https://research.umich.edu/federal-funding-updates/
[72] Impact of NIH Grant Terminations, AAMC Medical Research Brief, May 6, 2025.
[73] National Institutes of Health Grant Terminations Disproportionately Impact Minority Scientists, UC San Diego Today, May 6, 2026, https://today.ucsd.edu/story/NIH-grant-terminations-disproportionately-impact-minority-scientists
[74] See the alarming extent of NIH and NSF funding cuts in 2025, ScienceNews, November 18, 2025, https://www.sciencenews.org/article/nih-nsf-cuts-2025-data

- As of May 21, 2025, NSF lists 1,752 terminated grants totaling $1.4 billion. The STEM Education Directorate absorbed the largest hit, having 839 grants terminated, totaling $888 million and representing 48 percent of all terminated grants.[75]

Recent NIH and NSF Grant Terminations, 2026 to date

- At least 7,840 federal research grants have. year-to-date in 2026, been terminated, frozen, or cancelled by NIH and NSF in 2026: 5,844 NIH grants and 1,996 NSF grants.[76]

- NIH terminations have directly removed $2.45 billion from research.[77] The specific institutions most prominently mentioned in the reporting include:
  - Harvard
  - Columbia
  - Cornell
  - Northwestern
  - UCLA
  - Johns Hopkins
  - Duke

- There have been some reinstatements of funding but an estimated $1.4 billion is tied to the cancelled NIH and NSF grants that have not been reinstated to date.

- The states with the most grant terminations were
  - Texas $316 million
  - New York $313 million
  - California $294 million
  - Massachusetts $252 million

[75] NSF Releases List of Terminated Grants, COSSA Washington Update, May 27, 2025, https://cossa.org/nsf-releases-list-of-terminated-grants/

[76] Nature (2026), https://www.nature.com/immersive/d41586-026-00088-9/index.html

[77] Ivanova, Julia, “NIH awards fewer grants despite increased funding, raising concerns over research delays,” Telehealth.org, April 10, 2026, https://telehealth.org/news/nih-awards-fewer-grants-despite-increased-funding-raising-concerns-over-research-delays/