

## FOSTERING INNOVATION THROUGH RESEARCH & DEVELOPMENT INVESTMENT

June 7, 2024

California's world-class research and development (R&D) infrastructure has made the state a global economic powerhouse. With R&D accounting for 4.8% of gross state product (GSP) — and nearly one-third of total U.S. R&D activity<sup>1</sup> — California has long reaped the benefits of an innovation ecosystem that includes top-tier research universities, federal laboratories, startups, and high-tech companies. The technologies generated by R&D lead to new products, services, and processes that enhance productivity, create high-paying jobs, and attract investment.

The private sector is by far the main driver of R&D activities in the U.S. In 2021, 77% of the \$789 billion in R&D spending nationwide was conducted by private businesses.<sup>2</sup> As the fifth largest economy in the world, California is a global hub for high-tech companies that drive innovation. The state boasts a concentration of leading tech firms, startups, and research institutions that foster an entrepreneurial environment. Moreover, top-tier research institutions, including Stanford University, California Institute of Technology, and the University of California system, develop highly skilled graduates that offer a steady workforce pipeline into the tech industries.

Yet, challenges loom. California ranks third (behind Hawaii and Massachusetts) among states with the highest business and living costs,<sup>3</sup> making it difficult for many companies, especially small and medium-sized enterprises, to operate in the state. On top of this, conducting R&D is already an expensive, time-intensive, and indefinite venture.

To reduce costs and encourage innovation, many states and the federal government offer R&D tax credit programs to help lower the financial burden on the private sector. Introduced in 1987, California's R&D tax credit was designed to complement the existing federal R&D tax credit to encourage and attract in-state R&D investment. The credit allows qualifying companies to reduce their income tax burden by 15% to 24% if they invest in new technological product development or basic research (defined as activities that advance knowledge or understanding without specific, immediate commercial applications). California's tax credit can be carried forward indefinitely, allowing companies to carry over unused credits to future subsequent tax years until they are fully exhausted.<sup>4</sup>

In response to the economic impact of the COVID-19 pandemic, California enacted Assembly Bill 85 on June 2020. This legislation temporarily suspended the use of net operating losses (NOLs) for businesses with income over \$1 million and capped the amount of business tax credits that could be utilized in a

---

<sup>1</sup> U.S. Bureau of Economic Analysis Research and Development Satellite Account (2021).

<sup>2</sup> Gary Anderson, "U.S. R&D Increased by \$72 Billion in 2021 to \$789 Billion; Estimate for 2022 Indicates Further Increase to \$886 Billion," January 22, 2024, National Science Foundation, <https://nces.nsf.gov/pubs/nsf24317>.

<sup>3</sup> Moody's Analytics Cost of Doing Business Index and Cost of Living Index.

<sup>4</sup> California Research, State of California Franchise Tax Board, Accessed June 4, 2024, <https://www.ftb.ca.gov/file/business/credits/california-research.html>.

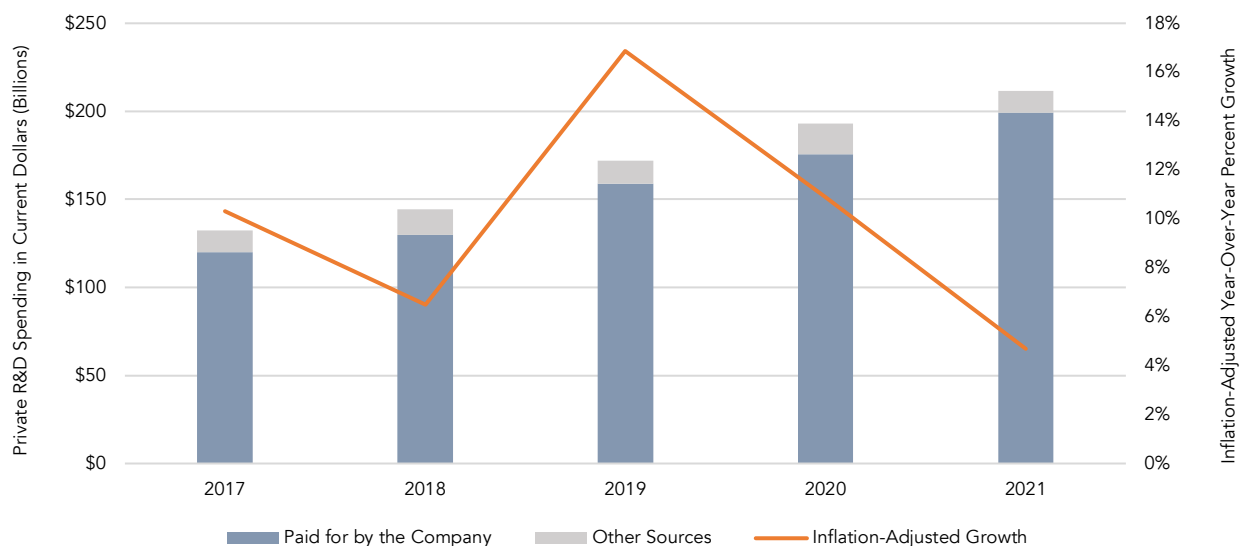
single year to \$5 million.<sup>5</sup> A massive budget surplus in 2022 led to the restoration of the tax credit, but the Governor has once again proposed suspending tax breaks for the 2025-2027 tax years given the current budget shortfall.<sup>6</sup>

The uncertainty caused by frequent policy changes makes it difficult for companies to plan for upcoming investment cycles and creates an unsteady operating environment. With other states offering appealing incentives and lower costs of doing business, California is at risk of (further) losing its competitive advantage in the innovation economy.

### R&D IN CALIFORNIA

In California, businesses fund 94% of their own R&D activities — a higher proportion than the nationwide average (87%) — highlighting the vital role industry actors play within the state’s innovation ecosystem. Private sector R&D spending grew an average of 13% year-over-year from \$132 billion in 2017 (in total expenditures) to \$212 billion in 2021 (Figure 1). Following a spending boost in 2019 (an increase of nearly 20%), growth slowed over the next two years to 12% and 10%, respectively. However, when adjusting for inflation, R&D spending increased only 5% between 2020 and 2021.

FIGURE 1: BUSINESS R&D SPENDING IN CALIFORNIA | 2017-2021



Source: National Science Foundation Business and Enterprise Research and Development Survey, CVL Economics.

<sup>5</sup> California Legislature, Assembly Bill No. 85, June 29, 2020, [https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200AB85](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB85).

<sup>6</sup> Taryn Luna, "With deadline nearing, Newsom and lawmakers disagree over solutions to California budget crisis," June 5, 2024, Los Angeles Times, <https://www.latimes.com/california/story/2024-06-05/newsom-california-democrats-legislature-budget-deficit-disagreements>.

Investment in R&D supports job creation in several industries. In 2021, over 700,000 jobs were directly related to R&D activities in California, including roles like researchers, technicians, and support staff (Table 1). The vast majority of these jobs (650,900) were in the private sector with firms in non-manufacturing industries accounting for the greatest share (345,400), followed by firms in manufacturing industries (247,700) and nonprofit institutions (57,900). Government entities were home to a modest number of R&D jobs; state and local entities accounted for 43,400 R&D jobs, and the federal government maintained 6,900 R&D jobs statewide.

TABLE 1: CALIFORNIA R&D EMPLOYMENT BY SECTOR | 2021

	NUMBER OF JOBS
Total R&D	701,200
Private	650,900
Manufacturing	247,700
Non-manufacturing	345,400
Nonprofit Institutions	57,900
Government	50,400
Federal	6,900
State and Local	43,400

Note: Includes full- and part-time wage and salary jobs engaged in the production of R&D.

Source: U.S. Bureau of Economic Analysis Research and Development Satellite Account, CVL Economics.

Jobs in R&D-heavy industries offer wages that are significantly higher than the overall industry average (Table 2). The average annual wage for an R&D job in California was \$211,400 in 2021, or more than double the statewide average annual wage of \$84,600. R&D jobs had the highest wage premium in the private sector, paying \$167,800 more on average than California’s private sector overall. This impact ripples through the economy as high-wage earners spend their incomes on goods and services from local businesses.

R&D plays a foundational role in technology-oriented sectors — which include high-tech manufacturing, information technology, software, entertainment, architecture and engineering, scientific R&D, aeronautics and space, and green technology — which extends beyond R&D-specific jobs (Table 3). These sectors do employ a greater share of STEM workers compared to others, but they also employ workers across numerous managerial, administrative, and generalist roles. Across the board, wages are well above the statewide average for all industries (\$84,600).

TABLE 2: CALIFORNIA AVERAGE ANNUAL WAGES IN R&D VS. ALL INDUSTRIES | 2021

	R&D AVERAGE ANNUAL WAGE	AVERAGE ANNUAL WAGE FOR ALL INDUSTRIES	R&D WAGE PREMIUM
Total	\$211,412	\$84,548	+\$126,864
Private	\$220,670	\$52,832	+\$167,838
Manufacturing	\$228,343	\$119,333	+\$109,010
Non-manufacturing	\$235,862	\$83,707	+\$152,155
Nonprofit Institutions	\$96,836	\$60,476	+\$36,360
Government	\$91,427	\$77,351	+\$14,076
Federal	\$92,449	\$77,621	+\$14,828
State and local	\$91,475	\$77,295	+\$14,180

Note: Includes full- and part-time wage and salary jobs engaged in the production of R&D.

Source: U.S. Bureau of Economic Analysis Research and Development Satellite Account, U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages, U.S. Census Bureau, CVL Economics.

TABLE 3: CALIFORNIA EMPLOYMENT AND AVERAGE ANNUAL WAGES IN R&D-SUPPORTED SECTORS | 2023

	NUMBER OF JOBS	AVERAGE ANNUAL WAGE
High-Tech Manufacturing	418,742	\$210,068
Information Technology	374,349	\$201,791
Software	265,404	\$293,009
Entertainment	218,447	\$188,477
Architecture & Engineering	202,231	\$124,661
Scientific R&D	188,272	\$221,198
Aeronautics & Space	84,679	\$128,740
Green Technology	7,763	\$119,503

Note: Includes full- and part-time employment and self-employment.

Source: U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages, U.S. Census Bureau, CVL Economics.

## STATE R&D INCENTIVES

As the most populous state, it should not be surprising that California ranks first in terms of total R&D spending by a large margin (Table 4). Looking at business R&D spending per capita, though, California ranks third (\$5,393) behind Washington (\$6,343) and Massachusetts (\$5,691) (Table 5). Among the top five states in spending per capita, California experienced the slowest growth rate between 2020 and 2021. While R&D spending in Delaware, Massachusetts, and Washington increased by 42%, 22%, and 17%, respectively, spending in California rose by only 10%.

TABLE 4: BUSINESS R&D SPENDING BY TOP 5 STATES | 2021

STATE	R&D SPENDING (Billions)
California	\$211.62
Washington	\$49.08
Massachusetts	\$39.75
Texas	\$28.26
New York	\$26.32

Source: National Science Foundation Business and Enterprise Research and Development Survey, CVL Economics.

TABLE 5: BUSINESS R&D SPENDING PER CAPITA BY TOP 5 STATES | 2021

STATE	R&D SPENDING PER CAPITA	2020-2021 GROWTH
Washington	\$6,343	17%
Massachusetts	\$5,691	22%
California	\$5,393	10%
Delaware	\$3,580	42%
New Jersey	\$2,703	14%

Source: National Science Foundation Business and Enterprise Research and Development Survey, U.S. Census Bureau American Community Survey, CVL Economics.

Currently, 35 states offer an R&D tax credit. R&D tax credits cover a wide range of activities aimed at developing new or improved products, processes, or technologies. While eligible activities vary by state, they typically include experimentation, design, and development efforts that involve engineering, computer science, and physical or biological sciences, as well as emerging industries like artificial

intelligence. Eligible activities often involve developing prototypes, testing and refining new materials, software development, and conducting basic and applied research.

States are competing to attract these high-value industries into their regions and offer different tax credit rates to remain competitive (Table 6). Some states specifically tailor incentives to further reduce costs for small businesses (Connecticut, Delaware, Maryland, New York, and Pennsylvania from the selected states in Table 6) and some offer refundable or transferable credits that help businesses that haven't turned a profit (Delaware, Maryland, New Jersey, New York, and Pennsylvania). In Connecticut, New Jersey, and New York, tax credits are limited to operations within a certain area (e.g., enterprise zone) or within specific industries. Some states also have a limit to the amount of tax credits that can be applied, and others have limitations on how many years a tax credit can carry over to future years.

California's R&D tax credit is a crucial incentive for businesses to invest in research and development in the state, driving technological advancements and economic growth. Without this financial support, compounded by the state's already high costs of doing business, companies may choose to start or move their R&D activities to other jurisdictions with more favorable tax environments. This could lead to a decline in high-paying jobs, a slowdown in innovation, and a weakening of California's leadership position in high-growth technological and innovative industries.

TABLE 6: R&D TAX CREDITS IN SELECT STATES

STATE	NAME	CREDIT RATE	TYPE	CREDIT LIMIT	CARRY FORWARD
California	Research and Development Tax Credit	15% of qualified expenses that exceed base amount (incremental expenditures); 24% of basic research payments			Unlimited
Connecticut	Research and Development Incremental Expenditures Tax Credit	20% of qualified incremental research expenditures; 6% if non-incremental R&D expenditures for qualified small businesses	Partially refundable for small businesses		15 years
Delaware	Research and Development Tax Credit	10% of qualified incremental research expenditures; 20% of qualified incremental research expenditures for small businesses	Refundable		15 years
Maryland	Research and Development Tax Credit	3% of qualified incremental research expenditures for Basic R&D Tax Credit; 10% of qualified incremental expenditures for Growth R&D Tax Credit	Refundable for small businesses	\$12 million	7 years
Massachusetts	Research and Development Tax Credit	15% of incremental basic research expenditures; 10% of incremental qualified research expenditures		A business's first \$25,000 of tax liability, plus 75% of any liability over \$25,000	15 years
Minnesota	Research and Development Tax Credit	10% of qualified incremental expenditures up to \$2 million and 4% for expenditures above \$2 million			15 years
New Jersey	Research and Development Tax Credit	10% of qualified incremental expenditures plus 10% of basic research payments	Transferable for small businesses		7 years, 15 years for specific industries
New York	Excelsior Research and Development Tax Credit	50% of the federal R&D credit on related research expenditures in the state up to 6% of qualified research expenditures or 8% for qualified green projects in-state			Unlimited
	Life Sciences Research and Development Tax Credit	15% of incremental research expenditures for companies with 10 or more employees; 20% of incremental research expenditures for companies with fewer than 10 employees	Refundable	\$10 million	n/a
Pennsylvania	Research and Development Tax Credit Assignment Program	10% of incremental research expenditures; 20% for qualified small businesses	Transferable	\$55 million (\$11 million set aside for small businesses)	15 years
Texas	Franchise Tax Credit for Qualified Research and Development Activities	5% of incremental research expenditures; 6.25% if spent with a higher education institution		50% of franchise tax	20 years
Utah	Research and Development Tax Credit	5% of incremental basic research expenditures; 7.5% for qualified research expenses			14 years for basic research expenditures

Source: KBKG, Acena Consulting, Joint Legislative Audit and Review Commission (Report to the Governor and the General Assembly of Virginia), individual state governments, CVL Economics.