



THE ROLE OF THE TECH SECTOR IN SHAPING CALIFORNIA'S ECONOMY

JUNE 2024

ACKNOWLEDGEMENTS

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This report was produced by CVL Economics in collaboration with Matt Horton. CVL Economics is an economic consulting firm that takes a data-driven, human-centric approach to equitable development and sustainable growth. Founded in 2021, CVL Economics partners with communities, municipalities, organizations, and institutions to address today’s most complex challenges and foster bold action. Coupling robust economic models with innovative research methodologies, we provide decisionmakers with the actionable insights needed to effect change, expand opportunity, and improve economic well-being.

Note: All figures and tables that appear throughout this document are based on the most recent data available at the time of analysis.

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EXECUTIVE SUMMARY

Technology and innovation are key drivers of economic development. California has historically been a leader on both fronts and has deservedly earned its reputation as a global economic powerhouse. The “Tech Sector” — comprising industries engaged in research, development, and distribution of technological goods and services fueled by innovation — is a major contributor to economic output statewide. The growing demand for Tech Sector goods and services (especially those that can be delivered digitally) allows the sector’s component industries to have global reach and be more resilient in economic downturns. The sector also stands out in terms of the role it plays in creating jobs, generating tax revenue, and improving overall productivity.

On its own, the Tech Sector accounts for 19% of California’s gross regional product (GRP), contributing \$623.4 billion to the state’s economy in 2022. The full breadth of its impact is even larger when taking into account the activity it drives in other industries via business-to-business interactions and through personal consumption spending by Tech Sector workers. Factoring in these ripple effects, the Tech Sector contributed nearly \$1 trillion to California’s GRP, accounting for 30% of the state’s economy. In terms of employment, the Tech Sector supported 4.2 million jobs, or 20% of all jobs statewide.

The Tech Sector’s sizeable economic output serves as a critical source of tax revenue. The Tech Sector and its supported activity contributed \$55.9 billion in state tax revenue during Fiscal Year 2022–23, which accounted for 30% of total state tax revenue generation. Most of the sector’s fiscal impact comes from personal income and corporate taxes, which account for 22% and 44% of California’s total tax revenue generation, respectively. At a time when the state faces a \$27.6 billion deficit (which includes the offset from a one-time \$17 billion early actions budget package), a strong Tech Sector will play a vital role in uplifting the state from its current — and future — fiscal situation.

However, increasing global competitiveness is challenging the status quo. California’s high cost of living, a shift to remote work, and the rising costs of doing business are not only deterring firms from moving to California but pushing existing companies out of the state. High-value industries that were once concentrated in Silicon Valley and Hollywood are now finding hubs in states or countries that offer more competitive incentives, robust entrepreneurial ecosystems, and affordable housing options. For California to sustain its innovation-based economy and to maintain its competitive edge, it will need to offer an environment that encourages business attraction, retention, and growth.

INTRODUCTION

DEFINING THE TECH SECTOR

The Tech Sector is not officially designated as a sector unto itself by the U.S. government. Rather, it comprises a set of different industries that span the entire economy. Silicon Valley-based companies like Facebook, Microsoft, and Alphabet, are often thought of as the archetypes of Tech Sector activity. While these firms are indeed major players, the Tech Sector extends far beyond industries like Software and Information Technology and includes others that — on the surface — may not seem as technology driven at first blush. This analysis defines the Tech Sector as a collection of eight innovation-oriented subsectors involved in the design, production, and/or distribution of technologically advanced goods and services: Software, Information Technology, Entertainment, Scientific Research & Development (R&D), Architecture & Engineering, Green Technology, Aeronautics & Space, and High-Tech Manufacturing (Table 1).

The more expansive definition of the Tech Sector used here builds on existing definitions of high-tech industries developed by the U.S. Bureau of Labor Statistics (BLS), the U.S. Census Bureau, and the National Science Foundation (NSF). The BLS, Census Bureau, and NSF considers high-tech industries as those having a relatively high concentration of Science, Technology, Engineering, and Math (STEM) workers. While the BLS does take some industries involved in clean energy generation into account, many other cutting-edge industries (such as virtual production or digital media distribution) are not found in any of the three definitions. The industries in the Entertainment subsector, in particular, are included here because they largely operate on the frontlines of the digital realm and produce technical goods and services that have an outsized impact on the economy.

TABLE 1: SUMMARY OF TECH SUBSECTORS

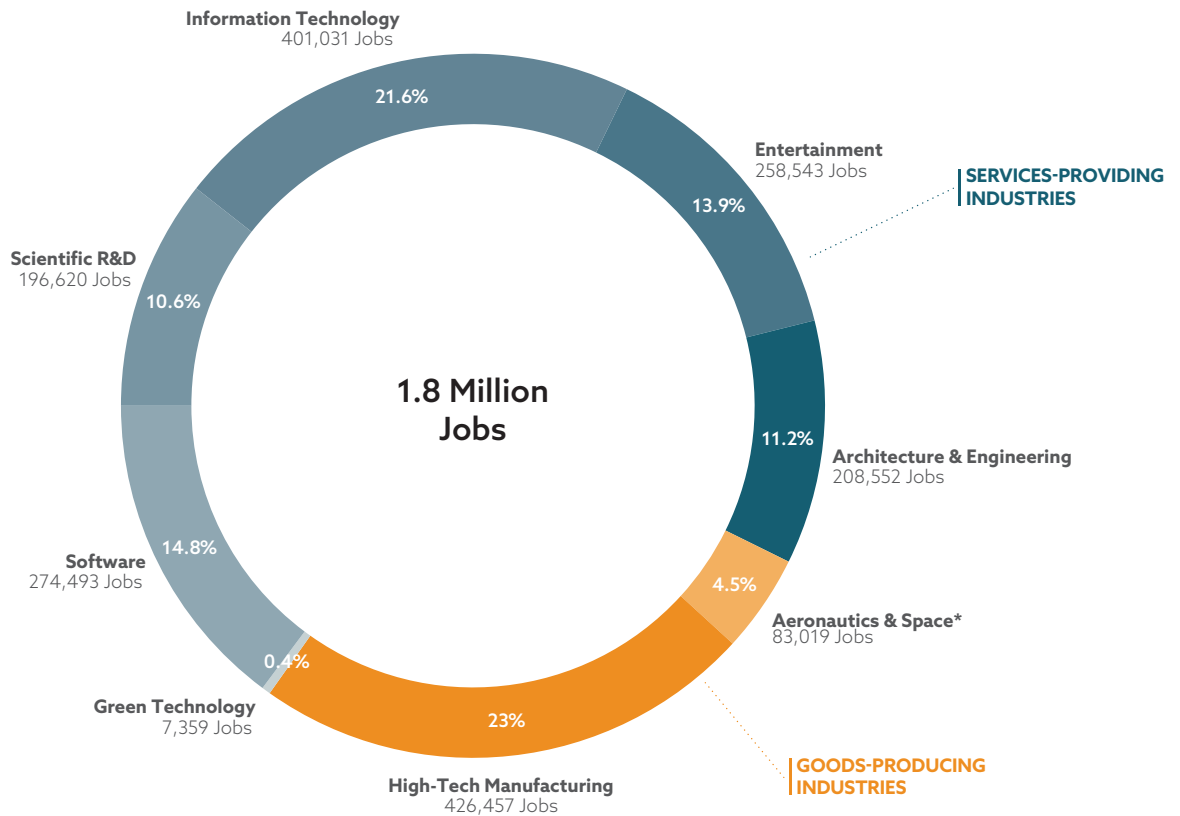
SUBSECTOR	DESCRIPTION
Software	Organizations primarily engaged in software publishing (such as producing and distributing computer software), computing infrastructure, data processing services, web hosting services, and web search portals.
Information Technology	Organizations primarily engaged in computer programming services, planning and designing computer systems using hardware, software, and communications technologies, and computer facilities management and installation services.
Entertainment	Organizations primarily engaged in film, television, and digital media production and distribution (including streaming, tele-production and postproduction services), and social content providers such as media streaming distribution services and social networks.
Scientific Research and Development	Organizations primarily engaged in research and development in biotechnology, engineering and life sciences.
Architecture and Engineering	Organizations primarily engaged in architectural and engineering services, including surveying and mapping services.
Green Technology	Organizations primarily engaged in clean energy electric power technologies and generation (including solar, wind, geothermal, biomass), and production of electric vehicles.
Aeronautics and Space	Organizations primarily engaged in aerospace product and parts production (such as for aircrafts, guided missiles, and space vehicles), and satellite telecommunications.
High-Tech Manufacturing	Organizations primarily engaged in the manufacturing of high-tech inputs and biomedical equipment and products, including pharmaceuticals, diagnostic and laboratory equipment, semiconductors, computer and communications hardware, and other electronic components.

LANDSCAPE ANALYSIS

California has long been the epicenter of the nation’s technology and innovation economy and is home to 1.8 million jobs. High-Tech Manufacturing is the largest of the eight subsectors in terms of employment with 426,500 jobs, accounting for nearly one quarter (23%) of all Tech Sector jobs (Figure 1). Close behind is Information Technology with 401,000 jobs, followed by Software (274,500 jobs) and Entertainment (258,500). Combined, these three subsectors account for half of all employment in the sector.

Distinguishing between goods-producing and services-providing industries when gauging performance is important because the nature of work between these two groups varies significantly. For instance, the output of a software company differs from that of a semiconductor manufacturer. Benchmarking the economic performance of the Software subsector with other service-oriented industries and that of the High-Tech Manufacturing subsector with other production-oriented industries, for instance, would be more instructive than comparing the Software subsector directly with the High-Tech Manufacturing subsector. Over 72% of Tech Sector jobs are employed in services-providing industries and the remaining 27% are employed in goods-producing industries.

FIGURE 1: CALIFORNIA TECH SECTOR EMPLOYMENT
2023



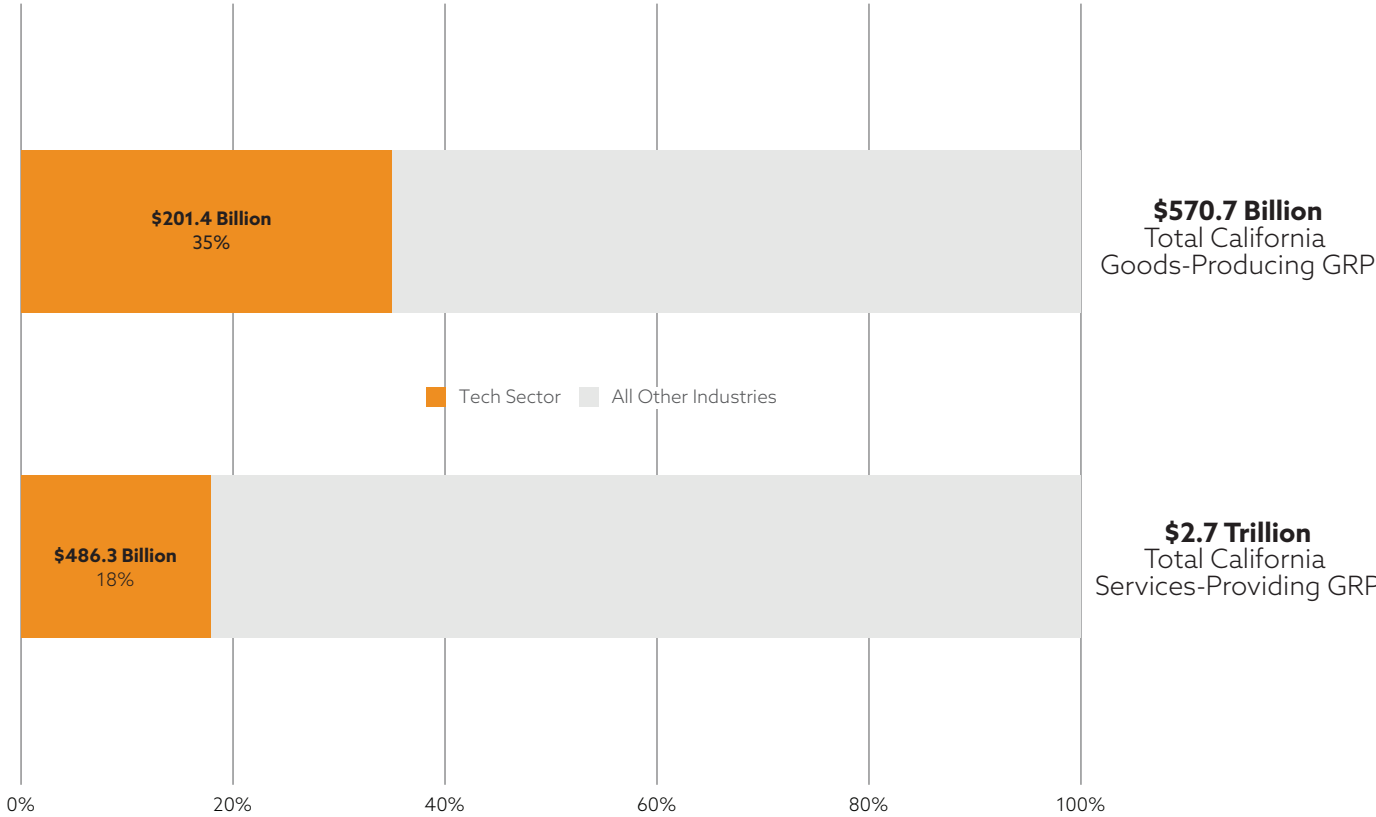
*Note: Subsectors are composed of both goods-producing and services-providing industries but, for visual purposes, are color-coded by the industry group they primarily operate in. Job counts include full-time, part-time, and self-employed workers.

Source: CVL Economics; U.S. Census Bureau; U.S. Bureau of Labor Statistics

Goods-producing industries in the Tech Sector account for 35% (\$201.4 billion) of California’s total goods-producing GRP (Figure 2). Composed of the High-Tech Manufacturing, Aeronautics & Space, and a small portion of the Green Technology subsectors, this share is especially noteworthy at a time when the U.S. is shifting focus back to industrial policy and supply-chain resiliency with major infrastructure investments like the CHIPS and Science ACT, the Infrastructure Investments and Jobs Act, and the Inflation Reduction Act.

In terms of services-providing industries, the Information Technology, Software, Entertainment, Architecture & Engineering, and Scientific R&D subsectors account for 18% of California’s total services-providing GRP. Although this is a smaller share than goods-producing industries, services-providing industries generate significantly more in state GRP: \$2.7 trillion versus \$570.7 billion. As such, 18% equates to generating \$486.3 billion in GRP by Tech services-providing industries in 2022.

FIGURE 2: TECH SECTOR GOODS-PRODUCING AND SERVICES-PROVIDING SHARE OF TOTAL CALIFORNIA GROSS REGIONAL PRODUCT (GRP)
2022



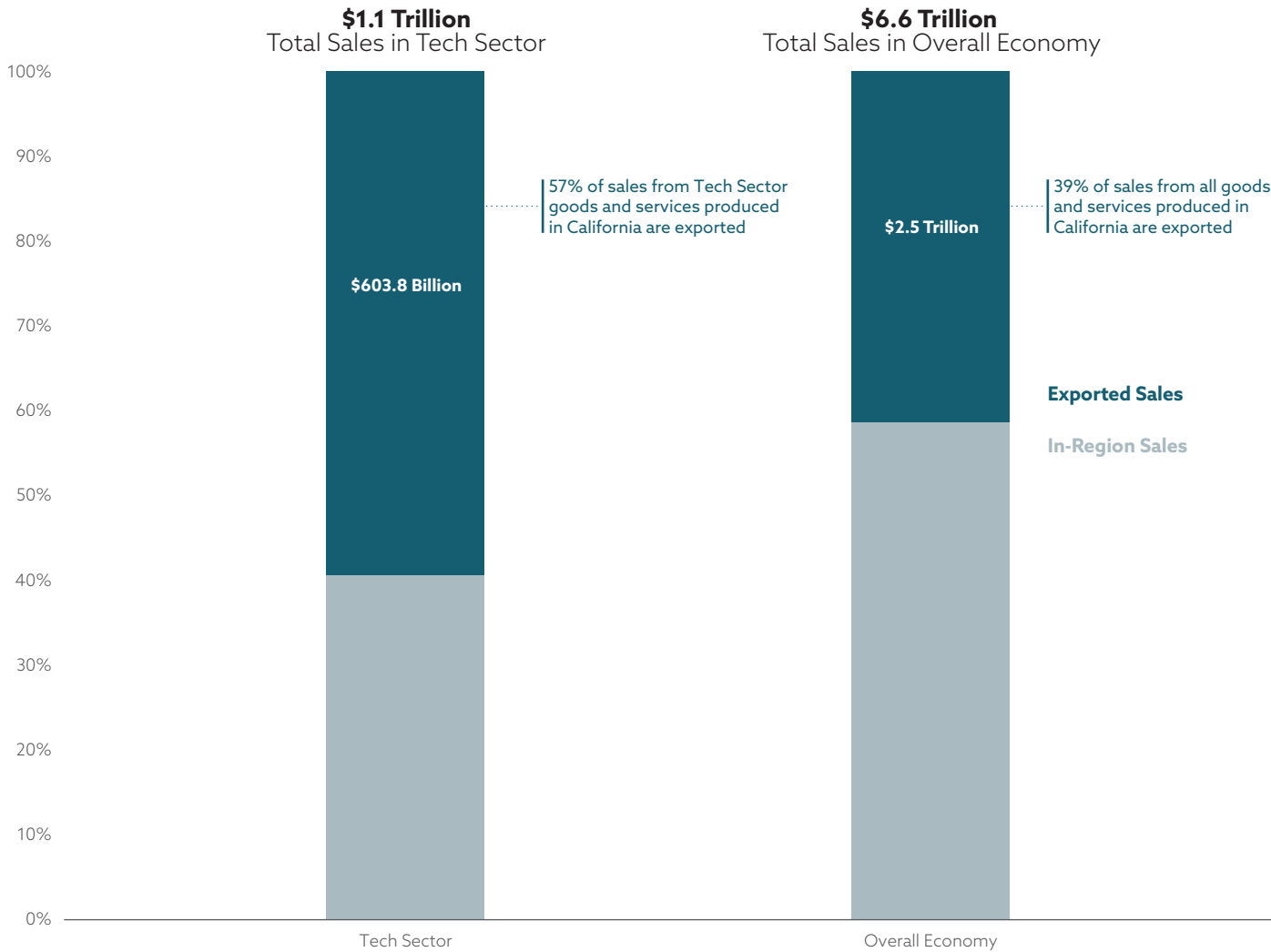
Source: CVL Economics; U.S. Census Bureau; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis

Since many of the sector’s products and services are digital, they can be easily distributed to businesses and consumers around the globe. Additionally, many of the sector’s non-digital goods are in high demand; as a result, many of the sector’s goods-producing industries are high-export industries as well. Major Tech Sector export-oriented goods include aircraft, pharmaceutical products, navigational equipment, semiconductors, and circuits. About 57% of California Tech Sector sales are exported to other countries; by comparison, the figure for total sales across all industries is only 39% (Figure 3).

Part of what makes the Tech Sector a high-value set of industries is this global reach. Export industries are especially valuable to regional economies because they are not limited to servicing local markets. This also means that the export activity from a company located in a given region has spillover effects into the local economy as employees earn their income and spend their wages on locally available goods and services.

FIGURE 3: SHARE OF TOTAL EXPORTED GOODS AND SERVICES IN THE TECH SECTOR AND TOTAL ECONOMY IN CALIFORNIA

2022

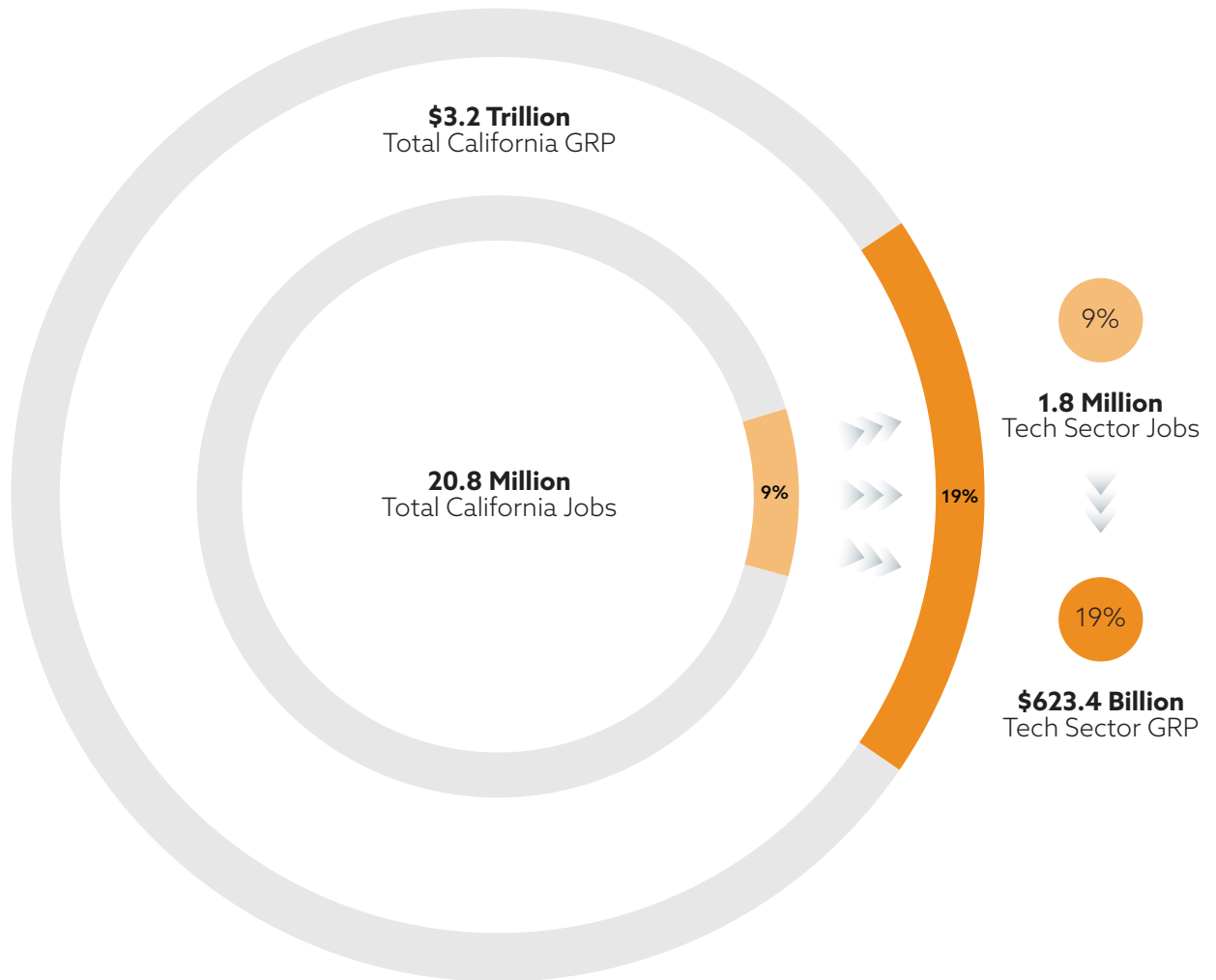


Source: CVL Economics; U.S. Bureau of Economic Analysis; IBIS World

The Tech Sector is a highly productive industry and plays an outsized role in contributing to the state's \$3.2 trillion economy. Its high-export goods and services, highly skilled workforce, and use of advanced technologies result in higher output per worker than in most other industries. The work conducted by each employee contributes to an economy's overall production of goods and services.

When workers are more productive, they can produce more goods and services in the same amount of time. Worker productivity is a key factor in growing an economy's GRP. The Tech Sector's 1.8 million jobs account for 9% of California's 20.8 million jobs (Figure 4). While the Tech Sector's jobs account for 9% of California's total employment, the sector directly accounts for 19% (\$623.4 billion) of California's GRP.

FIGURE 4: TECH SECTOR SHARE OF TOTAL CALIFORNIA EMPLOYMENT AND GROSS REGIONAL PRODUCT
2023 (EMPLOYMENT) AND 2022 (GRP)



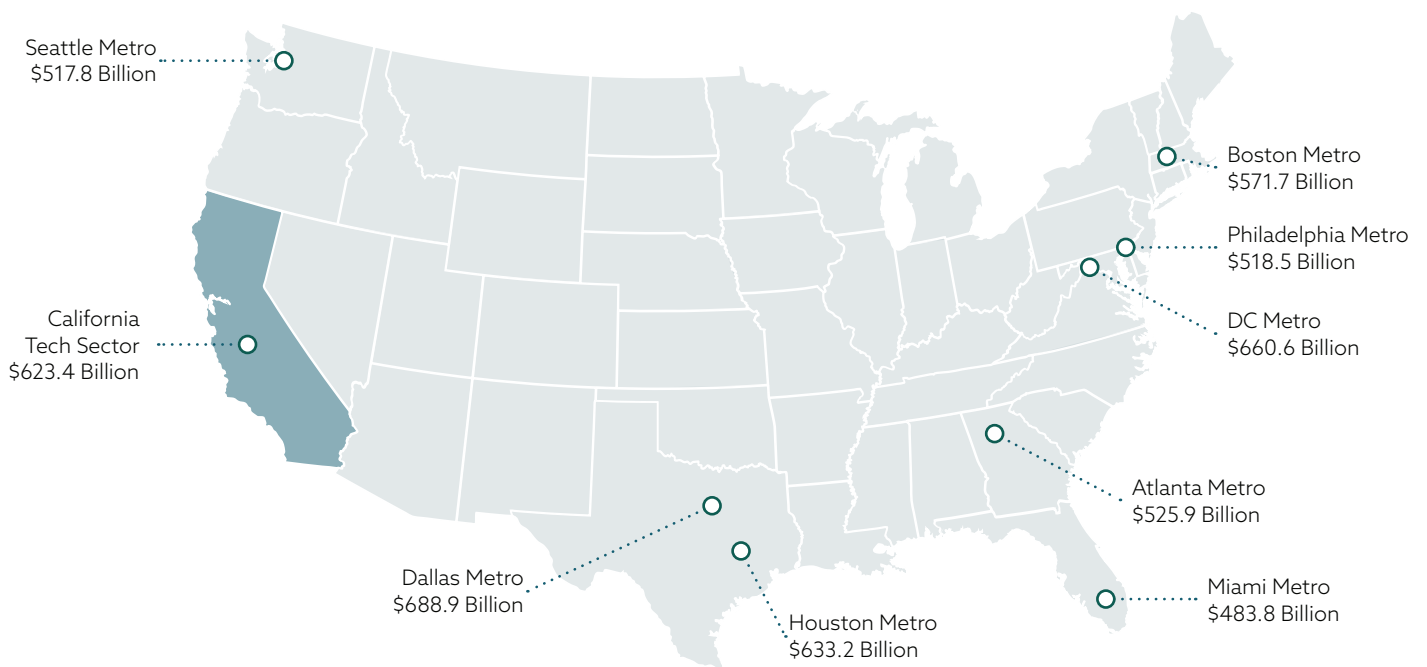
Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau; U.S. Bureau of Economic Analysis

The sector's \$623.4 billion in economic activity is comparable in size to entire regional economies. Within the United States, California's \$623.4 billion Tech Sector is larger than the GRP of the Boston, Atlanta, Philadelphia, Seattle, and Miami metro areas (Figure 5). It's about the same size as the Houston

economy, and not much smaller than the economies of the Dallas and DC metro areas. California's Tech Sector is also larger than many economies abroad. If it were its own country, California's Tech Sector would rank 23rd in terms of GDP, just below Argentina and above Norway, Sweden, and Belgium (Table 2).

FIGURE 5: GROSS REGIONAL PRODUCT OF U.S. METRO REGIONS COMPARABLE IN SIZE TO CALIFORNIA'S TECH SECTOR

2022



Source: CVL Economics; U.S. Bureau of Economic Analysis

TABLE 2: GROSS DOMESTIC PRODUCT OF COUNTRIES COMPARABLE IN SIZE TO CALIFORNIA'S TECH SECTOR

COUNTRY	GDP
Poland	\$688.1 Billion
Argentina	\$631.1 Billion
Norway	\$595.3 Billion
Sweden	\$591.7 Billion
Belgium	\$583.4 Billion

Source: World Bank Group



Overall, California's Tech Sector has seen rapid growth over the last decade, especially in relation to other industries. Between 2013 and 2023, Tech Sector employment grew nearly 40% — significantly higher than the economy overall, which increased by 17% in the same period (Figure 6).

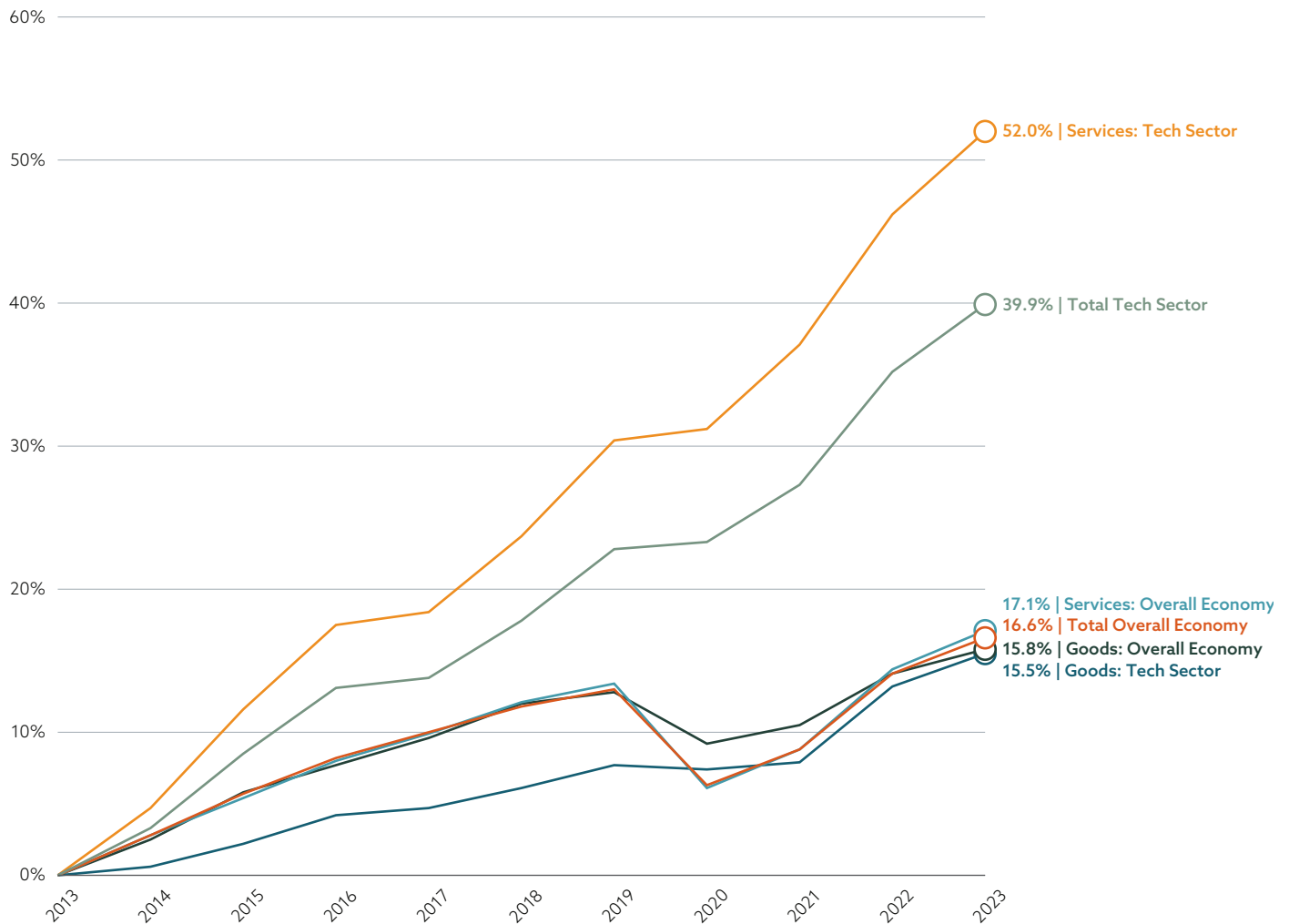
But looking at employment growth between service-oriented and goods-oriented Tech industries provides further insight. Growth in services-providing Tech industries (52%) significantly outpaced that in the overall economy (17.1%). In contrast, employment growth in goods-producing Tech industries did not

differ much from the goods production across all industries, with both categories growing just under 16%.

Yet both Tech industry groups were more resilient than the overall economy during the pandemic. Employment in Tech services industries actually increased slightly between 2019 and 2020, while employment dropped significantly in the overall services economy. Additionally, employment in Tech goods-producing industries decreased by just -0.2% in that period, compared to a -3.2% decline in the overall goods economy.

FIGURE 6: EMPLOYMENT GROWTH RATE FOR TECH SECTOR VS. OVERALL ECONOMY IN CALIFORNIA

2013–2023



Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau

Over the last year, the Tech Sector has frequently made headlines due to mass layoffs. In 2023, over 260,000 employees were laid off from tech companies in the U.S., with most (168,000) taking place in Q1 2023. While 2024 may fare better, about 50,000 tech employees have been laid off as of March 2024.

The major factor contributing to recent mass layoffs is attributable to a hiring frenzy in 2021 as unprecedented demand for products emerged during the pandemic. As a result, companies hired record numbers of employees in 2021 to help increase

supply and business capacities. The recent layoffs have largely and most publicly been taking place at select companies in the Information Technology and Software subsectors. While the impact on the Tech Sector and state economy has certainly been real, it is important to remember that the Tech Sector employs 1.8 million people across a diverse set of industries, which overall saw employment grow each year between 2021 and 2023. Indeed, current employment in impacted sectors remains above Q1 2021 levels (Figure 7). Overall, tech employment is still growing.

FIGURE 7: EMPLOYMENT GROWTH IN TECH SECTORS WITH LAYOFFS

2021-2024

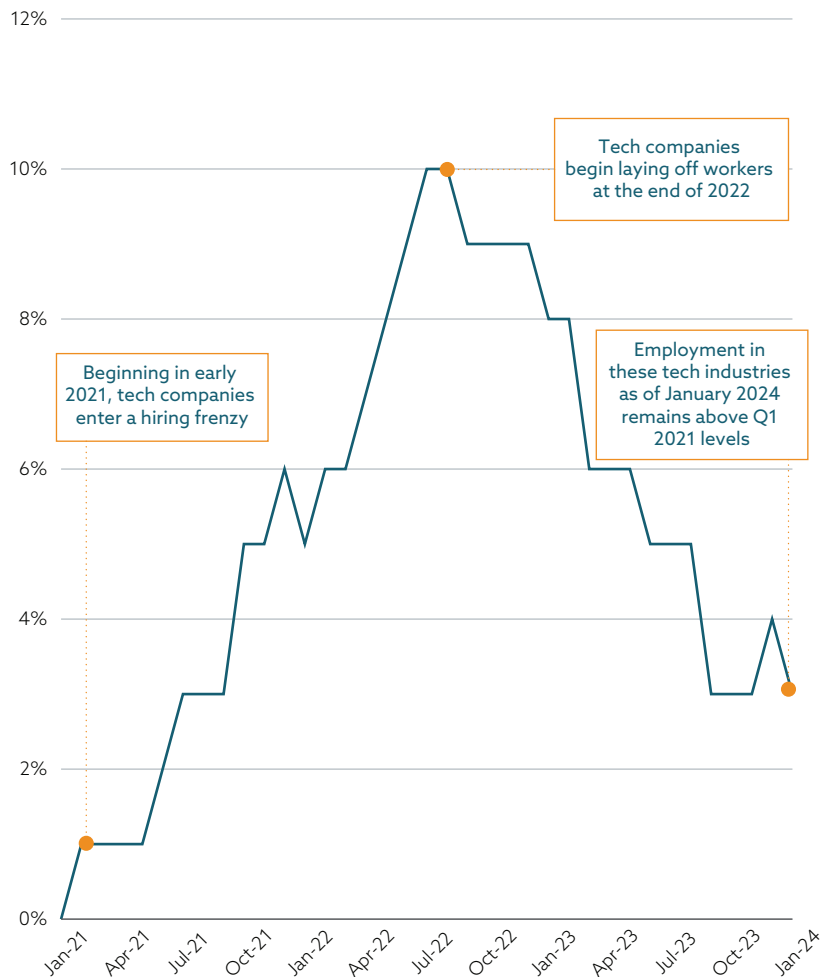
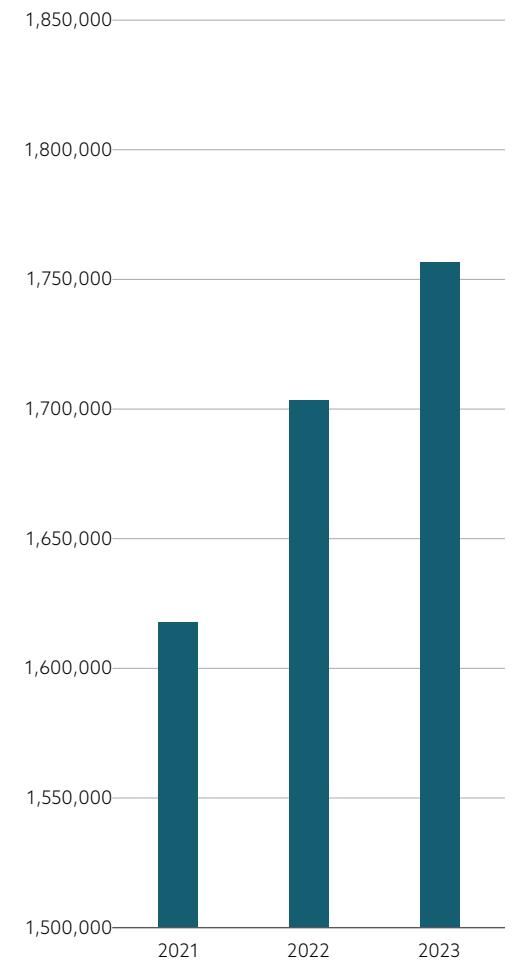


FIGURE 8: TOTAL TECH EMPLOYMENT

2021-2023



Note: Includes industries where Tech layoffs have primarily occurred and are included in monthly CES estimates. Industries included are Software Publishers, Media Streaming Distribution Services and Social Networks, Telecommunications, Data Processing and Hosting, and Computer Systems Design.

Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau; California Economic Development Department Current Employment Statistics (CES); Layoffs.fyi

In addition to rapid growth, the Tech Sector also provides high-quality jobs. The Tech Sector has an average annual wage of nearly \$200,000, paying 2.4 times higher than the average annual wage (\$80,490) across all industries (Table 3). Each of the eight Tech subsectors pay above the statewide average as well.

TABLE 3: TECH EMPLOYMENT AND WAGES BY SUBSECTOR

2023

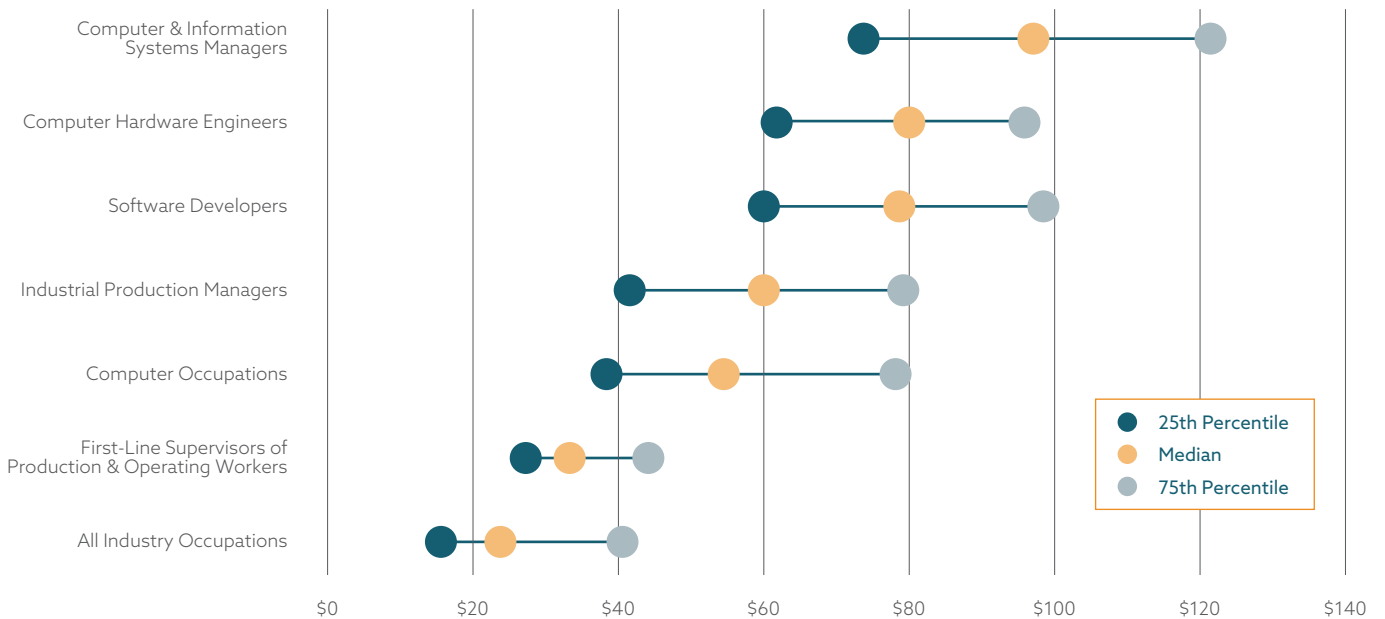
SUBSECTOR	AVERAGE ANNUAL WAGES
Software	\$287,937
High-Tech Manufacturing	\$281,807
Scientific R&D	\$216,678
Information Technology	\$192,689
Entertainment	\$167,169
Aeronautics & Space	\$121,875
Green Technology	\$120,070
Architecture & Engineering	\$119,703
Total Tech Sector	\$196,010
Total All Industries	\$80,490

Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau

Occupations in the Tech Sector tend to have wider wage distributions than the average job in the overall economy (Figure 9). This means that different people with similar job functions may earn very different salaries. This can be a good thing; occupations with wide wage distributions mean workers can grow their salaries significantly as they progress through their career. For many Tech Sector jobs, the lowest earning individuals within that occupation group (25th percentile) still earn above the median and even high earners (75th percentiles) in the overall economy.

FIGURE 9: HOURLY WAGES BY PERCENTILE FOR MAJOR TECH SECTOR JOBS

2022



Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau



Its high-skilled workforce means the Tech Sector plays a critical role in the health of regional innovative ecosystems. The Tech Sector has a strong and symbiotic relationship with universities, for instance. Key players in regional tech hubs, universities provide a high-skilled talent pool and are often centers for research and development. A thriving tech hub provides fertile ground for collaboration between universities and industry — leading to knowledge exchange, technology transfer, and commercialization of inventions. At the same time, tech hubs and universities often engage with local communities through outreach programs, workshops, and events that promote STEM education and serve disadvantaged communities. Universities in ecosystems with a robust Tech Sector also foster strong entrepreneurship among their student bodies, with many going on to start new companies.

It is not a coincidence that many of the top universities in the U.S. are located within or around tech hubs. Measuring university alumni who founded new companies and raised venture capital in the

last decade, Stanford University ranked first in both undergraduate and graduate programs (Table 4). Over the last decade, 1,435 founders holding Stanford undergraduate degrees founded VC-backed companies and raised \$73.5 billion in capital. In terms of graduate degree holders, 2,731 VC-backed founders attended Stanford and raised \$127.2 billion.

California universities have notable representation among these rankings. Three California universities ranked in the top 10 by number of founders from undergraduate programs and two remained on the list for number of founders from graduate programs. In terms of public universities, three University of California schools ranked in the top 10 (Berkeley, Los Angeles, and San Diego) across degree levels. The ecosystems surrounding these universities play a pivotal role in this outcome, encouraging entrepreneurship and fostering innovation. In regions with a thriving ecosystem, students will stay within the university's regional economy to launch startups.

TABLE 4: TOP UNIVERSITIES BY NUMBER OF FOUNDERS

2013-2023

A) UNDERGRADUATE PROGRAMS

UNIVERSITY	NUMBER OF FOUNDERS	VENTURE CAPITAL RAISED (Billions)
Stanford University	1,435	\$73.5
University of California, Berkeley	1,433	\$47.5
Harvard University	1,205	\$51.8
University of Pennsylvania	1,083	\$34.0
Massachusetts Institute of Technology (MIT)	1,079	\$46.0
Cornell University	856	\$30.0
University of Michigan	800	\$25.3
University of Texas	742	\$15.8
University of California, Los Angeles (UCLA)	639	\$17.2
Yale University	638	\$24.0

B) GRADUATE PROGRAMS

UNIVERSITY	NUMBER OF FOUNDERS	VENTURE CAPITAL RAISED (Billions)
Stanford University	2,731	\$127.2
Massachusetts Institute of Technology (MIT)	1,914	\$75.2
Harvard University	1,647	\$75.9
University of California, Berkeley	1,105	\$37.2
Columbia University	912	\$27.2
Carnegie Mellon University	682	\$24.1
Cornell University	595	\$17.9
New York University	575	\$16.9
University of Michigan	553	\$20.5

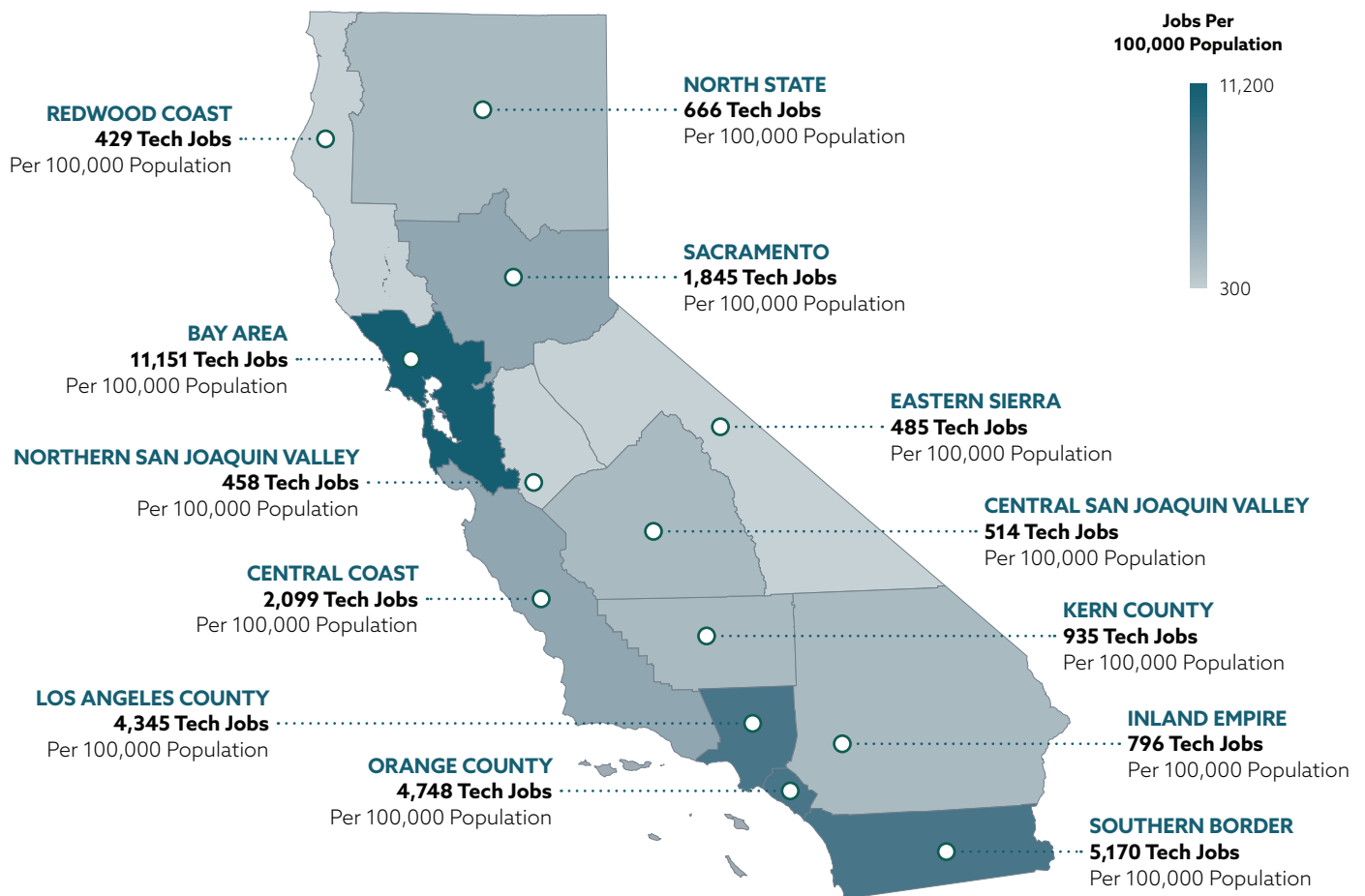
Source: PitchBook

TECH'S STATEWIDE FOOTPRINT

Tech Sector employment is found throughout California (Figure 10). Although Silicon Valley is known for its high concentration of Tech Sector employment, these jobs are found in every region across the state. While the Bay Area, Los Angeles and Orange Counties, and the Southern Border region (which includes San Diego County) have the highest concentration of Tech jobs, other regions have a notable presence as well: the Central Coast (2,099 Tech jobs per 100,000 population), Sacramento (1,845), Kern County (935), and the Inland Empire (796). Still more remote regions like North State, Central and Northern San Joaquin Valley, and Redwood Coast have about 500 Tech jobs per 100,000 of their respective populations.

FIGURE 10: CALIFORNIA TECH SECTOR EMPLOYMENT CONCENTRATION BY REGION

2023



Note: To align with statewide economic development efforts, this analysis uses the 13 regions identified by the California Jobs First Initiative (formerly the California Economic Resilience Fund, or CERF), a statewide program developed by OPR, GO-Biz, and LWDA to support resilient, equitable, and sustainable regional economies.

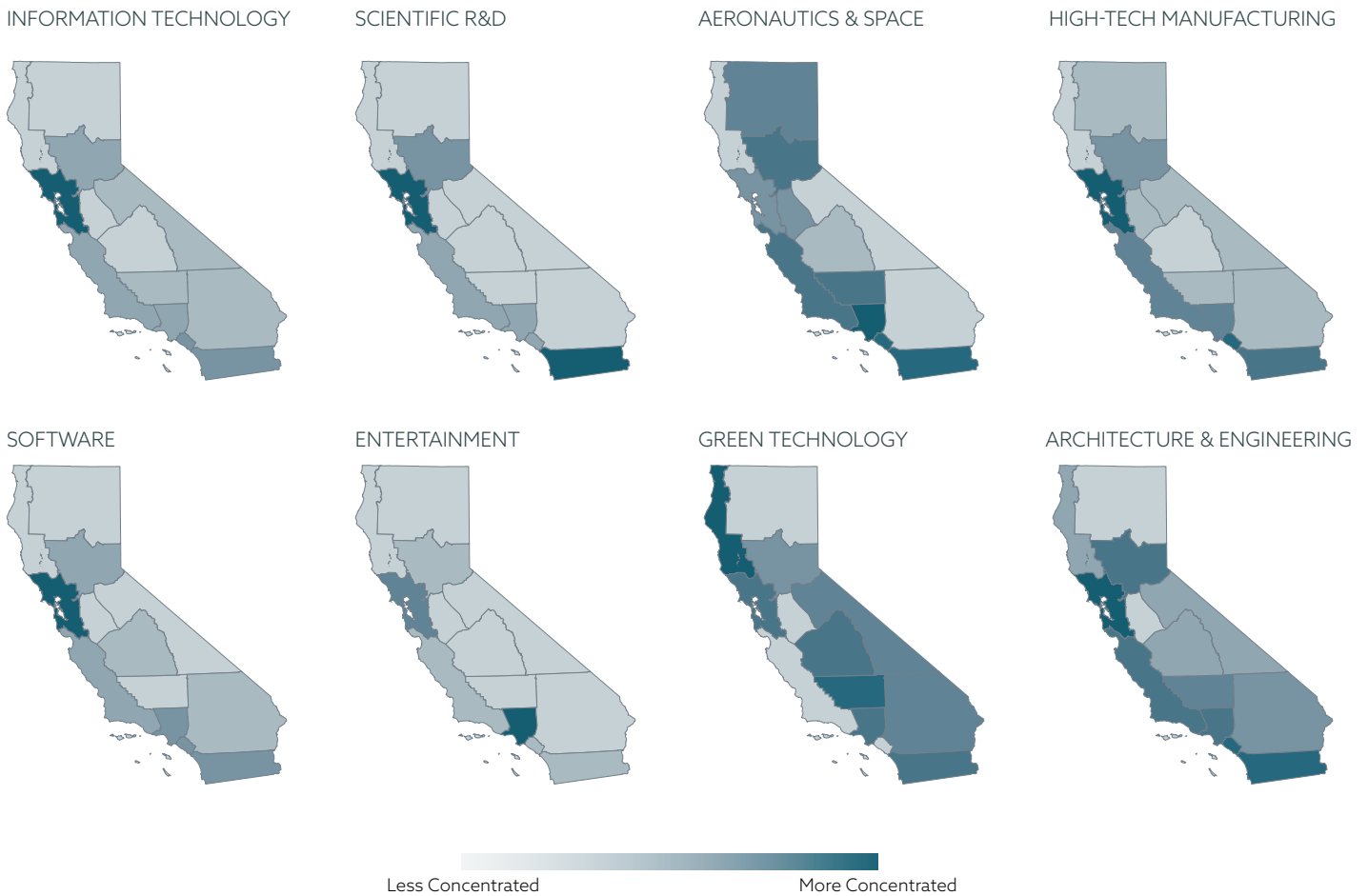
Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau

However, when looking at employment concentrations across regions by each of the eight Tech subsectors, a slightly different picture emerges (Figure 11). Unsurprisingly, the Bay Area is a hub for the two largest services-providing subsectors: Information Technology and Software. The region also has a high concentration of Scientific R&D jobs along with the Southern Border region (San Diego), which is home to a thriving biotech and life sciences industry cluster. Although employment is significantly more concentrated in these regions, jobs in these three subsectors appear throughout the state as well.

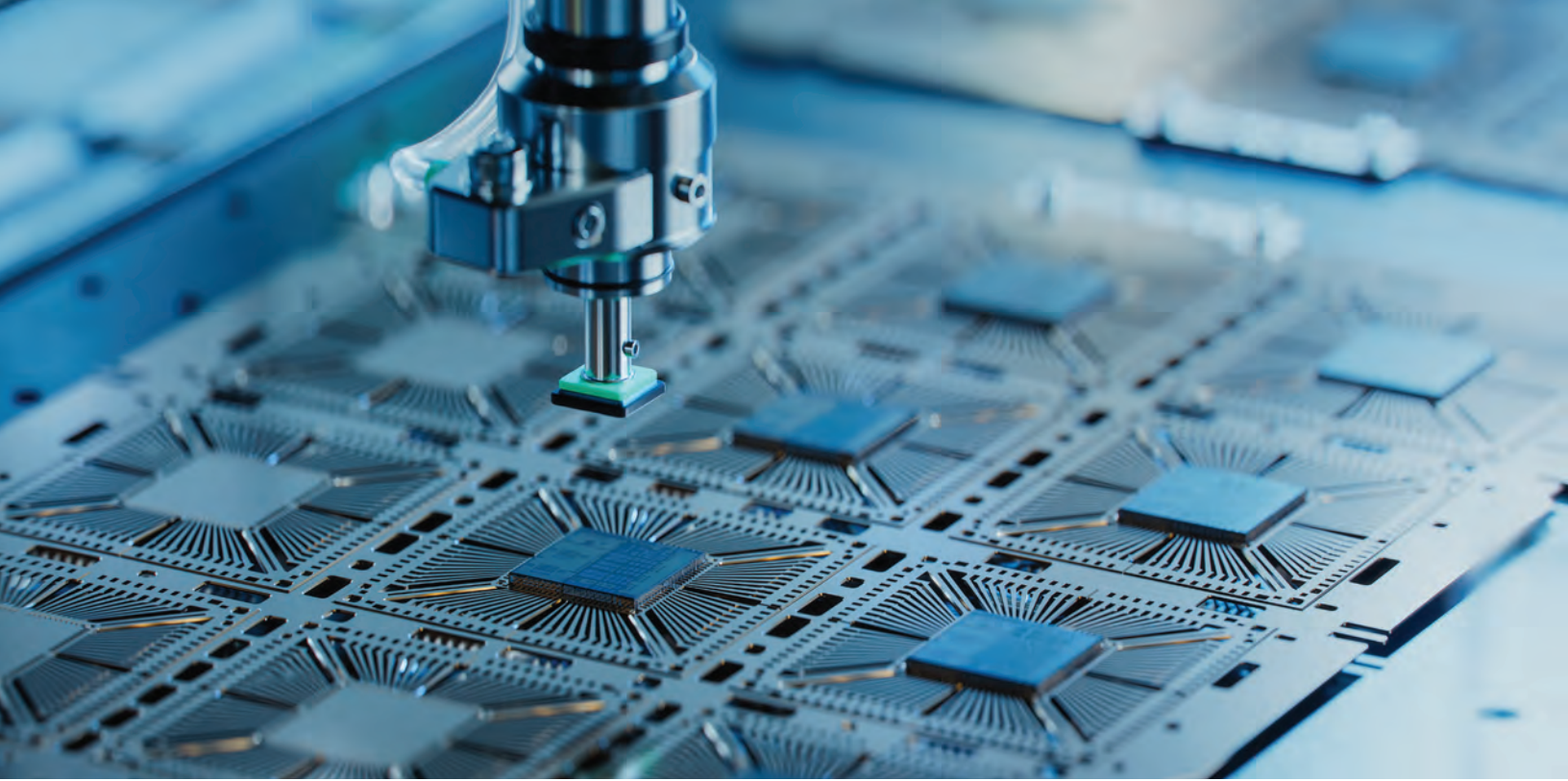
Home to the Hollywood film industry, Los Angeles County has the highest concentration of Entertainment jobs. Green Technology, which includes electric power generation facilities, is most concentrated in the Redwood Coast and in the central and eastern parts of the state. Southern California has an Aeronautics & Space industry cluster, but there is also a notable presence in areas like the Central Coast, Kern County, and Sacramento. High-Tech Manufacturing is highly concentrated in the Bay Area, Orange County, and the Southern Border region, but also has a relatively large footprint in the Central Coast, Los Angeles County, and Sacramento. Finally, Architecture & Engineering employment is more evenly distributed across California.

FIGURE 11: CALIFORNIA TECH SECTOR EMPLOYMENT CONCENTRATION BY REGION AND SUBSECTOR

2023



Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau



ECONOMIC IMPACT

To understand the full breadth of the Tech Sector's impact, this section dives into the additional activity the sector supports through the many other industries that rely on it, as well as through income paid to employees and associated spending.

Every industry is part of a broader regional ecosystem that includes interactions with other industries and consumers. For instance, the Tech Sector supports other industries through its supply chain. At the same time, the Tech Sector pays wages to employees – which are relatively high – who then go and spend their incomes on various goods and services throughout the economy, like at restaurants, dry cleaners, and grocery stores. Measuring this additional activity, which extends beyond the direct industry itself and into upstream and downstream industries and households, provides a clearer picture of the full breadth of the Tech Sector's impact on California's economy.

Economic impact models are designed to capture industry relationships, consumer spending, and ripple effects that result from direct economic activity generated by the sector. These economic impacts are reported as direct impacts, indirect impacts, induced impacts, and gross tax receipts paid. The latter will be explored more in the following section, but the former three are defined below.

- **Direct** contributions comprise the employment and value-added output generated by Tech Sector firms.
- **Indirect** contributions reflect the employment and GRP contribution made by the suppliers of those establishments in the Tech Sector and, in turn, within the supply chains of those suppliers.
- **Induced** contributions estimate the economic activity supported by the consumer spending of wages by those employed directly by companies in the Tech Sector or those in their supply chains.

THE TECH SECTOR'S TOTAL ECONOMIC IMPACT

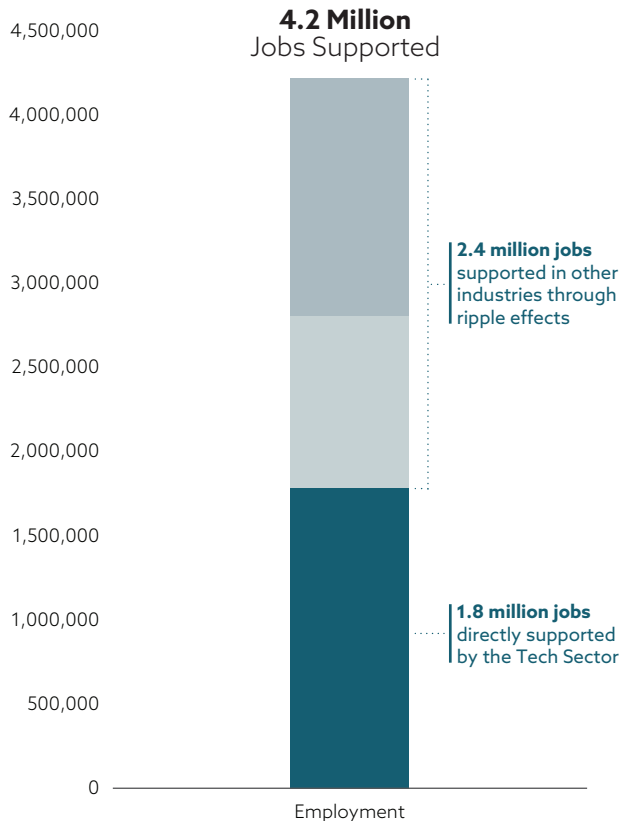
The Tech Sector's total economic impact is far-reaching. In 2023 — when taking multiplier effects (indirect and induced) into account — the Tech Sector supported 4.2 million jobs and generated \$970.7 billion in GRP in California (Figure 12).

In terms of employment, 2.4 million jobs were supported in other industries through ripple effects. The Tech Sector has a relatively high employment multiplier — meaning for every job directly employed by the Tech Sector, more jobs are supported in other associated industries. In other words, for every 1,000 jobs directly employed by the Tech Sector, an additional 2,400 jobs are supported in other industries as Tech's reach ripples throughout the economy.

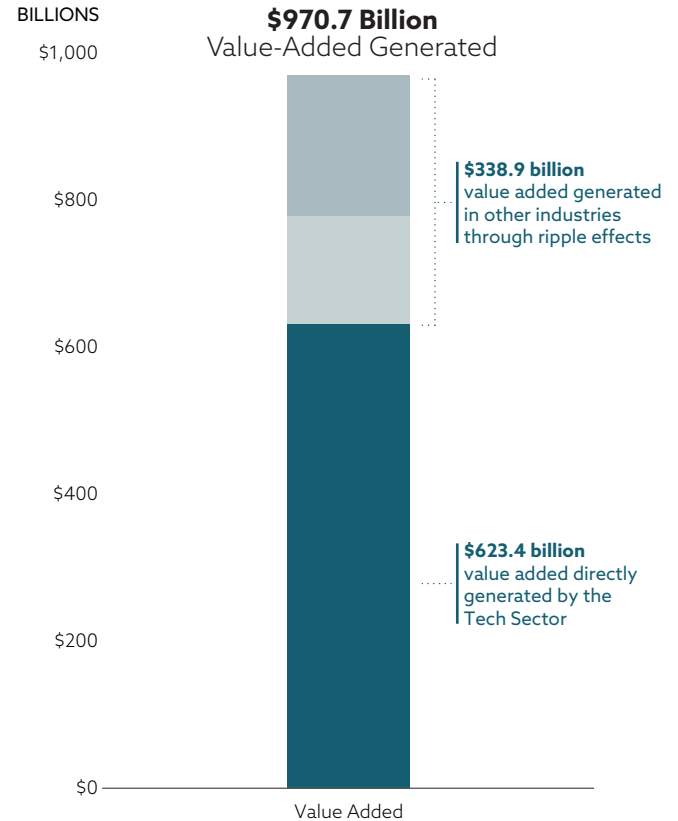
In terms of value-added (contributions to GRP), the Tech Sector generated \$338.9 billion in other industries through ripple effects. This means that for every \$1 million of value-added directly generated by the Tech Sector, an additional \$1.6 million is generated by other industries stemming from Tech Sector activity.

FIGURE 12: TOTAL ECONOMIC IMPACT OF CALIFORNIA'S TECH SECTOR
2023

A) EMPLOYMENT



B) VALUE-ADDED

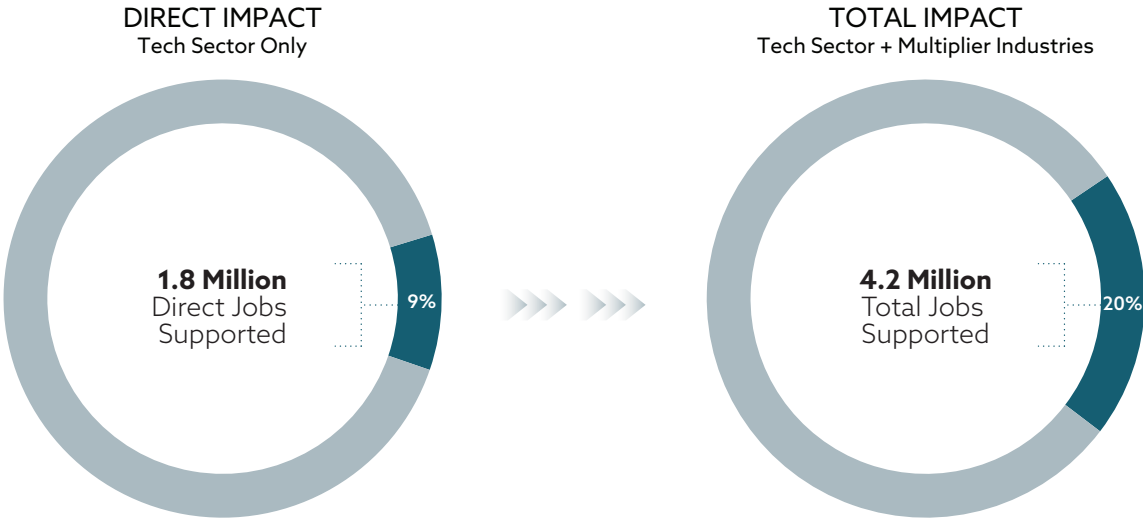


Source: CVL Economics; IMPLAN; U.S. Bureau of Labor Statistics; U.S. Census Bureau; U.S. Bureau of Economic Analysis

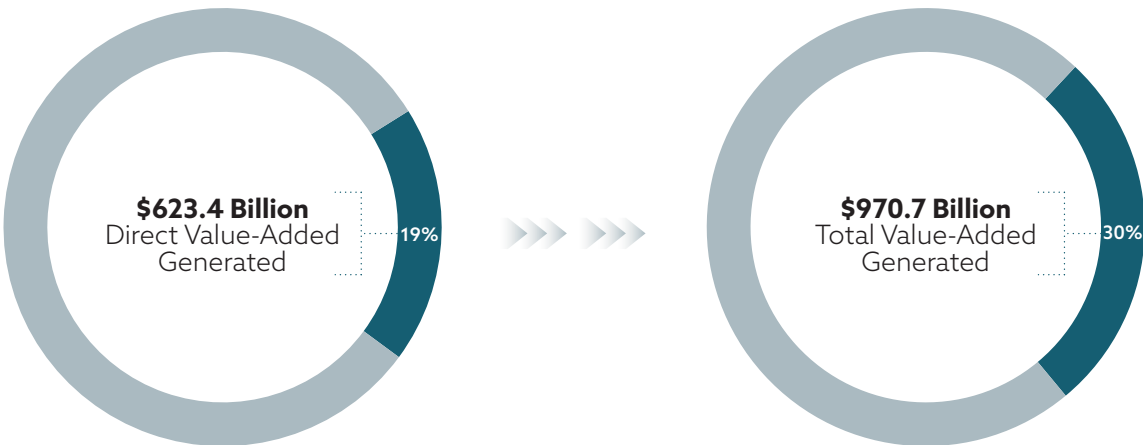
With the addition of supported industries through ripple effects, the total employment and value-added impacts translate to the Tech Sector accounting for an even larger share of the state economy (Figure 13). In terms of employment, the 9% of California jobs the Tech Sector directly employs grows to 20% when factoring in other industries that the Tech Sector supports. In terms of the Tech Sector’s contributions to GRP, the 19% of California GRP the Sector directly accounts for grows to 30% of state GRP when considering the multiplier impacts.

FIGURE 13: TECH SECTOR DIRECT AND TOTAL IMPACT AS A SHARE OF TOTAL CALIFORNIA ECONOMY 2023

A) EMPLOYMENT



B) VALUE-ADDED



Source: CVL Economics; IMPLAN; U.S. Bureau of Labor Statistics; U.S. Census Bureau; U.S. Bureau of Economic Analysis

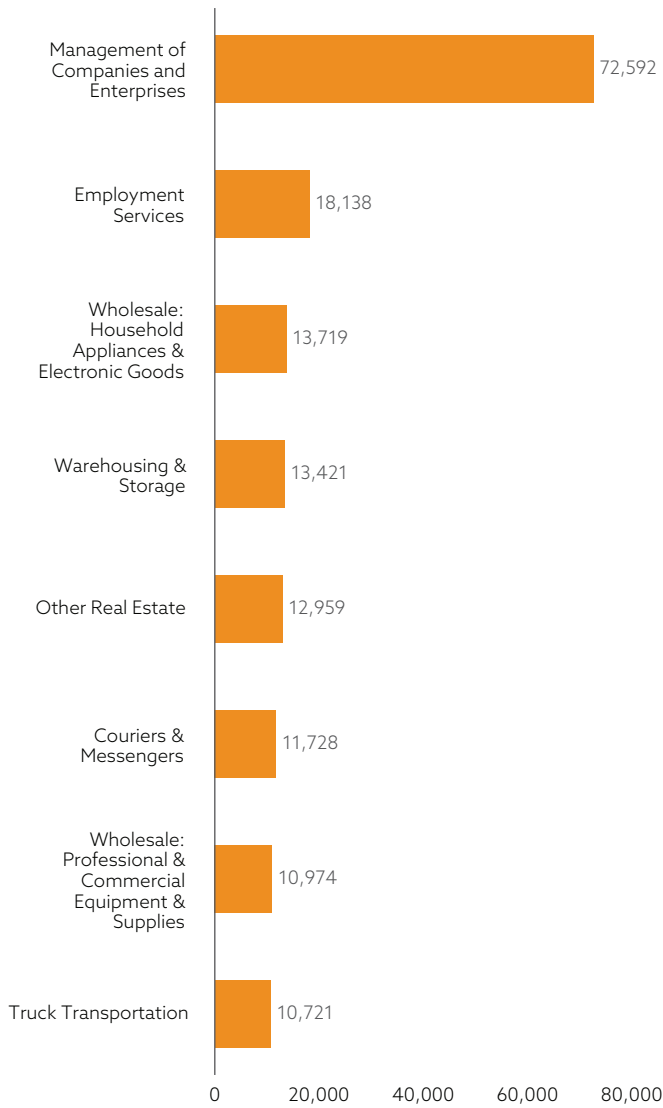
There are many different types of other industries that are supported by Tech Sector activity. Because the work stemming from goods-producing and services-providing industries vary, the respective supply chain industry impacts (indirect effect) have been broken out between the two industry groups in Figure 14. For Tech's goods-producing sectors, the industries most supported down the supply chain

include Management of Companies & Enterprises (e.g., holding companies), Employment Services (e.g., employment placement agencies), Wholesale: Household Appliances & Electronic Goods and Warehousing & Storage. Tech's services-providing sectors primarily support Employment Services, Real Estate, and Management Consulting Services industries.

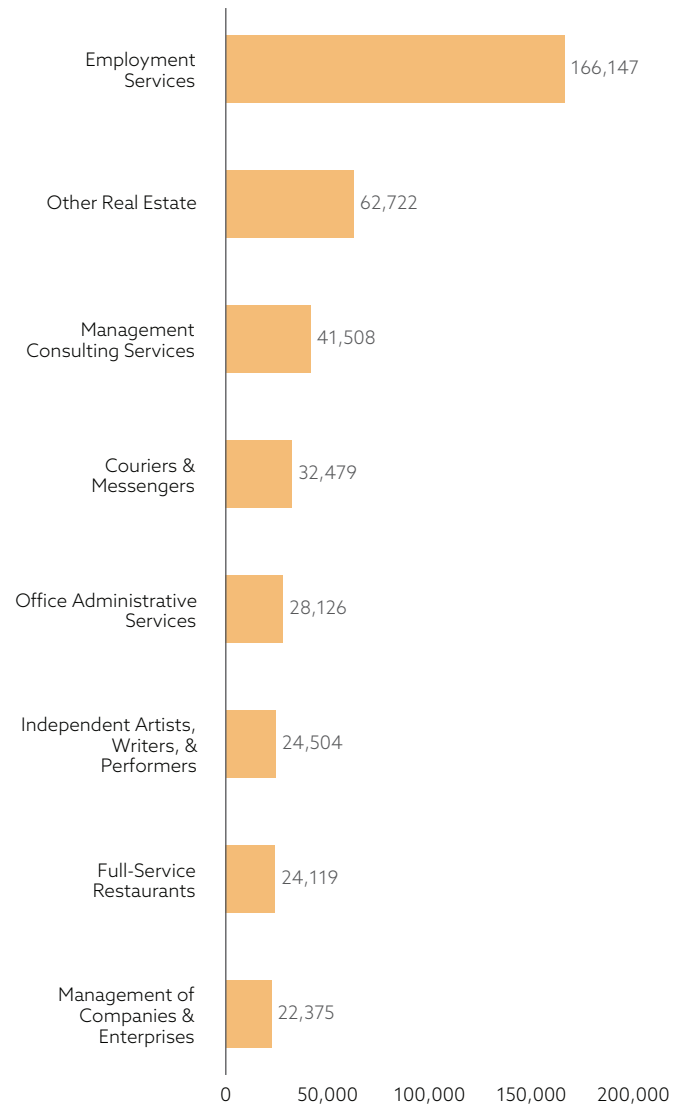
FIGURE 14: TECH-SUPPORTED EMPLOYMENT IN CALIFORNIA THROUGH THE SUPPLY-CHAIN IN TOP INDUSTRIES (INDIRECT EFFECT)

2023

A) TECH GOODS-PRODUCING INDUSTRIES IMPACTS



B) TECH SERVICES-PROVIDING INDUSTRIES IMPACTS

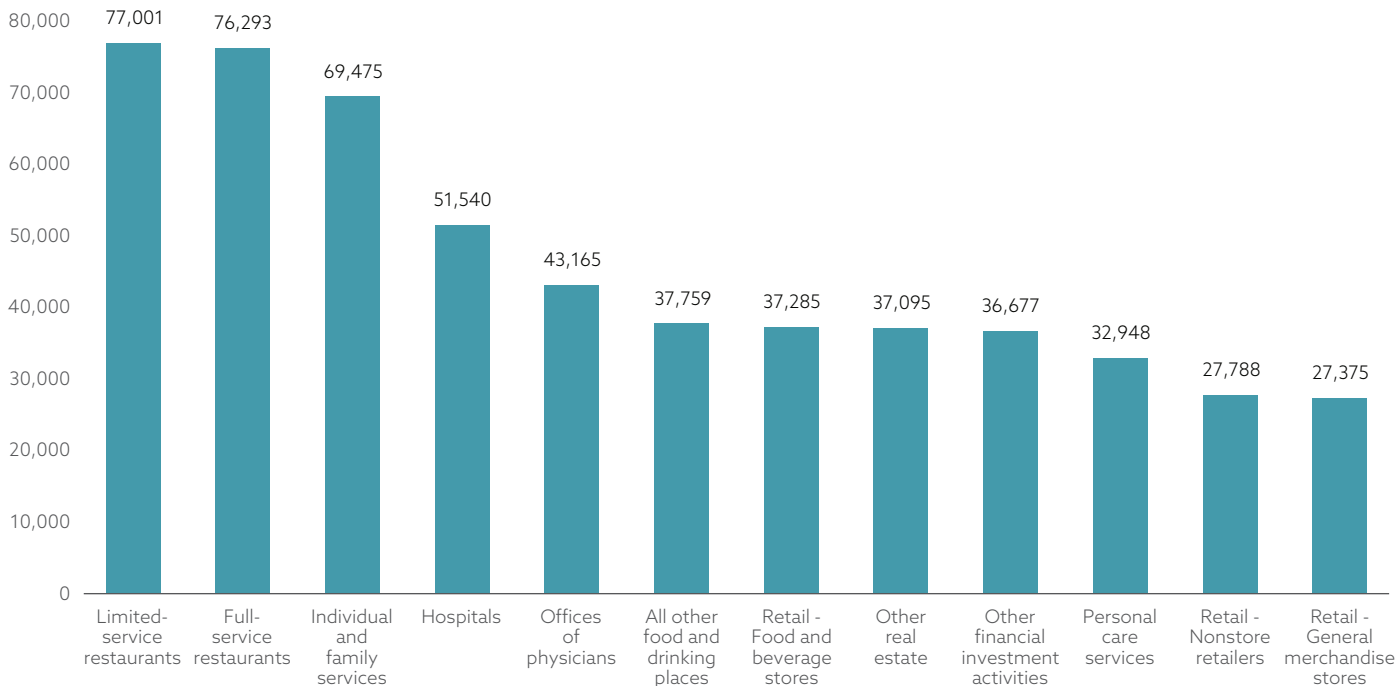


Source: CVL Economics; IMPLAN; U.S. Bureau of Labor Statistics; U.S. Census Bureau; U.S. Bureau of Economic Analysis

Regarding induced effect impacts, because the Tech Sector is a high-paying industry, Tech employees have more money to spend on various goods and services. The wages paid to employees ripple throughout the economy as households spend their income on various goods and services. In addition to the wages paid directly within the Tech Sector, the sector also supports the labor income of employees in supporting industries (e.g., supply-chain industries). The major spending categories that Tech-supported employees spend their income on are at Restaurants (supporting over 150,000 jobs in the restaurant industry), on Individual and Family Services (69,475 jobs), health care-related services, retail, and personal care services (Figure 15).

FIGURE 15: TECH-SUPPORTED EMPLOYMENT IN CALIFORNIA BY HOUSEHOLD SPENDING IN TOP INDUSTRIES (INDUCED EFFECT)

2023



Source: CVL Economics; U.S. Bureau of Labor Statistics; U.S. Census Bureau

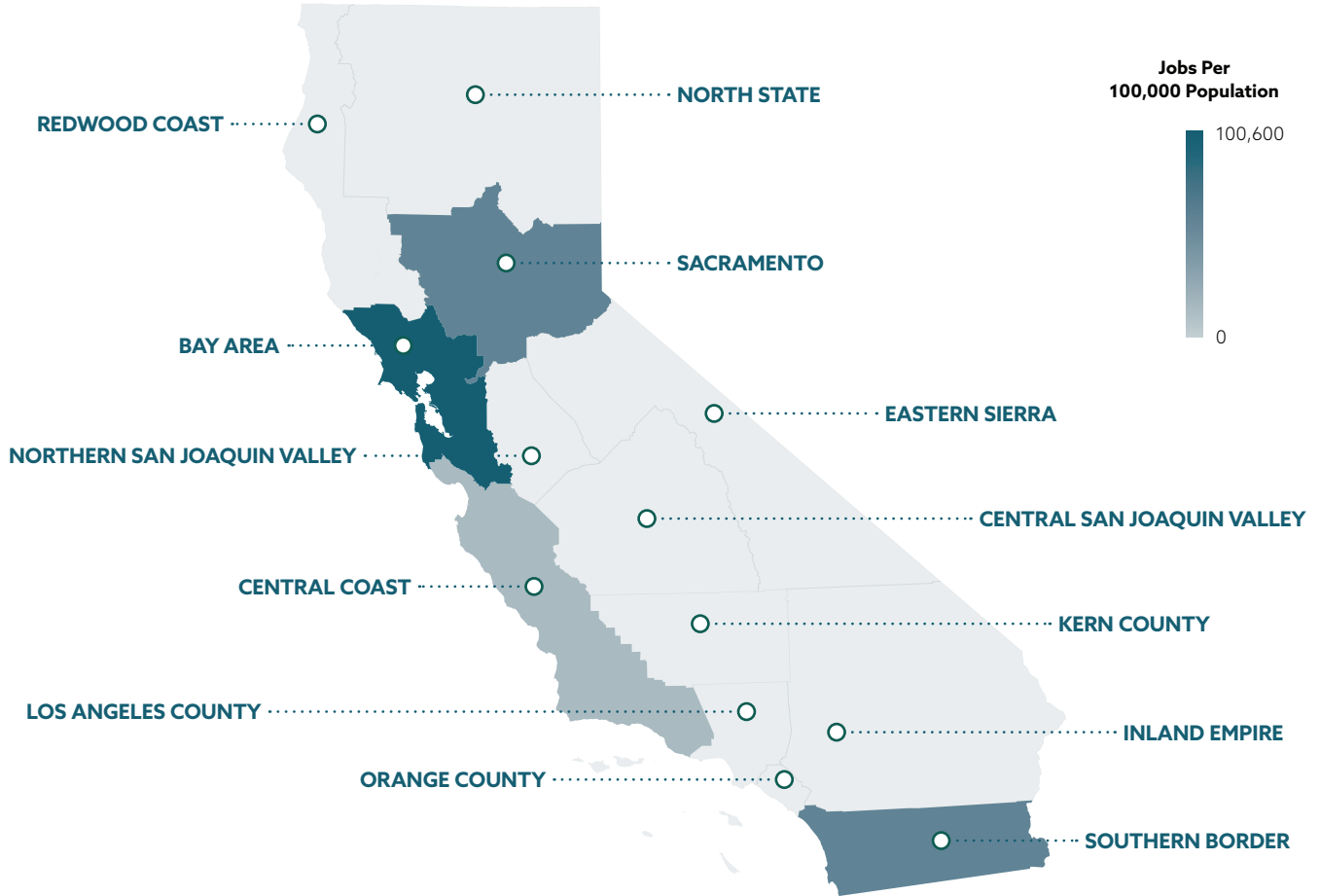
The jobs supported through the induced effect are unique from those impacted through business-to-business interactions in the direct and indirect effects. Unlike the latter two, jobs supported through the induced effect stem from household spending. Whereas industry and supply-chain impacts occur at the place of business, household spending impacts largely occur in communities where workers live.

Because the Tech Sector pays relatively high wages, employees have more disposable income to spend

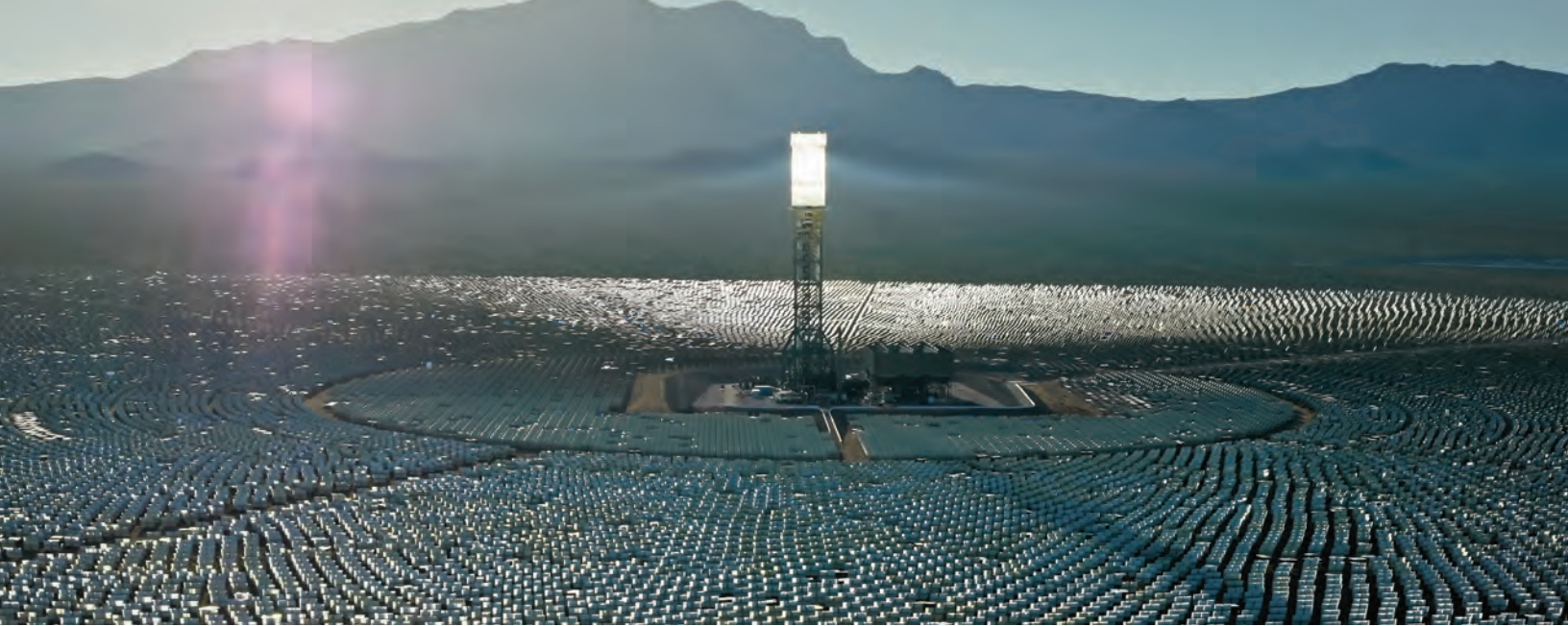
at restaurants, grocery stores, and retail shops, and on health care, childcare services, and personal care. In the Bay Area, which has the highest average Tech Sector wage, the impact of higher spending is more pronounced (Figure 16). But the diverse set of industries the Tech Sector comprises and supports means the communities where people live across the state are benefiting from household spending that stems from Tech-related employment.

FIGURE 16: CONCENTRATION OF TECH-SUPPORTED EMPLOYMENT BY HOUSEHOLD SPENDING (INDUCED EFFECT)

2023



Source: CVL Economics; IMPLAN; U.S. Bureau of Labor Statistics; U.S. Census Bureau; U.S. Bureau of Economic Analysis



FISCAL IMPACT

On January 10, the Governor released his proposed 2024–25 California state budget, which projected a \$38 billion deficit.¹ The projected shortfall largely stems from state revenue collections falling \$44 billion below expectations for fiscal years 2022–23 through 2024–25. This drop became clear only recently, as the Internal Revenue Service extended 2022 tax filing deadlines from April to November last year. Recent tax filings reflect the impact of steep downturns in the stock market in 2022, which affected income tax collections from high-earning Californians and corporations, and the economic slowdown resulting from Federal Reserve interest rate hikes.²

As results for the 2023 tax year are coming to light, 2023 cash receipts have also fallen short of expectations. The Governor’s May Revision estimates that the budget shortfall has increased about \$7 billion, generating a combined \$44.9 billion deficit for fiscal year 2024–25. Although a \$17 billion early actions budget deal between the Governor and

Legislature in early April offset some of this deficit — bringing the total budget shortfall to \$27.6 billion — this is not a long-term solution for the state’s budget shortfall. Needless to say, generating tax dollars will be critical to uplift the state from its current — and future — fiscal situation.

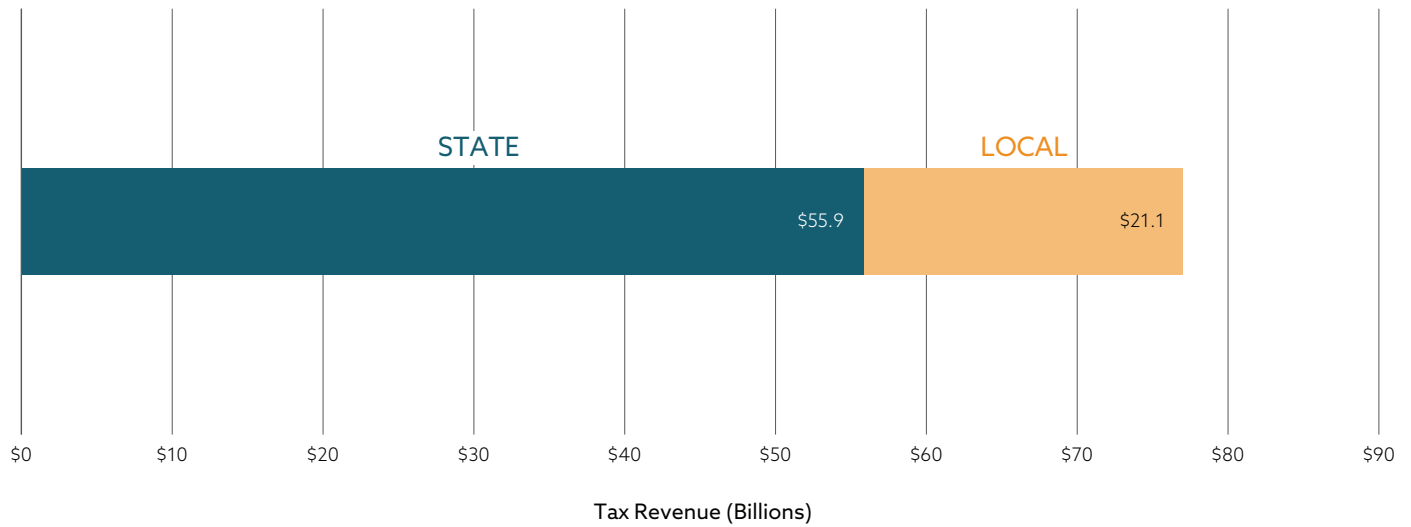
The previous section highlighted the Tech Sector’s sizeable impacts on California employment and contributions to gross regional product (value-added). Through this economic activity — through both direct and ripple effects — the Tech Sector generates significant tax revenue that supports federal, state, and local governments. To provide a better understanding of the Tech Sector’s role in California’s fiscal health, this section focuses on Tech’s fiscal impact on state and local governments.

The Tech Sector and its related activity generated a combined \$77.0 billion in California state and local tax revenue in 2023 (Figure 17). Of this amount, about \$55.9 billion is state tax revenue generated and the remaining \$21.1 billion is local tax revenue generated.

¹2024–25 Governor’s Budget

²California Budget & Policy Center

FIGURE 17: CALIFORNIA STATE AND LOCAL TAX REVENUE GENERATED BY TECH-SECTOR ACTIVITY
2023

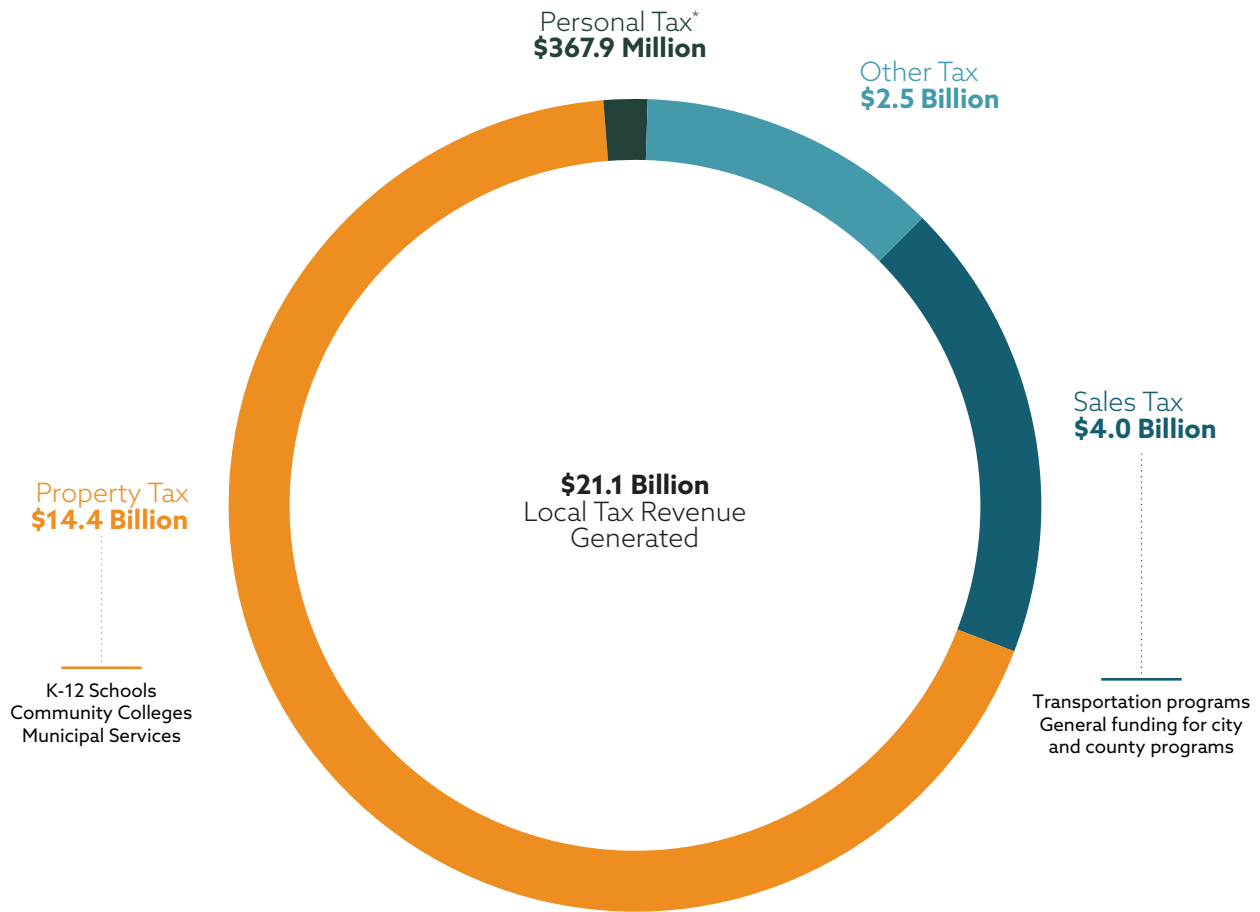


Note: Includes tax revenue generated through the direct, indirect, and induced effects.

Source: CVL Economics; IMPLAN (2022); U.S. Bureau of Labor Statistics; U.S. Census Bureau

In terms of the \$21.1 billion generated in local tax revenue, most was generated through property tax (\$14.4 billion) and sales tax (\$4.0), followed by personal tax (\$367.9 million) – which primarily includes taxes on property income as payroll is not levied at the local level – and other taxes (Figure 18). The contributions made through property tax are especially critical to fund education, including K-12 schools and community colleges, and municipal services such as the fire department, sanitation, water utility management, and street services. Tech’s contributions to sales tax are also significant, supporting various state-supported local programs, transportation programs, and other general funding for city and county programs.

FIGURE 18: TOTAL CALIFORNIA LOCAL TAX REVENUE GENERATED BY TECH SECTOR ACTIVITY
2023

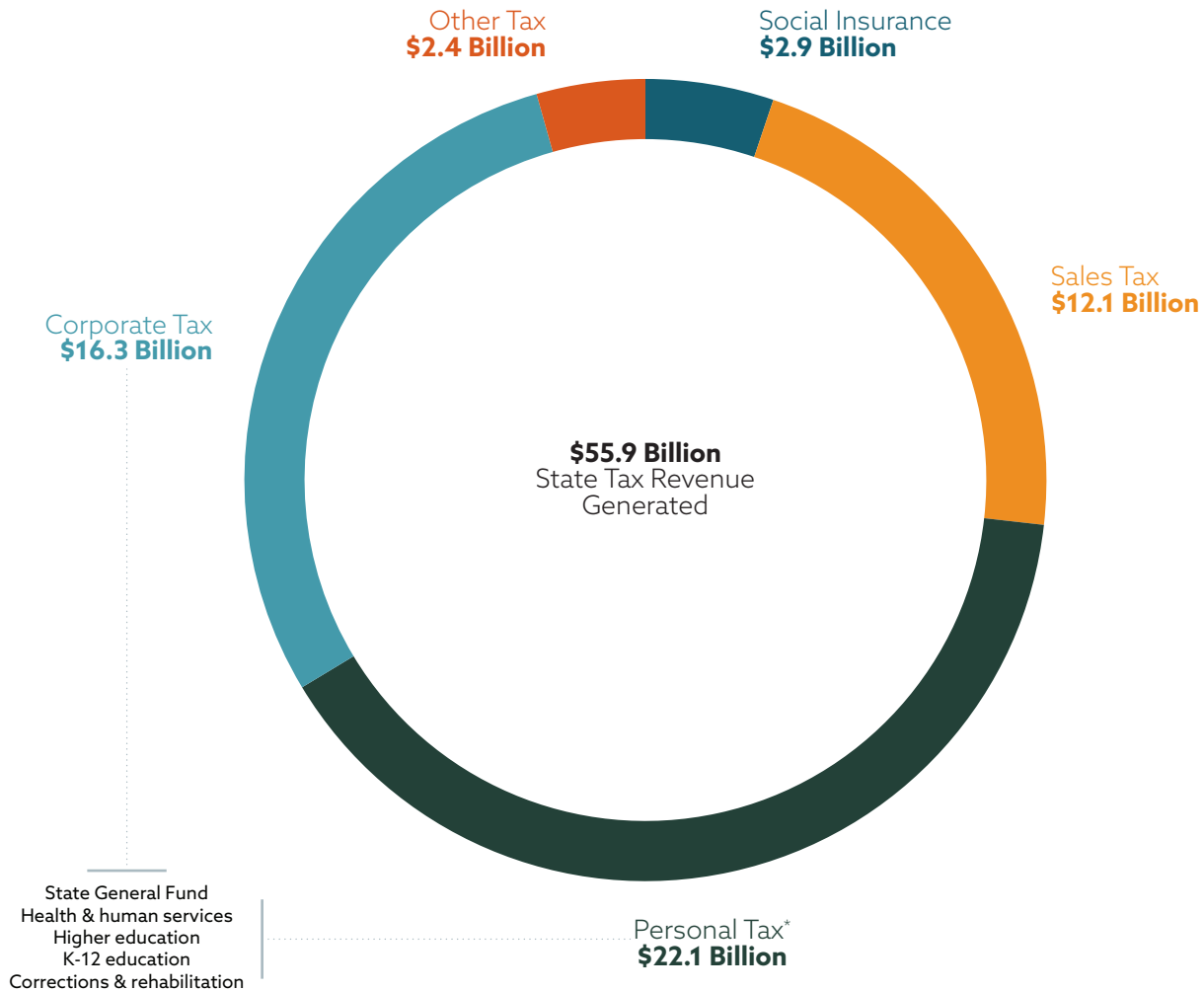


*Note: Personal income tax is not levied at the local level, and therefore Personal Tax includes taxes paid on other forms of income besides payroll that are levied at the local level. Revenue sources vary by local jurisdiction, but primarily include revenue from taxes paid on property income (such as on rental income). All results include tax revenue generated through the direct, indirect, and induced effects.

Source: CVL Economics; IMPLAN (2022); U.S. Bureau of Labor Statistics; U.S. Census Bureau

The Tech Sector is an especially critical source of state tax revenue. Most of the \$55.9 billion in state tax revenue was generated by personal tax (\$22.1 billion), corporate tax (\$16.3 billion), and sales tax (\$12.1 billion) (Figure 19). Other sources include social insurance and other taxes. Tech’s contributions to personal income and corporate taxes are significant – combined they generated \$38.4 billion. Tax revenue from these two categories is critical to supporting the State General Fund, including health and human services, higher education, K-12 education, and corrections and rehabilitation.

FIGURE 19: TOTAL CALIFORNIA STATE TAX REVENUE GENERATED BY TECH SECTOR ACTIVITY
2023



*Note: Personal Tax primarily includes personal income tax, as well as taxes on other forms of income including property income. All results include tax revenue generated through direct, indirect, and induced effects.

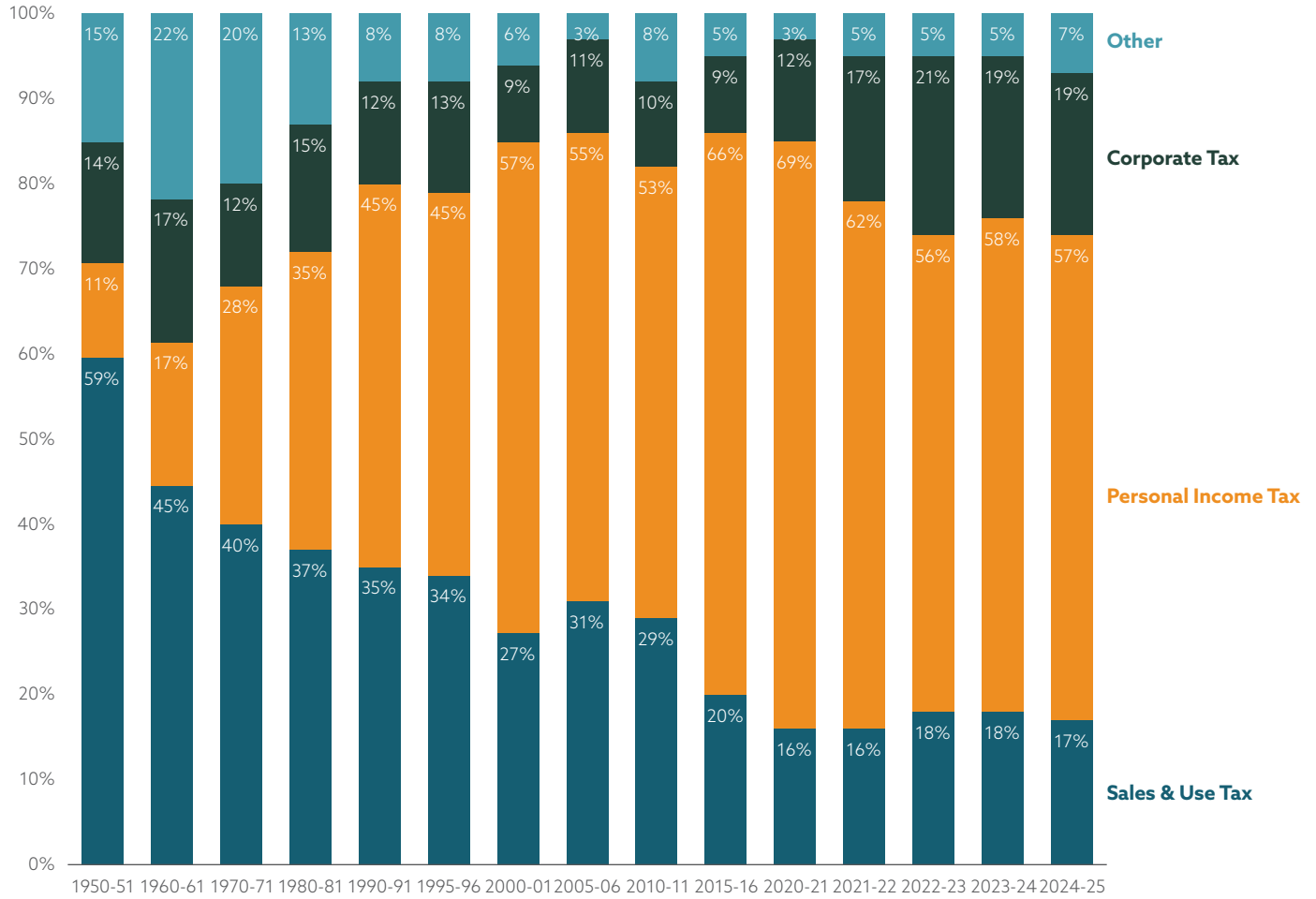
Source: CVL Economics; IMPLAN (2022); U.S. Bureau of Labor Statistics; U.S. Census Bureau

The \$55.9 billion in state tax revenue generated by Tech Sector activity accounted for 30% of California’s total tax revenue in fiscal year 2022–23 (\$181.1 billion). This highlights the significance that the Tech Sector has on California’s fiscal health, which supports programs throughout the state to improve communities.

This is particularly important to think about in terms of the source of tax generation. California’s three largest sources of revenue are personal income tax, corporate tax, and sales and use tax – all of which the Tech Sector significantly contributes to. The 2024-25 Governor’s budget shows personal income tax – comprising taxes on all forms of income, including wages, dividends, interest, capital gains, and other income – accounts for 57% of total state revenue, corporate tax for 19%, and sales and use tax for 17% (Figure 20).

FIGURE 20: CALIFORNIA STATE TAX REVENUE BY SOURCE

FISCAL YEARS 1950-51 TO 2024-25

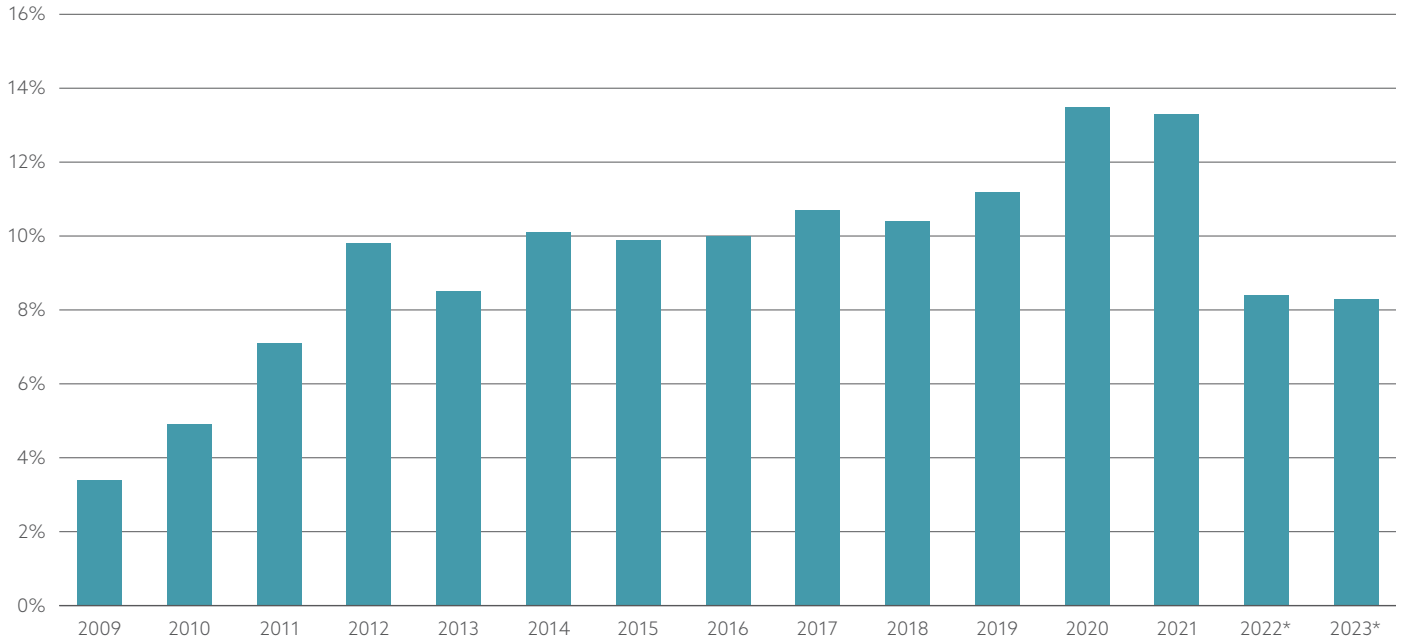


Source: California Franchise Tax Board; 2024-25 Governor’s Budget

The Tech Sector generated \$22.1 billion in personal tax in 2023, which accounted for 22% of total state personal tax revenue. As the single largest source of state revenue, Tech accounts for nearly one-quarter of this revenue source, making it critical to California’s economy. The second largest revenue source generated by the Tech Sector was corporate tax. The \$16.3 billion generated in corporate tax by the Tech Sector accounted for 44% of California’s total corporate tax revenue. In recent years, corporate tax has been a growing revenue source for the state budget.

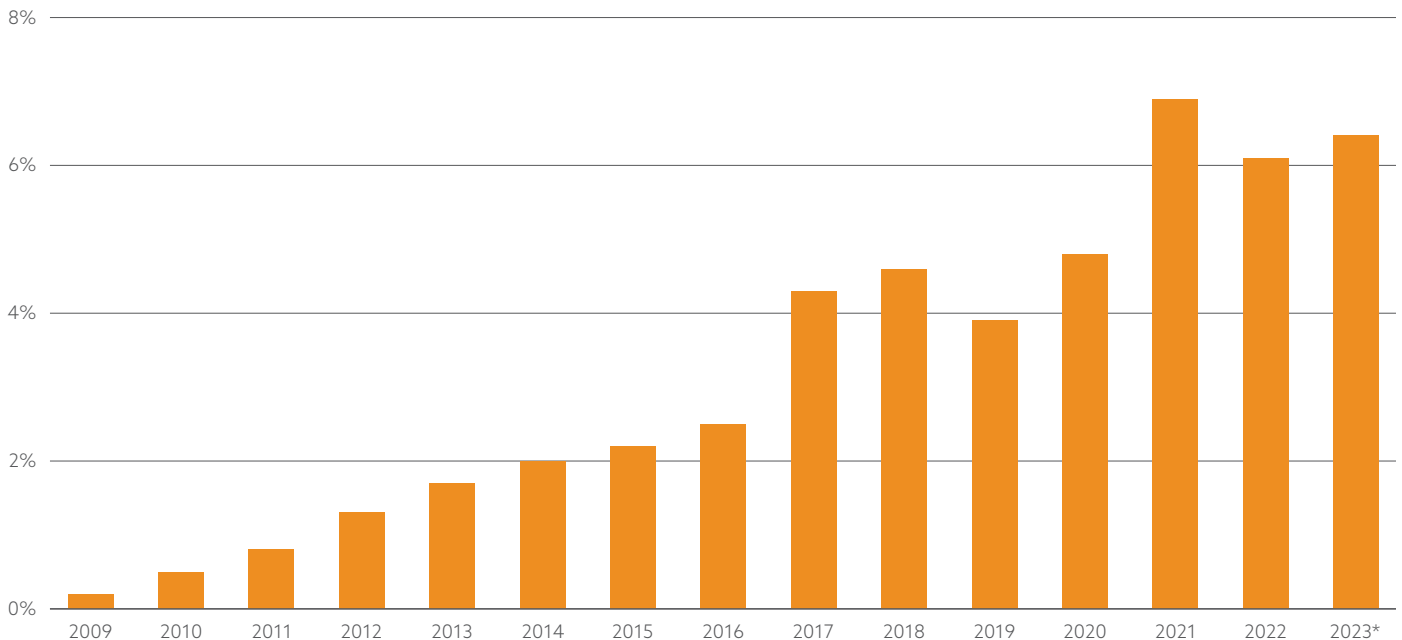
Another significant and growing source of tax revenue is through capital gains. Despite some fluctuations, capital gains as a percentage of General Fund revenue averaged over 10% over the last decade (Figure 21). A major form of capital gains is those made through stocks – and much of those movements are driven by Tech companies. Although stocks are highly volatile, the reality and status quo of California’s fiscal situation is that one out of every \$10 in the General Fund is generated by tax revenue from capital gains. In the long-term, gains from investments like stock equity withholdings are growing and will play an increasing role as a source of revenue for California’s budget (Figure 22).

FIGURE 21: TAX REVENUES FROM CAPITAL GAINS AS A PERCENTAGE OF GENERAL FUND REVENUE
2009 TO 2023



Source: California Franchise Tax Board; Legislative Analyst's Office

FIGURE 22: STOCK EQUITY WITHHOLDINGS AS A PERCENTAGE OF TOTAL INCOME TAX WITHOLDING FOR CALIFORNIA'S LARGEST TECH COMPANIES
2009 TO 2023



Source: California Franchise Tax Board; Legislative Analyst's Office

REGIONAL COMPETITIVE OVERVIEW

Economic growth initiatives in California are often hampered by the state's deep-seated affordability and business challenges. The state's high cost of living, driven by housing shortages and rising rents, exacerbates income inequality and limits economic mobility. Businesses also confront regulatory complexities and high operating costs, which can stifle innovation and competitiveness. California has one of the most complex regulatory frameworks in the country; businesses face stringent environmental regulations, labor laws, and tax policies that increase compliance costs and administrative burdens. At the same time, the high cost of real estate, utilities, and wages in California adds further to businesses' operational expenses. This is particularly challenging for small and medium-sized enterprises (SMEs) that have limited financial flexibility.

While California boasts a highly skilled workforce, the high cost of living makes it difficult for businesses to attract and retain talent. Professionals, especially those in the tech and service industries, are often lured by more affordable living conditions in other states.

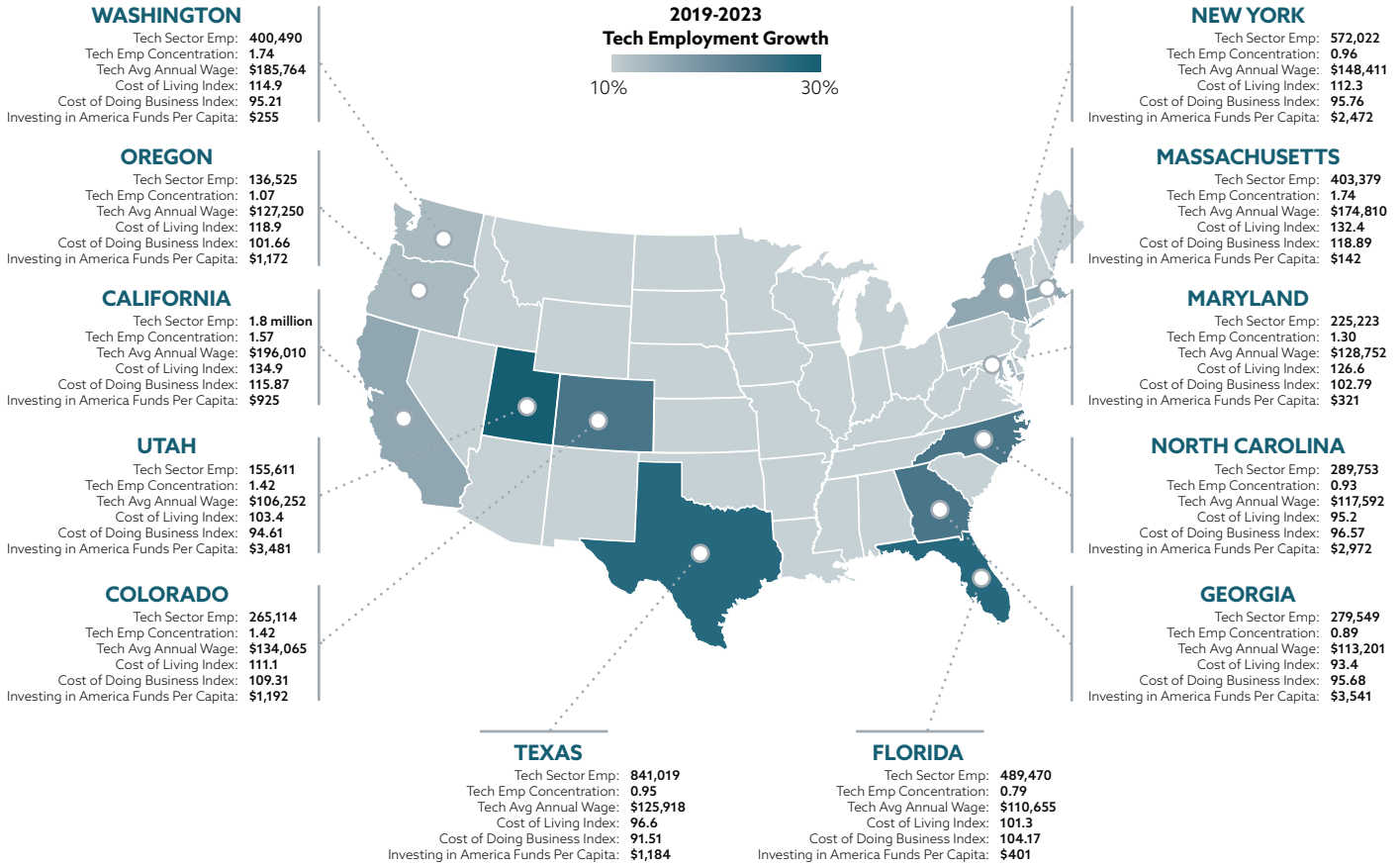
Now more than ever, California is competing with other jurisdictions that offer business-friendly environments, appealing tax incentives, and lower costs of living. In recent years, California's high costs and strict regulations have fueled a corporate exodus, with many large firms exiting the state — including the headquarters of large firms like Hewlett-Packard and Oracle — leaving a dent on regional employment.

On top of this, record federal investments are being made across the country in research, development, and manufacturing. The federal government's Investing in America Agenda — which includes the CHIPS and Science Act, Inflation Reduction Act, and the Infrastructure Investments and Jobs Act — aims to spur tech innovation and bring manufacturing back to the U.S. after decades of offshoring.

Public and private investments have been made across the country in semiconductors, clean energy manufacturing, biomanufacturing, and batteries production. The Tech Hubs Program, funded through the CHIPS and Science Act, will invest in regions to develop and grow American innovation, manufacturing, and high-quality jobs across the country — transforming them into globally competitive resource centers.

California has the largest Tech Sector employment than any other state by far, although part of this is attributable to its sheer size (Figure 23). That's not to say California's Tech hubs are insignificant; indeed, the state has one of the highest Tech employment concentrations behind just Washington and Massachusetts. Yet, these three states saw little Tech employment growth over the last five years compared to others, especially in states where Tech employment is currently less concentrated, such as Texas, Florida, Georgia, and North Carolina. Utah and Colorado, both of which already have high concentrations of Tech employment, also experienced significant growth in this period. Utah stands out in particular, ranking first in five-year employment growth in both goods-producing and services-providing Tech industries.

FIGURE 23: 5-YEAR EMPLOYMENT GROWTH AND SUMMARY INDICATORS OF STATES WITH GROWING AND HIGHLY CONCENTRATED TECH SECTORS
2019 TO 2023



Note: Investing in America Funds include (as of March 2024) private investments through the Infrastructure Investment and Jobs Act, CHIPS and Science Act, and the Inflation Reduction Act in areas like semiconductors and electronics, EVs and batteries, clean energy manufacturing, biomanufacturing, and clean power. Funds Per Capita are calculated using 2023 population data. Employment Concentration is calculated as the industry location quotient. The Cost of Doing Business Index is a Moody's Analytics calculation factoring in labor costs, energy costs, office rent, and tax burden. The Cost of Living Index is a C2ER calculation factoring in costs related to grocery items, housing, utilities, transportation, health care, and miscellaneous goods and services. Data Years: Employment Concentration (2022), Employment (2023), Annual Wage (2022), Cost of Living Index (2022), Business Cost Index (Q3 2023).

Source: CVL Economics; U.S. Bureau of Labor Statistics, U.S. Census Bureau, U.S. Bureau of Economic Analysis; Moody's Analytics, The Council for Community and Economic Research (C2ER), The White House

In terms of wages, California's Tech Sector has the highest annual average wage (\$196,010), followed closely by Washington (\$185,764) and Massachusetts (\$174,810). All the selected states offer competitive Tech Sector wages above \$110,000, on average. However, while California has the highest average annual wage, it also has the highest cost of living. Texas, North Carolina, and Georgia have relatively low costs of living yet still pay a high annual average wage. California also has a relatively high-cost operating environment. Out of the selected states, California followed closely behind Massachusetts as the states with the highest costs of doing business. Texas and Utah had the lowest costs of doing business out of the selected states.

Finally, historic levels of federal investment in research, development, and manufacturing are taking place through the Investing in America Agenda. With the goal of reaching all parts of the country, these investments may reshape tech hubs across the nation. So far, a total of \$649 billion in private investments has been announced through these programs. Funds are reported in per capita terms to adjust for the relative size of each state. California, which has \$36 billion in investment commitments, ranks below most other states on a per capita basis (\$925 per resident). Georgia, which has an even larger total amount of commitments than California (\$39 billion), still ranks first on a per capita basis (\$3,541) among the selected states. Utah ranks closely behind (\$3,481), followed by North Carolina (\$2,972) and New York (\$2,472).

Another metric to measure the health of the Tech ecosystem is venture capital (VC) investment. Between 2021 and 2023, the U.S. saw over \$773 billion in venture capital investment dispersed across the nation. California companies received the vast majority; the state accounted for 45% of all VC investment in that period, with most capital flowing to the San Francisco Bay Area (\$262 billion) and a significant portion to the Los Angeles metro area as well (\$60 billion) (Figure 24).

Yet the market share of California metros has been shifting (Figure 25). Out of the top markets, San Francisco saw the largest decrease in its market share over a five-year period: its share of total U.S. VC investments declined nearly 4 percentage points. The Los Angeles share also declined in this period. Meanwhile, the VC market share of other metros like New York, Chicago, Denver, Austin, and Miami grew in this period.

FIGURE 24: VENTURE CAPITAL INVESTMENT IN TOP MARKETS
2021 TO 2023

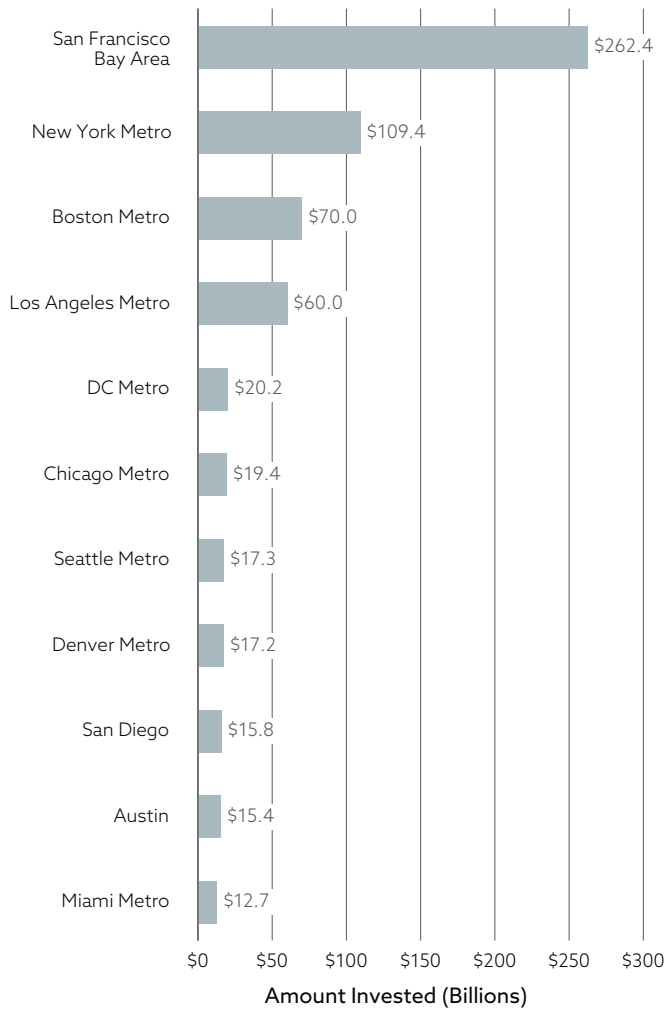
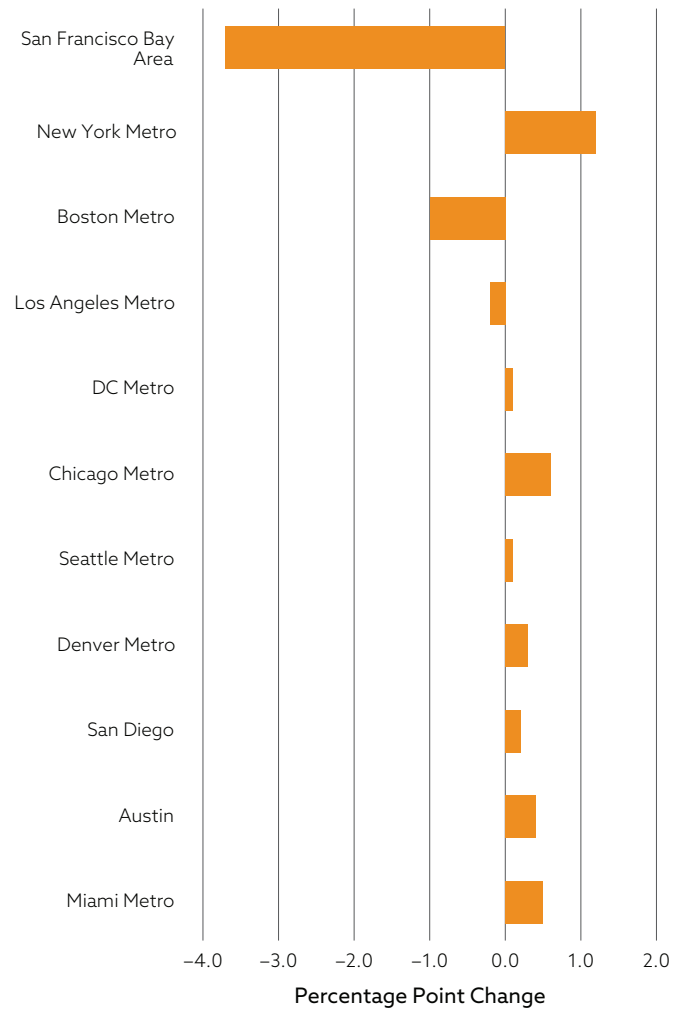


FIGURE 25: PERCENTAGE POINT CHANGE IN VC MARKET SHARE
2015-2017 VS. 2021-2023

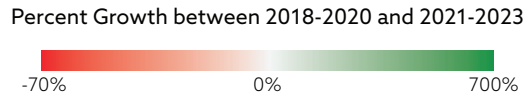
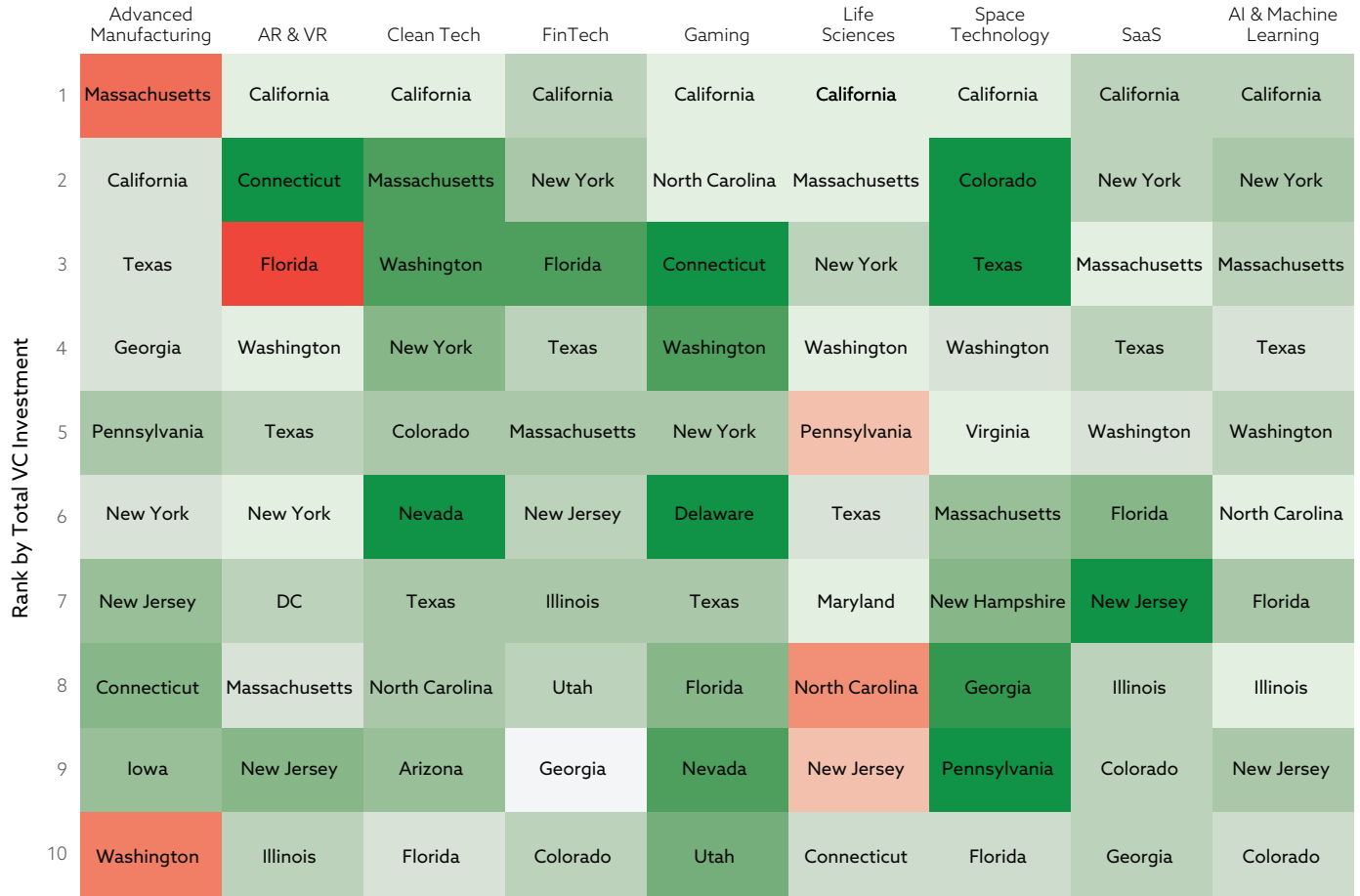


Note: Years are grouped in 3-year periods to control for major fluctuations

Source: CVL Economics; Pitchbook

California remains the leader in all major tech industries in terms of VC investment except for Advanced Manufacturing, where it ranks second after Massachusetts (Figure 26). However, compared to other states, total VC investment in California has grown little over the last five years. In the Gaming industry, Connecticut, Washington, Delaware, Nevada, Utah, and Florida, all experienced significant growth in VC investment. In the Space Technology Industry, significant VC growth took place in Colorado, Texas, Pennsylvania, and Georgia.

FIGURE 26: VENTURE CAPITAL GROWTH BY INDUSTRY IN TOP 10 STATES FOR EACH INDUSTRY
2021 TO 2023



Note: Years are grouped in 3-year periods to control for major fluctuations

Source: CVL Economics; Pitchbook



FINAL CONSIDERATIONS

As a leader in technology and innovation, California ranks highly — if not first — across most Tech-related indicators, such as Tech employment, wages, federal investment, venture capital investment, and gross regional product. While these metrics are noteworthy, it is important to consider them through a dynamic and relative lens. In terms of dynamics, California's Tech Sector has experienced little growth compared to states like Utah, Texas, Colorado, Florida, and North Carolina, where Tech-related measures like employment and private investment have grown rapidly in recent years. California being the most populous state means that assessing values in absolute numbers can be misleading. One-to-one comparisons should not be made between a state that's home to 40 million people versus one like Utah, which is more than ten times smaller.

California's standing as a global tech hub should not be taken for granted. Its reach touches all corners of the state, not only by its makeup of diverse industries but also through the additional impacts of business-to-business interactions and household spending. The Tech Sector and all the industries that rely on it generate nearly \$1 trillion in economic activity — accounting for 30% of California's total gross regional product. Furthermore, the Sector is a major contributor to state tax revenue. As other jurisdictions offer more business-friendly environments and affordable costs of living, California finds itself in a period of uncertainty. The Tech Sector plays an outsized role in California's economy — there will be major repercussions if that activity moves elsewhere as the state loses its competitive edge.

APPENDIX

TECH SECTOR INDUSTRY CODES

AERONAUTICS & SPACE

336411	Aircraft Manufacturing
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile & Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
517410	Satellite Telecommunications

GREEN TECHNOLOGY

221114	Solar Electric Power Generation
221115	Wind Electric Power Generation
221116	Geothermal Electric Power Generation
221117	Biomass Electric Power Generation
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing

ARCHITECTURE & ENGINEERING

541310	Architectural Services
541320	Landscape Architectural Services
541330	Engineering Services
541360	Geophysical Surveying and Mapping Services
541370	Surveying and Mapping (except Geophysical) Services
541380	Testing Laboratories

INFORMATION TECHNOLOGY

541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services

ENTERTAINMENT

512110	Motion Picture and Video Production
512120	Motion Picture and Video Distribution
512191	Teleproduction and Other Postproduction Services
512199	Other Motion Picture and Video Industries
516210	Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers

SCIENTIFIC R&D

541713	Research and Development in Nanotechnology
541714	Research and Development in Biotechnology (except Nanobiotechnology)
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)

SOFTWARE

513210	Software Publishers
518210	Data Processing, Hosting, and Related Services
519290	Web Search Portals and All Other Information Services

HIGH-TECH MANUFACTURING

325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
333242	Semiconductor Machinery Manufacturing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	Other Communications Equipment Manufacturing
334310	Audio and Video Equipment Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
334419	Other Electronic Component Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories

REGION DEFINITIONS

INLAND EMPIRE

Riverside, San Bernardino

NORTHERN SAN JOAQUIN VALLEY

Merced, San Joaquin, Stanislaus

EASTERN SIERRA

Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, Tuolumne

SACRAMENTO

Colusa, El Dorado, Nevada, Placer, Sacramento, Sutter, Yolo, Yuba

NORTH STATE

Butte, Glenn, Lassen, Modoc, Plumas, Shasta, Sierra, Siskiyou Tehama, Trinity

LOS ANGELES COUNTY

ORANGE COUNTY

CENTRAL COAST

Monterey, San Benito, Santa Barbara, Santa Cruz, San Luis Obispo, Ventura

CENTRAL SAN JOAQUIN VALLEY

Fresno, Kings, Madera, Tulare

BAY AREA

Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma

REDWOOD COAST

Del Norte, Humboldt, Lake, Mendocino

SOUTHERN BORDER

Imperial, San Diego

KERN COUNTY

INPUT-OUTPUT METHODOLOGY AND IMPLAN

The Industry Economic Accounts produced by the Bureau of Economic Analysis (BEA) are a key foundational data source for all input-output models. The BEA's tables provide a summary of how industries produce and consume commodities at the national level. The economic impact analysis in this report utilizes the industry-standard IMPLAN (Impact Analysis for Planning) software. IMPLAN is an input-output modeling system used to build economic models at various levels of geography. IMPLAN is widely used and recognized by government organizations, nonprofits, economic development organizations, workforce planners, education institutions, and consultants across the U.S. and Canada.

For this analysis, CVL Economics tailored the modeling framework specific to the Tech Sector to build an Input-Output (I-O) model to better account for market transactions, capture supply chains across regions, and more accurately estimate regional industry leakages. The impact analyses were estimated using a Multi-Regional Input-Output (MRIO) model, which expands upon the traditional I-O system to include various additional socioeconomic variables, including sub-regional trade and income flows, commuting patterns, and household spending patterns between the 13 identified regions in California, which cover the entire state.