California Research Bureau
California State Library

2021
California Statewide
National Security Economic Impacts

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Requested by

Governor's Office of Planning and Research
Governor's Military Council

Acknowledgements

6 Key Findings

National security agencies are significant employers in the State of California and a major source of business for numerous California industries. This is the fourth annual report the California Research Bureau prepared at the request of the Governor's Office of Planning and Research and the Governor's Military Council that explores the economic impact of national security spending within California.

This report, using fiscal year 2020 public data from the U.S. Departments of Defense (DoD), Homeland Security (DHS), and Veterans Affairs (VA), finds:

1 National security activity generates 792,000 full-time equivalent jobs for residents of the State of California.

This includes 411,000 full-time equivalent jobs (FTEs) directly employed by the national security agencies and their contractors. Among this, DoD, DHS and VA combined employ 348,000 Californians, including 168,000 active duty and 57,000 reserve service members, as well as 120,000 civilian employees. In addition, 67,000 FTEs are employed indirectly through the supply chain of direct activities, and 314,000 FTEs are employed as a result of economic activity induced by the additional money in the economy.

3.2%
since 2019

Induced
314k

Direct
411k

Indirect
67k

FTE Employment
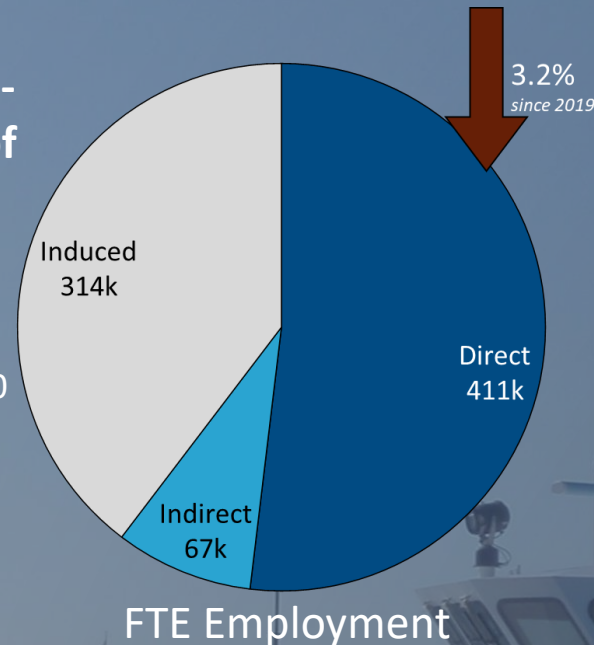
2 National security activity produces $168.7 billion in economic impact across numerous California industries.

$168.7 billion in economic activity represents approximately 5.4% of the state's economy. This includes:

- $93.9 billion of direct economic activity by the agencies and their contractors,
- $15.6 billion of indirect economic activity created through the supply chain of direct activities, and
- $59.2 billion of induced economic activity as a result of additional money in the economy.
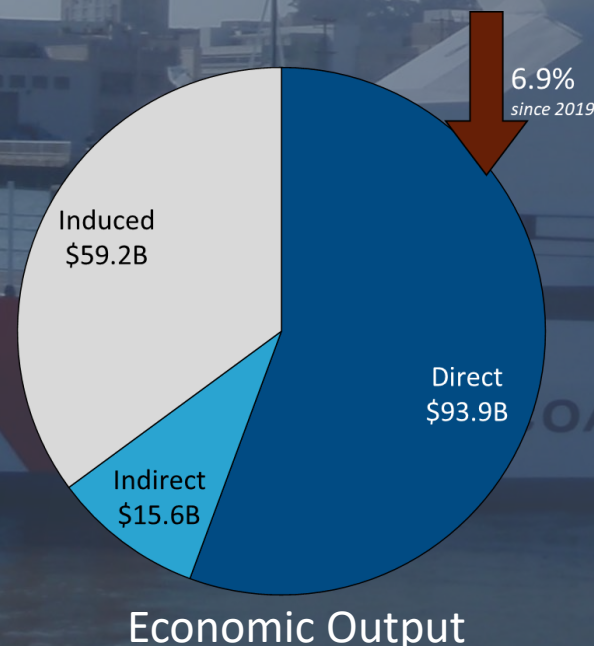
Nearly every industry in the state benefits from national security spending, with the largest impacts in manufacturing (particularly, aerospace and electronics); professional services (particularly, scientific research and development); real estate; insurance; and healthcare.

6.9%
since 2019

Induced
$59.2B

Direct
$93.9B

Indirect
$15.6B

Economic Output

3 **National security employment provided a steady backstop in the COVID-19 recession.**

Statewide employment dropped by 15% at the beginning of the COVID-19 recession. National security employment proved to be one of the more resilient sectors, not only avoiding any losses, but actually increasing by 2% since the start of the pandemic.

4 **California is home to more security-related employment than any other state, and third in spending.**

California has 168,000 active duty service members, more than any other state, ahead of Virginia (130,000), Texas (117,000) and North Carolina (102,000), the next highest states. California's 101,000 civilian employees was second only to Virginia (111,000) while Texas was third (82,000). California also had the third largest share of security-related contracts in 2020 with $31.2 billion across the three departments, trailing Texas ($65.2 billion) and Virginia ($40.6 billion), which saw large increases in 2020.

5 **National security activity generates $22.7 billion in tax revenue for federal, state and local governments.**

Federal tax revenue totals $15.1 billion, including $7.3 billion from payroll taxes, $6.0 billion from income taxes, and $1.8 billion from various business taxes. State tax revenue totals $7.5 billion, including $2.3 billion in state income tax revenue, $2.2 billion in property tax, and $1.5 billion in sales tax, as well as other smaller taxes and fees.

6 **Including a portion of the Department of Energy's activities would increase total economic activity in California by approximately $5.3 billion.**

The estimated portion of Department of Energy (DoE) activity related to national security leads to approximately $5.3 billion in total output and 28,300 FTEs, mostly concentrated in scientific research and development.

U.S. Navy Blue Angels F-18 Hornet combat jets fly in front of the Golden Gate Bridge in San Francisco, California.

Contents

An aerial view of the Port of LA in Los Angeles, California.

California Statewide National Security Economic Impacts, 2021 Update

Introduction

California is home to the nation's largest concentration of military personnel and other national security activity. Around 168,000 active duty military personnel and an additional 57,000 reservists and National Guard are stationed at more than 30 military installations across California.[1] About 1.8 million veterans call California home.[2] National security agencies employ an additional 123,000 civilians in California.[3] In fiscal year 2020, military and other national security activity in the state generated an estimated $168.7 billion in economic activity, approximately 5.4% of California's economy.

The California Research Bureau at the California State Library produced this report with U.S. Department of Defense funding at the request of the Governor's Office of Planning and Research and the Governor's Military Council. The California Research Bureau previously released a report estimating the economic impact of national security spending in California during fiscal years 2016,[4] 2018[5] and 2019.[6] The California Research Bureau used a Department of Defense grant to fund this report, which uses fiscal year 2020 spending and employment data from the Departments of Defense, Homeland Security and Veterans Affairs, to expand existing research to include estimated impacts of national security spending in each of California's 53 congressional districts and 58 counties, which have been published in additional supplements.

Prior to this study, all studies on the impacts of national security spending in California have been limited in geography and/or scope. The Department of Defense provides annual reports on direct spending and employment without conducting economic impact studies.[7] The San

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[1] DMDC (2019) Department of Defense Personnel, Workforce Reports & Publications.
[2] CAVSA (2020) The California Veteran Community: Three Year Review.
[3] Department of Defense, Department of Homeland Security and Department of Veterans Affairs.
[4] Lavelle, DM (2018) California Statewide National Security Economic Impacts. CRB.
[5] Lavelle, DM (2019) California Statewide National Security Economic Impacts, 2019 Update. CRB.
[6] Lavelle, DM (2020) California Statewide National Security Economic Impacts, 2020 Update. CRB.
[7] DOD Office of Local Defense Community Cooperation Defense Spending by State.

Diego Military Advisory Council has produced an economic analysis annually since 2008.[8] It provides similar analysis to this report but is limited to San Diego County. In addition, while a number of other analyses have been completed over the years, they are generally limited to the relative impact of a specific base on its local or regional community.

In addition to the Departments of Defense, Homeland Security and Veterans Affairs, this report begins to consider the impacts of the portion of the Department of Energy activity in California related to national security.[9] In this report, Department of Energy impacts are provided as a supplement and are not included in the overall estimate. Intelligence spending, such as the Defense Advanced Research Projects Agency (DARPA) for example, is included if the source of funding is included under the specified agencies. Other agencies with national security responsibilities either have limited data availability due to security concerns, and/or do not have the data available to disambiguate security and non-security activities within the agency.

Finally, this report includes a section on economic impacts related to COVID-19. While the rest of the economy dropped into recession, losing 15% of employment by April 2020, the national security sector proved to be among the more resilient. The sector not only avoided any losses but saw overall growth over the course of the pandemic.

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[8] SDMAC Military Economic Impact Study.
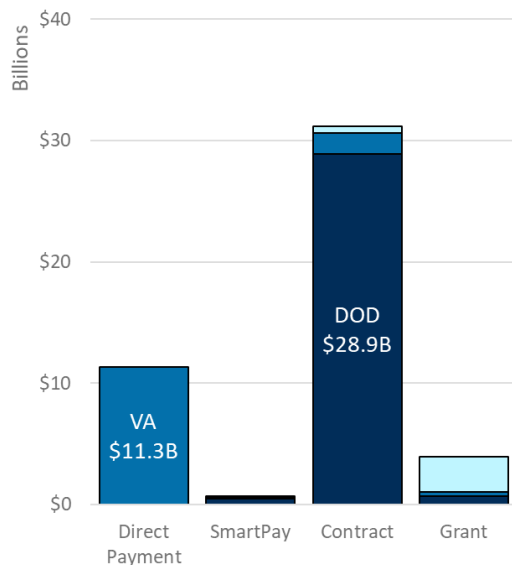[9] Lawrence National Labs Economic Impacts Page.

Direct Activity

The three federal agencies identified – Defense, Homeland Security and Veterans Affairs[10] – collectively spent $47.0 billion and directly employed approximately 348,000 civilian and military residents of California (including reservists and National Guard) in fiscal year 2020.[11] By far, the largest share of spending comes from Defense contracting, totaling $28.9 billion. Direct payments totaling $11.3 billion represented the bulk of the remaining direct spending and Veterans Affairs contracts added an additional $1.7 billion to the total. Homeland Security contracts add about $540 million to the total. In addition, the federal government's charge card program, SmartPay,[12] totals $620 million and grants total $3.9 billion across the three agencies, a bulk of which came from Homeland Security ($2.9 billion). Figure 1 depicts this distribution.

Direct Employment

Direct employment is also concentrated in the Department of Defense, which employed 64,000 civilians, 168,000 active duty personnel and 57,000 reserve and National Guard personnel in fiscal year 2020.[13] The Departments of Veterans Affairs and Homeland Security combined to employ an additional 60,000 civilians. Homeland Security also employed an additional 5,000 active duty and 1,000 reserve Coast Guard personnel that round out the totals in Figure 2.[14]

Figure 1: Direct Spending   **Figure 2: Direct Employment**

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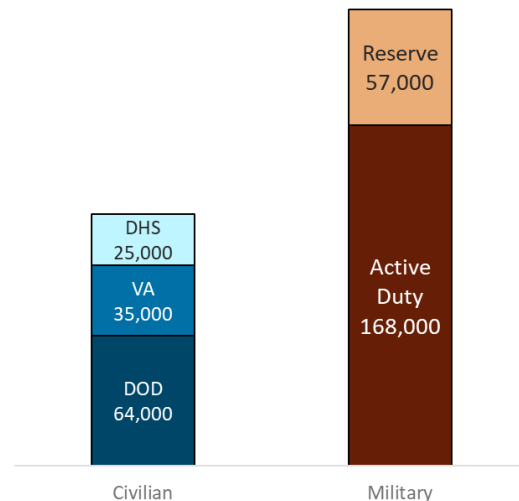
[10] These agencies were selected in the original report based on having clear national security missions with readily available data. This report begins to consider Department of Energy national security activities as well.

[11] Federal fiscal year.

[12] Government purchase cards used for very small purchases.

[13] Department of Defense total does not include Coast Guard personnel employed by the Department of Homeland Security.

[14] DMDC (2018) Military and Civilian Personnel by Service/Agency by State/Country (Updated Quarterly).

After dipping modestly as a result of budget sequestration,[15] civilian employment has grown steadily since 2014. Total civilian employment grew by 2.7% from 2019 to 2020 and has averaged a 2.0% annual increase over the last six years, as shown in Figure 3.

Military active duty employment continued to recover from budget sequestration as well. After a significant drop between 2013 and 2016, active duty employment has increased the last four years. Employment increased by 3.5% from 2019. The number of active duty members in California in fiscal year 2020 reached 168,000.

Reserves stayed at 2019 levels, a little over 57,000, and have been relatively steady throughout the period. Both are represented in Figure 4.

Figure 3: Civilian Employment by Year
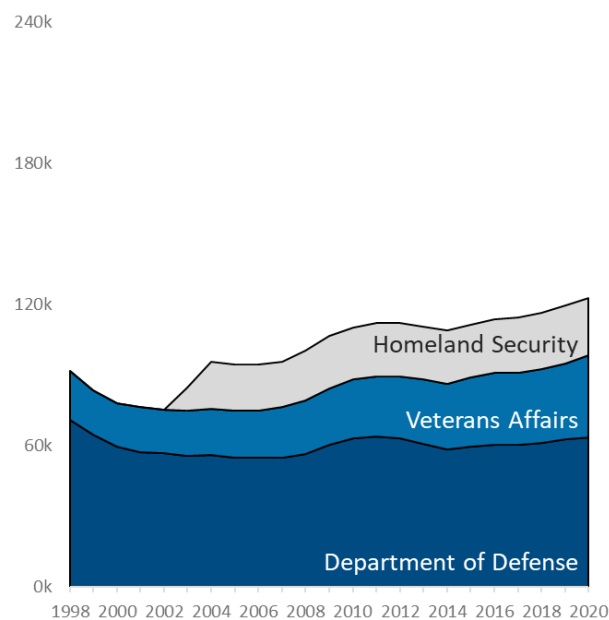
Figure 4: Military Employment by Year

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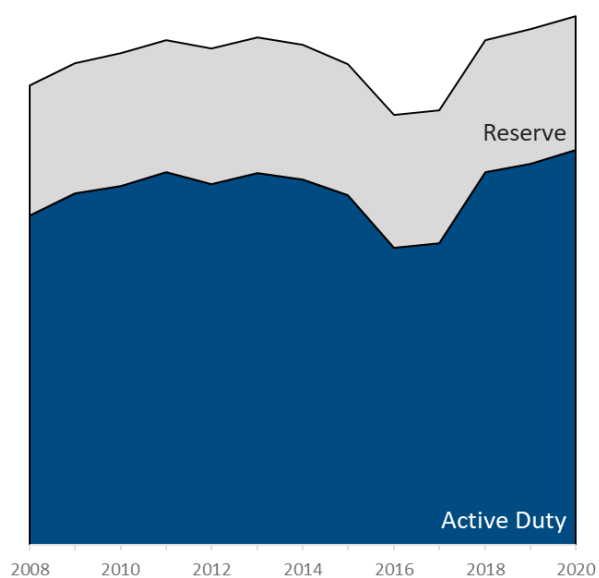
[15] The Budget Control Act of 2011 implemented significant across the board cuts to federal spending, including large cuts to national security agencies, going into effect in 2013.

Direct Spending

Direct spending decreased from $54.3 billion in 2019 to $47.0 billion in 2020 (a 13.5% nominal decrease). This decrease in direct spending, when accounting for inflation, would drop to an approximately 14.8% real decrease.

The bulk of the decrease is in contract spending, which fell by 23.9%, an almost $9.8 billion drop. The large majority, a $5.1 billion decrease, was with Veterans Affairs (74.4% decrease). Defense and Homeland Security contract spending decreased by $4.7 billion (13.9%) and $71.3 million (11.7%), respectively.

This apparent drop is primarily due to a challenge with this report's methodology, rather than an actual decline. "Spending," in a given year, is actually contracts awarded in that year. In most cases this is essentially a distinction without a difference. Typically, the contract is awarded and shortly thereafter the work is done, or the product is delivered and paid for. Since the exact timing of that work and associated payments is unknowable based on public data, this report focuses on the contract date, assuming any variations will largely average out over the years.

This assumption proved flawed in one large case. McKesson has provided pharmaceutical services to Veterans Affairs since 2004. These contracts were renewed in 2019. This was structured as an initial two-year deal, with a series of options thereafter.[16] McKesson's total Veterans Affairs awards were $4.4 billion in 2017, $4.8 billion in 2018 and $5.2 billion in 2019, while 2020 saw no new dollars obligated for this contractor. This primarily impacts the estimate for San Francisco County.

The increase in Veterans Affairs direct transfers (generally pension payments) for fiscal year 2020 brings this spending total to its highest point across the time period. After accounting for inflation, the $11.3 billion total remains just lower than in 2016 real dollars.

Alongside the decrease in contracts and increase in direct payments, there were notable changes in SmartPay and grants spending. SmartPay had a nominal decrease of 16.4% from 2019, dropping to its lowest level since 2014. Conversely, grants spending nominally increased by nearly 120% from the previous year, propelled by a near $1.9 billion increase in Homeland Security grants.

Even with the decrease in Department of Defense spending for fiscal year 2020, defense spending and employment in California is similar to the total military spending of NATO allies Germany and France, illustrating the value of national security activity in the state.[17]

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[16] McKesson (2019) McKesson Selected by Department of Veterans Affairs as Prime Pharmaceutical Provider.

[17] Koop, A. (2021). This is How Much NATO Countries Spend on Defense.

Figure 5: Direct Spending by Year
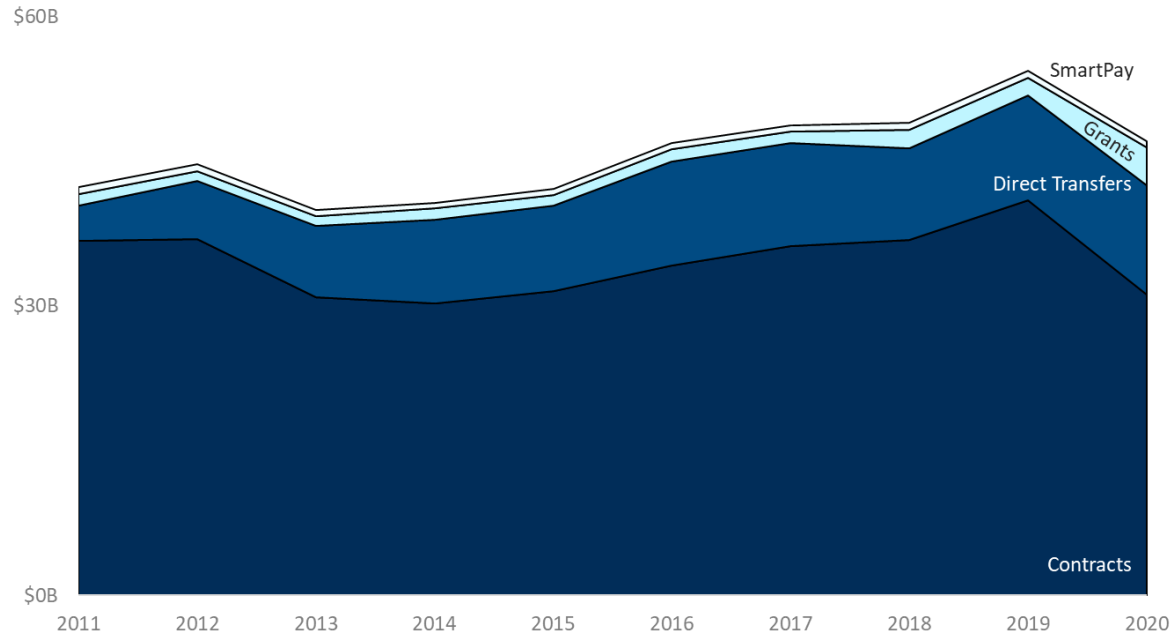
A border patrol vehicle drives along the international border wall in San Diego.

Economic Impacts

Total Output

The spending and employment included in this estimate generated $168.7 billion in total economic activity output in California during fiscal year 2020.[18] This total output includes:

- $93.9 billion of direct economic activity by the agencies and their contractors;
- $15.6 billion of indirect economic activity created through the supply chain of direct activities;
- $59.2 billion of induced economic activity created as a result of additional money in the economy.

This total represents an 6.9% nominal decrease since 2019.

Figure 6: Total Output

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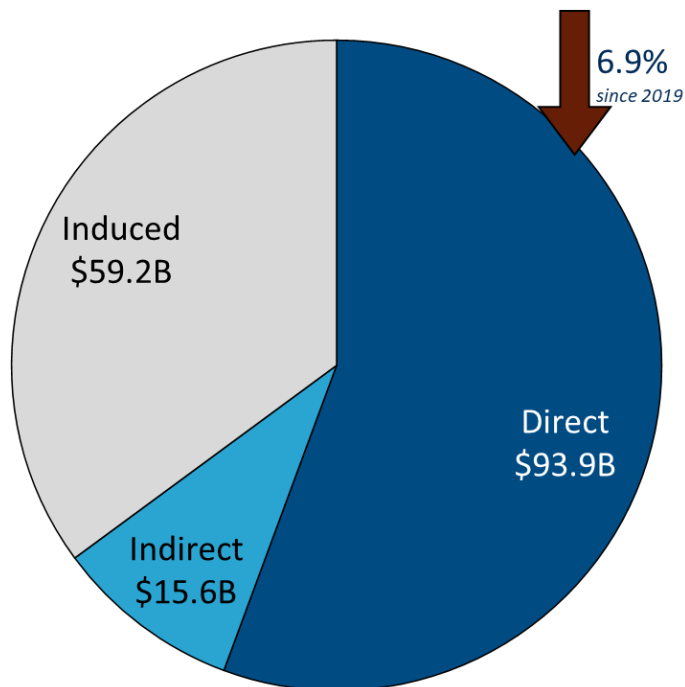
[18] May not sum due to rounding

Total Employment

The spending and employment included in this estimate generated 792,000 full-time-equivalent (FTE) jobs in California.[19] This total includes:

- 411,000 FTEs directly employed by the agencies and their contractors;[20]
- 67,000 FTEs employed indirectly through the supply chain of direct activities;
- 314,000 FTEs employed because of economic activity induced by the additional money in the economy.

This total represents a 3.2% decrease since 2019.

Figure 7: Total Employment

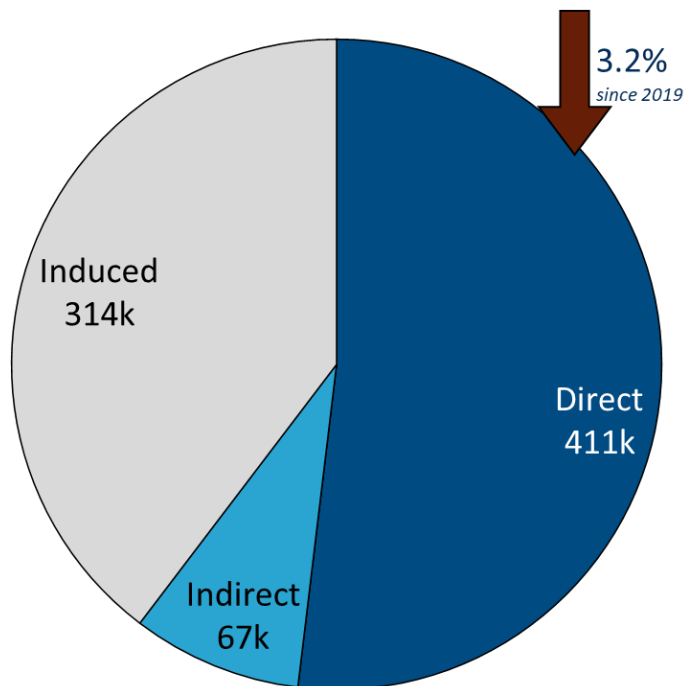
[19] May not sum due to rounding
[20] Direct employment includes federal employees as well as the employment of federal contractors and vendors generated by direct government spending.

Government Revenue

Economic activity generates additional tax revenue for governments at all levels, especially through payroll and income taxes generated by hundreds of thousands of FTE employment. The economic software used for this report, described in the Methodology & Data section below, estimates that the federal government received approximately $7.3 billion in payroll tax and $6.0 billion in personal income tax as a result of the spending and employment modeled. Other business taxes total $1.8 billion, for a total federal revenue of $15.1 billion.[21]

At the state and local level, combined impacts include $2.3 billion in income tax, $2.2 billion in property tax, $1.5 billion in sales tax, and another $1.5 billion in other smaller taxes and fees that make up the remainder of the $7.5 billion total.

Industries Impacted

Spending and employment modeled in this report impact a wide variety of industries. These generally fall into four broad categories. The first two categories include broad types of direct spending:[22]

- **Core Mission**: A large portion of spending and resulting economic activity occur in industries that are central to the work of the three federal agencies involved, including defense contractors (primarily aerospace and research and development) and pharmaceutical manufacturers that supply Veterans Affairs' healthcare facilities.

- **Large Employer**: Some industries benefit because they are related to employment and are similar for any large employer. This includes insurance, driven by the Department of Defense's TriCare health care program, among the top industries.

The next two categories include indirect and induced spending:

- **Subcontractors**: This category includes the contractors and suppliers of industries in the categories above, including supply chain industries such as manufacturers, transportation, and wholesalers, as well as general business-supporting industries such as janitorial and professional services.

- **Population-focused**: The remaining industries, such as restaurants, real estate, and education, primarily serve the local population and benefit when any spending occurs because it results in increased local employment and earnings.

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[21] May not sum due to rounding

[22] Overlap does exist between these groups. For example, healthcare could be considered to be part of every category. The health industry is a major contractor for the Veterans Affairs, as part of its central mission to provide healthcare to veterans. The healthcare industry also serves the Department of Defense, as an employer providing insurance for its workforce and the insurance industry, as a major subcontractor. It is also an industry that serves the local population.

Nearly every industry in the state benefits from national security spending. The largest economic impacts are in manufacturing, with the various sectors combining for $19.5 billion in total output (direct, indirect and induced spending) and 41,000 in FTE employment. As shown in Figure 8, the top manufacturing sectors include aerospace ($7.2 billion in output and 10,400 in FTE employment); electronics ($3.7 billion and 7,400 FTEs); and other vehicles ($2.1 billion and 7,600 FTEs). Other top sectors in total output include professional services, with $15.4 billion in output and 80,600 FTEs (especially scientific research and development: $4.3 billion and 14,400 FTEs); real estate ($13.3 billion and 17,100 FTEs); insurance ($8.3 billion and 21,700 FTEs); and healthcare ($7.1 billion and 50,400 FTEs).

In addition, the retail ($5.4 billion and 47,600 FTEs); restaurant ($3.7 billion and 45,600 FTEs); and transportation & warehousing ($3.6 billion and 24,800 FTEs) industries saw at least 20,000 jobs generated because of national security spending.

Figures 8 and 9 show the industries with the largest total economic output and employment, respectively, resulting from national security spending and employment. While the underlying methodology and industry groupings remain the same, the economic modeling software used for this report has updated its industry classifications since the prior report. As a result of these changes, there may be some small variation in industry results relative to the prior report.

Policymakers may wish to consider other characteristics of the impacted industries that are beyond the scope of this report. These include: 1) economic considerations such as industries that support the generation of exports or innovation that may lead to future economic growth; 2) cultural considerations such as the importance of a particular profession or industry to the state or a local community's identity; and 3) externalities related to the industry such as environmental, health or educational impacts.

Figure 8: Industry Impacts – Output

Industry	Value
Professional Services	$15.4B
Real Estate	$13.3B
Insurance	$8.3B
Manufacturing - Aerospace	$7.2B
Healthcare	$7.1B
Wholesale	$5.4B
Retail	$5.4B
Publishing - Electronic	$4.4B
Financial	$4.1B
Restaurants	$3.7B
Manufacturing - Electronic	$3.7B
Transportation & Warehousing	$3.6B

Legend: ■ Direct ■ Indirect + Induced

Figure 9: Industry Impacts – Employment

Industry	Value
Professional Services	81k
Healthcare	50k
Retail	48k
Restaurants	45k
Transportation & Warehousing	25k
Insurance	22k
Personal Services	19k
Real Estate	17k
Wholesale	17k
Construction & Maintenance	17k
Human Services	16k
Education	16k

■ Direct   ■ Indirect + Induced
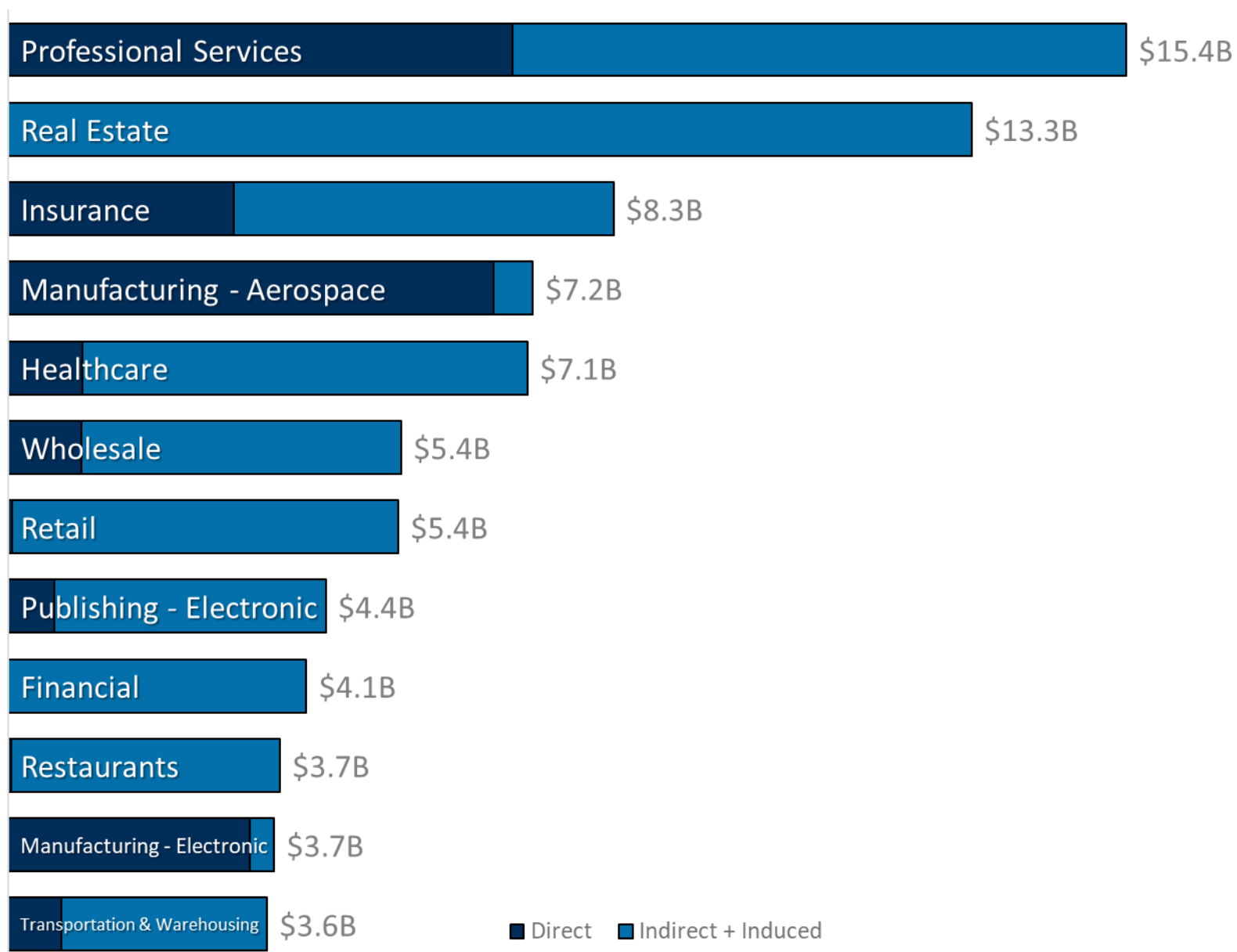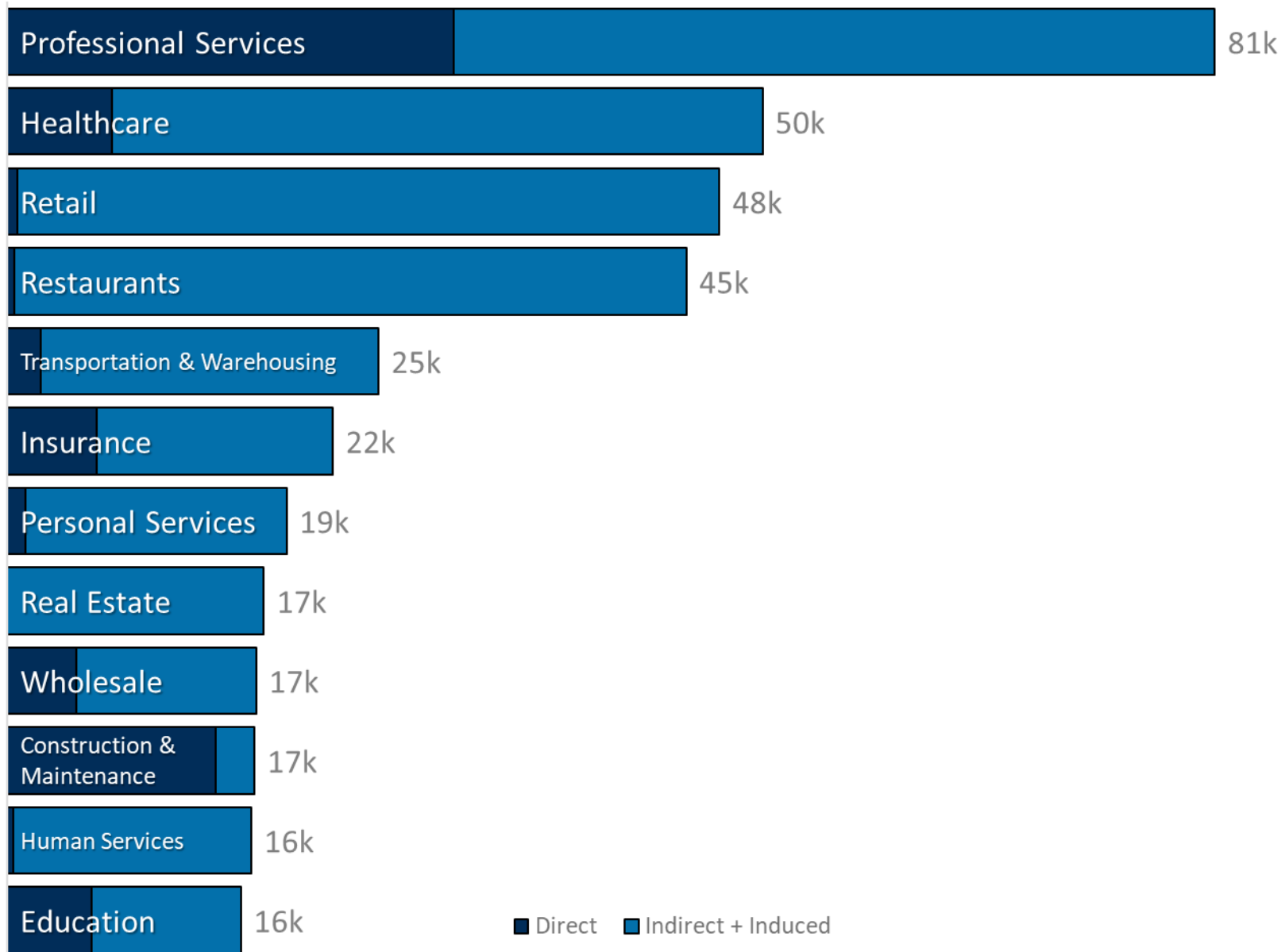
Select State Comparisons

Employment

In 2020, the Departments of Defense, Homeland Security and Veterans Affairs collectively employed 1.3 million civilians and stationed an additional 1.2 million active duty military members in domestic locations. Of these 2.5 million jobs, over 760,000 are concentrated in just three states: California (290,000), Virginia (247,000) and Texas (224,000). While states such as Florida and North Carolina have nearly as many civilian and military jobs, respectively, they both fall further behind when the two employment areas are examined in combination. Figure 10 displays the breakdown of civilian employment by state.

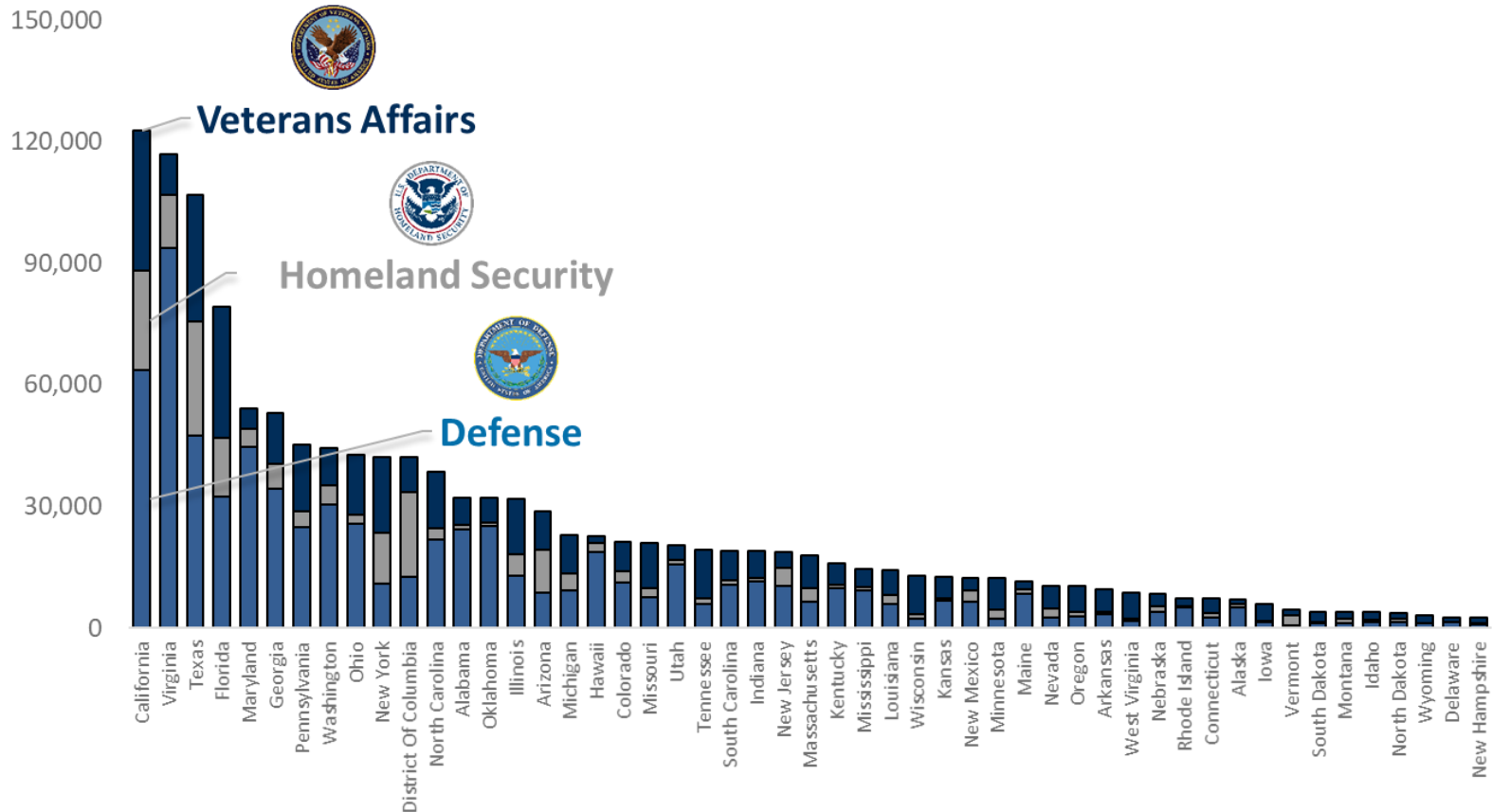### Figure 10: Civilian Employment by State

Figure 11 displays active duty military employment by state, broken out by branch. In addition to having the largest concentration of active duty military overall, California has the largest Marine Corps concentration, the second largest among the Navy and Coast Guard, and the third largest among the Air Force.

**Figure 11: Active Duty Military Employment by State**
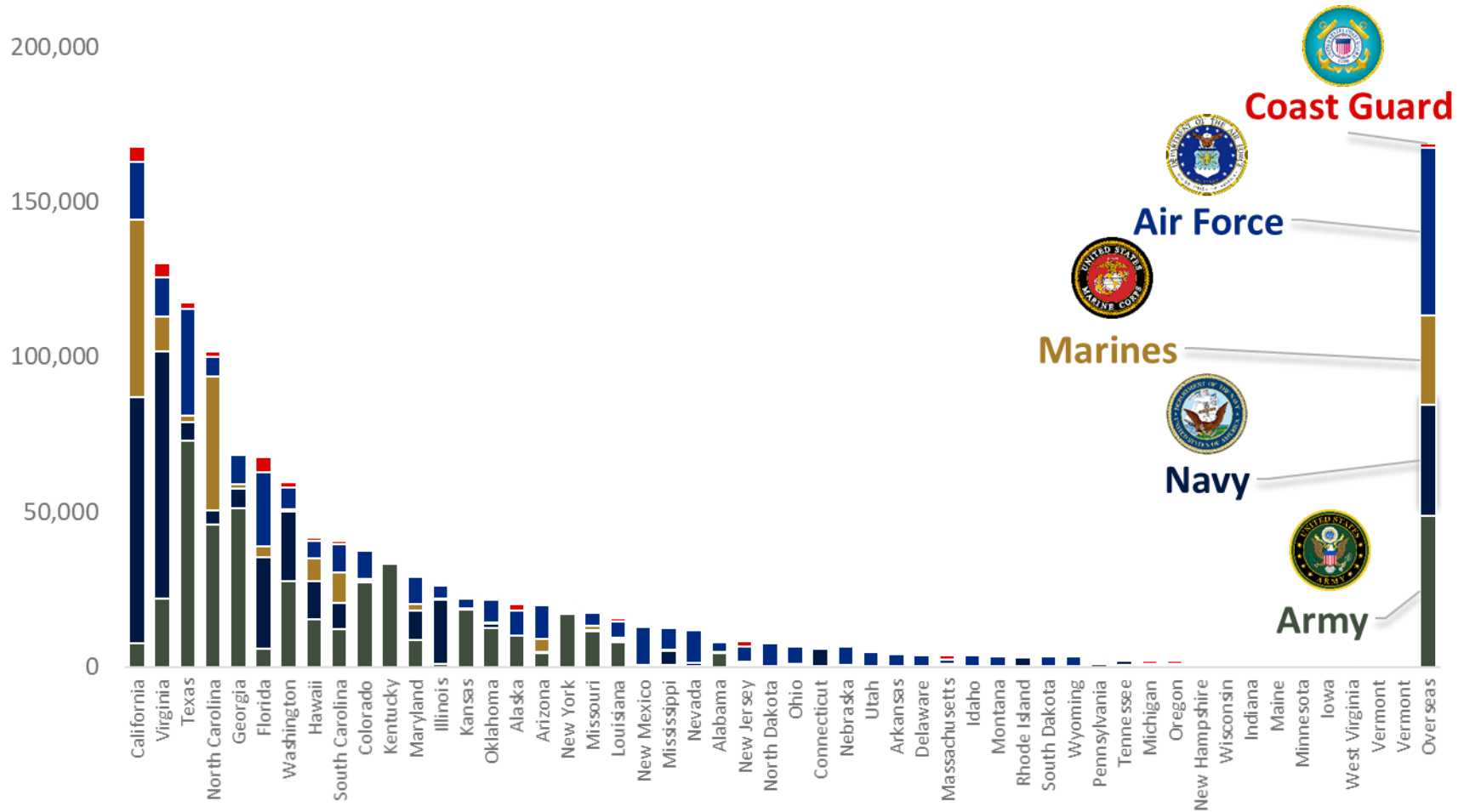
Historical Comparisons

This section details a comparison over the last several years of the three states with the largest share of national security-related employment (California, Texas and Virginia), examining their experience over time. Civilian employment data by state is currently available since 1998, while military employment data is available since 2008.

Through 2012, the three states appeared to follow similar trends. California and Virginia had a similar number of security employees in their states, while Texas fell 20,000 to 30,000 behind. Gains or falls in each year happened at about the same rate. The three states had somewhat different experiences in the early years of the budget sequestration. California's total employment declined by 3% before bottoming out in 2014. Texas declined by 4% and Virginia by 7%. California's civilian employment has grown modestly faster since then as well, surpassing its pre-sequestration peak in 2016. Texas surpassed its 2012 level in 2017, while Virginia remained below 2012 until 2019. As of 2020, California had 10% more civilian employment than its prior peak, Texas had 7% more, while Virginia had just 1% more than its 2012 peak.[23]

Figure 12: Civilian Employment by Year
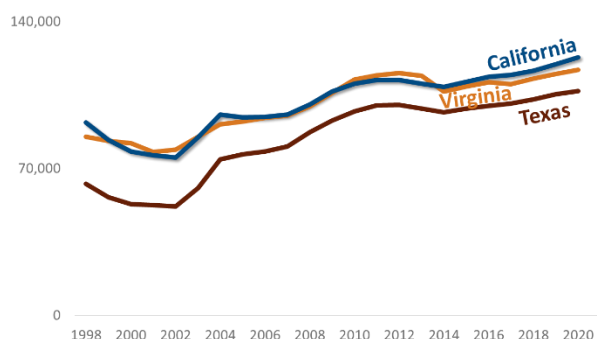
**Figure 13: Indexed Civilian Employment**
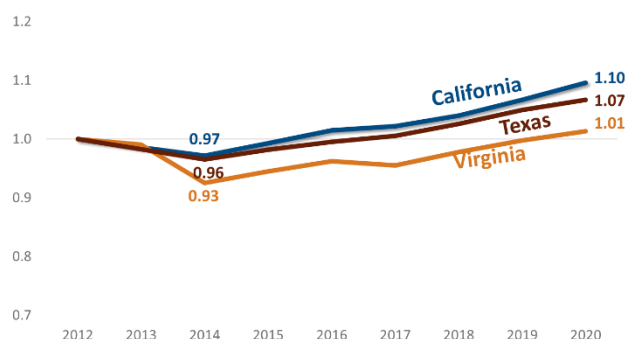
While civilian trends, with the exception of the depth of loss from budget sequestration, were largely similar, active duty employment trends have been more varied. California has consistently been the top state in military employment, while Texas and Virginia have exchanged second and third place four times in the past 12 years.

The states' experiences with budget sequestration varied as well. Virginia initially saw an increase in active duty employment lasting through 2015 before falling the furthest of the three states in 2016 and 2017, dropping 20% from 2012 and 29% from its 2015 peak. California was initially relatively stable, increasing slightly in 2013 before declining slowly through 2015 and falling rapidly in 2016. This totaled an 18% drop from 2012 and 20% decline from its 2013 peak. Texas, on the other hand, saw a rapid decline in 2013 and then continued to decline slowly

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[23] Due to a technical error in distributing suppressed DHS employment, the 2020 report overstated the declines in post 2012 employment for Texas and Virginia.

through 2017, but yielded the smallest overall decline of the three states at only 13%. Since 2017, however, Texas has grown the most slowly and is 8% below 2012 active duty employment levels. Virginia has grown the most quickly and surpassed its 2012 total by 16%. California has fallen in the middle with a 9% increase since 2012.

Figure 14: Active Duty Employment by Year
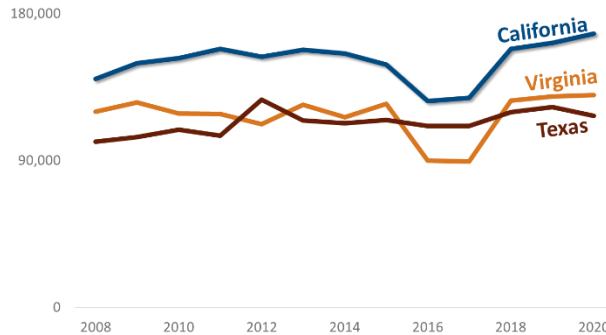
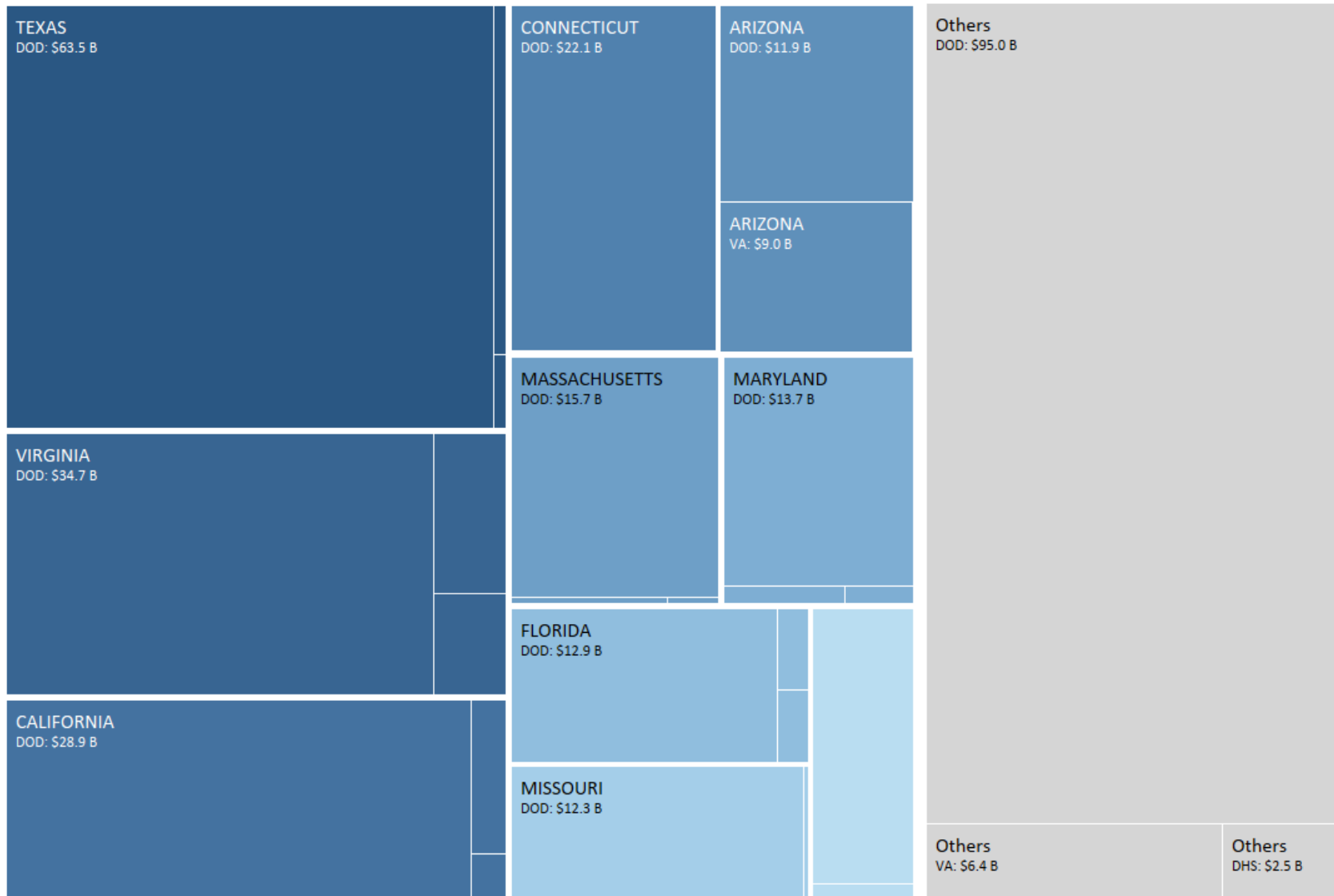**Figure 15: Indexed Active Duty Employment**
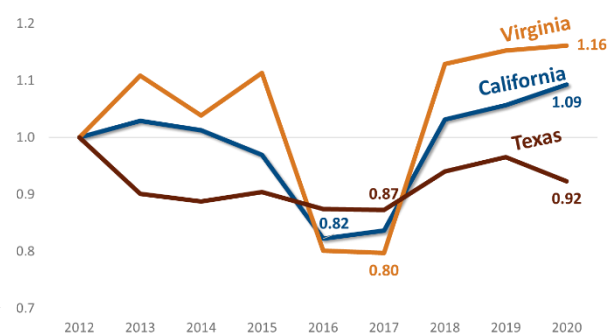
Direct Spending

2020 Comparisons

California received $31.2 billion in security-related contracts across the three national security agencies in 2020, a roughly 23.9% nominal decrease from the $41.0 billion last year. Overall, California received the third-most in security-related contracts among all states, trailing only Texas ($65.2 billion) and Virginia ($40.6 billion). Connecticut ($22.2 billion); Arizona ($21.1 billion); Massachusetts ($16.1 billion); Maryland ($14.8 billion); Florida ($14.4 billion); Missouri ($12.4 billion); and Pennsylvania ($9.4 billion) round out the Top 10 states.

Historical Comparisons

Among the states with a large national security presence, since 2012, Texas has increased by $35.2 billion; Virginia by $7.4 billion; Connecticut by $9.7 billion; and Florida by $9.4 billion. California's spending appeared to decrease; however, this apparent decline is due to the challenges in the methodology discussed previously.

Figure 16: 2020 Contract Spending by State (in billions)

TEXAS
DOD: $63.5 B

VIRGINIA
DOD: $34.7 B

CALIFORNIA
DOD: $28.9 B

CONNECTICUT
DOD: $22.1 B

ARIZONA
DOD: $11.9 B

ARIZONA
VA: $9.0 B

MASSACHUSETTS
DOD: $15.7 B

MARYLAND
DOD: $13.7 B

FLORIDA
DOD: $12.9 B

MISSOURI
DOD: $12.3 B

Others
DOD: $95.0 B

Others
VA: $6.4 B

Others
DHS: $2.5 B

The USS Midway Museum in San Diego.

Department of Energy

The Department of Energy (DOE) conducts a wide variety of work, which includes some national security related activities. Prior reports have not attempted to quantify this activity and instead simply note the total impact of national security activity would likely be higher if these factors were considered.

This report takes the initial steps of beginning to consider this activity. While this activity is not included in the overall number, this report lays the groundwork to developing a methodology to potentially include in the future.

Direct Spending

In fiscal year 2020, DOE awarded $4.0 billion to California contractors for projects performed in California. In addition, DOE issued $498 million in grants. Large portions of this spending are for non-specified research funded by the DOE's Science Office. For example, this included six of the 10 largest contracts in fiscal year 2020.[24] Since we cannot verify these funds were spent on security-related research, contracts such as these were omitted from the analysis.

In order to ensure conservative results, this analysis only includes spending from sub-agencies that are directly related to national security.[25] Contracts and grants from these funding sub-agencies total $2.5 billion, 55.0% of the DOE's total spending in the state.

Employment

The Department of Energy is among the smaller Cabinet-agency employers, with 14,555 staff nationwide. The largest share is in the District of Columbia (4,208). Among the states, Washington (1,972), Oregon (1,197), Maryland (894), New Mexico (867), and Colorado (778) make up the Top 5. California is seventh with 358 DOE staff.

As discussed in the prior section, a portion of the work performed by DOE staff is not national security related. For the purpose of this estimate, we use the portion of contract spending estimated to be security related (55.0%) to apportion employment, yielding an estimate of 197 staff.

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[24] This includes four contracts with the University of California and two with Stanford University.
[25] Funding sub-agencies included: Department of Defense Advanced Research Projects Agency (DARPA), Department of the Army, Department of the Air Force, Missile Defense Agency (MDA), Defense Threat Reduction Agency (DTRA), Department of Defense, Department of the Navy and Department of Energy spending with the National Nuclear Security Administration as the funding office.

Economic Impacts

Estimated Output from DOE Activity

Estimated security related spending and employment in California from DOE results in approximately $5.2 billion in economic activity. This includes $2.5 billion in direct activity, $1.2 billion in indirect activity, and $1.5 billion in induced activity. About 50% ($2.6 billion) of that activity is concentrated in scientific research and development services within the professional services sector.

Estimated Employment from DOE Activity

Estimated security related spending and employment in California from DOE results in approximately 23,000 FTEs. This includes 9,500 in direct employment, 5,500 in indirect employment, and 8,000 in induced employment. About 40% (8,600) of that activity is concentrated in scientific research and development services within the professional services sector.

The Impact of COVID-19

During the course of fiscal year 2020, the United States began grappling with the COVID-19 pandemic and the resulting pandemic-induced recession. Economic output dropped by 9.3% from 2020 Q1 to Q2 and did not recover to pre-pandemic levels until 2021.[26] Total employment dropped by 15% from February to April 2020[27] and had not recovered to pre-pandemic levels as of November 2021.[28]

Figure 17: Indexed Employment in California During COVID-19

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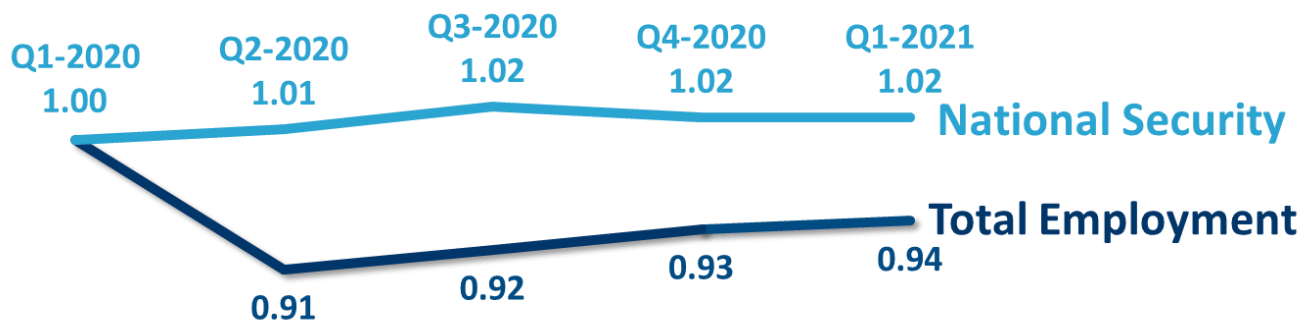
[26] BEA. National Data: National Income and Product Accounts.
[27] The chart reflects quarterly changes, to match available security data. Total employment had already begun to rebound by the end of Q2, which is why it shows a smaller decline than the monthly decline cited in the narrative.
[28] FRED (2021). All Employees, Total Nonfarm [PAYEMS].

Even so, the national security space was economically resilient. This is due to the economic essentiality of the industry, where the national security sector's workforce stepped in to assist with the deployment of needed materials and human effort to combat COVID-19.[29] Additionally, the national security industry could more readily adapt to a shift into remote work relative to other industries – such as hospitality, manufacturing and construction – which require a large part, if not all, of their workforce to be working in-person.[30] Figure 17 displays how employment in California, both statewide and national security-related, fared during the time lapse of COVID-19 from Quarter 1 in 2020 to Quarter 1 in 2021. Statewide employment in California fell by 9% from Quarter 1 to Quarter 2 in 2020, and is still 6% below pre-pandemic employment levels as of Quarter 1 in 2021. National security employment in California actually grew during this same time period, and has maintained a steady 1% to 2% growth from pre-pandemic employment levels.

Model Impacts

Recognizing the unique economic environment that occurred during this period, the economic modeling software used for this report, IMPLAN, has provided different model year configurations to choose from. Typically, IMPLAN provides an updated model with the prior year's data in November of a given year. For example, at time of writing, the 2019 data year is the most recent full year released, while shortly before publication, the 2020 data year was released. Recognizing this delay, IMPLAN provided two interim models focusing on the period when COVID-19 most impacted the economy, quarters two and three of 2020.

To address this, we ran the statewide data through each of the three models. The models estimated similar results, overall, within the range of 780,000 to 783,000 FTEs and around $170 billion to $174 billion in economic output. While the total impacts were similar, significant variation among industries existed. The COVID-19 models estimated less indirect and induced economic activity in expected areas like sit-down restaurants and travel sectors, and more construction and maintenance activity.

This report focuses on the results using the 2019 model. This model was chosen because it reflects the reality for half of the fiscal year 2020 data, while the other models each only reflect one quarter. In addition, it is a standard model, based on complete, final data, rather than an interim estimate. Most importantly, the differences are sufficiently minor, so it was judged best not to add additional complications. Nonetheless, given the impact of COVID-19, these results should be considered to have a higher level of uncertainty, especially in regards to industry impacts. For more information on the IMPLAN tool, please refer to the Methodology & Data section.

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[29] OECD (2021). Strengthening Economic Resilience Following the COVID-19 Crisis: A Firm and Industry Perspective. See Figures 3.1 and 3.3 denoting the economic essentiality of "public admin and defence".
[30] UC Berkeley Labor Center (2020). The Effects of the COVID-19 Pandemic on Workers in California. See pgs. 6-7.

Summary

National security contributes significantly to California's economy. The total impact appears similar to high profile sectors such as the agriculture[31] and film industries.[32] The federal government invests at least $47.0 billion and directly employs approximately 348,000 residents in the state. This results in $181.2 billion in economic impact and supports over 792,000 full-time equivalent jobs in California.

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[31] CDFA (2019) California Agricultural Production Statistics.
[32] BEA (2020) Arts and Cultural Production Satellite Account, U.S. and States.

Tests of aircraft acceleration and vibration exposure while flying in receiver formation at various speeds and altitudes, Edwards Air Force Base.

Methodology & Data

Scope

As discussed in the introduction, this report focuses on the U.S. Departments of Defense, Homeland Security and Veterans Affairs.

Within these three federal agencies, three broad areas of economic activity are examined: direct employment, direct purchasing, and spending on veterans' benefits. Figure 18 details the components of these spending areas.

Figure 18: Scope of Analysis
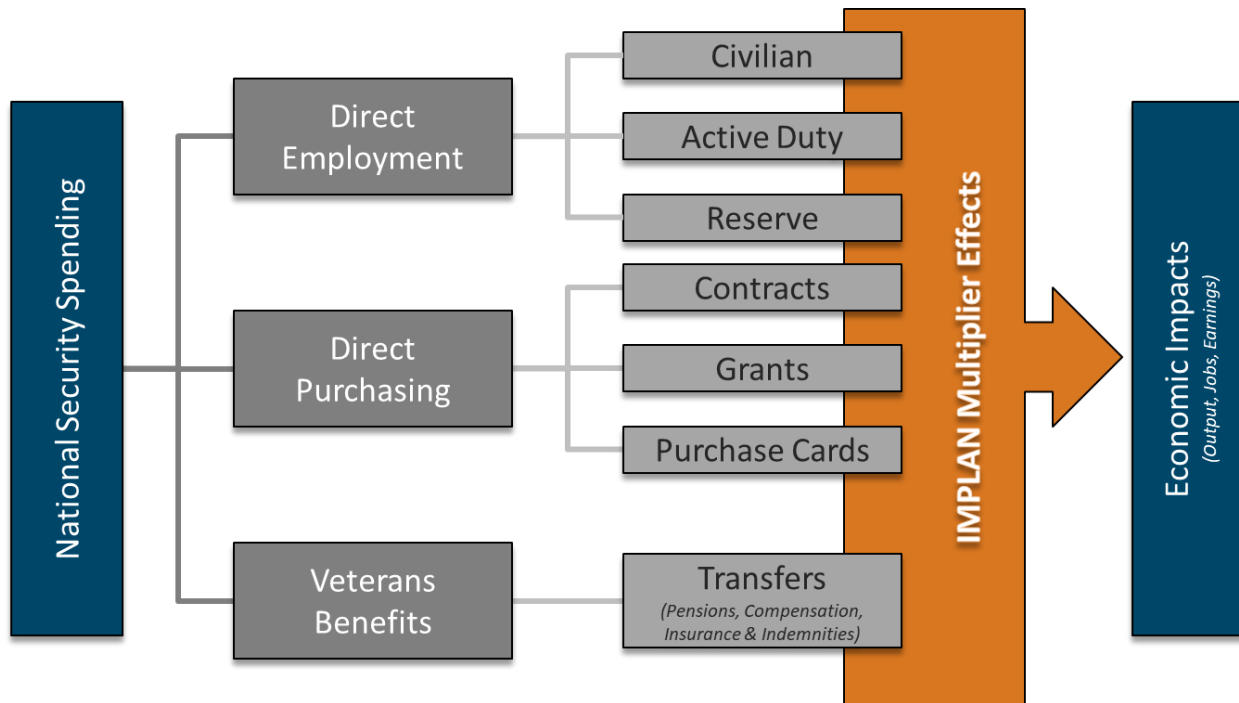
This report does not include impacts from activities other than direct government spending and employment. Examples of what is not included in this report:

- Purchasing of military equipment from international governments that is enabled by the infrastructure and research performed to provide this equipment to the U.S. government;
- Tourism related to celebrations, conferences or other gatherings related to the military installations; and,
- Other partnerships that aerospace and defense companies may have with universities enabled by their security work.

Data

All data was acquired from U.S. government sources. Data is publicly available from the USA Spending database or regularly updated reports.

Spending

USASpending.gov remains the primary source for spending data. USASpending.gov provides a public database of nearly all federal spending. Although the database has limitations[33],[34] it is a very useful tool that provides comprehensive data. Given these limitations, only spending from California-based prime contractors and their California-based subcontractors for projects completed within California are analyzed.

SmartPay data was acquired from the General Services Administration.[35] Data provided by the departments was inconsistent or unavailable. Thus, spending was apportioned to counties and congressional districts based on the share identified in the prior report.

Employment

Civilian employment was previously acquired from the Office of Personnel Management (OPM), reported by county. This source is no longer available. Data was instead acquired from OPM's FedScope.[36] This tool reports data at the statewide level. In addition, the location of many investigative[37] employees have been suppressed in recent years. These suppressed positions were allocated to California based on the ratio of investigative positions to total positions that existed in prior years. County and congressional district distribution is estimated based on the distribution drawn from square footage of facilities operated by each department.

Military employment was acquired from the Department of Defense's Defense Manpower Data Center's (DMDC) Location Report. DMDC only provides data by state, however. County and district distribution is estimated based on the distribution drawn from the American Community Survey. In addition, full-time equivalent estimates for reservists and National Guard were made based on relative salaries for reservists and active duty personnel matched by rank and experience. Reservist salaries range from 17.5% of matched active duty pay to a high of 21.2%, with an average of 18.25%. As a result, reservists are estimated at 0.1825 FTE (or 5.5 reservists are considered the equivalent of 1 active duty employee for economic purposes).

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[33] POGO (2013) USASpending.gov: NOT Your One-Stop Shop for Following Taxpayer Dollars.
[34] Sunlight Foundation (2017) A brief history of the DATA Act.
[35] Available at About GSA Smartpay under the "Statistics" and "Sales, Transactions, Account Holder Data" menus.
[36] U.S. Office of Personnel Management (2020) FedScope Employment Cube September 2010-2020.
[37] This includes the large majority of Transportation Security Administration, Customs and Border Protection, Immigration and Customs Enforcement and Citizenship and Immigration Services staff.

Methodology

Input-Output Modeling

This report models economic impacts using IMPLAN software, based on standard Input-Output methodology. The purpose of the study is to estimate the impacts of existing spending, rather than modeling any policy changes or other counterfactuals. As a result, the analysis estimates gross benefits and does not account for alternate federal spending or other use of resources that might occur in California in the absence of national security spending and employment.

Input-output (I-O) models identify relationships between industries, estimating how changes in one industry flow through into other industries. For example, the purchase of required inputs that result in logistics or business services and changes to household purchasing due to shifts in employment and earnings.

Cumulatively, I-O models estimate the amount of times the modeled dollar is re-spent within a geographic area before it fully leaks out.

The concept was pioneered by Wasilly Leontief, who was awarded the Nobel Prize in 1973 "for the development of the I-O method and for its application to important economic problems."[38]

IMPLAN Economic Model

The IMPLAN (IMpact Analysis for PLANning) I-O economic model was selected for this analysis based on its reputation and the resources available. IMPLAN was developed by the U.S. Department of Agriculture Forest Service in the 1970s to fulfill the requirements of the Rural Development Act of 1972 to estimate the impacts of alternate uses for U.S. public forest resources.

IMPLAN models the economy within a specified region as 546 sectors with unique spending patterns derived from U.S. Bureau of Economic Analysis expenditure patterns.

As depicted in Figure 19, the model begins with the direct effects of the modeled economic activity. This includes the employment/wages and output of the sector being analyzed. From here, the model estimates the supply chain impacts for the output of the direct effects. This includes leakages, such as imported inputs, taxes and profits, and local purchases of inputs toward the final product. These local purchases generate labor income (which includes total compensation of both the employee and the proprietor), which joins the stream with the labor income from the direct effect. This stream then has leakages, including imports, income to employees living beyond the modeled region, taxes and savings. Remaining income – spent on locally purchased goods and services – cycles back around and the cycle begins anew until all remaining funds are exhausted due to leakage.

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[38] NobelPrize.org. Wassily Leontief – Facts.

Figure 19: IMPLAN Model[39]
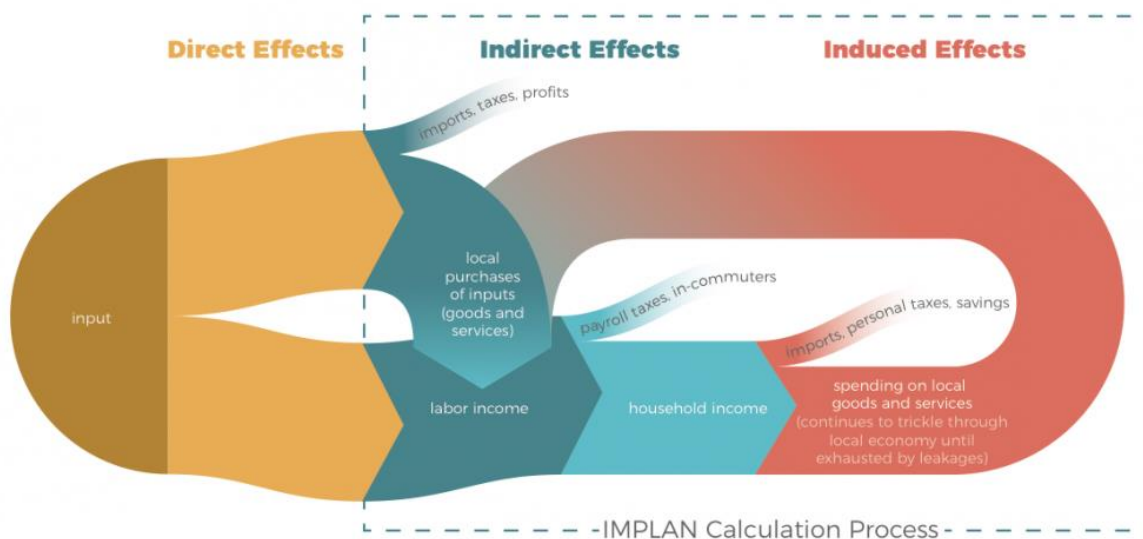
MRIO Analysis

Since the prior report was released, IMPLAN added an additional feature to its tool, Multi-Regional Input-Output (MRIO) analysis. This tool offers a simplified path to fully account for localized impacts, without the need to generate 174 models required to complete the custom methodology employed in the prior report.

"MRIO expands backward supply linkages beyond the boundaries of a single-region Study Area. MRIO analyses utilize interregional commodity trade and commuting flows to quantify the demand changes across many regions stemming from a change in production and/or income in another region. This powerful analytical method allows analysts to go beyond a single study region, measuring the economic interdependence of regions. In an MRIO analysis, the Direct Effect in one region, Region A, can trigger Indirect and Induced Effects in linked regions, capturing some of what would have been a leakage in a traditional I-O model."[40]

An approach like MRIO more fully accounts for the localized impacts within the state, but does not impact the statewide estimates. While a single economic model can be run to estimate the impact of spending within each region, this methodology would understate the total impact, because it would omit spillover effects from spending in other counties. This more basic methodology would have overlooked approximately 10% of total state output in the 2019 regional structure and approximately 17% in the 2018 county structure.[41] The number of regions impacts the amount of activity that would be omitted by the simpler methodology. If

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[39] IMPLAN. Assisted Economy.
[40] Clouse, C. (2019) MRIO: Introduction to Multi-Regional Input-Output Analysis. IMPLAN.
[41] Clouse, C. (2019) MRIO: Introduction to Multi-Regional Input-Output Analysis. IMPLAN.

there are more regions, each region includes less economic activity and, thus, loses more spillover activity to surrounding regions. For example, if one were to consider the greater Sacramento region, as in the 2019 report, it would include the spillover that spending in Sacramento County would provide to nearby Yolo County. However, if it was focused on specific counties, as in the 2018 report, Yolo County would be considered separately from Sacramento County. This would result in the spillover being missed in the simpler methodology and explains why the estimate for 2019 was less than 2018. In either case, these spillover impacts are captured by the methodology used in these reports and are included in the results.

Figure 20: MRIO[42]

Limitations of the Input-Output model

Readers should be aware of a number of limitations with the modeling techniques employed, as Leontief himself acknowledged.[43]

I-O models are based on fixed assumptions about the economy being modeled. It assumes that X input leads to Y output. Reality, however, may play out differently. For example, if the scenario led to the need to purchase more widgets, the model would assume the local widget industry would be able to expand as necessary to maintain the level at which it currently fulfills local widget needs. This assumption could be flawed in ways that could over or understate the impact. The local economy might not have the resources, physical space, capital and/or workforce to support that expansion and the widget industry may not grow at all. Conversely, if it is able to expand to fulfill the modeled needs, expansion may lead to the widget industry investing the capital to expand sufficiently to fulfill all of the added demand or even supplant demand currently fulfilled by imports. Similarly, the growth will impact the workforce in ways that could further grow the economy by bringing in additional workers or shrink other aspects of the economy by competing for a limited pool of employees. Similarly, it assumes that prices are fixed and that ratios for intermediate inputs (i.e., efficiency) are fixed.

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[42] Clouse, C. (2019) MRIO: Introduction to Multi-Regional Input-Output Analysis. IMPLAN.
[43] Leontief, W. (1955) Some Basic Problems of Empirical Input-Output Analysis. Input-Output Analysis: An Appraisal.

These issues are most pronounced at the largest scales (both relatively and absolutely). For example, if we were to introduce an additional $10 trillion in spending nationally, it would not double the overall size of the economy, as an I-O model would estimate. Instead, it would largely crowd out other economic activity, since the country's workforce and resources could not absorb the extra demand for goods and services, resulting in significant inflation, but little real economic growth.

Because the purpose of this study is to estimate the existing impacts of current spending levels, these limitations are less significant.

Beyond specific limitations of I-O modeling, as Leontief described it, the "theoretical formulation is designed to protect the investigator from this danger: it does not permit him to draw any special or general conclusions before he or someone else completes the always difficult and seldom glamorous task of ascertaining the necessary facts."[44] In other words, any model is only as good as its data.

The inputs used are entirely U.S. administrative data, which is typically considered among the most reliable sources. There are limitations, however. Several datasets do not perfectly align with the model or the needs of this study. Some spending data is tagged to a specific company but not a specific industry. In these cases, contractors and the California Research Bureau made a judgement as to which IMPLAN sector code to assign that spending. In cases where sufficient detail is not available to differentiate between similar sectors, the sector with multipliers closest to the average of the other sectors was assigned. Provision of SmartPay data by the departments has proven unreliable. As a result, national data is used apportioned based on prior years when more detailed data was available. As discussed above, this analysis does not include data on in-state subcontractors operating under out-of-state prime-contractors, largely because of the condition of the original datasets and concerns about duplicating counts.

These limitations notwithstanding, I-O modeling generally, and the IMPLAN model specifically, are widely accepted tools for estimating impacts for government spending. The estimates provide a reasonable approximation of the impacts.

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[44] Dietzenbacher, E. & Lahr, M.L. (2004) Wassily Leontief and Input-Output Economics. Cambridge University Press.

Airshow fighter jets are in formation through white clouds in the sky.