

# California Statewide & Regional National Security Economic Impacts

December 2019



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GAVIN NEWSOM  
GOVERNOR

December 5, 2019

California plays an essential role in our nation's security, and national security is a significant part of California's economy. Home to the world's most valuable air, sea, and land ranges, California has seen generations of American service members prepare for conflicts around the world on its more than 30 vast, interconnected and irreplaceable military installations. The state's location is highly strategic, ideal for furthering our nation's defense through power projection, space launch, overseas deployment support and homeland defense. Our broad network of military installations, aerospace and defense companies, technology start-ups, homeland security and Coast Guard activities and research universities and institutions make California uniquely suited to help the nation address the security threats of the coming decades.

Out of our culture of innovation, the aerospace and emerging defense technology companies founded here provide essential technology to our military, and our world-class education and research institutions develop the leaders and ideas that guide our national defense into the future. The Golden State provides military personnel, weapons systems and precision aircraft with the best climate for the maximum number of training days to develop and test new weaponry and equipment on the numerous air, land, sea and cyber training ranges throughout the state. More California companies supply the Department of Defense's largest aircraft programs than the next three states combined. Our universities are second to none, and the technological expertise and resident human capital of Californians' cannot be found anywhere else in the world. The close proximity and partnerships between military activities and high-tech hardware, software, and manufacturing industries stoke the high demand for STEM professionals. Education institutions such as CalTech, USC, Stanford, and the UC system, are inextricably linked with military schools and research activities such as the Naval Postgraduate School, Defense Language Institute, Lawrence Livermore and Berkeley National Labs to deliver highly-educated young adults to assist the nation's defense. More educated youth from California join the military than any other state in the nation.

Simply put, our country has protected itself and projected strength around the globe over the last century due to the installations, institutions, people and partnerships in California and this has in turn contributed to the ongoing, reliable economic well-being of our state. California should continue to posture itself as the nation's premier centerpiece for all facets of national security and defense, for our citizens, businesses, environment, servicemembers, veterans and their families.

We thank our servicemembers for their fearless sacrifices, for their family's sacrifices, and for their commitment, because California is committed to you.

Sincerely,



Rocky Chavez  
Colonel, US Marine Corps (Ret)  
Chair



Jody Breckenridge  
Vice Admiral, US Coast Guard (Ret.)  
Vice Chair

## Author

Devin Lavelle

## Requested by

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

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# California Statewide National Security Economic Impacts, 2019 Update

## Introduction

California has the largest share of our country's military, a fact that is often lost behind perceptions of California as America's breadbasket and a tourist's paradise, a leader in high-tech development and manufacturing and an international mecca for film and television. Nearly 160,000 active duty military personnel and an additional 57,000 reservists and National Guard are stationed at more than 30 military installations across California, making the state home to the largest concentration of American military of any state or country in the world.<sup>1</sup> About 1.8 million veterans call the state home.<sup>2</sup>

The Governor's Office of Planning and Research and the Governor's Military Council asked the Research Bureau to conduct an economic analysis of the impact of federal national security spending in California. Existing studies have investigated direct spending and activities statewide, the economic impacts of spending in San Diego County and economic impacts of specific military installations. Additional information on these studies is available in the 2018<sup>3</sup> version of this report. With the exception of San Diego County, none of the existing studies the Research Bureau identified provide statewide economic impacts or comprehensive localized impacts.

This report relies on data from the Departments of Defense, Homeland Security and Veterans Affairs for inputs. 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. For example, the Department of Energy has significant security and non-security spending, which has a significant economic impact in California.<sup>4</sup> Intelligence spending, such as the Defense Advanced Research Projects Agency (DARPA), is included if the source of funding is included under the three specified agencies.

The California Research Bureau previously released a report estimating the economic impact of national security spending in California during fiscal year 2016.<sup>5</sup> This report updates the findings of that report using 2018 spending and employment data.

**Figure 1: Installations & Operational Area**



<sup>1</sup> DMDC (2019) Department of Defense Personnel, Workforce Reports & Publications. Source: [https://www.dmdc.osd.mil/appj/dwp/dwp\\_reports.jsp](https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp)

<sup>2</sup> LAO (2017) Understanding the Veterans Services Landscape in California. Source: [LAO Report](#)

<sup>3</sup> 2018 refers to the publication date, rather than the data vintage

<sup>4</sup> [Lawrence National Labs Economic Impacts Page](#)

<sup>5</sup> Lavelle, DM (2018) California Statewide National Security Economic Impacts. California Research Bureau. Source: [Link](#)

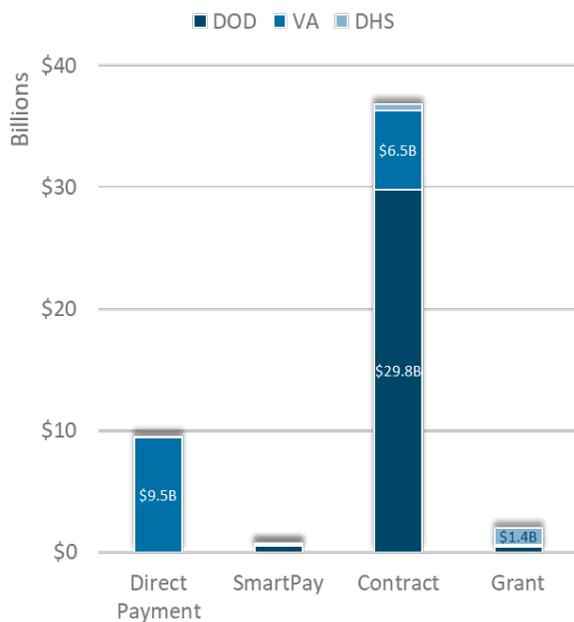
## Statewide Results

### Direct Activity

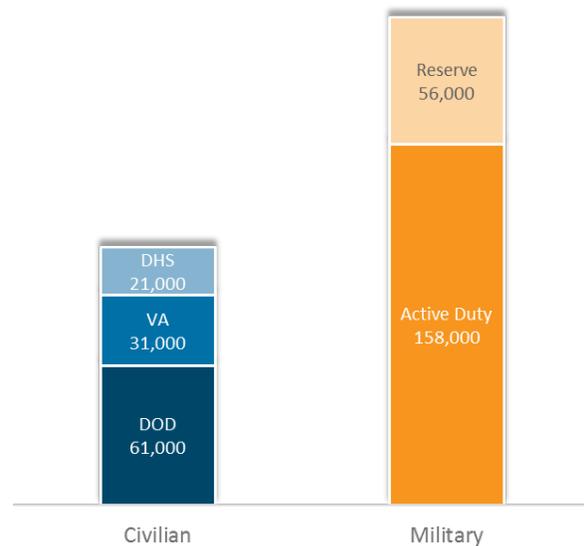
The three agencies identified – the Departments of Defense, Homeland Security and Veterans Affairs – collectively spent \$49.0 billion and directly employed approximately 330,000 civilian and military residents of California (including reservists and National Guard) in fiscal year 2018.<sup>6</sup> By far the largest share of spending comes from the Department of Defense contracting, totaling \$29.8 billion. Direct payments totaling \$9.5 billion represented the bulk of the remaining direct spending and VA Contracts add an additional \$6.5 billion. SmartPay,<sup>7</sup> grants and Homeland Security spending combine for \$3.2 billion in total spending. Figure 2 depicts this distribution.

Direct employment is also concentrated in the Department of Defense, which employed 61,000 civilians, 154,000 active duty personnel and 55,000 reserve and National Guard personnel in fiscal year 2018. The Departments of Veterans Affairs and Homeland Security combined to employ an additional 52,000 civilians. An additional 5,000 active duty and 1,000 reserve Coast Guard personnel are employed by the Department of Homeland Security.<sup>8</sup>

**Figure 2: Direct Spending**



**Figure 3: Direct Employment**



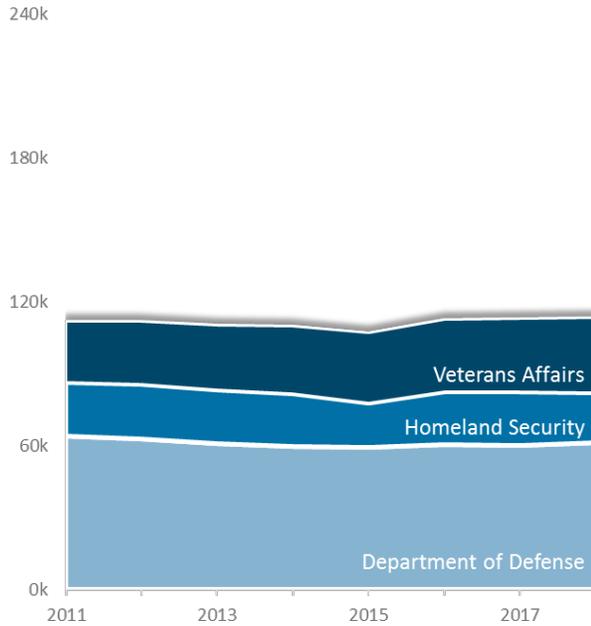
Civilian employment has remained relatively stable since 2011, with a modest increase of 0.5% since 2016, shown in Figure 4. Military active duty employment saw a significant drop between 2013 and 2016, however, Active Duty employment returned to prior levels in 2018. Reserves stayed about the same and have been relatively steady throughout the period. Both are represented in the Figure 5 chart.

<sup>6</sup> Federal fiscal year

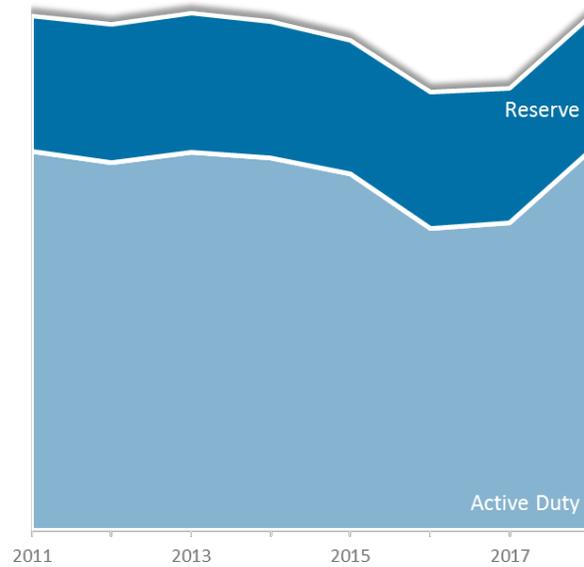
<sup>7</sup> Government purchase cards used for very small purchases.

<sup>8</sup> DMDC (2018) Military and Civilian Personnel by Service/Agency by State/Country (Updated Quarterly). Source: [Link](#)

**Figure 4: Civilian Employment by Year**

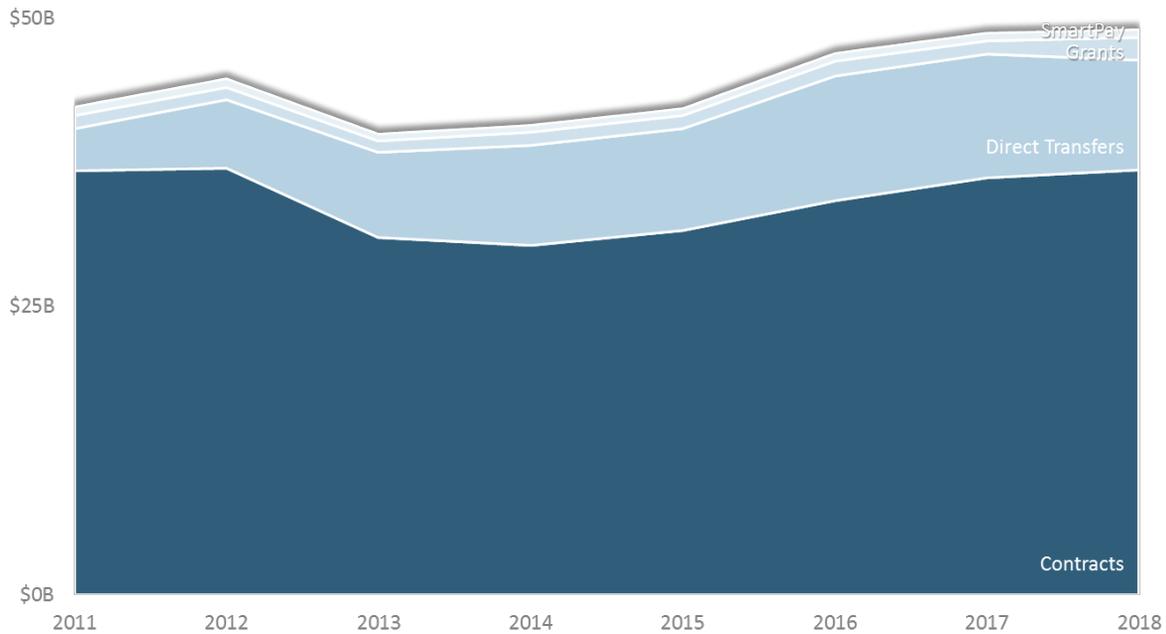


**Figure 5: Military Employment by Year**



Direct spending increased by 4.4% since 2016. This figure is in nominal dollars, so after accounting for inflation, spending is essentially flat. Since the sequester,<sup>9</sup> spending on contracts and SmartPay have increased by about 3.5% annually.

**Figure 6: Direct Spending by Year**



<sup>9</sup> Sequestration was a provision of the Budget Control Act of 2011 that imposed across-the-board spending cuts to national security and domestic spending. The sequester was eliminated in the 2019 budget agreement.

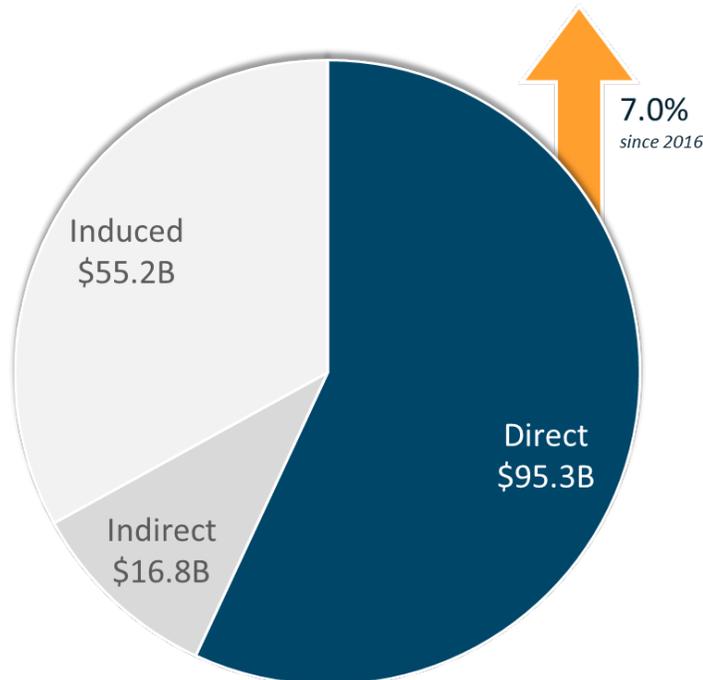
## Economic Impacts

### Total Output

The spending and employment included in this estimate generated \$167.3 billion in economic activity in California during fiscal year 2018.<sup>10</sup> This total includes:

- \$95.3 billion of direct economic activity by the agencies and their contractors.
- \$16.8 billion of indirect economic activity created through the supply chain of direct activities.
- \$55.2 billion of induced economic activity created because of additional money in the economy.
- This total represents a 7.0% nominal increase since 2016.

Figure 7: Total Output



### Total Employment

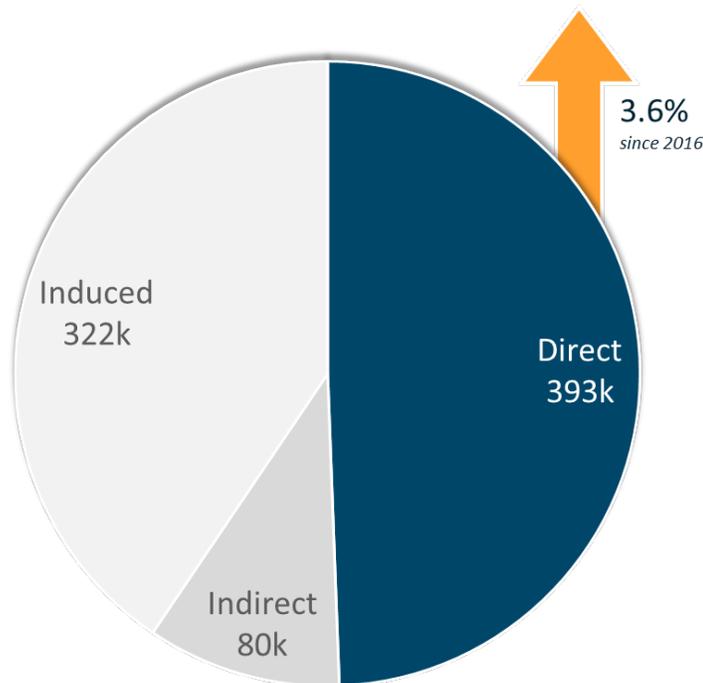
The spending and employment included in this estimate generated 795,000 full-time-equivalent (FTE) jobs in California.<sup>11</sup> This total includes:

- 393,000 FTEs directly employed by the agencies and their contractors.<sup>12</sup>
- 80,000 FTEs employed indirectly through the supply chain of direct activities.
- 322,000 FTEs employed because of economic activity induced by the additional money in the economy.
- This total represents a 3.6% increase since 2016.

<sup>10</sup> May not sum due to rounding

<sup>11</sup> May not sum due to rounding

<sup>12</sup> Direct employment includes federal employees as well as the employment of federal contractors and vendors generated by direct government spending.

**Figure 8: Total Employment**

## 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 IMPLAN model, described in the Methodology & Data section of this report, estimates that the federal government received approximately \$7.1 billion in payroll tax and \$6.4 billion in personal income tax as a result of the spending and employment modeled. Other business taxes total \$2.5 billion, for total federal revenue of \$16.0 billion.

In addition, combined state and local impacts include \$2.2 billion in income tax, \$1.8 billion in sales tax and \$1.7 billion in property tax, as well as other smaller taxes and fees, which make up the remainder of the \$7.2 billion total. The model does not differentiate between the portion of this revenue that is generated by local governments and state government.

## 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:<sup>13</sup>

<sup>13</sup> 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.

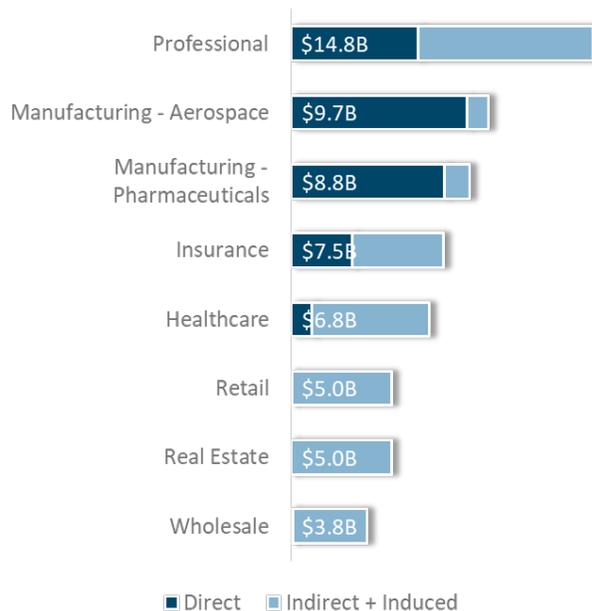
- **Core Mission:** A large portion of spending and resulting economic activity occur in industries that are central to the work of the three federal agencies involved, including defense contractors (primarily aerospace and research & development) and pharmaceutical manufacturers that supply Veterans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

The next two categories include indirect and induced spending:

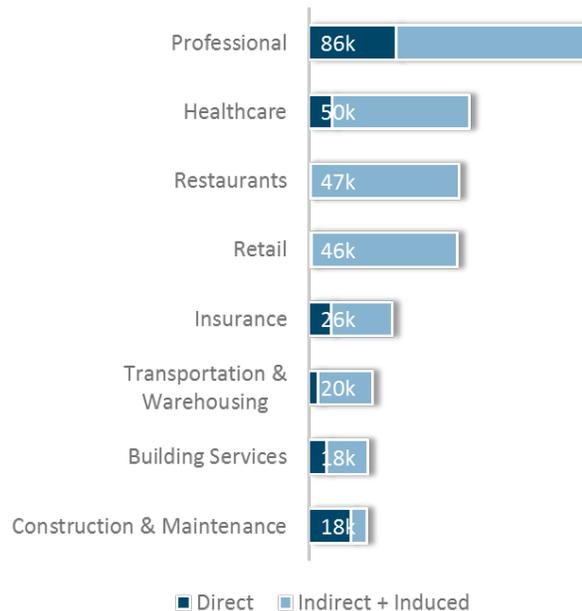
- **Subcontractors:** This category includes the contractors and suppliers of industries in the categories above, including supply chain industries such as manufacturers, transportation, wholesalers and general business-supporting industries such as janitorial and professional services.
- **Population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

Figures 9 and 10 show the industries with the largest total economic output and employment, respectively, resulting from national security spending and employment. The underlying industries and related methodology remain the same, however, this report uses a more robust grouping of industries. As a result, the figures reported here are not directly comparable to the prior report.

**Figure 9: Industry Impacts - Output**



**Figure 10: Industry Impacts - Employment**



Policymakers may wish to consider other characteristics of the impacted industries that are beyond the scope of this report. These include economic considerations such as industries that support the generation of exports or innovation that may lead to future economic growth. They also include cultural considerations such as the importance of a particular profession or industry to the state or a local

community’s identity. Other major considerations include externalities related to the industry, such as environmental, health or educational impacts.

## Regional Results

### Economic Output

Economic output as a result of national security spending is clustered in Southern California, especially San Diego County which is home to a large concentration of military installations and servicing industries. San Diego County alone accounts for 30% of the state’s total security-driven output, \$49.0 billion. The total grows to \$93.1 billion across Southern California.

The San Francisco Bay Area is divided into three regions: San Francisco Bay, Silicon Valley and North Bay. Together, this high-tech hub combines for \$27.8 billion in security-driven output.

The Sacramento region, home to California’s state government, accounts for \$21.7 billion in output. This may overstate the true local output, however, as a portion of spending flows through the state government in Sacramento to other regions where that portion of the output actually occurs.

Figure 11: Regional Impacts - Output

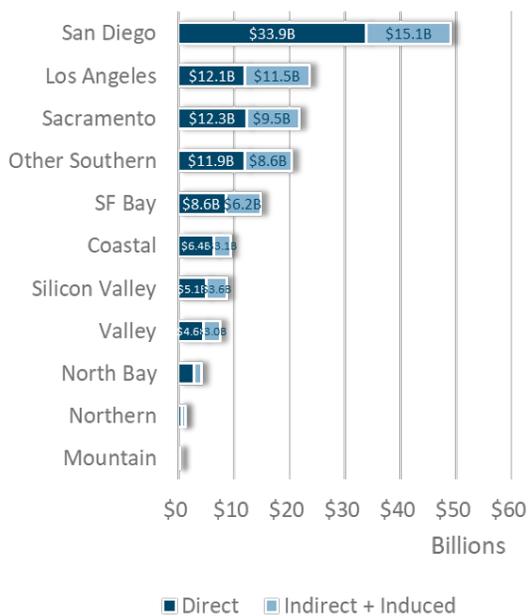
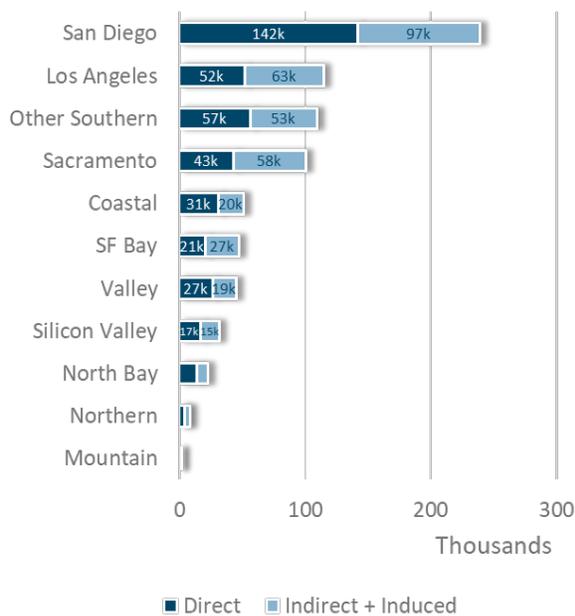


Figure 12: Output Distribution



Regional definitions are provided in the Regional Analysis section.

### Employment

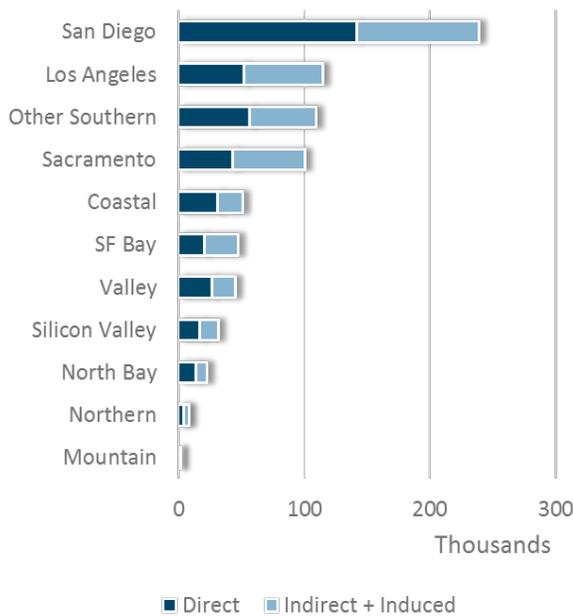
Employment<sup>14</sup> as a result of national security spending is similarly clustered in Southern California. San Diego County alone accounts for 31% of the state’s total security-driven employment; 240,000 jobs. The total grows to 464,000 jobs across Southern California.

<sup>14</sup> All employment figures in this section are listed as Full-time Equivalent (FTE)

The San Francisco Bay Area (SF Bay, Silicon Valley and North Bay) combines for 103,000 jobs in security-driven employment.

The Sacramento region accounts for 100,000 in security-driven employment. As mentioned previously, this may overstate the true local employment.

**Figure 13: Regional Impacts - Employment**



**Figure 14: Employment Distribution**

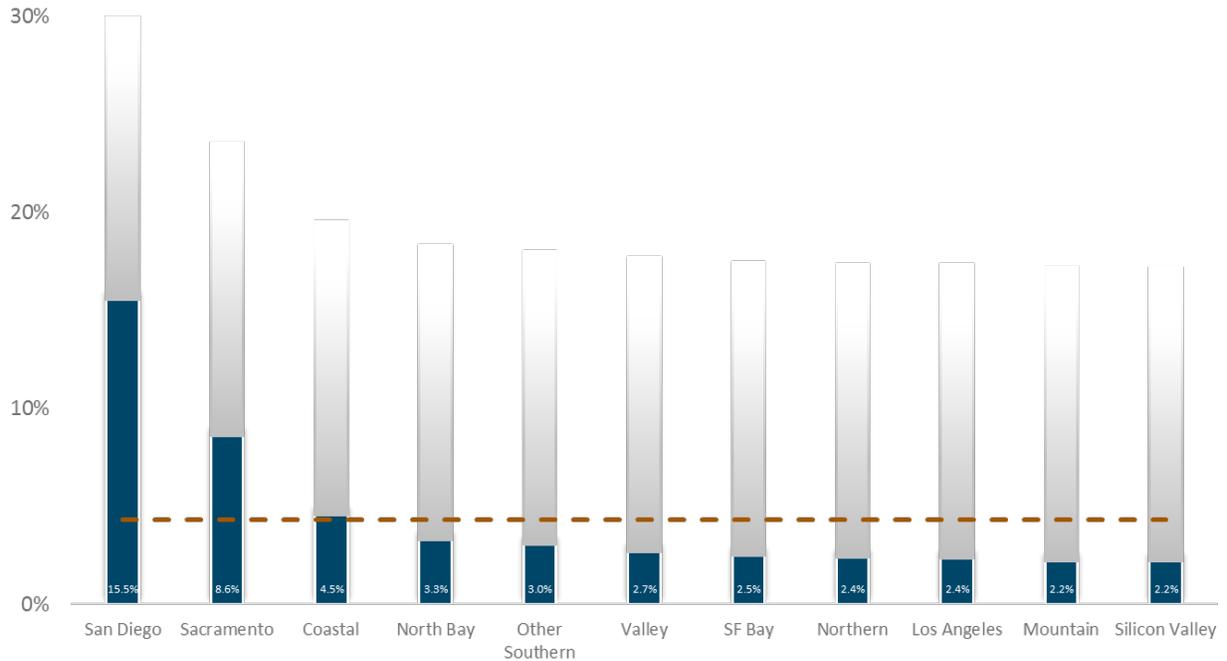


*Regional definitions are provided in the Regional Analysis section.*

Statewide, direct, indirect and induced employment as a result of national security spending totals 4.3% of California’s 18.6 million jobs.<sup>15</sup> Dependence by region is relatively concentrated. San Diego is by far the most dependent, with 16% of its jobs attributable to national security spending. Sacramento is estimated at 8.6%, twice the state average. As mentioned previously, this may overstate the true local impact. The Coastal region is just above the state average at 4.5%. All other regions have a relatively similar level of dependence, falling between 2.2% and 3.3%.

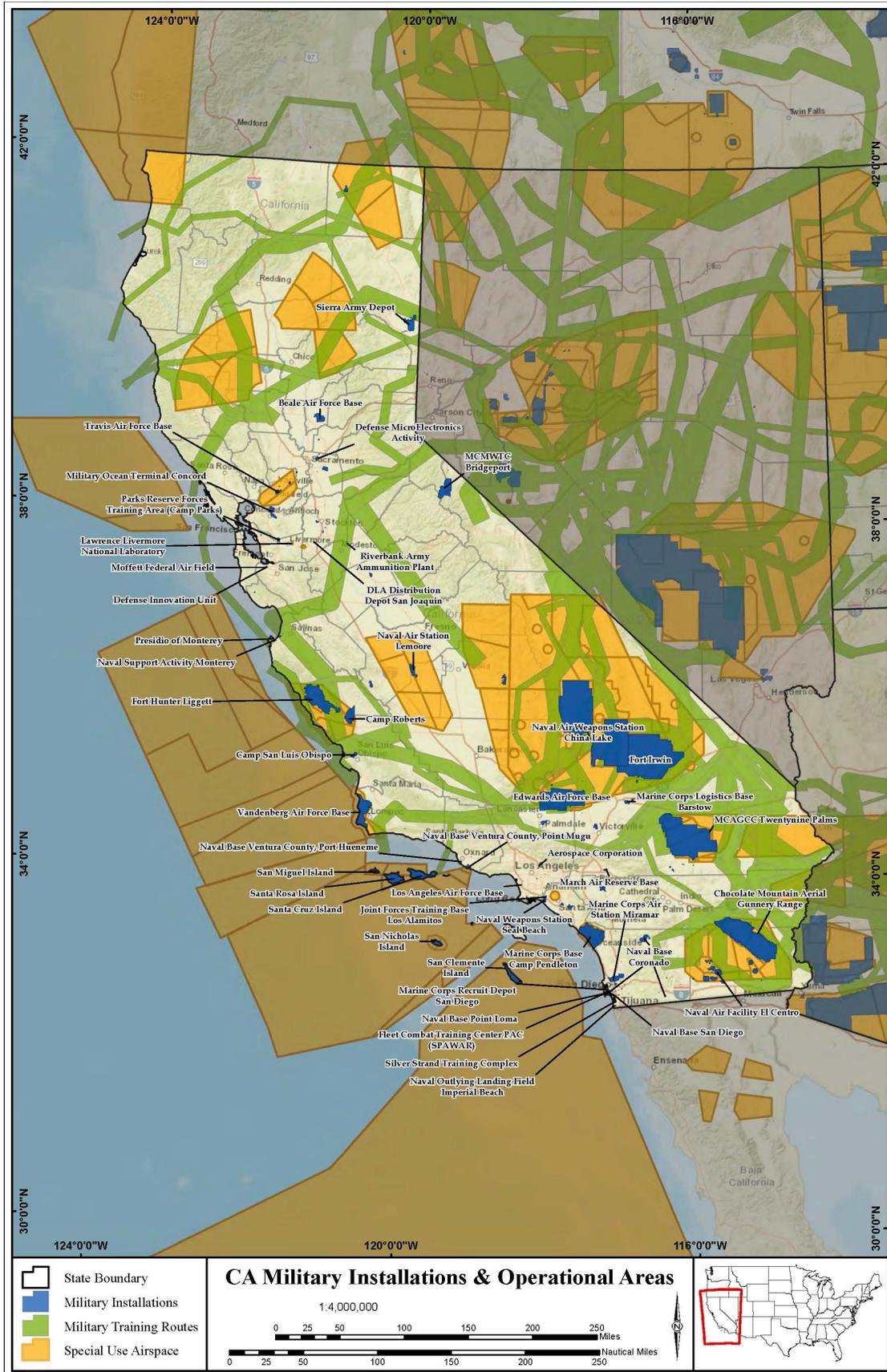
<sup>15</sup> Employment Development Department (2019 Monthly Labor Force Data for Counties, Annual Average 2018)

**Figure 15: Share of Jobs by Region**



## Summary

National security contributes significantly to the state’s economy. The total impact appears similar to high profile sectors like agriculture and the film industry. The federal government invests at least \$49 billion dollars and directly employs approximately 330,000 residents in the state. This results in \$167 billion in economic impact and supports more than 795,000 full time equivalent jobs in California. Economic activity occurs in every region of the state, from major coastal areas like San Diego and Los Angeles to small, inland communities, like Bridgeport, El Centro and Ridgecrest.



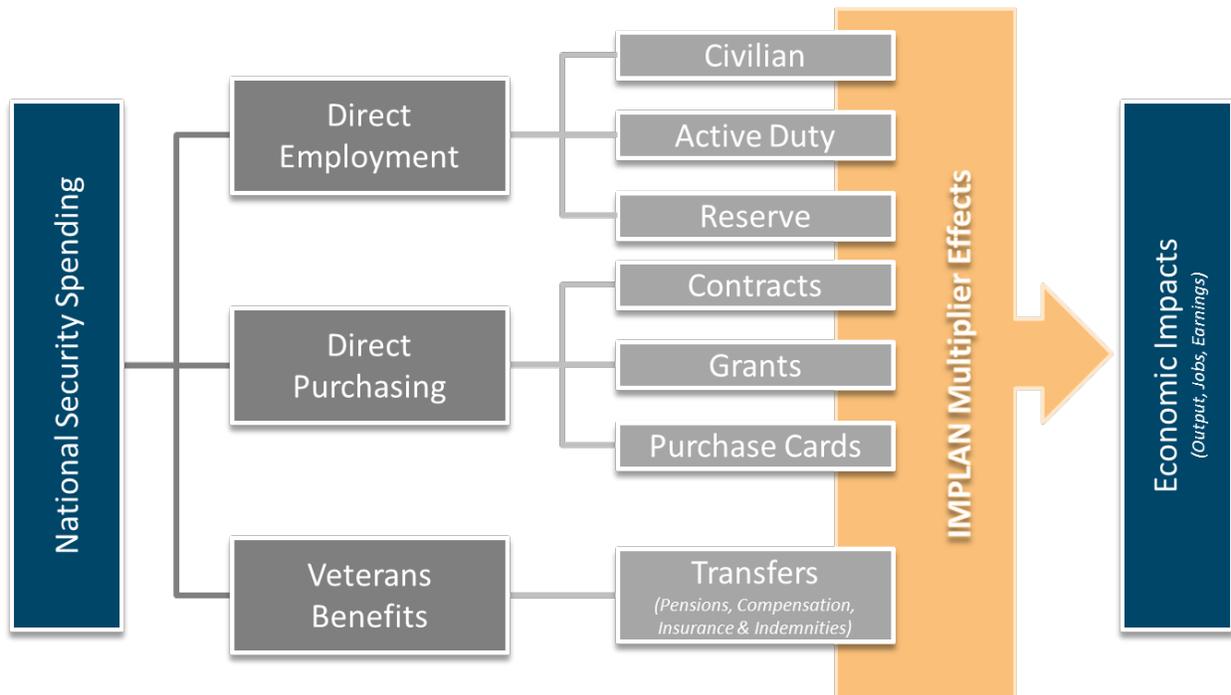
## Methodology & Data

### Scope

As discussed in the introduction, this report focuses on the 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 16 details the components of these spending areas.

**Figure 16: 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 aerospace and defense companies may have with universities enabled by their security work.

### Data

A contractor, Network Solution Consulting (NSC), was engaged to support data collection for this report. This resource allowed data from prior years to be acquired as well as data necessary for this update. 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<sup>16,17</sup> 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, which provides data at the state level.<sup>18</sup> The contractor did not receive responses in its attempt to acquire data by county or zip code through the Freedom of Information Act process. Instead spending was apportioned to counties 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.<sup>19</sup> This tool reports data at the statewide level. In addition, the location of many investigative<sup>20</sup> employees have been suppressed in recent years. These suppressed positions were allocated to California based on the ratio of investigative positions to non-investigative positions that existed in prior years. County distribution is estimated based on the distribution drawn from the American Community Survey.

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 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).

## 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

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<sup>16</sup> POGO (2013) USASpending.gov: NOT Your One-Stop Shop for Following Taxpayer Dollars. Source: [Link](#)

<sup>17</sup> Sunlight Foundation (2017) A brief history of the DATA Act. Source:

<sup>18</sup> Available at [About GSA Smartpay](#) under the "Statistics" and "Sales, Transactions, Account Holder Data" menus.

<sup>19</sup> U.S. Office of Personnel Management (2019) FedScope Employment Cube September 2010-2018. [Link](#)

<sup>20</sup> This includes the large majority of Transportation Security Administration, Customs and Border Protection, Immigration and Customs Enforcement and Citizenship and Immigration Services staff.

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 Wassily 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.”<sup>21</sup>

### **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 United States 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.

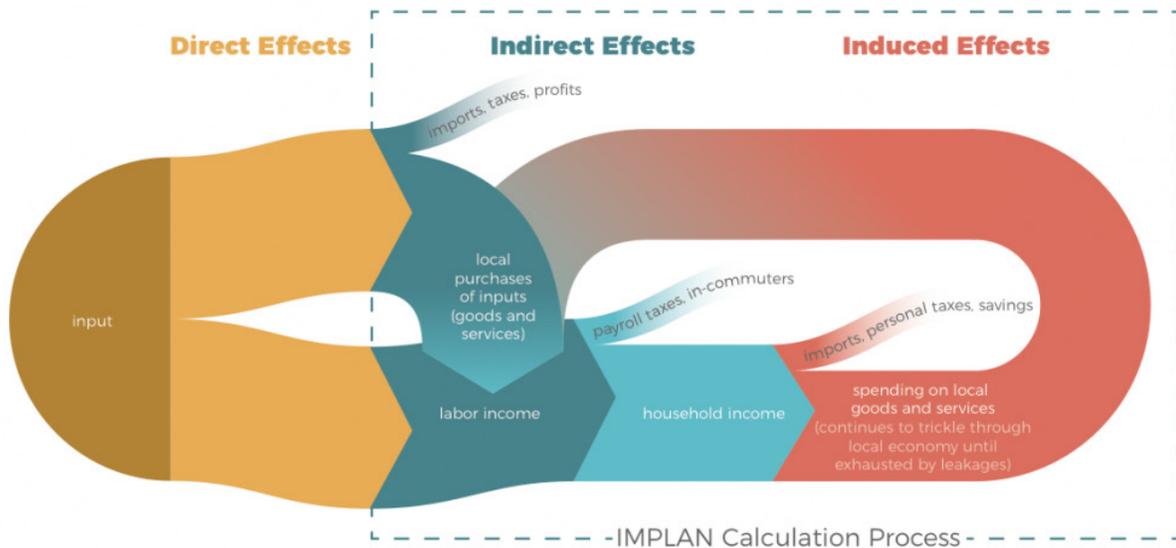
IMPLAN models the economy within a specified region as 528 sectors with unique spending patterns derived from U.S. Bureau of Economic Analysis expenditure patterns.

As depicted in Figure 17, 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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<sup>21</sup> NobelPrize.org. Wassily Leontief – Facts. Source: [Link](#)

Figure 17: IMPLAN Model<sup>22</sup>



## Regional Analysis

Both the approach and methodology for estimating impacts at a sub-statewide level changed significantly from the prior report.

### *Regional Impacts*

In the 2018 report (2016 data), impacts were reported for each county. This represented a labor and time intensive process to break out, input and process data for all of California’s 58 counties. In order to make the best use of resources, this report uses regions instead of counties as the level of local analysis. Regions are loosely based on the California Economic Development Department’s “California Economic Markets”<sup>23</sup> but customized to meet the unique needs of this project.

<sup>22</sup> IMPLAN. Assisted Economy. Source: [Link](#)

<sup>23</sup> EDD. Interactive Maps and Data Tables. Source: [Link](#)

Figure 18: Regions



Coastal	Los Angeles	Mountain	North Bay	Northern	Other Southern	Sacramento	San Diego	SF Bay	Silicon Valley	Valley
Monterey	Los Angeles	Amador	Lake	Butte	Imperial	Alpine	San Diego	Alameda	San Mateo	Fresno
San Benito		Calaveras	Marin	Colusa	Orange	El Dorado		Contra	Santa Clara	Kern
San Luis		Inyo	Napa	Del Norte	Riverside	Nevada		Costa		Kings
Obispo		Mariposa	Solano	Glenn	San	Placer		San		Madera
Santa Barbara		Mono	Sonoma	Humboldt	Bernardino	Sacramento		Francisco		Merced
Santa Cruz		Tuolumne		Lassen		Sutter				San Joaquin
Ventura				Mendocino		Yolo				Stanislaus
				Modoc		Yuba				Tulare
				Plumas						
				Shasta						
				Sierra						
				Siskiyou						
				Tehama						
				Trinity						

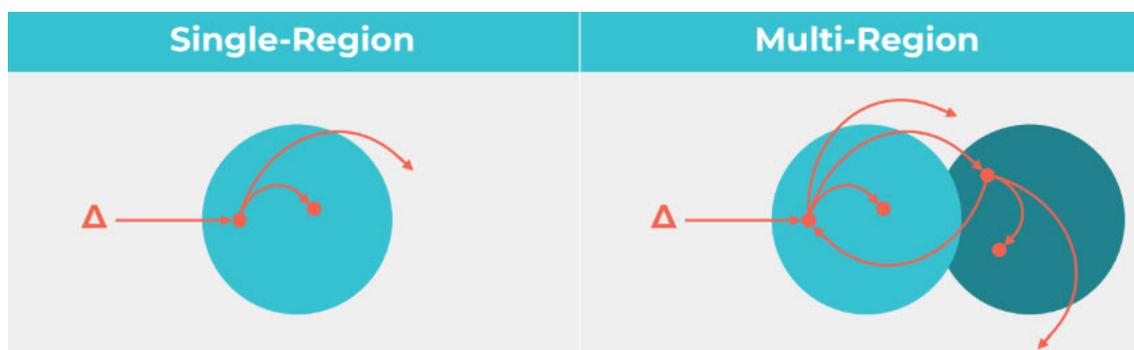
*MRIO Analysis*

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.”<sup>24</sup>

An approach like MRIO more fully accounts for the localized impacts within the state, but does not impact the statewide estimates. While 11 economic models 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 overlooks approximately 10% of total state output.<sup>25</sup> This is less than reported in the prior version of this report because of the change to regions instead of counties. Because there are fewer geographic entities, covering more area, there is less spillover between them. As a result of the changes in methodology and geography, the figures reported here are not directly comparable to the prior report.

**Figure 19: MRIO<sup>26</sup>**



### Limitations of the Input-Output model

Readers should be aware of a number of limitations with the modeling techniques employed, as Leontief himself acknowledged.<sup>27</sup>

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

<sup>24</sup> Clouse, C. (2019) MRIO: Introduction to Multi-Regional Input-Output Analysis. IMPLAN. url: [Link](#)

<sup>25</sup> Clouse, C. (2019) MRIO: Introduction to Multi-Regional Input-Output Analysis. IMPLAN. url: [Link](#)

<sup>26</sup> Leontief, W. (1955) Some Basic Problems of Empirical Input-Output Analysis. Input-Output Analysis: An Appraisal. Source: [Link](#)

<sup>27</sup> Leontief, W. (1955) Some Basic Problems of Empirical Input-Output Analysis. Input-Output Analysis: An Appraisal. Source: [Link](#)

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.

These issues are most pronounced at the largest scales (both relatively and absolutely). For example, if we were to introduce an additional \$9 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."<sup>28</sup> 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 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. For two of three departments, charge card data was provided in aggregate, so specific industries were not available. (Notably, charge card data only accounts for 1.4% of total spending, lessening the impact of this limitation.) For the third, the number of individual charges was too large to be practical to manually assign codes. For these cases, spending was modeled as a proportional change to the federal government – defense sector, overall. 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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<sup>28</sup> Dietzenbacher, E. & Lahr, M.L. (2004) Wassily Leontief and Input-Output Economics. Cambridge University Press. P. 32. Source: [Link](#)