California Statewide National Security Economic Impacts

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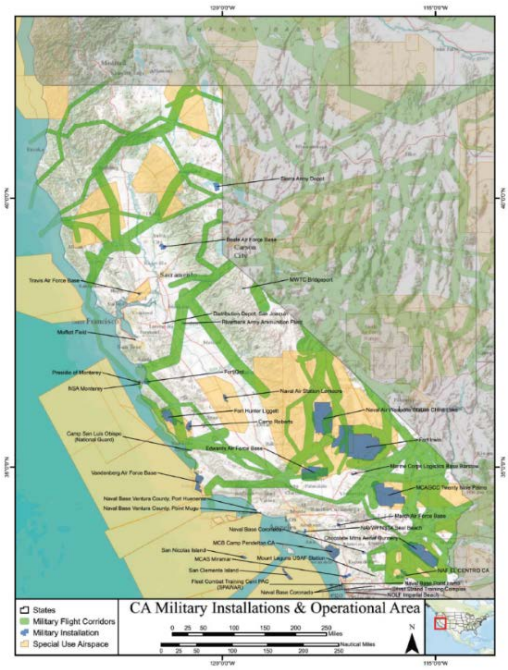
California Statewide National Security Economic Impacts

Introduction

California is home to the largest share of our country's military, a fact that is largely 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 130,000 active duty military personnel and an additional 56,000 reservists & National Guard are stationed across California's 30 military installations, the largest concentration of American military in any state or country in the world.[1]

Figure 1: Installations & Operational Area[2]



The Governor's Office of Planning & Research and the Governor's Military Council asked the California 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 *Comparable Studies* section. With the exception of San Diego County, none of the existing studies identified provide statewide economic impacts or comprehensive localized impacts.

As other agencies that have 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, this report focuses on the Departments of Defense (DoD), Homeland Security (DHS) and Veterans Affairs (VA) for its inputs.

[1] DMDC (2017) DoD Personnel, Workforce Reports & Publications. Source: https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp
[2] Governor's Military Council. California Military Bases. Source: http://militarycouncil.ca.gov/s_californiamilitarybases.php

Statewide Results

Direct Activity

The three agencies identified collectively spent $47.0 billion in fiscal year 2016 and directly employ 295,000 residents of California (including reservists & National Guard). By far the largest share of spending is DoD contracting, totaling $28.3 billion. VA benefits totaling $10.9 billion were nearly all of the remaining direct spending. Charge cards,[3] grants and DHS spending combine for less than $2 billion in total spending. Figure 2 depicts this distribution.

Direct employment is also concentrated in the DoD, which employed 62,000 civilians, 125,000 active duty personnel and 56,000 reserve & National Guard personnel in fiscal year 2016. VA and DHS combined to employ an additional 53,000 civilians, as shown in Figure 3.

Figure 2: Direct Spending

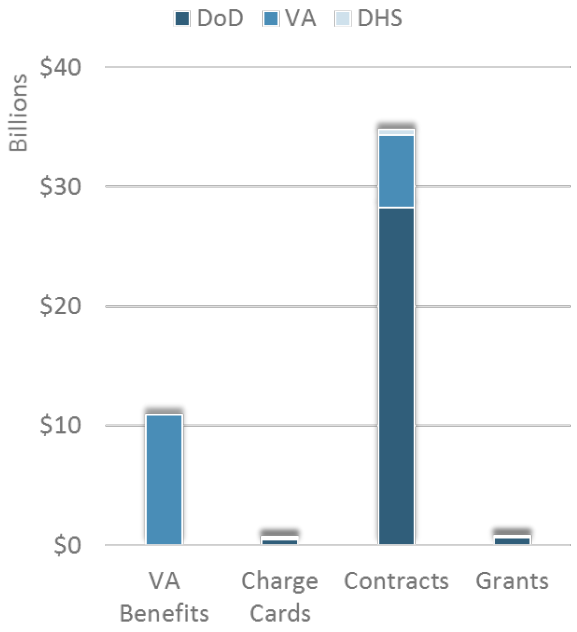
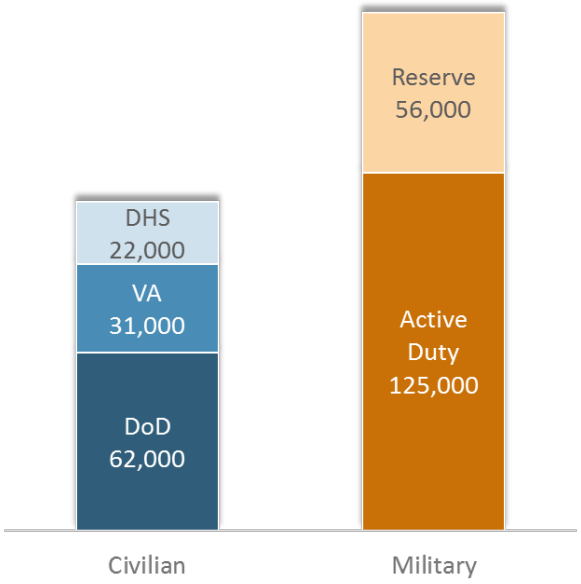


Figure 3: Direct Employment



Economic Impacts

Total Output

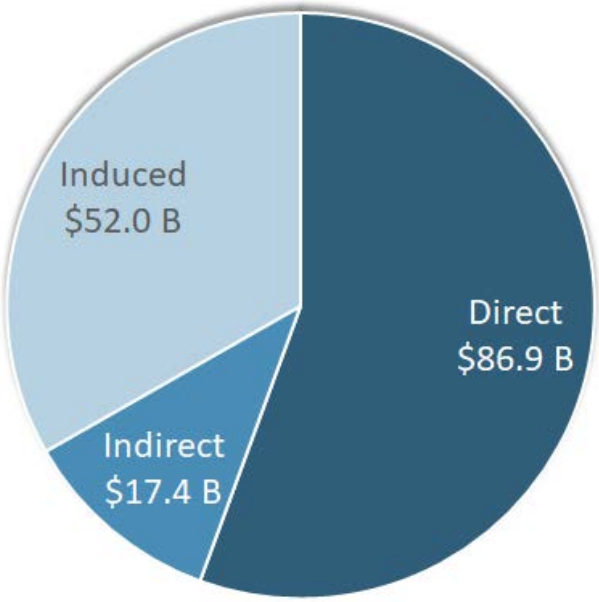
The spending and employment included in this estimate generated $156.3 billion in economic activity in California during fiscal year 2016. This total includes:

- $86.9 billion of direct economic activity by the agencies and their contractors.

[3] Credit cards issued directly to employees for small transactions

- $17.4 billion of indirect economic activity created through the supply chain of direct activities.
- $52.0 billion of induced economic activity created because of additional money in the economy.

Figure 4: Total Output



Total Employment

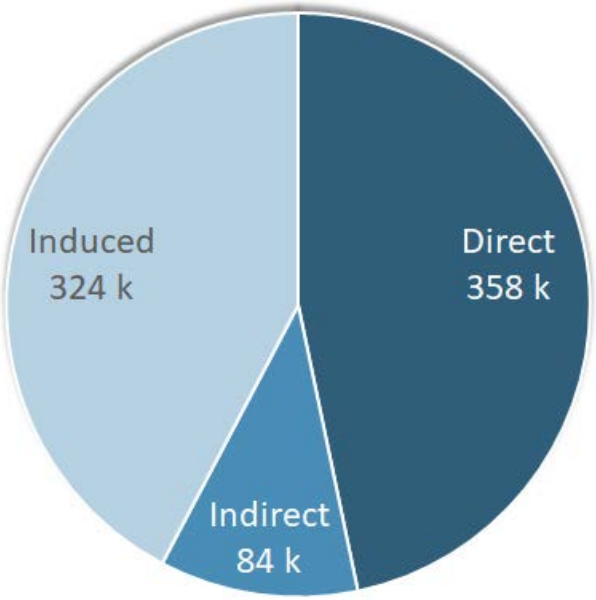
The spending and employment included in this estimate generated 767,000 full-time-equivalent (FTE) jobs in California.[4] This total includes:

- 358,000 FTEs directly employed by the agencies and their contractors.[5]
- 84,000 FTEs employed indirectly through the supply chain of direct activities.
- 324,000 FTEs employed because of economic activity induced by the additional money in the economy.

[4] Does not sum due to rounding

[5] Direct includes full- and part-time federal employees referenced in Figure 3 as well as the FTE employment of federal contractors and vendors generated by direct government spending referenced in Figure 2.

Figure 5: Total Employment



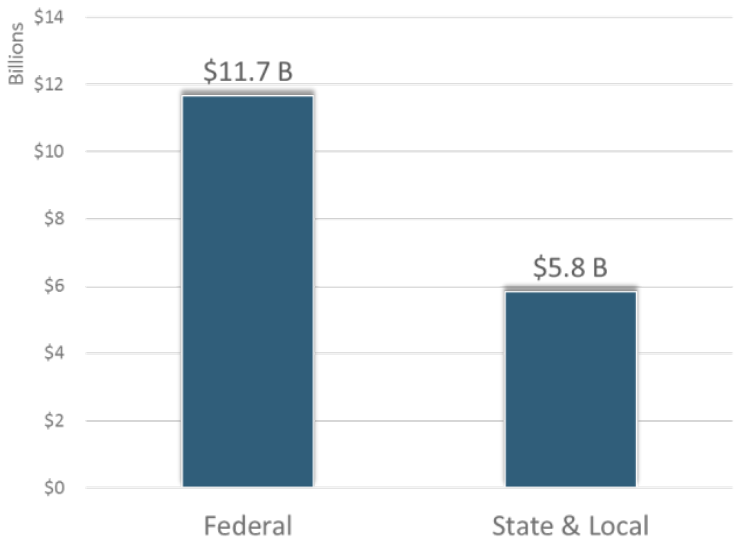
Government Revenue

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, estimates that the federal government received approximately $6.2 billion in payroll tax and $5.4 billion in personal income tax as a result of the spending and employment modeled.

In addition, combined state and local impacts include $1.9 billion in income tax, $1.7 billion in sales tax and $1.3 billion in property tax, as well as other smaller taxes and fees, which make up the remainder of the $5.8 billion total. The model does not differentiate between the portion of this revenue that is generated by local governments and state governments.

Figure 6: Government Revenue



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: [6]

- 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 VA 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 DoD'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.

[6] Overlap does exist between these groups. For example, healthcare could be considered to be part of every category. It is a major contractor for the VA, as part of its central mission to provide healthcare to veterans. The healthcare industry also serves the DoD, 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.

Figure 7 and Figure 8 show the industries with the largest total economic output and employment, respectively, resulting from national security spending and employment. Both lists include many of the same industries, however, we see that high-tech manufacturing and research industries fall lower or even off the employment list, while lower-paying industries such as restaurants and social services rise near the top of the employment chart, illustrating the potential disconnect between economic activity and job creation.

Figure 7: Industry Impacts – Output

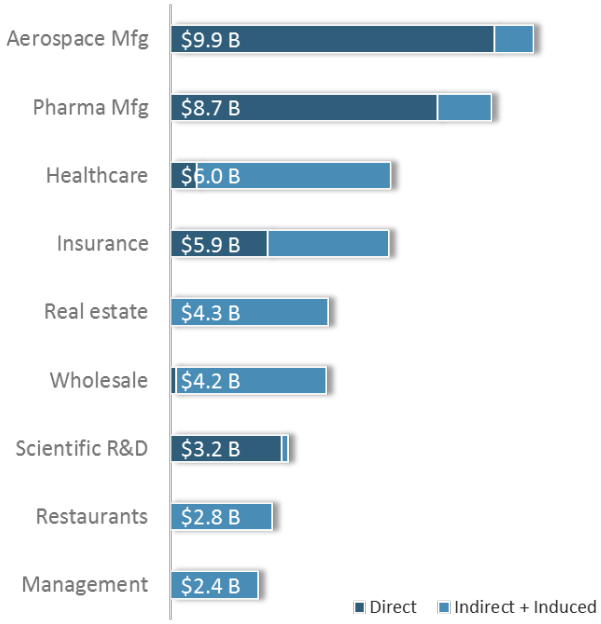
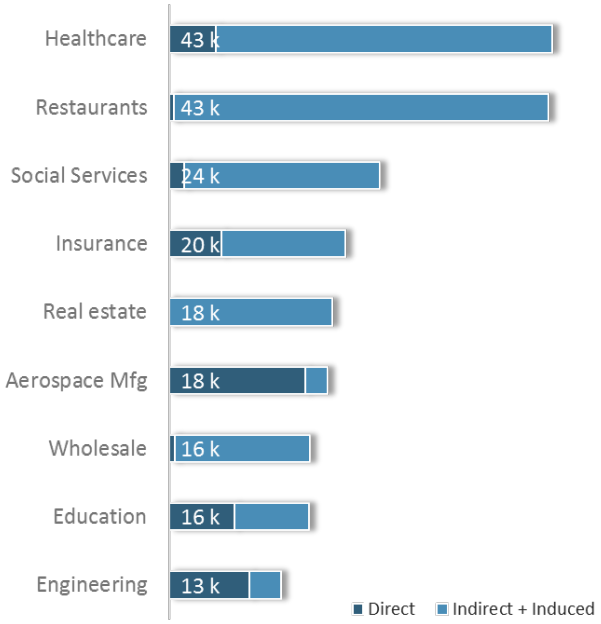


Figure 8: Industry Impacts - Employment



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.

County Results

Economic output as a result of national security spending is clustered in Southern California, especially San Diego County, home to a large concentration of military installations and servicing industries. San Diego County alone accounts for 30 percent of the state's total security-driven output, $46.2 billion. Along the southern coast, San Diego, Orange and Los Angeles counties combine for $80.4 billion and the total grows to $102.7 billion across Southern California.[7]

[7] Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego & Ventura counties.

The San Francisco Bay Area, home to numerous technology companies and research universities, has the second-largest concentration. These six counties[8] combine for $25.0 billion in direct, indirect and induced output.

The Sacramento metropolitan area's four counties[9] combine for $13.4 billion in output and the Central Valley's seven counties[10] combine for $5.5 billion.

Figure 9: County Impacts – Output

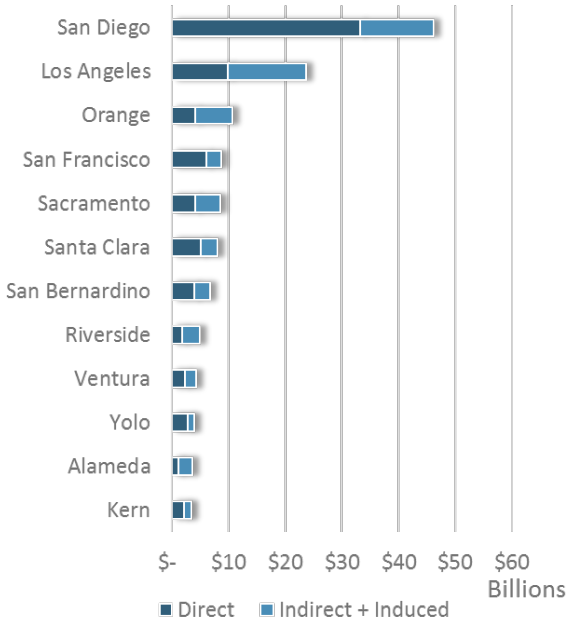
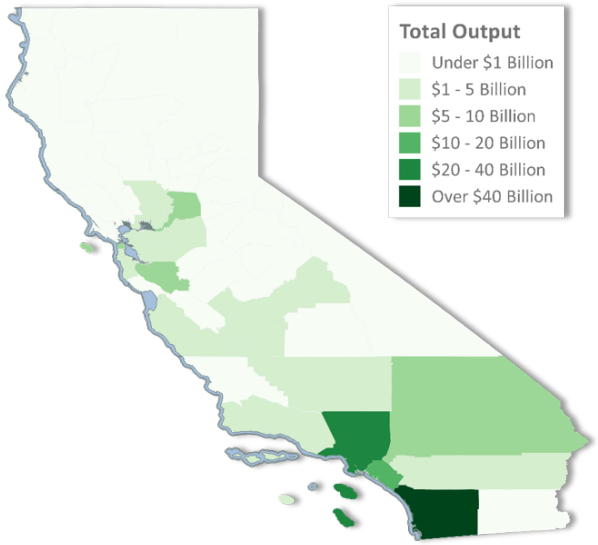


Figure 10: Output Distribution



Employment is concentrated in San Diego County in particular and across Southern California in general. Some 235,000 FTE jobs in San Diego County are attributable to defense employment and spending. This figure grows to 401,000 in the three coastal counties and 541,000 across Southern California overall, averaging $190,000 of output per FTE.

Per FTE, the Bay Area's 78,000 jobs average $320,000 in output, while Sacramento metro's 60,000 jobs average $220,000 and the Central Valley's 32,000 jobs average just over $170,000 in output.

[8] Alameda, Contra Costa, Marin, San Francisco, San Mateo & Santa Clara counties.
[9] El Dorado, Placer, Sacramento & Yolo counties.
[10] Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus & Tulare counties.

Figure 11: County Impacts - Employment

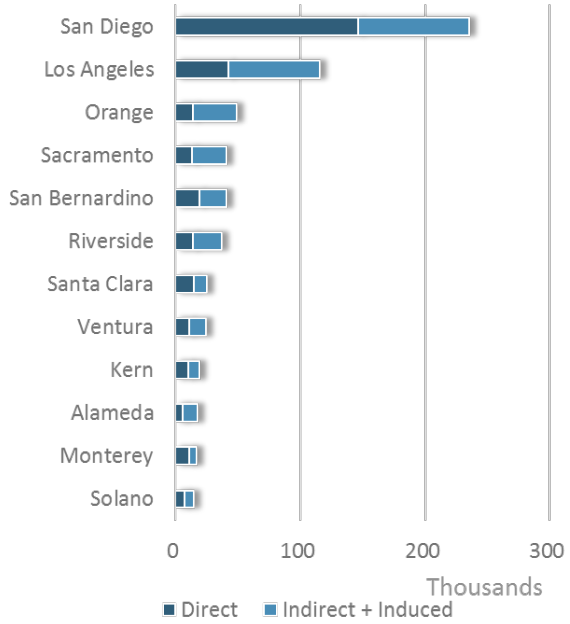
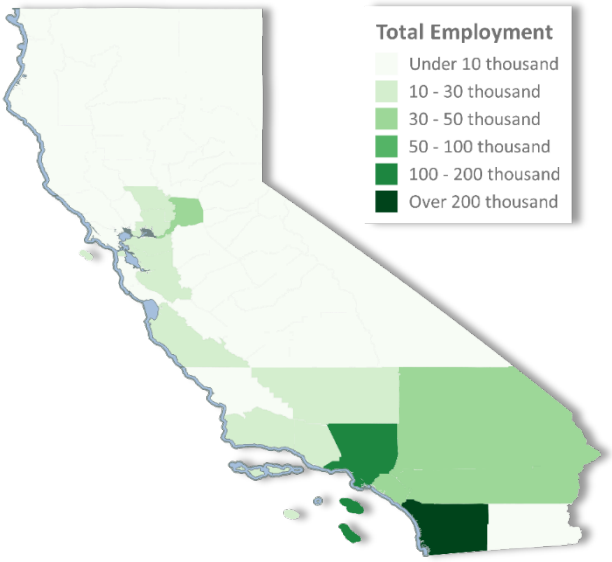


Figure 12: Employment Distribution

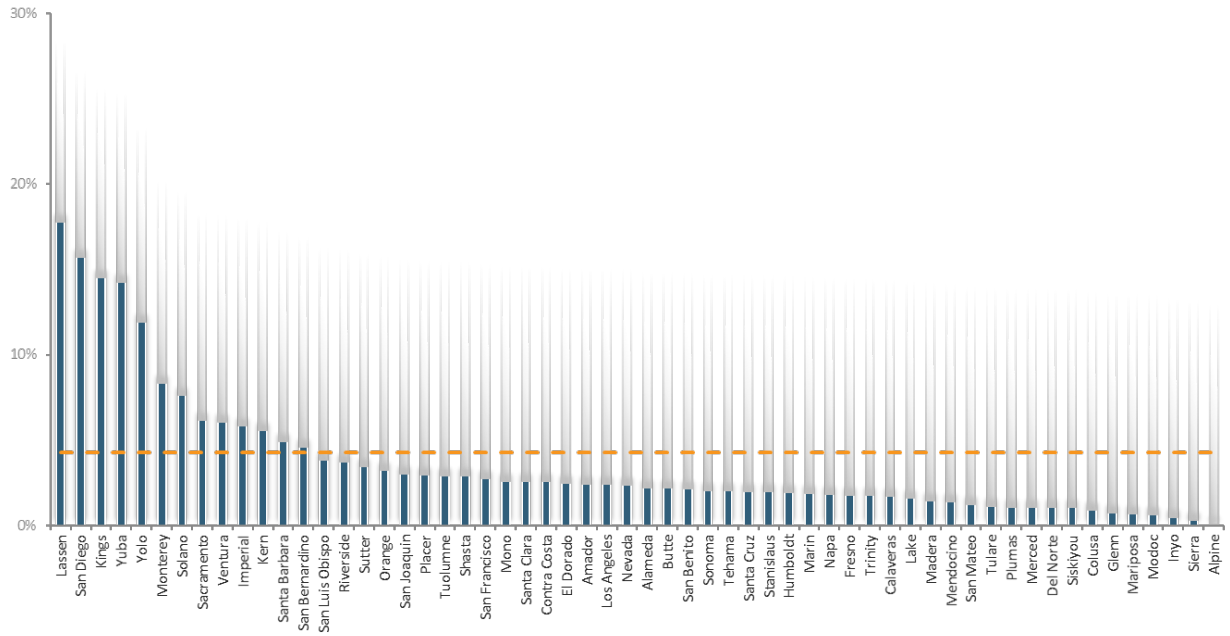


Statewide, direct, indirect and induced employment as a result of national security spending total 4.2 percent of California's 18 million jobs.[11] Dependence by county varies substantially, from highs of 18 percent in Lassen and 16 percent in San Diego counties to less than 1 percent in seven counties.[12] Among other relatively large counties, Sacramento, Ventura, Kern (6 percent each), Santa Barbara and San Bernardino (5 percent each) have a larger than average share. Conversely, large counties such as Los Angeles (2 percent), San Francisco (3 percent) and Santa Clara (3 percent), despite large total national security related employment, have a lower than average share of employment. Figure 13 depicts this distribution.

[11] Employment Development Department (2017) Monthly Labor Force Data for Cities and Census Designated Places (CDP), Annual Average 2016 – Revised.

[12] While the total number of jobs impacted by the inability to calculate spillover in certain counties is very small, as described in the Methodology: County Analysis section, it is possible that this represents a meaningful share of jobs in some counties, which may impact the precision of estimates on the low end of this range.

Figure 13: Share of Jobs by County



Comparable Studies

While the impacts of military and national security spending are relatively widely studied, there are no other studies of economic impact for each county in the state.

The San Diego Military Advisory Council commissions an annual *Military Economic Impact Study*, which is similar in focus and methodology, but limited to San Diego County. The 2017 study by Point Loma Nazarene University's Fermanian Business & Economic Institute estimates $49.2 billion in output in San Diego in fiscal year 2016, which is similar to the $46.2 billion estimated in this report. The San Diego study includes the economic impacts of tourism, which likely accounts for the bulk of the difference.[13]

The DoD's Office of Economic Adjustment provides an annual *Defense Spending by State* report. The report identifies $49.3 billion in defense spending and 269,540 DoD employees in California, compared to $47.0 billion and 242,000 DoD employees in this report.[14] The discrepancy in employment figures is due to the DoD's use of older data and a subsequent decline in related employment in California over 2015.[15]

[13] SDMAC (2017) Military Economic Impact Study. Source: https://www.sdmac.org/MEIS2017/

[14] 242,000 figure is limited to DoD employment, omitting VA and DHS employment, which are not included in the OEA report.

[15] DoDOEA (2015) Defense Spending by State Fiscal Year 2015. Source: http://www.oea.gov/resource/defense-spending-state-fiscal-year-2015

A number of California's military installations have produced economic analyses based on their activity. They are focused on a narrower band of economic activity, and often different geographies, than this report. These reports are available at the Governor's Military Council website.[16] Examples include:

- $1.8 billion in Kern, Los Angeles and San Bernardino output from Edwards Air Force Base's operations and expenditures.
- $119.4 million in output in Imperial County from Naval Air Facility El Centro's operations and expenditures.
- $2.0 billion in total economic activity to Ventura County from Naval Base Ventura County's operations and expenditures.
- $1.7 billion in local output from Travis Air Force Base's operations and expenditures.

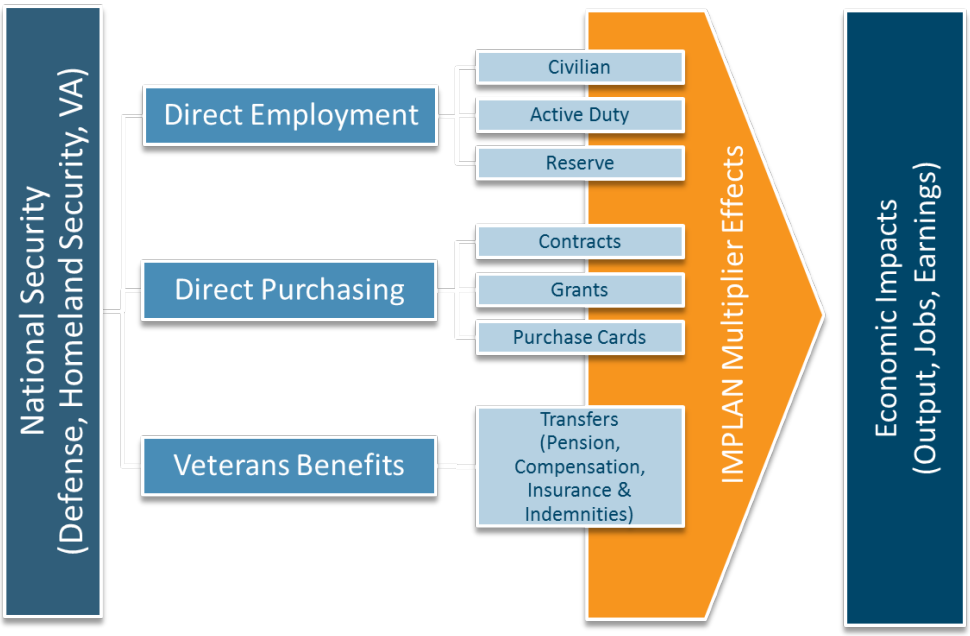
Methodology & Data

Scope

As discussed in the introduction, this report focuses on the Departments of Defense (DoD), Homeland Security (DHS) and Veterans Affairs (VA).

Within these three federal agencies, three broad areas of economic activity are examined: direct employment, direct purchasing and spending on veterans benefits. Figure 14 details the components of these spending areas.

Figure 14: Scope of Analysis



[16] http://militarycouncil.ca.gov/s_economicdata.php

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

All data was acquired from U.S. government sources. Some data is publicly available from the USA Spending database or regularly updated reports. Other data was requested and provided directly.

USASpending.gov provides a public database of nearly all federal spending. Although the database has limitations,[17,18] 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.

In addition to normal contract-based purchasing reported through USASpending.gov, the General Services Administration (GSA) allows purchases under the "micro-purchase" threshold to be made with SmartPay purchase cards, similar to a "company card" in the private sector. The VA provided data for all purchases within California for fiscal year 2016. GSA provided summary data for DHS and DoD purchasing, organized by zip code.

VA benefits, primarily the cost of providing healthcare, were acquired from the National Center for Veterans Analysis and Statistics, which reports on spending by county.

Civilian employment was acquired from the Office of Personnel Management, also reported by county.

Military employment was acquired from the DoD'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, FTE estimates for reservists & 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 percent of matched active duty pay to a high of 21.2 percent, with an average of 18.25 percent. 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).

[17] POGO (2013) USASpending.gov: NOT Your One-Stop Shop for Following Taxpayer Dollars. Source: http://www.pogo.org/blog/2013/05/usaspendinggov-not-your-one-stop-shop-for-following-taxpayer-dollars.html
[18] Sunlight Foundation (2017) A brief history of the DATA Act. Source: https://sunlightfoundation.com/2017/05/08/a-brief-history-of-the-data-act/

Table 1: Data Categories & Sources

Category	Type	Geography	Year	Source
Federal Spending	Contracts	Address	FY 2016	USASpending.gov
	Grants	Address	FY 2016	USASpending.gov
	Purchase Cards – DHS	Zip	FY 2016	Provided by GSA
	Purchase Cards – DoD	Zip	FY 2016	Provided by GSA
	Purchase Cards – VA	County	FY 2016	Provided by VA
	VA Benefits	Zip	FY 2016	USASpending.gov
Federal Employment	Civilian	County	Sept 2016	Office of Personnel Management
	Military	Statewide	Dec 2016	DMDC Location Report
	County data is estimated using American Community Survey data for share by county.			
	Reservists & National Guard are estimated at 0.183 FTE based on a comparison of wages matched by rank and experience levels.			

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 counter-factuals. 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 purchasing of required inputs, resulting 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."[19]

IMPLAN Economic Model

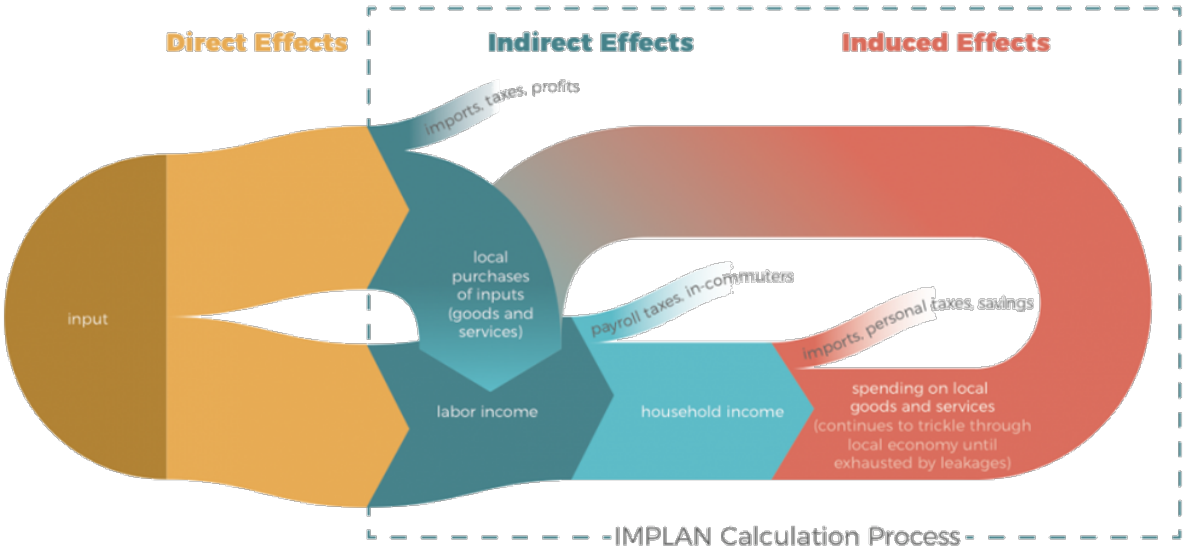
The IMPLAN (IMpact Analysis for PLANning) I-O economic model was selected for this analysis based on its reputation and the resources available. IMPLAN was developed by the USDA Forest Service in the 1970s to fulfill the requirements of the Rural Development Act of 1972 to estimate the impacts of alternate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

[19] NobelPrize.org. Wassily Leontief – Facts. Source: https://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1973/leontief-facts.html

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 15, 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.

Figure 15: IMPLAN Model[20]



County Analysis

The IMPLAN model is designed to estimate impacts for one specified geography. While the geography is highly customizable, potentially any desired combination of zip codes, counties or congressional districts, the analysis is limited to the single geographic area.

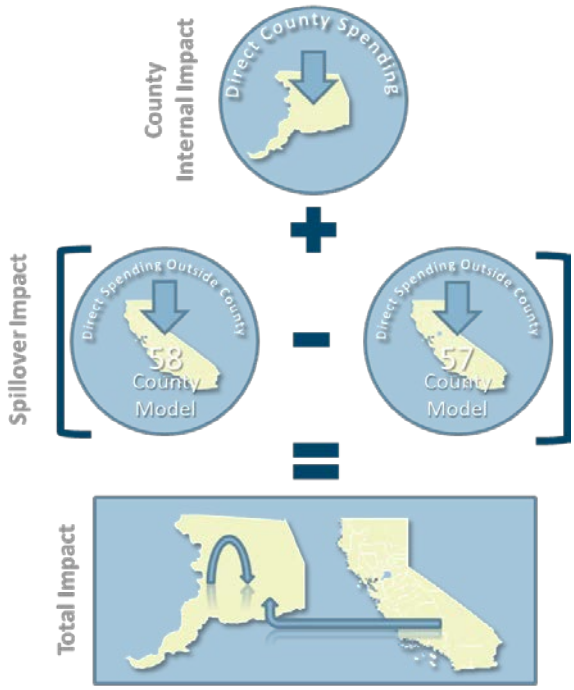
While 58 economic models can be run to estimate the impact of spending within each county, this methodology would understate the total impact, because it would omit spillover effects from spending in other counties. For example, if a worker in Sacramento commutes from West Sacramento, in Yolo County, the economic impacts resulting from her income would not appear in either the Sacramento County model (because it is considered commute-in leakage) or the Yolo County model (because the spending that occurred in Sacramento County is not included). This methodology overlooks approximately 17 percent of total state output. It can also distort county information significantly. For

[20] IMPLAN. Assisted Economy. Source: http://implan.com/case-studies/assisted-economy/

example, 80 percent of economic activity in Tuolumne County would be excluded. These impacts are most significant in counties with large tourist economies and counties that are home to a large number of commuters from nearby counties.

In order to estimate these impacts, the Research Bureau employed a custom three-model methodology, as depicted in Figure 16.

Figure 16: Custom County Analysis



The first model is a standard one-county model, which estimates the internal impact of the direct spending and employment that occurs within that county.

We use the additional two models to estimate spillover impact of spending in the other 57 counties.

First, we calculate the remaining spending and employment (statewide spending and employment minus spending and employment in the reference county).

This spending is run through a model of the entire state (58-county model[21]), which estimates the indirect and induced impacts of that spending statewide.

The same spending is then run through a second model of the state, omitting the reference county (57-county model). This estimates the indirect and induced impacts of the same spending in all of the counties, except the reference county.

The difference between the estimates of indirect and induced economic activity in the 58-county model and the 57-county model is the spillover that occurs in the reference county.

We repeat this process for each of the 58 counties, yielding a total of 175 unique economic models (three for each county plus one statewide model).

There are some shortcomings to this methodology. First, it does not take into account the exact location of spending outside the county. As a result, it likely modestly overstates the economic impacts in areas that are geographically farther from areas where direct spending is most concentrated (e.g. counties farther from San Diego and Los Angeles and, to a lesser extent, the Bay Area and Sacramento). Second, rounding occurs at multiple levels within the data and within the model. For the counties with the smallest economies, this makes it impossible to generate a meaningful estimate using this methodology,

[21] In order to ensure we are holding every factor as constant as possible between the two models, the statewide model is run as a model built from the 58 counties, which yields slightly different results than one built by simply selecting California as the geography due to rounding errors or other minor distinctions.

as differences are lost to rounding errors making any spillover impacts in these counties indistinguishable from zero. While this may result in a small understatement of the economic impacts in these counties, that difference is very small and would typically be lost within this report's rounding conventions if it could be estimated and included.

Limitations of the Input-Output model

Readers should be aware of a number of limitations with the modeling techniques employed, as Dr. Leontief himself acknowledged.[22]

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.

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 Dr. 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."[23] 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. Most spending data is tagged to a specific company but not a specific

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[22] Leontief, W. (1955) Some Basic Problems of Empirical Input-Output Analysis. Input-Output Analysis: An Appraisal. Source: http://www.nber.org/chapters/c2864.pdf
Leontief, W. (1955) Some Basic Problems of Empirical Input-Output Analysis. Input-Output Analysis: An Appraisal. Source: http://www.nber.org/chapters/c2864.pdf
.org/nobel_prizes/economic-sciences/laureates/1973/leontief-lecture.pdf

industry. In these cases, California Research Bureau staff 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 percent 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.

Appendix – County Results

County	Employment		Output ($ Millions)	
	Direct	Total	Direct	Total
Alameda	5,600	17,700	$1,154	$3,627
Alpine	--	--	--	--
Amador	--	300	$3	$42
Butte	400	2,100	$38	$290
Calaveras	--	300	$3	$39
Colusa	--	100	$2	$16
Contra Costa	2,500	13,600	$525	$2,778
Del Norte	--	100	$3	$12
El Dorado	200	2,100	$20	$301
Fresno	2,700	7,200	$354	$1,008
Glenn	--	100	$2	$10
Humboldt	300	1,100	$42	$137
Imperial	2,300	3,400	$460	$605
Inyo	--	--	$1	$5
Kern	10,300	19,500	$2,040	$3,391
Kings	5,100	7,500	$1,235	$1,627
Lake	--	400	$5	$54
Lassen	1,400	1,700	$198	$247
Los Angeles	42,800	116,000	$9,897	$23,633
Madera	100	800	$12	$130
Marin	500	2,600	$68	$469
Mariposa	--	--	$1	$5
Mendocino	200	500	$24	$62
Merced	200	1,100	$15	$198
Modoc	--	--	--	$2
Mono	200	200	$28	$35
Monterey	10,900	17,000	$2,466	$3,298
Napa	100	1,300	$11	$197
Nevada	200	1,100	$23	$120
Orange	13,700	49,500	$3,989	$10,604
Placer	1,200	5,100	$133	$702
Plumas	--	100	$2	$10
Riverside	14,000	37,000	$1,823	$4,849
Sacramento	13,500	40,700	$4,042	$8,503
San Benito	200	600	$39	$104
San Bernardino	19,300	40,700	$3,874	$6,722
San Diego	146,700	235,200	$33,236	$46,156
San Francisco	7,900	14,900	$6,092	$8,636
San Joaquin	2,600	8,900	$415	$1,410
San Luis Obispo	2,500	5,200	$315	$654

County	Employment		Output ($ Millions)	
	Direct	Total	Direct	Total
San Mateo	3,200	5,400	$752	$1,748
Santa Barbara	5,000	10,100	$1,010	$1,746
Santa Clara	14,900	25,500	$5,020	$7,967
Santa Cruz	300	2,700	$52	$406
Shasta	300	2,000	$44	$246
Sierra	--	--	--	--
Siskiyou	--	200	$4	$19
Solano	7,200	15,000	$1,591	$2,886
Sonoma	1,400	5,100	$196	$741
Stanislaus	400	4,400	$64	$790
Sutter	600	1,400	$58	$174
Tehama	100	500	$6	$58
Trinity	--	100	$3	$7
Tulare	500	2,100	$56	$328
Tuolumne	--	600	$3	$76
Ventura	11,200	24,500	$2,296	$ 4,313
Yolo	5,300	11,900	$2,806	$ 3,924
Yuba	2,700	3,700	$561	$699
California	358,000	767,000	$86,900	$156,300