

Implementation of Action 6 of CSFAP Phase 2a Tracking Economic Competitiveness

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A Research Report from the Pacific Southwest Region
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16. Abstract This project continues earlier work aimed at implementing Action 6 of the California Sustainable Freight Action Plan (CSFAP). Action 6 requires the development of performance measures for monitoring the economic competitiveness of the freight sector, as well as the establishment of targets for increased economic competitiveness. The purpose of this project is to complete the performance measures and comparison groups, as well as to identify an appropriate economic competitiveness target. As with the previous stages of this research, the research team collaborated with the Economic Competitiveness Working Group. The Working Group includes representatives of various freight sectors, as well as public agencies. The project has resulted in a comprehensive set of performance measures and a complete set of baseline metrics and comparisons.			
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About the Pacific Southwest Region University Transportation Center

The Pacific Southwest Region University Transportation Center (UTC) is the Region 9 University Transportation Center funded under the US Department of Transportation's University Transportation Centers Program. Established in 2016, the Pacific Southwest Region UTC (PSR) is led by the University of Southern California and includes seven partners: Long Beach State University; University of California, Davis; University of California, Irvine; University of California, Los Angeles; University of Hawaii; Northern Arizona University; Pima Community College.

The Pacific Southwest Region UTC conducts an integrated, multidisciplinary program of research, education and technology transfer aimed at *improving the mobility of people and goods throughout the region*. Our program is organized around four themes: 1) technology to address transportation problems and improve mobility; 2) improving mobility for vulnerable populations; 3) Improving resilience and protecting the environment; and 4) managing mobility in high growth areas.

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Introduction

Project Purpose

This project continues earlier work aimed at implementing Action 6 of the California Sustainable Freight Action Plan (CSFAP). Action 6 requires the development of performance measures for monitoring the economic competitiveness of the freight sector, as well as the establishment of targets for increased economic competitiveness. The purpose of this project is to complete the performance measures and comparison groups, as well as to identify an appropriate economic competitiveness target. As with the previous stages of this research, the research team collaborated with the Economic Competitiveness Working Group. The Working Group includes representatives of various freight sectors, as well as public agencies. The project has resulted in a comprehensive set of performance measures and a complete set of baseline metrics and comparisons.

The CSFAP

As per Executive Order B-32-15 by Governor Brown, the California Sustainable Freight Action Plan (CSFAP) was initiated in July 2016. The Plan provides the vision for California's freight sector to be more efficient, more economically competitive and less polluting. The freight sector is vital for California as the nation's largest contributor for international trade and domestic commerce. It is also clear that the freight sector is responsible for a high portion of the pollution within the state of California. In order to combat climate change, the state of California has already set ambitious targets to reduce greenhouse gas emissions. The Plan aims at integrating investments, policies and programs within the state of California and offers a unified approach to improve efficiency, transition to zero emission technologies and improve the state's freight sector competitiveness. As part of the freight sector vision for 2030 and beyond, the Executive Order has directed the state agencies to set targets for the three main aspects: improve efficiency, transition to zero emission and increase economic competitiveness. At the time the CSFAP was approved, economic competitiveness targets and metrics had not been selected.

Prior Work

This is the third of three contracts to support implementation of Action 6. Under the first contract (Phase 1) METRANS conducted three meetings with the Economic Competitiveness working group, one being a full day workshop. Its purpose was to create a framework for developing metrics for tracking economic competitiveness over the life of the CSFAP. Outcomes of this work included a working definition of economic competitiveness, a high-level definition of the freight sector, a discussion of potential metrics and agreement on approach for continuing the work and fulfilling the requirements of the CSFAP (Giuliano, 2017).

The second contract refined and finalized working definitions for economic competitiveness and the freight sector (Phase 2). These were used as the basis for generating performance measures. The research team developed conceptual groups for performance measures, evaluated various data sources, and generated a preliminary set of measures. This effort resulted in the identification of critical data gaps, problems of data suppression, and adjustments of specific sub-sectors to be included in the metrics (Giuliano and Hassan, 2018)

This third contract addresses and solves the major data problems, provides a complete baseline for the entire sector, trucking, and ports; and proposes a competitiveness target (Phase 2a). Because this

project is a continuation of the previous one, we summarize the work of the second report in order to place our results in context. For additional details, please see Giuliano and Hassan (2018).

Research Results

The second project had the following tasks: 1) Definition of the freight sector; 2) Definition of economic competitiveness; 3) Measuring economic competitiveness; 4) Identifying economic competitiveness targets. Strong emphasis was placed on carefully defining terms in order to develop metrics that accurately reflect the sector's performance, as well as to select the best available data sources for measurement. For each of these tasks, we summarize results from the second project and then present results from this project.

Task 1: Definition of the freight sector

1.1 Definition

The working group agreed on the following broad definition of the freight sector:

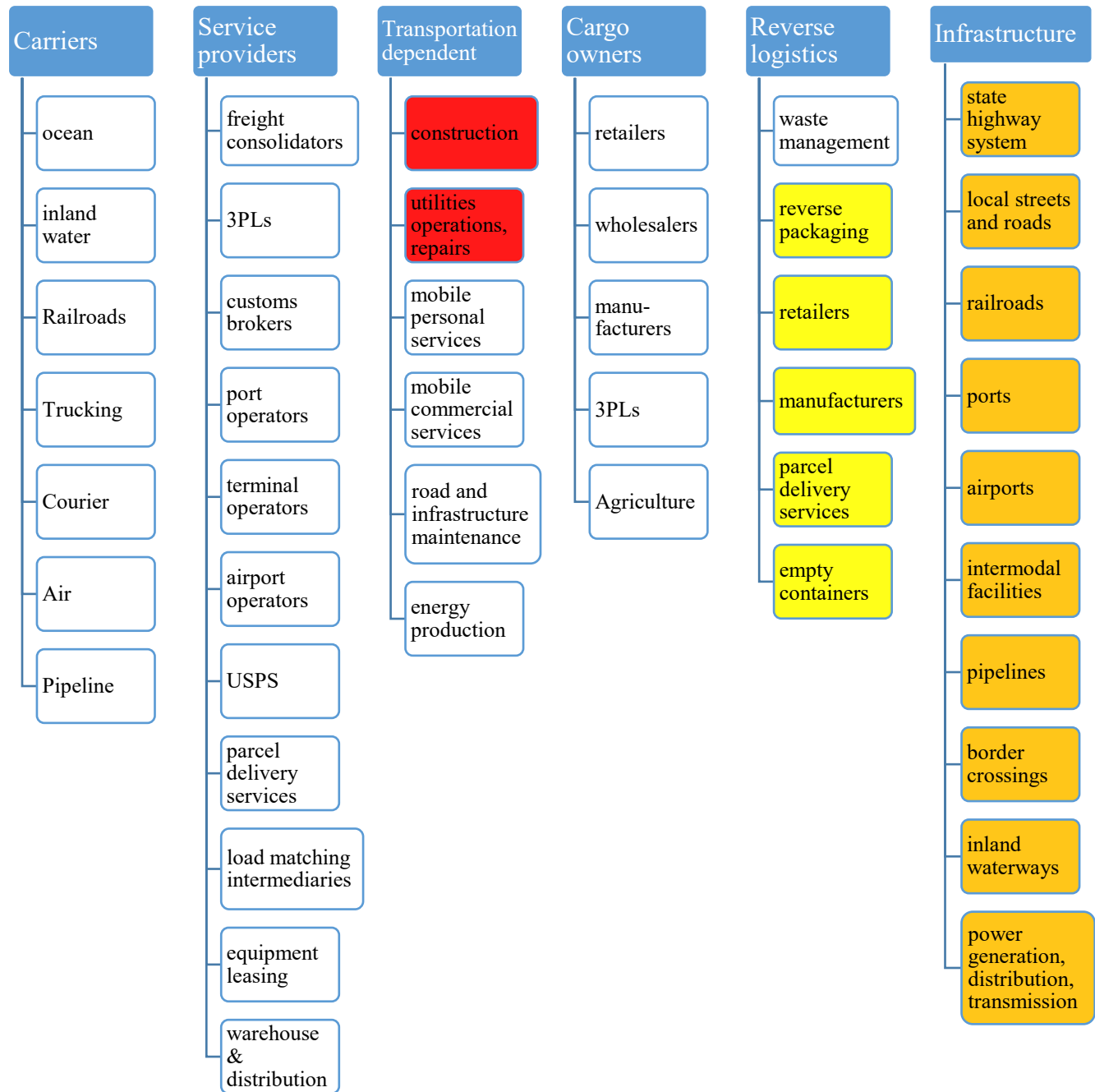
The freight sector constitutes all transportation based and transportation dependent enterprises involved in the supply chain from point of origin to point of consumption.

It includes:

1. All carriers
2. All transportation service providers involved in moving, handling, managing, or planning the flow of cargo
3. All transportation dependent activities
4. All cargo owners or intermediaries
5. Reverse logistics chains
6. Transportation infrastructure

The Working Group argued that cargo owners should be included, because the fundamental purpose of freight movement is to connect producers with consumers. However, the size of the retail, manufacturing, and wholesale sectors dwarfs the more traditional concept of freight sector. We therefore compute performance metrics with and without cargo owners. The Working Group included transportation infrastructure (public and private) because infrastructure is a critical part of the goods movement system. Performance measures are entirely different for public infrastructure, and the group elected to defer consideration of infrastructure metrics.

Figure 1 gives the final enumeration of all activities included in the six subsectors. The yellow boxes denote activities that could not be separately measured; they are effectively incorporated into the main sectors (e.g. retailing includes returns). The red boxes are sectors that were large, and for which transportation represented a small part, and hence were removed. The orange boxes represent the sector deferred.

Figure 1: Freight sector enumerated by group

1.2 Data and Sources

Figure 1 was operationalized using NAICS (National Industrial Classification System) code data at the 6-digit level. This level of granularity was necessary in order to measure as closely as possible all of the activities in Figure 2 (except infrastructure). Although there are limitations (e.g. some 6-digit codes are activities common to multiple services), 6-digit granularity generates the best possible enumeration of each part of the freight sector. Table 1 illustrates the NAICS mapping for All Carriers.

Table 1: Example of NAICS mapping: all carriers

Number	Group	NAICS description	NAICS code
1	Ocean carriers	Deep sea freight transportation	483111
		Coastal and Great Lakes transportation	483113
2	Inland water carriers	Inland water carriers	483211
3	Railroads	Railroads-Shortlines	482112
		Classes-line haul-571 Carriers-including passengers	482111
4	Trucking	Trucking-general freight trucking, local	484110
		general freight trucking, long distance, truckload	484121
		General freight trucking, long distance, less than truckload	484122
5	Couriers	Couriers	491110
		Couriers and express delivery	492110
		Local messengers and local delivery	492210
6	Air transport	Air transport	481112
		Nonscheduled chartered air transportation	481212
7	Pipeline	Pipeline-Oil	486110
		Gas	486210
		Refined Petroleum Product	486910
		All other	486990

In the previous phase, three data sources were selected for computation of performance metrics. Two additional sources were added in this project. Table 2 gives short descriptions and notes what is excluded from each data source. The Quarterly Census of Employment and Wages (QCEW) is the main data source; it provides quarterly data for employment and earnings for all employees covered by unemployment insurance. Although QCEW is the most detailed and consistent data source of its kind available, it is not perfect. There are various types of missing data problems, and of course the data are only as good as what is reported to the state.

Some parts of the freight sector have a significant share of self-employed. Thus, the QCEW data is supplemented with Non-employer Statistics (NES). NES is provided annually, and there is a two year lag before it becomes available. The second project results did not incorporate the NES data. Results presented later in the report incorporate NES. Bureau of Economic Analysis (BEA) is the only source of annual sector level GDP data, but it is limited to 2-digit sectors. The Economic Census (EC) data are used to expand GDP data to 6-digit sectors.

The Economic Census does not have railroad or USPS data. It therefore was not possible to include railroads in some of the metrics. In calculating the initial set of metrics, it became apparent that railroad data are broadly missing from QCEW as well. In this project, we discussed railroad data with Working Group representatives. By using AAR data and obtaining California specific data directly from the two Class 1 railroads (BNSF and UP), we were able to incorporate railroads in the performance metrics. The two additional data sources are highlighted in grey. Descriptions of these data sources are given below Table 2.

Table 2: Data sources

Data Source	Frequency	Latest data available	NAICS digits	Variables	Exclusions
Quarterly Census of Employment and Wages (QCEW)	Quarterly	Q4 2017	2-6	Employment, earnings	Public sector not covered by unemployment insurance program; self-employed
Non-Employer Statistics (NES)	Annual	2015	2-4	N of establishments, revenues	Firms with employees
Economic Census	5 years	2012	2-6	N of establishments, employees, payroll per employee, total annual payroll, revenues	Firms with no employees, RR, USPS
Bureau of Economic Analysis (BEA)	Annual	2016	2	GDP, real GDP, per capita real GDP	
AAR, UP, BNSF	Annual	2017	6	Employment, establishments, payroll	N/A

Non-Employer Statistics (NES)

<https://www.census.gov/programs-surveys/nonemployer-statistics/about.html>

Description: NES is an annual data series that provides economic data in 2 to 6-digit NAICS code for businesses that have no paid employees and are subject to federal income taxes. The most common example is sole proprietorship.

Data Sources: NES data relies on statistical data obtained through business income tax records that IRS provides the census bureau. Data are then processed through automated and analytical reviews.

Association of American Railroads

<https://www.aar.org/data-center/railroads-states/>

Description: AAR releases an annual data series that provides employment and payroll within the RR sector (All Classes included) in California. Data include number of establishments, number of employees, average wages and Freight railroad mileage.

Data Sources: Data are generated using Surveys that are collected from all RR companies.

Union Pacific (UP) and Burlington Northern Santa Fe (BNSF) fact sheets

Description: Both companies released data fact sheets for their California operations when contacted by Go-Biz. Data include number of employees and total payroll.

Task 2: Definition of “Economic Competitiveness”

2.1 Definition

The working group agreed on the following definition of economic competitiveness:

The California freight sector’s ability to 1) successfully compete with freight sectors in other states as measured by using existing comparable metrics, and 2) increase the productivity of freight and related sectors and contribute to the growth of California’s economy. Economic competitiveness is affected by policies, institutions, and investments that influence the freight sector’s productivity.

This definition was the basis of developing a suitable set of metrics and a suitable comparative group. The second part of this definition recognizes that public policy affects competitiveness. For example, investments to reduce freight bottlenecks will increase reliability, contributing to economic competitiveness. Policies that add to the cost of doing business will reduce competitiveness, all else equal. The CSFAP recognizes that plan implementation may have positive or negative effects on the freight sector, and calls for the development of targets and tools that will help evaluate the strategies proposed under the Action Plan to ensure consideration of impacts on economic growth and competitiveness throughout the development and implementation process (adapted from CSFAP, p.10). The tools to evaluate strategies will be addressed in Phase 3 of this project. Metrics and targets are considered in this project.

2.1.1 Metrics

There are many aspects of economic performance that could be measured. Starting with the composite measure, overall economic performance is traditionally measured by the sector’s contribution to GDP. As the sector grows relative to other sectors, its contribution to GDP grows. However, GDP contribution may not be the best indicator for the freight sector. As freight becomes more productive, its share of GDP will decline, all else equal. Thus, a better measure of the economic health of the industry might be net profits or revenue per employee. In this phase of the project we generated the following list of possible metrics and calculated the entire set except for profits, for which sufficient data is not available. Data sources are also listed.

1. Financial Performance Measures
 - Revenues (Economic Census)
 - Revenues to employment ratio (Economic Census & QCEW)
 - Profits and debt-to-liabilities ratios (If data becomes available)
2. Workforce Statistics
 - Number of establishments (Economic Census)
 - Number of employees(QCEW, NES)
 - Employee average revenue(QCEW, NES)
 - Total Payroll (QCEW)
3. Overall Economic Performance
 - GDP and Real GDP¹ (BEA)

As noted earlier, a different approach is required for transportation system performance. Due to time constraints, transportation system metrics were deferred to a later phase of the project.

Task 3: Measuring Economic Competitiveness

In the previous report we used 2016 data and generated three test metrics: revenues/employee, payroll/employee, and GDP/employee. We used the QCEW data, updated the Economic Census data to 2016, and expanded the BEA data to 6 digits. In doing so we discovered problems of missing data, and inconsistent data for railroads. We also were aware that the absence of self-employment data was likely affecting at least some subsectors. In this report we correct these data problems and generate the full set of metrics.

3.1 Resolving the data problems

In this section we describe how each of the main data problems were resolved.

3.1.1 Accounting for the self-employed

We use the NES to account for self-employment. The data set provides two variables, revenues and number of establishments, where each establishment is one self-employed worker. However, the main issue with NES is the inconsistency of NAICS codes available; it varies between 2 and 6 codes due to data suppression to protect confidentiality. We used a similar approach to that of the Economic Census to expand NES to 6 digits; see equation 1 below. Note that revenues in NES is equivalent to revenues reported by firms with employees.

$$N\ Estab_6 = N\ Estab_3 * (QCEW\ Emp_6 / QCEW\ Emp_3), (1)$$

where the subscripts represent the number of NAICS code digits.

Table 3 shows the importance of the self-employed for the freight sector. Overall, about 21% of the workforce is self-employed. The largest shares are in all carriers and transportation dependent activities, while other sectors have relatively small shares. There large shares reflect the large number

¹ GDP is defined as the sum of goods and services sold to final users. It is measured as: Personal consumption expenditures + Gross private fixed investment + Change in private inventories + Government consumption expenditures and gross investment + Net exports of goods and services.

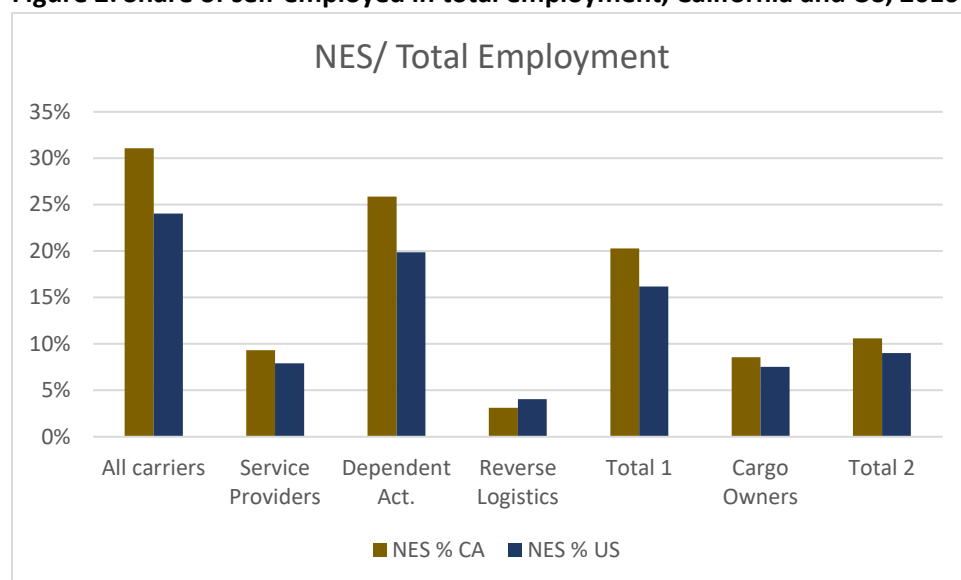
of owner-operators in the trucking industry. Clearly, omitting the self-employed would generate highly inaccurate metrics.

Table 3: Employment numbers with and without Self Employment, California, 2016

Category	Emp without NES	Emp with NES	NES share
All carriers	240,580	349,062	31%
Freight transp service providers	298,328	329,030	9%
All transportation dependent activities	94,506	127,479	26%
Cargo owners	3,708,519	4,056,319	9%
Reverse logistics	48,675	50,249	3%

Figure 2 shows that the self-employed share is higher in California than the US average, except in the reverse logistics sector, which is waste management. It is possible that the large share of international trade activity in California, and hence large numbers of owner-operators in short-haul transport, contributes to the difference.

Figure 2: Share of self-employed in total employment, California and US, 2016



3.1.2 Railroad data

In our test metric calculations, the railroad data showed great inconsistencies. In some cases, railroad data is missing due to data suppression due to the small number of establishments. In other cases, railroad data is simply omitted (e.g. Economic Census). In consultation with railroad representative in the Working Group, we were able to obtain data provided by Association American Railroads (AAR) which includes employment, number of establishments and payroll data. However, the AAR data is available only for the entire sector, which therefore combines long and short lines (Classes I, II, III). Data for the California Class I operators was provided directly from BNSF and UP. We then could back out the

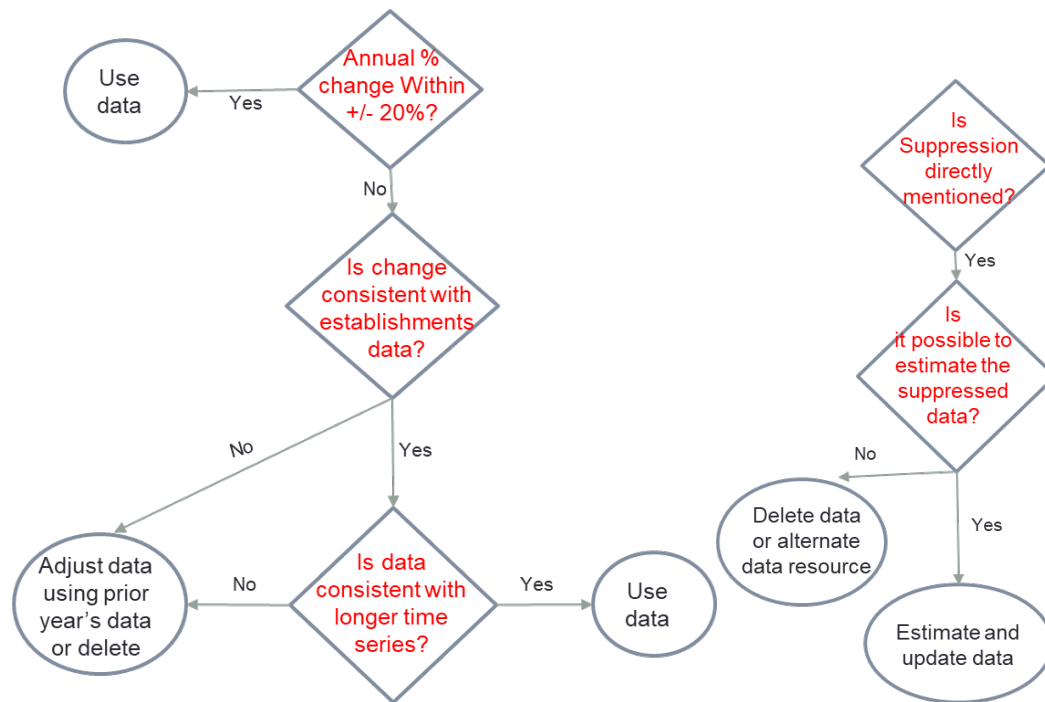
Class II and III operators from the aggregate AAR data. Table 4 gives updated metrics for 2016 employment, as well as percent change from 2015-2016. These numbers are much larger than those shown in the previous report (see Giuliano and Hassan, 2018, Appendix A).

Table 4: Railroad updated data, California, 2016, and change 2015-16

All carriers	Code	Emp 2016	change	Payroll 2016	Payroll / Emp	change
Railroads – Short lines	482112	477	-6.3%	41,609,493	87,229	-8.1%
Railroads – Long lines	482111	7,834	-6.4%	689,614,364	88,028	-8.5%

3.1.3 QCEW data suppression problems

QCEW is a very reliable and thorough data source. However, it still suffers from some data suppressions mainly due to privacy protection. There is no obvious way to know whether a data element is missing or suppressed. Suppression may happen in one year, but not the next, even at the level of 6 digit codes, there are many observations within a given code. When we aggregate to the code level, how do we know whether year to year changes are consistent (e.g. based on exactly the same observations)? It is not practical to enumerate every observation for every year. We therefore developed a set of rules to test for missing or inconsistent data. The process is illustrated in Figure 3 below. One branch of the figure starts with whether there is notification that the data are suppressed. In this case, we estimate the suppressed data if possible, or seek data from another source. The example here is the absence of railroad data in the Economic Census. The other branch of the figure starts with comparing year to year values. If the change is 20% or more, we investigate. First, is the change consistent across metrics? Second, is the change consistent over previous years? If not, we assume there is a problem with the data. If possible, we adjust (say by a three year average), and if not we consider the data as missing. Using this method, it was decided not to include Marine Cargo Handling activity within the Freight Transportation Service Providers sector for 2015 and 2016. We acknowledge that this omission is significant. Per one of the Working Group members, Pacific Maritime Association (PMA) payroll for California was about \$1.7 Billion in 2018. The data will be evaluated again when compiling the 2017 metrics.

Figure 3: Process for dealing with suppressed or missing data in QCEW

3.2 Generating the metrics

This section presents the corrected metrics for California, taking into account self-employment, railroad data, and missing data, we also present the metrics for the selected comparison groups: all US for the California freight sector as a whole, Nevada, Arizona, and Utah for trucking, and Georgia and Virginia for ports.

3.2.1 2016 Revised California Indicators

We calculate all metrics with and without cargo owners, due to the large size of this sector relative to the others. Table 5 gives the revenue metrics, total revenue and revenue per employee. Table 6 gives the workforce related measures: total employment, establishments, payroll, and payroll per employee. Note that payroll and payroll per employee exclude the self-employed. Table 7 gives overall economic performance, GDP and GDP per employee. All the tables give percent change from 2015 to 2016 by the 6 freight sector groups. Detailed tables of each industry activity are given in Appendices A and B.

Table 5: Total revenue including self-employed and revenue/employee, California, 2016

Category	Revenues (\$1000)	% Change	Rev/Emp (\$)
All carriers	37,197,025	4%	106,563
Freight transportation service providers	28,471,186	7%	86,531
All transportation dependent activities	9,256,402	2%	72,611
Reverse logistics	12,502,517	2%	248,811
Total freight sector	87,427,132	4%	102,156
Cargo owners	2,102,531,544	1%	518,335
Total freight and freight related	2,189,958,676	1%	445,826

Table 6: Workforce related measures including self-employed, California, 2016

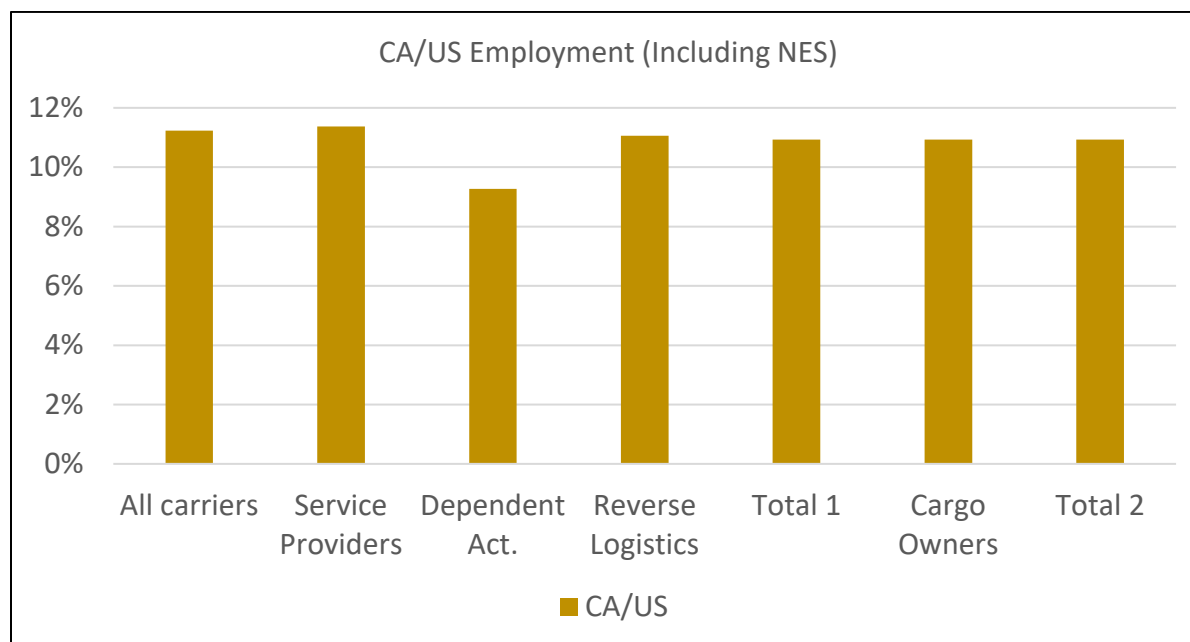
Category	Emp	% change	N Estab	% change	Total Payroll (\$1000)*	% change	Payroll/Emp (\$)*
All carriers	349,062	6%	118,327	8%	12,985,873	4%	53,977
Freight Transportation Service Providers	329,030	9%	38,402	14%	15,482,552	5%	51,898
All Transportation dependent activities	127,479	2%	40,142	0%	5,304,921	2%	56,133
Reverse Logistics	50,249	2%	3,706	-1%	3,055,382	5%	62,771
Total freight sector	855,820	6%	200,577	7%	36,828,728	5%	53,994
Cargo Owners	4,056,319	1%	550,502	0%	225,911,044	3%	60,917
Total freight and related	4,912,140	2%	751,080	1%	262,739,772	3%	59,841

Table 7: GDP and GDP per employee, California, 2016

Category	GDP (\$million)	% Change	GDP / Emp (\$)
All carriers	25,532	14%	106,129
Freight transportation service providers	31,661	18%	106,129
All transportation dependent activities	16,949	2%	179,339
Reverse logistics	7,177	14%	147,443
Total freight	81,319	13%	119,221
Cargo owners	571,453	0.3%	154,092
Total freight and freight related	652,772	2%	148,675

3.2.2 Comparison 1: California and US

The national comparison includes a comparison between California and the US in total. The comparison covers the three groups of metrics: financial performance, workforce statistics and overall economic performance. The discussion below includes the percentage change from year 2015 to 2016 (For complete data tables check Appendix C). Figure 4 gives California's share of total employment in each of the five groups. The overall average is about 11%, and the range is very narrow. This share slightly less than California's 13% contribution to US GDP (<https://howmuch.net/articles/us-economy-summarized-in-one-diagram>).

Figure 4: CA share of total US Employment, freight groups, 2016

Financial Measures:

Figure 5 gives the percent change in total revenues, 2015-2016. It can be seen that revenue increases in California are greater than that of the US in every group. Figure 6 gives change in revenue/employee. While most of the subsectors showed a decrease in the ratio, the decrease was lower for California than the US, with the exception of the cargo owners category.

Figure 5: Percent change in revenues from 2015 to 2016, California and the US, by freight sector group

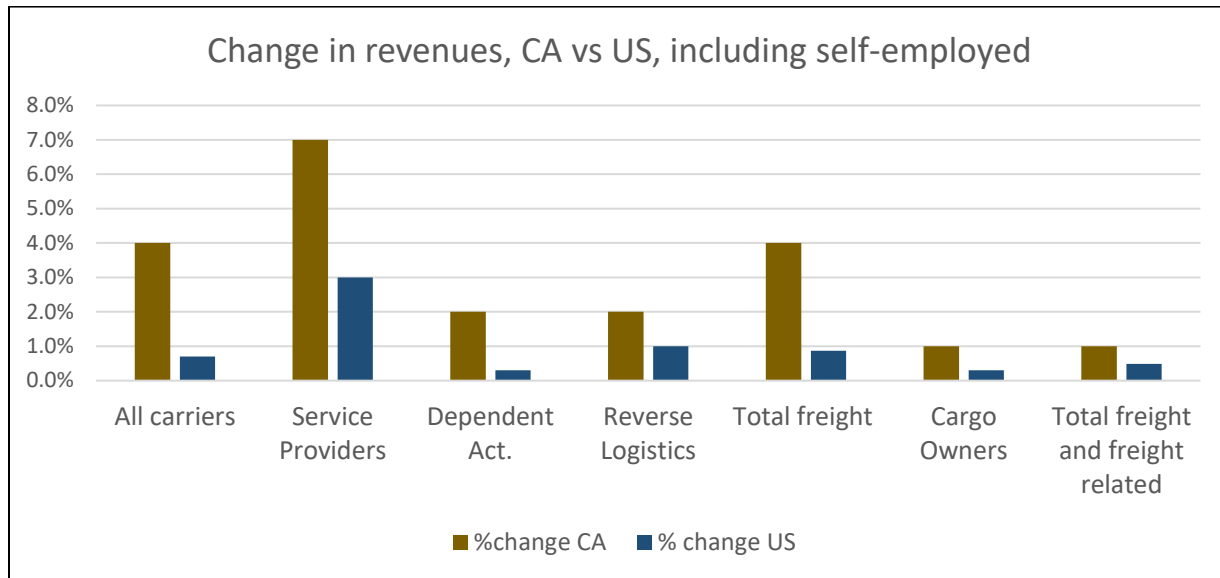
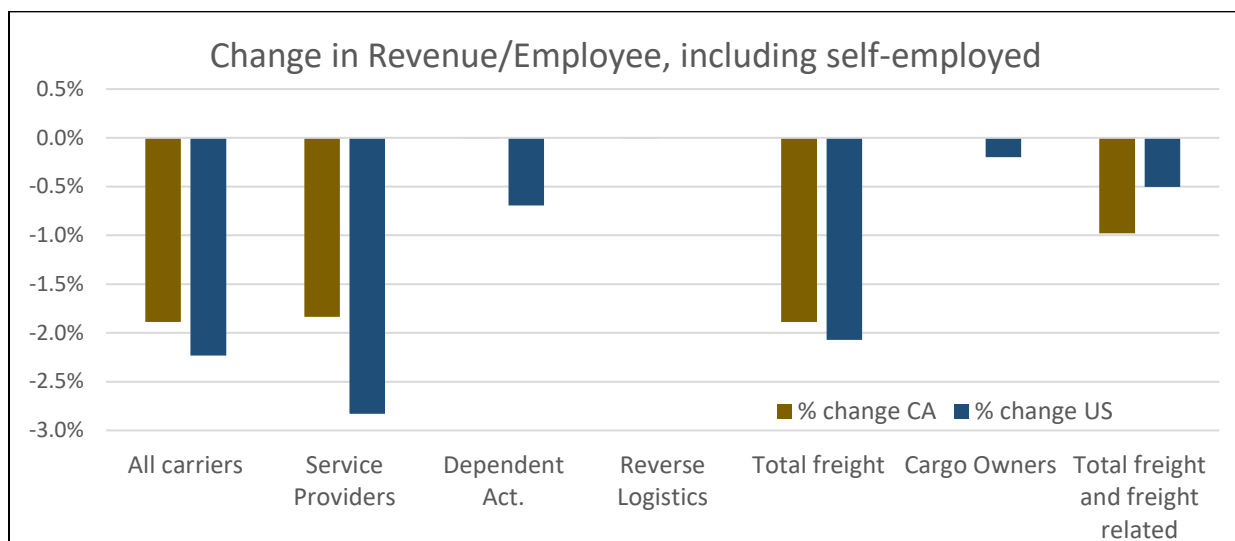


Figure 6: Percent change in revenues per employee from 2015 to 2016, California and the US, by freight sector group



Workforce Statistics:

Table 8 and figures 7 through 9 give California vs US workforce statistics. Self-employment is included in employment and number of establishments, but not included in payroll metrics.

Results are quite consistent; the rate of growth for California is greater than that of the US for both total employment and employment by group, for total number of establishments, and payroll. Exceptions include number of establishments for transportation dependent activities and cargo owners, as well as payroll for transportation dependent activities. We note that while total payroll increased, payroll/employee decreased for all carriers and for service providers. In discussing these results with the Working Group, it was decided that number of establishments does not provide additional useful information; changes could be due to restructuring or growth/decline. Number of establishments will therefore not be included in the annual metric reporting.

Table 8: Employment, California and the US, 2016, including self-employed

Group	Emp CA	%change CA	Emp US	% change US
All carriers	349,062	6%	3,106,305	3%
Service Providers	329,030	9%	2,892,763	6%
Dependent Act.	127,479	2%	1,375,269	1%
Reverse Logistics	50,249	2%	454,479	1%
Total 1	855,820	6%	7,828,816	3%
Cargo Owners	4,056,319	1%	37,094,953	0.5%
Total 2	4,912,140	2%	44,923,768	1%

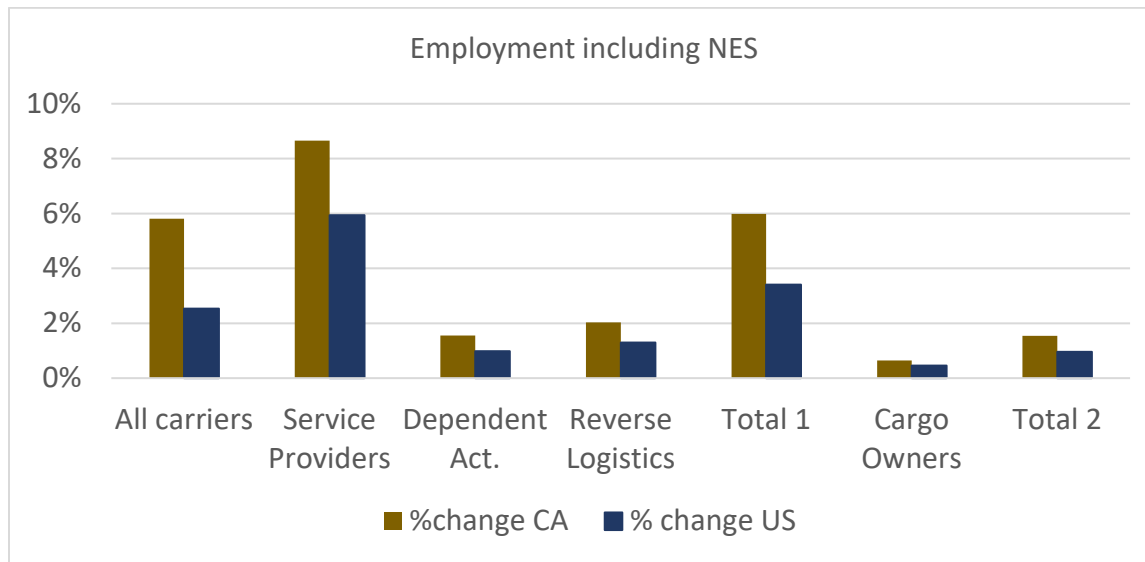
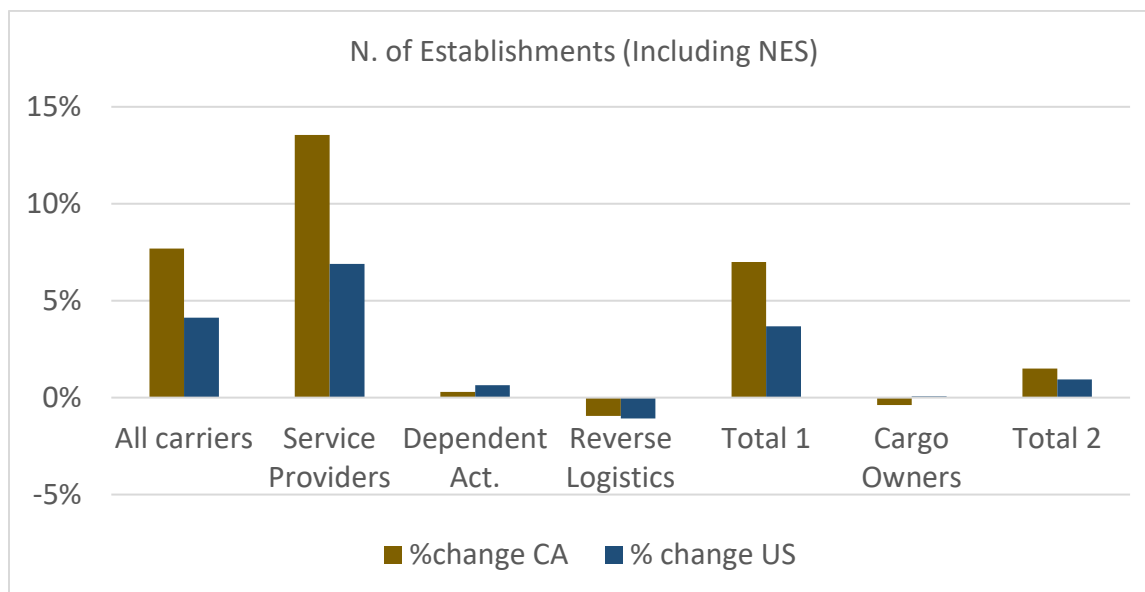
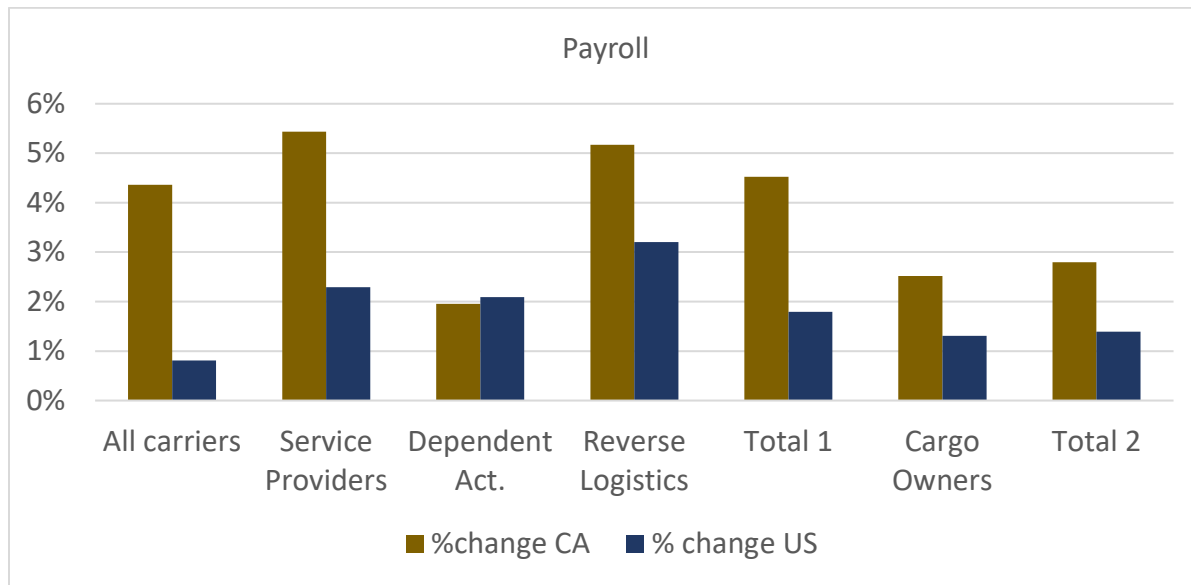
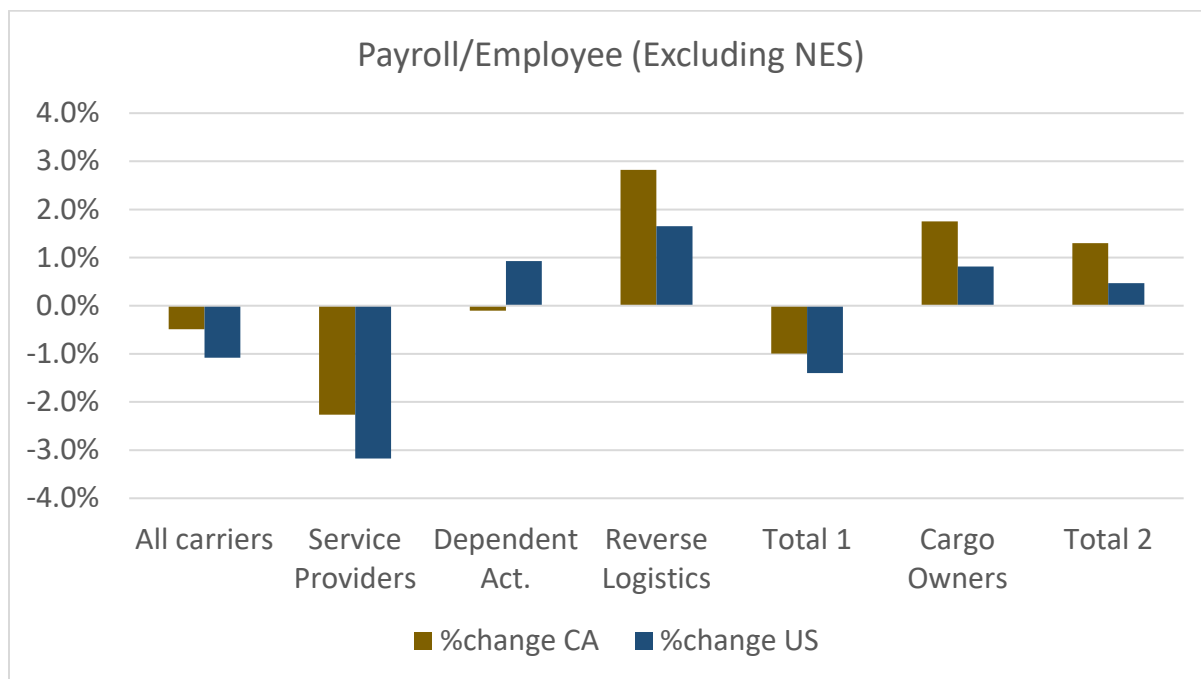
Figure 7: Percent change in employment, California and US, 2015 to 2016, including self-employed**Figure 8: Percent change in number of establishments, California and the US, 2015 to 2016, including self-employed**

Figure 9: Percent change in payroll, California and the US, 2015 to 2016*

*Excludes self-employed

Figure 10: Percent change in payroll/employee, California and the US, 2015 to 2016

Overall Economic Performance

The final metric is overall economic performance, measured as total GDP per sector and per group. Rates of change are of much greater magnitude than that of the other metrics, suggesting a potential data problem. Therefore we do not show the results. GDP calculation will be revisited in the next phase of the project.

The California vs US comparisons suggest that California's freight sector performed better than the national average. Are these results consistent with expectations? We have anecdotal evidence suggesting that California is losing its competitiveness as firms choose to move or expand elsewhere. We have evidence that California is losing share in seaborne international trade; it is possible that at least some of the increase is explained in population growth and its associated freight demands. It may be argued that the measures should be standardized by population, but this would depend on whether the focus is activity that can be bid away, or the general performance of the sector.

3.2.3 Comparison 2: Trucking

When comparing specific subsectors, we include only the portion of each of our groups that includes subsector or subsector related activities. We do not include cargo owners, as we have no way to separate out the transportation portion of these sectors. For trucking, there are trucking related activities in all carriers, freight transportation service providers, all transportation dependent activities. Table 9 below lists all of the 6-digit activities included in the trucking comparisons.

Table 9: Six digit sectors included in trucking metrics

Group	NAICS codes	
All carriers	Trucking-General Freight trucking, Local	484110
	General Freight trucking, Long distance, truckload	484121
	General Freight trucking, Long distance, less than truckload	484122
	Couriers/Last mile	491110
Freight transportation service providers	Couriers and express delivery	492110
	US postal Service	491110
All transportation dependent activities	Communication Equipment Repair and Maintenance	811213
	Other Electronic and Precision Equipment Repair and Maintenance	811219
	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	811310
	Home and Garden Equipment Repair and Maintenance	811411
	Appliance Repair and Maintenance	811412
	Re-upholstery and Furniture Repair	811420
	Funeral Homes and Funeral Services	812210
	Pet Care (except Veterinary) Services	812910

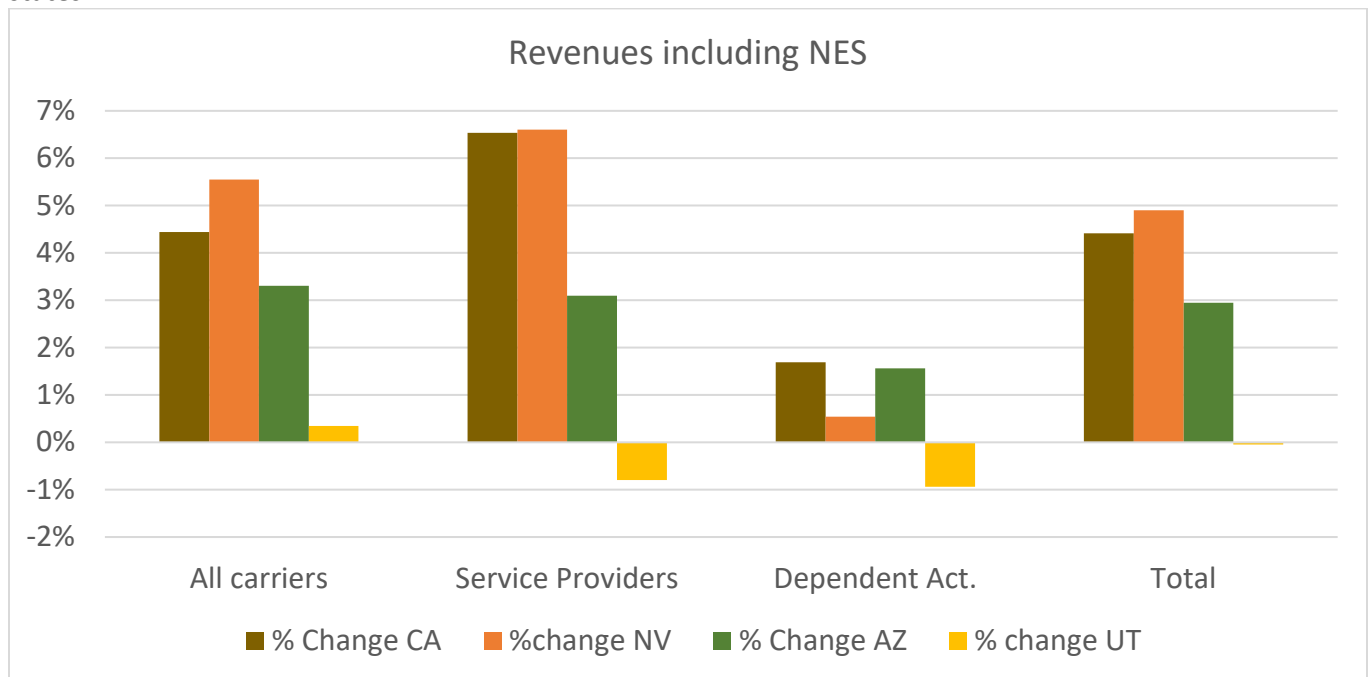
Selected results for the metrics are presented here. Full results are available in Appendix D. California trucking sector performance is compared with Nevada, Arizona and Utah. It is important to note the difference in the population of these states. The 2016 estimated population of the states are:

California, 39.25 million; Arizona, 6.93 million; Nevada, 2.94 million, and Utah, 3.05 million.² Thus California population is almost 6 times as large as Arizona and 13 times as large as Nevada and Utah. Differences in the relative scale of the trucking sector are comparable; see Table 11, which gives total employment and employment change. The California sector is orders of magnitude larger than any of the other states. Thus, percentage change comparisons should be made with caution.

Financial Measures:

Change in total revenue by group and state is given in Figure 11. Results are mixed. Utah fares the worst in all sectors, followed by Arizona. California and Nevada are comparable.

Figure 11: Percent changes in revenues from 2015 to 2016 in California and the trucking competitive states



Workforce Statistics:

Table 10 give trucking sector employment. The rate of growth is highest for California and Nevada, with much lower rates for Arizona and Utah. Most of the growth is coming from the all carriers sector. With regard to number of establishments, Nevada has experienced more growth in all carriers and transport service providers. However, the increase is suspect. In checking the data, we find that the increase is due to a large increase in self-employment (owner operators). Since number of establishments is being dropped from the metric, this issue was not further pursued.

² Source: American Community Survey 5 year average estimates.

Table 10: 2016 Trucking Employment in California, Arizona, Nevada, and Utah, and percent change, 2015-16

Group	CA Emp	% change CA	NV Emp	% change NV	AZ Emp	% change AZ	UT Emp	% change UT
All carriers	349,062	11%	19,577	8%	47,115	4%	28,826	1%
Service Providers	148,314	6%	9,601	8%	21,752	4%	11,620	2%
Dependent Act.	85,892	1%	6,050	0%	14,159	2%	8,295	-1%
Total	583,269	8%	35,228	7%	83,026	4%	48,741	1%

Finally, payroll data shows that payroll grew most in California for all carriers and transportation service providers. The transportation dependent group is quite mixed. We note that the changes in payroll are lower than the changes in employment, suggesting a possible decline in wages. We therefore calculate payroll per employee. Results are in Table 11 below.

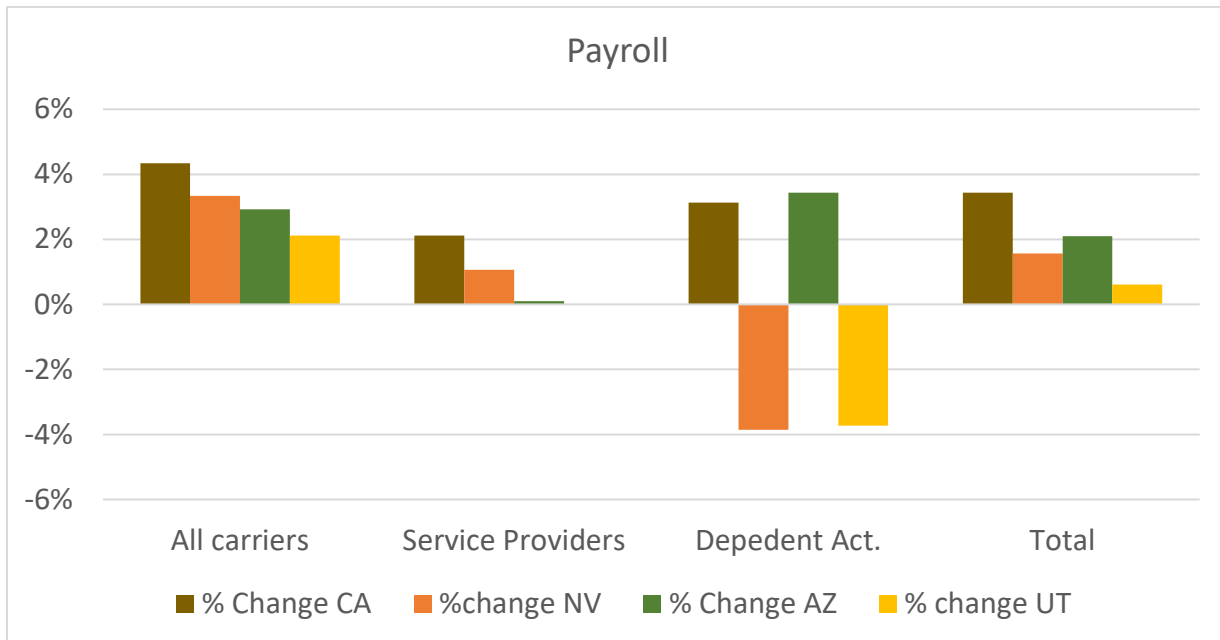
Figure 12: Percent changes in payroll from 2015 to 2016 in California and the trucking competitive states

Table 11 shows that average payroll per employee is quite comparable across the states, with the Utah average somewhat lower. Given the large difference in the cost of living in California, the payroll data suggests that California payroll is lower in purchasing power than that of Nevada and Arizona. There is a general pattern of decline in payroll/employee for all states except Utah.

Table 11: Payroll per employee by state, excluding self-employed

Group	CA	% change CA	NV	% change NV	AZ	% change AZ	UT	% change UT
All carriers	\$ 51,299	-1%	\$ 50,467	-1%	\$ 49,647	0%	\$ 45,524	1%
Service Providers	\$ 53,747	-2%	\$ 51,593	-3%	\$ 50,368	-2%	\$ 45,239	-1%
Dependent Act.	\$ 48,625	1%	\$ 45,443	-4%	\$ 44,548	1%	\$ 46,991	-2%
Total	\$ 51,732	-1%	\$ 50,093	-2%	\$ 49,140	-1%	\$ 45,672	0%

Overall Economic Performance

The final metric is GDP. As noted above, the California – US GDP comparison had GDP increases unlikely to occur in one year. More research on the validity of the numbers is required before presenting any results.

Little can be concluded from a one year comparison across states. Overall, California appears to be doing better than the comparison states in total revenue and employment growth. There is some evidence that pay is somewhat lower relative to California’s cost of living. Two or three years of additional data will be needed to verify these observations.

3.2.4 Comparison 3: Ports

Port activity is dependent upon the competitive strength of California’s ports relative to both other west coast ports as well as ports in the southeast US. As noted earlier, California ports are losing market share to east coast and gulf coast ports. Thus comparing port performance is particularly important for tracking the impacts of the CSFAP. We selected Georgia and Virginia as comparison states.

Unfortunately, our data are limited for port-related activity metrics. There are only two groups that include port related activity: all carriers, and freight transportation service providers. Recall that marine cargo handling was eliminated from this group due to data problems. The main problem is data suppression; there are only a small number of ports in California, and even fewer in Georgia and Virginia. With just two years of data, we are not yet able to determine how data suppression may vary from year to year. In addition, the ports in Georgia and Virginia are state owned and receive public subsidies. Therefore the QCEW numbers may not capture the full activity of these ports. We calculated preliminary results for 2015-16 for workforce metrics. The revenues and GDP comparisons could not be computed as they were severely affected by suppressions.

Workforce Statistics:

Calculation of the workforce metrics revealed serious data problems. There is again large differences in scale: 2016 California port container traffic was in excess of 18 million TEUs, compared to 3.6 million for Georgia (Savannah) and 2.6 million for Virginia (Norfolk).³ Total employment should be at least roughly

³ Source: AAPA NAFTA Port Container Traffic Profile 2016, available at <https://www.aapa-ports.org/unifying/content.aspx?ItemNumber=21048>

in proportion, but Virginia has almost half the number of employment as California. The employment numbers are quite small, which means that any problem in the data could generate large percentage differences. While California ports report data directly to the state; the ports in Virginia and Georgia are state authorities, and the state authority reports for the authority as a whole. Thus there may be differences in what is actually being reported.

Total employment increased in California, did not change in Georgia, and decreased in Virginia. The Georgia numbers are troubling, employment in all carriers increased, while transport service providers decreased. The same patterns are observed in the payroll data. Changes in establishments show Virginia having the greatest growth, which is inconsistent with the Virginia employment and payroll results. Clearly there are problems with the data, and the comparisons are not reliable. The QCEW data are not sufficient for measuring port-related activity performance. We therefore do not present the port comparison data in this report. In the next phase, we will pursue other data sources to better measure port activity.

3.3 Conclusions on metrics

Calculating the complete set of metrics has revealed both the strengths and limitations of our comparisons. Year over year comparisons for the entire freight sector seem to be reliable, but additional years of data will be necessary to draw a firm conclusion. The California and US peer comparison also appears to be reliable. However, GDP comparisons suggest a data problem. The trucking sector comparisons appear to be internally consistent, except for the change in establishments in the service providers sector in Nevada. We have eliminated establishments from the metrics, but will check these patterns with the 2017 data collection to be conducted in Phase 3. The port comparisons are not reliable. Other strategies will have to be pursued if a peer group comparison for ports is to be developed.

Task 4: Targets

The final task of this phase was the establishment of a 2030 target for economic competitiveness. Targets was discussed at the meeting conducted on March 6, 2019.

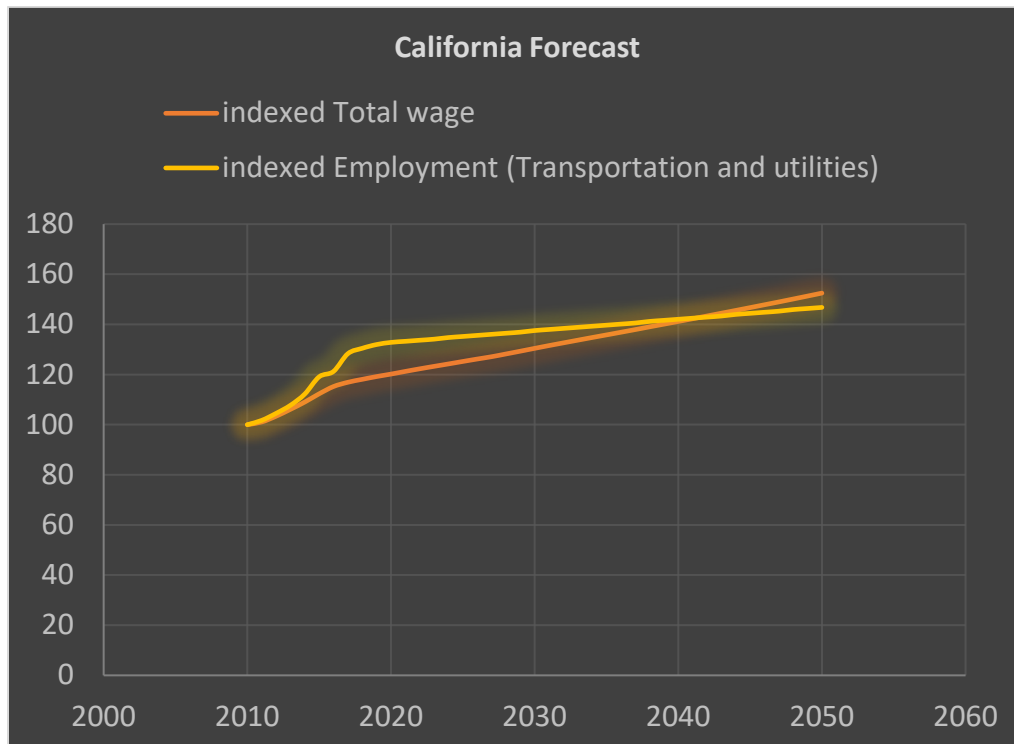
4.1 Options

We presented and discussed three options for establishing a target. The first is to set the target based on historical trend. For example, a target could be that the sector should continue to grow at its historic trend through 2030, or should grow at a rate beyond the historical trend. However, generating a consistent and comparable trend would be difficult. There are not enough years of comparable data at the 6 digit NAICS level, and the Great Recession had a significant impact for some years after 2008.

The second option is to tie the target to a comparable trend, such as the state's GDP forecast. The target could be that the freight sector achieve the same increase in GDP as the California economy as a whole, or achieve a greater increase than the economy as a whole. There are many forecasts available. For example, there are regular forecasts of US and state level GDP. The advantage of this approach is that it will deliver a target that takes into consideration the growth of the state economy as a whole. However, the main disadvantage is that the target will not only reflect the freight sector but also the total GDP. If industry mix changes, the freight share of GDP will change, slightly shifting what GDP is measuring relative to the freight sector. There is also the question of whether a smaller increase in the GDP for the freight sector reflects slower growth or greater productivity.

California generates state level employment and wage estimates at the 2-digit level. Figure 16 presents the indexed employment and wage forecast for Transportation and Utilities. It was generated in 2017 by Caltrans. It is based on NAICS code 48-49 with some minor revisions. The main advantage with this forecast is that it offers forecast by industry. However, the main problem with this forecast is that it will limit the target setting to competing with California itself without considering the growth in the competitive states or even nationwide.

Figure 16: Caltrans Employment (Transportation and Utilities) and total payroll forecast for California



The third option is to use a combination of expert judgement and anticipated technological change to set a target that is not based on a comparable. The other CSFAP targets (freight efficiency, zero emission vehicles) are of this type. Such targets are at least to some degree arbitrary. The Working Group rejected this option.

It was decided to use US GDP as the basis of the target, as it provides a comparable that is well established, available annually, and comparable across years. The disadvantages appear to be minor. The Working Group did not establish a specific target but did agree that GDP growth of the California freight sector should be greater than US GDP growth. The target will be refined in the next phase.

Conclusions

The Phase 2 project was a temporary effort to continue the metrics work while a larger and more permanent funding source could be identified. Thus, the work here is a continuation of the Phase 1 work as reported in Giuliano and Hassan, (2018). Here is a brief summary of the accomplishments of Phase 2a.

This third contract addresses and solves the major data problems, provides a complete baseline for the entire sector, trucking, and ports; and proposes a competitiveness target.

Freight sector

On the basis of the preliminary calculation of metrics, we eliminated utilities and construction from the freight definition. There is no way to isolate the transport portion within these industry codes, and it was the judgement of the team that transport likely makes up a small proportion of these sectors.

Metrics

A final set of metrics was identified. The following metrics will be tracked and reported annually as part of CSFAP Action 6. Reporting will include indexed annual change.

1. Financial Performance Measures
 - Revenues
 - Revenues/employee
2. Workforce Statistics
 - Number of employees
 - Total Payroll
 - Payroll/employee
3. Overall Economic Performance
 - GDP

Data problems

In the earlier phases we discovered some critical missing data. We added self-employed workers, because they represent a significant share of workers in the freight sector. We added railroad data from new sources, in some cases proprietary sources. In generating the port sector data, additional data problems were discovered. These will be addressed in the next phase. Finally, we developed a process for addressing data suppression problems in QCEW.

Complete baseline

We have generated a complete baseline of metrics for 2016 and have calculated change from 2015 to 2016. Tables in the appendices present the baseline metrics for the five freight groups. Included are the comparison metrics for California vs US, and the state level comparison metrics for trucking. Port comparisons are not included because of data problems. For the industry specific comparisons, we removed cargo owners, because it was not possible to separate out the trucking or port-related portions within these industries.

Target

The target will be based on comparison of California freight sector GDP and US GDP. The Working Group did not establish a specific target but did agree that GDP growth of the California freight sector should be greater than US GDP growth. The target will be refined in the next phase.

Next Steps

Phase 3 will continue the economic competitiveness work. Main tasks include the following. First, the metrics data will be refined based on the Phase 2a work. Second, the data collection process will be structured and streamlined so that metrics can be generated semi-automatically. The permanent host for the data and metrics will be identified. 2017 metrics will be calculated and the changes 2015-16, 2016-17 will be generated. Third, the metrics must be reported through the life of the CSFAP; hence a long-term funding source will be identified. Fourth, the next phase will begin the second requirement of Action 6, evaluating the impact of CSFAP policies on the freight sector. The first impact study will be conducted under the guidance of the Working Group.

Appendix A: California Metrics

Table A-1 Financial Performance 1: Revenues, 2016, including self-employed

Group		(\$1000)
1	All carriers	37,197,026
2	Freight transportation service providers	28,471,186
3	All transportation dependent activities	9,256,403
4	Reverse logistics	12,502,518
	Total freight sector	87,427,132
5	Cargo owners	2,102,531,545
	Total freight and freight related	2,189,958,677

Table A-2 Financial Performance 2: Revenues/Employee, 2016, including self-employed

Group		Rev/Emp CA
1	All carriers	\$ 106,563
2	Service Providers	\$ 86,531
3	Dependent Act.	\$ 72,611
4	Reverse Logistics	\$ 248,811
	Total freight sector	\$ 102,156
5	Cargo Owners	\$ 518,335
	Total freight and freight related	\$ 445,826

Table A-3 Workforce Statistics 1: Total employment, 2016, including self-employed

Group		Emp CA
1	All carriers	349,062
2	Service Providers	329,030
3	Dependent Act.	127,479
4	Reverse Logistics	50,249
	Total freight sector	855,820
5	Cargo Owners	4,056,319
	Total freight and freight related	4,912,140

Table A-4 Workforce Statistics 2: Total payroll, 2016, excluding self-employed

Group		Payroll CA
1	All carriers	12,985,872,634
2	Service Providers	15,482,551,875
3	Dependent Act.	5,304,920,753
4	Reverse Logistics	3,055,382,402
	Total freight sector	36,828,727,664
5	Cargo Owners	225,911,044,251
	Total freight and freight related	262,739,771,915

Table A-5 Workforce Statistics 3: Payroll/employees, 2016, excluding self-employed

Group		Payroll/Emp
1	All carriers	\$ 53,977
2	Service Providers	\$ 51,898
3	Dependent Act.	\$ 56,133
4	Reverse Logistics	\$ 62,771
	Total freight sector	\$ 53,994
5	Cargo Owners	\$ 60,917
	Total freight and freight related	\$ 59,841

Table A-6 Overall Economic Performance 1: GDP

Group		GDP (\$million)
1	All carriers	25,532
2	Freight transportation service providers	31,661
3	All transportation dependent activities	16,949
4	Reverse logistics	7,177
	Total freight	81,319
5	Cargo owners	571,453
	Total freight and freight related	652,772

Table A-7: Overall Economic Performance 2: GDP/employee, including self-employed

Group		GDP/ Emp
1	All carriers	\$ 73,146
2	Service Providers	\$ 96,226
3	Dependent Act.	\$ 132,953
4	Reverse Logistics	\$ 142,825
	Total freight	\$ 95,019
5	Cargo Owners	\$ 140,880
	Total freight and freight related	\$ 132,890

Appendix B: National Comparison

Table B-1 Financial Performance 1: Revenues, including self-employed, California and US, 2016 and percent change 2015-16

Group	Revenues CA (\$1000)	%change CA	Revenues US (\$1000)	% change US	CA/ US
All carriers	37,197,025.56	4%	379,619,213.53	1%	10%
Service Providers	28,471,186.43	7%	211,183,378.27	4%	13%
Dependent Act.	9,256,402.60	2%	515,464,482.12	0%	2%
Reverse Logistics	12,502,517.61	2%	86,877,612.70	1%	14%
Total freight	87,427,132.20	4%	1,193,144,686.62	1%	7%
Cargo Owners	2,102,531,544.61	1%	18,741,688,546.62	0%	11%
Total freight and freight related	2,189,958,676.80	1%	19,934,833,233.24	0%	11%

Table B-2 Financial Performance 2: Revenues/Employee, including self-employed, California and US, 2016 and percent change 2015-16

Group	Rev/Emp/CA	% change CA	Rev/Emp/US	% change US
All carriers	\$ 106,563	-2%	\$ 124,507	-2%
Service Providers	\$ 86,531	-1%	\$ 74,591	-2%
Dependent Act.	\$ 72,611	0.3%	\$ 378,309	-1%
Reverse Logistics	\$ 248,811	0.2%	\$ 190,857	0.2%
Total freight	\$ 102,156	-1%	\$ 156,091	-2%
Cargo Owners	\$ 518,335	-0.1%	\$ 506,673	-0.3%
Total freight and freight related	\$ 445,826	-1%	\$ 447,027	-1%

Table B-5 Workforce Statistics 3: Payroll/employees, excluding self-employed, California and US, 2016 and percent change 2015-16

Group	Payroll/Emp	%change CA	Payroll/emp US	%change US
All carriers	\$ 53,977	-0.5%	\$ 53,073	-1%
Service Providers	\$ 51,898	-2%	\$ 49,691	-3%
Dependent Act.	\$ 56,133	-0.1%	\$ 71,251	1%
Reverse Logistics	\$ 62,771	3%	\$ 56,953	2%
Total freight	\$ 53,994	-1%	\$ 55,010	-1%
Cargo Owners	\$ 60,917	2%	\$ 50,289	1%
Total freight and freight related	\$ 59,841	1%	\$ 51,047	0.5%

Table B-6 Overall Economic Performance 1: GDP including self-employment, California and US, 2016 and percent change 2015-16

Group	GDP CA (\$million)	%change CA	GDP US (\$million)	% change US	CA/US
All carriers	25,532	14%	237,991	1%	11%
Service Providers	31,661	18%	268,773	5%	12%
Dependent Act.	16,949	2%	237,198	1%	7%
Reverse Logistics	7,177	14%	56,153	9%	13%
Total freight	81,319	13%	800,114	3%	10%
Cargo Owners	571,453	0.3%	4,351,509	1%	13%
Total freight and freight related	652,772	2%	5,151,623	1%	13%

Table B-7: Overall Economic Performance 2: GDP/employee, including self-employed, California and US, 2016

Group		GDP/ Emp CA	GDP/Emp US
1	All carriers	\$ 73,146	\$ 76,616
2	Service Providers	\$ 96,226	\$ 92,912
3	Dependent Act.	\$ 132,953	\$ 172,474
4	Reverse Logistics	\$ 142,825	\$ 123,554
	Total freight	\$ 95,019	\$ 102,201
5	Cargo Owners	\$ 140,880	\$ 117,307
	Total freight and freight related	\$ 132,890	\$ 114,675

Appendix C: Trucking Industry Comparison

Table C-1 Financial Performance 1: Revenues, including self-employed, California and comparison states, 2016 and percent change 2015-16

Group	CA Rev (\$1000)	% change CA	AZ Revenues (\$1000)	% change AZ	UT Revenues (\$1000)	% change UT	NV Revenues (\$1000)	% change NV
All carriers	33,946,109	4%	4,550,475	3%	3,034,305	0%	1,722,345	6%
Service Providers	11,372,620	7%	1,321,291	3%	602,675	-1%	647,057	7%
Dependent Act.	8,874,455	2%	1,292,300	2%	791,747	-1%	481,921	1%
Cargo Owners	2,098,372,607	1%	241,529,563	1%	144,797,511	2%	89,407,741	1%
Total	2,152,565,791	1%	248,693,628	1%	149,226,237	2%	92,259,063	1%

Table C-2 Financial Performance 2: Revenues/Employee, including self-employed, California and comparison states, 2016

Group	CA Revenues/Emp	AZ Revenues/Emp	UT Revenues/Emp	NV Revenues/Emp
All carriers	\$ 98,548	\$ 96,582	\$ 105,263	\$ 87,977
Service Providers	\$ 76,679	\$ 60,743	\$ 51,864	\$ 67,396
Dependent Act.	\$ 103,321	\$ 91,271	\$ 95,453	\$ 79,660
Cargo Owners	\$ 520,680	\$ 380,811	\$ 388,060	\$ 360,322
Total	\$ 467,062	\$ 346,719	\$ 353,723	\$ 325,589

Table C-3 Workforce Statistics 1: Total employment including self-employed, California and comparison states, 2016 and percent change 2015-16

Group	CA Emp	% change CA	AZ Emp	% change AZ	Utah Emp	% change UT	Nevada Emp	% change NV
All carriers	349,062	11%	47,115	4%	28,826	1%	19,577	8%
Service Providers	148,314	6%	21,752	4%	11,620	2%	9,601	8%
Dependent Act.	85,892	1%	14,159	2%	8,295	-1%	6,050	0%
Cargo Owners	4,030,064	1%	634,251	1%	373,132	3%	248,133	1%
Total	4,613,333	2%	717,277	2%	421,873	3%	283,361	2%

Table C-4 Workforce Statistics 2: Total payroll, excluding self-employed, California and comparison states, 2016 and percent change 2015-16

Group	CA	% change CA	NV	% change NV	AZ	% change AZ	UT	% change UT
All carriers	\$ 51,299	-1%	\$ 50,467	-1%	\$ 49,647	-0.1%	\$ 45,524	1%
Service Providers	\$ 53,747	-2%	\$ 51,593	-3%	\$ 50,368	-2%	\$ 45,239	-1%
Dependent Act.	\$ 48,625	1%	\$ 45,443	-4%	\$ 44,548	1%	\$ 46,991	-2%
Cargo Owners	\$ 60,976	2%	\$ 41,552	1%	\$ 49,477	1%	\$ 44,837	2%
Total	\$ 60,045	1%	\$ 42,473	1%	\$ 49,443	0.1%	\$ 44,930	1%

Table C-5 Workforce Statistics 3: Payroll/employees, excluding self-employed, California and comparison states, 2016 and percent change 2015-16

Group	CA	% change CA	NV	% change NV	AZ	% change AZ	UT	% change UT
All carriers	\$ 51,299	-1%	\$ 50,467	-1%	\$ 49,647	0%	\$ 45,524	1%
Service Providers	\$ 53,747	-2%	\$ 51,593	-3%	\$ 50,368	-2%	\$ 45,239	-1%
Dependent Act.	\$ 48,625	1%	\$ 45,443	-4%	\$ 44,548	1%	\$ 46,991	-2%
Cargo Owners	\$ 60,976	2%	\$ 41,552	1%	\$ 49,477	1%	\$ 44,837	2%
Total	\$ 51,732	-1%	\$ 50,093	-2%	\$ 49,140	0%	\$ 45,672	0%

Table C-6 Overall Economic Performance 1: GDP including self-employment, California and comparison states, 2016 and percent change 2015-16

Group	CA GDP	% change CA	AZ GDP	% change AZ	Utah GDP	% change UT	Nevada GDP	% change NV
All carriers	23,924	15%	3,895	3%	2,260	3%	1,543	3%
Freight Transportation Service Providers	7,230	16%	1,056	2%	465	0%	460	5%
All Transportation dependent activities	5,373	3%	773	4%	793	-0.4%	327	-3%
Cargo Owners	568,933	0%	66,945	3%	36,066	2%	22,550	4%
Total	605,461	1%	72,669	3%	39,584	2%	24,880	4%

Table C-7: Overall Economic Performance 2: GDP/employee, including self-employed, California and comparison states, 2016 and percent change 2015-16

Group	CA GDP/Emp	AZ GDP/Emp	UT GDP/Emp	NV GDP/Emp
All carriers	\$ 69,454	\$ 82,672	\$ 78,408	\$ 78,794
Freight Transportation Service Providers	\$ 48,750	\$ 48,533	\$ 40,003	\$ 47,909
All Transportation dependent activities	\$ 62,551	\$ 54,618	\$ 95,572	\$ 54,104
Cargo Owners	\$ 141,172	\$ 105,550	\$ 96,658	\$ 90,880
Total	\$ 131,372	\$ 101,313	\$ 93,829	\$ 87,804

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