

Appendix C. California's Competitive Position

California's competitiveness is vital to both public agencies and private stakeholders. Losses of commerce, businesses, and jobs to other states or nations are keenly felt throughout the state and across sectors. Increasing statewide competitiveness is a key priority for the State; this section connects the role, and potential growth, of efficient goods movement in California's competitiveness and achieving this goal.

Losses of economic activity due to interstate and international competition vary in scope and effect. Losses are highly visible and tangible when businesses move away from California or when businesses that might have located in California choose a competing location instead. Other economic losses are less obvious or immediate, such as gradual shifts in business activity away from California or closures of California businesses. Yet, these less obvious losses can be equally important to California's aggregate economy and affect some communities disproportionately. Increasing competitiveness across the state can contribute to local and state economic development by making California the preferred choice of developers, businesses, and transportation providers.

"Competitiveness" is often defined in general terms but is typically grounded in economic activity and attraction. Key definitions of "competitiveness" are included below:

- "A competitive region is one that can attract and maintain successful firms and maintain or increase standards of living for the region's inhabitants. Skilled labor and investment gravitate away from 'uncompetitive' regions towards more competitive ones."¹
- "Competitive regions provide conditions under which companies can compete successfully on national and international markets while paying wages that can support a high standard of living to citizens."²

Few discussions of competitiveness specify over what states are competing for, which business entities or sectors are competing, or how freight transportation affects winning or losing. There are few available comparisons of freight transportation performance between regions, states, or nations. This chapter serves to address the nature of competition between locations and the role of goods movement in that competition.

The state and its communities, transportation providers, and businesses compete in several ways:

- The State of California and California municipalities compete for business locations, including production facilities, distribution centers, and offices.
- California producers, manufacturers, distributors, and wholesalers compete for business and market share with their domestic and foreign counterparts elsewhere and may also compete for business within their own firms.
- California seaports, airports, and freight carriers compete with their counterparts in other states and nations for freight transportation business.

This section examines these different types of competition and the factors that affect California's competitive position in each.

The role of freight transportation in economic competitiveness is usually assumed to be a function of freight system capacity, performance, and efficiency. In most discussions of competitiveness, quantitative or qualitative shortfalls in freight capacity, cost, service frequency, transit time, reliability, safety, etc. are presumed to diminish economic competitiveness.

Beyond freight transportation costs and services, California's competitiveness is affected by several factors cited in the industry focus groups conducted for the CFMP 2020. These factors include:

- **Workforce availability and cost of living**-- Production and distribution facilities have reported difficulty in obtaining qualified workers and truck drivers in California. California's cost of living, particularly housing costs, makes it difficult for workers to make ends meet on typical wages.
- **Land and development costs and uncertainty**-- The difficulty and cost of securing land and developing facilities in California are frequently cited as handicaps in California's competitiveness. The length and uncertainty of the development approval process contribute to this problem.
- **Environmental regulations**-- California's environmental regulations, and the cost of compliance, are frequently cited as decreasing the state's competitiveness. Uncertainty over future regulations is also a significant factor.
- **Lack of linkage between goods movement and economic development efforts**-- Stakeholders feel that California's economic development efforts lag behind other states and are not effectively linked to the goods movement industry or its capabilities.

This section provides a high-level perspective on the potential role of goods movement in California's national and international competitiveness and identifies factors that may be of concern to non-transportation agencies. The section addresses the following subjects:

- Competition for:
 - Business locations
 - California products and production
 - Distribution centers
 - Seaport business
 - Air cargo business
- Cost differences in:
 - Freight transportation
 - Labor and supply
 - Land
 - Energy and utilities
- Perceptions of California's business climate

- Competitive economic development efforts
- Implications for competitiveness and potential growth

Competition for Business Locations

The focus of most regional and state competitiveness discussions is competition for locations of new production, distribution, or transportation facilities. These facilities generate jobs, tax revenue, and positive economic impacts within communities. Californians are concerned over the potential loss of businesses, and over facilities that close due to out-of-state competition or relocate to outside of the state. For this discussion, it is critical to first understand how companies are making various location decisions.

Types of location decisions-- Although there are many possible variations and combinations, most location decisions fall under a few basic types:

- Choosing a location for a new production or distribution facility
- Choosing whether to expand, contract or close an existing location
- Choosing how much production or distribution activity to allocate among locations

Location Decision Factors-- Key factors in location decisions commonly include:

- Access to target markets
- Availability of suitable sites, buildings, or other facilities, with appropriate zoning
- Fit within existing or planned production, supply chain, and distribution networks
- Development timeline (e.g. permitting, construction, EIRs)
- Land cost and zoning
- Cost of doing business (other than transportation)
- Local regulations and other restrictions
- Workforce availability
- Proximity to suppliers, intellectual capital, and other inputs
- Freight transportation capacity and reliability
- Freight transportation service and cost

California's consumer population and direct access to international markets via ports on the Pacific Rim give the state a competitive edge to the first factor- access to target markets. Few businesses have a major presence in the California market without a physical location in California.

Some of these factors, such as site availability and access to inputs, can eliminate a given location from further consideration. If there are no suitable sites available or if critical inputs cannot be obtained, other factors do not matter. Similarly, if freight transportation capacity and reliability needs cannot meet in a given location, the business will locate elsewhere.

While freight transportation capacity (e.g. highway, port, rail, or air cargo capacity) can usually be taken for granted, this is not always the case. Facilities that require or produce large volumes of marine bulk cargo (e.g. export grain elevators) or specialized cargo (e.g. import autos) need specialized terminals with sufficient capacity. Reliability can usually be achieved, but sometimes at a higher cost. If fleet operators must add drivers, add equipment, or allow extra time to overcome local problems, then costs can increase significantly. Notably, some parts of rural California have limited STAA truck access, which can reduce the ability of those areas to compete for new facilities.

While cost differences are relatively easy to quantify, reliability differences are not. There is a relationship between reliability and inventory levels (e.g., the need for larger or smaller “safety” stocks), but in most cases, the greater concern is the ability to meet corporate and customer requirements consistently. Recurrent congestion reduces productivity and can affect reliability if the parties cannot anticipate and accommodate expected delays.

Non-recurrent delays and congestion are a more serious reliability problem. As California transportation facilities of all kinds – highways, arterials, ports, airports, railroads – operate closer to their capacity, the frequency and severity of non-recurrent congestion tend to rise. In some parts of California, notably the San Francisco Bay Area, usable corridors are restricted by geography. Often, there are no practical alternatives to congested routes.

Manufacturing plants may have flexibility in their location decision, either within California or in other states. Manufacturing plants that use easy-to-transport inputs (e.g. electrical components) or widely available inputs (e.g. paper or basic metals) may take the full list of location factors above into account. If all other factors are equal, goods movement may become the deciding factor. However, the ability of the facility to locate in a wide variety of locations implies that either goods movement differences are not likely to be critical, or that there are few significant goods movement differences between locations.

Where more generic inputs such as semi-skilled labor, space, or electrical power are a major part of production expenses, the costs of those inputs will have a greater impact on location decisions. In this case, California’s higher labor, land, or power costs – or perceptions of higher costs – may place the state at a competitive disadvantage. These perceptions are discussed further in the Perceptions of California’s Business Climate section of this section.

Local Market Facilities-- Many goods movement and freight-dependent industry facilities must be located close to the market that they serve or the sources on which they rely. California does not need to compete for these local market facilities, although there may be competition between cities and counties within California. For example:

- Suppliers of basic building materials (aggregates, cement, lumber) need to be close to construction projects. Consequently, these facilities are spread widely throughout the state.
- Processors of perishable inputs (wine grapes, tomatoes, strawberries) need to be close to the source to maintain quality without excess transport and handling costs.

- Suppliers of inputs to true “just in time” manufacturing (e.g. auto assembly plants) must be located close to their customers to maintain the required responsiveness.
- Facilities that require specific work force skills (e.g. high-tech product development, software engineering) usually located near sources for those skills (e.g. major universities) or other facilities that need those skills (e.g. Silicon Valley).

These local market examples are cases where California does not need to compete for the production or distribution function. Cement batch plants, for example, are distributed throughout the state to serve local markets, and cannot serve California cities from other states. Likewise, sand and gravel producers – quarries, etc. – cannot locate away from the underlying resource. In general, fungible commodities with high transportation costs relative to their value cannot be shipped very far and still compete with nearer suppliers.

Competition for California Products and Producers

California producers and their products compete with producers and products from other states and nations. The extent and nature of that competition depend on commodity type. For example, some California products are differentiated by source or brand, such as Napa Valley wines, California raisins, or Tesla autos. Since customers may not see wines, raisins, or autos from elsewhere as perfect substitutes, differentiated products can often command a somewhat higher price and have a greater ability to absorb transportation cost differences without losing market share. Other California products dominate their industry due to production volume and are somewhat shielded from competition because other sources cannot satisfy the market demand. However, California products that are not differentiated by source or brand must compete on delivered price and reliability of supply. Examples discussed below to illustrate the differences in competition between products and markets.

Medium-grain rice

California medium-grain rice is an example of a product that is slightly differentiated but must also compete on delivered price. Medium-grain rice produced in and milled in California (e.g. Sutter County), for example, must compete in domestic and foreign (Asian) markets with medium-grain rice of equivalent grades from elsewhere in the U.S. or from other countries. Medium-grain rice generally competes with other types of rice, including long-grain and basmati rice, also produced in California and elsewhere. Within the U.S., Arkansas is the leading rice production state and is a competitor to California’s rice industry. Some California rice varieties, such as the Calrose variety, and its commercial descendants, are favored for their texture in sushi and other Asian cuisines, and therefore can command a somewhat higher price in those markets.

Within the medium-grain rice export production and shipping process, freight transportation efficiency would affect:

- Transportation of rice seed, fertilizer, and equipment to fields
- Transportation of harvested rice to rice mills

- Transportation of milled rice in bags or bulk to seaports
- Transportation of rice by ship to foreign markets

Medium-grain rice growers in one part of California (e.g. Sutter County) may compete with growers in other areas (e.g. Glenn and Butte Counties). If growers in both areas receive the same delivered price at the mill, the grower with the lower trucking cost will have higher net revenue. The difference in total trucking cost is likely to be small, however, and the difference in trucking efficiency (e.g. cost per mile) within California is likely to be smaller yet.

The delivered cost of California medium-grain rice in Hong Kong would include:

- California production, milling, and distribution costs
- Trucking costs in California
- Shipping costs (including port costs) from California to Hong Kong
- Distribution and delivery cost in Hong Kong

Due to the short distances involved, internal California transportation costs would have a relatively minor role in the delivered cost of California medium-grain rice and its competitiveness in world markets. For a given and competitively determined delivered price in Hong Kong, the rice wholesaler or broker will realize a greater net profit if transportation costs are lower.

Within California, there may be competition for the location of new rice milling or storage facilities. That location may be influenced by the condition of local roads and access to rail service, but it is more likely to be determined by land costs and distance to growers and ports.

Almonds

California almond production is shielded from domestic and foreign competition, due to both sheer production volume and product differentiation. In 2016, California produced about 80 percent of the world's almonds and 100% of the U.S. commercial supply. California also produced about 65 percent of the world's almond exports to more than 90 countries worldwide.³ As a result, California almonds face very little competition.

Depending on market conditions, higher transportation costs will either raise the delivered cost or reduce the producer's profit. In the case of almonds, California dominates world trade. If foreign consumers want more almonds than are available locally, they must pay California prices. The risk to California almond producers is that foreign consumers will buy fewer almonds if prices become too high or if the delivery becomes unreliable.

For almonds, California goods movement efficiency would have a little competitive impact. The almond industry cannot readily move to another state, nor can other producers quickly increase production to displace California almonds.

Competition for Distribution Centers

Distribution centers (DCs) can be national (NDCs), serving the entire nation, regional (RDCs, serving a region within the nation), or local in scope. There may also be separate import distribution centers (IDCs), handling imported goods separately from domestic goods. A state or a sub-region may compete as a potential location for a national, regional, or import DC. RDCs in the state may also “compete” for coverage with RDCs in other states.

Large retail chains, manufacturers, and wholesalers may adopt one of several distribution center strategies to access their customers:

- A single national distribution center (NDC)
- A series of regional DCs (RDCs)
- A tiered system of an NDC feeding multiple RDCs

Firms may progress through different strategies:

- Starting with a single NDC, often at the point of production or near a port
- Establishing additional RDCs as a volume in regional markets grows
- Establishing additional IDCs as import volumes justify multiple entry ports

Large, well-known retail chains typically have multiple RDCs. For example, the following retail chains have RDCs in California:

- Target – Woodland, Rialto, Shafter
- Home Depot – Lathrop, Mira Loma
- Crate & Barrel – Tracy, Santa Fe Springs
- Rite Aid – Woodland, Lancaster
- Safeway – Tracy, Santa Fe Springs, Norwalk
- J.C. Penney – Stockton
- Walmart – Porterville, Mira Loma
- IKEA – Lebec
- Kohl’s – Patterson, San Bernardino

California is such a large market that it is unlikely that a major retail business would serve the state without at least one RDC there. As noted, many DCs are already here. However, the activity level of California’s DCs may be subject to “competition” within the supply chain of various types:

- **Competition for existing territory** – how much of California, or the western states, will be served from California DCs, as opposed to DCs elsewhere?
- **Competition for expansion** – will the firm choose to expand stores or sales in the state, thus increasing volume at the state DC, or elsewhere?

- **Competition for the new territory** – as a producer, importer, or retail chain expands into new markets, will those markets be served from California DCs, from existing DCs elsewhere, or from new DCs elsewhere?

For example, an importer with growing volume at a single Inland Empire facility might choose: 1) to expand that facility and continue to serve the whole country from a single point; or 2) to establish a second import facility in Georgia, served by the Port of Savannah. In the first case, California lost a second facility and all the additional jobs and tax revenue from that decision, but in the second case, the state loses volume, expansion potential, jobs, and tax revenue.

In this type of planning, the importer must weigh the total cost of serving a mid-continent market (Kansas City, for example) from the Inland Empire versus from Georgia. The relevant costs would include:

- Ocean transportation costs from the source to the U.S. port
- Inland transportation (truck) to the port-area DC
- Inland transportation to the store or customer in Kansas City

Port handling costs do not figure directly into the importer’s calculations, because those costs are part of the ocean transportation expense. However, the importer may see additional clean trucks and PierPass/Off Peak fees at Southern California ports.

In the example above, the importer may pay for truck drayage between the port and the DC, and between the DC and an intermodal rail terminal for the trip to Kansas City.

California ports “compete” for this business but have no direct influence over the costs and services involved, except for their own fees.

CFMP outreach and interviews with importers and other parties revealed that transportation cost is only one factor in the DC location decision, and perhaps not the deciding factor. Many stakeholders regard it as significantly more difficult, more time consuming, costlier, and less certain to build or expand a facility in California than elsewhere. This perception – whether it is true or not in every case – tends to tip the scale in favor of locations in other states. Other consequences and effects of perceptions are discussed further in the Perceptions of California’s Business Climate section.

Competition for California Seaport Business

While there has been much commentary on the efficiency of U.S. and West Coast ports compared to leading Asian and European ports, a realistic view of the role of ports in state competitiveness is much narrower.

California has 12 deep water port complexes, each specializing in a different mix of major cargo types, commodities, and service territories:

- The Ports of Los Angeles, Long Beach, and Oakland are best known as container ports, but the San Pedro Bay ports also handle autos, break-bulk cargo, dry bulks, and liquid bulks (chiefly petroleum and petroleum products)
- The Port of Hueneme handles fresh fruit in refrigerated containers and autos
- The Port of Richmond handles autos, vegetable oils, and break-bulk cargo
- The Port of Benicia handles autos
- The Port of Redwood City handles bulk commodities
- The Port of Humboldt Bay handles forest products and fuels
- The Port of San Francisco handles bulk commodities and autos
- The Ports of West Sacramento and Stockton handle bulk commodities and break-bulk cargo

California also has numerous private terminals that handle liquid and dry bulk commodities, such as petroleum products, gypsum, and scrap metal.

Container Port Competition

As container ports, Los Angeles, Long Beach, and Oakland compete for different trade flows in different ways.

The San Pedro Bay ports handle essentially all dry containerized cargo moving to and from Southern California, with incidental amounts moving via Oakland or Mexican ports. To some extent, the Ports of Los Angeles and Long Beach compete with the Ports of San Diego and Hueneme for refrigerated cargo. Port Hueneme and San Diego, however, are served by specific carriers in the refrigerated fruit trade that does not call at San Pedro Bay, so the primary competition is between carriers, while the ports may compete for carrier calls.

The Port of Oakland handles nearly all containerized imports and exports for Northern California, as well as some intermodal cargo moving to and from inland points.

California container ports compete with other U.S. and North American ports in two ways:

1. California ports compete for “discretionary” container traffic that can move by rail to other regions through any one of several ports. For example, Los Angeles or Long Beach compete for Asian imports to Midwestern consumer markets with the Ports of Oakland, Vancouver, Prince Rupert, New York-New Jersey, Baltimore, and Norfolk.
2. California ports compete with other regions for the location of import DCs and their inbound trade flows. For example, Riverside County might compete with Georgia for a new import DC that would bring in goods through either Los Angeles/Long Beach or Savannah.

In the case of discretionary cargo, economic activity and employment, both at the port and in the transportation network, are at risk due to competition with other ports. In the case of import DC location, economic activity and employment at the DC itself are also at risk due to competition with other regions.

The large local and regional markets in Southern California draw first inbound vessel calls to Los Angeles and Long Beach. Inland importers use these vessel schedules to get the fastest service from Asia. However, Pacific Northwest and British Columbia ports have faster sailing times from ports in North Asia (e.g. Korea, Japan, Northern China), giving these ports a transit time advantage over California ports for discretionary intermodal imports

For exports, Oakland's geographic position near California agricultural production gives it an advantage. Oakland is also often the last port of call before vessels return to Asia, providing a faster shipping option for exporters. As a result, Oakland is one of few U.S. ports where containerized exports exceed imports.

There is an overlap between the Los Angeles, Long Beach, and Oakland markets in the Central and Southern San Joaquin Valley. There, importers and exporters may choose ports based on relative trucking ocean costs and timing of vessel schedules.

Port Market Shares

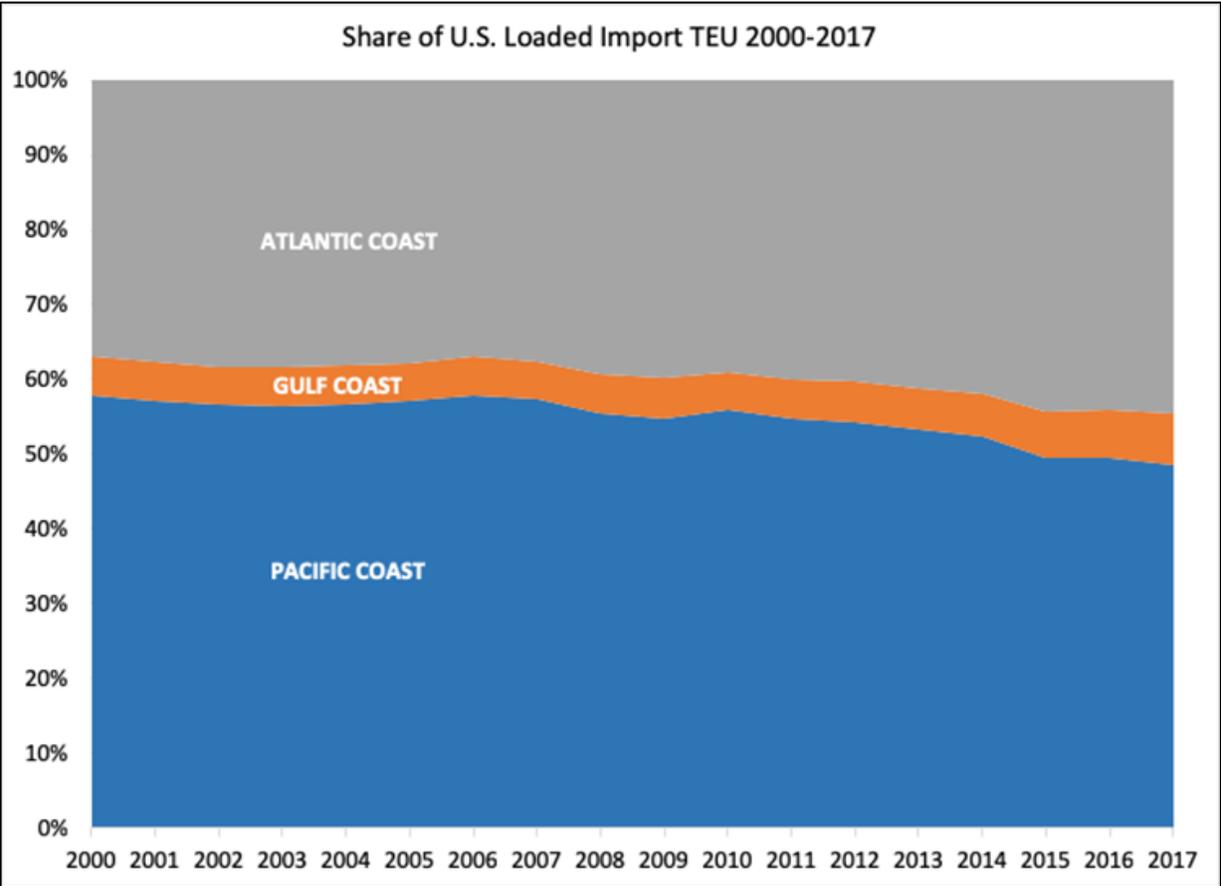
Table C.1. and **Figure C.1.** show the Pacific Coast ports combined had a 55 to 58 percent share of the loaded U.S. import container trade from 2000 through 2012. Starting in 2012, that share declined to 49 percent in 2017^{4,5}. Since 2012, the Atlantic port share has risen from 40 to 45 percent and the Gulf port share from 5 to 7 percent. This apparent loss of market share, shown graphically in

Figure C.1 has prompted concerns over the competitiveness of California's container ports.

Table C.1. Coastal Shares of Loaded Import TEU, 2000-2017

Year	Pacific	Atlantic	Gulf
2000	58%	37%	5%
2001	57%	38%	5%
2002	57 %	38%	5%
2003	56 %	38%	5%
2004	57 %	38%	5%
2005	57%	38%	5%
2006	58%	37%	5%
2007	57%	38%	5%
2008	55%	39%	5%
2009	55%	40%	5%
2010	56%	39%	5%
2011	55%	40%	5%
2012	54%	40%	5%
2013	53%	41%	6%
2014	52%	42%	6%
2015	50%	44%	6%
2016	50%	44%	6%
2017	49%	45%	7%
Source: American Association of Port Authorities			

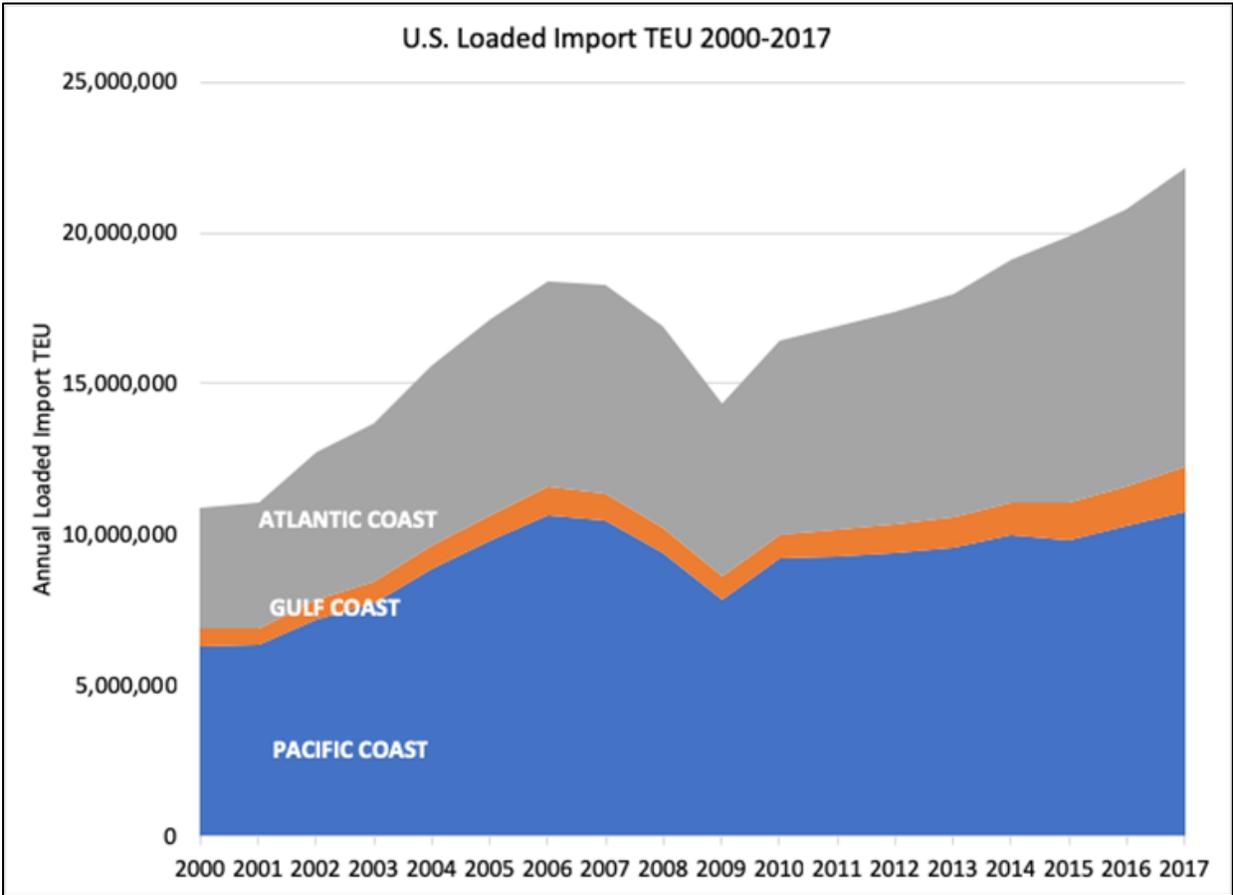
Figure C.1. A Shift in Coastal Import Shares



Source: American Association of Port Authorities

As **Figure C.1.** reveals, however, the market share shift did not result from net cargo loss at California or Pacific Coast ports, but from faster growth at Atlantic and Gulf Coast ports. Imports on all three coasts grew rapidly up to a peak in 2006-2007, then fell off during the 2008-2009 recession. After the recession, growth resumed on all coasts (although interrupted on the West Coast by the labor-management dispute of late 2014 and early 2015). **Figure C.2.** shows the U.S Loaded Import TEU by Coast, 2000-2017. ⁶

Figure C.2. U.S. Loaded Import TEU by Coast, 2000-2017



Source: American Association of Port Authorities

There was faster growth on the Atlantic and Gulf coasts for several reasons identified in the literature and trade press:

- Strong growth in the transatlantic/European and Caribbean/South American trades served by the Atlantic and Gulf ports
- Increased use of Suez Canal routings from Southeast Asia to the U.S., driven in part by a shift of manufacturing and sourcing from China to Southeast Asia and the Indian subcontinent
- Increased adoption of "three corners" and "four corners" logistics strategies by large importers (notably large retail chains), which dispersed import flows from the major Southern California gateway^{7,8}
- A reduction in Southern California import transloading
- An increase on rail intermodal service, leading ocean carriers to replace rail movements from Southern California to some inland markets with truck or rail moves from other ports

- Rising costs of locating and operating distribution and manufacturing facilities in California, versus aggressive economic development efforts in other states
- Modernization and increased capacity at Atlantic and Gulf ports
- New Panama Canal locks permitting larger, more efficient vessels on that route
- Increased cost at Southern California ports (and California ports in general) due to "clean truck" requirements, PierPass/Off Peak fees, and rising drayage costs from port and highway congestion
- Concern over West Coast labor relations stability after the lengthy 2014-2015 dispute and accompanying shipping disruption

Of these factors, only the last two are specific to California ports; the others are shifts in trade patterns and in the economic context in which California ports must compete.

There is virtually no publicly available information on relative costs at different container ports. The fees that marine terminal operators charge their ocean carrier customers are negotiated and embodied in confidential contracts. The rents that port authorities charge marine terminals operators are likewise negotiated and confidential.

Table C.2. provides a key perspective on the relative growth of California's container port volumes.⁹ In the rapid growth era of 1990-2007, Southern California ports outperformed the nation. Much of the cargo and share growth in that period was attributable to the rapid expansion of rail intermodal container movements through San Pedro Bay in response to the introduction and adoption of double-stack rail cars. This period also saw an increase in the practice of import transloading: bringing in international containers of imported merchandise and transferring the goods to domestic containers or trailers in Southern California. Finally, this period also saw dramatic growth in U.S. imports from China, with Southern California as the leading gateway. The Port of Oakland did not benefit as much from the expansion of intermodal traffic or transloading, and Northern California TEU totals did not grow as fast.

Table C.2. Container Port Cargo Growth Rates 1990-2017

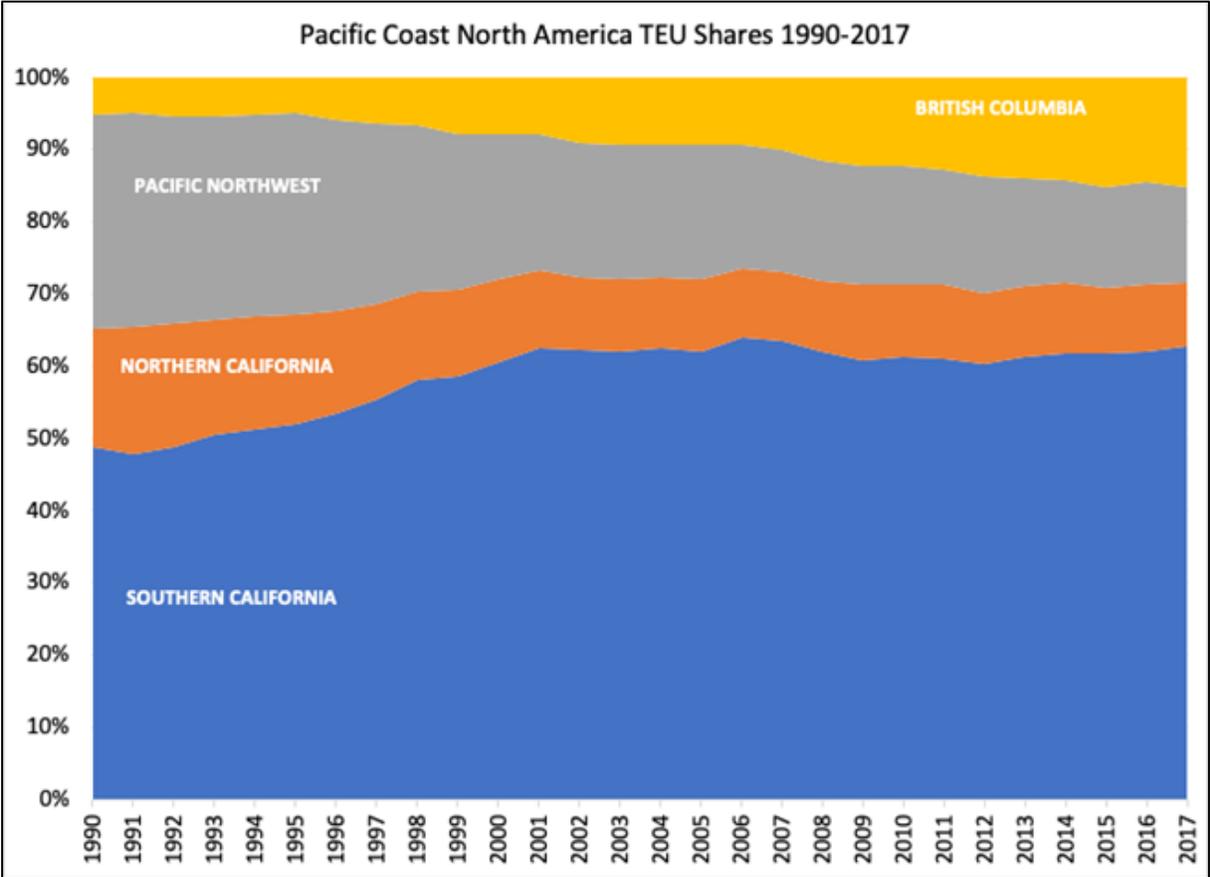
Compound Average Growth Rate (CAGR)	1990-2007	2007-2009	2009-2017
U.S.	6.4%	-6.1%	4.4%
California	7.9%	-8.4%	4.3%
Southern California	8.9%	-8.9%	4.6%
Northern California	3.8%	-5.0%	2.1%
Pacific Northwest	3.6%	-8.1%	1.4%
British Columbia	11.7%	-1.3%	7.1%
Source: American Association of Port Authorities			

U.S. container ports were hit hard by the recession, with Southern California losing 24 percent of its 2007 peak volume by 2009. Following the recession, the Southern California ports rebounded slightly faster than the nation. Oakland's volume dropped by 14 percent during the recession but did not grow as quickly after partial recovery in 2010. The labor-management issues in late 2014 and early 2015 hampered recovery for all U.S. West Coast ports.

Table C.2. also highlights one other critical factor: the rapid growth of the British Columbia ports as a gateway to both Canadian and U.S. markets. Before the recession, the Port of Vancouver began working with the Canadian railroads to offer highly competitive rail intermodal service to both markets. This effort, backed by Transport Canada's Asia-Pacific Gateway and Corridor Initiative, infrastructure funding, and the extension of Canadian railroads into U.S. markets through merger and acquisition, led to notable market share growth. The opening of Prince Rupert's Fairview terminal in 2007 created a second British Columbia rail intermodal gateway. Much of the market share gained by the British Columbia ports has come at the expense of U.S. Pacific Northwest ports (as suggested by their slow post-recession growth in **Table C.2**), but the success of Vancouver and Prince Rupert has restrained Southern California's growth as well.

Figure C.3. shows this shift of Pacific Coast shares graphically. The share going to California ports peaked in 2001 at 73.4 percent.^{10,11} The post-recession California share has varied from 70.2 to 71.5 percent, where it stood in 2017. In contrast, the Pacific Northwest ports dropped from a high of 29.7 percent in 1990 to 13.2 percent in 2017. Portland has not handled significant container business since 2014. Seattle and Tacoma have joined forces as the Northwest Seaport Alliance, partly to rationalize infrastructure investment and reinforce marketing efforts.

Figure C.3. Pacific Coast North America TEU Shares 1990-2017



Source: American Association of Port Authorities

Ro-Ro Trade

For roll-on/roll-off (Ro-Ro) trade, mainly automobiles and vehicles, the Ports of San Diego, Long Beach, Hueneme, San Francisco, and Richmond all participate and compete. Ro-Ro facilities are the principal of two types: brand-linked (such as the Toyota import facility at Long Beach) and operator-based (such as the Pasha facilities at San Diego and San Francisco). Ports and terminal operators compete for multi-year contracts with major auto importers and on a shipment-by-shipment basis for other flows. The key factors in this competition are:

- Fit within the importer’s international market strategy
- Access to major consumer markets
- Costs of ocean shipment, port handling, and vehicle processing
- Trucking costs to local and regional markets
- Rail access, service, and cost to intrastate markets

From the above factors, most often geography and market access are primary factors, and transportation cost is a secondary factor.

The Ports of Richmond and Benicia are entry and distribution points for imported autos, and Pasha has recently started up auto operations at the Port of San Francisco. Each manufacturer/importer tends to choose one or more ports as entry points for multi-year commitments. Ports and auto terminal operators, therefore, tend to compete for these long-term commitments rather than shipment-by-shipment. Other major West Coast auto import ports include Long Beach and Portland. To the extent that one importer may bring in autos to more than one port, the port terminal operators may compete for volume and territory, as do distributors of other goods.

Break-bulk Trade

“Break-bulk” trade, also called “general cargo”, includes non-bulk, non-containerized commodities such as structural steel, lumber, and machinery. “Project cargo” is a key subcategory of break-bulk trade, and includes goods such as bridge components, refinery assemblies, subway car shells, and other goods requiring special handling to support a near-term local or regional project. Wind farm generator towers and blades are an important project cargo at many ports. Occasional project cargo shipments may be handled through special stowage on container vessels and handled at container terminals.

Project cargo and break-bulk cargo, in general, are typically handled at multi-purpose terminals at Los Angeles, Long Beach, Stockton, or West Sacramento. Handling and inland transport costs are high for items such as windmill blades, steel shapes, or transit cars, so shipments typically move through the closest port. California ports would thus compete with other California ports. The only significant area of overlap may be Northern California and Southern Oregon.

Oakland, Stockton, West Sacramento, and other Northern California ports do not compete with other ports for shipments to and from Northern California. Northern California importers and exporters do not regularly use the Southern California or Pacific Northwest ports unless they require a specific service that is not available in Northern California.

Bulk Commodities

There is also limited competition between regional ports for bulk commodity exports. The Port of Stockton and Levin Richmond Terminals have handled export coal and iron ore movements, primarily from Utah to China. These movements might have been handled through the bulk export terminal at the Port of Long Beach.

Southern California ports have major flows of petroleum products for local refineries and markets. The San Francisco Bay Area refineries act as petroleum import ports. They compete with other refineries for imports to the extent that they compete for inland markets (e.g. in the San Joaquin Valley) with refineries elsewhere (e.g. in Southern California).

Competition for California Air Cargo Business

Like seaports, the competitive position of California’s cargo airports is largely determined by their geographic position relative to major markets.

Because both domestic and international air cargo tends to be time-sensitive, shippers commonly choose airports based on the combination of ground and air transit time. As a practical matter, the ground transit time to and from the airport may differ more than the air transit time, especially where carriers offer equivalent service from multiple airports. A shipper or air freight forwarder in the San Joaquin Valley might, therefore, choose between San Francisco (SFO) and Los Angeles (LAX) for an export shipment based on the truck time and cost to the airport, rather than on airport or air service characteristics.

Direct competition for air cargo business is largely regional, as outlined below:

- Oakland (OAK) and SFO compete for Bay Area air cargo, with OAK prevalent in domestic and SFO in international. San Jose (SJC) has a much smaller air cargo business at present
- Sacramento (SMF) and Mather (MHR) compete for air cargo business in the Sacramento area (DHL and UPS serve MHR)
- LAX and Ontario (ONT) compete for air cargo in Southern California with LAX having the dominant share. San Diego (SAN) competes for the southern portion of the market
- The numerous other California airports (Stockton, Modesto, Merced, Fresno, etc.) are served by feeder connections to the major airports. Stockton (SCK) has recently added service by Amazon flights

California airports compete with other states for hub status and for transfer/interchange freight.

Hub airports host a larger number of feeder flights to and from regional airports, as well as a full schedule of flights serving other major airports and markets. At present, California has the following hub relationships:

- LAX – DHL, FedEx, UPS
- ONT – UPS, FedEx
- SFO – FedEx (International)
- OAK – FedEx, UPS
- MHR – DHL, UPS

The competition for West Coast hub status is primarily within California, the nearest alternatives being Portland or Las Vegas. The size of the Northern and Southern California markets, however, will keep major air cargo hub locations within the state.

Major hubs may also compete for air cargo transfer/transshipment business between foreign and domestic carriers. For this market, all major West Coast international airports can be in contention: Anchorage, Seattle-Tacoma, San Francisco, Vancouver, and Los Angeles. The outcome of this competition is affected by on-airport costs and network connections, not by ground transportation issues.

Air cargo is increasingly dominated by the integrated carriers, chiefly FedEx, UPS, and DHL. To use these carriers the customer tenders the shipment locally, and the carrier chooses the

routing and the airports. UPS, for example, uses OAK but not SFO. California airports, therefore, compete mostly for the business of the integrated carriers rather than for the underlying customer choices. Passenger airlines continue to carry substantial volumes of “belly cargo”. These air cargo services may be sold directly to the customer or through an air freight forwarder.

Relatively few producers or businesses rely heavily on on-air cargo due to the high cost. E-retailers such as Amazon make strenuous efforts to develop and manage regional and local distribution centers to minimize air cargo use. Businesses that do rely heavily on on-air cargo, particularly repair parts suppliers, are likely to locate next to a major national hub, or even on airport property. LAX, SFO, or OAK could compete for such businesses with other major hubs.

Key factors in airport competition include:

- Availability of takeoff/landing windows at key flight times
- Availability of gates and gate time slots for passenger services
- Airport landing and gate fees

Except for the air cargo transloading segment, which stays on the airport footprint, California’s airports are not in close competition with those in other states. Goods movement mobility within the state is unlikely to affect the competitive position of California airports either nationally or internationally.

California Cost Differences

Freight Transportation Costs

Trucking Costs

Table C.3 shows average U.S. marginal trucking costs per mile for 2009–2017, as computed by the American Transportation Research institute.^{12, 13} As of 2017, the average U.S. marginal cost per mile was estimated at \$1.691.

Table C. 3. Average Marginal Costs per Mile, 2009-2017 (ATRI 2018)

Motor Carrier Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vehicle-based									
Fuel Costs	\$0.405	\$0.486	\$0.59	\$0.641	\$0.645	\$0.583	\$0.403	\$0.336	\$0.368
Truck/Trailer Lease or Purchase Payments	\$0.257	\$0.184	\$0.189	\$0.174	\$0.163	\$0.215	\$0.23	\$0.255	\$0.264
Repair & Maintenance	\$0.123	\$0.124	\$0.152	\$0.138	\$0.148	\$0.158	\$0.156	\$0.166	\$0.167
Truck Insurance Premiums	\$0.054	\$0.059	\$0.067	\$0.063	\$0.064	\$0.071	\$0.074	\$0.075	\$0.075
Permits and Licenses	\$0.029	\$0.040	\$0.038	\$0.022	\$0.026	\$0.019	\$0.019	\$0.022	\$0.023
Tires	\$0.029	\$0.035	\$0.042	\$0.044	\$0.041	\$0.044	\$0.043	\$0.035	\$0.038
Tolls	\$0.024	\$0.012	\$0.017	\$0.019	\$0.019	\$0.023	\$0.020	\$0.024	\$0.027
Driver-based									
Driver wages	\$0.403	\$0.446	\$0.460	\$0.417	\$0.440	\$0.462	\$0.499	\$0.523	\$0.557
Driver benefits	\$0.128	\$0.162	\$0.151	\$0.116	\$0.129	\$0.129	\$0.131	\$0.155	\$0.172
Total	\$1.451	\$1.548	\$1.706	\$1.633	\$1.676	\$1.703	\$1.575	\$1.592	\$1.691

Source: American Transportation Research Institute (ATRI) 2018

As **Table C.4** shows, the costs vary by the trucking sector. Less-than-truckload (LTL) costs were higher at \$1.84 per mile due to last mile pickup and delivery costs and terminal handling costs.¹⁴ Truckload (TL) costs were lower at \$1.49 per mile.

Table C.4. Average Total Marginal Costs by Sector, 2009-2017 (ATRI 2018)

Sector	2009	2010	2011	2012	2013	2014	2015	2016	2017
LTL	\$1.43	\$1.76	\$1.93	\$1.79	\$1.84	\$1.83	\$1.60	\$1.74	\$1.84
Other	\$1.67	\$1.61	\$1.79	\$1.73	\$1.67	\$1.85	\$1.72	\$1.83	\$1.95
TL	\$1.36	\$1.43	\$1.57	\$1.51	\$1.60	\$1.58	\$1.50	\$1.42	\$1.49

Source: American Transportation Research Institute (ATRI) 2018

The share data in **Table C.5** indicate that fuel accounts for 22 percent and driver wages and benefits are 43 percent of average marginal cost.¹⁵

Table C.5. Share of Total Average Marginal Cost, 2009-2017 (ATRI 2018)

Motor Carrier Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vehicle-based									
Fuel Costs	28%	31%	35%	39%	38%	34%	26%	21%	22%
Truck/Trailer Lease or Purchase Payments	18%	12%	11%	11%	10%	13%	15%	16%	16%
Repair & Maintenance	8%	8%	9%	8%	9%	9%	10%	10%	10%
Truck Insurance Premiums	4%	4%	4%	4%	4%	4%	5%	5%	4%
Permits and Licenses	2%	3%	2%	1%	2%	1%	1%	1%	1%
Tires	2%	2%	2%	3%	2%	3%	3%	2%	2%
Tolls	2%	1%	1%	1%	1%	1%	1%	2%	2%
Driver-based									
Driver wages	28%	29%	27%	26%	26%	27%	32%	33%	33%
Driver benefits	9%	10%	9%	7%	8%	8%	8%	10%	10%
Total	100%								
Source: American Transportation Research Institute (ATRI) 2018									

Fuel economy ranges from 4.9 to 6.3 mpg, as shown in **Table C.6.**¹⁶ At a mid-range value of about 6.8 mpg, California's recent \$0.12 per gallon diesel fuel tax increase would add about \$0.02 per mile to trucking costs.

Table C.6. Respondent Reported Fuel Economy Compared to Typical Operating Weight (ATRI 2018)

Typical Operating Weight	MPG
Less than 20,000 lbs	6.3
20,001-40,000 lbs	6.8
40,001-60,000 lbs	7.2
60,001-80,000 lbs	6.3
Greater than 80,000 lbs	4.9
Source: American Association of Port Authorities	

Table C.7 below shows that the West has an average marginal cost of about \$1.616 per mile – higher than most regions, but lower than the Northwest.¹⁷ If the Southeast and Southwest are

regarded as the West's key competitors, their average trucking costs are about 4 to 5 percent lower.

Table C.7. Average Marginal Cost per Mile by Region, 2017 (ATRI 2018)

Motor Carrier Costs	Midwest	Northeast	Southeast	Southwest	West
Vehicle-based					
Fuel Costs	\$0.350	\$0.336	\$0.327	\$0.314	\$0.377
Truck/Trailer Lease or Purchase Payments	\$0.238	\$0.300	\$0.242	\$0.253	\$0.230
Repair & Maintenance	\$0.158	\$0.163	\$0.145	\$0.128	\$0.180
Truck Insurance Premiums	\$0.077	\$0.071	\$0.061	\$0.064	\$0.078
Tires	\$0.024	\$0.025	\$0.018	\$0.021	\$0.028
Tolls	\$0.027	\$0.040	\$0.022	\$0.023	\$0.014
Driver-based					
Driver wages	\$0.530	\$0.575	\$0.543	\$0.564	\$0.498
Driver benefits	\$0.150	\$0.194	\$0.160	\$0.129	\$0.172
Total	\$1.591	\$1.735	\$1.553	\$1.536	\$1.616
Source: American Association of Port Authorities					

It should be noted, however, that firms shipping to and from California locations do not necessarily pay the higher costs incurred by California-based motor carriers for the following reasons:

- National truckload carriers may be based anywhere in the U.S., and their cost structure may reflect a mix of labor, fuel, and other costs across many locations
- Large carriers recruit and pay drivers nationwide
- With fuel tanks holding up to 250 gallons, long-haul trucks can often avoid buying fuel at California prices

California's higher operating costs are therefore more likely to affect trucking within California, rather than affecting trucking to or from California. Out-of-state carriers do, however, compete for trips within California.

In the industry focus groups, Californian carriers expressed concern about competition from out-of-state carriers with lower cost structures. These higher cost factors are 1) the higher fuel costs (noted above), 2) the higher costs of "clean" trucks to meet CARB requirements, and 3) congestion in California cities. However, out-of-state carriers must use CARB-compliant trucks when operating in California, and large cities in other states are also congested.

Within California, motor carriers are deeply concerned about highway and facility congestion that reduces driver productivity, vehicle productivity, and effective capacity. This issue has received the most attention in connection with port container drayage, where longer times

spent in terminals, and on congested highways to and from the terminals reduce the number and length of the trips a driver can make within HOS limits. These issues are not unique to California or to port drayage, as busy Pacific Northwest and East Coast ports have similar problems, and urban congestion affects all trucks. When in competition with less congested regions and ports such as Savannah or Charleston, however, these costs place California at a disadvantage. The higher cost of port drayage in California is likely to be a significant factor in choosing the location for import distribution facilities or export-oriented businesses, offsetting California's advantage in being closer to Asian sources and markets.

Potential State Actions

These observations imply that California public agencies can improve the state's competitiveness on trucking costs by:

- Increasing capacity on state highways and local roads to reduce congestion
- Deploying ITS technologies to reduce congestion and lower trucking costs
- Easing emissions limits, clean truck requirements, and fuel taxes (contrary to environmental objectives)
- Acting, where possible, to reduce truck driver time spent at marine terminals and other freight facilities
- Improving truck driver training to increase the supply of drivers

Railroad Costs

California is served by two Class 1 railroads: BNSF and Union Pacific. The two railroads have extensive networks across the Western states with connection to other railroads at Midwestern gateways, to Canada, and to Mexico. California's short line railroads operate within the state. Their rates and service would not ordinarily affect California's competitiveness with other states.

It is not ordinarily possible to compare railroad rates charged to California customers or for routes through California ports with rates elsewhere. Since economic deregulation in 1980, most railroad traffic has travelled under confidential, negotiated contract rates rather than under published tariffs. Those contracts may include annual volume commitments, rate tiers, fuel surcharges, or rebates that are not reflected in any public records.

Railroad operating costs may be slightly higher in California than in other states. There has been a series of CARB actions designed to reduce emissions from both line-haul and yard operations, including:

- Increased use of low-sulfur fuel
- Introduction of low-emission, high-efficiency road locomotives
- Introduction of hybrid and other low-emission switching locomotives

In many respects, the CARB actions simply accelerate requirements eventually implemented by the U.S. EPA. Recently, the railroads have been acquiring low-emission locomotives for use across their systems. Over time, any higher costs in California will thus tend to equalize.

Railroad rate making is driven by three objectives that sometimes conflict:

- Maximizing business volume
- Maximizing profits
- Maximizing infrastructure, equipment, and labor utilization

Where railroads face effective competition from other railroads, rates tend to be lower and railroads will accept lower profits. Where railroads have available capacity, they will set rates more competitively to fill that capacity. Where demand is higher, and capacity is tight, railroads will set rates higher to maximize profit.

Recent downturns in key rail traffic volumes may lead BNSF and UP to encourage intermodal and other traffic to and from California. With the advent of fracking, lower-cost natural gas has replaced coal as a fuel for many electric power plants. The resulting decline in railroad coal traffic has reduced profits and created excess capacity in many places. While BNSF and UP lines in California were not dramatically affected, system traffic levels and profitability on both railroads declined. Both railroads have been seeking to expand other traffic sources, which may benefit current and potential rail customers in California, as well as in other states.

Differences in railroad costs and service may affect the ability of California ports to compete for discretionary intermodal shipments with Pacific Northwest and British Columbia ports. As described earlier, in Canada's Pacific Gateway Initiative, Canadian railroads have cooperated with British Columbia ports and the Canadian government to improve rail access, capacity, and service in competition for discretionary cargo. It is generally believed in the shipping industry that the Canadian railroads have also engaged in aggressive rate setting in competition with U.S. railroads – specifically BNSF and Union Pacific. These initiatives have contributed to the shift in market shares between U.S. and British Columbia ports on the West Coast of North America.

In at least one instance, the difficulty of developing facilities in California has prevented a railroad from improving service and lowering costs. BNSF's proposed Southern California Intermodal Gateway terminal (SCIG) would be located near the Ports of Los Angeles and Long Beach. Development of SCIG would add new, efficient intermodal transfer capacity to the port rail system and divert thousands of annual truck trips from I-710. SCIG development was initially proposed prior to 2011, but BNSF has so far been prevented from building the facility due to local opposition. Costs have risen to the point where BNSF may no longer find the project desirable. If SCIG is not built, then the competitiveness of the Ports of Los Angeles and Long Beach may decrease in the future.

Precision Scheduled Railroading

The advent of "Precision Scheduled Railroading" (PSR) may lead railroads to shed less profitable traffic while improving service to more profitable sectors. PSR generally consists of

improving rail service by pairing complex and less profitable services to simplify and speed up more profitable operations, permitting the railroad to improve overall service and profitability. Railroad industry investors and financial analysts tend to judge railroads by their operating ratio, the ratio of operating costs to revenue. UP, which historically enjoyed the industry's best operating ratio, produced a third quarter 2018 operating ratio of 61.7 percent, the same as in 2017. In comparison, railroads that had implemented PSR had operating ratios below 60 percent.

UP's Unified Plan 2020 (UP 2020), a new operating plan that implements PSR principles, was launched on October 1, 2018. The goal of UP 2020 is to help UP achieve a 60 percent operating ratio goal by 2020, on the way to eventually achieving a 55 percent operating ratio. UP 2020 is scheduled to be implemented in California in 2019. UP 2020 anticipates layoffs, some of which have already occurred, and more of which are planned. The strong economy and truck driver shortage is facilitating this strategy. Under this system, UP's financial hurdle for the continuation of any existing business or the addition of any new business will be much higher than in the past.

Ocean Shipping Costs

The ocean shipping rates paid by customers include the cost of vessel operations, the cost of terminal operations, fees assessed by ports, canal tolls, and ocean carrier overhead.

The current, highly competitive container shipping environment has resulted in very low rates for California shippers. Since the recession, containerized U.S. and world trade have grown slower than ocean carrier capacity. The capacity increase has been driven by carrier acquisition of larger container vessels to secure economies of scale. Faster growth in capacity than demand has resulted in persistent industry-wide overcapacity. Under these conditions, intense competition has driven down shipping rates to the point of widespread financial losses among the carriers.

The rate differences between California ports and their competitors are likely to be small and based on small differences in underlying cost. Container shipping at all U.S. and Canadian ports are dominated by the same carriers and carrier alliances. Many of the terminal operating costs are similar between California ports and competing ports elsewhere. All West Coast port terminals in North America are covered by the same basic labor contract, and many are operated by the same firms. The ports' own charges tend to be highly competitive. Vessels calling California ports do incur slightly higher costs for low-sulfur fuel and cold-ironing.

The opening of new, wider Panama Canal locks has enabled carriers to use large ships through the canal. The new locks can thereby reduce unit costs for Asia-East Coast voyages, competing with the combination of Asia-West Coast voyages and cross-country rail service. Some of the savings are captured in higher Panama Canal tolls, and moreover, the West Coast option is faster. The net result has been a minor shift in market share, as discussed in the section on port competition.

Almost all the relevant rates and fees are contained in confidential, negotiated contracts. It is not possible to assemble a quantitative comparison from available data.

Air Cargo Costs

The air cargo industry is dominated by the integrated carriers, Fedex and UPS, trailed by smaller air freight forwarders and airlines offering belly cargo space on passenger flights. Air cargo operations in California have similar costs as in other states, and California customers likely face similar rates for air cargo service.

Labor Costs

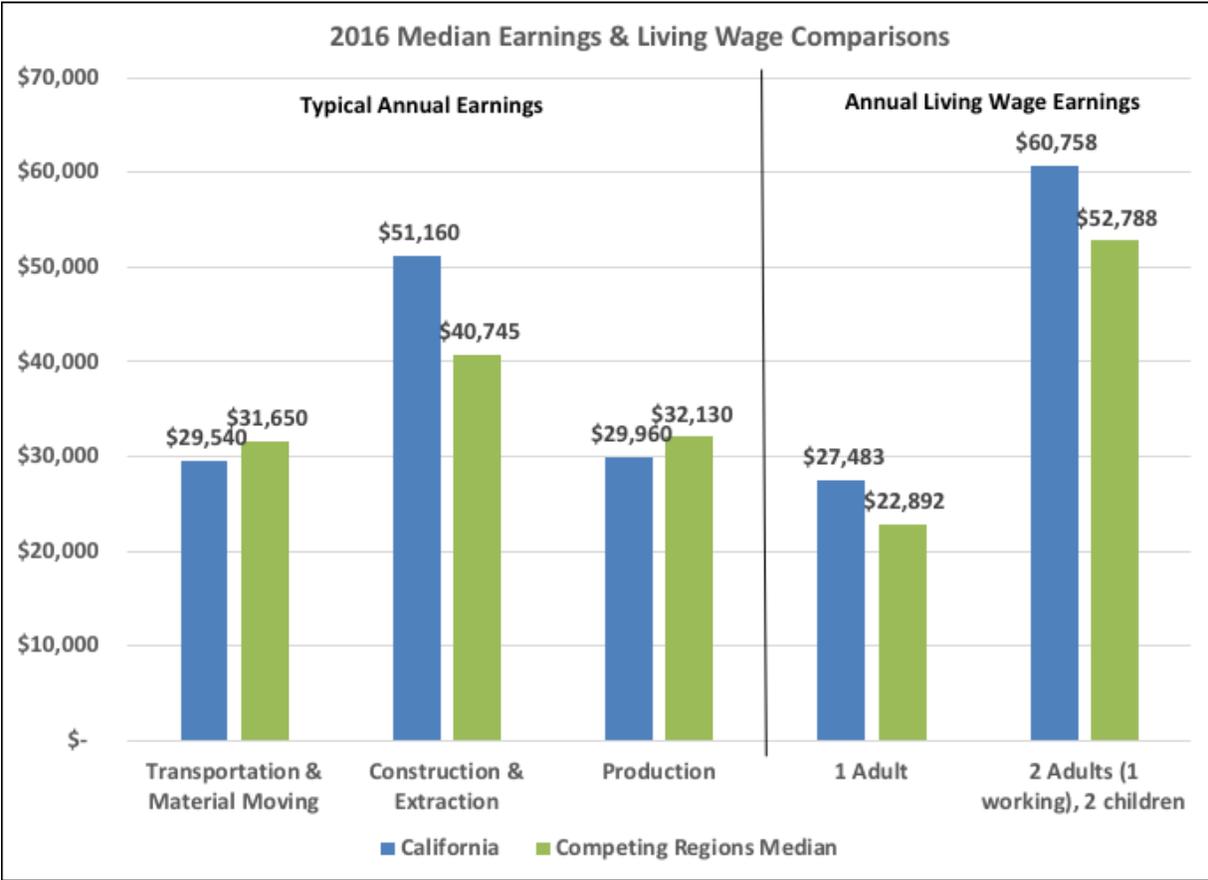
As

Figure C.4. shows, the differences in labor costs, reflected in median earnings and living wage levels, can vary.^{18,19} California's median earnings for the transportation and material moving occupations and production occupations are comparable or even lower than in some competing regions. In the construction trades, California earnings are higher, likely due to higher housing demand and prices, and the strength of organized labor in public sector construction.

High housing and living costs in California create a higher threshold for “living wage” earnings than in some competing regions. The differences in these costs vary from about 7 to 20 percent.

Because transportation occupations do not pay more in California and living costs are higher, transportation workers may enjoy a better standard of living in other states. This disparity makes transportation and materials handling jobs in California relatively less attractive than they are in other states.

Figure C.4. 2016 Median Earnings Comparison



Source: Massachusetts Institute of Technology Living Wage Calculator

Land Costs

Land cost is a significant factor for businesses with multiple alternatives for production locations. Within states, business location is central and fundamental to the cost of commercial land. Lands in central business districts of dense urban areas cost many times more than the same commercial or industrial land area in undeveloped rural areas. Land costs become more significant as facility sizes, and ensuing land requirements, increase. Modern distribution centers typically occupy at least 100,000 square feet, and facilities over 1,000,000 square feet are common.

For investors who use commercial land and properties as investments, high land values can be attractive. California ranks first in a national study of total land valuation by an economist at the U.S. Bureau of Economic Analysis.²⁰ That study estimated the combined value of all land in the country, finding that California accounts for 17 percent of the total value of the land in the 48 contiguous states. States with generally larger rural areas tend to have lower commercial land values relative to their size, while states with more densely populated areas, especially along the coasts, tend to have the highest estimated value per acre. Land use policies and zoning affect commercial land valuation as well, with undeveloped land generally having lower value

per acre, while improved, commercially zoned properties with good transportation access have generally higher land values.

In a populous state such as California, possible alternative land uses affect current land values, especially where undeveloped commercial land in metropolitan areas is scarce. In those cases, land values for residential use influence commercial land values where the potential conversion of commercial space for housing use or mixed-use development competes with continued commercial use. Thus, an understanding of more readily available residential land valuation can provide context to understand commercial land valuation market pressures.

In California, residential land prices have been increasing for decades, even in comparison to the values of the buildings on the land. In a national study of property values by the Lincoln Institute, California residential land values as a percentage of total property values have increased substantially over the last 40 years.²¹ Compared with 1976, the land value as a share of total property value increased from 36 percent to 61 percent. California ranks second nationally for this land value share, behind only Hawaii. This trend reflects the relatively high average cost of the land itself in California. Location matters, and the lower land values are found in many rural California areas with have led to the dispersion of businesses, especially distribution centers, into formerly rural areas near population centers. The Inland Empire in Southern California's San Bernardino and Riverside Counties is the best-known example, while the area of San Joaquin and Stanislaus Counties are known as the "Tracy Triangle" is a growing Northern California example.

Energy and Utility Costs

There are several energy source price metrics that affect California's competitiveness for business locations and freight movement, including the prices of petroleum gas, diesel, natural gas, and electricity.

Energy and utility costs, including electricity and water, can be prominent factors in facility operating costs and therefore in competition for such facilities between states. These factors become more important for facilities that use electric power for lighting, climate control, and production equipment, and water for processing. These costs also affect the cost of living for employees.

California's average commercial, industrial, and residential electric power rates are high compared with most other states. In 2018, according to the U.S. EIA, California had the fifth highest average commercial electricity rates, the sixth highest average industrial electricity rates, and the seventh highest average residential electricity rates. In studying a year of California's average commercial electricity rates, rates proved 59 percent higher in California than the US average for all other states. California's average industrial electricity rates for the same period were 100 percent higher than the average of all other states. California's average residential electricity rates were 49 percent higher than the average of all other states for this period.²²

Average retail gasoline prices in California are higher than in other states; only Hawaii typically has higher gas prices than California. The difference is significant. For example, in September 2018 the price difference was \$0.87 per gallon or 31 percent of the U.S. average gas price.²³ Gas price comparisons should be considered in the context of environmental regulations that require motor gasoline grades sold in California to create fewer emissions than in gasoline grades sold for less in other states.

Diesel fuel prices are an especially important factor in freight transportation, which currently still depends on diesel-powered trucks and rail locomotives. Compared with other states, California's average diesel fuel prices are commonly ranked second-highest, behind only Hawaii. In September 2018, for example, the average diesel fuel price in California was \$0.86 higher than the average for the other states, a 27 percent difference.²⁴

Another energy source price metric used as a competitiveness measure is natural gas. Average natural gas prices for transportation and for building heating and industrial process use are higher in California than in other states. The U.S. EIA reports that for the 12 months ending July 2018, California's average residential natural gas rates were 16 percent higher than the average for other states. In the same period, California's average natural gas rates for commercial customers were seven percent higher than the average for the rest of the U.S., while industrial natural gas customers in California paid an average natural gas rate 77 percent higher than the average for the rest of the country.

The energy price averages across the state mask local variations in a state as large as California. In California, regions are subject to various levels of regulation; therefore, there are specific prices for electricity and natural gas utilities, and the gasoline and diesel in each market across the state. As one example, in September 2018 the difference in average regular gasoline prices in California compared to the average for the rest of the U.S. varied from \$0.77 in the Sacramento Region up to \$0.97 in the Central Sierra Region.²⁵

Comparative Distribution Center Costs

The combined impact of these various cost factors is evident in overall operating costs for distribution centers or other industrial facilities. The comparisons in this section were derived from *Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities*, a 2015 report by The Boyd Company, Inc. The Boyd study estimated costs for 25 potential distribution center locations, including Patterson and Tracy in Northern California and Hesperia, Apple Valley, Victorville, and Mira Loma in Southern California. Warehouse operating costs were scaled to a hypothetical 500,000 sq. ft. facility employing 150 nonexempt workers and shipping over-the-road to the nearest intermodal and port city.

As **Table C.8** indicates, California locations had the highest annual combined costs except for points in the Northeast and Idaho.²⁶ The estimate for Tracy, for example, was 16% higher than in Cordele, GA, and the company would save \$1.85 million annually by choosing Cordele over Tracy.

Table C.8. Distribution Center Operating Cost Ranking, 2015

Total Annual Geographically-Variable Operating Cost Ranking	
Distribution Warehouse Location	Total Annual Operating Costs
Stoughton, MA	\$15,081,230
Meadowlands, NJ	\$14,631,975
Idaho Falls, ID	\$14,576,733
Bordentown, NJ	\$14,273,497
Newburgh, NY	\$13,660,758
Tracy, CA	\$13,302,372
Patterson, CA	\$13,104,947
Hesperia, CA	\$12,937,809
Apple Valley, CA	\$12,923,646
Victorville, CA	\$12,913,886
Mira Loma, CA	\$12,912,925
Bethlehem, PA	\$12,894,630
Casa Grande, AZ	\$12,694,040
Miramar, FL	\$12,573,879
Kent, WA	\$12,490,728
Mequite, NV	\$12,490,074
York, PA	\$12,120,409
Kingman, AZ	\$11,936,644
Springfield, OR	\$11,935,905
Fernley, NV	\$11,899,135
Columbia, SC	\$11,728,259
Humble, TX	\$11,661,803
Cordele, GA	\$11,450,594
Ritzville, WA	\$11,351,481
Chesterfield, VA	\$11,289,491
Source: Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities	

Table C.9 breaks down the operating cost estimates for locations in Southern California and competing locations in Arizona. Labor, electric power, and amortization (construction) costs are markedly higher in California, while property and sales tax costs are higher in Arizona.²⁷ The much higher transportation cost to reach Arizona is a tradeoff for the otherwise lower operating costs. Even with the offsetting transportation costs, Kingman is about a million dollars less annually than the Southern California locations.

Table C.9. Annual DC Operating Costs, California vs. Arizona

Comparative Annual Operating Cost Simulation Summary	Casa Grande	Kingman	Apple Valley	Hesperia	Mira Loma
	AZ	AZ	CA	CA	CA
	Metro Area				
Nonexempt Labor					
Weighted Average Hourly Earnings	\$13.90	\$12.55	\$16.42	\$16.70	\$16.85
Annual Base Payroll Costs	\$3,969,840	\$3,584,280	\$4,689,552	\$3,769,520	\$4,812,360
Fringe Benefits	\$1,349,746	\$1,218,655	\$1,594,448	\$1,621,637	\$1,636,202
Total Annual Labor Costs	\$5,319,586	\$4,802,935	\$6,284,000	\$6,391,157	\$6,448,562
Electric Power Costs	\$581,892	\$655,200	\$837,888	\$837,888	\$837,888
Amortization Costs	\$3,143,710	\$3,121,886	\$3,984,366	\$3,994,324	\$4,072,557
Property and Sales Tax Costs	\$1,662,052	\$1,596,576	\$1,234,805	\$1,237,025	\$1,260,146
Shipping Costs	\$1,986,800	\$1,760,047	\$582,587	\$477,415	\$293,772
Total Annual Geographically-Variable Operating Costs	\$12,694,040	\$11,936,644	\$12,923,646	\$12,937,809	\$12,912,925
Source: Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities					

Table C.10 shows the construction cost and land cost differences that drive the amortization costs higher in California.²⁸ With higher land and construction costs, the same warehouse in California would cost roughly \$15 million or approximately 27 percent more in California than in Arizona.

Table C.10. Warehouse Construction and Amortization Costs, California vs. Arizona

Warehouse Construction and Amortization Costs	Casa Grande	Kingman	Apple Valley	Hesperia	Mira Loma
	AZ	AZ	CA	CA	CA
	Metro Area				
Site Acquisition: No. of Acres	35	35	35	35	35
Cost per Acre	73,500	\$57,500	\$298,500	\$303,500	\$322,500
Site Improvement Cost	-	-	-	-	-
Total Land Cost	\$2,572,500	\$2,012,500	\$10,447,500	\$10,622,500	\$11,287,500
Construction Cost	\$32,677,230	\$32,853,690	\$39,576,510	\$39,576,510	\$40,286,430
Machinery and Equipment	\$20,000,000	\$20,000,000	\$20,000,000	\$20,000,000	\$20,000,000
Total Project Investment	\$55,249,730	\$54,866,190	\$70,024,010	\$70,199,010	\$71,573,930
Project Amortization					
Cost of Funds (Interest)	3.0%	3.0%	3.0%	3.0%	3.0%
Payment Factor	0.0569	0.0569	0.0569	0.0569	0.0569
Total Annual Amortization Cost	\$3,143,710	\$3,121,886	\$3,984,366	\$3,994,324	\$4,072,557
Source: Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities					

Table C.11 breaks down the operating cost estimates for locations in Southern California and competing locations in the Southeast.²⁹ Labor, electric power and amortization (construction) costs are again markedly higher in California. Property and sales tax costs can be either lower or higher in the Southeast. The transportation cost differences are minimized by the proximity to the South Atlantic ports. Overall, the Southeast locations can be about \$0.5 million to \$1.8 million lower annually than the California locations.

Table C.11. Annual DC Operating Costs, California vs. Southeast

Comparative Annual Operating Cost Simulation Summary	Patterson	Tracy	Victorville	Miramar	Cordele
	CA	CA	CA	FL	GA
	Metro Area				
Nonexempt Labor					
Weighted Average Hourly Earnings	\$16.99	\$17.00	\$16.52	\$15.05	\$14.13
Annual Base Payroll Costs	\$4,852,344	\$4,855,200	\$4,718,112	\$4,298,280	\$4,035,528
Fringe Benefits	\$1,649,797	\$1,650,768	\$1,604,158	\$1,461,415	\$1,372,080
Total Annual Labor Costs	\$6,502,141	\$6,505,968	\$6,322,270	\$5,759,695	\$5,407,608
Electric Power Costs	\$702,000	\$958,368	\$837,888	\$520,788	\$477,360
Amortization Costs	\$4,212,951	\$4,245,771	\$3,992,332	\$3,721,880	\$3,075,686
Property and Sales Tax Costs	\$1,208,857	\$1,292,371	\$1,236,581	\$1,584,364	\$1,123,754
Shipping Costs	\$478,998	\$299,894	\$524,815	\$987,152	\$1,366,186
Total Annual Geographically-Variable Operating Costs	\$13,104,947	\$13,302,372	\$12,913,886	\$12,573,879	\$11,450,594
Source: Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities					

Table C.12 shows the construction cost and land cost differences that drive the amortization costs higher in California.³⁰ With higher land and construction costs, the same warehouse in California would cost roughly \$5 to 20 million more in California than in Georgia or Florida.

Table C.12. Warehouse Construction and Amortization Costs, California vs. Southeast

Warehouse Construction and Amortization Costs	Patterson	Tracy	Victorville	Miramar	Cordele
	CA	CA	CA	FL	GA
	Metro Area				
Site Acquisition: No. of Acres	35	35	35	35	35
Cost per Acre	348,000	\$358,500	\$302,500	\$315,500	\$76,500
Site Improvement Cost	-	-	-	-	-
Total Land Cost	\$12,180,000	\$12,547,500	\$10,587,500	\$11,042,500	\$2,677,500
Construction Cost	\$41,861,310	\$42,070,617	\$39,576,510	\$34,368,390	\$31,376,730
Machinery and Equipment	\$20,000,000	\$20,000,000	\$20,000,000	\$20,000,000	\$20,000,000
Total Project Investment	\$74,041,310	\$74,618,117	\$70,164,010	\$64,410,890	\$54,054,230
Project Amortization					
Cost of Funds (Interest)	3.0%	3.0%	3.0%	3.0%	3.0%
Payment Factor	0.0569	0.0569	0.0569	0.0569	0.0569
Total Annual Amortization Cost	\$4,212,951	\$4,245,771	\$3,992,332	\$3,721,880	\$3,075,686
Source: Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities					

These comparisons resonate with comments made by industry stakeholders in the CFMP workshops. The cost advantages of the Southeast states also align with the market shares gains made by Southeast ports at the expense of California ports.

Perceptions of California's Business Climate

Many of the freight industry stakeholders contacted for this study perceive an "anti-business" attitude in California, and see that attitude manifest in environmental regulations, high taxes and fees, and opposition to facility development.

Opinions and concerns over California's friendliness to business are evident in state rankings on the ease of doing business, or as places to start a business. For example, WalletHub used a variety of statistics to rank states as places to start a business (**Table C.13**).³¹ Although California ranked eighth overall, it lagged behind states such as Texas and Georgia that are

making strong efforts to attract firms. It is notable that California ranked forty-seventh in business costs. In addition, below are three other related publications regarding California's business climate.

- A ranking by USA Today placed California 15th among the best states in which to do business.³²
- Similarly, a 2018 CNBC poll placed California 25th among "America's Top States for Business".³³ California was ranked:
 - 12th on workforce
 - 24th on infrastructure
 - 48th on the cost of doing business
 - 11th on the economy
 - 21st on quality of life
 - 1st on technology
- A 2009 study by the Public Policy Institute of California compared multiple rankings and found that California typically ranks highly on productivity, but poorly in terms of taxes and costs (**Figure C.5**).^{34, 35}

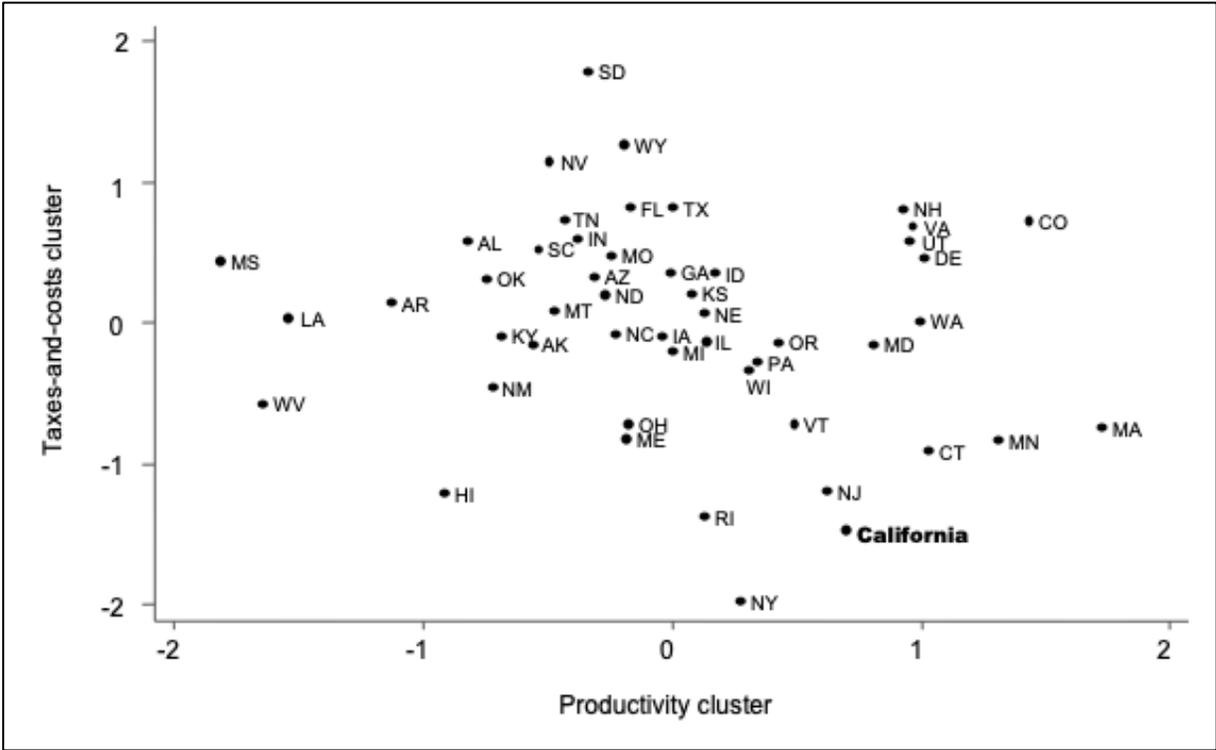
Table C.13. WalletHub Ranking of Best States to Start a Business

Overall Rank (1=best)	State	Total Score	"Business Environment" Rank	"Access to Resources" Rank	"Business Costs" Rank
1	Texas	61.05	1	11	30
2	Utah	60.95	7	2	26
3	Georgia	58.12	5	17	13
4	North Dakota	57.68	2	19	32
5	Oklahoma	57.58	8	36	1
6	Florida	56.75	4	20	21
7	Arizona	54.39	9	12	29
8	California	54.30	3	3	46
9	Montana	53.71	11	30	8
10	Colorado	52.67	6	18	34

Source: WalletHub, 2019

California is viewed by some sources as a magnet for high-tech research and product development, with superlative access to venture capital and expertise. These advantages, however, do not translate well for a wholesaler seeking to build a distribution center.

Figure C.5. California's Business Climate Rankings



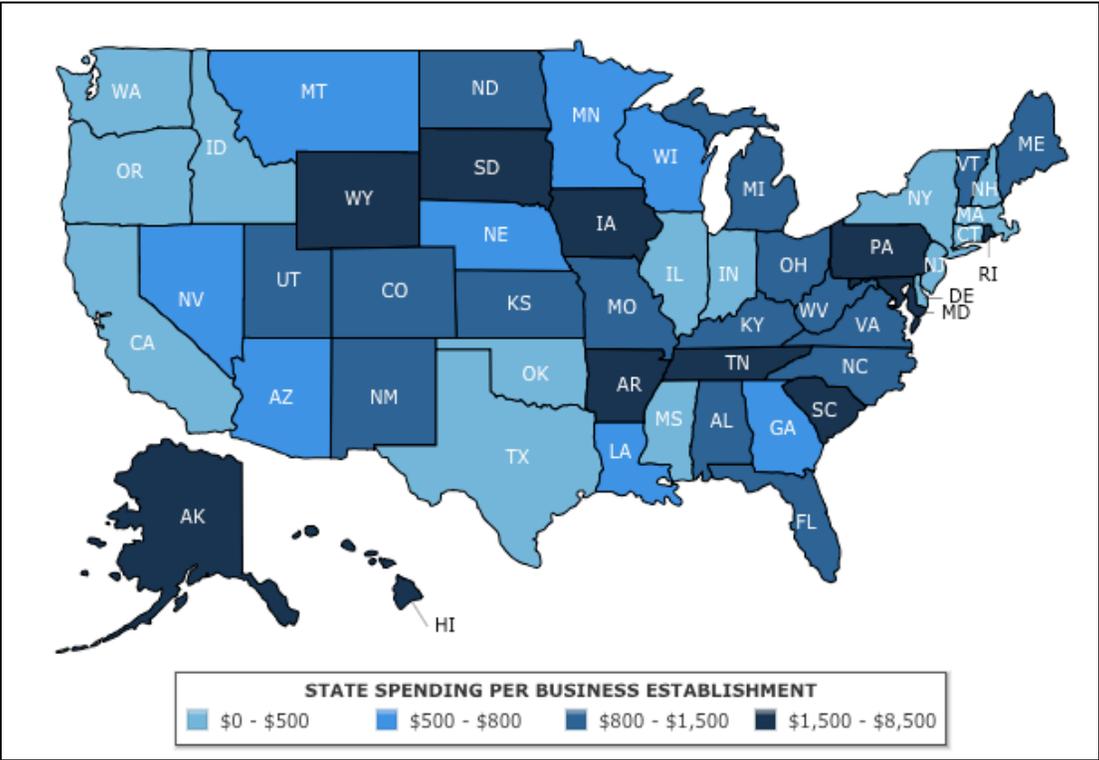
Source: Public Policy Institute of California, 2009

Competitive Economic Development Efforts

Industry outreach efforts have revealed deep concerns over California’s economic development efforts and the linkage of those efforts to goods movement, logistics, and freight transportation infrastructure.

Figure C.6 shows relative state spending on economic development and related functions, such as work force development, in Fiscal Year 2016, as compiled by the Council for Community and Economic Research. California ranked 48th among the 50 states.³⁶ As calculated by the Council for Community and Economic Research, the State spent only \$173 per business establishment on economic development programs in Fiscal Year 2016. The only states that spent less were Massachusetts and Connecticut. **Table C.14** compares California’s spending in Fiscal Year 2016 with major competing states.³⁷ The spending by the Southeast states is noteworthy and paralleled with strong economic development in that region.

Figure C.6. State Economic Development Spending, Fiscal 2016



Source: The Council for Community and Economic Research, 2016

Table C.14. State Economic Development Spending

State	Fiscal 2016 Spending per Business
California	\$ 173
Texas	\$ 237
Arizona	\$ 532
Nevada	\$ 696
Georgia	\$ 758
North Carolina	\$ 988
Alabama	\$ 988
Utah	\$ 1,097
Florida	\$ 1,113
South Carolina	\$ 1,753

Source: Council for Community and Economic Research, 2016

Conventional vs. Logistics-Based Economic Development

While conventional economic development practices and tools are widely known and used, logistics-based economic development efforts use slightly different tools and have different targets. Rather than seeking new corporate headquarters or manufacturing developments based on local cost advantages, logistics-based development expands the market to include transportation, distribution, and logistics facilities on the basis of supply chain efficiency. **Table C.16** highlights the differences between the two types of development.³⁸

Table C.16. Economic development and logistics-based development comparison

Economic Development	Logistics-Based Development
Goal: Attract beneficial businesses and organizations to the region.	Goal: Attract logistics-based businesses to the region.
Message: The region is an attractive, low-cost, and high-yield place to do business.	Message: The region/site offers specific logistical advantages (besides its general business advantages).
Anchor Tenants: Any business, but often manufacturers.	Anchor Tenants: Distribution centers, carrier facilities.
Issues and tools:	Issues and tools:
Location assistance	Freight transportation infrastructure (truck, rail, water, air)
Zoning and permitting	
Telecom & utilities	Location on trade lanes and corridors
Labor pool	Role in supply chains
Marketing assistance	Freight carrier participation
Financial assistance	Regional & national market access
Cost of doing business	Cost of logistics
Local business climate	Local receptivity to freight & logistics
Source: Tioga Group	

Conventional Economic Development

Economic development agencies typically have responsibility for attracting a wide range of desirable businesses and other organizations to the region. The target organizations and businesses can range from a franchise restaurant to a department store or an auto manufacturer. The basic message of economic development agencies is, “Our region is an attractive place for your organization.” For businesses, the message tends to emphasize low capital and operating costs, a high-yield market, and various financial incentives. For headquarters offices, the agency is more likely to emphasize the quality of life and cultural advantages. In seeking an “anchor tenant” for a large development, an economic development agency is likely to seek a manufacturer, hotel, department store, or office building as appropriate. Economic development agencies will address transportation issues but tend to emphasize passenger transportation and access to regional markets.

Logistics-based Economic Development

By focusing on the freight transportation and logistics advantages of a candidate site, logistics-based developers bring additional tools and leverage to bear on location decisions. The Alliance Texas development, for example, is one of the earliest and best-known logistics-based developments. A critical distinction is that logistics-based advantages can complement and strengthen the basic attractions of a city, region or site, but cannot override the poor location. Logistics-based development is much more likely to succeed with the involvement of a specialized master developer, such as CenterPoint Properties (Joliet) or the Hillwood Group (Alliance Texas, Alliance California). Another key factor in successful logistics development is willing long-term commitments from trucking companies, ports, railroads, air cargo operators, or other carriers. The difference between logistics-based development and market-based development is illustrated by the emergence of trade and transportation corridors as DC candidates. DCs used to be located to serve a given local or regional market at the least cost, usually by locating them at or near the center of the market. A category of DCs is emerging, however, and is intended for forwarding distribution of transloaded or sorted goods to more distant points in a corridor. The two Wal-Mart DCs at Joliet, for example, are intended primarily to receive import loads from the Pacific Northwest and distribute sorted goods to points in Chicago and eastward.

Canada's Asia-Pacific Gateway Initiative

Canada launched the Asia-Pacific Gateway initiative in 2006, and the program is on-going:

The primary objective of the Asia-Pacific Gateway and Corridor Transportation Infrastructure Fund is to address capacity challenges facing Canada's Asia-Pacific Gateway and Corridor transportation system. The Asia-Pacific Gateway and Corridor Transportation Infrastructure Fund provides funding for strategic infrastructure projects in British Columbia, Alberta, Saskatchewan, and Manitoba that enhance the competitiveness, efficiency, and capacity of Canada's multimodal transportation network focused on international commerce with the Asia-Pacific region.

The Asia-Pacific Gateway and Corridor Transportation Infrastructure Fund transfer payment program will result in the completion and advancement of strategic transportation infrastructure projects that contribute to the objectives of the Asia-Pacific Gateway and Corridor Initiative, including addressing bottlenecks, capacity constraints and other impediments to the flow of trade.³⁹

Expenditures were \$18.5 million in the Fiscal Year 2016–2017 and are planned for \$32.6 million in the Fiscal Year 2017–2018.

In November 2018, Canada announced that it would invest \$16.7 million in transportation infrastructure to improve the competitiveness of the Port of Prince Rupert. Fairview Terminal at Prince Rupert handles only discretionary rail intermodal cargo. As **Figure C.7** shows, Prince Rupert is connected to U.S. Midwestern and Eastern markets by rail.⁴⁰

Figure C.7. Prince Rupert Rail Connections

Source: Port of Prince Rupert

Prince Rupert has already attracted substantial cargo away from Southern California ports, and intends to attract more:

“Chicago remains the top destination for import containers from Asia,” said Brian Friesen, Prince Rupert’s director of trade development. “Toronto and Montreal are up there as is Memphis, a destination that has seen a lot of growth in the past few years. We are also seeing growth in Detroit and the Ohio valley. Much of that is driven by auto parts. On the way out, we are seeing agricultural products from the Midwest coming to Prince Rupert via the CN network which are then shipped to overseas markets.”⁴¹

A key strength of the Asia-Pacific Gateway Initiative is its flexibility:

The targeted recipients are provinces and territories, including provincial and territorially-owned transportation entities; municipalities, including municipally-owned transportation entities; public sector organizations, including transit agencies, commissions and boards but excluding federal Crown corporations; not-for-profit organizations; and, industry-related organizations, including for-profit organizations and Canada Port Authorities (subject to Canada Marine Act amendments).⁴² Funds have been used to support workforce programs as well as improving infrastructure.

From the freight industry’s perspective, the construction of some major California network improvements requires a long lead time that needs to be accounted for. The I-710 Corridor

project, for example, has been in progress for over 15 years with no tangible capacity improvements.

Implications for Competitiveness and Potential Improvements

Competitiveness is a matter of degree rather than a dichotomy. California's competitiveness varies depending on the type of decision being made, the industry sector and products involved, and the location within California. California is highly competitive in sectors where its resources, products, markets, and capabilities are difficult to match elsewhere. Examples include unique agricultural products and high-technology research and development. Freight mobility is a minor factor in those sectors. California is much less competitive for businesses or functions that can be readily located elsewhere and that are vulnerable to high transportation, labor, land, or utility costs. Distribution is one such sector, and distribution centers that do not need to be near California markets or ports are increasingly likely to locate elsewhere. Freight mobility is a significant factor in such sectors.

Some of the perceived losses of economic activity and market share are resultant of exogenous logistics developments and strategies. Wider Panama Canal locks have reduced the cost of shipping from Asia to the East Coast versus the West Coast, and port market shares have shifted in response. As import volumes grow and import supply chains mature, importers have established multiple import routes and facilities, again reducing California's market share.

Many of the factors in state competitiveness are beyond the direct control of state government or state planning. Issues such as housing availability, cost of living, and market geography are driven by major long-term demographic and economic trends. While state government efforts may be warranted to blunt the most dramatic impacts on groups or industries at risk, the CFMP will not be able to reverse those demographic and economic trends. Workforce training is one area in which California can actively increase competitiveness.

Goods Movement Initiatives

The measures and initiatives that can improve California's competitiveness through increased capacity, reliability, and efficiency are the same as those that can improve performance for California's own needs:

- **Highway capacity:** Congestion in urban areas and on rural highways is the most frequently cited factor in poor California goods movement performance, and in freight transportation's impact on competitiveness. The standard tools of bottleneck relief and capacity increase may be augmented by effective IT solutions if and when they emerge.
- **Seaport Capacity:** California's ports, particularly the major container ports, have regularly added to their capacity and increased their productivity with relatively little state involvement. Unlike in most competing states, they are not state agencies. Yet if California wishes to compete more vigorously with other states, there may be a need for greater state support.

Economic Development Programs

California may need to link port and state economic development efforts and fund them at competitive levels to meeting competitive challenges from other states. Beyond the issues of transportation and development costs, California has not kept pace with logistics-based, transportation-linked economic development initiatives in competing states and nations, as in the case of Canada. The Ports of Georgia, Virginia, South Carolina, and Houston are state agencies and have been highly effective in attracting cargo growth and regional economic development. As local entities, California’s ports lack statewide development responsibility and statewide development resources.

Local and regional economic development agencies can play an effective role in facilitating industrial and commercial development. There may be room to augment their traditional tools of tax concessions, site location and preparation help, etc. There can be a downside when inter-jurisdictional competition for development leads to concessions with adverse long-term impacts, such as allowing higher floor area ratings (FARs) that relegate truck parking to public streets.

Business Climate

Competitiveness is a matter of perception as well as reality, and – compared to other states – California is perceived to have little interest in attracting or keeping business. Businesses making location, production, distribution, and routing decisions compare costs and other tangible factors. Yet, they also hold their own perceptions of indifference or even hostility from communities, and of the difficulty of locating and operating in California, as external sources and studies affirm. Changing these perceptions may require significant “public relations” efforts linked to economic development programs.

Environmental and Building Regulations

As part of the State’s efforts to improve freight mobility and competitiveness, the State may wish to examine environmental and other regulations, and the processes governing commercial and industrial development, to see if they can be streamlined without compromising their goals or effectiveness. While the rules and processes may be formulated by the State, they are implemented at the local level, and it is frequently at the local level where delays and uncertainty appear.

The cost, time, and uncertainty of developing or expanding facilities in California are primarily local or regional issues rather than a state government issue. Many local communities are legitimately concerned with the growth of transportation and distribution activity. Localities typically welcome the potential employment and expansion of the local tax base, but those benefits can be offset by unintended environmental impacts, like new traffic, emissions, and noise. Businesses attempting to build facilities may be met with open arms in other states’ communities while it may perceive or experience organized community opposition in California. One major California-based industrial development company reported that visits from governors of other states encourage projects there, in contrast to a perceived indifference or hostility to projects within California.

Regulatory Stability and Predictability

Many stakeholders expressed concerns over what they see as frequent and unpredictable changes in California's regulations, specifically environmental regulations. Stakeholders in this and other studies have cited progressively restrictive clean air action plans by the CARB and the San Pedro Bay ports, which stakeholders claim have made some previous compliance investments obsolete. Here, too, the issue may be as much perception as reality, but the effect on competitiveness is the same. The State may wish to consider changes in regulations less often or communicate the nature and need for change more clearly to industry (although industry bears some responsibility for following and understanding the regulatory process).

Trade-offs

There is an implicit balance between economic development and environmental objectives in California's policies and funding choices. The tradeoff between environmental quality and economic growth is difficult to negotiate. In enforcing and strengthening California Environmental Quality Act (CEQA) requirements, CARB regulations, and other related measures, the State and its communities have made an implicit choice to accept the costs of a better environment. Those costs necessarily diminish California's short-term economic competitiveness with less restrictive locations but produce a better quality of life for Californians. That quality of life must be balanced against the need for employment and earnings security with California's high cost of living. California has many areas of high poverty, which are often very areas with environmental justice issues from nearby transportation activity.

California is not alone in environmental concerns. Federal emissions standards lag behind California's but have moved in the same direction. Congested urban areas throughout the country face emissions issues and will need to act. Other port areas now require clean trucks, and more will likely follow. In this regard, some of California's higher costs may be regarded as only near-term competitive disadvantages that may be reduced in the long run.

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- ⁵ American Association of Port Authorities
- ⁶ American Association of Port Authorities
- ⁷ Using four import ports, such as Los Angeles, Seattle, Savannah, and New York-New Jersey
- ⁸ Using three import ports, such as Los Angeles, Savannah, and New York-New Jersey
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- ²⁵ Online search result from <http://www.gaspricewatch.com/CA-california/cities/gas-prices/1.htm>
- ²⁶ Figures copied from the Boyd report should be replaced by fresh versions for the final report.
- ²⁷ The Boyd Company, Inc. “*Comparative Distribution Warehousing Costs in Port and Intermodal-Proximate Cities*,” 2015.

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Appendix D. National Highway Freight Network Mileage

Table D.1. California Primary Highway Freight System (PHFS) Route¹

Route	Start Point	End Point	Length (Miles)
Dillon Rd	SR 86	I-10	1.51
Figueroa St	CA30P	I-110	0.17
I-10	I-405	I-5	13.03
I-10	I-710	CA/AZ Line	221.71
I-105	CA3A	I-605	17.39
I-110	SR 47	I-10	20.50
I-15	I-8	CA/NV Line	288.47
I-205	I-580	I-5	12.96
I-210	I-5	I-10	48.79
I-215	I-15	SR 30	46.25
I-238	I-880	I-580	2.16
I-305	CA34P	I-80	0.81
I-305	I-5	SR 99	2.14
I-40	I-15	CA/AZ Line	154.75
I-405	I-5	I-5	72.52
I-5	CA37P	I-8	3.21
I-5	I-805	CA/OR Line	772.38
I-580	U.S. 101	I-80	13.33
I-580	I-238	I-205	30.60
I-605	I-405	I-210	27.46
I-680	U.S. 101	I-580	29.59
I-710	CA29P	I-10	20.55
I-780	CA40P	I-80	6.62
I-8	I-5	0.17 Miles East of SR 67	15.92
I-8	SR 111	SR 7	7.14
I-80	U.S. 101	CA/NV Line	203.67
I-805	SR 905	I-5	26.67
I-880	U.S. 101	I-80	41.78
Miramar	I-805	I-15	5.15
SR 111	I-8	SR 78	14.32
SR 118	I-405	8.19 Miles West of I-405	8.19
SR 120	I-5	SR 99	6.34
SR 134	I-5	2.39 Miles East of I-5	2.39
SR 14	I-5	23.45 Miles Northeast of I-5	23.45