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Domestic Shipping with Portunus

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Background

The Jones Act
The Merchant Marine Act of 1920, commonly known as the Jones Act for its author Senator Wesley Jones, addresses cabotage in American shipping. Cabotage laws cover shipping between two domestic ports by a foreign company. There are four main requirements of the act that apply to ships engaging in commerce between two US ports.

1. Ship must be US-flagged
2. Ship must have been constructed at an American shipyard
3. The ship must be owned primarily by citizens of the United States
4. The crew must consist primarily of U.S. citizens or permanent residents

The Jones Act is critical for the project because it will govern the ships that can operate on the routes between the new Portunus port and the current ports on land.

Jones Act Debates
The Jones Act is a protectionist act that helps US shipyards and shippers at the expense of American consumers. The requirements of US built and crewed ships raise the costs of doing business. These increased costs are passed on consumers in the form of higher prices. For example, building ships in American shipyards costs four times as much as building ships in Asian shipyards.[1] However, the act continues to receive bipartisan support due to the high-quality, good-paying jobs it provides American workers and helps maintain high ship building standards needed for national defense. The act also helps retain a strong merchant marine fleet that can be called upon in times of war to serve as an auxiliary military force. For these reasons having a vibrant shipping fleet and qualified personnel remains essential for American security.

The Jones Act Fleet
Today there are 39,773 ships in the Jones Act fleet, meaning they meet the four requirements of the Jones Act addressed above. The vast majority of these ships are tugs and barges that conduct service on the inland waterways and along the American coasts. There are currently eighty-six oceangoing, self-propelled vessels with deadweight tonnages of over 1,000 gross tons.[2] This group consists of tankers, dry bulk, general cargo, and roll-on roll-off (RoRo) ships, as well twenty-two containerships. These twenty-two containerships operate in the open-ocean trades between the continental United States and Alaska, Hawaii, or Puerto Rico. Many of these ships are nearing the end of service years, as ten of the containerships are over thirty-five years of age. New vessels will be needed in the near future, making this an opportune time for Portunus to take risks to change the shipping industry.

Trends in Shipping
The biggest trend in the open-ocean shipping industry today is the rapidly increasing size of the largest containerships. In 2000, the largest containerships were capable of handling about 8,000 twenty-foot equivalent unit containers (TEU). Now the average size of trade on the longest routes from East Asia to Europe is 10,000 TEUs and the largest ship is the

MSC Oscar with a capacity of over 19,200 TEUs.[3] The effects of these larger ships carry over to other routes because of the "cascade effect" whereby the "old" largest ships will move down the next longest routes and this trend continues down to smaller and smaller ports. As a result the size of ships on all routes is expected to increase in the future.

In addition, an expansion for the Panama Canal will be opening up within the next year. The current canal can only handle ships up to 4400 TEUs. However, the new maximum ship size (Panamax) for the canal will be approximately 12,500 TEUs. This could lead to a shift in the US shipping industry. Currently most ships drop their cargo at large West Coast ports and then goods are carried by truck and rail across the country to their destinations on the East Coast. The new canal will make it more economically viable to ship directly to the East Coast. There are disagreements over what the effects of the new canal will have in terms of market share. However, at least some of the traffic West Coast ports currently enjoy will shift to East Coast ports.

Shipping Options in the United States

There are four main options for getting goods from point A to B: air, maritime, rail, and truck. Shipping by air is very expensive and thus the other three options are typically used for shipping in bulk. Maritime shipping in the United States is centered at the ports on the coasts, but can also take advantage of the navigable waterways of the Mississippi and Ohio River system to ship to inland cities. It is the cheapest per ton of cargo and the most environmentally friendly form of transportation, but it is also the slowest method of transport. Rail shipping is faster than maritime shipping but is more expensive per unit of cargo. It provides a way to get freight from West Coast ports to the Midwest and East Coast quickly and fairly cheaply. Finally, trucking is almost always necessary in some form to get cargo from a rail yard or port to its final destination. However, this form is very costly both monetarily and environmentally.

Cost Factors

Cost Factors Involved in Determining Route Schedules

A paper by two Greek economists called "Some Key Variables Affecting Liner Shipping Costs" addresses keys issues shippers face in determining how to minimize their costs.[4] They identify six cost factors liner-shipping companies must take into account when planning their routes. These are service schedules, shipping costs, port charges, container operations costs, container costs, and administration costs. My research focused on two of these, specifically service schedules and port charges.

Case Study on Southern California Ports

To try to understand how the project might affect cost factors for companies (and in turn routing decisions), I analyzed the effects I believe Portunus will have on shipping in Southern California. I focused on five ports in my analysis: (1) Port of Los Angeles, (2) Port of Long Beach, (3) Port of San Diego, (4) Port of Hueneme, (5) Port of Oakland. Four of these ports are located in Southern California, and I included the Port of Oakland

as well in order to try to understand how I think shipping traffic might change in the larger sense. Below are basic descriptions about the business of each port.

Port of Los Angeles

The Port of Los Angeles is located approximately 20 miles south of downtown Los Angeles. It is the busiest port in the United States and in 2014 handled 8.3 million TEUs of containerized cargo traffic. The port's container cargo facilities include nine terminals with a fifty-foot draft as well as four dockside rail yards that connect the Port with rail hubs in downtown Los Angeles to support the intermodal connections. The port has experienced a growth in traffic from a little over two million containers in 1990 to 8.3 million containers in 2014. The service schedule at the port in 2012 included a total of 1,418 containership calls and these handled 8.1 million TEUs of cargo. Thus on average there were 27.27 calls per week and the average vessel called the port with 5,712 TEUs on board.[5]

Port of Long Beach

The Port of Long Beach is located adjacent to the Port of Los Angeles three miles from downtown Long Beach and approximately twenty-five miles from downtown Los Angeles. It is the second-busiest container port in the United States and handled 6.8 million TEUs of cargo in 2014. The port's facility includes six container terminals with a fifty-foot draft. Container traffic has grown from just under three million TEUs in 1995 to just under seven million TEUs in 2014. In 2012 the Port handled 1,009 containership calls with 6.05 million TEUs of cargo on-board. Thus in an average week 19.40 ships called the port with an average of 5,996 TEUs on board each vessel.[6]

Port of San Diego

The Port of San Diego consists of two terminals with a forty-two foot draft near the city's downtown. In 2011 it was the twenty-eighth busiest container port in the United States, and in 2014 it handled approximately 55,500 TEUs of cargo. The primary trade the port is involved in is actually automobile and refrigerated cargo imports (specifically bananas), and it also maintains a large passenger cruise service terminal. The port intermodal connections available include on-yard rail services as well as close proximity to three major interstate highways. The port has handled roughly 50,000 TEUs every year since 2003. In 2012 the port handled fifty containership calls, a little less than one per week, and in those calls handled 53,629 TEUs of cargo for an average vessel size per call of 1,073 TEUs.[7]

Port of Hueneme

The Port of Hueneme is located approximately sixty miles west of downtown Los Angeles in Oxnard. It is the only deep-water port between Los Angeles and the Bay Area. In 2014 it handled approximately 54,000 TEUs. It was the thirty-sixth busiest container port in the United States back in 2011. The facilities at the port include one terminal with six berths, each of which has a draft of thirty-five feet and future drafts of forty feet after a dredging project is completed. It has highway connections to connect it to rail yards in addition to nearby interstate routes. The port experienced significant growth between 1997 and 2014, as trade grew from around 5,000 TEUs up to 54,000 TEUs. In 2012 the

port handled eighty-eight containership calls for an average of 1.69 calls per week, and handled 53,288 TEUs for an average of 606 TEUs per call.[8]

Port of Oakland

The Port of Oakland is located along the San Francisco Bay near downtown Oakland. It is the fifth-busiest container port in the United States and in 2014 handled 2.4 million TEUs of container cargo. Its facilities include five terminals with a fifty-foot draft and two dockside rail yards for intermodal connections. It has seen steady growth from a little over one million containers in 1990 to about 2.5 million containers today. In 2012 the port handled 453 containership calls carrying 2.34 million TEUs, for an average of 8.71 calls per week with each vessel averaging 5,171 TEUs per call.[9]

Port Charges

The charges below are provided by each of the ports in the tariffs on their website except for Oakland's pilotage fees which were found on the San Francisco Bar Pilots Website.[10] Pilotage costs are normally based on some combination of the length of the ship as well as the tonnage of the ship. Dockage costs are typically a fixed fee based on the length of the ship (and thus how much dock space it takes up). Wharfage costs were typically given by container, and I calculated the wharfage costs for a ship by taking its TEU capacity, dividing by two to get the forty-foot equivalent capacity (FEU), and then multiplying the FEU capacity by the price of a forty-foot container.

Ships Used

Ship	TEU Capacity	Length (ft./m)	Draft(ft.)
Crowley El Conquistador	796	580/177	12
Matson Maunalei	2500	681/208	34
Matson Mahimahi	2824	860/262	35
Panamax Vessel	4400	965/294	39.5

The three ships mentioned by name are all currently involved in Jones Act trades. The El Conquistador is a part of the fleet that conducts Crowley's Puerto Rico services, while Matson's Maunalei and Mahimahi are both involved on the Hawaiian service routes. Finally, the generic Panamax vessel is included to give a sense of larger ships that could be built to service these routes.

Los Angeles

Pilotage

Ship	Cost ($)
El Conquistador	983.72
Maunalei	1,372.10
Mahimahi	1,824.52
Panamax	2,153.00

Dockage

Ship	**Cost ($)**
El Conquistador	2,046.00
Maunalei	2,923.00
Mahimahi	5,137.00
Panamax	6,472.00

Wharfage by Container

Container Size	**Cost ($)**
20 ft. container	193.20
40 ft. container	388.40

Wharfage by Ship

Ship	**Cost ($)**
El Conquistador	153,787.20
Maunalei	483,000.00
Mahimahi	540,960.00
Panamax	854,480.00

Other Information

Free Time	5 days
Wharf Demurrage	$21.83/20 foot container/day $43.66/40 foot container/day
Wharf Storage	$11.04/20 foot container/day $22.07/40 foot container/day

Long Beach

Pilotage

Ship	**Cost ($)**
El Conquistador	1,415.08
Maunalei	1,954.01
Mahimahi	2,609.42
Panamax	3,126.00

Dockage

Ship	**Cost ($)**
El Conquistador	2,016.00
Maunalei	2,882.00
Mahimahi	5,066.00
Panamax	6,379.00

Wharfage by Container

Container Size	**Cost ($)**
20 ft. container	178.00
40 ft. container	327.00

Wharfage by Size

Ship	**Cost ($)**
El Conquistador	130,146.00
Maunalei	408,750.00
Mahimahi	457,800.00
Panamax	719,400.00

Other Information

Free Time	4 days
Wharf Demurrage	$21/20 foot container/day $44/40 foot container/day
Wharf Storage	$12/20 foot container/day $24/40 foot container/day

San Diego

Pilotage

Ship	**Cost ($)**
El Conquistador	1,046.90
Maunalei	1,459.70
Mahimahi	1,939.83
Panamax	2,294.00

Dockage

Ship	**Cost ($)**
El Conquistador	2,145.00
Maunalei	3,065.00
Mahimahi	5,386.00
Panamax	6,786.00

Wharfage by Container

Container Size	**Cost ($)**
20 ft. container	163.52
40 ft. container	280.33

Wharfage by Ship

Ship	**Cost ($)**
El Conquistador	111,571.34
Maunalei	350,412.50
Mahimahi	392,462.00
Panamax	616,726.00

Other Information

Free Time	7 days
Wharf Demurrage	$6.61/20 foot container/day $13.21/40 foot container/day
Wharf Storage	$0.79/20 foot container/day $1.53/40 foot container/day

Hueneme

The Port of Hueneme has a maximum berth length of 800 feet and thus the Mahimahi and Panamax are not able to call at Hueneme. Besides the length, the Panamax vessel has a draft of 39.5 feet that exceeds the port's maximum of 35 feet.

Pilotage

Ship	**Cost ($)**
El Conquistador	898.00
Maunalei	1,351.00
Mahimahi	N/A
Panamax	N/A

Dockage

Ship	**Cost ($)**
El Conquistador	1,962.35
Maunalei	2,803.00
Mahimahi	N/A
Panamax	N/A

Wharfage by Container

Container Size	**Cost ($)**
20 ft. container	164.93
40 ft. container	315.32

Wharfage by Size

Ship	**Cost ($)**
El Conquistador	125,497.36
Maunalei	394,150.00
Mahimahi	N/A
Panamax	N/A

Other Information

Free Time	5 days
Wharf Demurrage	$1.62/kT/day (kilotons per day)
Wharf Storage	$0.35/kT/day

Oakland

Pilotage

Ship	**Cost ($)**
El Conquistador	3,358.01
Maunalei	3,352.77
Mahimahi	5,300.66
Panamax	9,894.87

Dockage

Ship	**Cost ($)**
El Conquistador	2,148.00
Maunalei	3,070.00
Mahimahi	5,397.00
Panamax	6,799.00

Wharfage by Container

Container Size	**Cost ($)**
20 ft. container	83.00
40 ft. container	166.00

Wharfage by Ship

Ship	**Cost ($)**
El Conquistador	66,068.00
Maunalei	207,500.00
Mahimahi	232,400.00
Panamax	365,200.00

Other Information

Free Time	5 days
Wharf Demurrage	$19/20 foot container/day $34/40 foot container/day
Wharf Storage	$9.50/20 foot container/day $15/40 foot container/day

Total Costs by Port

	Los Angeles	Long Beach	San Diego	Hueneme	Oakland
El Conquistador	156,816.92	133,577.08	114,763.24	128,357.71	71,574.01
Maunalei	487,295.10	413,586.01	354,937.20	398,304.00	213,922.77
Mahimahi	547,921.52	465,475.42	399,787.83	N/A	243,097.66
Panamax	863,105.00	728,905.00	625,806.00	N/A	381,893.87

To calculate the total costs, I simply added up the pilotage, dockage, and wharfage by ship fees for each of the ships at each of the ports. The biggest surprise was how much cheaper the Port of Oakland at about half the price of any of the Southern California

ports. The major reason for this was wharfage fees. The per unit wharfage cost of cargo at Oakland was much cheaper and this is reflected in the prices.

Economics and Expectations

Substitutability

One of the main issues involved in the economics is the substitutability of one port for another. The possibility of switching can increase competition among ports. The main place that this could have effects is on the prices at Los Angeles and Long Beach. Currently these two have a very large market share and there are not many alternatives to their use. The only existing competition for them in California is the Port of Oakland, and they have superior intermodal connections and are still the best ports to call when sending cargo from Asia. In addition it would be very difficult for any existing port to enter the transshipment market they dominate. San Diego and Hueneme have recognized this and instead focus on smaller shipments that are destined primarily for local markets. The ports of Los Angeles and Long Beach have used this dominance of the market to make more money than they would in truly competitive market. This is reflected in the prices above, as they are the two most expensive ports to call.

Issues of Supply

The current composition of port's businesses is a good way to see what relative advantages they maintain and also the current profits for each service. An economic analysis of this will focus on the marginal rate of substitution, or the tradeoff between two goods. A fundamental concept in economics is that if one service becomes more profitable, then the marginal rate of substitution will change and there will be a shift away from the now relatively less profitable good to the relatively more profitable good. If profits for container shipping change as expected under Portunus, this could cause some of the smaller ports to change their business models and place a greater emphasis on container shipping. An example of this would be at the Port of San Diego, where a more profitable container industry may lead to a shift from automobile imports to container imports for example. In this way you will see smaller ports providing greater support for container shipping than they do at the present time.

Expectations

I have three main expectations for Southern California ports if Portunus come to reality. The first is that I expect container traffic to shift towards meeting local traffic at smaller ports such as San Diego and Hueneme as well as ports in Northern California that better serve the Bay Area. The reason that current traffic goes through Los Angeles and Long Beach in greater numbers than the other ports is that Los Angeles and Long Beach serve as the transshipment hubs that can handle cargo coming in from overseas because of their facilities. However, with Portunus the transshipment role will be carried out by the port out at sea, and thus serve as the hub in a hub-and-spoke distribution model that will place greater emphasis on using local ports. Based on the calculations I have one, these ports will provide cheaper dockings, make it quicker and less expensive to get cargo to the

final destination, and will also result in positive environmental externalities by removing some of the trucking currently required in the shipping industry.

However, I believe that Los Angeles and Long Beach will retain major roles in the American shipping industry. They will remain the ports of call for cargo moving further inland because their infrastructure is far better than that of the smaller ports. The large barriers of entry will result in few companies undergoing major development projects to try to win this trade, and so Los Angeles and Long Beach will retain those advantages. A lower percentage of cargo coming through Asia will go through these ports when the Panama Canal is finished, but they will still retain a significant amount of this trade due to the time it takes to make the all-water journey to the East Coast. In addition, they retain the geographic advantage of being the ports which can best serve the Los Angeles metropolitan area and its population of somewhere between twelve and twenty million people depending on the area covered.

Finally, in terms of routing schedules I expect smaller ships with more frequent services because of the short lengths of routes these ships will be undertaking. Larger ships cost effective over longer distances, but all Portunus shipping will be done over fairly short distances. Since the ocean voyages will be so short I believe the diseconomies of scale at port will overwhelm the economies of scale at sea and so smaller ships will be more efficient for the Portunus trade. I believe the largest ships will be used between the expected Portunus port in Southern California and the ports in the Northern California because of the greater distance involved in that trade. This will provide shippers with greater economies of scale because of the length of the sea journey and thus make the larger ships more valuable on this route than they would be servicing the ports in Southern California.

Possibilities for Further Research

As I conducted my research I had a few topics that I would have hoped to cover which may be valuable in the future. One of these concerns the case study I began and goes into greater depth as to the effects Portunus would have on the local shipping conditions in Southern California. During the course of my research I read an interesting paper entitled "Transportation Cost Equivalence Line: East Coast vs. West Coast Ports" written by a team at CBRE.[11] They look at the cost equivalencies for shipping to the West Coast and then using rail transit to ship cross-country versus shipping straight to East Coast ports. I would like to use this idea and apply it to Southern California to determine the current cost equivalencies locally and how Portunus will change the cost equivalency line for local shipping.

Another thing that I think would be important to look at would be how Portunus will change the routing schedules of the international liner shipping companies. The expectation among some people is that they will increase the size of the ships on their routes to that seen on the East Asia-Europe routes, but I am not sure that is the case. This would involve looking at open-ocean shipping and the economics governing liner-shipping schedules in greater detail.

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