The National Impact of a West Coast Port Stoppage

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The National Impact of a West Coast Port Stoppage[1] Executive Summary

Trade operations at all seaports along the U.S. West Coast face a summer of uncertainty. On June 30, the current labor contract between the International Longshore and Warehouse Union (ILWU) and its employer group, the Pacific Maritime Association (PMA), will expire. A protracted dispute between the negotiating parties could lead to reduced or shuttered terminal operations for an extended period. If such disruptions occur, the economic impact would be significant and widespread according to a new economic analysis of West Coast ports commissioned by the National Association of Manufacturers (NAM) and the National Retail Federation (NRF). The last major port disruption due to a contract negotiation was the 2002 10-day West Coast ports lockout, which cost the U.S. economy several billion dollars and took months to recover.

West Coast ports are a critical artery of the nation's transportation infrastructure and essential for the seamless flow of imports and exports—cargo moving through West Coast ports represents an economic value of 12.5 percent of U.S. GDP.[2]

The NAM and NRF asked economists from Inforum to quantify the macroeconomic consequences of a West Coast ports closure, considering various durations of time. The Inforum analysis uses the LIFT economic model[3] and breaks down the impact on U.S. employment, output and income if port operations cease for 5, 10 or 20 days at 30 West Coast ports along the continental United States (Alaska and Hawaii not included).

Table 1: Summary of the National Impact of a West Coast Port Stoppage*

	5 Days	10 Days	20 Days
Employment Disruption	73,000 jobs	169,000 jobs	405,000 jobs
Reduced Economic Output (Measured by Loss to GDP)	$9.4 billion (0.05% of GDP)	$21.2 billion (0.12% of GDP)	$49.9 billion (0.29% of GDP)
Loss of Household Purchasing Power	$81 per household	$170 per household	$366 per household
Loss of Exports	$1.5 billion	$3.2 billion	$6.9 billion
Loss of Imports	$1.8 billion	$3.9 billion	$8.3 billion
Daily Cost of West Coast Port Disruption to U.S. Economy (Measured by Loss to GDP)	$1.9 billion	$2.1 billion	$2.5 billion

*All dollar figures are in 2013 dollars and refer to 2014 and are model impacts compared to a baseline economic forecast that assumes no port disruptions.

[1] This research was conducted by Inforum at the University of Maryland with the support of the National Association of Manufacturers and the National Retail Federation. The principal author was Inforum Executive Director Jeffrey Werling. Questions may be directed to **werling@econ.umd.edu** or (301) 405-4607. More information about Inforum may be found at **www.inforum.umd.edu**.

[2] Source: Martin Associates, ***Economic Impact and Competitiveness of the West Coast Ports and Factors that Could Threaten Growth***, page 3.

[3] LIFT stands for Long-Term Interindustry Forecasting Tool. LIFT is developed and maintained at the Inforum Research Center at the University of Maryland, College Park.

A widespread interruption of this magnitude would negatively affect economic activity and jobs through three main channels: export loss, import delay and higher costs, and reduced purchasing power for consumers. First, export loss would directly lessen output and employment of exporting industries, and the loss would indirectly reduce activity in their supply chains. Second, the interruption, delay and higher cost for imports would also reduce GDP and employment by throwing sand in the gears of productive activities. An important characteristic of competitive and modern supply chains is the orchestrated and speedy integration of goods, services and information. An interruption to flows within these highly sophisticated supply chains can be particularly costly to manufacturers and retailers, especially as time passes during a protracted dispute. Finally, because consumers would be saddled with higher costs for their products, overall household purchasing power would be diminished.

The chain reaction associated with each of these channels, also known as "knock-on effects," would impact the supply chains of domestic and global manufacturers, retailers, agricultural and food producers and other key industries that rely on and serve ports up and down the West Coast, including, but not limited to, trucking, rail and warehousing. This is of critical concern as retailers prepare for back-to-school and holiday shopping seasons during the summer months.

Manufacturing and retail sectors, in particular, are concerned about a protracted West Coast port disruption because trade losses mount exponentially as a coast-wide port closure drags on through time, increasing the price of inputs, finished products and services. A 20-day port shutdown scenario would lead to a $6.9 billion loss in exports in 2014, and effects would linger into 2015, marking a $1.7 billion loss in export activity. An import disruption during this same 20-day period would cost the economy $8.3 billion in 2014 and an additional $2.0 billion in 2015.

Together, manufacturing and retail industries make up more than 18 percent of the nation's GDP and account for nearly 20 percent of all nonfarm payroll employment in the United States. Given a still-fragile economic recovery and lower-than-expected first-quarter growth, $2 billion or more in daily economic losses during a major West Coast port disruption is not something the U.S. economy can sustain.

Even though a labor agreement is not expected to be reached by the June 30 deadline, the ILWU and PMA must remain at the negotiating table, without engaging in disruptions, because the economic consequences of an intractable and prolonged dispute are too severe to ignore.

Introduction

At the beginning of July 2014, most trade operations of all seaports along the U.S. West Coast could be interrupted if no new agreement or contract extension is reached between the International Longshore and Warehouse Union (ILWU) and the Pacific Maritime Association (PMA). These ports are a critical component of the nation's transportation infrastructure, especially for the flow of exports out of and imports into the country. If operations are shuttered for an extended period, the detrimental economic impact would be significant and widespread.

If export shipments are delayed or disrupted for an extended period, jobs at factories that manufacture such exports would be threatened, even if temporarily. If imports are interrupted, supply chains across the economy might shut down due to the loss of critical inputs, or consumer goods might not make it to store shelves. In any case, the delay and logistics expenses for exports and imports would rise, harming the cost structure of U.S. industries. Moreover, consumers and purchasers of capital equipment would see similar cost increases for imported goods. Ultimately, businesses, consumers and governments would experience a loss of buying power because of lower incomes and higher prices.

This study quantifies the U.S. economic consequences of a closure of 30 West Coast ports over various durations of time and estimates the impact on U.S. employment, output and income if port operations cease for 5, 10 or 20 days. The basic methodology is to make assumptions about how the closures would affect the flow of exports and imports by industry, impose these trade shocks on the Inforum LIFT economic model[4] and then compare the resulting model simulation to a baseline economic projection without the shocks. The results are reported for both macroeconomic and industry-level variables.

[4] LIFT stands for Long-Term Interindustry Forecasting Tool. LIFT is developed and maintained at the Inforum Research Center at the University of Maryland, College Park.

Methodology[5]

The first step of this study is to identify, for each LIFT model trade commodity, the share of total import and export flows expected to come through the affected ports under each disruption scenario. This task is accomplished using U.S. Census annual trade flow data by port and commodity. It is not sufficient to just assume that an interruption of, say, five days entails a proportional trade loss out of annual operations. For any given closure, much of the incoming and outgoing goods that amass around closed ports would ultimately be delivered, albeit at a higher cost and with long delays. However, some products will ultimately be lost in a port disruption, including perishable commodities or retail goods that miss specific sell dates. Also, some trade will be rerouted, moving by air transport or through other seaports, including those of Canada and Mexico.

For each scenario, assumptions are made concerning the possibility of rerouting and the ultimate recovery of delayed trade. These assumptions vary by the classification of trade commodities as low value, high value or perishable. Commodities are distinguished among these categories according to their value per unit traded (i.e., tons, volume) relative to the average trade value per unit. Using rerouting and delay parameters as explained below, we compute the annual "net" disruption as percentages of port capacity for each scenario.

The second step is to place these assumptions into the LIFT model that was calibrated otherwise for a base scenario from 2014 to 2016. We assume a port stoppage starts on July 1, 2014, and we examine three closure cases: 5 days, 10 days and 20 days. The simulated deviations from the baseline case imply the economic impact of each scenario.

The LIFT model is an annual dynamic interindustry macroeconomic tool that provides a general equilibrium (economy-wide) framework with a "bottom-up" accounting of the U.S. economy. It contains a detailed industry (input and output) supply-and-demand structure embedded in the macroeconomic framework of the National Income and Product Accounts. Industry-level shocks work through the model via multiple pathways, such as shortages of consumer goods (e.g., clothing) or the disruption of key supply chain items (e.g., motor vehicle parts). The LIFT model is, therefore, particularly suited to analyze the economic impact of an event that affects industries differently, such as a widespread port stoppage.

Since export quantities and import prices are exogenous in the standard LIFT model, they are the most convenient variables to use as levers to simulate the trade effects of port interruptions. On the export side, the model traces how the direct loss of export volume affects production and employment across the entire supply chain and how those losses reduce overall income and demand. For imports, the model shows how higher delivered prices for various imports raise business costs and consumer prices, thus reducing the purchasing power of both. Increases in operating and capital costs cascade through the economy to reduce competitiveness, real incomes and, ultimately, final demand. To the extent that domestic supply fills in for more expensive imports, the cost-push impact is reduced.

At the outset of port closures, even a mitigated loss of trade flow means that important economic activity would be disrupted, and firms and consumers would face higher costs. These speed bumps can be significant. An important characteristic of competitive and modern

[5] The methodology closely follows that of Inforum's pioneering work on port disruptions described in Congressional Budget Office, ***The Economic Costs of Disruptions in Container Shipments***, 2006. A good description of similar, more recent work can be found in Adam Rose and Dan Wei, *Estimating the Economic Consequences of a Port Shutdown: The Special Role of Resilience*, Economic Systems Research, 25:2, 212–232, 2013.

supply chains is the orchestrated and speedy integration of goods, services and information. Interruption to flows within these supply chains can be particularly costly, especially to manufacturers, retailers and consumers.

Moreover, long delays and rerouting mean that finished consumer goods would be sold at a discount if they miss their important sell dates, such as the start of the school year or the holiday shopping season, leading to lost sales revenue, profits and wages. Even after operation of the ports is fully restored, in the subsequent weeks and months, ports would be dedicated partly to recover delayed trade flows. Therefore, economic effects linger well past the event, including higher supply chain costs, reduced business investment, damage to export relationships and lower consumer income and purchases.

Developing Assumptions for Port Scenarios

Table 2 lists the ports potentially affected by a closure. In 2012, by value, these ports accounted for 10.3 percent of non-energy exports and 22.3 percent of non-energy imports (calculated from U.S. Census Bureau data). Table 3 displays the proportion of total annual trade that flows through the affected ports for each LIFT non-energy commodity class and indicates the value classification for each LIFT sector commodity.

We assume the relative magnitude of trade and price disruptions should be proportional to the share of total exports and imports that normally flow through the affected West Coast ports over various time durations—5, 10 and 20 days—relative to total U.S. annual levels. Moreover, these estimates consider the rerouting of goods and for trade that is delayed but eventually recovered, albeit at a higher cost. Rerouting and recovery parameters vary across commodities, depending on their relative value and perishability.

Table 4 displays these parameters for imports. Table 5 displays the same information for exports.

Table 2: Ports Disrupted

Pacific Northwest: Washington	Pacific Northwest: Oregon/Columbia River	Northern California	Southern California
Aberdeen/Grays Harbor	Astoria	Benicia	Long Beach
Anacortes	Kalama	Crockett	Los Angeles
Bellingham	Longview	Eureka	Port Hueneme
Everett	North Bend/Coos Bay	Oakland	San Diego
Olympia	Portland	Port Chicago	
Port Angeles	Rainier	Redwood City	
Seattle	St. Helens	Richmond	
Tacoma	Vancouver	San Francisco	
		Stockton	
		West Sacramento	

Table 3: Value Share of Total Trade Routed Through Affected Ports by LIFT Trade Commodity (2010–2013 Average Percent Share)

LIFT Trade Commodity	Exports	Value Class	Imports	Value Class
Agriculture, forestry and fishery	34.0	perishable	14.1	perishable
Nonmetallic mining	14.3	high value	5.1	high value
Meat products	39.5	perishable	16.9	perishable
Dairy products	41.5	perishable	11.8	perishable
Canned and frozen foods	41.0	perishable	17.3	perishable
Bakery and cereal mill products	26.3	low value	17.5	low value
Alcohol beverages	18.0	low value	16.9	low value
Other food products	17.0	low value	19.8	low value
Tobacco products	1.5	low value	6.7	low value
Textiles and knitting	4.9	low value	34.7	high value
Apparel and household textiles	4.9	low value	45.7	high value
Paper	9.4	low value	12.5	low value
Printing and publishing	3.5	low value	37.2	low value
Agricultural chemicals	10.6	high value	8.9	high value
Plastics and synthetics	14.5	high value	16.5	high value
Drugs	2.2	high value	3.1	high value
Other chemicals	14.3	high value	11.4	high value
Petroleum refining	7.3	high value	6.3	high value
Rubber products	6.1	low value	40.6	low value
Plastic products	8.5	low value	34.4	low value
Shoes and leather	20.0	low value	61.2	low value
Lumber	24.2	low value	23.1	low value
Furniture	7.1	low value	46.0	low value
Stone, clay and glass	10.5	high value	31.7	low value
Primary ferrous metals	4.5	low value	15.2	high value
Primary nonferrous metals	4.5	low value	8.1	high value
Metal products	7.7	low value	30.5	high value
Engines and turbines	7.0	low value	17.7	high value
Agriculture, construction, mining and oilfield machinery	8.0	high value	16.8	high value
Metalworking machinery	4.6	high value	24.9	high value
Special industry machinery	4.4	high value	46.4	high value
General and miscellaneous industrial machinery	10.8	high value	32.5	high value
Computers	1.4	high value	17.8	high value
Office equipment	1.6	high value	24.1	high value
Service industry machinery	6.5	high value	27.5	high value

Table 3 (Continued): Value Share of Total Trade Routed Through Affected Ports by LIFT Trade Commodity (2010–2013 Average Percent Share)

LIFT Trade Commodity	Exports	Value Class	Imports	Value Class
Electrical industry apparatus and distribution equipment	5.4	high value	27.0	high value
Household appliances	9.5	high value	40.1	high value
Electrical lighting and wiring equipment	4.8	high value	37.4	high value
TVs, VCRs, radios and phonographs	7.9	high value	41.4	high value
Communication equipment	1.7	high value	10.5	high value
Electronic components	1.3	high value	9.1	high value
Motor vehicles	3.3	low value	5.5	low value
Motor vehicle parts	7.0	low value	30.4	low value
Aerospace	15.0	low value	12.9	low value
Ships and boats	7.2	low value	9.4	low value
Other transportation equipment	10.0	low value	25.6	low value
Search and navigation equipment	2.5	low value	17.3	low value
Medical instruments and supplies	3.5	low value	9.6	low value
Ophthalmic goods	2.0	low value	16.8	low value
Other instruments	3.0	low value	11.9	low value
Miscellaneous manufacturing	3.8	low value	32.5	low value
Average Shares by	8.9	low value	26.6	low value
Commodity Type	7.1	high value	20.2	high value
	35.6	perishable	14.5	perishable
Total Average Shares	10.3		22.3	

The first column of Table 4 (column a) represents the proportion of imports that is interrupted and not rerouted to other available ports and/or transport modes. If 100 percent of trade is disrupted, then there is no rerouting. If 90 percent of trade is interrupted, then 10 percent of trade is rerouted. The disruption proportion is lower for higher-value and perishable imports, signifying that traders are more likely to expedite deliveries of these imports through rerouting or via other modes, such as air and land.

While trade is delayed, we assume that most imports would ultimately reach their destinations. The second column (b) of Table 4 shows the proportion of delayed trade that is ultimately recovered, not including trade that is rerouted. A value of 90 percent means that only 10 percent of the trade interrupted in the period is ultimately lost. The recovery proportion is generally higher for lower-value items where importers can afford to wait longer for delivery. For higher-value items, consumers are assumed to be more willing to switch sources, and so the recovery parameter is lower.

The ultimate loss to import flows in trade days is computed as indicated by Table 4. Each stoppage is divided into 5-day segments, each with its own set of disruption and recovery patterns. A 5-day disruption contains one segment, a 10-day stoppage has two, and a 20-day closure contains four 5-day segments. For each segment, the first step is to multiply the "days disrupted" (column c) by the interruption parameter (column a) to yield "gross trade disrupted" in days (column d). We then multiply that disruption by the recovery parameter (column b) to find the "eventual trade recovered" (column e) in days. Subtracting the recovery from the disruption provides the "net trade disrupted equivalent" (column f) in days.

For illustration, examine the 5-day scenario for lower-value imports that is shown at the top of Table 4a. While we assume that no trade is rerouted, 90 percent of trade is recaptured, albeit at a slightly higher cost. Consequently, column f indicates that only 0.5 days of trade are lost in a 5-day closure, just 10 percent of the 5 days of trade potentially affected.

This 0.5-day loss is annualized by assuming 250 days per year of port operations (column g). Therefore, a loss of 0.5 days of trade is equivalent to just 0.20 percent of low-value imports flowing through West Coast ports in a year. Tables 4b and 4c show that the annual percentage disruption rises to 0.40 percent for high-value imports and 0.80 percent for perishable imports in a 5-day closure.

On the other hand, Table 4a indicates that a 20-day interruption means that 4.7 days of low-value imports are ultimately lost, or 1.89 percent of the annual flow of low-value imports through the ports. The corresponding number for high-value imports is 2.28 percent, and for perishables, it is 3.95 percent. Indeed, given that West Coast ports are responsible for a substantial share of imports for many commodities, a 20-day disruption would begin to take a bite out of the national economy.

Of course, the extent of these effects varies by commodity depending on its West Coast share of trade as shown in Table 3. For instance, the disruption of trade will be higher for apparel and household electronics, which have West Coast import trade shares exceeding 40 percent, compared to many equipment sectors where the share is below 40 percent. However, we can compute an approximation of the national disruption for each import type. As indicated in the tables, average West Coast ports' import share is 26.6 percent, 20.2 percent and 14.5 percent for low-value, high-value and perishable imports, respectively. Therefore, a 20-day disruption means a national average loss of low-value imports of 0.50 percent (1.89 percent x 26.6 percent). For high-value and perishable imports, the corresponding values are 0.46 percent and 0.57 percent, respectively.

Table 4a: Disruption Assumptions for Low-Value Imports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x d)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	90%	5.0	5.0	4.5	0.5	0.20
Total		**5.0**	**5.0**	**4.5**	**0.5**	**0.20**
10-Day Closure						
100%	90%	5.0	5.0	4.5	0.5	0.20
100%	80%	5.0	5.0	4.0	1.0	0.40
Total		**10.0**	**10.0**	**8.5**	**1.5**	**0.60**
20-Day Closure						
100%	90%	5.0	5.0	4.5	0.5	0.20
100%	80%	5.0	5.0	4.0	1.0	0.40
95%	70%	5.0	4.8	3.3	1.4	0.57
90%	60%	5.0	4.5	2.7	1.8	0.72
Total		**20.0**	**19.3**	**14.5**	**4.7**	**1.89**

Approximate National Import Disruption		
West Coast Ports Share (%) =		**26.6**
	5-Day	**0.05**
	10-Day	**0.16**
	20-Day	**0.50**

Table 4b: Disruption Assumptions for High-Value Imports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x d)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	80%	5.0	5.0	4.0	1.0	0.40
Total		**5.0**	**5.0**	**4.0**	**1.0**	**0.40**
10-Day Closure						
100%	80%	5.0	5.0	4.0	1.0	0.40
90%	70%	5.0	4.5	3.2	1.4	0.54
Total		**10.0**	**9.5**	**7.2**	**2.4**	**0.94**
20-Day Closure						
100%	80%	5.0	5.0	4.0	1.0	0.40
90%	70%	5.0	4.5	3.2	1.4	0.54
80%	60%	5.0	4.0	2.4	1.6	0.64
70%	50%	5.0	3.5	1.8	1.8	0.70
Total		**20.0**	**17.0**	**11.4**	**5.8**	**2.28**

Approximate National Import Disruption		
West Coast Ports Share (%) =		**20.2**
	5-Day	**0.08**
	10-Day	**0.19**
	20-Day	**0.46**

Table 4c: Disruption Assumptions for Perishable Imports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x c)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
Total		**5.0**	**5.0**	**3.0**	**2.0**	**0.80**
10-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
95%	50%	5.0	4.8	2.4	2.4	0.95
Total		**10.0**	**9.8**	**5.4**	**4.4**	**1.75**
20-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
95%	50%	5.0	4.8	2.4	2.4	0.95
90%	40%	5.0	4.5	1.8	2.7	1.08
80%	30%	5.0	4.0	1.2	2.8	1.12
Total		**20.0**	**18.3**	**8.4**	**9.9**	**3.95**

Approximate National Import Disruption		
West Coast Ports Share (%) =		**14.5**
	5-Day	**0.12**
	10-Day	**0.25**
	20-Day	**0.57**

Table 5 shows the same computations for exports for each disruption scenario. Exporters are assumed to have better opportunities for rerouting merchandise, especially for high-value and perishable products. Therefore, the trade disruption parameters are a bit lower than those for imports. On the other hand, since foreign customers are more likely to reach out to alternate suppliers, trade recovery for exports is lower compared to imports and, in the case of the extended scenario, falls to just 20 percent for perishable items.

On a national basis, Table 5a indicates that West Coast ports ship about 8.9 percent of low-value exports over a year. Therefore, the total national loss of low-value exports is just 0.05 percent for a 5-day closure, 0.12 percent for a 10-day scenario and 0.29 percent for a 20-day disruption. These proportions rise to 0.06, 0.12 and 0.27 for high-value exports and 0.36, 0.76 and 1.62 for perishable exports. That is, for highly perishable goods, a 20-day port closure could reduce annual national exports of those goods by nearly 2 percent.

The final step is to turn the assumptions of Tables 4 and 5 into control parameters for the LIFT model. To develop the 2014 import price shocks for each commodity, the annual percentage trade disruption is multiplied by the inverse of the LIFT import equation price elasticity. All other things being equal, the price shock should reduce the import quantities by the appropriate amounts indicated on the tables. The percentage losses of export volumes are applied directly to the exogenous commodity export levels for the model.

Table 5a: Disruption Assumptions for Low-Value Exports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x d)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	70%	5.0	5.0	3.5	1.5	0.60
Total		**5.0**	**5.0**	**3.5**	**1.5**	**0.60**
10-Day Closure						
100%	70%	5.0	5.0	3.5	1.5	0.60
95%	60%	5.0	4.8	2.9	1.9	0.76
Total		**10.0**	**9.8**	**6.4**	**3.4**	**1.36**
20-Day Closure						
100%	70%	5.0	5.0	3.5	1.5	0.60
95%	60%	5.0	4.8	2.9	1.9	0.76
90%	50%	5.0	4.5	2.3	2.3	0.90
85%	40%	5.0	4.3	1.7	2.6	1.02
Total		**20.0**	**18.6**	**10.4**	**8.3**	**3.28**

Approximate National Export Disruption		
West Coast Ports Share (%) =		**8.9**
	5-Day	**0.05**
	10-Day	**0.12**
	20-Day	**0.29**

Table 5b: Disruption Assumptions for High-Value Exports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x d)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
Total		**5.0**	**5.0**	**3.0**	**2.0**	**0.80**
10-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
90%	50%	5.0	4.5	2.3	2.3	0.90
Total		**10.0**	**9.5**	**5.3**	**4.3**	**1.70**
20-Day Closure						
100%	60%	5.0	5.0	3.0	2.0	0.80
90%	50%	5.0	4.5	2.3	2.3	0.90
85%	40%	5.0	4.3	1.7	2.6	1.02
80%	30%	5.0	4.0	1.2	2.8	1.12
Total		**20.0**	**17.8**	**8.2**	**9.7**	**3.84**

Approximate National Export Disruption		
West Coast Ports Share (%) =		**7.1**
	5-Day	**0.06**
	10-Day	**0.12**
	20-Day	**0.27**

Table 5c: Disruption Assumptions for Perishable Exports

Port Capacity Disrupted (100 – Reroute)	Proportion Trade Recovered	Days Disrupted	Gross Trade Disrupted	Eventual Trade Recovered	Net Trade Disrupted Equivalent	Annual Percentage Disruption
(%)	(%)	(Days)	(Days)	(Days)	(Days)	(%)
(a)	(b)	(c)	(d) = (a x c)	(e) = (b x d)	(f) = (d - e)	(g) = 100 x (f) / 250
5-Day Closure						
100%	50%	5.0	5.0	2.5	2.5	1.00
Total		**5.0**	**5.0**	**2.5**	**2.5**	**1.00**
10-Day Closure						
100%	50%	5.0	5.0	2.5	2.5	1.00
95%	40%	5.0	4.8	1.9	2.9	1.14
Total		**10.0**	**9.8**	**4.4**	**5.4**	**2.14**
20-Day Closure						
100%	50%	5.0	5.0	2.5	2.5	1.00
90%	40%	5.0	4.5	1.8	2.7	1.08
85%	30%	5.0	4.3	1.3	3.0	1.19
80%	20%	5.0	4.0	0.8	3.2	1.28
Total		**20.0**	**17.8**	**6.4**	**11.4**	**4.55**

Approximate National Export Disruption		
West Coast Ports Share (%) =		**35.6**
	5-Day	**0.36**
	10-Day	**0.76**
	20-Day	**1.62**

Annual Simulation Results

Tables 6a and 6b show the annual macroeconomic results for each of the three scenarios. For each indicator, the tables display the baseline levels and the alternative simulation results as both absolute differences and as percentage deviations from the baseline. For GDP and related quantities, the differences in billions of 2013 dollars are shown, and employment deviations are shown in thousands of jobs.

Most significant consequences for the economy are confined to 2014. Table 6a shows that compared to the baseline the reduction of GDP for 2014 as a whole is $9.4 billion (-0.05 percent of GDP) for a 5-day scenario, $21.2 billion (-0.12 percent) for a 10-day closure and $49.9 billion (-0.29 percent) for a 20-day disruption. The daily cost of a port disruption would reduce GDP in 2014 by $1.9 billion in a 5-day case, $2.1 billion in a 10-day scenario and $2.5 billion in a 20-day stoppage. The nonlinear damage pattern reflects the presumption that trade losses mount exponentially as a port closure drags out through time.

The effects on GDP would continue into 2015. It is small in a 5-day scenario ($1.6 billion), but a 20-day disruption subtracts $7.6 billion from GDP in 2015. By 2016, the economy regains some of the lost output of the previous two years in all cases. However, in a 20-day event, the “clawback” is minimal. In other words, most of the reduction to income occurring in 2014 is lost forever.

The costs of a port disruption on economic activity and jobs develop through three main channels. The first is through the loss of exports. In a 20-day port shutdown, exports would be 0.31 percent—or almost $6.9 billion—lower in 2014 and $1.7 billion lower in 2015. These losses directly lessen the output and employment of exporting firms, and they indirectly reduce activity in their supply chains, including transportation, utilities and other sectors. Moreover, lower incomes in export supply chains have knock-on effects on consumer and business investment spending throughout the economy, amplifying the direct export impact by reducing consumer spending and business investment.

Second, the interruption, delay and higher cost of imports would also reduce GDP and employment. The import disruption in a 20-day case is $8.3 billion in 2014 and an additional $2.0 billion in 2015. Many imported goods are destined for assembly lines across the manufacturing sector. These lines could be shuttered temporarily due to a lack of capital equipment or key inputs, thereby idling workers. This reduction drives up the cost of production inputs of domestic firms, damages domestic business and harms international competitiveness. Such an interruption would also affect imports of finished consumer goods destined for retail stores. This could mean products for the important back-to-school and holiday shopping seasons could be missed, resulting in immediate markdowns and lost sales opportunities.

These effects are best seen in the inflationary impacts of the shocks. One of the direct controls for each alternative simulation is higher import prices for traded commodities. Table 6b provides indicators of how port interruptions would affect annual costs. In 2014, the annualized purchasers’ price of imported goods and services rises by a minimum of 0.08 percent in a 5-day case to 0.47 percent in a 20-day disruption. These increases translate to boosts to personal consumption inflation of 0.03 percent to 0.18 percent.

Indeed, because consumers could face higher costs for imports, their overall purchasing power will be reduced. This is the third channel of economic damage. Lower real household expenditures mean lost business and jobs.

The net economic impact is summarized most clearly by the loss of consumer purchasing power relative to the baseline. This figure is defined as "real personal income" (nominal household income divided by consumption prices). This indicator combines the change of income with the loss of purchasing power. In a 20-day event, real household income is reduced by 0.31 percent, or $366 per household in 2013 prices. Note that this income loss is more or less permanent. That is, it will not be regained by new economic activity over subsequent years. On the other hand, by 2016, there is little trace of the port disruption remaining.

Table 6b also shows that annualized employment is affected significantly as well. In a 5-day scenario, the annualized loss is more than 73,000 jobs, and in a 20-day disruption, it is more than 405,000. The mechanics of the LIFT model specify that employers adjust employment to production losses relatively quickly and completely. However, some employers will preserve labor levels (at least in the earliest stages of any port disruption), thus absorbing some costs of labor idleness. Therefore, while job losses shown here probably overstate what would actually occur, the costs of labor idleness would still be disruptive, especially for an extensive shutdown.

Table 7 presents the effects on employment for major industries. For 2014 to 2016, deviations of industry employment levels from the baseline, measured in thousands of jobs, are shown for a 5-, 10- and 20-day disruption scenario. As mentioned, for a 20-day disruption, total employment losses are more than 405,000 in 2014 of which 51,500 are in manufacturing and 83,600 in retail trade. However, reductions are spread across the economy. While lost availability of supplies and equipment directly causes losses in some sectors, additional jobs are lost when consumers lose real income and, thus, reduce spending. Agriculture, mining and manufacturing producers typically have high labor productivity, so they employ relatively few workers, and so absolute job losses are lower compared to construction, trade and services sectors. Total job losses fall to 116,200 in 2015, and employment in 2016 is slightly higher than the baseline as construction and other sectors recover some business.

Table 6a: Annual Macroeconomic Simulation Results for GDP, Exports and Imports

	2014	2015	2016
Real GDP (in Billions of 2013 Dollars)	17,220	17,750	18,293
5-Day Disruption			
Difference in Billions of 2013 Dollars	-9.4	-1.6	1.2
Percent Difference	-0.05	-0.01	0.01
10-Day Disruption			
Difference in Billions of 2013 Dollars	-21.2	-4.1	2.5
Percent Difference	-0.12	-0.02	0.01
20-Day Disruption			
Difference in Billions of 2013 Dollars	-49.9	-7.6	5.6
Percent Difference	-0.29	-0.04	0.03
Real Exports			
(in Billions of 2013 Dollars)	2,199	2,311	2,446
5-Day Disruption			
Difference in Billions of 2013 Dollars	-1.5	-0.2	-0.1
Percent Difference	-0.07	-0.01	0.00
10-Day Disruption			
Difference in Billions of 2013 Dollars	-3.2	-0.6	-0.3
Percent Difference	-0.15	-0.02	-0.01
20-Day Disruption			
Difference in Billions of 2013 Dollars	-6.9	-1.7	-0.6
Percent Difference	-0.31	-0.07	-0.02
Real Imports			
(in Billions of 2013 Dollars)	2,634	2,760	2,900
5-Day Disruption			
Difference in Billions of 2013 Dollars	-1.8	-0.2	-0.1
Percent Difference	-0.07	-0.01	0.00
10-Day Disruption			
Difference in Billions of 2013 Dollars	-3.9	-0.7	-0.3
Percent Difference	-0.15	-0.02	-0.01
20-Day Disruption			
Difference in Billions of 2013 Dollars	-8.3	-2.0	-0.7
Percent Difference	-0.31	-0.07	-0.02

Table 6b: Annual Macroeconomic Simulation Results for Prices, Employment and Real Household Income

	2014	2015	2016
Import Prices (Percent Difference)			
5-Day Disruption	0.08	0.00	0.00
10-Day Disruption	0.19	0.01	0.00
20-Day Disruption	0.47	0.05	0.00
Consumer Prices (Percent Difference)			
5-Day Disruption	0.03	0.00	0.00
10-Day Disruption	0.08	0.01	-0.01
20-Day Disruption	0.18	0.02	-0.02
Employment (Thousands)	154,523	157,202	160,038
5-Day Disruption			
Difference in Thousands	-73.4	-23.0	12.6
Percent Difference	-0.05	-0.01	0.01
10-Day Disruption			
Difference in Thousands	-169.0	-56.5	26.7
Percent Difference	-0.11	-0.04	0.02
20-Day Disruption			
Difference in Thousands	-405.9	-116.2	61.8
Percent Difference	-0.26	-0.07	0.04
Real Personal Income per Household			
Baseline Level (in Thousands of 2013 Dollars)	116.5	119.0	121.7
5-Day Disruption			
Difference in 2013 Dollars	-81.1	-9.9	-5.8
Percent Difference	-0.07	-0.01	0.00
10-Day Disruption			
Difference in 2013 Dollars	-170.3	-29.7	-13.8
Percent Difference	-0.15	-0.02	-0.01
20-Day Disruption			
Difference in 2013 Dollars	-366.0	-86.3	-30.1
Percent Difference	-0.31	-0.07	-0.02

Table 7: Annualized Employment Impact of Port Disruption by Sector

Alternatives are shown in deviations from base values in thousands. For each sector, the first line is a 5-day disruption, the second line is a 10-day scenario, and the third line is a 20-day closure.

	2014	2015	2016
Agriculture, Forestry and Fisheries	-3.5	-0.7	0.4
	-7.3	-1.9	0.9
	-15.5	-4.7	1.8
Mining	-0.2	-0.1	0.0
	-0.5	-0.2	0.1
	-1.2	-0.3	0.1
Construction	-7.3	-2.9	1.2
	-17.3	-7.0	2.4
	-42.9	-13.1	5.2
Manufacturing	-9.5	-6.7	0.6
	-21.5	-15.6	0.9
	-51.5	-37.7	2.9
Nondurables	-4.7	-2.2	0.6
	-10.7	-5.1	1.2
	-25.6	-14.0	3.3
Durable Materials and Products	-2.2	-1.7	0.1
	-5.0	-3.9	0.1
	-12.0	-8.6	0.5
Nonelectrical Machinery	-0.5	-1.4	-0.1
	-1.1	-3.2	-0.3
	-2.5	-7.2	-0.8
Electrical Machinery	-0.6	-0.4	0.0
	-1.3	-0.9	-0.1
	-3.0	-2.1	-0.2
Transportation Equipment	-1.1	-0.6	0.0
	-2.5	-1.5	0.0
	-5.9	-3.3	-0.1
Instruments and Miscellaneous	-0.4	-0.4	0.0
	-1.0	-1.0	0.0
	-2.6	-2.4	0.1

Table 7 (Continued): Annualized Employment Impact of Port Disruption by Sector

Alternatives are shown in deviations from base values in thousands. For each sector, the first line is a 5-day disruption, the second line is a 10-day scenario, and the third line is a 20-day closure.

	2014	2015	2016
Transportation Services	-2.9	-0.6	0.2
	-6.6	-1.5	0.4
	-15.3	-3.1	0.9
Utilities	-0.7	-0.2	-0.2
	-1.6	-0.5	-0.5
	-3.7	-1.2	-1.1
Wholesale Trade	-3.5	-1.5	0.3
	-7.9	-3.5	0.6
	-18.4	-8.0	1.4
Retail Trade	-14.3	-0.6	3.0
	-34.0	-2.4	6.7
	-83.6	0.6	14.7
Restaurants and Bars	-4.4	-0.3	1.0
	-9.9	-0.9	2.1
	-23.3	-1.3	4.7
Finance, Insurance and Real Estate	-5.3	-0.6	0.8
	-12.1	-1.7	1.8
	-28.5	-2.9	4.0
0ther Services	-21.8	-8.8	5.3
	-50.3	-21.3	11.3
	-121.9	-44.7	27.1
Total Employment	-73.4	-23.0	12.6
	-169.0	-56.5	26.7
	-405.9	-116.2	61.8

Quarterly Simulation Results

Since a port interruption could be a temporary event confined mostly to July 2014 or another point in time this summer, it is important to consider the short-run effects by quarter. Table 8 displays the results by quarter for GDP and employment across 2014 and 2015 for each interruption scenario. For each scenario, the quarter-on-quarter growth rate for GDP is shown on the first line and the difference in this rate compared to the baseline is shown on the second line.

In a 5-day disruption, most of the damage is confined to the third quarter of 2014. The baseline forecast assumes a GDP growth rate (SAAR[6]) in the third quarter of 3.4 percent. The table shows that in a 5-day disruption scenario, this growth is reduced to 2.7 percent in the quarter, down 0.7 percentage points. This means the annualized level of GDP will be about 0.17 percent lower in the quarter, or almost $30 billion in 2013 dollars. Since the annual rate of GDP is four times the quarterly GDP, the actual loss of business is $7.4 billion ($29.4 / 4).

Results are differences from the baseline, so most figures represent reductions from an otherwise growing economy. By the fourth quarter of 2014, because of a rebound effect, growth in a 5-day disruption scenario is actually 0.5 percentage points higher at 4.1 percent, compared to the baseline. Nevertheless, annualized GDP remains $6.1 billion lower compared to the baseline.

The economic damage of a 20-day disruption is much larger and longer lasting. Three-fifths of the total impact is felt in the third quarter of 2014, and GDP growth falls to 0.6 percent on an annualized basis, a loss of almost 3.0 percentage points compared to baseline growth. This event would undermine any hopes that 2014 would see a more robust recovery. While growth revives in the fourth quarter, the economy still loses almost $20 billion, and GDP is almost 0.5 percent lower than the baseline. Indeed, the GDP level does not return to the baseline until 2016.

In employment terms, the table shows significant losses over the final two quarters of 2014. Considering both direct and indirect impacts, the table indicates that during the third quarter, the number of jobs potentially disrupted varies from 217,000 in a 5-day closure to as many as 991,000 in a 20-day work stoppage.

Once again, the actual employment loss in each quarter depends on how employers react to a temporary interruption of their business. The current analysis assumes that employers adjust labor requirements relatively quickly and completely. If employers preserve labor levels, then the job loss would be mitigated. To the extent that jobs are preserved, employers take on more of the interruption cost in terms of lower labor productivity and lost profits.

[6] The quarterly GDP figures and growth rates are provided in seasonally adjusted annual rates (SAAR). The quarterly SAAR for GDP adjusts for normal seasonal variation and annualizes by multiplying the quarterly GDP figure by four.

Table 8: Quarterly Simulation Results for GDP and Employment

	Q32014	Q42014	Q12015	Q22015	Q32015	Q42015
Real GDP						
Baseline Projection Growth (SAAR)	3.4	3.6	2.6	2.5	3.3	3.2
5-Day Port Disruption						
Percent Growth from Previous Quarter (SAAR)	2.7	4.1	2.7	2.6	3.3	3.2
Difference from Baseline Growth	-0.7	0.5	0.1	0.1	0.0	0.0
Percent Difference from Baseline Level	-0.17	-0.04	-0.02	-0.01	0.00	0.00
Difference from Baseline (Bill. 2013$ SAAR)	-29.41	-6.11	-3.51	-0.88	-0.18	0.00
Difference from Baseline (Quarterly)	-7.4	-1.5	-0.9	-0.2	0.0	0.0
10-Day Port Disruption						
Percent Growth from Previous Quarter (SAAR)	2.2	4.0	3.2	2.6	3.3	3.2
Difference from Baseline Growth	-1.2	0.4	0.6	0.1	0.1	0.0
Percent Difference from Baseline Level	-0.30	-0.20	-0.05	-0.02	-0.01	0.00
Difference from Baseline (Bill. 2013$ SAAR)	-51.9	-34.9	-8.8	-3.5	-0.9	-0.2
Difference from Baseline (Quarterly)	-13.0	-8.7	-2.2	-0.9	-0.2	0.0
20-Day Port Disruption						
Percent Growth from Previous Quarter (SAAR)	0.6	4.6	4.0	2.7	3.5	3.2
Difference from Baseline Growth	-2.8	1.0	1.4	0.2	0.2	0.0
Percent Difference from Baseline Level	-0.70	-0.45	-0.11	-0.06	-0.01	-0.01
Difference from Baseline (Bill. 2013$ SAAR)	-121.1	-78.5	-19.3	-10.6	-1.8	-0.9
Difference from Baseline (Quarterly)	-30.3	-19.6	-4.8	-2.7	-0.4	-0.2
Employment (Baseline Level and Alternative Deviation in Thousands of Jobs)						
Baseline	154,836	155,513	156,155	156,825	157,548	158,282
5-Day Port Disruption	-217	-78	-47	-39	-2	0
10-Day Port Disruption	-449	-226	-148	-55	-16	-8
20-Day Port Disruption	-991	-638	-312	-118	-32	-8

Summary

West Coast ports are a critical component of the nation's transportation infrastructure, especially for the flow of exports out of and imports into the country. If no new agreement between the ILWU and the PMA is reached and disruptions across 30 West Coast ports take place, the economic consequences would be significant and widespread. Furthermore, this level of uncertainty could lead to an extended period of diminished trade.

An interruption of West Coast port operations would harm economic activity and jobs across the economy. Lost exports would directly reduce output and employment of exporting firms and indirectly reduce activity in their supply chains. By disrupting tightly integrated U.S. supply chains, the delay and higher cost for imports would also reduce GDP and employment. In addition, because consumers face higher costs for imports, overall household purchasing power would be reduced. Lower real household expenditures create lost business and jobs.

Compared to a baseline forecast which assumes no port disruptions, GDP for 2014 as a whole is reduced by $9.4 billion (-0.05 percent of GDP) for a 5-day scenario, $21.2 billion (-0.12 percent) for a 10-day closure and $49.9 billion (-0.29 percent) for a 20-day disruption. Each day of a port disruption would reduce GDP in 2014 by $1.9 billion in a 5-day case, $2.1 billion in a 10-day scenario or $2.5 billion in a 20-day disruption. In a 20-day scenario, 2014 real household income is reduced by 0.31 percent, or $366 per household.

In particular, this study finds that the economic damage of a 20-day disruption would undermine the prospects of continued economic recovery in 2014 and further delay the potential for more robust growth in 2015.

Even after operations are fully restored after a port disruption, the subsequent weeks and months would be dedicated partly to recovering delayed trade flows. Therefore, economic effects would linger well past the closures and include rising supply chain costs, reduced business investment, damage to export relationships and lower consumer income and purchases.

During these important negotiations, the ILWU and PMA must remain at the table and avoid outcomes that could lead to significant supply chain disruptions. The economic consequences of a lengthy dispute that results in a ports closure of any length of time would be detrimental to consumers, workers and the U.S. economy.

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The National Impact of a West Coast Port Stoppage

Inforum Report Commissioned by the National Association of Manufacturers
and the National Retail Federation