Outline

• Background and Research Objectives.
• Previous Studies.
• Modelling the Elasticity of POLA/POLB Port Traffic.
• Impact of Environmental Fees.
• Impact of the Panama Canal Expansion.
• Conclusions.
Background

• Southern California Air Quality Management District recently approved a new Air Quality Management Plan (AQMP) which is estimated to result in $15.7 billion in incremental costs between 2017 and 2031.

• User-pay container fees of up to $100 per TEU have been proposed as a source of revenue for funding these expenditures.

• These proposals have generated opposition from port stakeholders due to their potential impact on the competitiveness of Southern California as a container gateway.
Research Objectives

This research addresses the question: Does environmental compliance impact port competitiveness?

This requires examination of two issues:

1. What is the impact of relative transportation costs on the volume of containerized imports through the Ports of Los Angeles and Long Beach (i.e. the elasticity of demand)?

2. What portion of these costs is attributable to environmental initiatives?

The timing of the research also offers an opportunity for analysis of the initial impacts of the Panama Canal expansion on POLA/POLB traffic.
Previous Studies

• Previous studies focused on relative costs and transit times for U.S. imports from Asia.

• Analysis has focused on individual market segments based on destination, inland transport mode (truck, Inland Point Intermodal (IPI, or transload), and product value.
Previous Studies

Methodology and previous results have varied significantly.

<table>
<thead>
<tr>
<th>Previous Studies Elasticity Estimates Southern California Container Traffic</th>
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<tbody>
<tr>
<td>Methodology</td>
</tr>
<tr>
<td>Demand Data</td>
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<tr>
<td>Cost Data</td>
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<tr>
<td>Elasticity Local Traffic</td>
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<tr>
<td>Elasticity Transload</td>
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<tr>
<td>Elasticity IPI</td>
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<td>Elasticity Total Traffic</td>
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Modelling the Elasticity of POLA/POLB Port Traffic

• Lack of reliable data on the quantities and commodity distributions of inland flows to destination regions within the US makes it impossible to verify the accuracy of the market segment estimates.

• This study takes a different approach by analyzing aggregate market share for POLA/POLB to enable evaluation of model accuracy based on verifiable data.
Regression Methodology

- Based on regression analysis of aggregate market share on cost differentials.
- Approach is similar to Moffat & Nichol (2008) except:
  - Analysis is based on time series rather than cross-sectional data on market shares.
  - Relative vessel transit time is explicitly incorporated as an explanatory variable.
  - Changes in relative costs are based on shipping line and railway revenues rather than modal cost models to provide more accurate estimates of the prices shippers actually pay.
Transit Time

• Two routes for Asian imports through East Coast ports: the Panama Canal and the Suez Canal.

• Transit time for Suez shipments is longer due to the greater distance involved.

• Average transit time from Asian ports to the US East Coast is a function of the share of traffic on each of these routes.
Transit Time

- Data on shipping line capacity and transit times from 1Q 2012 was provided courtesy of BlueWater Reporting.

- Dramatic shift from the Suez Canal to the Panama Canal following the opening of the expanded Panama Canal in June 2016.

Panama and Suez Canal Shares of Asia - US East/Gulf Coast Capacity

POLA/POLB Labour Dispute | Panama Canal Expansion
---|---
Panama Canal Capacity Share | Suez Canal Capacity Share

Davies Transportation Consulting Inc.
Environmental Compliance and Port Competitiveness METRANS I-NUF Oct. 18, 2017
Transit Time

- Weighted transit time estimated for the Port of NBY/NJ based on express services from Asia and Suez/Panama Canal shares.

- Shift to Panama route reduces transit time advantage for Ports of Los Angeles and Long Beach.

- POLA/POLB transit times affected by labor dispute 4Q 2014 – 2Q 2015.
Relative Costs

- IPI cost estimates from POLA/POLB and PANY/NJ are used as the benchmark due to the dominance of the Midwest in intermodal markets.
- Estimates of individual cost components are based on available public data:
  - Transpacific Stabilization Agreement Revenue Index for ocean rates.
  - TSA surcharges for bunker surcharges.
  - Railway financial reports for revenue per intermodal carload.
  - Information on other surcharges from TSA website.
Regression Results

- LALB Share = 0.73 - 0.127 LALB IPI /NYNJ IPI + Surcharge - 0.268 LALB/NYNJ Transit Time
- Yields an adjusted $R^2$ of .77 and all variables are significant at the 99% level.
- Results in an estimated average elasticity of .26.

LA/Long Beach Share of Pacific Rim Imports Actual vs Fitted 1Q 2012 - 1Q 2017
Estimated Impact of Cost Increases and Transit Time Changes on POLA/POLB Traffic

Impact of Cost Increases and Relative Transit Time Changes on LA/LB Annual Traffic 1Q 2017

- Total Annual TEUs
- Sensitivity - 1 Day Transit EC
- Sensitivity - 2 Day Transit EC

Annual TEUs Thousands

Increase in LA/LB Costs per FEU

$0 $100 $200 $300 $400 $500 $600 $700 $800 $900 $1,000 $1,100 $1,200 $1,300

11,500 12,000 12,500 13,000 13,500 14,000 14,500 15,000 15,500 16,000
Costs of User-Pay Environmental and Congestion Mitigation Programs

- Alameda Corridor user charges.
- PierPass Traffic Mitigation Fee.
- Estimated Clean Trucks Program costs due to accelerated replacement of almost 17,000 drayage trucks from 2008 – 2012.

### Environmental/Congestion Mitigation Program Cost Estimates 2017

<table>
<thead>
<tr>
<th>POLA/POLB Loaded TEUs 2016</th>
<th>9,363,423</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Alameda Corridor Costs 2017</th>
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<tbody>
<tr>
<td>Alameda Corridor Revenue</td>
</tr>
<tr>
<td>$ Per Loaded TEU (Imports)</td>
</tr>
<tr>
<td>$ per Loaded FEU (Imports)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PierPass Costs 2017</th>
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</thead>
<tbody>
<tr>
<td>PierPass Revenue</td>
</tr>
<tr>
<td>$ Per Loaded Teu</td>
</tr>
<tr>
<td>$ per Loaded FEU</td>
</tr>
</tbody>
</table>

### Clean Trucks Program Cost Estimates 2017

<table>
<thead>
<tr>
<th>CTP Diversion Avg Revenue per truck 2007</th>
<th>$107,100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drayage Fleet</td>
<td>16800</td>
</tr>
<tr>
<td>Total Trucking Cost</td>
<td>$1,799,280,000</td>
</tr>
<tr>
<td>CTP Increase %</td>
<td>16%</td>
</tr>
<tr>
<td>CTP Cost 2007</td>
<td>$287,884,800</td>
</tr>
<tr>
<td>CTP Cost 2017</td>
<td>$324,053,688</td>
</tr>
<tr>
<td>Cost per TEU</td>
<td>$34.61</td>
</tr>
<tr>
<td>Cost per FEU</td>
<td>$69.22</td>
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</tbody>
</table>
Impact of User-Pay Environmental and Congestion Mitigation Programs on Port Traffic

### Impact of Environmental Costs on Annual Traffic

<table>
<thead>
<tr>
<th></th>
<th>Cost per FEU</th>
<th>%</th>
<th>Impact TEUs</th>
<th>% of Annual Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTA</td>
<td>$21.42</td>
<td>16%</td>
<td>-29,821</td>
<td>-0.2%</td>
</tr>
<tr>
<td>PierPass</td>
<td>$40.82</td>
<td>31%</td>
<td>-56,830</td>
<td>-0.4%</td>
</tr>
<tr>
<td>CTP</td>
<td>$69.22</td>
<td>53%</td>
<td>-96,367</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Total</td>
<td>$131.46</td>
<td>100%</td>
<td>-183,017</td>
<td>-1.2%</td>
</tr>
</tbody>
</table>

- Reduction in annual traffic of 183,017 TEUs or 1.2% of annual traffic.
- Clean Trucks Program accounts for 96,367 TEUs or .6% of total traffic.
- Moffat & Nichol estimate of CTP impact in 2008 was 75,000 TEUs or .5% of total traffic.
Impact of the Panama Canal Expansion
Reduced weighted average transit times for East Coast ports due to shift in traffic from longer Suez route.
Impact of the Panama Canal Expansion

• East Coast ocean rates declined significantly from previous levels beginning in 1Q 2016.
• Bunker surcharges fell due to low bunker fuel costs.
Does environmental compliance impact port competitiveness?

1. What is the elasticity of demand?
   • Demand is inelastic, with an estimated value of 0.26 (a 10% increase in costs would result in a decline of 2.6% in traffic).

2. What portion of costs is attributable to environmental fees?
   • Estimated aggregate current cost is $131.46 per FEU or approximately 4.6% of total IPI costs to Chicago.
   • Based on these estimates, a new US$100 per TEU container fee (US$200 per FEU) would reduce POLA/POLB volume by a further 1.8%.
Conclusions

• To date user-pay environmental and congestion mitigation programs have had only a small impact on the volume of port traffic.

• However, POLA/POLB market share fell from 46.2% in the first quarter of 2016 to 44.2% in the first quarter of 2017 in spite of the low elasticity of demand as a result of significant reductions in the West Coast advantage over East Coast Ports in ocean shipping costs following opening of the Panama Canal expansion.

• Based on this experience, POLA/POLB are likely to face ongoing competitive challenges from East Coast routings even in the absence of additional environmental fees.
Future Research

• Regional and port authority infrastructure and environmental strategies should be targeted to enhance regional competitiveness and mitigate the impacts of necessary environmental costs.

• The success of the modelling approach in this paper in developing data-based quantitative estimates of the influence of cost and transit time variables on aggregate port traffic levels suggests that development of more detailed quantitative models is feasible.

• The primary obstacle is the lack of reliable detailed data on origin-destination transportation costs and performance parameters on an ongoing basis, including ocean and inland costs, transit times, and other performance criteria for individual origins and destinations.

• Assuming a project sponsor, development of a database on ongoing supply chain competitiveness factors is a logical first step in developing the models necessary for informing strategic initiatives.
Environmental Compliance and Port Competitiveness of the Ports of Los Angeles and Long Beach

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