Elasticity Analysis of Asian Imports Through the Ports of Seattle and Tacoma

Rob Leachman
Leachman & Associates LLC
245 Estates Drive
Piedmont, CA 94611
3 December, 2007

Purpose of Study

- Apply analytical methodology and database to predict flows of containerized imports by port and landside channel as a function of transportation rates, transportation service quality, and potential container fees
- Analysis is quite similar to “Port and Modal Elasticity Study” prepared for Southern California Association of Governments, Aug., 2005, but with updated data

References for Analytical Approach

- The 2005 SCAG Report, “Port and Modal Elasticity Study”, maybe down-loaded from http://www.scag.ca.gov/goodsmove/pdf/FinalElasticityReport0905rev1105.pdf
- An academic reference on the methodology is “Port and Modal Allocation of Waterborne Containerized Imports from Asia to the United States,” *Transportation Research Part E*, **44** (2), P. 313 – 331, which may be purchased from http://dx.doi.org/10.1016/j.tre.2007.07.008

The Model

- "Long-run elasticity model"
  - Mid-2007 transportation rates, 2005 import value distributions and 2005 transit time statistics
  - Takes mean and standard deviation of container flow times as given and fixed
  - Model calculates predicted container flows as a function of port fees and transportation rates
  - Demonstrates impact of hypothetical container fees applied to all inbound loaded containers from Asia to USA via Ports of Seattle and Tacoma, without any new fees at other ports

Data collection

- 2005 PIERS and WTA summaries of customs data obtained from POLB and MARAD
- Transportation rate quotations obtained from steamship lines, NVOCCs, IMCs, dray companies
  - Rates are in considerable flux and have considerable disparity from carrier to carrier

Model Structure

- 83 real importers and 18 “generic” importers are included
  - The 83 real ones are the only ones with volumes sufficient to consider consolidation-deconsolidation import strategies
  - The 18 “generic” ones are proxies representing all other (small) importers; volumes are engineered so that the overall distribution matches a smoothing of the actual distribution of declared values in US Customs data
- Model optimizes supply chain for each importer, taking costs and service quality of each alternative channel as a given
- USA divided into 21 regions, one destination per region
  - Volume to each region proportional to region’s purchasing power

Model Structure (cont.)

- Ports included: Prince Rupert/Vancouver, Seattle/Tacoma, Oakland, Los Angeles/Long Beach, Houston, Savannah, Charleston, Norfolk, NY-NJ
- Landside channels included: CY + local dray, CY + trucking marine box, IPI, Trans-load to rail in domestic container, and trans-load to truck channels included.
  - Trans-load channels are used only in connection with consolidation-deconsolidation import strategies

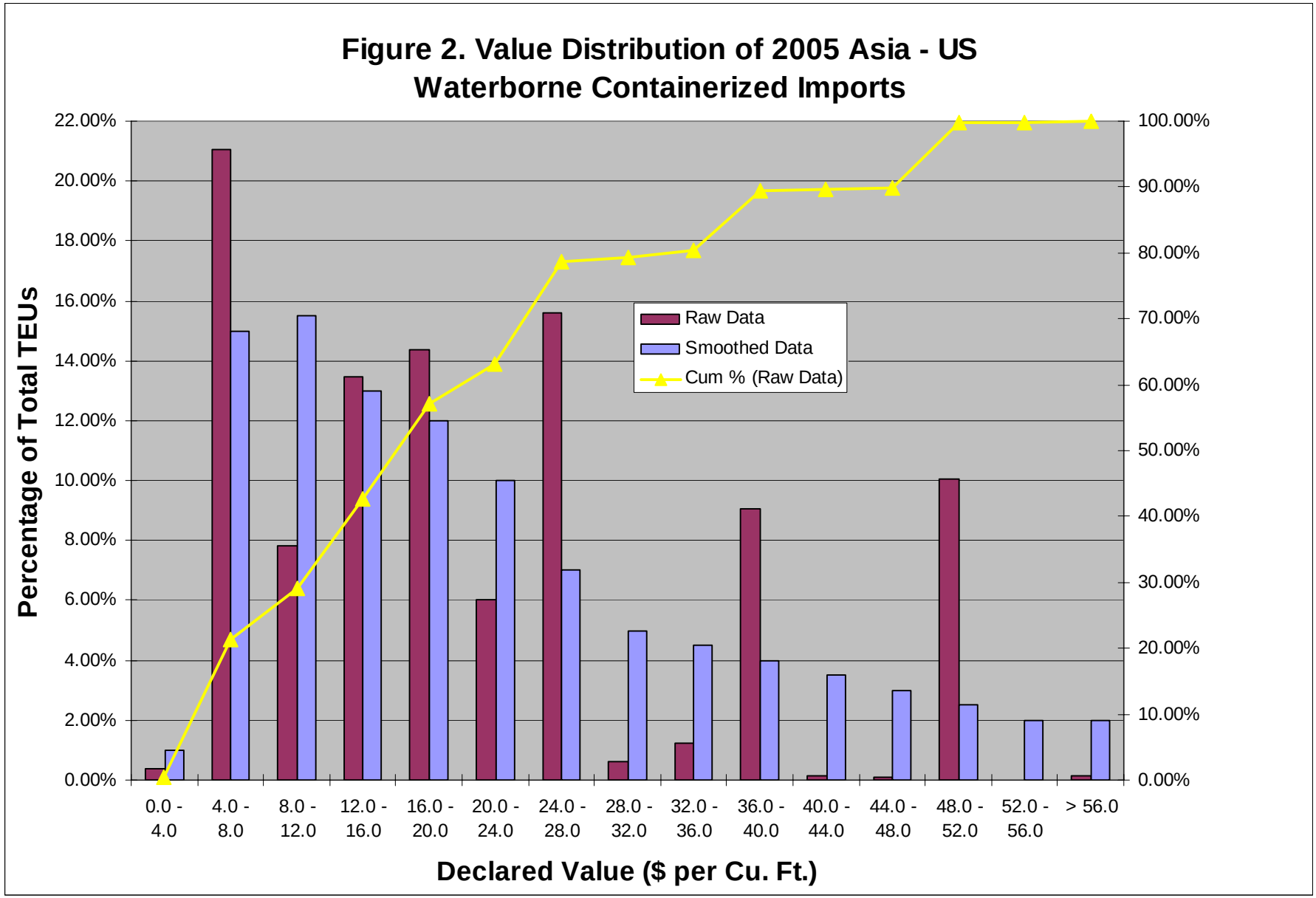
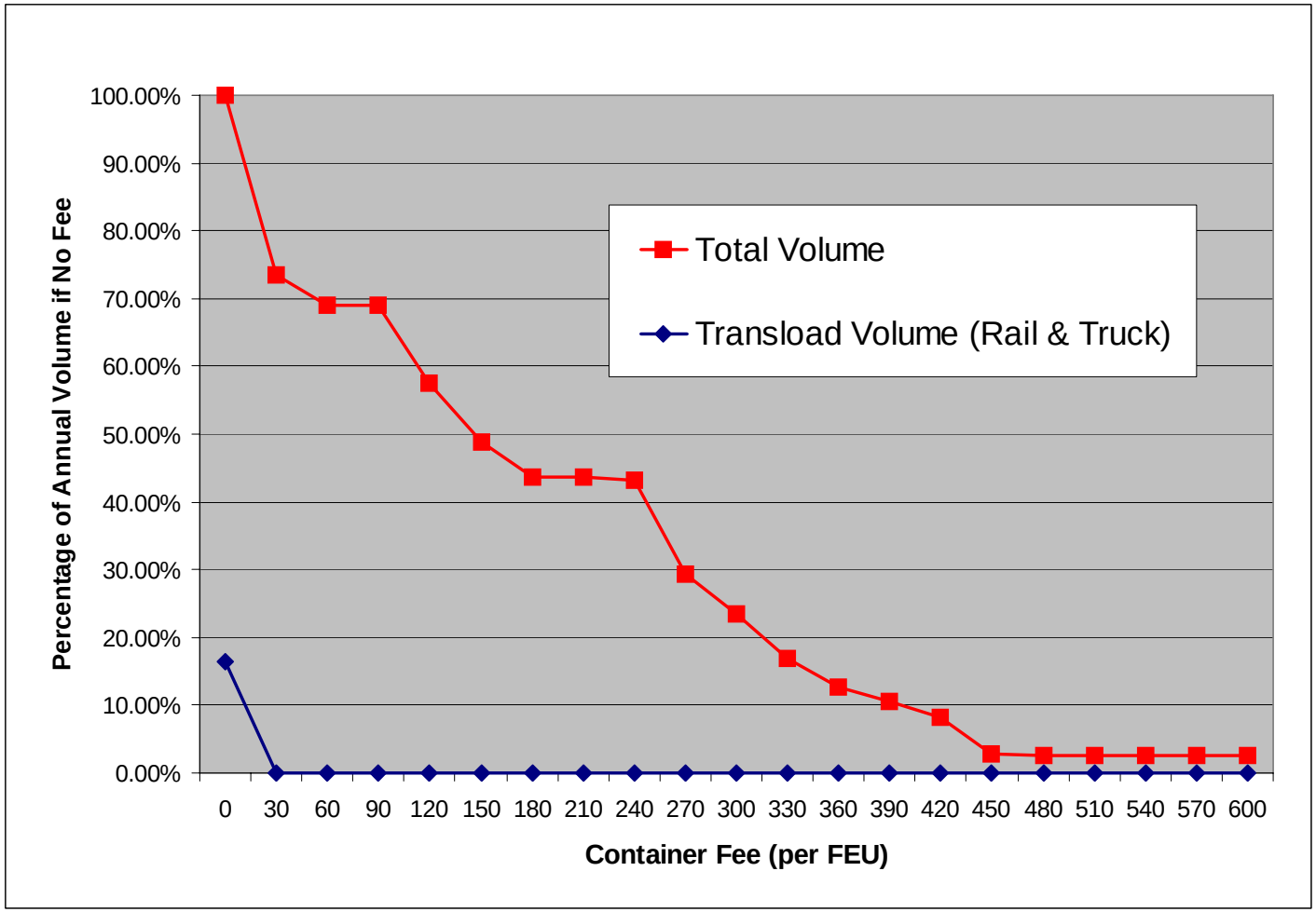


Figure 2. Value Distribution of 2005 Asia - US Waterborne Containerized Imports
Percentage of Total TEUs
22.00%
20.00%
18.00%
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Raw Data
Smoothed Data
Cum % (Raw Data)
0.0 - 4.0
4.0 - 8.0
8.0 - 12.0
12.0 - 16.0
16.0 - 20.0
20.0 - 24.0
24.0 - 28.0
28.0 - 32.0
32.0 - 36.0
36.0 - 40.0
40.0 - 44.0
44.0 - 48.0
48.0 - 52.0
52.0 - 56.0
> 56.0
Declared Value ($ per Cu. Ft.)

Changes in import economics since the 2005 SCAG analysis

- For direct inland movement of marine boxes, the break point in declared value at which it is cheaper to import via the West Coast instead of all-water movement to Eastern markets fell from $46 to $40 per cubic foot.
- The break point in declared value at which it is cheaper to consolidate-deconsolidate using 4 or 5 ports on both Coasts rose from $13.33 to $13.89 per cubic foot.
- The break point in declared value at which all imports should be consolidated-deconsolidated in So Cal fell from $27 to $23 per cubic foot.

Response of PNW Imports to Potential Container Fee



Discussion of Results

- Imports via the PNW ports are much more elastic than those via the So Cal ports. Even a small fee would incentivize importers and lines to re-align supply chains away from the PNW ports.
  - IPI rates via So Cal and via PNW are very competitive
    - A PNW container fee would encourage a shift in IPI volumes
  - Total costs of consolidation-deconsolidation channels using So Cal and PNW ports are very competitive
    - PNW volume has grown by dint of low dray and handling costs, not because of any RR rate advantage. A PNW container fee would encourage the large importers to re-allocate their inland volumes away from the PNW at little or no expense to them.

Discussion of Results (cont.)

- It is important to recognize that these results portray the *long-term* incentives for traffic re-allocations. Shifts in supply chains and vessel service do not happen immediately; they may take years to implement because of:
  - Port and carrier contracts, building leases, capacity limitations, etc.
- The model does not recognize the value of risk reduction from spreading supply chains across multiple ports. After the 2004 melt-down in So Cal, supply chains became more diversified, even though this resulted in more costly inventory financing.

Conclusions

- The PNW ports are close to parity with the So Cal ports in terms of total transportation costs for IPI and trans-loading channels. For reasons of inventory pooling with the large local market, the So Cal ports have an inherent economic advantage. If PNW ports take the lead in assessing container fees, they are liable to suffer sharp losses in market share.
- But as fees on imports are introduced in So Cal, they can be matched in the PNW without loss of market share. (Or, if PNW fees are kept lower, market share can be grown.)