Commercial Justification of Port Investment Projects

American Association of Port Authorities

2016 Infrastructure Development and Financing Seminar

San Diego, CA

MERCATOR
INTERNATIONAL LLC
Logistics & Infrastructure Advisors

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Brief Intro of Mercator International LLC

Who we are:

- Advisors to developers, financiers, operators, and customers of transport and logistics infrastructure, especially related to ports.
- Formed in early 2009 by former executives of Macquarie Capital, Sea Land, Maersk, SSA, and APL.
- Headquartered in suburban Seattle, with associates in multiple countries and continents.

What we do:

- Freight market research
- Microeconomic and cargo forecasting
- Pricing analysis and forecasting
- Transport and port operations reviews
- Transportation asset valuations
- Capital investment analysis
- Transport infrastructure M&A
- Strategic planning

Supporting Port Sector Investment Decisions

A significant portion of our work involves evaluations of port concession acquisitions or sales, as well as major capital investments in port infrastructure improvements

Some of the major investment projects that we have been involved in recent years include:

Purchases/Sales of Concessions

Asciano Ports	Australia
Brisbane Port Corporation	Australia
Terminal de Paranagua	Brazil
Fairview Terminal	Canada
Montreal Gateway Terminals	Canada
SPR Buenaventura	Colombia
Tertir Ports	Portugal
Grup TCB	Spain
Yilport Holdings	Turkey
Amports	United States
TraPac Terminals	United States
Associated British Ports	United Kingdom

Infrastructure Improvement Projects

Terminal automation	California
Port-rail terminal development	Florida
Terminal expansion	New York
Greenfield development	North Carolina
Terminal enhancement	Nova Scotia
On-dock cold storage	Pennsylvania
Terminal renovation	Puget Sound
Terminal expansion	Dominican Republic
Busan terminal expansion	Korea
Greenfield development	Panama
Gdansk terminal expansion	Poland
Greenfield development	United Arab Emirates

Evaluating Port Investment Projects – Alternate Perspectives

- Providers of capital for port investment projects tend to have different evaluation metrics, depending on their entity-type

Key metrics

Financial institutions	Terminal operators	Port authority
• Return on capital • Risk premium	• Return on capital • Business synergies • Strategic benefits	• Return on capital • Risk premium • Economic development • Strategic benefits • Market share

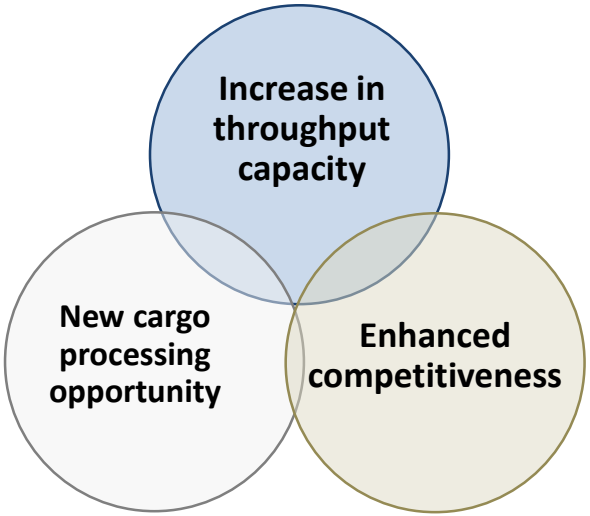
- Among private-sector financial institutions, different perspectives on risk and investment horizon also prevail, given the type of institution and the capital being provided

Focal points

Lenders	Private Equity Funds	Infrastructure Funds
• Safety of yield income • Preservation of capital • Flexible time horizon	• Turnaround opportunity • Quantum income growth capability • 5-7 year horizon	• Stability of earnings • Bolt-on opportunities • Expansion options • 10+ year horizon

Commercial Drivers for Port infrastructure Improvements

Need/Desire



Core infrastructure components

Wharves

Yard/gate

Handling equipment

Automation technology

Rail transfer facility

Rail track links

Increase in volume

Market definition → Market demand drivers → Market growth outlook → Port/terminal competitiveness → Market share → Port/terminal volume

Current price analysis → Capacity supply forecast → Demand/supply forecast → Rate projection

Rate

Revenue

Market Definition – The Essential Starting Point

- The structure of the market demand analysis required to commercially justify a port infrastructure project will be driven by type(s) of cargo that the project is designed for:

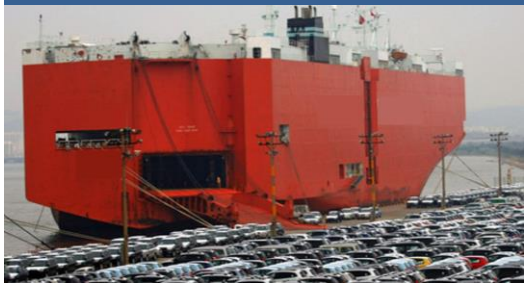
Drybulk

(grains, minerals, ores)

Liquid bulk

(oil/petroleum, chemicals, LNG)

RoRo



(vehicles, machinery)

Breakbulk

(steel, forestry products)

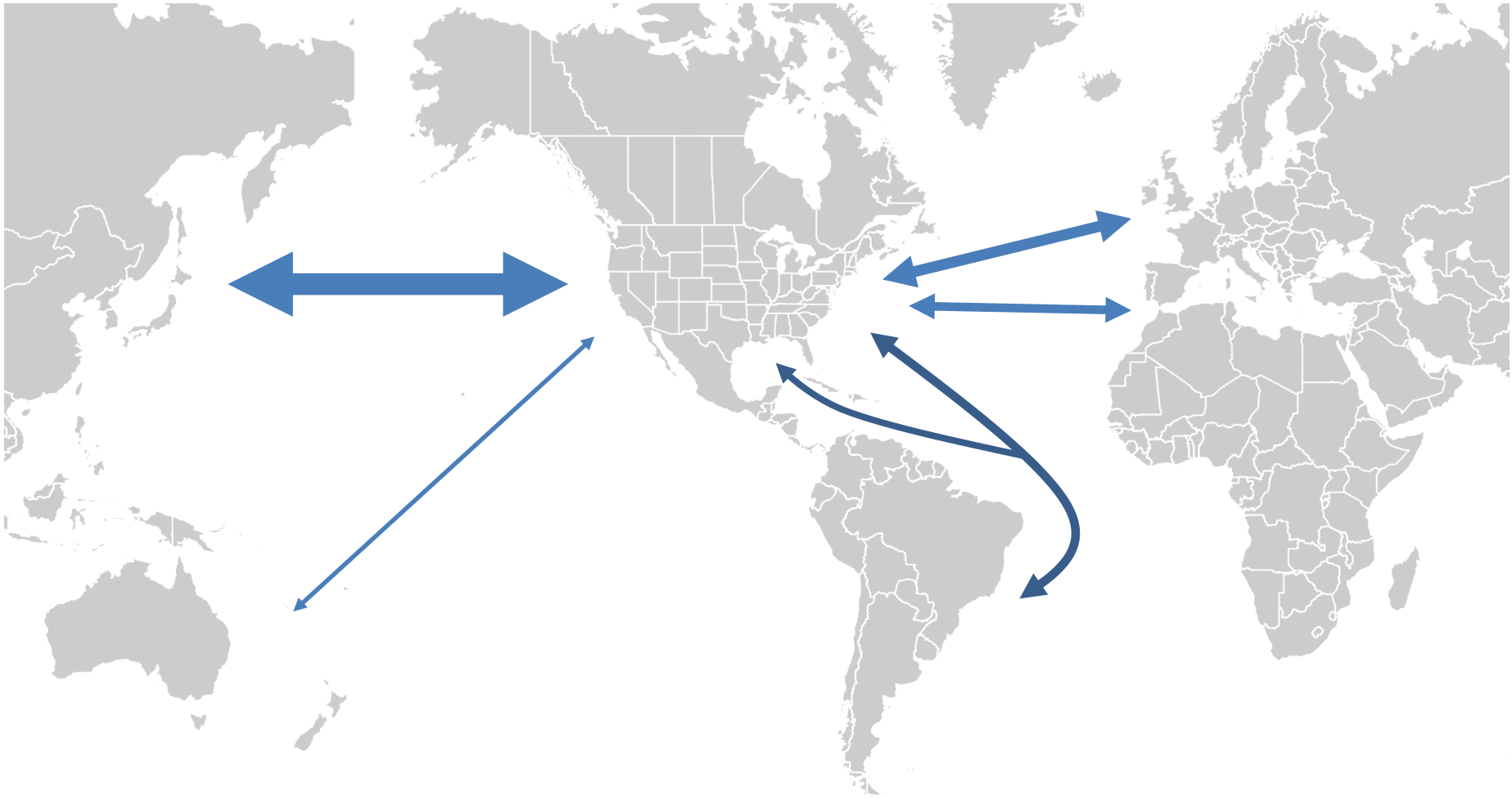
Unitized

(container, trailers)

- For bulk target cargoes, analyses of specific industries will be more critical, whereas for unitized cargoes, macroeconomic performance will be of greater importance

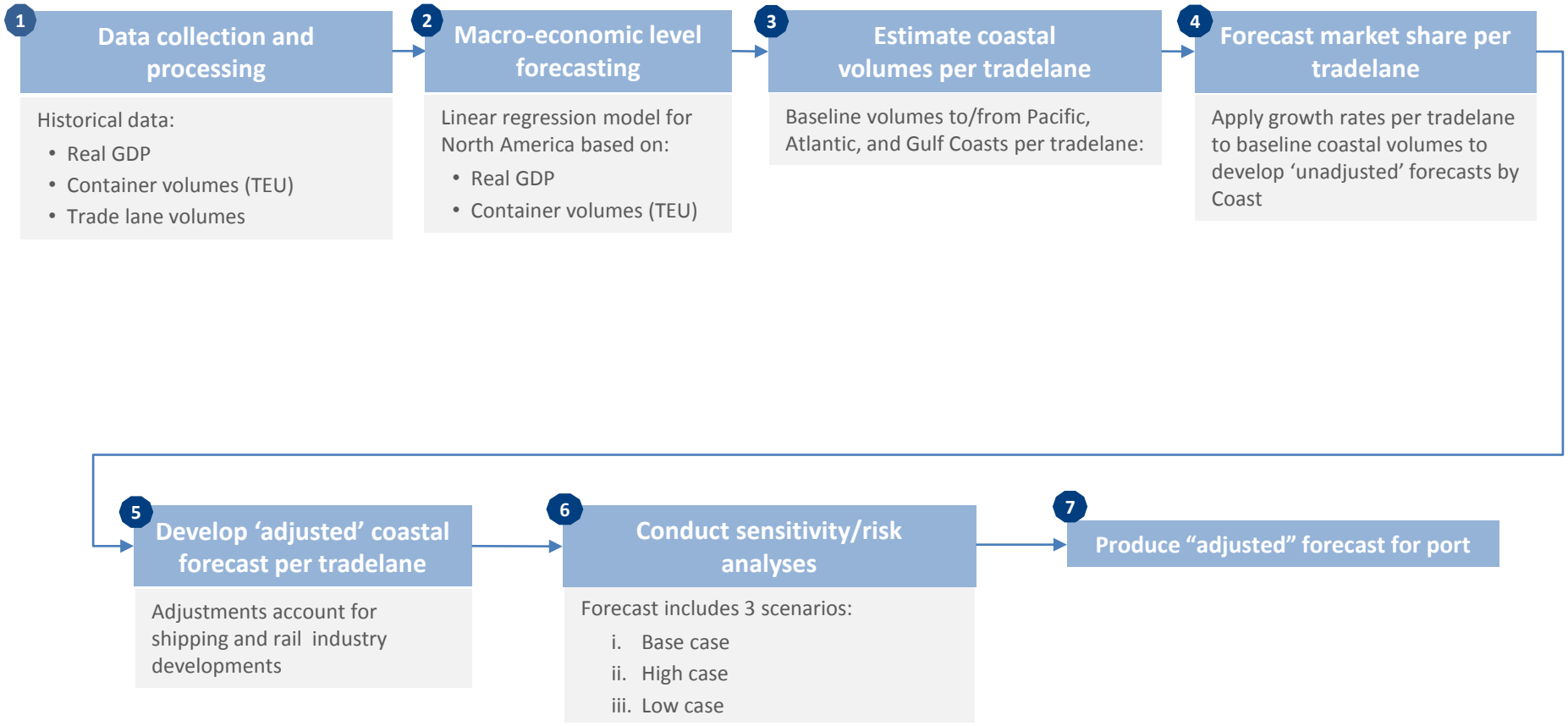
Market Definition – The Essential Starting Point

- Geographic scope of project demand analysis will be driven by type of cargo opportunity and the location of the port.



Example of Demand Forecast Methodology

Mercator's demand forecasting methodology for North American container ports follows a top-down approach composed of multiple sequential steps:

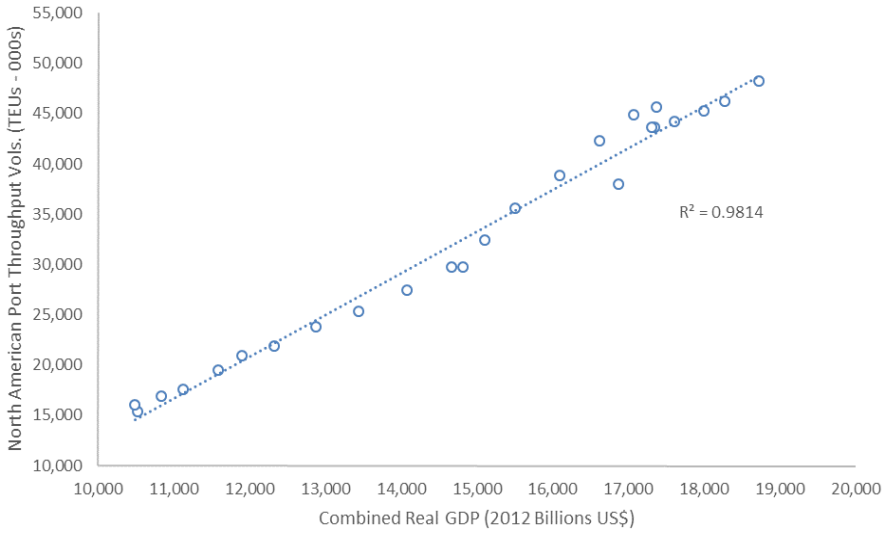


An important step in demand forecasting is a manual review of the model results to ensure the results are consistent with rational expectations since mathematical models cannot account for every impact.

Demand Forecast Methodology – Model Accuracy

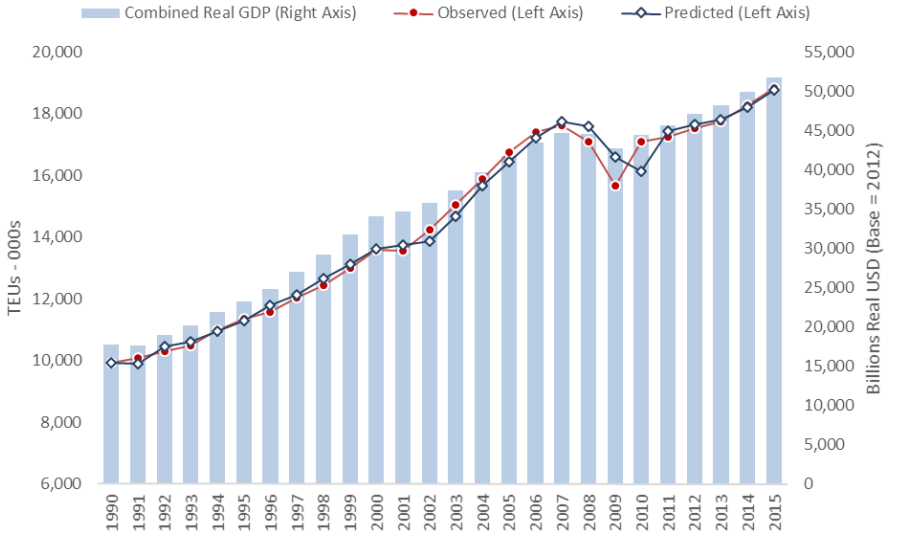
- To test the reliability of the linear regression model, historical real GDP figures are used to predict historical container throughput, which are then compared to observed volumes.
- Mercator's model combines real GDP of the U.S. and Canada, and explains 98.1% of the variability of the response data around its mean.
- With the exception of data points associated with major economic disruptions (outliers), our model effectively predicts historical throughput.
- The volume forecasted for 2015 was within 1.0% of the actual.

Combined Real GDP and Container Throughput (1990-2015)



Source: Mercator International, March 2016.

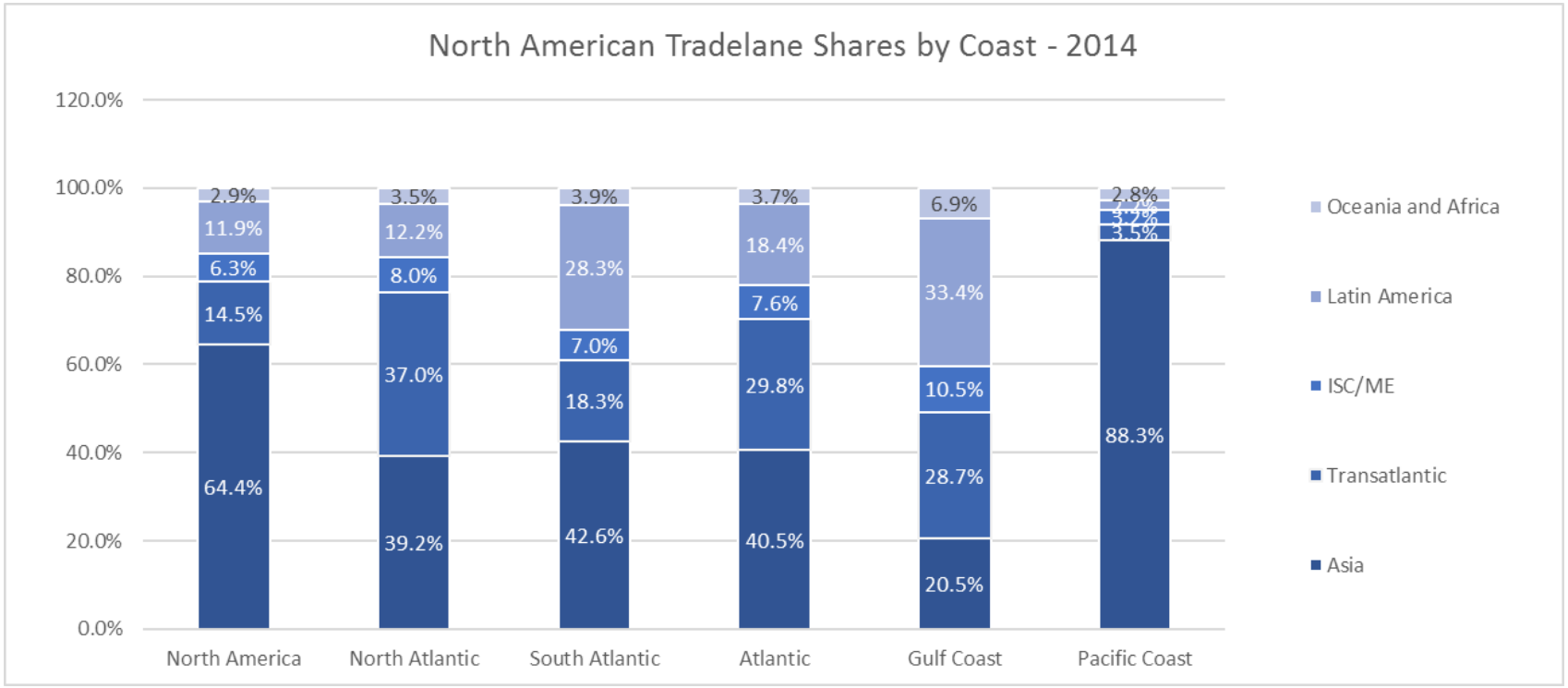
Historical Accuracy of the Linear Regression Model



Source: Mercator International, March 2016.

Demand Forecast Methodology - Tradelane Dimensions

- The composition of coastal zone volume by tradelane can vary greatly by trade lane across North America – especially for container traffic, as can be seen below:



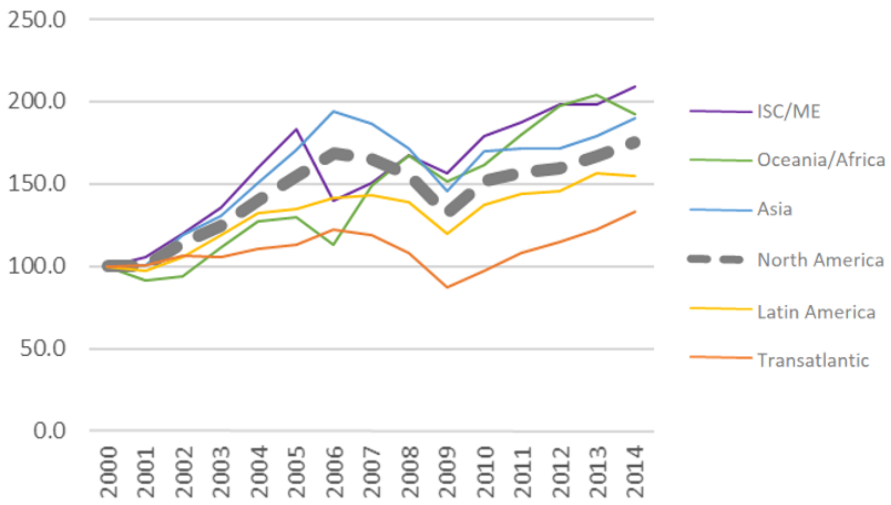
- Similar differences can be observed with other types of cargoes

Source: Mercator International, March 2016.

Demand Forecast Methodology - Tradelane Growth Differentials

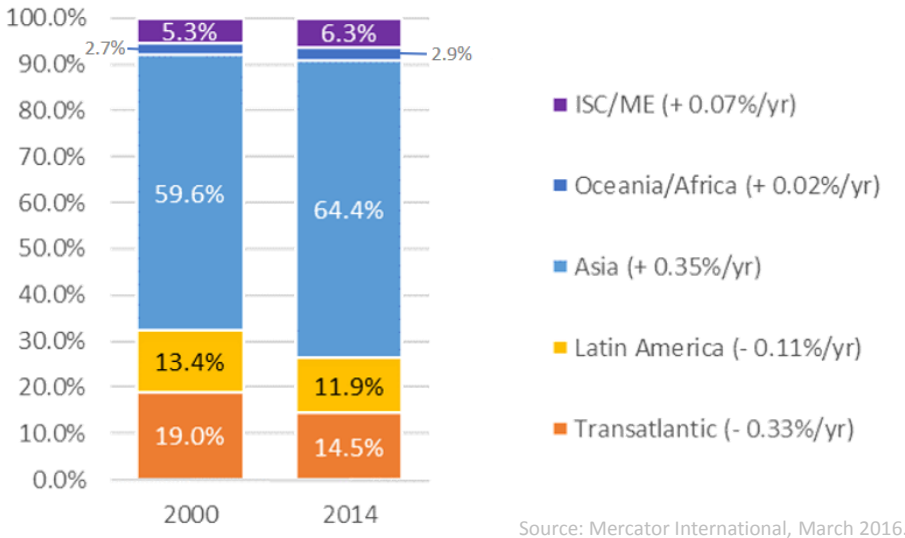
- By indexing historical tradelane volumes to 2000=100, the tradelanes that have gained share can be easily distinguished from those that have lost share (those growing faster than the continental rate will gain share while those growing more slowly will lose share).
- The ISC/ME, Oceania and Africa, and (most importantly) Asia tradelanes have all grown at rates that are above the North American rate, and the impact on shares can be seen in the accompanying bar chart.
- In terms of annual shifts, Asia's gained 0.35 percentage points per year (pp/y) was nearly completely offset by the Transatlantic loss of 0.33 pp/y.
- Similarly, Latin America's loss of 0.11 pp/y has been nearly completely offset by the gains of .07 and .02 pp/y in the ISC/ME and Oceania/Africa tradelanes, respectively.

Tradelane Volumes Index (2000 = 100)



Source: Developed by Mercator with data from the IMF WEO, October 2015.

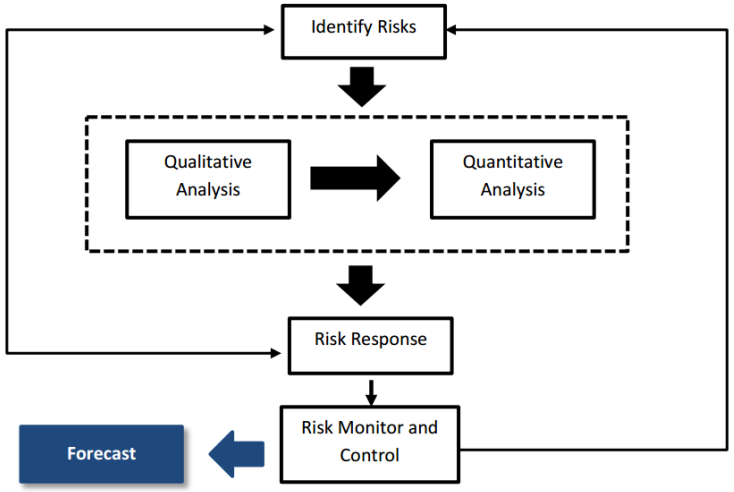
Shift in Tradelane Shares (2000 to 2014)



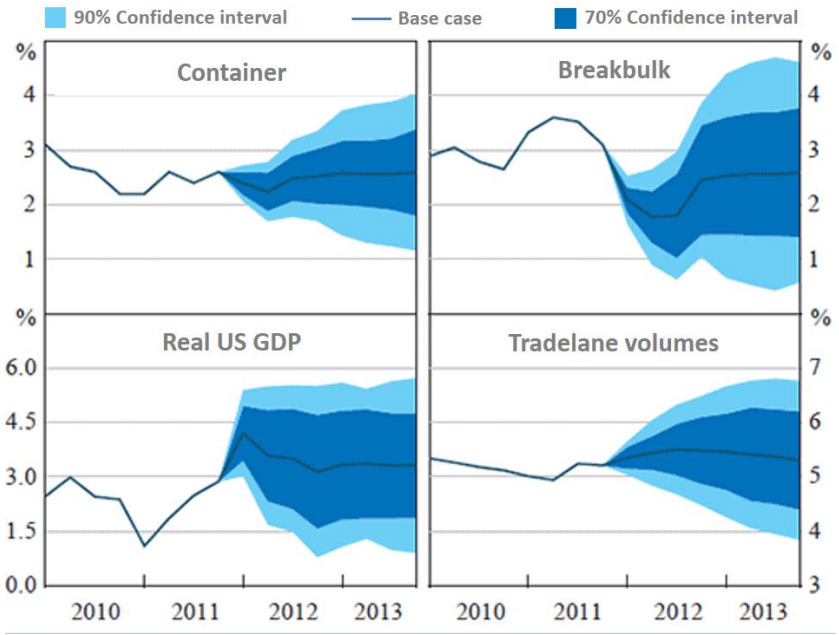
Source: Mercator International, March 2016.

Demand Forecast Methodology—Scenario Development

- After quantifying project risks, the forecast can be split into different scenarios, the most common of which would be the upside, base, and downside cases (optimistic, most probable and pessimistic).
- The pessimistic scenario incorporates the EMV of risks and the optimistic scenario incorporates the EMV of opportunities identified.

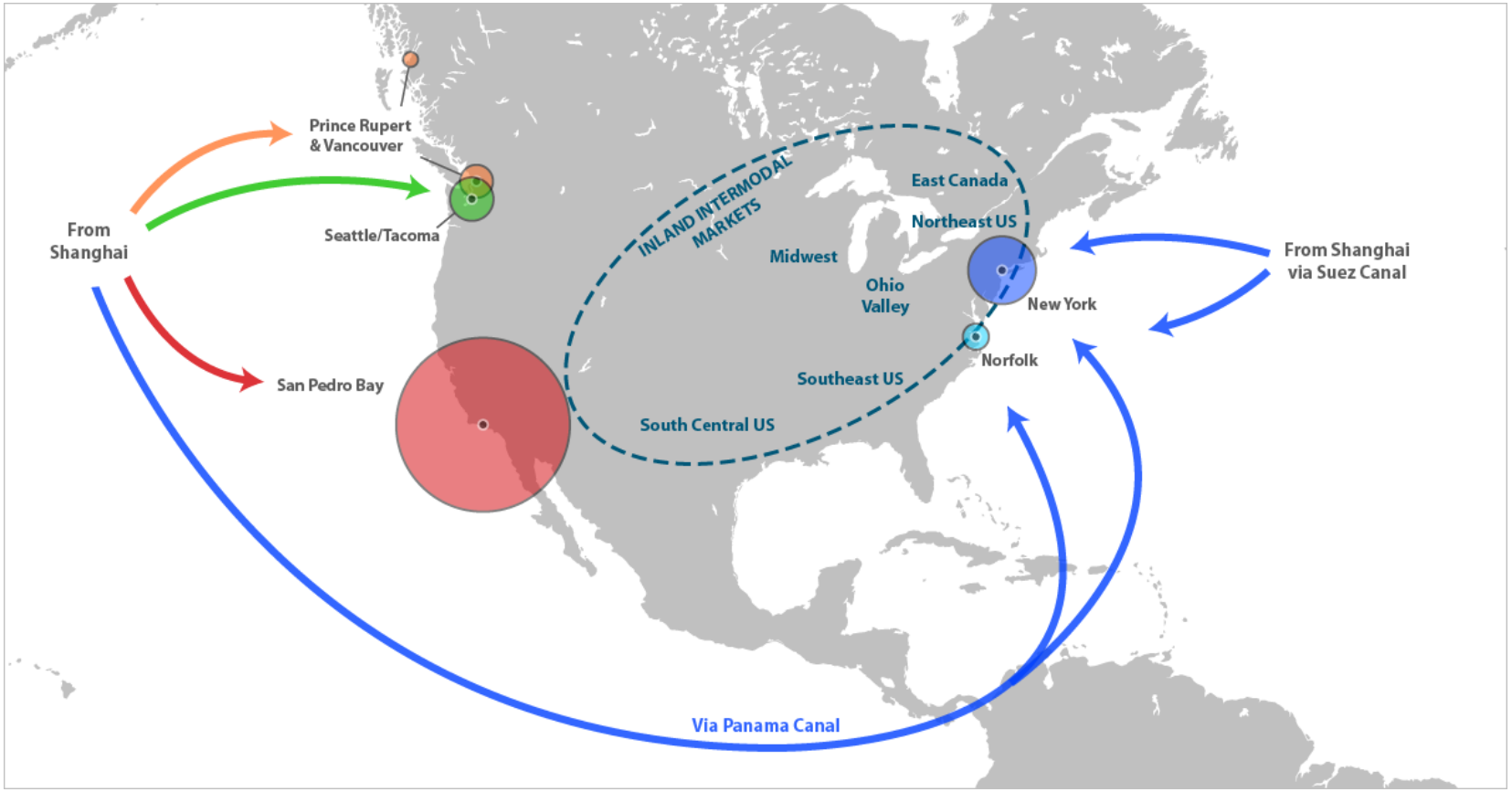


Typical Scenario Development Profile



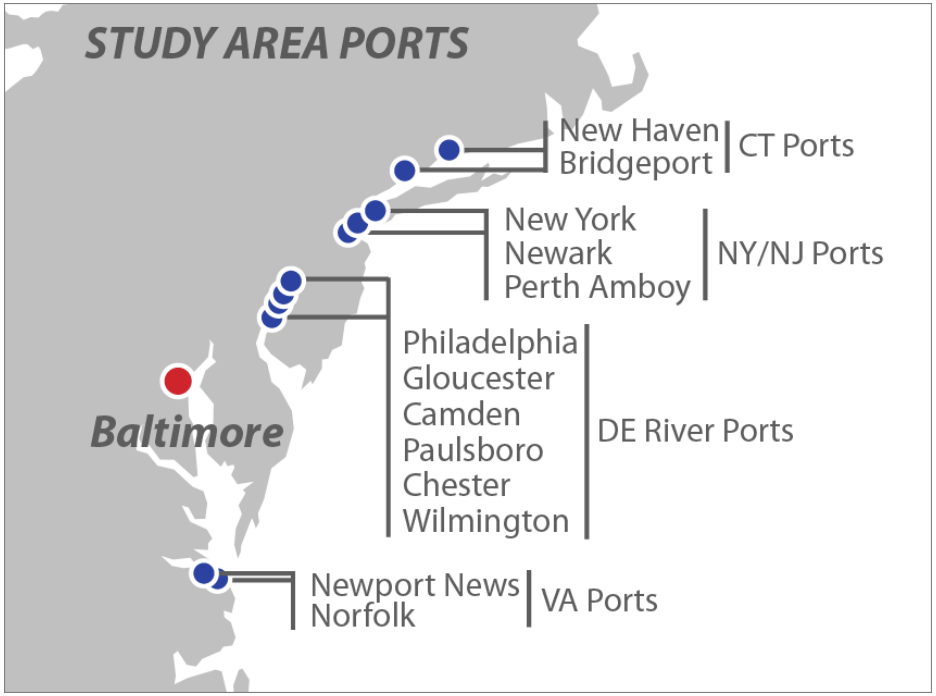
Market Share Analysis – Competition Framework

- Depending on the type of the targeted cargo for a port project, and the location of the port, the framework of competition for the project can encompass multiple ports
- For example, the competition for an expanded container terminal in Southern California includes terminals in BC and PNW ports, as well as East and Gulf Coast ports



Market Share Analysis – Competition Framework

- As an additional example, in a recent study assessing the demand for a new multi-purpose terminal (to handle break-bulk, dry bulk, and RO-RO cargoes) in a Middle Atlantic port, Mercator defined all of the ports shown map to the right as comprising the competition framework for the proposed facility

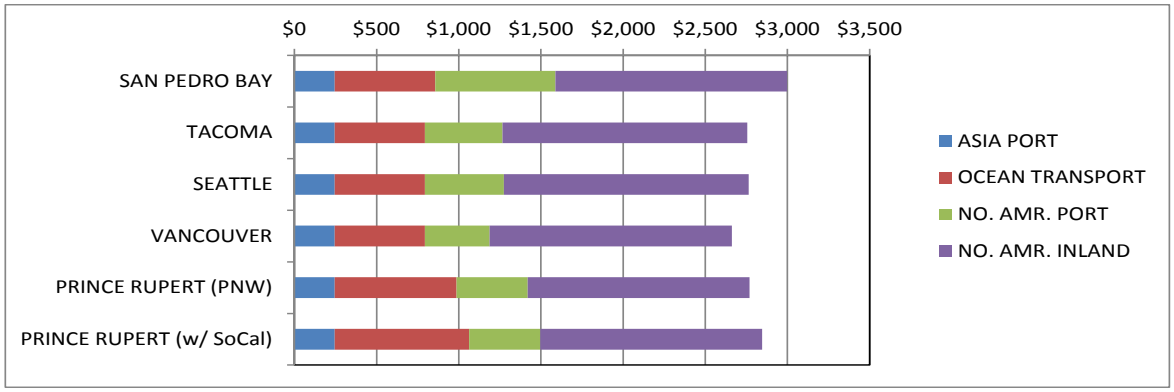


- Given the volumes of import/export cargoes that are destined to (or originate in) inland points well outside port metropolitan areas, the analysis of inland transport cost differentials between competing ports is a critical component of assessing a port's or terminal's competitive position

Market Share Estimating – Cargo Routing Cost Analysis

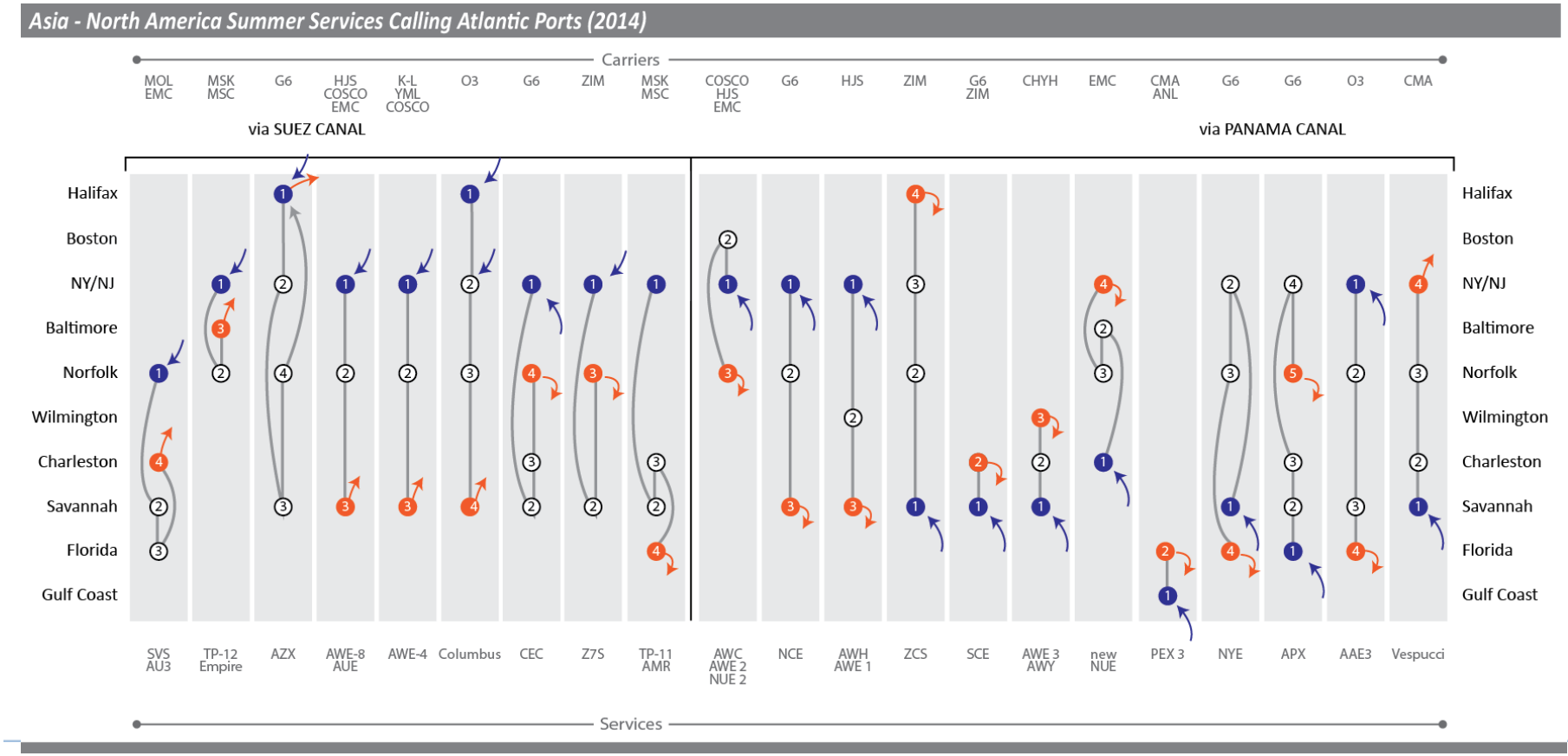
- For projects entailing construction of new, or expansion/renovation of existing terminals, integrated route cost analysis, combining inland cost differential analysis with models of ocean transportation costs, terminal costs, and equipment repositioning costs, is an essential tool for assessing the terminal's competitive position before and after project implementation.

GATEWAY PORT	VESSEL SERVICE DESIGN	---------- COST COMPONENT ---------- ASIA PORT	OCEAN TRANSPORT	NO. AMR. PORT	NO. AMR. INLAND	TOTAL ROUTE COST
SAN PEDRO BAY	FE - SPB - OAK - FE	245	611	732	1410	***2998***
TACOMA	FE - TAC - VCR - FE	245	549	472	1490	***2756***
SEATTLE	FE - SEA - VCR - FE	245	548	482	1490	***2765***
VANCOUVER	FE - TAC - VCR - FE	245	548	394	1475	***2662***
PRINCE RUPERT (PNW)	FE - PRP - VCR - TAC - FE	245	741	433	1350	***2769***
PRINCE RUPERT (w/ SoCal)	FE - PRP - SPB - OAK - FE	245	818	433	1350	***2846***



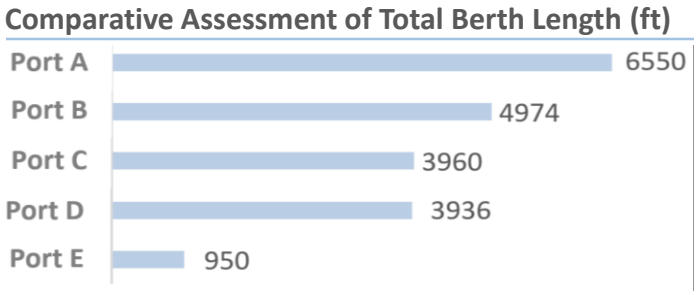
Market Share Estimating – Cargo Routing Service Analysis

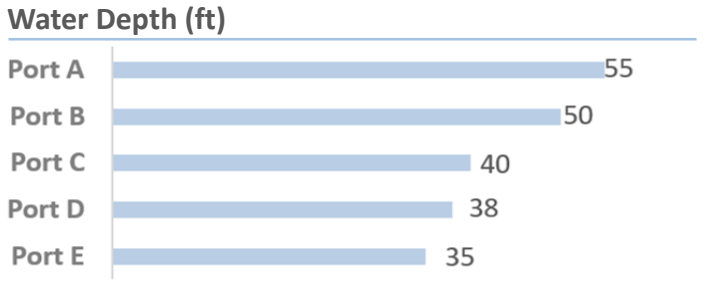
- Although transit time has increasingly become a less important factor in cargo routing decisions than total route cost, service differentials of more than one or two days can still have a bearing on a gateway port's share of discretionary cargoes
- Thus, an important element of assessing the expected market share of a port or terminal, post implementation of the project, relates to service competitiveness

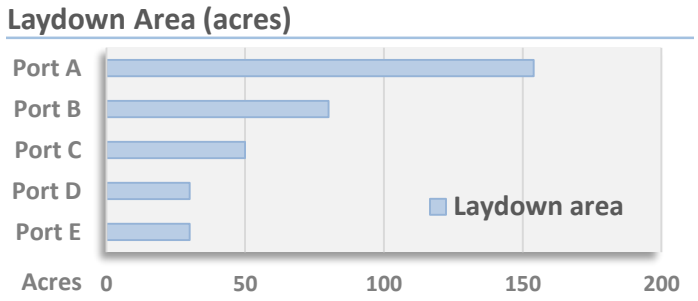


Market Share Estimating – Infrastructure Differentials

- Another essential tool in projecting future market shares of ports and terminals is the analysis of differentials in infrastructure parameters and capabilities
- The optimal parameters to utilize in such comparative analyses will vary, depending on the type(s) of cargo targeted for the project, but in general should include:
  - Total berth length and maximum contiguous (linear) berth length
  - Maximum ship displacement on berth
  - Water depth alongside berth
  - Crane outreach/maximum ship beam
  - Overall maximum ship dimensions
  - Total external cargo marshalling area
  - Annual thru-put capacity

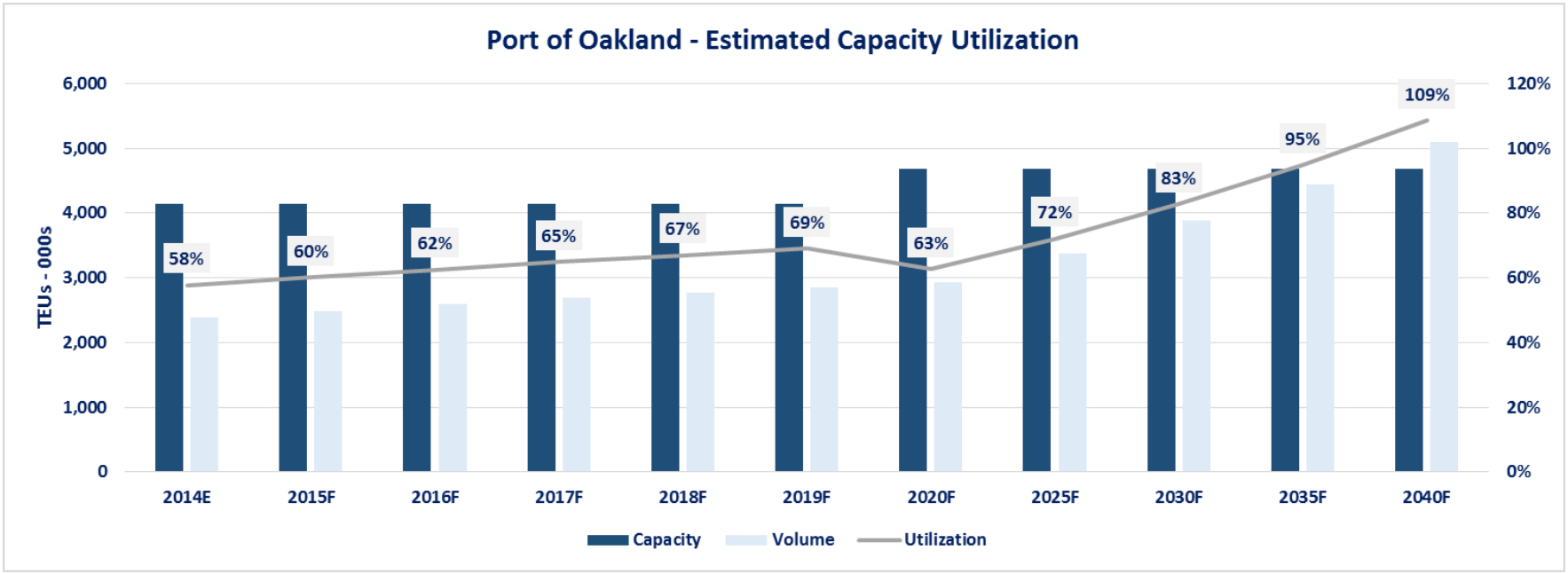






Price Forecasting – Demand/Supply Analysis

- In projecting the directions and quantums of changes in unit revenues for a port infrastructure development, it is important to first forecast the balance between aggregate cargo demand and terminal capacity supply over the relevant time period – whether for a given port or range of ports (depending on the competition framework)



- Additional analysis of the number of carriers serving the market versus the number of terminal operators, and the relative strength of each group is also a key element of price forecasting

Summary Points

- Commercial justification of a port infrastructure improvement project, that can help secure financing for the project, entails quantitatively addressing several key questions:
  - What is the expected growth of the cargo market(s) underpinning the project's ***forecasted*** volume?
    - *What macroeconomic and/or microeconomic factors cause that expected growth to be sustainable over the forecast period?*
  - What share of the market will the terminal/port be expected to capture from implementing the project?
    - *What competitive advantages will support the project's planned incremental volumes?*
  - In the near term, what pricing actions can be expected from competitors that could impact planned unit revenues for the project?
  - What is the expected outlook for terminal capacity demand versus supply during the forecast period, to support or impede long-term pricing increases?
  - What threats and risks could emerge during the forecast period that could significantly impact projected volumes and revenues?

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