How Global Trade Is Driving Demand For Ports

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**Industrial Property Management**
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Develops and executes creative public-private partnerships and local government negotiations.

**Capital Markets**
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**Industrial Project & Development Services**
Assists with master planning, peer review of construction and infrastructure pricing and architectural and engineering work product.

**Research**
Provides understanding of demand and supply chain trends as well as comparative market reconnaissance and benchmarking.

**Supply Chain & Logistics Consulting**
Provides understanding of demand and supply chain trends as well as comparative market reconnaissance and benchmarking.
Demand for port services remains strong

- The drivers of global trade remain intact
  - Benign global economic environment continues if productivity picks up
  - Growing global middle class
  - Waterborne freight costs continue to decline
- Congestion, slightly offset by automation, has impacted logistics and retail
  - Shopping at retail outlets is a lot less convenient
  - Logistics and transportation labor productivity declined
  - Worsening reliability requires more safety stock (inventory)
- The three T’s of policy indicate more growth ahead, particularly exports
  - Trade agreement renegotiation could open foreign markets
  - Tax reform incentives manufacturing capacity increases
  - Transportation infrastructure investment is critical
Best global economic environment in 20 years

ANNUAL REAL GDP GROWTH 2001 – 2018(E)

COMMODITY PRICES 1994 – 2018 (2018 =100)

Source: Oxford, JLL
Where is the US in the business cycle?

ANNUAL REAL GDP, PRODUCTIVITY AND EMPLOYMENT GROWTH 1948 – 2017

- Average expansion period between 1948 and 2018 is 19 quarters
- Longest expansion period was September 1990 to December 2000 (39 quarters)
- Current expansion period is 34 quarters
- Current expansion period is the first since 1948 not to experience a bounce-back
- Key question is why has growth slowed so significantly in the last few decades
What has happened to the drivers of GDP growth?

- Employment growth has slowed due to aging population and low labor demand growth
- Key question is why has productivity growth slowed so significantly in the last 10 to 15 years
US investment spending trends

US NON-RESIDENTIAL INVESTMENT SPENDING GROWTH 1950 - 2017

- Average investment spending growth from 1950 to 2017 was 4.9% per year
- Excluding recessions, investment spending growth averaged 7% per year from 1950 to 2017
- Since the 2007 – 2009 recession ended, average investment spending was 4.6% per year
- During the period since the recession corporate profits, dividends and share buybacks increased substantially
Slowing investment in transportation infrastructure

US PUBLIC SECTOR INVESTMENT IN TRANSPORTATION AS A PERCENTAGE OF GDP: 1956 - 2015

- Public sector investment in transportation infrastructure slowed more than private sector investment.

Source: Office of Management and Budget, Bureau of Economic Analysis, Census Bureau
Higher wage growth adds to inflation pressures

GROWTH IN HOURLY EARNINGS AND CONSUMER PRICE INDEX EXCLUDING FOOD AND ENERGY: 1960 - 2017

- The unemployment rate declined to 4.1% in January 2018.
- The January labor market report also stated that wages grew 2.5%.
- Rising commodity prices, transportation costs and labor costs result in “cost push” inflation.
Manufactured goods leads global trade volume growth

**WORLD REAL GDP AND TRADE INDEXES 1950-2015E**

<table>
<thead>
<tr>
<th>1950 - 2015 CAGR</th>
<th>Relative to GDP Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>3.7%</td>
</tr>
<tr>
<td>Manufactured Goods</td>
<td>7.0%</td>
</tr>
<tr>
<td>Fuels and Mining Products</td>
<td>3.8%</td>
</tr>
<tr>
<td>Agricultural Goods</td>
<td>3.5%</td>
</tr>
<tr>
<td>Total Trade</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

Trade is driven by:

- **Resources** – better to worse endowed countries
- **Demographics** – manufacture in low cost, high demand growth countries
- **Trade Agreements** – no barriers or burdens
- **Infrastructure** – road, rail, ports, fleets
- **Technology** – information and communication

Most trade agreements are focused on manufactured goods, not raw materials

Source: WTO, JLL
US containerized trade has recovered to new high levels

CONTAINER VOLUME TRENDS – MONTHLY 2006 TO 2016 (12 OF LARGEST 14 CONTAINER PORTS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Int'l Volumes</th>
<th>Change</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>37,912,734</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>40,291,297</td>
<td>2,378,563</td>
<td>6%</td>
</tr>
<tr>
<td>2007</td>
<td>40,867,520</td>
<td>576,223</td>
<td>1%</td>
</tr>
<tr>
<td>2008</td>
<td>38,664,705</td>
<td>(2,202,815)</td>
<td>-5%</td>
</tr>
<tr>
<td>2009</td>
<td>33,597,661</td>
<td>(5,067,044)</td>
<td>-13%</td>
</tr>
<tr>
<td>2010</td>
<td>38,593,130</td>
<td>4,995,469</td>
<td>15%</td>
</tr>
<tr>
<td>2011</td>
<td>39,244,570</td>
<td>651,440</td>
<td>2%</td>
</tr>
<tr>
<td>2012</td>
<td>39,919,197</td>
<td>674,627</td>
<td>2%</td>
</tr>
<tr>
<td>2013</td>
<td>40,816,094</td>
<td>896,897</td>
<td>2%</td>
</tr>
<tr>
<td>2014</td>
<td>42,622,719</td>
<td>1,806,625</td>
<td>4%</td>
</tr>
<tr>
<td>2016</td>
<td>44,265,397</td>
<td>1,642,678</td>
<td>4%</td>
</tr>
<tr>
<td>2017</td>
<td>47,368,071</td>
<td>3,102,674</td>
<td>7%</td>
</tr>
</tbody>
</table>

The four largest ports (Los Angeles + Long Beach, New York/New Jersey, Savannah and Seattle - Tacoma) handled 30.5 million TEUs or 65% of the national total.
Larger ships have lower average container costs

Race to build larger ships

- Few innovations in industry apart from building larger ships

Scatter chart of all containerships built 1956-2020

- Containerships delivered
- Converted containerships
- Semi-container ships
- Containerships on order

Source: Alphaliner, World Shipping Council
## Largest ocean carriers then and now

### TOP 20 IN 2012

<table>
<thead>
<tr>
<th>Rank Operator</th>
<th>Total existing TEU</th>
<th>Ships</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 APM-Maersk</td>
<td>2,589,081</td>
<td>614</td>
</tr>
<tr>
<td>2 MSC</td>
<td>2,191,401</td>
<td>459</td>
</tr>
<tr>
<td>3 CMA CGM</td>
<td>1,359,752</td>
<td>406</td>
</tr>
<tr>
<td>4 COSCON</td>
<td>721,299</td>
<td>160</td>
</tr>
<tr>
<td>5 Evergreen</td>
<td>720,508</td>
<td>183</td>
</tr>
<tr>
<td>6 Hapag-Lloyd</td>
<td>643,529</td>
<td>142</td>
</tr>
<tr>
<td>7 APL</td>
<td>586,462</td>
<td>129</td>
</tr>
<tr>
<td>8 Hanjin Shg</td>
<td>575,260</td>
<td>109</td>
</tr>
<tr>
<td>9 CSCL</td>
<td>571,781</td>
<td>149</td>
</tr>
<tr>
<td>10 MOL</td>
<td>513,760</td>
<td>112</td>
</tr>
<tr>
<td>11 OOCL</td>
<td>443,492</td>
<td>97</td>
</tr>
<tr>
<td>12 Hamburg Sd</td>
<td>414,560</td>
<td>100</td>
</tr>
<tr>
<td>13 NYK Line</td>
<td>408,481</td>
<td>95</td>
</tr>
<tr>
<td>14 HMM</td>
<td>363,682</td>
<td>63</td>
</tr>
<tr>
<td>15 K Line</td>
<td>342,855</td>
<td>70</td>
</tr>
<tr>
<td>16 Yang Ming</td>
<td>335,423</td>
<td>81</td>
</tr>
<tr>
<td>17 Zim</td>
<td>323,476</td>
<td>86</td>
</tr>
<tr>
<td>18 PIL</td>
<td>290,618</td>
<td>141</td>
</tr>
<tr>
<td>19 UASC</td>
<td>267,352</td>
<td>44</td>
</tr>
<tr>
<td>20 CSAV</td>
<td>264,231</td>
<td>59</td>
</tr>
</tbody>
</table>

### TOP 20 IN 2017

<table>
<thead>
<tr>
<th>Rank Operator</th>
<th>Total existing TEU</th>
<th>Ships</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 APM-Maersk</td>
<td>4,151,807</td>
<td>774</td>
</tr>
<tr>
<td>2 MSC</td>
<td>3,147,525</td>
<td>505</td>
</tr>
<tr>
<td>3 CMA CGM</td>
<td>2,514,170</td>
<td>504</td>
</tr>
<tr>
<td>4 COSCO Shg</td>
<td>1,801,243</td>
<td>335</td>
</tr>
<tr>
<td>5 Hapag-Lloyd</td>
<td>1,547,865</td>
<td>215</td>
</tr>
<tr>
<td>6 Evergreen</td>
<td>1,060,224</td>
<td>193</td>
</tr>
<tr>
<td>7 OOCL</td>
<td>689,118</td>
<td>100</td>
</tr>
<tr>
<td>8 Yang Ming</td>
<td>594,806</td>
<td>99</td>
</tr>
<tr>
<td>9 MOL</td>
<td>584,236</td>
<td>81</td>
</tr>
<tr>
<td>10 NYK Line</td>
<td>557,781</td>
<td>95</td>
</tr>
<tr>
<td>11 PIL</td>
<td>384,807</td>
<td>132</td>
</tr>
<tr>
<td>12 Zim</td>
<td>366,292</td>
<td>76</td>
</tr>
<tr>
<td>13 Hyundai M.M.</td>
<td>347,136</td>
<td>61</td>
</tr>
<tr>
<td>14 K Line</td>
<td>341,354</td>
<td>58</td>
</tr>
<tr>
<td>15 Wan Hai</td>
<td>235,591</td>
<td>90</td>
</tr>
<tr>
<td>16 X-Press Feeders</td>
<td>140,112</td>
<td>92</td>
</tr>
<tr>
<td>17 KMTC</td>
<td>127,585</td>
<td>59</td>
</tr>
<tr>
<td>18 Zhonggu Logistics</td>
<td>123,836</td>
<td>99</td>
</tr>
<tr>
<td>19 Antong Logistics</td>
<td>110,920</td>
<td>101</td>
</tr>
<tr>
<td>20 SITC</td>
<td>105,312</td>
<td>77</td>
</tr>
</tbody>
</table>

Source: JLL Research
Panama Canal expansion

Prior locks
Maximum capacity of transiting vessels
4,400 TEU

New locks
Maximum capacity of transiting vessels up to
14,000 TEU

Source: JLL Research
Accommodating larger vessels

Who pays?

- Federal Government
- State Governments
- Port Authorities

Source: JLL Research
What it means to handle a 13K TEU vessel service

13,000 TEU Vessel
95% Full
13,700 lifts to unload and load

77% moved by truck
10,600 one-way truck trips
122 miles of trucks end-to-end

23% moved by rail
9 unit trains
18 miles of trains end-to-end

642,200 TEUs per year
93,410,909 sf of DC space

Average Intermodal Shares of Various Ports
Los Angeles/Long Beach 40%
New York 25%
Savannah 18%
Norfolk 35%
Roadway congestion is getting worse

2020 CONGESTION FORECASTS, WITH TRUCKS

*No gas tax increases in 20 years left the Highway Trust Fund in financial distress*

*Other considerations:*

- FMCSA increased restrictions on Hours of Service
- National truck driver shortage estimated to be 200,000 drivers
- Younger generation prefers not to spend the night away from home
- Electronic Logging Devices (ELD) required as of April 1, 2018
Ecommerce trends

RETAIL AND ECOMMERCE SALES

- Ecommerce share of retail sales has increased from less than 1% in Q4-1999 to 10.5% in Q4-2017
- Ecommerce is expected to continue to gain share as retailers adapt their business models and re-optimize their distribution networks
- The goal is to develop a successful omnichannel strategy

Source: Census Bureau, JLL
How purchases were made in 2016

CONSUMER SEGMENTS BASED ON SHOPPING BEHAVIOR

- Research online and in store, buy in store: 22%
- Research online and in store, buy online: 16%
- Search and buy in store: 20%
- Search and buy online: 42%

A total of 58% of shoppers made purchases online in 2016, a shift away from in store purchases.

Survey of 5,000 shoppers in a Wall Street Journal study

Source: American Association of Port Authorities, JLL
Omnichannel strategy

Operating profile vs. distance to MSA

- Omnichannel is about maximizing share of each type of consumer
- Ecommerce requires more inventory in more places
- Successful retail outlets display more and hold less inventory
- Ecommerce fulfillment can be used to replenish retail outlets
- Successful omnichannel strategy requires more locations and types of structures
- Distribution networks development requires a lot more expertise compared to 10 years ago
Inventory-to-sales ratio is structurally different

CONSUMER SEGMENTS BASED ON SHOPPING BEHAVIOR

- Lower interest rates means capital tied up in inventories is less expensive
- Ecommerce/omnichannel means retailers hold more inventory in more places
- DCs are increasing in number, size and complexity
- Worsening congestion and truck driver shortage requires greater safety stocks

Source: Census Bureau, JLL
Inland hubs are becoming more numerous

Four Kinds of Inland Hubs:

- DC clusters, e.g., Inland Empire
- Railyards, e.g., Logistics Park Kansas City
- Private sector developments, e.g., Centerpoint
- Public sector operated, e.g., Cordele

Source: JLL Research
Growing global middle class is the largest sustainable source of growth

- For US growth to be sustained above 3% it will be necessary to sell into this market
- US exports are the focus of the current national economic policy

Source: OECD, US Census Bureau
The trade deficit value gap

GOODS TRADE DEFICIT IN US$: 2003 – 2016E

GOODS TRADE DEFICIT IN METRIC TONS: 2003 – 2016E

- US imports high value per ton goods and exports low value per ton goods
- Imports have been able to support import-oriented infrastructure investment
- To support higher economic growth, the US needs to focus on growing low value per tons
Non-containerized trade trends

- Liquid bulk, petroleum and natural gas, provide the best opportunities to improve the US trade deficit
- US must focus on growing agriculture, capital goods and energy exports

Source: Census Bureau, JLL
Summary

• The drivers of global trade remain intact

• Unbalanced investment in freight corridors underlies the West to East coast shift

• The three T’s of policy indicate more growth ahead, particularly exports
PAGI thanks you for your time

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