UNIVERSITY of WISCONSIN Superior

Department of Business & Economics

McNair Research Report:

# China's Accession to WTO:

# Implications for Chinese Exports and

# US Marine Transportation Infrastructure

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**Abstract**

This is a two-part study: First, it examines the impacts of China's accession to the World Trade Organization (WTO) on China's exports to US; second, it assesses the implications of changes in Chinese export trade flows on US marine transportation infrastructure. Specifically, using Zepol and UN Comtrade data and OLS regression as a method of analysis, this study assesses the value and volume of Chinese exports to US by commodity before and after China's accession to WTO. According to the commodity value results, China's accession to the WTO benefited exporters of selected commodities. For commodity volume, data limitations prevented us from testing the effects of WTO membership on the trade volume. However, using post-WTO accession data, we were able to determine that west coast US ports, including Long Beach & Los Angeles, tend to be the predominant destination points for Chinese exports. Further, using the Port of Long Beach as a case study, we forecasted the implications of increasing Chinese exports on the port's capacity. Assuming that the case study port's capacity does not change over time, increasing Chinese exports are projected to reach the port's capacity around 2050. To summarize, the study found that WTO membership has indeed helped increase both the volume and value of Chinese exports to the United States; and that given the expected growth in Chinese exports, specifically to the Port of Long Beach, there is no urgent need to increase the port's throughput capacity.

## Introduction

As a student majoring in Transportation & Logistics Management and Economics, I wanted to conduct a study that allowed me to combine my knowledge of transportation networks and economic globalization. Specifically, after undergoing an internship with CH Robinson in Hong Kong, I wanted to explore how China's accession to WTO has impacted its trade relations with the US, and the implications of these trade changes on US transportation networks. Thanks to the McNair Scholars Program, I was able to realize my goal.

## Literature Review

### *World Trade Organization*

The World Trade Organization (WTO) is an international organization that deals with the rules of trade between nations through agreements, negotiations, and dispute settlements (World Trade Organization, 2015). Many countries join the WTO to strengthen their economic standing through the benefits of trade liberalization. Further, by joining the WTO, countries commit to the international commodity standards helping to promote their exports. In line with the gradual reforms China had been initiating years prior to the turn of the Millennium, after rounds of negotiation and preparation, China was accepted into the World Trade Organization in December of 2001. This step implied greater trade liberalization and promised to stimulate the country's economy and improve the standards of living.

*Pre-accession Negotiations*

China's accession to the WTO was preluded with a unique history that provided some doubt to its fit within the organization. Due to China's communist revolution, the Republic of China's government fled to nearby Taiwan, while the Mainland established the People's Republic of China (Mastel, 2000). Even though China was initially involved with international trade organizations, such as the General Agreement on Tariffs and Trade (GATT), the newer PRC had no interest in trade institutions like GATT (Mastel, 2000). The PRC's disinterest in global trade organizations, combined with policies discouraging trade, led to an era of being closed. However, in the late 1970's, China started opening to trade with the rest of the world and started to establish relations with GATT-affiliated organizations and countries to secure markets for their developing textile industries (Mastel, 2000). Even with the gradual opening, the PRC still had a strong presence of state representation in its businesses as structural shifts were occurring.

Apart from China's domestic politics, foreign affairs were critical in the process of accession to WTO. Although China's trade with western countries became well balanced, relations between them were often off-kilter from the mid-1980's to mid-1990's (Mastel, 2000). After this time, the WTO had taken China's application with greater seriousness, and bilateral negotiations between China and key member countries in the WTO made some headway. Countries specifically interested in China as a trading partner became the "working group," which pushed for China to make commitments to lower tariffs and other concessions that would parallel China's trade

regime with current WTO participants (Mastel, 2000). While the United States played the largest role, other countries like Japan, Canada, and nations within the European Union also made bilateral agreements with China (Mastel, 2000). Several highlights of the many agreements made with China included a safeguard for existing WTO members initiating temporary limitation of Chinese exports that could potentially disrupt other's local markets and included the establishment of rules on the dumping of Chinese exports with unfair pricing (Mastel, 2000). In addition to preventing unfair export practices, China was required to lessen tariffs and other barriers so that foreign countries could export to China.

Most negotiations between China and members of the WTO were focused on opening China up through lessening restrictions on foreign imports, and not focused on lessening restrictions of China's exports into WTO members' economies. However, a major exception to this—and is one such exception that applies directly to this study—occurred during discussions in November of 1999. The United States consented to "phase out all current textile and apparel quotas for China by 2005—the same schedule applied to other countries," which the U.S. had previously strongly opposed (Mastel, 987). This phasing out of tariffs was expected to lead to a greater volume of products, especially textile, exported from China to the U.S. after 2005.

*China's Accession to WTO*

One has to have lived under a rock to have not heard of the efforts and successes of the Chinese economy. China's annual growth rate in GDP has been an approximate steady 10.5 percent increase over the first 10 years of WTO membership, and has allowed

China to leap-frog rankings from the sixth highest position to the second in terms of overall GDP (Li, Wang & Wang, 2013).

China maintained its commitment to trade liberalization, even though it has continued a strong trade protectionist position prior to WTO. Negotiations on anti-dumping (AD) policies—or policies that prohibit the act of exporting commodities and selling them in foreign markets at prices lower than they are marketed for domestically—were a large contribution of China's accession to WTO. China, due to much lower labor costs and an abundance of natural resources, could move into foreign markets, and take out the competition with extremely low priced goods resulting in market domination. This is considered an unfair trade practice, and many countries employ protectionist policies to prevent this from happening. Only two years after accession, China submitted its first proposal calling for stricter disciplines to AD, limiting the discretion of governments in using AD measures and would be considered 'pro-trade,' showing China's compliance with WTO (Harpaz, 2011). From 1997 to 2009, the number of China's AD investigations totaled 178, which, is much less in comparison to countries such as India, U.S. and the E.U. at 569, 404, and 348 respectively (Harpaz, 2011). The lower the number of investigations over this time period, the more pro-trade a country can be viewed in this aspect. China also conveyed that this is impressive because of the volume of imports that flowed to China after it joined the WTO (Harpaz, 2011). Moreover, transparency in government can indicate a level of compliance. In terms of reporting on AD legislation, measures and enforcement, China has a good record in that they have "submitted most AD notifications on a timely basis" since joining the WTO (Harpaz, 752).

Overall we see China's performance as stellar after joining the WTO, and see that it is compliant with the trade liberalizing nature of the WTO. It can be expected that this will reflect well in analyzing commodity valuation and volume trends for China's exports to the U.S.

*Trade Liberalization & Economic Growth*

When studying China's international trade, the following theories and concepts provide a theoretical foundation for understanding what commodities the country is likely to export and what commodities the country would import:

- Principle of comparative advantage (D. Ricardo): Countries should specialize in the production of goods and services which they can produce at a lower opportunity cost than other countries, then trade their goods for the goods produced by other countries.
- Factor Endowment Theory (Hecksher-Ohlin): Economies that are endowed with resource x—be it labor, capital, natural resources, etc.—should utilize that resource and create comparative advantages by producing goods and services that heavily utilize the said resource (Sen, 2010). China is well-endowed with labor resources and hence should specialize in labor-intensive manufacturing. In turn, by developing comparative advantage in labor-intensive manufacturing, China would produce goods at a lower opportunity cost than the US, for example.
- New trade theory (P. Krugman): This theory is based on the increasing returns to scale and network effects, where the more firms of a certain industry (x) are

located in a specific area, the better the infrastructure and handling of resources for the products/services created by that industry. This provides increasing returns to scale, or the lowering of average costs of producing a unit of product with higher production volumes, as industries try realizing economies of scale while lowering transportation costs and create a strong core-periphery network within a given area (Krugman, 1991). Extending this idea, China should be producing certain goods more efficiently as demand for manufacturing those goods increases in certain areas and as scaling and network effects are experienced by those industries. The top commodities should reflect these effects.

- Gravity model (Tinbergen): The theory behind gravity model implies that economies are much more likely to engage in trade with other like economies. "Like" economies can be defined as economies that share close proximity, similar geography, similar culture, as well as relationships through trade agreement. By joining the WTO, we should see China increasing trade with similar partners, large economies that are members of WTO (Anderson, 2011).

**Empirical Study**

*Models*

Two sets of studies were conducted: First, a study of the impacts of WTO membership on value of Chinese exports to US, and second, a study of volume of Chinese exports to US. Models and hypotheses for each study are outlined below.

Commodities value

There are 3 main OLS regressions that included commodity exports value as a dependent variable y:

$$y_n = \alpha + \beta_1 t + \beta_2 WTO + \Omega_n$$

$$y_n = \alpha + \beta_1 t + \beta_2 WTO + \beta WTO * T + \Omega_n$$

$$y_n = \alpha + \beta_1 t + \beta_2 WTO + \beta WTO * T + \Omega_n * WTO * T$$

where the first model includes the constant, coefficient for time, coefficient for WTO, and where $\Omega$ is a vector of dummy variables expressing the fixed effects for each commodity. The second model builds from the first, and includes an interaction term WTO*T to measure the change in the trend slope after the WTO accession, or a structural break. In the third model, interaction terms are added to measure the effects between WTO, T and the commodity dummy variables.

Commodities volume

Due to lack of data on commodities volume before China's accession to WTO, the following model was limited to post-accession period:

$$\upsilon_{it} = \alpha + \beta_1 t + \beta_2 WC_i + \Phi_i$$

where the dependent variable is the commodity volume measured in TEUs, and independent variables include a constant, time trend, dummy for West Coast, and $\Phi$ is a vector of dummy variables for each port (ten in total).

*Hypotheses*

1st Hypothesis: Ceteris paribus, the value of commodities transported from China to U.S. increases upon China's accession to the World Trade Organization.

2nd Hypothesis: Ceteris paribus, increases in volume of products exported from China to US will increase the demand on destination port's infrastructure.

*Data*

This study used U.S. import and export data from a global trade intelligence source Zepol.com. Data series such as bill of ladings and Harmonized Tariff Schedule Codes have been identified for past trends in commodity flows from China to US before and after China's accession to WTO. Moreover, this global trade database has been used to find volumes of commodities flowing through the most active ports in the U.S. to gain insight on demands on US marine transportation infrastructure. Data gathered from UN Comtrade has been used to value the top commodities flowing from China to U.S. and has been considered in coordination to any found changes in tariffs. Statistical analysis techniques, such as OLS regression and a structural break in time-series have been used to test for significant shifts in commodity flow changes.

*Description of Data*

Top 11 Commodity Values

From the years 1992 to 2013, data on top China's export commodities were collected from the combination of online sources UN Comtrade and Zepol.com. This time period was selected as it offers enough observations before and after China's accession to WTO in 2001 to pick out general trends from the effects of accession. Data from UN Comtrade provided the values of commodity exports from China to US, while data from Zepol contained aggregate shipment volumes in terms of Twenty-foot Equivalent Units (TEUs, a standard for shipping containers), and tons.

Commodities gathered were categorized by the Harmonized Tariff Schedule, an international system for identifying and categorizing goods transported internationally for the use in determining import/export taxes between countries. For this study, the first two number codes for the Harmonized Tariff Code is utilized for the differentiation of commodities, which provided a broad picture on exported commodities.

Results yielded the following commodities that ranked among the top 11 commodities by value imported into the U.S. from China at least once in 1992-2013:

- 27 – Mineral fuels, oils, distillation products, etc
- 39 – Plastics and articles thereof
- 42 – Articles of leather; saddles and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)
- 61 – Articles of apparel and clothing accessories, knitted or crocheted
- 62 – Articles of apparel and clothing accessories, not knitted or crocheted

- 63 – Other made textile articles, sets, worn clothing etc
- 64 – Footwear, gaiters and the like; parts of such articles
- 67 – Bird skin, feathers, artificial flowers, human hair
- 73 – Articles of iron or steel
- 84 – Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof
- 85 – Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles
- 87 – Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof
- 90 – Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof
- 94 – Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings
- 95 – Toys, games and sports requisites; parts and accessories thereof

The table below provides an explanation for the variables within the dataset in relations to the commodities study. After running regression analysis, these 15 commodities have been sifted down to the five commodities that showed significant

changes during the time period examined, and will be further elaborated on in the results section.

**TABLE 1. VARIABLE DESCRIPTIONS**

| Variable | Description |
|---|---|
| Commcode | Commodity's 2-digit HTC code |
| Comm | Name & Des of commodities categorized |
| ValueUS | Overall value of goods transported as reported by US |
| TEU | Amount of commodity transported by 20 Equivalent Units |
| Exrate | The exchange rate observed between USD and Yuan |
| WTO | Dummy: 1 = member of WTO; 0 = has yet to join |
| WTO*T | Interaction term of WTO & time trend to measure change in slope of structural break |
| Year | Expresses the point in time by year (1992-2013) |
| Fixed Effects | Variables that signify if obs. is a certain commodity. 1=specified commodity; 0 = different commodity.<br>For the port studies, the variables signify if obs. is related to a certain port. 1=specified port; 0 = different port. |
| Interaction terms | Variables that capture dynamics between the fixed effects and WTO*T. |

*U.S. Most Active Container Ports by Throughput*

Data retrieved from Zepol.com revealed that the ports that appeared most often in top 10 most active U.S. Ports from the years 2004 to 2014—in no particular order—are as follows:

- Charleston, SC
- Long Beach, CA
- Los Angeles, CA
- Miami, FL
- New York, NY
- Newark, NJ
- Norfolk, VA
- Oakland, CA
- Savannah, GA
- Seattle, WA
- Tacoma, WA

The ports here represent ports that have the most throughput of specifically goods that are from China in which U.S. is the destination, and therefore does not quantify the total throughput experienced by each U.S. port. According to preliminary data analysis, West Coast ports tend to receive significantly more volume than the East Coast ports. It is for this reason that locations on the West Coast have been captured by a West Coast dummy variable.

*Endeavors for Enhancing US Marine Transport Infrastructure: Case Study*

Port of Long Beach was identified as one of the main destinations for Chinese exports, so it was selected as a case study port to assess the impacts of increasing Chinese exports on the port's infrastructure.

According to a current news release by the port of Long Beach, March of 2015 showed the release of a new system to pool chassis and ease equipment shortages (The Port of Long Beach, 2015). This improved efficiency as backlogs of cargo from congestion built up at West Coast ports over recent months were cleared (The Port of Long Beach, 2015). Plans to further invest in the infrastructure of Long Beach revealed a focus on impacts of the port rather than the capacity for throughput. There is an ongoing $4 billion program that is modernizing the equipment and facilities of Long Beach to further develop environmentally sustainable growth (The Port of Long Beach, 2015). This shift may be caused by both social movements in recent years within the industry, as well as potentially identified cost savings for the port. Long Beach's decision to focus on this aspect of infrastructure enhancement will factor into the analysis later on.

Following the brief exercise in researching the port of Long Beach, the current burden and capacity of the port must be identified. Current capacities for the A & T terminals of Long Beach, CA is about 5.5 million TEUs inbound annually (USA Port Terminals, 2015). Although it can only handle that amount for TEUs entering the port, the port handled an accumulative 6,820,806 containers in 2014, of which 3.5 million were loaded inbound and 1.6 million were loaded outbound (The Port of Long Beach, 2015). Unfortunately,

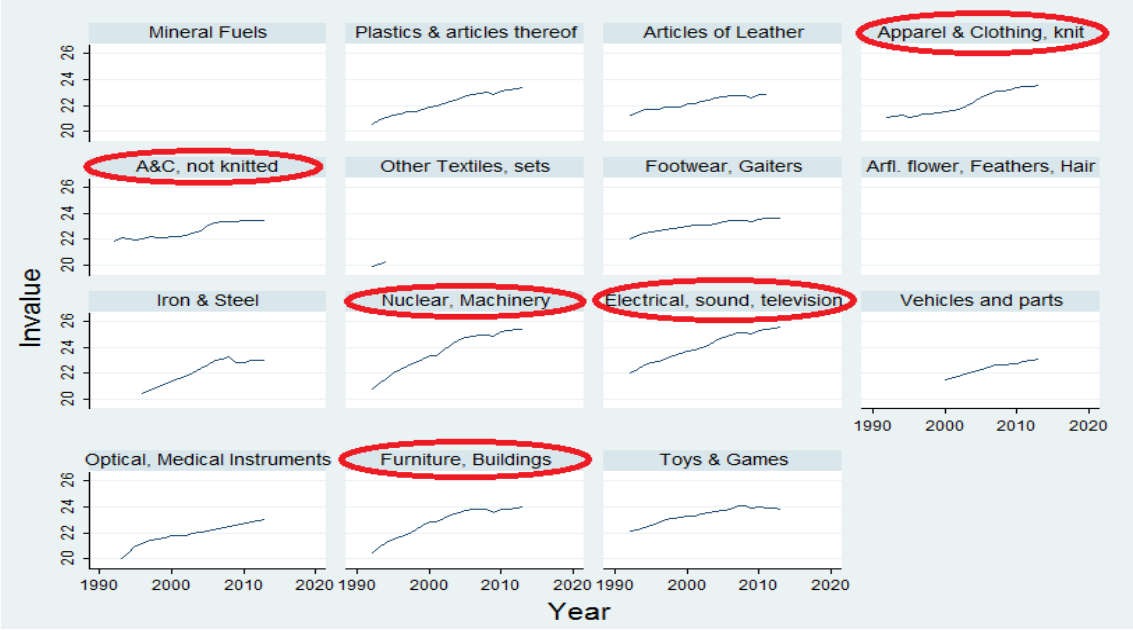
empty containers are still an issue, and reached volumes of almost 1.7 million (The Port of Long Beach, 2015).

**Preliminary Analysis**

*Commodities*

Pre-diagnostic screening revealed that not all commodities showed promising growth, even among the top 11 commodities over the 21 year period. According to figure 1, we see that 5 commodities show the most promising results: the two apparel and clothing commodities of knitted & un-knitted, nuclear reactors, electrical machinery, and furniture & prefabricated buildings all show large growth or significant changes. Therefore, focusing on these five variables will show the largest benefits of WTO on specific Chinese exports to the U.S. For both apparel and clothing variables, we see a gradual increase in the valuation until around 2005, where there is a large upward shift. This is expected and in line with the current literature review, where U.S. agreed to eliminate all tariffs for textiles and fabrics by 2005.

**FIGURE 1. TOP COMMODITY VALUES**

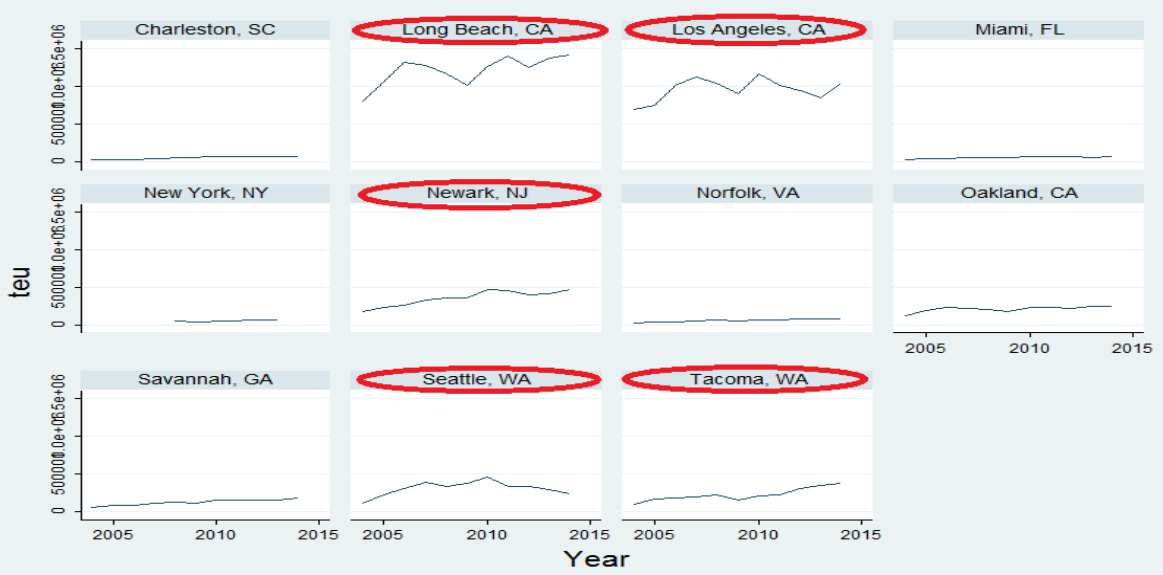



Next, the commodity data was checked for multicolinearity to determine any biases (see figure 2). Due to the nature of many variables being dummy variables, correlation was not found to be exceedingly high. The only cases of high correlation were between the variables lnvalue (dependent variable) and T, WTO as well as between T and WTO. These correlations ranged from .6399 up to .8520. However, we do not have to worry about multicolinearity dynamics between these specific variables due to the time-series nature of this data set.

**FIGURE 2. COLLINEARITY MATRIX**

| | lnvalue | t | dwto | knitcode | unknit~e | steelc~e | nuclea~e | furncode |
|---|---|---|---|---|---|---|---|---|
| lnvalue | 1.0000 | | | | | | | |
| t | 0.7235 | 1.0000 | | | | | | |
| dwto | 0.6399 | 0.8520 | 1.0000 | | | | | |
| knitcode | -0.1506 | 0.0013 | 0.0011 | 1.0000 | | | | |
| unknitcode | -0.0183 | 0.0013 | 0.0011 | -0.1005 | 1.0000 | | | |
| steelcode | -0.1230 | 0.0995 | 0.0983 | -0.0873 | -0.0873 | 1.0000 | | |
| nuclearcode | 0.2635 | 0.0013 | 0.0011 | -0.1005 | -0.1005 | -0.0873 | 1.0000 | |
| furncode | 0.0338 | 0.0013 | 0.0011 | -0.1005 | -0.1005 | -0.0873 | -0.1005 | 1.0000 |

**FIGURE 3. COMMODITY VOLUMES BY PORT**




*Ports*

Pre-diagnostic screening of the ports revealed that, much like the commodities and their values, not all ports experienced significant increases in trade volumes of Chinese exports as time goes on (see figure 3). The figure displays that, of the top 10 ports, 5 show significant changes. The 5 ports are indicated with red and are as follows: Long Beach, Los Angeles, Newark, Seattle, and Tacoma. Most of the ports with seemingly

significant changes are on the West Coast, while only one port—Newark, NJ—is located on the East Coast. Of the ports, Long Beach shows the most rapid growth in Chinese exports; therefore, an exercise has been conducted to check the necessity of expanding operations or investing in equipment at the port to increase its throughput capacities.

**Results**

*Commodities Findings*

Table 2 shows the three OLS regression results that explain the exported commodity values. Upon accession into the WTO, there is an initial 19.07% increase in value for commodities across the board. For knitted clothing and apparel there is a growth in value between 68.45% and 81.92%. Unknitted clothing and apparel displayed a much higher growth in value from 126.18% to 150.23%. Nuclear reactors and machinery had significant growth from around 169.74% to 233.25%. The highest growth in value shown is for electrical equipment and ranges from 238.28% to 269.29%, which is quite remarkable. The last of the five commodities focused on is the category furniture and prefabricated buildings, which had a variation in growth from 124.91% up to 149.31%.

**TABLE 2. COMMODITY VALUE REGRESSION RESULTS**

| *Variable* | *R1* | *R2* | *R3* |
|---|---|---|---|
| *Constant* | *19.8939**** | *19.7430**** | *19.7263**** |
| *WTO* | *.1907**** | *.1907**** | *.1907**** |
| *Knitcode* | *.8192**** | *.7784*** | *.6845**** |
| *Unknitcode* | *1.3026**** | *1.2618**** | *1.5023**** |
| *Nuclearcode* | *2.3325**** | *2.2917**** | *1.6974**** |
| *Electriccode* | *2.6929**** | *2.6521**** | *2.3828**** |
| *Furncode* | *1.4931**** | *1.4523**** | *1.2491**** |
| *Constant* | *19.8939**** | *19.7430**** | *19.7263**** |
| *WTO* | *.1907**** | *.1907**** | *.1907**** |
| *Knitcode* | *.8192**** | *.7784*** | *.6845**** |
| *Unknitcode* | *1.3026**** | *1.2618**** | *1.5023**** |
| *Nuclearcode* | *2.3325**** | *2.2917**** | *1.6974**** |
| *Electriccode* | *2.6929**** | *2.6521**** | *2.3828**** |
| *Furncode* | *1.4931**** | *1.4523**** | *1.2491**** |
| *Fixed Effects* | *Remaining codes* | *Remaining codes* | *Remaining Codes* |
| *Interaction Terms* | - | *WTO*T* | *Knit, Unknit, Electrical, Nuclear, Furn, WTO*T* |
| *# Observations* | *241* | *241* | *241* |
| *Probability > F* | *0.0000* | *0.0000* | *0.0000* |
| *Adj. R-sq* | *.9029* | *.9062* | *.9594* |

Fixed effects of the remaining codes were included in all three regressions. Interaction terms were included in the second regression, and were capturing the dynamics between the WTO and trend T variable. The third regression included interaction terms capturing the dynamics between WTO, trend T as well as between the WTO, T, and commodity dummies. For all regressions, the numbers of observations were at 241, clearing the conditions for the central limit theorem. The statistical significance of each

regression as a whole attained significance at 1%, and adjusted coefficient of variations ranged from .9029 to .9594, indicating high explanatory power of the variables chosen for the regressions.

*Port Findings*

Table 3 shows the OLS regression results of the TEUs of the top 10 ports. Starting off, the West Coast ports receive 160.8% more in TEUs than that of the East Coast ports. In addition to this, Long Beach is receiving 176% more TEUs than other ports.

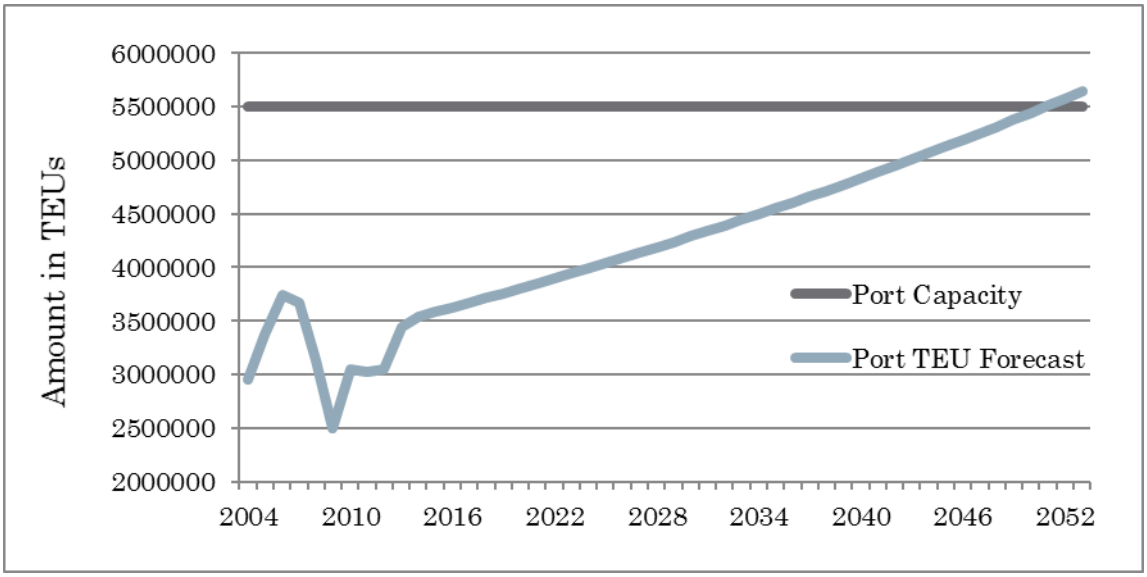
**TABLE 3. COMMODITY VOLUME REGRESSION RESULTS**

| *Variable* | *Coefficient* |
|---|---|
| *Constant* | *10.1932**** |
| *Westcoast* | *1.6081**** |
| *Long Beach* | *1.7587**** |
| *Newark* | *2.1121**** |
| *Los Angeles* | *1.523**** |
| *Seattle* | *1.0243**** |
| *Tacoma* | *.3475**** |
| *Fixed Effects* | *Remaining Ports* |
| *# Observations* | *110* |
| *Probability>F* | *0.0000* |
| ***Adj. R-sq*** | *.9667* |

Next, using a simple forward forecast, the year in which the growth of commodities would surpass the current capacity, or maximum ability to handle imported container loads, was ascertained. In figure 4, data extrapolation of the growth in volume of Chinese goods was used from over the years 2004 to 2014, combining this growth with the totals of the port of Long Beach. In the graph we see volumes steadily rising from around 3 million TEUs imported to 3.75 million TEUs. At the onset of the 2008 recession, we see annual imports declining to a local minimum of 2.5 million TEUs.

From there, small booms and gradual increases occur into 2014. The forecast begins at 2015 and steadily increases. All else held constant, it is not until 2050 that Long Beach's total import capacity of 5.5 million TEUs is projected to be reached as a result of increasing inflow of Chinese imports.

**FIGURE 4. PROJECTIONS OF PORT CAPACITY FOR THE PORT OF LONG BEACH**




The results showed that at the current growth rate in volume of commodities, port capacity would not be surpassed until around 2050. In accordance with this time horizon, it would not make sense to invest in port infrastructures in terms of enhancing the capacity of throughput. Moreover, combining the current investment strategy of Long Beach with this simple exercise warrants their move to increase the environmental efficiencies of the ports by modernizing the facilities rather than increasing the raw number of containers the port can handle annually. While evidence supports this, it is good form to keep this in mind as time moves onward, and annual reevaluations should

be considered in case of sudden surges of trade volumes from China or perhaps other nations trading through Long Beach.

**Conclusion**

The first research hypothesis is supported for the following commodities: 39 – articles of plastic; 42 – articles of Leather; 61 & 62 – both knitted and unknitted apparel & clothing categories; 64 – footwear & gaiters 84 – nuclear reactors and machinery; 85 – electrical machinery, sound & video instruments; 90 – Optical & medical instruments; 94 – Furniture and prefabricated buildings; and finally 95 – toys & games. All of the mentioned commodities showed large growth in value at a statistically significant level of 1%. The second research hypothesis was supported for the following ports: Long Beach, Los Angeles, Miami, Newark, Seattle and Tacoma. All of the mentioned ports showed large growths in TEUs at a statistically significant level of 1%.

One of the limitations of this study is due to the limited time-series and cross-sections in the data. Data derived from Zepol was largely "non-categorized," at times reflecting around 50% of missing data. Moreover, Zepol is more business-oriented, providing up-to-date data and does not function primarily as a historical archive for data. This means that volumes for commodities could not stretch prior to 2004, and that the volumes cannot capture the complete picture of China's accession to WTO. UN Comtrade, in contrast, does not have the most up-to-date information as it serves more as the historical archive of data.

Extensions and opportunities for this study are to gather more complete data from the lack of volumes in years prior to 2004 to achieve greater explanatory power in our

analysis. Moreover, capturing more complete data for the ports and utilizing it for more accurate and detailed forecasting measures would identify possible future port congestions with greater precision.

**Bibliography**

Adnan, Miller & Sarder. Understanding the Reshoring Decision-Making Process Using AHP Approach. (2014). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1622308689/fulltextPDF/8CBD3E72763E42F9PQ/1?accountid=9358

Anderson, J. E. The Gravity Model*. (January 2011). Boston College and NBER. Retrieved June 21, 2015, from https://www2.bc.edu/james-anderson/GravityModel.pdf

Armbrecht Jr, R. WTO entry, government's welcome could spur foreign R&D in China. (2002). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/213803667/fulltextPDF/3DCF063D87AB45E4PQ/1?accountid=9358

Crooks, E. US manufacturers "reshoring" from China. (2015). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1444520571/fulltext/C8A28CF0ED994D16PQ/1?accountid=9358

Deligio, T. SPECIAL REPORT: The Truth About Reshoring. (n.d.). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1505321533/fulltextPDF/85684E2D0CD54EB9PQ/1?accountid=9358

Ellram, Petersen & Tate. OFFSHORING AND RESHORING: AN UPDATE ON THE MANUFACTURING LOCATION DECISION. (April 2013). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1467439379/fulltextPDF/A69273C419BF4795PQ/3?accountid=9358

Giacalon, J. & Greenridge, G. China, The World Trade Organization, And The Market For Rare Earth Minerals. (March, 2013). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1418721152/fulltextPDF/F97D39DE63574F1EPQ/1?accountid=9358

Harpaz, M. China's WTO Compliance-Plus Anti-dumping Policy. (2011). Kluwer Law International. Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/902121941/fulltextPDF/F6952D8DA80947F1PQ/1?accountid=9358

Harpaz, M. Sense and Sensibilities of China and WTO Dispute Settlement. (2010). Kluwer Law International. Retrieved March 19, 2015, from

http://www3.uwsuper.edu:3569/abicomplete/docview/819244372/fulltextPDF/F020554594F34CABPQ/1?accountid=9358

International Monetary Fund. Changing Patterns of global trade. (June, 2011). Retrieved March, 26, 2015 from http://www3.uwsuper.edu:3569/abicomplete/docview/1420394224/F60260C1E871490APQ/1?accountid=9358

Krugman, P. Increasing Returns and Economic Geography.. (June, 1991). The Journal of Polictical Economy, Masachusetts Institute of Technology. Retrieved June 21, 2015 from http://www.princeton.edu/~pkrugman/geography.pdf

Li, Wang & Wang. China's ten years in the WTO: review and perspectives. (n.d.). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1368561538/fulltextPDF/FFD4BAFFDE9495EPQ/7?accountid=9358

Mastel, G. China and the World Trade Organization: Moving forward without sliding backward. (n.d.). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/205916571/fulltextPDF/E7A3F7F58FA74164PQ/6?accountid=9358

Minnick, J. U.S. Reshoring: Real Shift in Production or Just a Fantasy Future? (2015). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1639799024/fulltext/A69273C419BF4795PQ/1?accountid=9358

Navarro, P. China 2013 The Year Of Reshoring to America? (n.d.). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1428933301/fulltextPDF/D2ADA6088E6F4D5CPQ/1?accountid=9358

Port of Long Beach (2015). Yearly TEUs. Port of Long Beach – The Green Port. Web. Retrieved May 14 2015 from http://www.polb.com/economics/stats/yearly_teus.asp

Port of Long Beach (2015). Cargo Rises Sharply in March. The Port of Long Beach – The Green Port. Web. Retrieved May 14 2015 from http://www.polb.com/civica/filebank/blobdload.asp?BlobID=12629

Sen, S. (2010). International Trade Theory and Policy: A Review of the Literature. Levy Economics Institute of Bard College. Retrieved June 21, 2015 from http://www.levyinstitute.org/pubs/wp_635.pdf

Skowronski, Esenduran, & Rungtusanatham. The Reshoring Phenomenon: What Supply Chain Academics Ought To Know And Should Do. (April 2013). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/1467438772/fulltextPDF/968B025F833540C9PQ/1?accountid=9358

Snyder, F. China, Regional Trade Agreements and WTO Law. (n.d.). Retrieved March 19, 2015, from http://www3.uwsuper.edu:3569/abicomplete/docview/217562192/fulltextPDF/9FC6E6E584B14CB3PQ/1?accountid=9358

USA Port Terminals. (2015). SSA & TTI Long Beach Terminals – Technical Specifications. Retrieved May 05, 2015

World Trade Organization. (2015). Retrieved April 30, 2015 from https://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm