Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SWUTC/09/167861-1		

4. Title and Subtitle	5. Report Date
The U.S.-Brazil-China Trade and Transportation Triangle: Implications for the Southwest Region	March 2009
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Dr. Leigh B. Boske and John C. Cuttino	Report 167861

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Center for Transportation Research University of Texas at Austin 3208 Red River, Suite 200 Austin, Texas 78705-2650	11. Contract or Grant No. 10727

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Southwest Region University Transportation Center Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135	14. Sponsoring Agency Code

15. Supplementary Notes

Supported by general revenues from the State of Texas.

16. Abstract

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17. Key Words	18. Distribution Statement
U.S.-China Trade, U.S.-Brazil Trade, China-Brazil Trade, Maritime Transportation, Supply Chains, Intermodal Transportation, Transportation Corridors	No restrictions. This document is available to the public through NTIS: National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	130	

The U.S.-Brazil-China Trade and Transportation Triangle Implications for the Southwest Region

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The advent of globalization and more integrated international trade has placed increased demands on transportation infrastructure. This report assesses the impacts of triangular trade between and among the United States, Brazil and China with an emphasis on the effects on the U.S. Southwest region. Triangular trade is viewed through a trade corridor analysis of the three sets of bilateral trading relationships. Special emphasis is given to the transportation services that delimit the capacity to carry out triangular trade with particular attention to the latest developments in services and schedules. While international trade trend analysis may point to China's explosive consumption of raw materials from the U.S. and Brazil, this report also signals the increasing Chinese presence in the U.S. and Brazil via outsourcing and industrialization, crowding out U.S. and Brazilian domestic industry, and inhibiting Brazilian competitiveness in the U.S. Notwithstanding these trends, a counterflow or reverse globalization is also beginning to appear where Brazil and China are making investments in each other and the U.S. in order to secure their raw materials and access consumer markets. Future analysis of transportation infrastructure demand in the U.S. Southwest region may need to be flexible to account for these developments, first visible through a trade corridor analysis of the movement of goods across complete supply chains.

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Acknowledgments

The authors recognize that support for this research was provided by a grant from the U.S. Department of Transportation, University Transportation Centers Program to the Southwest Region University Transportation Center, which is funded, in part, with general revenue funds from the State of Texas. Additionally, the authors thank Timothy Box for his contributions to parts of this report.

Executive Summary

Introduction

According to the World Trade Organization, the United States and China ranked second and third in 2006 global merchandise exports, respectively accounting for $1.04 trillion and $968.9 billion. In the same year, Brazil rated twenty-fourth in global exports with $137.5 billion, while leading in exports of basic commodities that fuel China, such as iron ore and soybeans. On the import side, the United States was the world's leading importer accounting for $1.92 trillion in merchandise imports. China trailed a distant third importing $791.5 billion in 2006, while Brazil ranked 28th with $95.9 billion in imports.[1]

International trade trends reveal an emerging trade triangle among the United States, China and Brazil. China's current and future spectacular growth has placed numerous demands on international trade lanes and transportation infrastructure as it pursues a state-led capitalism, where it sources raw materials from the United States and Brazil and increasingly sells back finished goods to the United States and Brazil. At the same time as China becomes the manufacturer to the United States, Chinese exports are increasingly competing directly in Latin American and Brazilian markets, often crowding out Brazilian products in their regional and domestic markets.

Meeting the demands of the U.S.-China-Brazil trade triangle has placed increasing pressures on transportation and logistics infrastructure: maritime transport and ports, highways, railroads, airports, intermodal landside access, and storage and warehousing. For the economies of Texas and the Southwest, the derived demand has brought challenges and opportunities to transportation planning and economic development. With the prospects of more congestion, higher tariffs, and high-cost environmental requirements at West Coast Ports, direct all-water services from Asia to the Southwest are becoming alternatives for shippers that seek to distribute their products in Texas and the Southwest. As a result, there is both a boom in large-scale distribution centers and real estate speculation occurring in and around the major consumption centers of Houston, Dallas and San Antonio.

While not at the scale of Chinese containerized trade to the United States, the impacts of late arriving containerization in Latin America are forcing the modernization of ports and driving

[1] World Trade Organization (WTO), *International Trade Statistics 2007*, Geneva, 2007, pp. 10-12.

public/private investment. Moreover, the run to scale economies in shipping is causing a global reformulation of trading routes and capacity investments.

The United States is Brazil's largest trading partner and the port of Houston is the United States' leading exporting port of containerized cargo to Brazil and the second-leading U.S. importing port of same. With added capacity, steamship lines serving Brazil and the U.S. Gulf are making the investments necessary to serve this trade. Brazilian difficulties with port infrastructure and management have kept the country from being able to participate in economies of scale in the container trade related to use of larger vessels. In fact, Brazil and Latin America in general are playing receiver to older- generation container vessels displaced by newly built vessels of far greater scale that serve European and Asia markets. Quite different, but related, the Asia-United States trade lane is preparing to receive the larger vessels that Brazil will not be able to handle for many years. In stark contrast to the situation in containerized cargoes, Brazilian vertically integrated mining and steel companies have world class port infrastructure and are embarking on long-term charter parties and the world's largest-capacity, dry-bulk vessels to carry bulk trade on Brazil-Asia routes to supply raw materials for the Chinese economy. In this respect, much of Chinese production comes back to Brazil and the United States via containerized manufactures, benefiting from the scale achieved on raw materials from Brazil. Lacking infrastructure capacity to handle and expedite containerized cargoes in Brazil may also be hampering competitiveness in foreign markets, including the United States.

This report sets out to delineate the U.S.-China-Brazil trade triangle. With intrinsic value as individual U.S. trading partners, China and Brazil also serve as proxies for Latin America and Asia, capable of delimiting the impacts of increasing trade from these regions on the Southwest's economy and transportation infrastructure. In all, with Brazil emerging as a maturing economy with inflation under control since 1994 and GDP growth targets at 5 percent per annum and with China becoming the world's leading producer and consumer, the United States is presented with challenge and opportunity to engage along these important and emerging trade corridors.

Following this executive summary, chapter 1 of this report will outline some of the global trade trends while elaborating on the concept of trade corridor that will further the analysis. Chapter 2 will introduce U.S.-China trade and profile selected trade corridors, identifying issues facing the corridor and opportunities for the Southwest and Texas. Chapter 3 will do the same with U.S.-Brazil trade with a more in-depth evaluation of ocean services as was done with U.S.-

China trade in phase I of this report.[2] In chapter 4, this report will investigate Brazil-China trade and its consequences on the trade triangle. Even though the U.S. is not involved, to what extent are there trade and transportation impacts and opportunities for Texas brought on by Brazil-China trade? Chapter 5 will bring together a discussion the U.S.-Brazil-China trade triangle and the impacts and opportunities for the U.S. Southwest with additional suggestions for future research.

[2] *The Impact of U.S.-China Trade on Multimodal Transportation Systems and the Economies of Texas and Mexico*, Leigh B. Boske coord., Center for Transportation Research, The University of Texas at Austin, Austin, Texas, 2005.

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Chapter 1. The Dynamics of U.S-Brazil-China Trade Triangle

In 2006 world trade grew 8 percent outpacing world economic growth as measured in gross domestic product (GDP). Since the year 2000, trade growth has doubled GDP rates reaching more than $11.78 trillion in 2006.[3] Of this figure, world seaborne trade accounted for 7.1 billion metric tons of volume.[4] The United States accounted for 1.38 billion tons or approximately 19.4 percent of global seaborne trade.[5] For 2007, triangular Brazil/China/U.S. trade amounted to more than $460 billion.[6] Tables 1.1 and 1.2 present a summary of 2006 trade figures of Brazil, China and the United States.

Table 1.1. World Merchandise Exports and Global Market Share

	World (USD$ trillions)	United States (%)	China (%)	Brazil (%)
2006	11.783	8.8	8.2	1.2
2003	7.371	9.8	5.9	1.0
1993	3.675	12.6	2.5	1.0

Source: WTO, *International Trade Statistics 2007*, Geneva, 2007, p. 10.

Table 1.2. World Merchandise Imports and Global Market Share

	World (USD$ trillions)	United States (%)	China (%)	Brazil (%)
2006	12.113	15.8	6.5	0.8
2003	7.650	17.0	5.4	0.7
1993	3.770	16.0	2.8	0.7

Source: WTO, *International Trade Statistics 2007*, Geneva, 2007, p. 11.

Explosive growth in China has catapulted China to be the world's third largest trading economy, falling behind the United States and Germany. The United States is witnessing a

[3] WTO, *International Trade Statistics 2007*, p. 1 and 10.
[4] Ibid., p. 112.
[5] U.S. Department of Commerce (USDOC), *U.S. Merchandise Trade: Selected Highlights (Report FT 920)*, Washington, D.C. and American Association of Port Authorities (AAPA), *AAPA Advisory*, March 5, 2007.
[6] USDOC, Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, Washington, D.C. and Brazilian Ministry of Development, Industry and Commerce (MDIC), Alice web, available at: aliceweb.desenvolvimento.gov.br.

steady decrease in its historical market share as Asia and emerging markets become more integrated into the global economy. Nevertheless, U.S. import and export growth figures in 2006 showed 11 percent and 15 percent growth, respectively, in value terms. China and Brazil exhibited significantly higher growth rates in 2006. Chinese exports grew 27 percent and imports at 20 percent, while Brazilian exports grew 16 percent and imports at 24 percent year-on-year.

As the major gateways to international trade, the importance of the U.S.-China-Brazil trade is very much in evidence in table 1.3. Table 1.3 presents illustrates where the leading U.S., Chinese and Brazilian ports fall in the world rankings. Of the top 50 world ports in terms of volume, the United States, China and Brazil account for 21 ports and a total volume approaching 3.7 billion tons. Six Chinese ports rank in the top ten in cargo volume. There are four Brazilian ports in the top 50 (Tubarão, Itaquí, Santos and Sepetiba/Itaguaí). Three of these ports (Tubarão, Itaquí, and Sepetiba/Itaguaí) are principal ports of the iron and steel industry, major importers of coal and leading exporters of iron ore to China, among other countries. Ports that serve the U.S. Southwest are also clearly in evidence with South Louisiana, Houston, Beaumont, Corpus Christi, and New Orleans leading the way. The port profiles of the U.S. Gulf are mainly focused on the movement of bulk liquids, petroleum and petroleum derivatives. On the container side, the trans-Pacific trade is evident by the prominence of U.S. West Coast ports and Chinese exporting ports. Leading the U.S. Gulf with 1.6 million TEUs moved in 2006, the Port of Houston does not break the top 50.

Table 1.3. 2006 U.S.-China-Brazil Port Comparison

Total Cargo Volume (Millions of Metric Tons)				Total Container Movement (Thousands TEUs)			
World Rank	**Port**	**Country**	**Tons**	**World Rank**	**Port**	**Country**	**TEUs**
1	Shanghai	China	537.0	2	Hong Kong	China	23,539
4	Ningbo	China	309.7	3	Shanghai	China	21,710
5	Guangzhou	China	302.8	4	Shenzhen	China	18,469
6	Tianjin	China	257.6	6	Kaohsiung	Taiwan	9,775
7	Hong Kong	China	238.2	10	Los Angeles	U.S.	8,470
8	Qingdao	China	224.2	11	Qingdao	China	7,702
11	Qinhuangdao	China	204.9	12	Long Beach	U.S.	7,289
12	South Louisiana	U.S.	204.6	13	Ningbo	China	7,068
14	Houston	U.S.	201.5	16	Guangzhou	China	6,600
15	Dalian	China	200.5	17	Tianjin	China	5,950
16	Shenzhen	China	176.0	18	NY/NJ	U.S.	5,093
20	NY/NJ	U.S.	143.0	22	Xiamen	China	4,019
30	Tubarão	Brazil	103.6	27	Dalian	China	3,212
34	Itaquí	Brazil	93.8	37	Santos	Brazil	2,446
42	Long Beach	U.S.	76.6	39	Oakland	U.S.	2,392
43	Santos	Brazil	76.3	46	Savannah	U.S.	2,160
46	Beaumont	U.S.	72.1	49	Keelung	Taiwan	2,129
47	Sepetiba/Itaguaí	Brazil	70.4	50	Tacoma	U.S.	2,067
48	Corpus Christi	U.S.	70.4				
49	Huntington	U.S.	70.0				
50	New Orleans	U.S.	69.8				

Source: Adapted from American Association of Po,rt Authorities *World Port Ranking- 2006*, available at: aapa.files.cms-plus.com/Statistics/worldportrankings_2006.xls, accessed June 9, 2008.

Trade Corridors as Units of Analysis

The United States, Brazil and China are three countries with continental dimensions tied together through trade. Also in this continental category are Russia, India, Canada, European Union taken as a whole, and Australia. In order to focus in on the triangular impacts of U.S., Brazil, and Chinese trade, this report benefits from adopting the trade corridor as a unit of analysis.

Trade, defined as the buying, selling, and bartering of goods and services, brings widespread economic impacts to local, regional, and national economies. As globalization brings the mobility of capital, investment, access to markets, and trade liberalization, governing authorities increasingly pursue policies designed to promote new and existing trade in order to generate economic growth, regional income, employment, and taxes. There is a growing

recognition that "firms, not nations, compete in international markets (Porter 1990)." For a country's firms to be competitive there must be efficient and competitive multimodal transportation networks to carry products and services to markets.[7]

Broadly, at their simplest levels, trade corridors are the geographically designated areas over which significant trade flows from a given origin of production to a given destination of consumption. A more complete definition considers a trade corridor to be a geographically designated area over which significant trade flows from a given origin of production to a given destination across a transport infrastructure met with a variety of services and linkages to labor, capital, production and consumption. In a transportation context, trade corridors have sets of physical and operating characteristics. They include:

- a commercial infrastructure comprising distribution and warehousing facilities, foreign trade zones, a regulatory system for customs and inspection, and trade incentives;
- an integrated regional technological infrastructure with telecommunications, electronic data interchange and trade databases;
- business and professional know-how and expertise, including custom brokers, freight forwarders, accountants, attorneys, consultants, and academicians;
- well-developed social, political, and business linkages;
- a physical infrastructure of highways, rail, air, sea, and inland waterway;
- direct access to multiple markets; and,
- specific legislation and regulations.[8]

A transportation corridor is a necessary component of a trade corridor. It is based on geography and space characterized by traffic flows of people, goods and services across multimodal links, nodes, and transfer points serving outbound and inbound movements. It can

[7] Multimodal is used in transportation to describe freight movements that occur as a combination of movements over more than one mode, such as truck, rail, air, inland waterway. Multimodal transportation requires specialized facilities to handle and transfer unitized and nonunitized cargo from one mode to the next.
[8] Leigh B. Boske and John C. Cuttino, "Measuring the Economic and Transportation Impacts of Maritime-related Trade," *Maritime Economics & Logistics*, no. 5 (2003), pp. 133-157.

be a right-of-way on the surface, air, or subsurface set apart to accommodate major multimodal transportation facilities. It includes arteries that connect production centers with consumption centers via roads and highways, rail lines, air facilities, ports, waterways, or bandwidth.

The currency of trade corridor data on which these dimensions are revealed comes in origin/destination data that connects production with consumption. Such data can be found in cargo volume and value, multimodal traffic flows on specific transport routes, and transportation costs. The Standard International Trade Classification (SITC) and the Harmonized System (HS) are among the classifications used by the United Nations to organize and analyze international commodity trade information. The United States adapts its Harmonized Tariff Schedule (HTS) from the HS as does Brazil, adopting its Mercosul Nomenclature (NCM). For purposes of this paper, aggregated global trade data derives from the World Trade Organization. Country level data to cover the permutations of U.S./Brazil/China origin-destination data trade come from two comparable sources, one United States and one Brazilian, based on the HTS and NCM standards.[9]

Table 1.4 illustrates what can be revealed using a trade corridor as unit of analysis. The trade corridor permits a focus on process where questions of how trade takes place and what drives it emerge, better unlocking analysis of policy-relevant impacts. Here it is worth noting that the seminal discussion paper on trade corridors has its roots in the natural disasters.[10] Given the current and future consequences of negative externalities due to weather conditions, such as 2005 Hurricane Katrina in the United States or the May 2008 earthquake in China's Chengdu province, a trade corridor lens can better identify factors involved in determining outcomes as well as outcomes/scenarios themselves.

[9] Most U.S. data used in this study come from the Office of Trade and Industry of the U.S. International Trade Administration, U.S. Department of Commerce. Data for Brazil/China trade come from the Brazilian Ministry of Development, Industry and Commerce.

[10] Stephen O. Bender, "Trade Corridors: The Emerging Regional Planning Unit in Latin America," in *New Regional Development Paradigms: Volume 2-New Regions, Concepts, Issues and Practices* ed. David W. Edgington, Antonio L. Fernandez, and Claudia Hoshino, Westport, Connecticut: Greenwood Press, 2001.
Bender derived his analysis from the Natural Hazards Project of the Organization of American States's Unit for Sustainable Development and Environment (OAS/USDE). The OAS/USDE developed program areas in trade corridor development in order to mitigate vulnerability to natural disasters and promote sustainable development.

Table 1.4. Dimensions Revealed through Corridor Analysis

Actors	Operations	Infrastructure	Industry Trends	External Factors
Governments (state, local, federal)	Documentation	Sea/river ports	Containerization	Damage and loss
Stevedores	Consolidated shipments	Inland dry ports	Electronic Data Interchange (EDI)	Robbery
Freight forwarders	Vessel-sharing agreements	Highways	Consolidation	Weather conditions
Consolidators	Hub-and-spoke operations	Railroads	Intermodalism	Political risk
Bankers	Port costs	Air	Larger vessels	Currency fluctuations
Traders	Voyage costs	Inland waterway	Privatization	Exchange rates
Consignees	Inland haul costs (rail/truck/ intermodal)	Intermodal	Ocean shipping conferences	Tariffs
Carriers (rail, liner, truck, barge)	Cargo preference restrictions	Intermodal terminals	Just-in-time	Regulation
Shippers	Security			Pollution
Inspectors	Congestion			Foreign markets
Customs brokers	Accessibility			Terrorism
Port authorities				
Terminal operators				
Labor Unions				
Trade associations				
Nongovernmental organizations				

Source: Adapted from Boske and Cuttino 2003.

Driving triangular trade are the demographic and continental characteristics of the United States, China and Brazil. Table 1.4 synthesizes a comparison of some corridor driving variables. With higher growth rates and a younger population as corridor drivers, Brazil and China will become increasingly larger producers and consumers of United States goods and services. With similar continental and geographic dimensions, the major difference is in the U.S. well-developed logistics network, making it far easier for Brazilian and Chinese goods to exit/enter the U.S. than for U.S. goods to reach final destinations in the other two countries.

Because of China's scale, the absolute volume of goods coming from China will be the major driver of the trade lanes. As will be shown in later chapters, the Chinese appetite for basic inputs yields more manufactured exports to the rest of the world. Brazil and the U.S. will be challenged to fuel significant segments of the Chinese economy, most notably food inputs and minerals (iron ore) used to make iron and steel products. The next section addresses the recent performance of specific economic sectors driving trade, energy, agriculture, and iron and steel.

Table 1.5. U.S., Brazil, and China Comparison

Variable	United States	Brazil	China
Area (sq. km)	9,826,630	8,511,965	9,596,960
Coastline (sq. km)	19,924	7,491	14,500
Population (total)	303,824,646	191,908,598	1,330,044,605
Median age (years)	36.7	29	33.6
GDP (purchasing power parity)	$13.86 trillion	$1.84 trillion	$7.04 trillion
GDP Growth (2007)	2.2%	4.5%	11.4%
Per capita GDP	$46,000	$5,300	$9,700
Labor force	153.1 million	99.49 million	803.3 million
Airports w/paved runways	5,143	708	403
Railroads (km)	226,612	29,295	75,438
Paved Highways (km)	6,430,366	96,353	1,515,797
Waterways (km)	41,009	124,000	50,000

Source: U.S. Central Intelligence Agency (CIA), *CIA World Factbook*, available at: www.cia.gov/library/publications/the-world-factbook/, accessed June 11, 2008.

The energy needs to sustain economic growth are enormous and also help differentiate the United States and China from Brazil. For the U.S. and Brazil, fuel imports respectively accounted for 18 percent and 19.2 percent of total imports in 2006. For China, based mainly on coal, fuel imports are 11 percent of total imports in 2006. With rising oil prices, the share of fuel imports is expected to rise significantly. Just as recently as the year 2000, fuel imports represented just 9.2 percent of Chinese imports, 11 percent of U.S imports, and 15 percent of Brazilian imports. An important factor to consider is the overwhelming reliance that the U.S. and China have on fuel imports from the Middle East. Table 1.6 breaks down the countries supplying fuel to the U.S. and China. With Brazil being mainly self-sufficient in oil production/consumption, its major fuel imports come in the form of petroleum derivatives.[11]

[11] Brazilian President Luíz Inácio "Lula' da Silva declared Brazil self-sufficient in oil production/consumption on April 21, 2006.

Table 1.6. Composition of U.S. and China Fuel Suppliers

	United States		China	
Region	**Value (USD$ millions)**	**Share (%)**	**Value (USD$ millions)**	**Share (%)**
World	345,059	100	89,001	100
Middle East	50,229	14.6	34,143	38.4
North America	108,436	31.4	1,857	2.1
Africa	70,073	20.3	21,095	23.7
South and Central America	64,223	18.6	4,604	5.2
Europe	30,316	8.8	375	0.4
Commonwealth of Independent States	12,170	3.5	10,860	12.2
Asia	9,612	2.8	17,593	19.8

Source: WTO, *International Trade Statistics 2007*, p. 55.

With two growing seasons prevailing over most of the country, Brazil is the one of the fastest converters of photosynthesis in the world, holding competitive advantages in the production of agricultural products. Brazil has been a traditional exporter of basic goods (agricultural products and raw materials) born out in the high percentage of agricultural exports as a percentage of total exports, 28.8 percent representing $39.53 billion in 2006. Conversely, Brazil imports of agricultural products as a percentage of total imports is just 6.2 percent or $5.90 billion over the same period. Notwithstanding Brazil's vocation for agriculture to which it dedicates a high percentage of its foreign exchange, although the United States and China import more than they export in agricultural goods, they are major exporters of agricultural inputs with the United States leading the world. In the case of the United States, imports approach exports in absolute value, $103.65 billion vs. $95.3 billion. U.S. agricultural imports represent 5.4 percent of total imports, while agricultural exports represent 8.9 percent of total exports. Chinese imports of agricultural goods, $51.65 billion, amount to 6.4 percent of total imports. Though China exports a value of agricultural exports to the world comparable to that of Brazil's $32.54 billion in agricultural goods (3.4 percent of total exports), it still relies on foreign imports. While this reflects that China and the U.S. specialize in more intermediate and finished products, it is an indication that Brazil and the United States agricultural exports compete for the Chinese market.[12]

[12] WTO, *International Trade Statistics 2007*.

Intriguing in global trade trends is the restructuring of the iron and steel industry. The United States steel industry, at the brink of collapse a decade ago, required government intervention in the form of protection (Section 201, antidumping and countervailing duties). Now it has recaptured competitiveness and rebounded attracting mergers and acquisition activity from Brazilian origin capital. Countries, such as Brazil, long a major exporter of slabs to the integrated mills in the U.S. Midwest, have now acquired a significant market share in the U.S. with its companies acquiring U.S. steel companies. Among the notable Brazilian companies in the U.S. market are Gerdau, Vale, and the National Steel Company (CSN). Additionally, the German-based Thyssen Group is building a mill at Mount Vernon, Alabama that will be supplied by a new mill built in Brazil in the Rio de Janeiro state. The cross-fertilization of the global iron and steel industry does not stop there. China, via Baosteel, has long engaged in seeking construction of a steel plant in Brazil. China has also been a long-term customer of Vale for its iron ore needs and is behind the Vale order of what will be the largest dry bulk vessels on the planet, built to carry iron ore from Maranhão state to China. Tables 1.7 and 1.8 delineate the exports and imports of iron and steel.

Table 1.7. Selected Iron and Steel Export Indicators

Country	Value (USD$ billions)	Share in World Exports			Avg. % Change	% Change
	2006	1990	2000	2006	2000-2006	2006
Brazil	9.5	3.4	2.6	2.5	17	4
China	32.5	1.2	3.1	8.7	40	69
United States	12.8	3.3	4.4	3.4	12	11

Source: WTO, International Trade Statistics 2007, p. 67.

Table 1.8. Selected Iron and Steel Import Indicators

Country	Value (USD$ billions)	Share in World Exports			Avg. % Change	% Change
	2006	1990	2000	2006	2000-2006	2006
China	21.6	2.5	6.2	5.5	14	-18
United States	39.6	9.5	12.4	10.0	13	30

Source: WTO, International Trade Statistics 2007, p. 67.

Iron and steel imports are precursors to production of value-added manufactured goods. The great story here lies in China's explosive growth. Already the world's leading steel producer in 2003, with crude steel production of 222 million metric tons, China more than doubled its production in the span of four years. To continue this growth, securing its iron and steel supply chain by ensuring adequate supply of iron ore is of strategic importance. This tends to favor Brazil, Australia, and India, the main iron ore suppliers. Because of such astounding growth, in less than a decade, China went from net importer of steel and steel products to net exporter. Table 1.9 shows the evolution of world crude steel production by country.

Table 1.9. Evolution of World Crude Steel Production (millions of metric tons)

Country	2003	2004	2005	2006	2007*	% Change 2007/2006
1. China	222.4	280.5	355.8	423.0	489.2	36.4
2. Japan	110.5	112.7	112.5	116.2	120.2	8.9
3. USA	93.7	99.7	94.9	98.6	98.2	7.3
4. Russia	61.5	65.6	66.1	70.8	72.2	5.4
5. India	31.8	32.6	45.8	49.5	53.1	4.0
6. South Korea	46.3	47.5	47.8	48.5	51.4	3.8
7. Germany	44.8	46.4	44.5	47.2	48.6	3.6
8. Ukraine	36.9	38.7	38.6	40.9	42.8	3.2
9. Brazil	31.1	32.9	31.6	30.9	33.8	2.5
10. Italy	27.1	28.6	29.4	31.6	31.5	2.3

* Preliminary data.

Source: Brazilian Steel Institute, *A Siderurgia em Números 2008 Pocket Yearbook*, Rio de Janeiro, 2008, p. 7.

Evidence of this structural shift is also seen in the negative import growth in 2006. Additionally, the Chinese government has put restrictions on steel exports.

In the case of Brazil seen in table 1.7, the 2006 growth figure of just 4 percent is a bit misleading. First, it reflects a problem with the blast furnace at one of the major export plants owned by CSN, which was pulled offline for repair. It also does not reflect the heavy investment underway in steel capacity expansion in Brazil. Nevertheless, the growth is not close to U.S. and Chinese growth. But there are clear indications that change is on the horizon. With single digit inflation for the last ten years and a growing demographic requiring steel products, Brazil is gearing up for booming demand domestically while expanding export capacity. At the end of 2007, Brazil had a steelmaking capacity of 41 million metric tons. Table 1.10 lists the major capital investments underway in Brazil. The Brazilian Steel Institute (IBS) estimates that the investment over the period of 2008 to 2013 of $27.1 billion will increase capacity by 15.3 million metric tons with 6.8 million tons coming from greenfield projects. After 2013, the IBS estimates that additional $12.8 billion investment will create additional new capacity of 17.5 million metric tons making total capacity. Total capacity by 2016 would be, if these projects are all carried out, 80.6 million tons, putting Brazil in fourth place worldwide, based on 2007 data.[13]

[13] Brazilian Steel Institute (Instituto Brasileiro de Siderurgia, IBS), "Siderurgia Brasileira-Investimentos e Expansão da Produção," pamphlet distributed at First Brazilian Steel Meeting (Primeiro Encontro Brasileiro de Aço), IBS, Rio de Janeiro, June 3, 2008.

Table 1.10. Brazilian Steelmaking Investments in Capacity

Company	Actual Production (millions metric tons)	Expansion (millions metric tons)	Year	Post-Investment Production (millions metric tons)	CAPEX (USD$ millions)	CAPEX per ton
USIMINAS-Ipatinga	5	2.2	2011-2012	7.2	1,793	815
USIMINAS-Cubatao	4.5	3	2014	7.5	2,700	900
Gerdau Acominas	3	1.5	2007-2008	4.5	1,500	1000
Gerdau Usiba	0.5	0.7	2008	1.2	n/a	n/a
Gerdau De-bottlenecking	0	1.1	2010	1.1	n/a	n/a
Gerdau Heavy Plate Expansion	0	0.87	2011-2012	0.87	400	460
National Steel Company-CSN-Volta Redonda	5.5	1.5	2012-2013	7	900	600
National Steel Company-CSN-Minas Gerais	0	4.5	2012-2013	4.5	3,400	756
National Steel Company-CSN-Itaguai	0	3	2013-2015	1.5	2,700	900
Arcelor Mittal-CSTl	5	2.5	2007	7.5	1,800	720
Arcelor Mittal-Belgo	1.1	1.2	2008	2.3	n/a	n/a
Atlantic Steel Company-CSA	0	5	2009	5	4,103	821
Vitoria Steel Company-CSV	0	5	2011	5	3,500	700
Ceara Steel	0	1.5	2009-2010	1.5	750	500
Para Steel	0	2.5	2009	2.5	2,941	1176
Techint	0	5	2012	5	3,000	600

Source: Credit Suisse, presentation by Roger Downey at CRU's 14th World Steel Conference, Rio de Janeiro, Brazil, March 14, 2008.

Trends in the U.S. Southwest

Growth in the U.S. Southwest is outpacing national growth. As depicted in table 1.11, four of the top-ten metropolitan areas in numerical population growth from July 2006 to July 2007 are located in the Southwest, all in Texas. Tied to population growth is the regional employment growth, an attractor for more population shifts. Table 1.12 shows that for the year 2007, the Dallas and Houston metropolitan areas placed first and second in nonfarm payroll employment job growth with growth three and four times the national average. It follows that

with more employment and population growth, demands for civil construction, housing, and consumption will continue with impacts on the U.S.-Brazil-China triangular trade. Moreover, the regional impacts of the U.S. mortgage crisis in 2007 and 2008 and high costs of living in other regions of the U.S. namely the West Coast, East Coast and Midwest (Rust Belt) will continue to contribute to Southwest growth. While the 2008 deceleration in the American economy has widespread effects, the Southwest is among the regions least affected. In fact, a downturn may accelerate population shifts to the Southwest and put more demands on housing, goods, services, and infrastructure. To meet these needs, triangular trade will play a role increasing pressures on diversified transportation infrastructure.

Table 1.11. Top Ten U.S. Metro Areas in Numerical Population Growth (July 1, 2006-July 1, 2007)

Metro Area	Population Growth
1. Dallas-Ft. Worth-Arlington, Texas	162,250
2. Atlanta-Sandy Springs-Marietta, Georgia	151.063
3. Phoenix-Mesa-Scottsdale, Arizona	132,513
4. Houston-Sugar Land-Baytown, Texas	120,544
5. Riverside-San Bernardino-Ontario, California	86,660
6. Charlotte-Gastonia-Concord, North Carolina/South Carolina	66,724
7. Chicago-Naperville-Joliet, Illinios/Wisconsin/Indiana	66.231
8. Austin-Round Rock, Texas	65,880
9. Las Vegas-Paradise, Nevada	59,165
10. San Antonio, Texas	53,925

Source: U.S. Bureau of the Census, press release, March 27, 2008, available at: www.census.gov.

Table 1.12. Nonfarm Payroll Employment Growth among Top Ten U.S. Metropolitan Statistical Areas (January 2007-January 2008)

Metropolitan Statistical Area	% Growth
1. Houston, Texas	3.9
2. Dallas-Fort Worth, Texas	2.9
3. Atlanta, Georgia	1.5
4. Washington, D.C.	0.9
5. New York, New York	0.9
6. Philadelphia, Pennsylvania	0.7
United States Average	0.7
7. Chicago, Illinois	0.6
8. Miami, Florida	0.1
9. Los Angeles, California	-0.3
10. Detroit, Michigan	-1.5

Source: U.S. Bureau of Labor Statistics, Press release, March 19, 2008.

The preceding section sought to introduce some of the major trends affecting international trade and situate the prominent position of the United States, China and Brazil. The trade corridor as unit of analysis was presented in order to begin to illustrate and compare some specific trade flows of the U.S.-China-Brazil triangle. As countries with continental dimensions, growing economies, burgeoning demographic, the consumption demands and need for international trade in agricultural products, energy, merchandise, and iron and steel are clearly evidenced. In the case of iron and steel, the explosive growth of China and the heavy investments underway in Brazil are changing and will change the transportation and infrastructure demands of the trade lanes. Finally, some of the demographic trends occurring in the Southwest were highlighted alerting to the likely continued demand for international trade. The next chapters will detail more elements of the triangular trade and the challenges and opportunities for Texas and the Southwest.

Chapter 2. U.S.-China Trade

The opening of the Chinese economy beginning in the 1980s to market-friendly reforms began a process of globalization that is structuring the economic global relationships of the twenty-first century. Low cost and abundant labor, facility for export, and a huge domestic market have made China attractive for global companies both as a destination market and a manufacturing base. China's strategy to compete globally in low-value manufactures and migrate towards value-added products follows the model of Japan and South Korea. In 2008, China is not only competitive for shoes, toys, and textiles but also cars, machinery and high technology. China's 1.3 billion population has been a major motor of global consumption of raw materials and foodstuffs. As an attractor for two-way trade, the United States has seen its trade with China grow to unparalleled levels. Much of China's demand is served by U.S. exports, but more impressive is the degree to which U.S. buys from China and has outsourced its manufacturing base.

As depicted in chart 2.1, the United States and China had a small but balanced trade at the onset of Chinese market opening. Twenty years later, the U.S. has seen its trade balance worsen to a deficit of more than $256 billion in 2007. While U.S. has increased its exports to China significantly in absolute terms, China has far outpaced the U.S. in its export-led growth. Near entire sectors of American economic activity, such as furniture, footwear, clothing, toys, and consumer electronics have either closed their doors or relocated manufacturing offshore to be competitive with China. The U.S. demand for cheap consumer products has generated a robust transpacific trade requiring an efficient port and container infrastructure. The Chinese economy is so strong now that the World Bank estimates that a 10 percent rate of growth in GDP will bolster American GDP growth by two percent.[14]

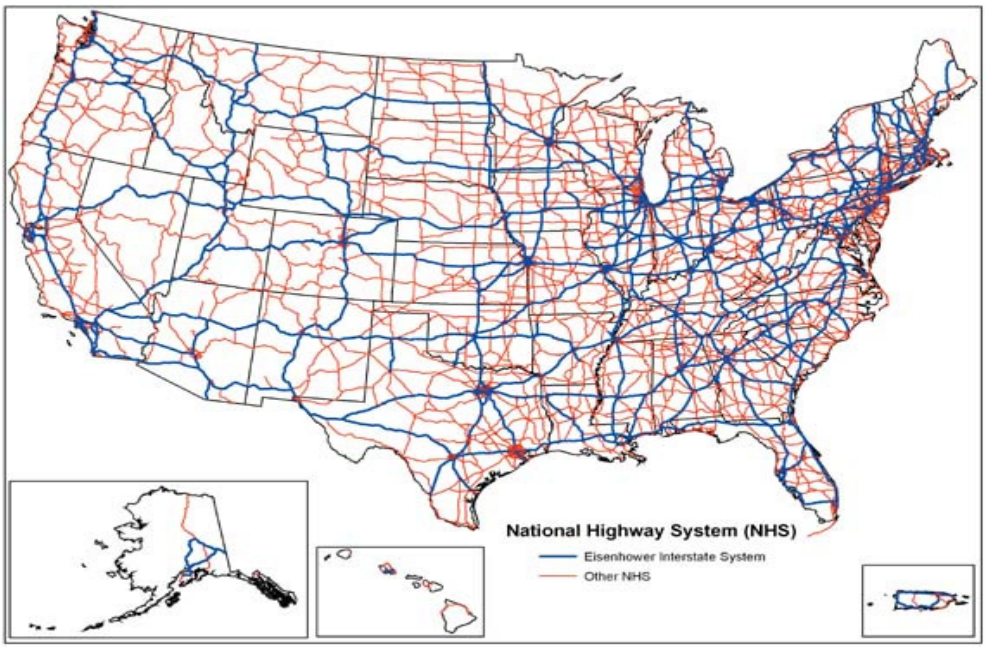
[14] Tiago Lethbridge, "O ano da China," *Revista Exame*, June 18, 2008, p. 30.

Chart 2.1. U.S.-China Trade (USD$ Millions)

Source: U.S. Census Bureau.

Without a common land border, the bulk of international trade with China takes place over Asia-North America sea lanes, with most imports arriving at U.S. West Coast ports and being distributed by major highways and railways. Table 2.1 illustrates the recent trends in U.S.-China waterborne commerce. Since 2002, total volumes and value of trade has doubled. Maps 2.1, 2.2, and 2.3 present the principal U.S. Interstate Highways and West Coast rail lines, the Burlington Northern Santa Fe Railroad and Union Pacific Railroad.

Map 2.1. U.S. National Highway System

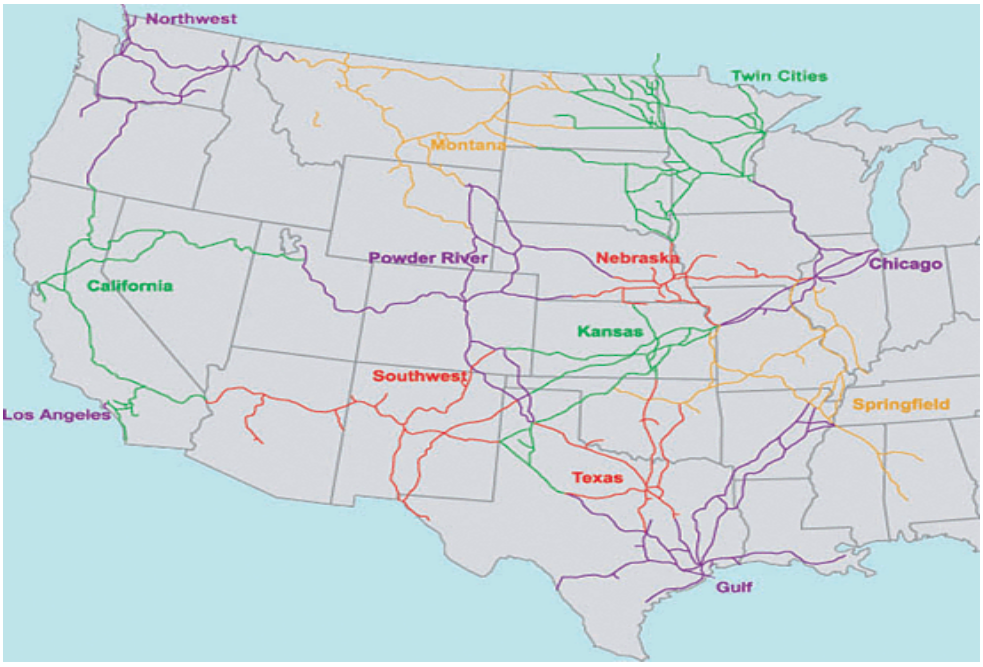


Source: U.S. Department of Transportation, Federal Highway Administration website, available at: http://www.fhwa.dot.gov/planning/nhs/, cited January 10, 2009.

Map 2.2. Union Pacific Railroad System

Source: Union Pacific website, available at: www.uprr.com/aboutup/maps/index.shtml, cited March 4, 2009.

Map 2.3. Burlington Northern Santa Fe Railroad System



Source: Burlington Northern Santa Fe website, available at: www.bnsf.com/tools/reference/division_maps, cited January 10, 2009.

Table 2.1. Evolution of U.S.-China Seaborne Trade

Year	Export Volume (Metric tons thousands)	Import Volume (Metric tons thousands)	Total Volume (Metric tons thousands)	Export Value (USD$ millions)	Import Value (USD$ millions)	Balance (USD$ millions)
2006	36,527	74,953	111,480	30,506	210,625	-180,119
2005	34,120	57,966	92,086	24,288	180,355	-156,067
2004	33,356	48,634	81,990	20,884	149,071	-128,187
2003	30,701	39,012	69,713	16,887	121,298	-104,411
2002	18,227	34,201	52,428	10,854	102,380	-91,526
2001	16,838	31,032	47,870	9,562	86,714	-77,152
2000	13,287	32,192	45,479	8,696	84,396	-75,700
1999	8,141	24,726	32,867	6,791	69,321	-62,530

Source: U.S. Department of Commerce, Bureau of the Census, *U.S. Merchandise Trade: Selected Highlights (Report FT 920)*, Washington, D.C.

Trade with China demonstrates a diverse commodity mix. Table 2.2 lists the top 20 merchandise groups as coded by the HTS and value. U.S. exports to China concentrate primarily in high value-added, aviation and energy manufactures, such as airplanes and electric machinery

and nuclear energy components. U.S. imports from China tend to concentrate in lower-value added products that can take advantage of abundant low-cost labor, such as shoes, furniture, and toys, but it is worth noting the entrance of consumer electronics as the most prominent single commodity group, accounting for 23.9 percent U.S. import value. Making a crude calculation from table XIII to arrive at an average value per metric ton of cargo, U.S. imports from China calculate to $2.8 million per metric ton vs. $0.8 million per metric tons of U.S. exports to China.

Table 2.2. U.S./China Top 20 Merchandise Groups Rank by 2007 Value (2-digit HTS)

U.S. Exports		U.S. Imports	
1. 85-Electric Machinery, Sound Equip; TV Equip.	16.3%	1. 85-Electric Machinery, Sound Equip; TV Equip.	23.9%
2. 84-Nuclear Reactors, Boilers, Machinery, Parts	13.6%	2. 84-Nuclear Reactors, Boilers, Machinery, Parts	19.9%
3. 88-Aircraft, Spacecraft, Parts	11%	3. 95-Toys, Games, & Sporting Equipment, Parts	8.1%
4. 12-Oil seeds, grain seeds, fruit, plant seed	6.4%	4. 94-Furniture, Bedding, Lamps	6.3%
5. 39-Plastics and articles thereof		5. 64-Footwear, Gaiters and parts thereof	
6. 90-Optical, Photo, Medical or Surgical Instruments		6. 62-Apparel Articles and Accessories Not Knit	
7. 72-Iron and Steel		7. 61-Apparel Articles and Accessories Knit or Crochet	
8. 74-Copper and Articles Thereof		8. 73-Articles of Iron or Steel	
9. 29-Organic Chemicals		9. 39-Plastics and articles thereof	
10. 47-Wood pulp, recovered waste & scrap		10. 42-Leather Art, Saddlery, Handbags	
11. 87-Vehicles except railway		11. 87-Vehicles except railway	
12. 76-Aluminum and articles thereof		12. 90-Optical, Photo, Medical or Surgical Instruments	
13. 52-Cotton incl. yarn and woven fabric		13. 63-Textile Art Nesoi, Needlecraft, Worn text. Art	
14. 41-Rawhides and skins		14. 83-Miscellaneous Articles of Base Metal	
15. 26-Ores, slags, and ash		15. 44-Wood and Articles of Wood; Wood Charcoal	
16. 38-Miscellaneous chemical products		16. 40-Rubber and Articles	
17. 02-Meat		17. 29-Organic Chemicals	
18. 28-Inorganic chemicals		18. 71-Nat. Pearls, Precious Stones, Coin	
19. 44-Wood and articles of wood; wood charcoal		19. 99-Special Import Provisions, Nesoi	
20. 40-Rubber and articles thereof		20. 82- Tools, Cutlery etc. of Base Metal and Parts	

Source: Office of Trade and Industry Information (OTII), International Trade Administration, U.S. Department of Commerce.

Most U.S.-China trade is captured by the West Coast ports. Los Angeles and Long Beach concentrate more than 50 percent of the Northeast Asia trade lane according to the *Journal of Commerce's* Port Import Export Reporting Service (PIERS). Table 2.3 presents the market share of Northeast Asia trade. It is worth noting the smaller but significant growth in market share by the Port of Houston.

Table 2.3. Port Market Share of NE Asia-U.S. Containerized Trade

Port	2002	2003	2004	2005	2006
Los Angeles	30.5	32.0	32.2	25.7	26.4
Long Beach	24.1	22.6	27.2	25.5	26.0
Tacoma	6.6	7.4	7.2	7.2	8.4
NY/NJ	6.9	7.2	8.6	8.0	7.9
Seattle	6.3	5.9	6.5	7.4	6.2
Oakland	6.1	6.3	6.9	6.8	6.6
Savannah	5.7	5.9	5.9	5.8	5.8
Virginia Ports	2.7	2.9	3.4	3.0	2.9
Charleston	2.5	2.0	1.9	2.0	1.8
Houston	0.2	0.4	0.8	1.1	1.2

Source: *Journal of Commerce*, March 26, 2007, p. 18.

With the explosion of the trans-Pacific trade, the U.S. West Coast ports are in a constant struggle with congestion issues. Heavily populated urban areas, environmental concerns, and legacies of unionized labor have also presented great challenges to shippers importing from Asia. The top four major importers of containers in the U.S. are big box department stores, led by Wal-Mart Stores Inc. (720,000 twenty-foot equivalent units, TEUs), Target Corp. (435,000 TEUs), Home Depot (365,300 TEUs), and Sears (248,600 TEUs).[15] Other retailers who import from China and account for more than 50,000 TEUs per year are: Lowes, Ashley Furniture, Nike, JC Penney, Williams Sonoma, Gap, Dollar General, and Pier I.[16] Most evident with Wal-Mart, many big box retailers have established regional distribution centers to handle the growing Asian traffic.

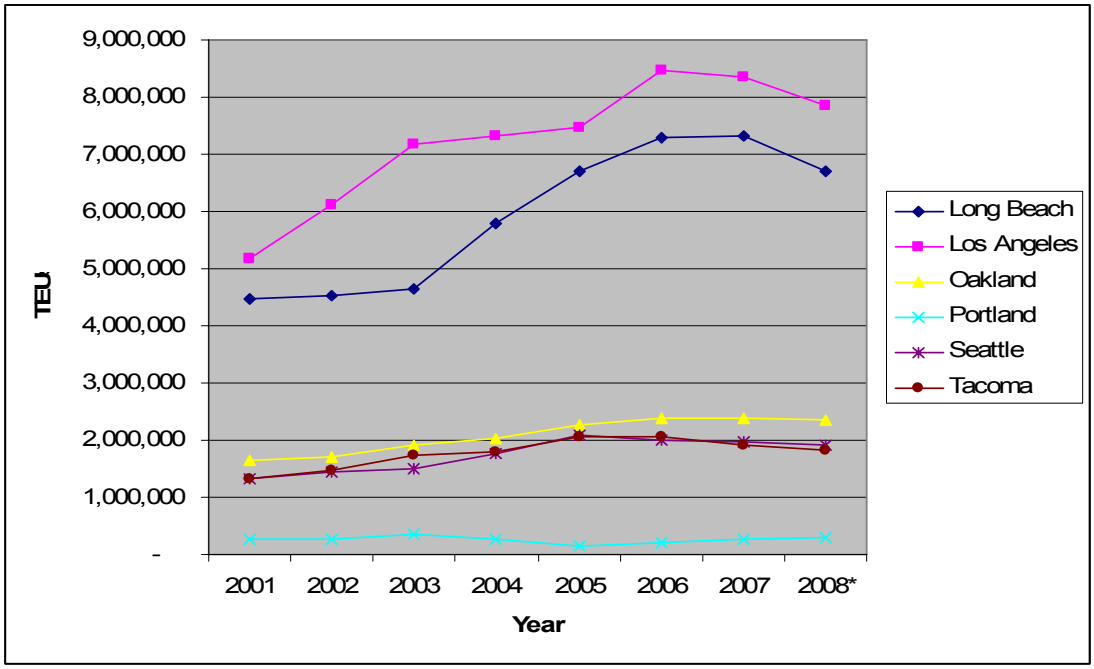
Several factors can explain the growth in regional distribution centers. First, the growing demographics of the U.S. require an efficient logistics and distribution to serve customers. Second, West Coast ports are facing landside access problems, congestion, labor problems, air quality restrictions, and growing environmental taxes that are adding to the costs of port operations. Additionally, new ports and port expansions are attracting shipping lines on both the West Coast, East Coast and U.S. Gulf Coast. Shipping lines in turn have focused on concentrating in a small-select number of ports that have deepwater drafts capable of handling post-Panamax vessels (Norfolk, Savannah, and Charleston). Most notable in the case of the U.S.

[15] Top 100 Importers and Exporters, *Journal of Commerce*, May 26, 2008, p. 14A.
[16] Ibid., pp. 14A-14B.

Southwest is the February 2007 opening of Houston's Bayport Container Terminal. The first service, in fact, to call Bayport was the CMA-CGM all-water service to/from Asia via the Panama Canal with five-thousand-TEU vessels. The new Bayport Container Terminal will allow the Port of Houston to triple its annual TEU capacity by 2.3 million TEUs at the end of construction. Third, the Panama Canal expansion will allow larger vessels and greater economies of scale for all-water direct services to the U.S. Gulf. In the case of the U.S. Gulf, Wal-Mart, Home Depot, and Rooms-to-Go have recently built new distribution centers in the Houston metropolitan region to serve the Southwest market. Wal-Mart has been the leader with a four million square foot facility at the Cedar Crossing Development, managed by Cushman and Wakefield.

Charts 2.2 to 2.5 illustrate the recent performance of U.S. and selected Mexican ports in containerized trade. The impact of China trade can be seen in the rise in volume. Of particular interest is the recent indication of shifting trade lanes. The Mexican ports of the Pacific Ocean are growing rapidly. Worth noting is the development of Lazaro Cardenas. Located South of Mexico City, Lazaro Cardenas may threaten U.S. Gulf ports as entry/exit point for Asian trade by way of its connectivity with the Kansas City Southern Railroad (KCS). The KCS, also known as the "NAFTA Railroad" as presented in map 2.4 could also provide competition for the West Coast ports and railroads that carry Asia cargoes to/from the U.S. Midwest, namely Dallas and Chicago. While some of the recent downturn in the trans-Pacific trade can be attributed a weak dollar, the decrease in the West Coast port performance is notable. With Panama Canal expansion looming, the emergence of Mexican ports and greater all-water connectivity with U.S. Gulf and U.S. East Coast ports, infrastructure investments will be needed to accompany the U.S. ports that absorb this growth.

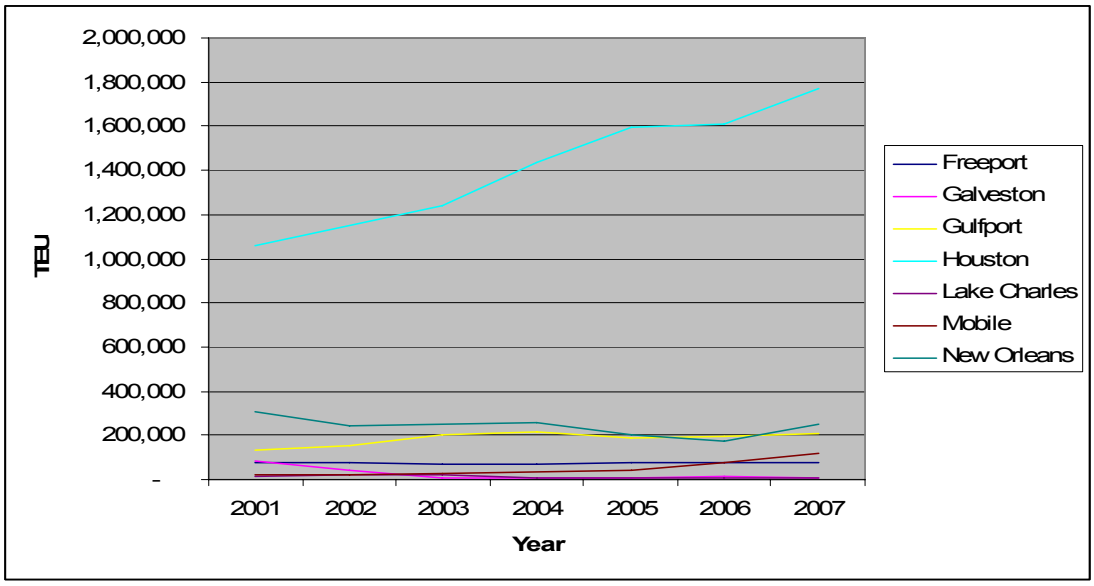
Chart 2.2. U.S. Pacific Ports Container Moves (TEUs)



* 2008 projections based on first quarter 2008 data.

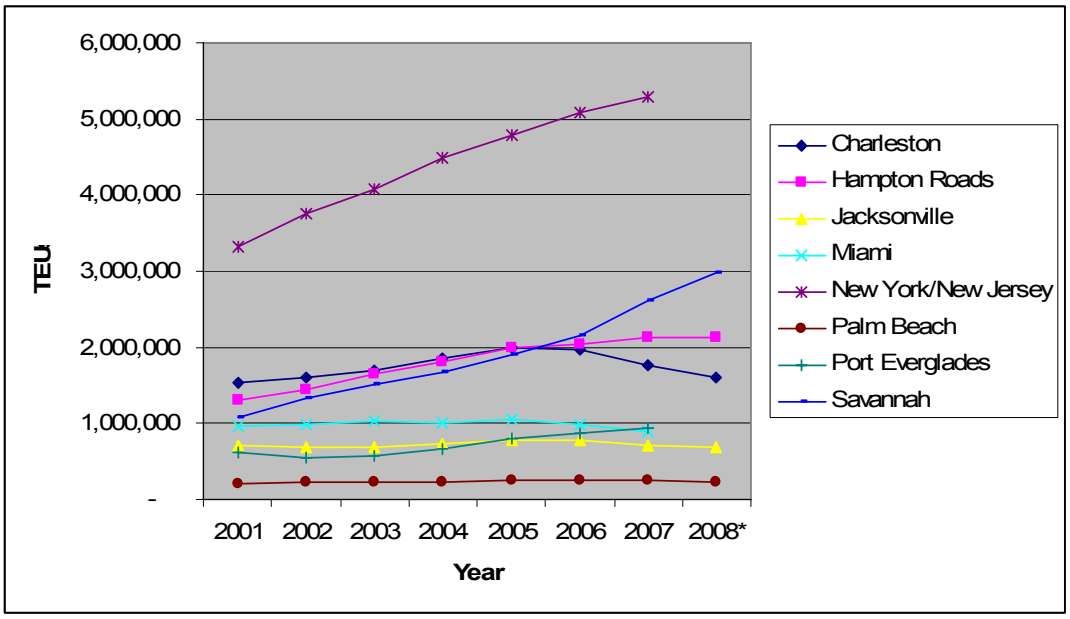
Source: American Association of Port Authorities (AAPA), AAPA website, available at www.aapa-ports.org/Industry/content.cfm?ItemNumber=900&navItemNumber=551, cited September 15, 2008.

Chart 2.3. U.S. Gulf Ports Container Moves (TEUs)



Source: American Association of Port Authorities (AAPA), AAPA website, available at www.aapa-ports.org/Industry/content.cfm?ItemNumber=900&navItemNumber=551, cited September 15, 2008.

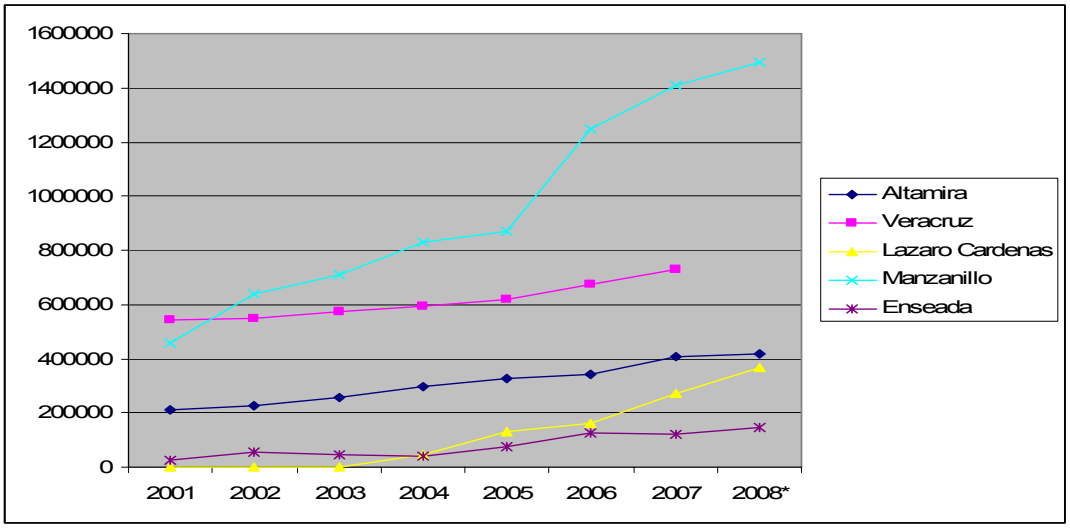
Chart 2.4. U.S. Atlantic Coast Ports Container Movements (TEUs)



* 2008 projections based on first quarter 2008 data.

Source: American Association of Port Authorities (AAPA), AAPA website, available at www.aapa-ports.org/Industry/content.cfm?ItemNumber=900&navItemNumber=551, cited September 15, 2008.

Chart 2.5. Mexican Ports Container Movements (TEUs)



* 2008 projections based on first quarter 2008 data.

Source: American Association of Port Authorities (AAPA), AAPA website, available at www.aapa-ports.org/Industry/content.cfm?ItemNumber=900&navItemNumber=551, cited September 15, 2008.

Map 2.4. Kansas City Southern Railroad

Source: Kansas City Southern Railroad (KCS), KCS website, available at: www.kcsouthern.com/SiteCollectionDocuments/system_map.pdf, cited March 4, 2009.

Factors Affecting U.S.-China Trade

Rising Wages

Recently, Chinese officials have proposed raising the monthly minimum wage by up to 23 percent in the province of Shenzhen, from RMB690 (US$86) to RMB800-850 (US$99-105).[17] This move in the province directly bordering Hong Kong has been seen by some observers as an axiomatic signal that rising labor prices are causing China to lose competitiveness with other low-cost labor producers throughout Asia, a *fait accompli* that will undermine further growth. However, this is probably not the case, as average wages in the region

[17] Mitchell, Tom, "An Alpha Delta: How Southern China is Handling Cost Rises by Boosting Value," *Financial Times*, May 8, 2006.

are already higher than what the 23% increase would establish, leaving manufacturing unaffected and rendering the move mostly symbolic. As for hopes that rising wages in China will tip the balance back towards domestic production in the U.S., a recent report by the U.S. Bureau of Labor Statistics reported that "in 2002, Chinese manufacturing wages were only 3 percent of those paid in the U.S., even after several years of big pay rises, while labor productivity has been rising faster than wages."[18]

Inland Development

More importantly, China has expanded low-value production, such as in textiles, while simultaneously moving into, and expanding, medium-value-goods production, such as machinery and electrical goods; hence, the growth is not zero-sum. As proof, China's share of the global textile industry has increased steadily since 1993; yet, over the same period, textiles as a percentage of overall Chinese exports have declined from 28 percent to 9 percent in 2005.[19]

Anecdotal evidence has shown that low-value manufacturing has not relocated to other countries, but has increasingly moved inland to provinces that "stand poised to snap up work that wealthier coastal provinces no longer want."[20] Certain companies, both foreign and domestic, have already begun moving their operations inland to ensure access to the increasingly affluent domestic Chinese market, as well as to guarantee access to cheap labor for export production for years to come. One example of this is Chongqing, a growing manufacturing center located 2,000 km inland from Shanghai along the Yangtze River, where a local business official has stated "about 30 large companies from the southern industrial province had invested or were planning to invest in Chongqing."[21] This movement embodies the broader, ongoing bifurcation of the manufacturing sector in China, with medium- to high-value production dominating the southern industrial coast, while low-value, labor-cost-dependent manufacturing shifts inland.

Foreign and domestic manufacturers in China are taking advantage of this state of affairs by employing a "hybridized" production process, effectively "splitting their production according to variables such as the degree of technical sophistication and closeness to markets –

[18] Dyer, Geoff, "Chinese Trendsetters Look to Country's West in Search of New Markets," *Financial Times*, May 23, 2006.
[19] "China's False Alarms," *Financial Times*, April 20, 2006.
[20] Ibid.
[21] Dyer, Geoff, "China Looks to its Interior in Move to Boost Markets," *Financial Times*, May 22, 2006.

and picking the location that makes the most sense."[22] This geo-strategic decision-making process is also employed by foreign producers at the international level.

For instance, when foreign companies decide what production can be outsourced to China and what processes should continue to be completed domestically, the decision is typically not made on cost alone. More and more, other concerns such as access to global transportation routes, ease of establishing business operations, and the customization and "flex-production" requirements of the specific good are taking priority. On these three metrics, China is generally seen to have adequate access to transportation routes, but is often cited as a difficult place both to start a business operation, due to the complex and opaque political system, and to alter production for "just-in-time" manufacturing processes. Among workers, China skeptics have also cited the country's Confucian-based education system – with its emphasis on rote memorization, a lack of interaction between pupils and instructors, and an aversion to group projects – for stifling innovative thinking and producing few, skilled managers. Yet, any perceived lack of innovation – difficult as it would be to prove – could just as easily be the result of the repressive Communist government's interference in the education system, as much as the system itself.

In any event, for producers assessing these downside production risks, larger foreign companies will often have advantages over smaller ones in negotiating with local political officials, and when recruiting the scarce, resourceful management personnel necessary to make Chinese operations efficient. At the same time, sourcing manufacturing components from China – those that can be mass-produced and do not require frequent, rapid shifts in production processes over time – and completing the final, highly-technical, high-value-added manufacturing in the United States, will also continue to prove an effective strategy for leveraging China's low-cost production.

However, as the production of these low-value components and other products increasingly moves to inland China in search of more land and low-cost labor, transportation infrastructure may begin to constrain China's cost-competitiveness. A 2004 study of the port of Hong Kong by McKinsey & Company, a consultancy, found that a mixture of lacking road infrastructure and arcane trucker licensing rules on the part of the Chinese government were the

[22] Marsh, Peter, "Foreign Makers Find Advantages on More Familiar Turf," *Financial Times*, May 8, 2006.

cause of up to 66 percent of Hong Kong's 8-9 percent cost disadvantage against the nearby Chinese ports of Yantian and Shekou-Chiwan.[23] The McKinsey researchers showed that:

> From a typical factory in Dongguan – the Pearl River Delta's largest export-oriented manufacturing area – the cost per container (40-foot-equivalent unit) of trucking goods to port is US $370 for Hong Kong, US $150 for Yantian, and US $110 for Shekou-Chiwan.[24]

The other cause of the cost disparity arises from trucker licensing rules which require Hong Kong truckers to pay "cross-border registration fees of HK $4,000 to HK $6,000 [US $500 to US $650] a month," while "[m]ainland Chinese truckers are not allowed to transport goods into Hong Kong and thus don't have to pay cross-border registration fees."[25] Even under this system, the port of Hong Kong's total container throughput was 19.1 million TEUs in 2002, the most of any port in the world, while still not operating at full capacity.[26]

The researchers offer several methods by which the port could seek to lower the cost difference against rival Chinese ports, including:

- Persuading the Chinese government to forgo licensing revenues on trucks in Guangdong province;
- Extending Chinese customs' hours-of-operation;
- Improving information technology services connecting Chinese and Hong Kong customs to decrease waiting times; and,
- Building better access to Chinese highways from the border crossings.[27]

Overall, the Hong Kong port case is instructive as it illustrates the willingness of manufacturers and importers to pay a premium for Hong Kong's "easier customs clearance"; its service to more international ports than its mainland rivals; its duty-free port status, which "makes it attractive as a regional warehouse for high-value goods"; as well as "its sophisticated legal and financial systems" that improve trade.[28] The report concludes that the ability to raise

[23] Chu, T. C., Alan Lau, and Nicolas C. Leung, "Shoring Up Hong Kong's Port," *The McKinsey Quarterly*, No. 3, 2004.
[24] Ibid.
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] Ibid.

efficiency at the Port of Hong Kong will increasingly be affected by constraints outside the port operator's control, rather than internal port inefficiencies that it could excise.

Transportation Infrastructure Investment

Further growth in global trade with China will, therefore, continue to make Hong Kong port access an increasingly-prized commodity, potentially raising rates there and, in turn, throughout the Pearl River Delta region. In response, several Chinese port operators, aware of this potentiality, have invested heavily in alternative ports on the mainland. Chief among these moves has been the recent moves to the coastline west of the Pearl River Delta, away from the massive deepwater ports of Hong Kong, Kwai Chung and Yantian to the east. There, at the Port of Gaolan, the last natural deepwater port in the region is slated to have begun operation of two container terminals by the year 2007.[29] If successful, it will undoubtedly spur the rapid development of the western coastline of the Pearl River Delta region, a heretofore mostly untapped fount of cheap land capable of spurring growth in Chinese manufacturing for years to come.

As mentioned before, China's communist leaders are also attempting to spread the growth of China's economy to its interior regions. Chinese officials have outlined the need for greater investment in transportation infrastructure – most particularly roads – to help equalize the rising income disparities between coastal manufacturing workers, and the larger majority of Chinese citizens who are still involved in agriculture in the interior – a situation inimical to the maintenance of an egalitarian Communist society.

To do so, party officials have proposed spending $273 billion to create a system of highways between the largest cities and towns with populations of more than 200,000. By 2026, the Chinese government "plans to build 55,000 miles of new roads and expressways – the equivalent of the U.S. interstate highway network."[30] The highways will also boost the movement of freight, of which 12.2 billion tons were moved using China's roads in 2004. In particular, container traffic should benefit greatly from the new highways, as "only 10% of container traffic received at China's ports" arrived by truck, the result of the lacking

[29] Mitchell, Tom, "An Alpha Delta: How Southern China is Handling Cost Rises by Boosting Value," *Financial Times*, May 8, 2006.
[30] "China to Spend Billions on Inland Transport," *The Journal of Commerce*, March 13, 2006, p. 8.

infrastructure, as well as the fact that "the average capacity of Chinese freight vehicles is two tones [sic], and there is a shortage of specialized vehicles."[31] The plan will proceed in stages, with initial efforts seeking to build 10,563 miles of roads between 2006 and 2010, with this first phase costing $155 billion and slated to cover 700 million of the population.[32]

The government has also cited the need for an expansion of the country's rail network. By 2020, "China wants to have 100,000 km of rail lines, up from 74,000 km. It also wants to insure that half of those lines are double track, up from 40 percent, and that the proportion electrified is raised from 30 percent to more than 50 percent."[33]

The new rail lines will take the form of a hub-and-spoke system, with "7 links radiating from Beijing, 9 running north-south and 18 east-west."[34] The cost of the new rail lines is estimated at $250 billion, while an additional $2.5 billion will be invested in "a container railway service network that will center on specialist logistics facilities and use existing railway lines to link ports with road haulage services."[35] To fund the project, China is seeking foreign funds. Huang Min, chief economist of the Ministry of Railways, has stated that he hopes, within a few years, to cut [the ratio of government expenditure] to just 70 percent" for all transportation projects, down from 90 percent at present.[36]

New Logistics Services

The growing Chinese logistics sector continues to facilitate the country's booming international trade and growth, while also becoming a substantial contributor to Chinese GDP in its own right, as the sector continues to grow. In 2004, the total value of all products moved using logistics services reached 38,382.9 billion yuan (US$4,641 billion), with a growth rate of 29.9% year-on-year.[37]

Nevertheless, structural barriers in the economy have slowed the expansion of the logistics sector to meet demand until recently. As part of the government's most-recent

[31] Eye For Transport (EFT) Research, "China's Logistics: Challenges and Opportunities," January 2006, Online. Available: http://www.eyefortransport.com.
[32] Tse, Kenneth, "Can China's Supply Chain Cope With Growth In Sino-U.S. Trade?" *Presentation to the 6th Annual Trans-Pacific Maritime Conference*, Online. Available: http://www.yict.com.cn.
[33] Dickie, Mure, "Foreign Investors Poised To Be Asked To Come Aboard," *Financial Times*, November 1, 2005.
[34] "China Distribution and Trading," *Li & Fung Research Centre*, Issue 27, June 2005.
[35] Ibid.
[36] Ibid.
[37] "China Distribution and Trading," *Li & Fung Research Centre*, Issue 27, June 2005.

expansion project, officials plan to build eighteen "contemporary inter-modal terminals," mostly in the southeastern coastal region, including the provinces and cities of Guangzhou, Shenzhen, Beijing, Shanghai, Tianjin, Wuhan, Chongqing and Dalian.[38] In Beijing, the city is planning three logistics facilities at the "Jingtai logistics port, Tongzhou Logistics Park, and Xinan logistics base."[39] The major centers included in the plan are slated to connect to the railroad network. While none are served at present, the government hopes to invite foreign investment to speed the process. Chinese officials are also obligated, through their WTO accession agreements, to allow foreign investors to wholly own subsidiaries of shipping and freight forwarding businesses.

International Freight and Foreign Express Couriers

The year 2006 marks the first year that foreign companies are not limited to international freight business, which is especially important to the major express package carriers operating in China: DHL, UPS, and FedEx. A detailed description of these companies' plans for entering the domestic Chinese market, mostly through partnerships with domestic operators Sinotrans and China Post, can be found in phase I of this report.

Initial analysis of these new operations has revealed few problems and plans appear to be on track. FedEx, in particular, has reported strong initial demand for services, evidenced by its recent addition of three flights per week to the region, raising its weekly total to twenty-six, while work continues to shift its regional hub from the Philippines to Guangzhou in the south of China.[40] After paying $400 million to take full control of its former partnership with Tianjin Datian W. Group, FedEx is also now in the process of consolidating its close to 90 facilities and 3,000 mainland workers.[41] UPS and DHL are undergoing similar consolidations after buying out their domestic partners, as well. All of this comes as Merrill Lynch forecasts that the Chinese international express market will see annual growth of 30 percent this year, four times the global rate, in 2006, with similar growth expected in 2007 and beyond.[42]

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[38]Tse, Kenneth, "Can China's Supply Chain Cope With Growth In Sino-U.S. Trade?" *Presentation to the 6th Annual Trans-Pacific Maritime Conference*, Online. Available: http://www.yict.com.cn. Cities listing from "China Distribution and Trading," *Li & Fung Research Centre*, Issue 27, June 2005.
[39] "China Distribution and Trading," *Li & Fung Research Centre*, Issue 27, June 2005.
[40] Ward, Andrew, "Flying Start to FedEx's Growth in China," *Financial Times*, February, 15, 2006.
[41] Ibid.
[42] Ibid.

Regional Integration Initiatives Spurring Logistics Demand

Elsewhere two specific regional integration initiatives also appear poised to spur growth in the logistics sector. The first is China's "Go West" policy, which, since 2000, has given preferential tax incentives, similar to those granted to foreign firms, for Chinese businesses operating in the west of the country. While initial uptake of the incentives has been slower than expected, future growth – with a similar investment in transportation infrastructure – could greatly broaden demand for logistics services.

The second integration initiative is the Pan-Pearl River Delta (PPRD) cooperation agreement. Consisting of nine mostly-inland provinces,[43] the agreement seeks to move low-cost manufacturing to the interior of the country, embodied by PPRD's slogan "shops in front and factories at the back."[44] PPRD is thus both a reaction to, and a facilitator of, the hybridized manufacturing shift occurring throughout the country, and has the potential to spur massive growth in the logistics sector as a result.

Obstacles to Further Growth

Before potential gains can be realized, several large problems currently facing the China's logistics sector will need to be addressed. One of the largest problems is that Chinese domestic logistics operators still typically offer only the most rudimentary transportation services, with few operators capable of providing increasingly-important services like warehousing and just-in-time shipping. Moreover, few operate across multiple regions as many foreign customers require, and even fewer utilize modern management practices and technology.[45] The lack of multi-region coverage by logistics providers is also detrimental for producers who must confront varying region's conflicting jurisdictional and protectionist measures. The inefficiencies of the sector translate to higher cost for producers, most apparent in terms of the management costs within the logistics sector itself, which are estimated at 14 percent of total logistics cost in China, compared to 3.8 percent of total logistics costs in the United States.[46]

[43] The nine provinces are Guangdong, Guangxi, Hunan, Hainan, Yunnan, Guizhou, Jiangxi, Fujian, and Sichuan.
[44] "China Distribution and Trading," *Li & Fung Research Centre*, Issue 27, June 2005.
[45] Ibid.
[46] Ibid.

Trans-Pacific Shipping

Global Supply and Demand Issues

Demand for trans-Pacific shipping services remains at record levels, spurred not only by growing production in China but by an economic resurgence in countries like India and Japan, as well. Globally, goods and services trade growth year-on-year was greater than ten percent in 2004, close to seven percent in 2005, and forecasts to be seven percent again in 2006.[47]

But two supply-side issues are beginning to affect the global liner shipping industry: over-supply and high oil prices. The first problem is arising because many shippers were too optimistic about the growth in China trade after recent boom years in 2001 and 2002, and so, in an attempt to capitalize on the expectations, ordered ships in 2002-03 that are now coming into operation and will continue to do so over the 2006-09 time period. In 2006 alone, shippers are expected to add 1.3 million twenty-foot-equivalent units (TEUs) to the global fleet.

The new ships will be deployed mostly along Asia-Europe routes through the Suez Canal, which is able to handle the deep drafts. Ships previously deployed to this route – many in the 5,500 to 6,000 TEU range – are expected to be redeployed to trans-Pacific routes. This is as much a result of large European demand for Asian goods as it is a lack of infrastructure capable of accommodating the new super-ships in the United States.

Demand, while still strong, is far from filling all of this new capacity, resulting in lower rates per TEU transported. This is especially true of the new, much larger ships coming on line that have capacities of greater than 7,500 TEUs. In 2006:

> About 59 of the 399 ships due for delivery this year will have a capacity of more than 7,500 [TEUs]. Only 86 such vessels were afloat at the start of this year and none at the start of 2004. Another 41 […] will be online in 2007.[48]

The effect of this growth in supply is that, while demand may "grow by 8 percent this year," some expect freight rates to "fall by [as much as] 15 percent".[49] This discrepancy will lead

[47] Beattie, Alan, "Hard To Shock: How the World Trading System is Defying the Doom-Mongers," *Financial Times*, March 15, 2006.
[48] Wright, Robert and Andrew Ward, "Growing Fleet Set to Sink Profits," *Financial Times*, April 17, 2006.
[49] Ibid.

to utilization rates of 80 percent on most ships.[50] In turn, over the course of the next few years, producers should find it marginally cheaper to ship goods as shippers battle one another to increase their slot utilization on their vessels. By mid-spring 2006, shippers were already reporting freight rate declines of $200 since the previous fall on eastbound Pacific shipments, and several predict "rates could drop by 15 percent in the eastbound Pacific" before 2007.[51]

Second, high oil prices of greater than $70 a barrel mean many shippers, because of the glut of supply, will be largely unable to pass fuel costs along to producers due to increased competition for business and slot utilization. Worldwide, partially due to higher oil prices, "the shipping industry will see its worldwide operating costs increase $2.4 billion over 2005."[52]

Some have even predicted that stiffer competition and the inability to absorb higher fuel costs could force a wave of insolvency in the shipping industry or provide the impetus for even more consolidation. In any event, producers should benefit from this cost-lowering state of affairs for several years to come.

Major Shipping Lines and Routes

Phase I of this report included a comparison of the major trans-Pacific services, as well as the major all-water routes through the Panama Canal and the Suez Canal, offered by Maersk Lines, the largest steamship line, and the three alliances that compete with it.

There has been little change in the route offerings of these major carriers during 2006; however, some minor alterations of the routes are indicative of broader shipping trends and worthy of discussion. The most important pattern that emerges from the routes that have been altered, is a returning reliance on the Southern California ports of Los Angeles and Long Beach. Phase I of this report found that the massive congestion at those ports had resulted in deferred routing of container cargo to ports up and down the Pacific Coast of North America. The other response to U.S. West Coast congestion had been an increased offering of all-water services through the Panama and Suez Canal. Yet, evidence has shown that over the past year, increasing

[50] Mongelluzzo, Bill, "Down, But Not Out," *The Journal of Commerce*, March 13, 2006, p. 18.
[51] Ibid. p. 19.
[52] Ibid. p. 20. [Note: Less directly, higher fuel costs for consumers in the United States may slow demand for all goods, including imports. Moreover, as interest rates continue to rise in the U.S., household borrowing should decrease, and disposable income falls, particularly since households have used housing equity to fuel consumption, with some evidence that this practice is coming to an end. Less demand typically means fewer goods shipped, resulting in less utilization of trans-Pacific shippers' services and downward pressure on trans-Pac rates.]

throughput at the ports of Los Angeles and Long Beach has allowed shippers, especially on trans-Pacific routes, to make their first port call at Los Angeles/Long Beach before going to ports in Portland, Oregon; Tacoma, Washington; or Vancouver. In 2005, the situation was often reversed, with first port calls being made at the peripheral ports before moving on to Los Angeles and Long Beach. Part of the reason this had been occurring was that, due to delays in Southern California, ships were forced to wait up to 10 days for a berth to open. In that situation, it made sense for shippers to deliver freight on-time where they could before beginning to wait for a berth in Southern California.

Four major liner shipping groups are offering fewer all-water services to U.S. East Coast, and fewer stops, as well. Furthermore, the major carriers appear to be making Norfolk, Virginia their Mid-Atlantic port of choice, with seven of the all-water routes now offering service to Norfolk.

The following tables update the shipping charts included in Phase I of this report. Accounting for upwards of 80 percent of all container traffic calling at all U.S. ports, the four major steamship lines and alliances listed below (Maersk Lines, the New World Alliance, the CKYH Alliance, and the Grand Alliance) account for the vast majority of U.S.-China trade. The name of the services, the service types, the origins of the routes, and the transit times are charted and present a near-total listing of the kinds and types of shipping services available to producers in China who wish to ship their goods to the United States.

Table 2.4. Maersk Lines

Service Name	Type of Service	Origin	Transit Times to U.S. Destinations
TP-1	Trans-Pacific	Hong Kong, PRC	13 days to Tacoma, WA; 16 days to Oakland, CA; 22 days to Honolulu, HI
TP-2	Trans-Pacific	Yantian	15 days to Tacoma, WA; 16 days to Vancouver
TP-3	All-water through the Panama Canal	Shanghai	27 days to Newark; 29 days to Norfolk, VA; 31 days to Charleston, S.C.
TP-5	Trans-Pacific	Shanghai	14 days to Los Angeles, CA; 15 days to Oakland, CA (eastbound)
TP-7	All-water through the Panama Canal	Hong Kong, PRC	24 days to Miami, FL; 26 days to Savannah, GA; 28 days to Norfolk, VA (eastbound)
TP-8	Trans-Pacific	Dalian	16 days to Los Angeles, CA; 19 days to Oakland, CA
TP-9/-10	Trans-Pacific	Hong Kong, PRC	15 days to Los Angeles, CA; 17 days to Oakland, CA; 18 days to Tacoma
TP-12	All-water through the Panama Canal	Hong Kong, PRC	24 days to Savannah, GA; 25 days to Charleston, S.C.
Canadian Trans-Pacific	Trans-Pacific	Koahsiung, Taiwan	14 days to Tacoma, WA (eastbound)
MECL2	All-water through the Suez Canal	Tanjung Pellepas, Malaysia	28 days to Newark, N.J.; 29 days to Norfolk, VA

Source: Maersk Line, Maersk website, available at : www.maersksealand.com, cited April 7, 2006.

Table 2.5. New World Alliance

Service Name	Type of Service	Origin	Transit Times to U.S. Destinations
PS-1	Trans-Pacific	Hong Kong	12 days to Seattle, WA; 14 days to Oakland, CA
PS-2	Trans-Pacific	Hong Kong	17 days to Los Angeles, CA; 19 days to Oakland, CA
PS-3	Trans-Pacific	Shanghai, PRC	16 days to Los Angeles, CA; 19 days to Vancouver; 20 days to Seattle, WA
PSX	Trans-Pacific	Hong Kong	13 days to Oakland, CA; 16 days to Los Angeles, CA
PSW	Trans-Pacific	Hong Kong	18 days to Long Beach, CA; 19 days to Oakland
PNW	Trans-Pacific	Hong Kong	16 days to Tacoma, WA; 18 days to Seattle, WA; 19 days to Vancouver
PCE	Trans-Pacific	Xingang, PRC	16 days to Los Angeles; 18 days to Oakland, CA
CNY	All water through the Panama Canal	Hong Kong	28 days to Miami, FL; 29 days to Savannah, GA; 31 days to Charleston, SC; 33 days to New York, NY
NYX	All water through the Panama Canal	Shanghai, PRC	26 days to New York, NY; 28 days to Norfolk, VA; 30 days to Savannah, GA; 31 days to Miami, FL

Source: Mitsui Orient Line (MOL), MOL website, available at : www.molpower.com, cited April 7, 2006.

Table 2.6. CKYH Alliance

Service Name	Service Type	Origin	Transit Times to/from U.S. Destinations
CALCO-A	Trans-Pacific	Shanghai	13 days to Long Beach, CA; 16 days to Oakland, CA
CALCO-C	Trans-Pacific	Hong Kong	12 days to Long Beach, CA; 16 days to Oakland, CA
CALCO-Y	Trans-Pacific	Yantian	14 days to Los Angeles, CA; 19 days to Oakland
CALCO-J	Trans-Pacific	Tokyo, Japan	8 days to Long Beach, CA; 11 days to Oakland, CA
CALCO-H	Trans-Pacific	Shanghai	11 days to Long Beach, CA; 15 days to Oakland, CA; 17 days to Seattle, WA
CALCO-M	Trans-Pacific	Shanghai	13 days to Oakland, CA; 15 days to Long Beach, CA
CALCO-Q	Trans-Pacific	Xingang	14 days to Long Beach, CA; 17 days to Oakland, CA
NOWCO-A	Trans-Pacific	Shanghai	11 days to Tacoma, WA; 14 days to Vancouver
NOWCO-K	Trans-Pacific	Hong Kong	13 days to Seattle, WA; 15 days to Portland, OR; 17 days to Vancouver

Source: K-Line, K-Line website, available at : www.kline.com, cited April 7, 2006.

Table 2.7. Grand Alliance

Service Name	Service Type	Origin	Transit Times to U.S. Destinations
PNX	Trans-Pacific	Hong Kong	12 days to Vancouver; 15 days to Seattle
ECN	All-water through the Panama Canal	Hong Kong	22 days to New York, NY; 24 days to Norfolk, VA; 26 days to Savannah, GA
PAX	Trans-Pacific with continuing all-water service through the Panama Canal	Kaohsiung, Taiwan	15 days to Seattle, WA; 18 days to Oakland, CA; 19 days to Long Beach; 30 days to Savannah, GA; 32 days to Norfolk, VA; 33 days to New York, NY
JCX	Trans-Pacific	Shanghai	14 days to Los Angeles, CA; 17 days to Oakland, CA
CCX	Trans-Pacific	Ningbo, PRC	10 days to Los Angeles
SSX	Trans-Pacific	Hong Kong	11 days to Long Beach, CA
SCX	Trans-Pacific	Laem Chabang	18 days to Los Angeles, CA; 22 to Oakland, CA
AEX	All-water through the Suez Canal	Laem Chabang	27 days to New York; 29 days to Savannah, GA; 32 days to Norfolk, VA
NWX	Trans-Pacific	Shanghai	13 days to Seattle, WA; 16 days to Vancouver
NCX	Trans-Pacific	Xingang	13 days to Los Angeles, CA; 17 days to Oakland, CA

Source: NYK Line, NYK Line website, available at: www2.nykline.com, cited April 7, 2006.

Shipping Through the Panama and Suez Canals

Phase I of this report detailed the use of all-water shipping routes through the Panama and Suez Canals. That report highlighted the material differences between the two canals –

specifically, the Suez Canal's ability to handle ships of much greater drafts (200,000 deadweight tons) than those able to pass through the Panama Canal (50,000 to 80,000 deadweight tons).

In response, the Panama Canal has been utilizing several practices, such as an overland rail service operated by the Panama Canal Railway Company and the opportunity to pay higher rates to move a ship forward in the queue. This year, the Panama Canal Authority (PCA) introduced three small changes that have reduced idle times at several of the locks, but are expected to add "30 million to 40 million tons of cargo annually."[53] Yet, the PCA's plans for further improvements will have to be funded by raising tolls, yet again, which are already expected to rise, in stages, by 69% by 2007.[54]

Overall, Phase I found that utilization of the Suez Canal as an all-water alternative to the Panama Canal was a difficult proposition. Phase I found an effective, continuous all-water service from Asia to the U.S. East Coast through the Suez Canal required the use of twelve vessels, as opposed to only eight or nine vessels for a service through the Panama Canal. These higher start-up costs, however, could be potentially offset by the growing container fleet, but it is unclear how many ships were being taken offline as new ships came into service.

The most important factor constraining the growth of all-water services through both canals has been the resurgence of the U.S. West Coasts ports, particularly their turn-around after the logjams of 2004. At present, although two services indirectly route freight from Hong Kong to the U.S. East Coast through the Suez Canal, there is no service directly connecting the two destinations.[55] By comparison, "15 regularly scheduled westbound liner services to East and Gulf Coast ports" through the Panama Canal.[56]

At the same time, the deeper draft of the Suez Canal means ever-larger ships can be utilized along the route, potentially cutting down the overall number of ships needed as the large, 7,500 TEU ships come online. In the words of Mark Page, a researcher for Drewry Shipping Consultants, soon "you can afford to put 10 ships on a Suez service as opposed to seven on [a Panama service], which does start to narrow the gap between Suez and Panama. We would

[53] Leach, Peter, "Panama or Suez?" *Gulf Shipper*, March 6, 2006, p. 56.
[54] Ibid. p. 58
[55] Leach, Peter, "Panama or Suez?" *Gulf Shipper*, March 6, 2006, p. 56.
[56] Ibid.

expect Suez to become a more prominent part of the trans-Pacific trade over the next couple of years. At the moment, it's a very minor footnote."[57]

For the Panama Canal, the medium-term prognosis is even less optimistic. A recent report on the canal by Drewry Shipping Consultants found that (1) continued growth in demand will outstrip the new capacity improvements made by the PCA "in just three years time"; and, (2) "even if and when the Panama Canal is expanded to handle post-Panamax ships in 10 years, most U.S. East Coast ports won't be ready to accommodate them."[58] If these conclusions come to pass, the validity of claims that the Panama Canal can act as a viable all-water alternative from Asia to the U.S. East Coast would be somewhat inaccurate. Similarly, developments at West Coast ports are further challenging these assumptions.

North American Ports and Infrastructure

Phase I of this report documented the development of the ports of Lazaro Cardenas and Manzanillo along the Pacific Coast of Mexico that were handling ever-increasing diversions of traffic from U.S. West Coast ports. Between these two ports, Lazaro Cardenas' development as a container port was particularly intriguing since it had heretofore been a largely industrial port, dwarfed by Manzanillo's container freight throughput.

Mexican and Canadian Infrastructure Development

Lazaro Cardenas

The Port of Lazaro Cardenas has proceeded apace with its plans to handle 400,000 TEUs annually by 2007, compared with Manzanillo's 800,000 TEU throughput in 2005. While still a small fraction of overall trans-Pacific trade, when one considers that the Port of Lazaro Cardenas only handled 2,670 TEUs in 2003, the growth seems more substantial. Under the management of Hutchison Port Holdings (HPH), a longer term investment in a $200 million dollar container terminal, capable of handling two million TEUs upon its completion, represents HPH's bet that U.S. West Coast ports will continue to struggle with handling the rising tide of containers.

[57] Ibid. p. 59.
[58] Leach, Peter, "Delivering a Message," *The Journal of Commerce*, November 21, 2005.

Prince Rupert

Phase I of this report did not, however, include a discussion of the Canadian alternatives to U.S. West Coast ports. Chief among these is the developing alternative of Prince Rupert, located 400 miles north of Vancouver. Developed by Maher Terminals, and located at the western terminus of the Canadian National rail line, Prince Rupert has ready-made links to the U.S. Midwest, creating certain competitive advantages over U.S. West Coast ports. In particular, Maher claims Prince Rupert provides "the shortest ocean-rail route from Asia to Chicago."[59] The two-stage expansion of the port is expected to increase handlings to 500,000 TEUs by October 2007, and to 2 million TEUs by 2010.[60]

The container port is also expected to facilitate transport of Canada's largest raw material exports – chiefly in lumber and grain. One other alleged advantage for Prince Rupert, according to Maher, has been the pro-development attitude of local residents who are said to be "eager to reap the rewards the new terminal would bring to the port, which has been depressed for many years."[61] This stands in stark contrast to the pervading sentiment surrounding the ports of Los Angeles and Long Beach, where tight environmental restrictions, and a lack of developable land in general, have made growth of the ports in the traditional sense – outward expansion – next to impossible.

United States Infrastructure Development

West Coast Ports

After the massive congestion witnessed at Southern California ports after the 10-day shutdown during the 2002 peak season, some industry analysts questioned whether the ports of Los Angeles and Long Beach could cope with ever-rising container volumes, given the constraints they were already facing. The next two years provided little positive persuasion to allay such fears. Handling over 40 percent of U.S. container traffic between the two of them, the rising congestion looked like an ominous sign not only for the U.S. transportation sector, but also for the U.S. economy as a whole.

[59] Leach, Peter T., "The New Gateways," *The Journal of Commerce*, March 13, 2006, p. 24.
[60] Ibid. p. 26.
[61] Ibid. p. 24.

Phase I of this report highlighted the important shift that was taking place away from the U.S. West Coast and towards ports in Mexico and the Pacific Northwest. In the first seven months of 2005, these alternatives experienced percentage growth of 10 percent, while Los Angeles/Long Beach grew at only 4 percent.[62] Along the U.S. West Coast, ports such as Oakland, Seattle, and Tacoma witnessed growth in traffic of 33.7 percent, 48.6 percent, and 19 percent, respectively.[63]

Yet, in the latter half of 2005, the ports of Los Angeles and Long Beach underwent a minor renaissance and began to recapture shipper confidence, with volumes rising 12.9 percent in August, and more regular growth rates since.[64] By hiring more workers, introducing the PierPass system, and allowing gates to stay open longer, the ports regained a large portion of the business they lost. However, some believe that the creation of new business, caused by the greater number of ships operating globally may mean that these ports are attracting new services, rather than winning back former clients.[65]

In any event, the ports' intermodal advantages are proving alluring to shippers and logistics providers, once again. In particular, the 47 trains that leave the ports of Los Angeles and Long Beach daily along the Alameda Corridor on their way to connections with the nation's major railways provide a rapid connection to the U.S. Midwest and East Coast. Furthermore, the ports of Los Angeles and Long Beach have reopened their time gap from Asia to the U.S. East Coast to one week over rival all-water services through the Panama Canal.

At the same time, all-water shippers have made themselves slightly less-competitive by raising their rates faster than trans-Pacific services, believing that high demand for their services justified a closure of the cost premium trans-Pacific services had been charging for their traditionally-quicker overland services. In particular, shippers raised all-water service rates by $600 per forty-foot-equivalent unit (FEU), while trans-Pacific shippers only raised rates by $450 per FEU in 2004.[66] For 2005, proposed rate increases averaged $430 for all-water services, $285

[62] Mongelluzzo, Bill, "The Lord of the Ports: The Return of the King," *The Journal of Commerce*, October 17, 2005. p. 11.
[63] Ibid. p. 12.
[64] Ibid. p. 11.
[65] Ibid. p. 11.
[66] Ibid.

for trans-Pacific service to the West Coast, and $350 for intermodal overland service through the West Coast.[67]

These rate increases are significant. Phase I of this report found the cost premium for transport to the East Coast between all-water and trans-Pacific services averages approximately $500 per container. Hence, a continued acceleration of relative rate rises for all-water services compared to trans-Pacific services could, in theory, see these two rates equalize within two to three years. However, the rising global capacity and the increasing productivity at the ports of Los Angeles and Long Beach would appear to make this trend evermore unsustainable, as all-water services will be forced to lower prices to account for the broadening time gap enjoyed by their trans-Pacific rivals.

Western Rail Improvements

Phase I of this report detailed the operations and initiatives of Burlington Northern Santa Fe (BNSF) and Union Pacific (UP), which combined exercise a virtual duopoly over containerized rail freight movement from U.S. West Coast ports to the U.S. Midwest, before it makes further connections to the East Coast.

Over 2005-06, complaints continued to mount about delays and inadequate capacity along western rail routes. The friction between clients and the rail operators has been taken to the United States Congress. There, rail operators are lobbying for tax incentives to provide the impetus for them to invest in additional infrastructure, citing their investors' inability to "accept more expenditures without greater rewards."[68]

On the other side of the debate, rail users believe more competition is needed in the sector to increase investment in capacity. After deregulation of the U.S. rail industry in 1980, operators began consolidating and combining their operations. Since then, four major operators have emerged (BNSF, UP, CSX and Norfolk Southern), but over the same period, rail capacity has declined by one-third.[69] This, rail users say, creates a perverse incentive structure whereby

[67] Ibid.
[68] Ward, Andrew, "U.S. Freight Customers Rail Against Delays From Outdated Tracks," *Financial Times*, May 10, 2006.
[69] Ibid.

financial industry analysts and shareholders "reward" rail companies for using capacity shortages to inflate prices.[70]

Recently-proposed legislation seeks to re-regulate the rail industry by removing anti-competition exemptions on the industry. These exemptions, opponents argue, have been the drivers of the large profits of both BNSF and UP – the latter of which reported a doubling of annual profits in the first quarter of 2006. Company officials typically argue that large profits are necessary for infrastructure development. BNSF, for example, will have invested $400 million of its $2.4 billion total capital expenditure on new capacity during 2006.[71] Furthermore, by 2008, Matthew Rose, chief executive officer of BNSF, predicts that BNSF's 2,200-mile premiere line between Los Angeles and Chicago will be completely double-tracked, eliminating the large bottlenecks that occur at the 4 percent of line along the route that is currently single-tracked.[72]

[70] Ibid.
[71] Ibid.
[72] Ibid.

Chapter 3. U.S.-Brazil Trade

The United States and Brazil share many similar characteristics in demography, geography, politics, economics, and natural resources. With both countries having continental dimensions and an abundance of natural resources, the two-way trade between the U.S. and Brazil is both diverse and balanced, far different from U.S.-China trade. Since Brazil transitioned to democracy with its first direct elections for president in 1989 after 25 years of military dictatorship, its economy has opened up to privatization, foreign investment and international trade. A stable currency, an annual GDP growth of 5 percent, and transparency in corporate governance has helped propel Brazil internationally to investment grade status. As a result, Brazil is increasingly becoming integrated into the world economy, while still only representing a small percentage of total global trade.

Notwithstanding nationalist tendencies in South America, the United States remains Brazil's most important trading partner. Though the U.S. has seen its market share erode, this is explained more by the maturation of South American economies and Brazil's engagement with Europe and countries along the South-South-South axis, in Africa, Indian Subcontinent, and Asia.[73] Table 3.1 illustrates Brazil's largest trading partners in 2007. What is notable in table 3.1 is the size of the total U.S.-Brazil trade. While the year-on-year increase from 2007 to 2006 was greater than 10 percent, it is also worth noting that other countries, namely European are increasing at much higher rates. Moreover, and the focus of chapter 4, China's explosive growth has catapulted China to third place as trading partner. Viewed from the U.S. side as a whole in table 3.2, Brazil is to the U.S. a top 15 trading partner, though not nearly as important as an origin/destination market as the U.S. is to Brazil. In the case of the U.S. Southwest, however, Brazil is far more important as will be shown.[74]

[73] A major Brazilian foreign policy emphasis has been on strengthening ties with countries in the Southern Hemisphere.

[74] Throughout this chapter similar data from both U.S. and Brazilian sources will be presented. Slight differences in commodity nomenclature and collection methodologies will show discrepancies. It is hoped the presentation of data from both countries will add to validity of this study.

Table 3.1. Brazil's Top 20 Trading Partners (2007)

Rank	Country	Total Trade (USD$ billions)	% Change 07/06	Market Share
1	United States	43.8	+12%	15.6%
2	Argentina	24.8	+25%	8.8%
3	China	23.4	+43%	8.3%
4	Germany	15.9	+30	5.7%
5	Holland	10.0	+52	3.5%
6	Japan	8.9	+15	3.2%
7	Italy	7.8	+22	2.8%
8	Chile	7.7	+14	2.8%
9	France	7.0	+27	2.5%
10	Nigeria	6.8	+28	2.4%
11	Mexico	6.2	+8	2.2%
12	Russia	5.5	+24	1.9%
13	South Korea	5.4	+7	1.9%
14	Spain	5.3	+41	1.9%
15	England	5.3	+24	1.9%
16	Venezuela	5.1	+22	1.8%
17	Belgium	5.0	+27	1.8%
18	Canada	4.1	+17	1.5%
19	Switzerland	3.4	+55	1.2%
20	Saudi Arabia	3.2	+2	1.1%

Source: *Análise Anuário 2008: Comércio Exterior*, p. 55 (São Paulo, Brazil).

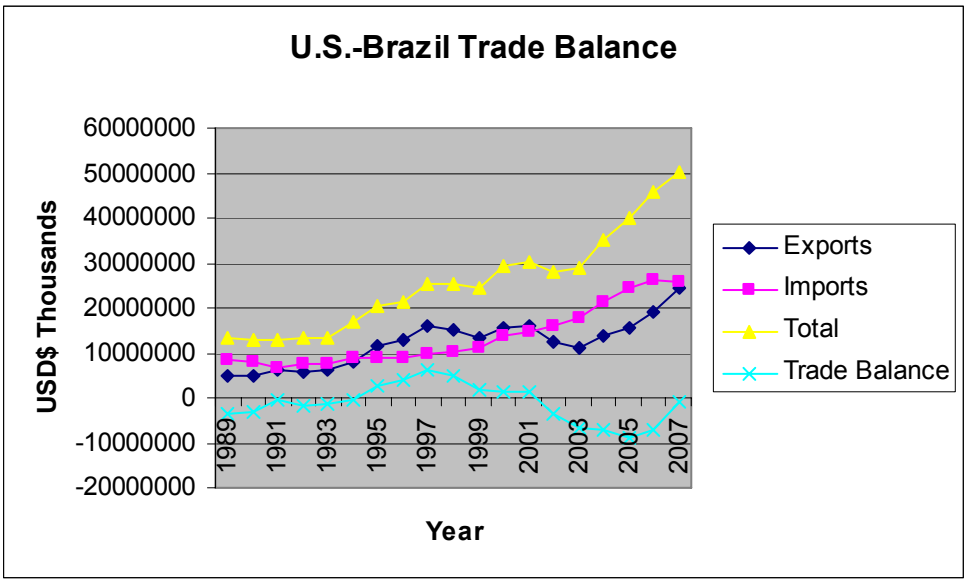
Table 3.2. U.S. Top 15 Trading Partners in 2007
(USD$ billions)

Rank	Country	Exports	Imports	Total	Market Share
1	Canada	248.9	313.1	562.0	18.0%
2	China	65.2	321.5	386.7	12.4%
3	Mexico	136.5	210.8	347.3	11.1%
4	Japan	62.7	145.5	208.1	6.7%
5	Germany	49.7	94.4	144.0	4.6%
6	United Kingdom	50.3	56.9	107.2	3.4%
7	South Korea	34.7	47.6	82.3	2.6%
8	France	27.4	41.6	69.0	2.2%
9	Taiwan	26.4	38.3	64.7	2.1%
10	Holland	33.0	18.4	51.4	1.6%
11	Brazil	24.6	25.6	50.3	1.6%
12	Venezuela	10.2	39.9	50.1	1.6%
13	Italy	14.1	35.0	49.2	1.6%
14	Saudi Arabia	10.4	35.6	46.0	1.5%
15	Singapore	26.3	18.4	44.7	1.4%

Source: Foreign Trade Division, U.S. Bureau of the Census, available at: www.census.gov, cited January 18, 2009.

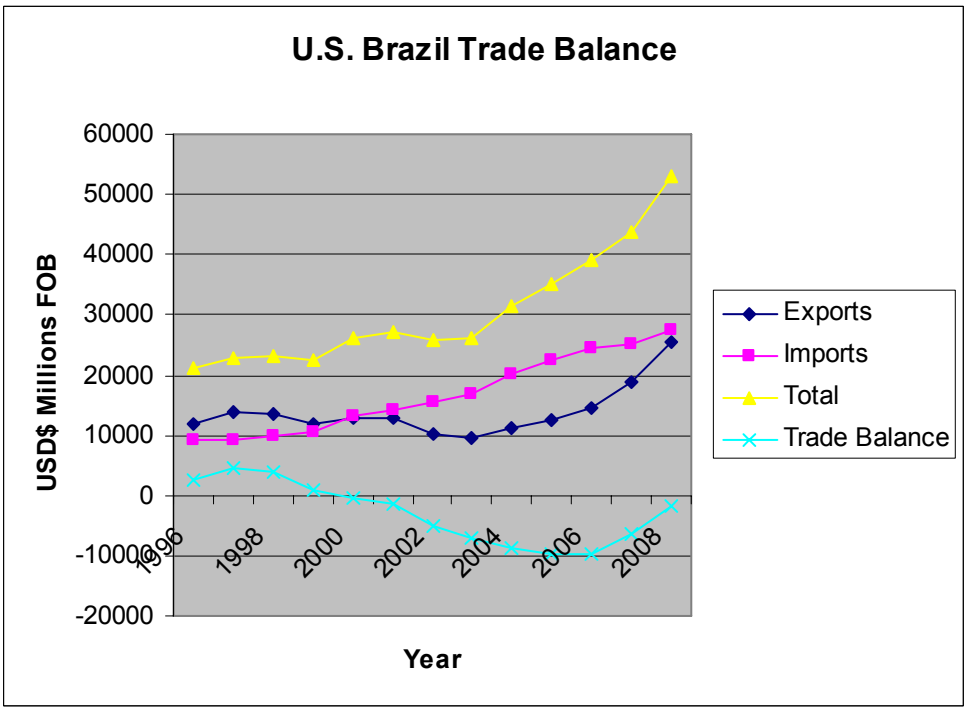
As shown in table 3.2, the United States and Brazil show a balanced trade lane. Charts 3.1 and 3.2, from both U.S. and Brazilian sources, show the same balanced trend over similar time periods. The Brazil-U.S. trade lane has emerged as a growing and balanced one. The notable take-off periods are evident in two distinct moments, the stabilization of the Brazilian economy at the onset of the Brazilian real currency (R$) in 1994 and after the presidential elections of 2002. The establishment of the Real Plan in 1994 brought hyperinflation under control and was accompanied by structural reforms that brought fiscal responsibility, administrative reform, social security reform, and privatization. With the global economy leery of a leftist assuming power in 2002 elections, the second take-off evident in the data is supported by the continuation of former President Fernando Henrique Cardoso's economic policies, especially monetary and fiscal policies by the administration of President Luís Inácio "Lula" da Silva. What is more, export promotion became a principal policy of Pres. Lula and his administration.

Chart 3.1. U.S.-Brazil Trade Balance



Source: Office of Trade and Industry Information, Manufacturing and Services, International Trade Administration, U.S. Department of Commerce, presented by Foreign Trade Division, U.S. Census Bureau, available at: tse.export.gov, cited January 17, 2009.

Chart 3.2. U.S.-Brazil Trade Balance



Source: Sistema Aliceweb, Secretariat of Foreign Trade, Brazilian Ministry of Development Industry and Foreign Trade, available at: aliceweb.desenvolvimento.gov.br, accessed on January 17, 2009.

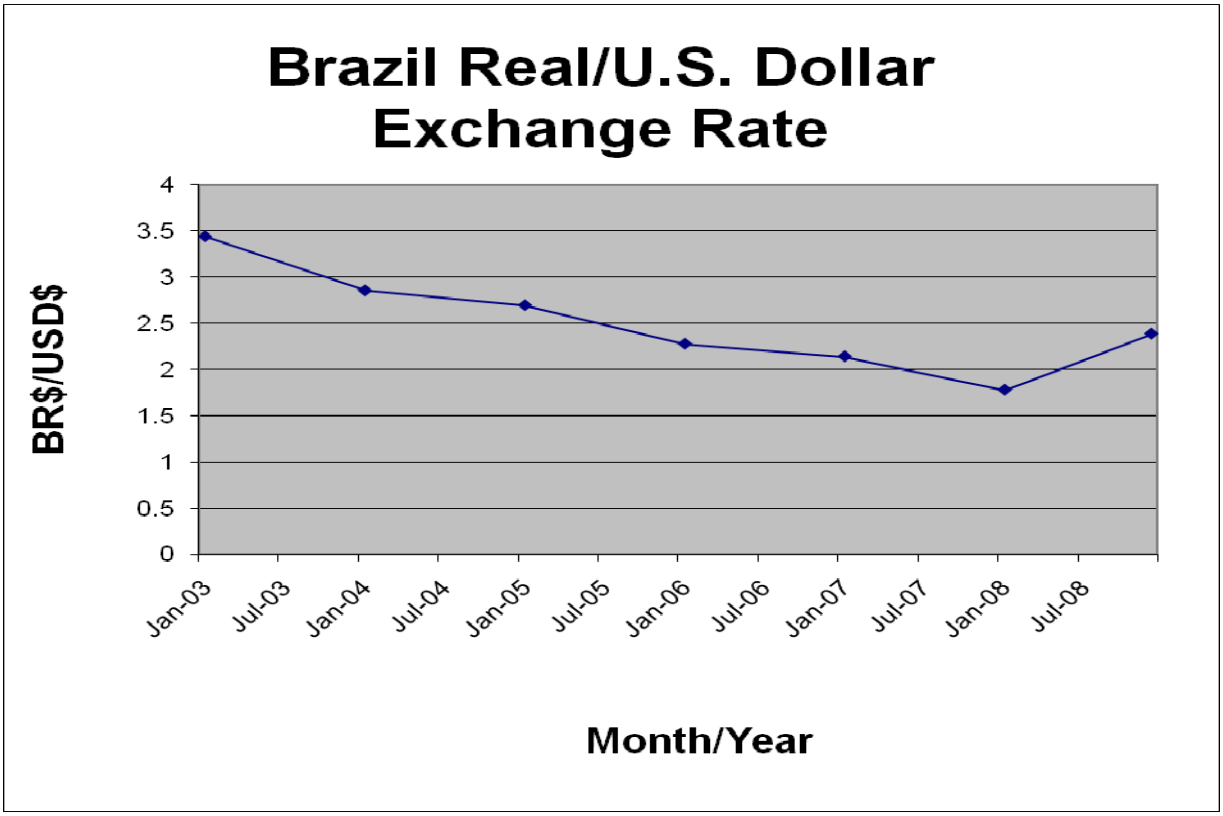
Illustrating the diversity of the commodity mix, the quality of U.S.-Brazilian trade is seen in tables 3.3 and 3.4 in 2007 U.S. dollar value terms. For U.S. exports to Brazil, machinery and equipments, aircraft, pharmaceuticals, intermediate chemicals and petrochemicals, fertilizers, optical and medical equipment hold high value positions. U.S. exports to Brazil a great many intermediate goods used for finishing in the petrochemical industries, such as synthetic resins. Also fertilizers used for Brazil's vast agricultural production maintain a strong position in U.S. exports. Oil well equipment and even rail equipment are also featured in the U.S. export mix to Brazil for the country's ambitious exploration of offshore oil and gas and the Growth Acceleration Program (PAC), the federal government's infrastructure modernization plan of public and private investments.

For U.S. imports from Brazil, the leading imports are fuels and iron and steel products in addition to machinery, aircraft, and vehicles. Also important are construction materials such as rubber, lumber and wood products, and ornamental stone (granite and slate). Coffee, beverages and fruits, meats and seafood are also apparent as Brazil is a leading protein producer and holds near absolute advantage in photosynthesis. Some outsourced industries where Brazil competes with U.S. and Chinese manufactures also figure prominently, such as furniture, textiles, and footwear.

While the United States housing crisis could have an impact on the demand for construction materials, steel, and items such as furniture and ornamental stone, a counterintuitive global trend is shaping up that makes Brazilian exports more competitive. Notwithstanding a weak U.S. dollar, the U.S. dollar has strengthened over the past year versus the Brazilian currency despite a healthy Brazilian economy. The Brazilian economy is expected to grow more than 3 percent in 2009 after averaging a steady 5 percent growth the past few years via strict monetary policy running a primary budget surplus and inflation targeting. Brazil has built its international reserves to more than $100 billion, able to withstand international shocks. Moreover, its banking system is not commingled with other U.S. and European financial institutions that are tied to credit default swaps and derivatives tied to U.S. housing. Part of the reason that the U.S. dollar may be strengthening against the Brazilian real may be the fact that during 2008 foreign investors, institutional and otherwise have taken their profits and pulled money out of Brazil to cover shortfalls and losses elsewhere. Whatever the determinants of exchange rate fluctuation, chart 3.3 shows the interesting trend to a more competitive Brazilian

real. In fact, 2008 was a tale of quarters, Brazilian companies were importing intermediate goods en masse as production/exporting costs in the United States were lower than producing similar product in Brazil. Companies like Braskem outsourced their resin production to the U.S. However, when these dollar denominated import contracts were hit by an upswing in the U.S. dollar over the third and fourth quarters, many Brazilian companies were forced into a crisis of liquidity. Brazilian exporters at the end of 2008 are looking forward to being more competitive. Whether or not a greater competitiveness will be reflected in a greater market share is an open question if the U.S. market does not rebound, but the prospect does loom that sectors that lost out to China during the down trend (furniture, textiles, tile, footwear) may recapture market share.

Chart 3.3. Shifting Competitiveness of USD$/BR$



Source: Average Monthly Exchange Rates, Brazilian Central Bank.

Table 3.3. 2007 U.S. Exports to Brazil (USD$)

Rank	HTS Code-Commodity Description	Value	%
1	84--NUCLEAR REACTORS; BOILERS; MACHINERY ETC.; PARTS	$7,211,971,808	29.3%
2	88--AIRCRAFT; SPACECRAFT; AND PARTS THEREOF	$3,231,644,854	13.1%
3	85--ELECTRIC MACHINERY ETC; SOUND EQUIP; TV EQUIP; PTS	$2,451,875,767	10.0%
4	29--ORGANIC CHEMICALS	$1,729,443,475	7.0%
5	39--PLASTICS AND ARTICLES THEREOF	$1,328,432,370	5.4%
6	90--OPTIC; PHOTO ETC; MEDIC OR SURGICAL INSTRMENTS ETC	$1,273,378,330	5.2%
7	27--MINERAL FUEL; OIL ETC.; BITUMIN SUBST; MINERAL WAX	$982,375,425	4.0%
8	38--MISCELLANEOUS CHEMICAL PRODUCTS	$773,339,754	3.1%
9	87--VEHICLES; EXCEPT RAILWAY OR TRAMWAY; AND PARTS ETC	$693,034,670	2.8%
10	30--PHARMACEUTICAL PRODUCTS	$576,348,034	2.3%
11	31--FERTILIZERS	$506,361,462	2.1%
12	98--SPECIAL CLASSIFICATION PROVISIONS; NESOI	$460,534,328	1.9%
13	40--RUBBER AND ARTICLES THEREOF	$361,913,280	1.5%
14	28--INORG CHEM; PREC & RARE-EARTH MET & RADIOACT COMPD	$341,467,061	1.4%
15	32--TANNING & DYE EXT ETC; DYE; PAINT; PUTTY ETC; INKS	$221,557,974	0.9%
16	73--ARTICLES OF IRON OR STEEL	$186,348,517	0.8%
17	86--RAILWAY OR TRAMWAY STOCK ETC; TRAFFIC SIGNAL EQUIP	$163,098,934	0.7%
18	48—PAPER & PAPERBOARD & ARTICLES (INC PAPR PULP ARTL)	$156,840,418	0.6%
19	37--PHOTOGRAPHIC OR CINEMATOGRAPHIC GOODS	$140,478,443	0.6%
20	76--ALUMINUM AND ARTICLES THEREOF	$122,617,076	0.5%
21	72—IRON AND STEEL	$113,945,827	0.5%
22	33--ESSENTIAL OILS ETC; PERFUMERY; COSMETIC ETC PREPS	$108,544,417	0.4%
23	47—WOOD PULP ETC; RECOVD (WASTE & SCRAP) PPR & PPRBD	$105,049,273	0.4%
24	10--CEREALS	$92,753,044	0.4%
25	34--SOAP ETC; WAXES; POLISH ETC; CANDLES; DENTAL PREPS	$89,153,374	0.4%
	Total	$24,628,410,843	100

Source: Office of Trade and Industry Information, Manufacturing and Services, International Trade Administration, U.S. Department of Commerce, presented by Foreign Trade Division, U.S. Census Bureau, available at: tse.export.gov, cited January 17, 2009.

Table 3.4. 2007 U.S. Imports from Brazil (USD$)

Rank	HTS Code-Commodity Description	USD$	%
1	27--MINERAL FUEL; OIL ETC.; BITUMIN SUBST; MINERAL WAX	$4,644,276,618	18.1%
2	72--IRON AND STEEL	$2,568,897,837	10.0%
3	84--NUCLEAR REACTORS; BOILERS; MACHINERY ETC.; PARTS	$2,370,058,594	9.2%
4	88--AIRCRAFT; SPACECRAFT; AND PARTS THEREOF	$1,711,738,950	6.7%
5	44--WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL	$1,165,121,438	4.5%
6	85--ELECTRIC MACHINERY ETC; SOUND EQUIP; TV EQUIP; PTS	$1,141,098,433	4.5%
7	87--VEHICLES; EXCEPT RAILWAY OR TRAMWAY; AND PARTS ETC	$910,950,630	3.6%
8	64--FOOTWEAR; GAITERS ETC. AND PARTS THEREOF	$764,957,064	3.0%
9	68--ART OF STONE; PLASTER; CEMENT; ASBESTOS; MICA ETC.	$728,363,359	2.8%
10	47--WOOD PULP ETC; RECOVD (WASTE & SCRAP) PPR & PPRBD	$682,148,332	2.7%
11	09--COFFEE; TEA; MATE & SPICES	$679,649,887	2.7%
12	29--ORGANIC CHEMICALS	$608,611,248	2.4%
13	40--RUBBER AND ARTICLES THEREOF	$439,289,772	1.7%
14	98--SPECIAL CLASSIFICATION PROVISIONS; NESOI	$437,709,673	1.7%
15	22--BEVERAGES; SPIRITS AND VINEGAR	$416,375,388	1.6%
16	20--PREP VEGETABLES; FRUIT; NUTS OR OTHER PLANT PARTS	$403,276,407	1.6%
17	76--ALUMINUM AND ARTICLES THEREOF	$364,418,671	1.4%
18	73--ARTICLES OF IRON OR STEEL	$357,239,914	1.4%
19	16--EDIBLE PREPARATIONS OF MEAT; FISH; CRUSTACEANS ETC	$326,036,273	1.3%
20	28--INORG CHEM; PREC & RARE-EARTH MET & RADIOACT COMPD	$303,467,055	1.2%
21	26--ORES; SLAG AND ASH	$297,521,059	1.2%
22	94--FURNITURE; BEDDING ETC; LAMPS NESOI ETC; PREFAB BD	$283,938,584	1.1%
23	24--TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES	$280,416,577	1.1%
24	39--PLASTICS AND ARTICLES THEREOF	$268,049,804	1.0%
25	63--TEXTILE ART NESOI; NEEDLECRAFT SETS; WORN TEXT ART	$248,152,275	1.0%
	Total	$25,635,975,923	100.0%

Source: Office of Trade and Industry Information, Manufacturing and Services, International Trade Administration, U.S. Department of Commerce, presented by Foreign Trade Division, U.S. Census Bureau, available at: tse.export.gov, cited January 17, 2009.

For purposes of delineating the transportation demand on the Southwest economy, foreign trade in tonnage terms is presented from the Brazilian Ministry of Trade for 2008 in tables 3.5-3.8 segmented by mode, waterborne and air. It is clear that high value and perishable items have a preference for the air mode, while bulk commodities are carried by waterborne means. What stands out in Brazilian exports to the U.S. via air are seafood, machinery, precious stones, footwear, leather goods and optical and medical equipment. For Brazilian imports from the U.S. via air, high-value more finished goods, manufactures and equipment are evidenced in

addition to intermediate plastics and chemicals. Among the important volumes are medical, optical equipment, pharmaceuticals, aircraft and aircraft parts.

Table 3.5. 2008 Brazilian Air Cargo Exports to USA

Rank	NCM Code	Commodity Description	KG	USD$
1	84	Machinery and mechanical appliances	10,137,256	$338,977,890
2	85	Electrical machinery and equipment	4,131,055	$332,984,569
3	03	Fish and crustaceans, molluscs and other aquatic invertebrates	3,783,967	$19,477,194
4	08	Edible fruit and nuts; peel of citrus fruit or melons	3,777,723	$5,329,914
5	87	Vehicles other than railway or tramway rolling stock	3,518,327	$41,080,576
6	64	Footwear, gaiters and the like; parts of such articles	2,048,788	$83,884,857
7	99	Commodities not specified according to kind	1,915,619	$2,731,637
8	41	Raw hides and skins (other than fur skins) and leather	1,219,706	$34,228,353
9	40	Rubber and articles thereof	882,594	$14,761,219
10	90	Optical, photographic, cinematographic, measuring, checking, etc.	816,144	$99,829,725
11	42	Articles of leather; saddlery and harness	802,331	$31,425,857
12	48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	693,458	$1,770,068
13	82	Tools, implements, cutlery, spoons and forks, of base metal	649,440	$34,054,807
14	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	647,587	$5,355,548
15	73	Articles of iron or steel	620,043	$19,343,981
16	93	Arms and ammunition; parts and accessories thereof	564,702	$75,615,742
17	39	Plastics and articles thereof	544,020	$10,560,374
18	29	Organic chemicals	370,688	$14,023,043
19	16	Preparations of meat, of fish or of crustaceans	345,701	$5,079,341
20	10	Cereals	315,738	$2,442,466
21	21	Miscellaneous edible preparations	276,794	$2,777,351
22	61	Articles of apparel and clothing accessories, knitted or crocheted	273,466	$14,714,756
23	15	Animal or vegetable fats and oils	257,950	$1,139,618
24	30	Pharmaceutical products	256,724	$25,266,833
25	69	Ceramic products	255,000	$2,553,574
26	71	Natural or cultured pearls, precious or semi-precious stones	251,446	$577,331,785
27	70	Glass and glassware	236,258	$4,734,827
28	62	Articles of apparel and clothing accessories, not knitted or crocheted	236,172	$10,691,513
29	09	Coffee, tea, matF and spices	233,106	$603,269
30	06	Live trees and other plants;	203,332	$4,713,125

Source: Sistema Aliceweb, Secretariat of Foreign Trade, Brazilian Ministry of Development Industry and Foreign Trade, available at: aliceweb.desenvolvimento.gov.br, accessed on January 17, 2009.

Table 3.6. 2008 Brazilian Air Cargo Imports from USA

Rank	NCM Code	Commodity Description	KG	USD$
1	84	Machinery and mechanical appliances; parts thereof	18,228,009	$3,352,070,620
2	85	Electrical machinery and equipment	7,446,868	$1,428,205,387
3	39	Plastics and articles thereof	5,010,340	$133,287,935
4	90	Optical, photographic, cinematographic, measuring, checking etc.	3,793,534	$1,183,323,090
5	29	Organic chemicals	2,993,353	$147,828,978
6	73	Articles of iron or steel	2,428,986	$195,240,006
7	38	Miscellaneous chemical products	2,298,805	$146,297,129
8	30	Pharmaceutical products	2,045,837	$816,474,607
9	40	Rubber and articles thereof	2,006,675	$71,175,979
10	87	Vehicles other than railway or tramway rolling stock	1,716,757	$33,297,739
11	49	Printed books, newspapers, pictures	1,519,220	$31,044,829
12	88	Aircraft, spacecraft, and parts thereof	1,212,655	$935,303,058
13	32	Tanning or dyeing extracts	1,079,316	$28,220,017
14	08	Edible fruit and nuts; peel of citrus fruit or melons	873,111	$3,087,261
15	72	Iron and steel	866,112	$10,558,961
16	37	Photographic or cinematographic goods	787,086	$13,796,705
17	34	Soap, organic surface-active agents	673,308	$6,261,780
18	82	Tools, implements, cutlery, spoons and forks, of base metal	636,077	$58,518,719
19	35	Albuminoidal substances; modified starches; glues; enzymes	509,940	$8,330,935
20	48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	500,714	$7,568,893
21	28	Inorganic chemicals	487,446	$15,438,591
22	21	Miscellaneous edible preparations	474,706	$4,962,645
23	76	Aluminum and articles thereof	450,053	$54,932,401
24	83	Miscellaneous articles of base metal	441,142	$23,349,696
25	33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	440,259	$14,005,368
26	70	Glass and glassware	403,155	$13,900,334
27	94	Furniture; bedding, mattresses, cushions and similar stuffed furnishing	355,069	$60,508,527
28	04	Dairy produce; birds eggs; natural honey;	338,033	$14,402,468
29	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	272,084	$18,189,108
30	74	Copper and articles thereof	261,529	$8,168,136

Source: Sistema Aliceweb, Secretariat of Foreign Trade, Brazilian Ministry of Development Industry and Foreign Trade, available at: aliceweb.desenvolvimento.gov.br, accessed on January 17, 2009.

Table 3.7. 2008 Brazilian Waterborne Imports from USA

Rank	NCM Code	Commodity Description	KG	USD$
1	27	Mineral fuels, mineral oils and products of their distillation	9,871,738,805	$2,633,983,537
2	28	Inorganic chemicals	1,933,221,298	$490,274,257
3	29	Organic chemicals	1,068,384,347	$2,048,328,449
4	31	Fertilizers	922,353,171	$611,647,649
5	10	Cereals	907,490,903	$320,281,865
6	39	Plastics and articles thereof	732,689,590	$1,655,682,376
7	25	Salt; sulfur; earths and stone; plastering materials	386,975,576	$205,680,673
8	72	Iron and steel	288,239,028	$384,696,087
9	37	Photographic or cinematographic goods	221,534,688	$129,011,064
10	84	Machinery and mechanical appliances; parts thereof	205,564,165	$2,560,237,296
11	47	Pulp of wood or of other fibrous cellulose material	163,222,973	$128,377,055
12	48	Paper and paperboard; articles of paper pulp	157,797,267	$189,886,756
13	38	Miscellaneous chemical products	155,859,615	$553,923,938
14	40	Rubber and articles thereof	112,390,509	$458,940,990
15	73	Articles of iron or steel	97,284,517	$310,356,692
16	70	Glass and glassware	78,229,622	$113,797,520
17	32	Tanning or dyeing extracts	75,791,980	$223,465,413
18	87	Vehicles other than railway or tramway rolling stock	50,748,984	$582,565,095
19	34	Soap, organic surface-active agents	42,081,616	$119,323,404
20	86	Railway or tramway locomotives, rolling-stock and parts thereof	40,849,111	$419,952,867
21	85	Electrical machinery and equipment and parts	30,110,783	$462,601,735
22	52	Cotton	24,018,697	$43,886,018
23	23	Residues and waste from the food industries	22,360,587	$26,126,778
24	76	Aluminum and articles thereof	18,203,596	$131,044,008
25	35	Albuminoidal substances; modified starches; glues; enzymes	12,642,592	$43,583,480
26	15	Animal or vegetable fats and oils	11,688,004	$21,684,354
27	21	Miscellaneous edible preparations	10,899,573	$51,029,287
28	17	Sugars and sugar confectionery	10,781,113	$10,764,004
29	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	9,915,085	$31,958,075
30	08	Edible fruit and nuts; peel of citrus fruit or melons	9,379,117	$21,100,897

Source: Sistema Aliceweb, Secretariat of Foreign Trade, Brazilian Ministry of Development Industry and Foreign Trade, available at: aliceweb.desenvolvimento.gov.br, accessed on January 17, 2009.

Table 3.8. 2008 Brazilian Waterborne Exports to USA

Rank	NCM Code	Commodity Description	KG	USD$
1	27	Mineral fuels, mineral oils and products of their distillation	8,218,942,257	$4,943,373,336
2	26	Ores, slag and ash	5,614,459,009	$335,936,882
3	72	Iron and steel	4,919,608,640	$3,106,632,520
4	47	Pulp of wood or of other fibrous cellulose material	1,476,071,044	$791,141,803
5	22	Beverages, spirits and vinegar	1,225,393,658	$764,852,084
6	44	Wood and articles of wood; wood charcoal	821,604,455	$780,352,996
7	28	Inorganic chemicals	680,450,804	$431,616,650
8	68	Articles of stone, plaster, cement, asbestos, mica or similar	605,748,524	$571,924,143
9	25	Salt; sulfur; earths and stone; plastering materials	526,992,962	$66,215,802
10	29	Organic chemicals	518,003,017	$627,569,363
11	84	Machinery and mechanical appliances; parts thereof	410,589,716	$1,964,968,584
12	20	Preparations of vegetables, fruit or nuts	401,692,922	$357,906,973
13	09	Coffee, tea, matF and spices	290,751,167	$763,883,459
14	17	Sugars and sugar confectionery	287,778,877	$129,293,622
15	69	Ceramic products	237,611,288	$110,096,183
16	48	Paper and paperboard; articles of paper pulp, paperboard	233,093,507	$233,278,276
17	73	Articles of iron or steel	175,523,642	$337,192,666
18	87	Vehicles other than railway or tramway rolling stock	172,365,989	$654,474,519
19	85	Electrical machinery and equipment and sound recorders	129,258,665	$924,057,666
20	40	Rubber and articles thereof	124,239,245	$493,320,016
21	76	Aluminum and articles thereof	121,174,531	$345,050,998
22	39	Plastics and articles thereof	81,118,074	$210,747,118
23	24	Tobacco and manufactured tobacco substitutes	78,297,374	$316,083,717
24	08	Edible fruit and nuts; peel of citrus fruit or melons	73,238,876	$207,136,452
25	56	Wadding, felt and non-wovens; special yarns, twine, cordage, ropes etc.	54,011,018	$88,626,141
26	16	Preparations of meat, of fish or of crustaceans	51,056,851	$281,683,967
27	94	Furniture; bedding, mattresses, cushions and similar	44,575,641	$154,063,465
28	33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	30,162,006	$53,145,901
29	21	Miscellaneous edible preparations	29,564,133	$113,243,050
30	18	Cocoa and cocoa preparations	28,028,752	$107,102,530

Source: Sistema Aliceweb, Secretariat of Foreign Trade, Brazilian Ministry of Development Industry and Foreign Trade, available at: aliceweb.desenvolvimento.gov.br, accessed on January 17, 2009.

Moving from general foreign trade data to transportation specific segmentation, much more can be discerned on the transportation impacts of foreign trade by situating U.S.-Brazilian trade by U.S. Customs District and by port of entry/exit for containerized maritime cargoes. For the U.S. Southwest, Brazil occupies a more important position as a trading partner than it does to the nation as a whole. The Houston-Galveston Customs House district is the second largest exit and entry point for U.S.-Brazilian trade after Miami. New Orleans trails in third place. Preventing Houston-Galveston from becoming the number one point of entry/exit is the lack of a regular direct air cargo service. Miami consolidates air and maritime cargoes with much high-

value Asian and U.S. cargoes embarking via air to Brazil. Expounding on the U.S. Customs District data, Brazil is shown to be Houston's number six trading partner according to table 3.10.

Table 3.9. U.S. Customs Districts' Trade with Brazil in 2007

Customs District	2007 Total Trade	% Change	Exports	Imports	Trade Balance
1. Miami	$10,749,672,927	21.0%	$8,417,226,158	$2,332,446,769	$6,084,779,389
2. Houston	$7,181,340,696	18.5%	$4,012,990,796	$3,168,349,900	$844,640,896
3. New Orleans	$5,633,275,070	14.2%	$1,793,050,203	$3,840,224,867	-$2,047,174,664
4. New York City	$4,633,531,897	0.0%	$1,962,434,480	$2,671,097,417	-$708,662,937
5. Norfolk	$2,704,388,218	17.4%	$980,810,355	$1,723,577,863	-$742,767,508
6. Los Angeles	$2,591,529,134	6.7%	$825,084,082	$1,766,445,052	-$941,360,970
7. Tampa/ Jacksonville	$2,253,323,951	-7.1%	$1,281,160,793	$972,163,158	$308,997,635
8. Baltimore	$1,954,952,494	-5.9%	$431,107,456	$1,523,845,038	-$1,092,737,582
9. Charleston	$1,891,251,486	-13.7	$744,038,350	$1,147,213,136	-$403,174,786
10. Savannah/ Atlanta	$1,543,486,910	32.0%	$638,268,960	$905,217,950	-$266,948,990

Source: *World City: 2008 Houston Trade Numbers* (Coral Gables, Florida), p. 21.

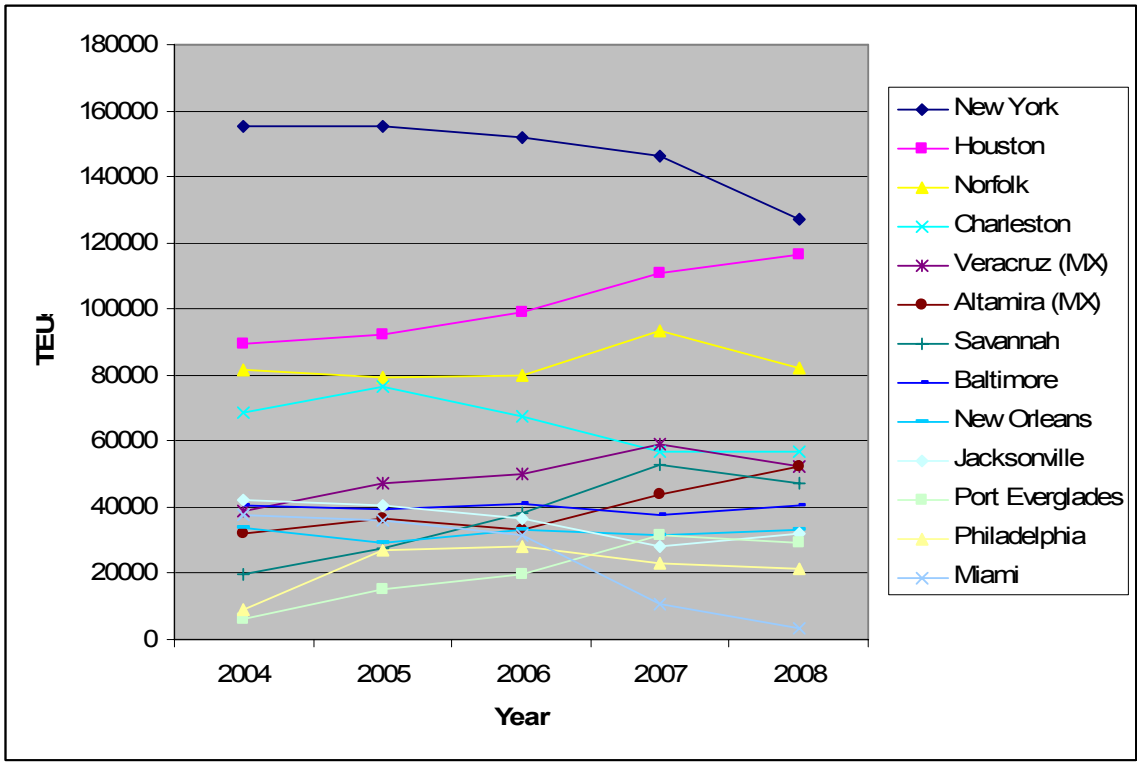
Up to this point, this chapter has highlighted the balanced trade Houston has with Brazil. Brazil and the United States both buy what the other is selling. A balanced trade is capable of adapting to macroeconomic changes. But what may make U.S.-Brazil trade via the U.S. Gulf even stronger is evident in the difference between the national foreign trade partner data and the local/regional trade partner trade data from Houston Customs District. Table 3.10 illustrates Houston's top trading partners. Two striking features of Houston and its top trading partners are the predominance of the oil countries and the trade deficits. Of the top ten trading partners, Brazil and Holland are the only countries where Houston has a trade surplus. But what may have the most meaning is the trade between Brazil and the Houston Customs District ($7.18 billion). If Houston Customs District were treated as a country trading partner (see table 3.1), it would be the ninth country with whom Brazil trades, ahead of France, Mexico, Russia, and Nigeria and just behind Italy and Chile.

Table 3.10. Houston's Top Trading Partners in 2007

Country	Total Trade	Exports	Imports	Balance
1. Mexico	$17,880,925,700	$5,483,618,859	$12,397,306,841	-$6,913,687,982
2. Venezuela	$17,097,597,222	$2,625,505,971	$14,472,091,251	-$11,846,585,280
3. Nigeria	$10,231,841,946	$1,477,462,814	$8,754,379,132	-$7,276,916,318
4. China	$9,857,235,811	$2,444,273,709	$7,412,962,102	-$4,968,688,393
5. Saudi Arabia	$8,200,438,665	$1,961,044,455	$6,239,394,210	-$4,278,349,755
6. Brazil	$7,181,340,696	$4,012,990,796	$3,168,349,900	$844,640,896
7. Germany	$7,042,487,938	$2,207,654,379	$4,834,833,559	-$2,627,179,180
8. Holland	$6,986,084,900	$5,097,447,802	$1,888,637,098	$3,208,810,704
9. United Kingdom	$6,647,213,250	$2,808,476,068	$3,838,737,182	-$1,030,261,114
10. Algeria	$5,583,844,034	$764,754,787	$4,819,089,247	-$4,054,334,460

Source: *World City: 2008 Houston Trade Numbers* (Coral Gables, Florida), p. 12.

Chart 3.4. U.S.-Brazil Seaborne Containerized Trade

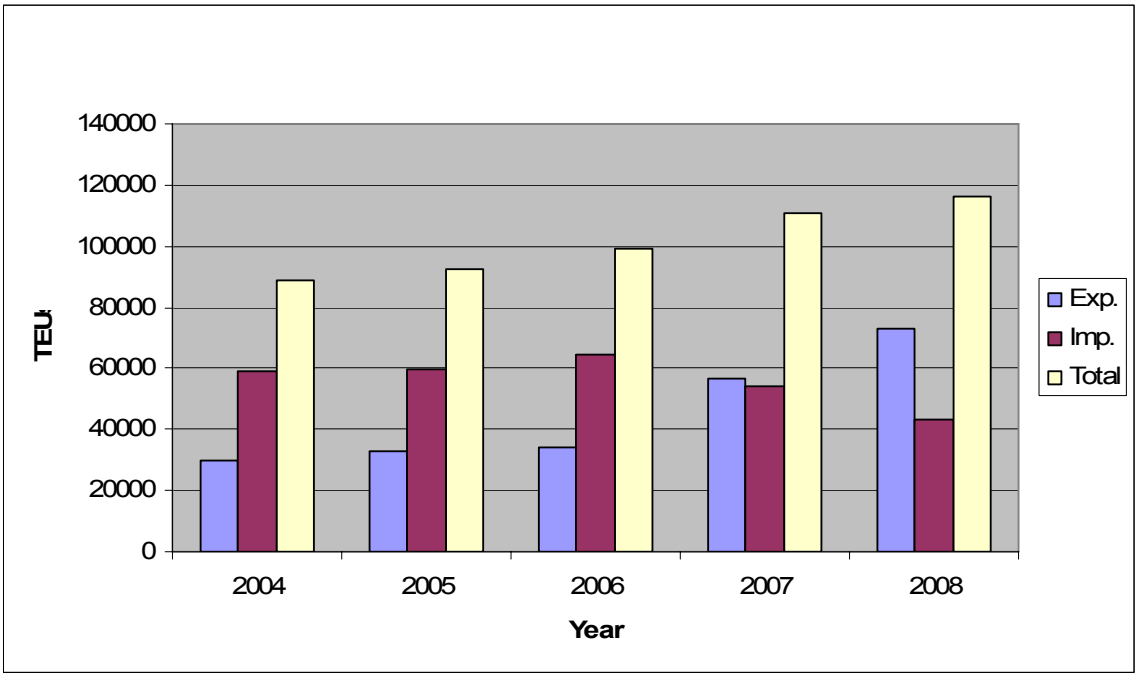


Source: Datamar Consultores Associados, DataFast, Rio de Janeiro (2009).

To begin to look at the differential transportation impacts of foreign trade, chart 3.4 chronicles the evolution of U.S.-Brazil containerized trade. Generally, containerized trade carries higher value than liquid bulk, dry bulk or breakbulk commodities. Its measurement can be viewed clearly by analyzing the TEU throughput at U.S. ports. Houston-Brazil containerized

sea trade shows consistent steady growth. With chart 3.4 revealing 2008 performance, Houston is both growing and closing its gap with the Port of New York/New Jersey in total throughput for Brazil origin/destination cargoes. Notwithstanding the economic recession traced back to 2007, in 2008 Houston container trade with Brazil surpassed 2007 TEU totals with 4.9 percent growth year-on-year or 116,465 TEUs in 2008. What is also notable is the growth in Altamira, nearly overtaking Veracruz for Mexico-Brazil cargoes. Also, consequences of the global economic crisis are most evident on U.S. East Coast ports, with Norfolk, New York, and Savannah falling by 10 percent or more. Houston closed the gap between itself and New York for leader on the U.S.-Brazil containerized trade lane by almost 25,000 TEUs, reaching within 11,000 TEUs of the top position.

Chart 3.5. Evolution of Houston-Brazil Container Trade



Source: Datamar Consultores Associados, DataFast, Rio de Janeiro (2009).

Containerized volumes at the Port of Houston show consistent overall growth. However, the exchange rate shifts seen in chart 3.3 demonstrate how competitiveness may change. In clear evidence in chart 3.5, exports and imports changed positions quite dramatically within a year-and-a-half period during 2007 and 2008. In 2008, Houston exports to Brazil accounted for 62.8 percent of Houston-Brazil container trade; imports 37.2 percent. Houston and its wide hinterland

can be seen to be exporter and importer, producer and consumer to the Brazilian market. For these and many reasons, Houston anchors several U.S. Gulf maritime services connecting Brazil and the United States.

Port of Houston Direct Liner Services to/from Brazil

The U.S. Gulf hosts a wide array of direct and indirect connections to Brazil. This next section profiles the principal direct services and their feeders. For containerized trade, there are three direct services:

- Mediterranean Shipping Company (MSC);
- Hapag-Lloyd in conjunction with CSAV (Libra); and,
- Aliança in conjunction with Hamburg Sud.

These three direct services have witnessed capacity increases with the substitution of 1,500 and 2,100 TEU vessels with 2,400-4,100 TEU vessels since 2006. Idiosyncratic to the Houston-Brazil trade lane is the fact that neither Houston nor the majority of Brazilian ports are presently capable or will likely become capable of receiving the larger 6,800 TEU vessels and greater at full draft. U.S. Gulf-Brazil services have increased capacity from smaller vessels to those in the 3,000 to 4,100 TEU range. Table 3.11 lists the regularly scheduled direct services between Brazil and the U.S. Gulf's Southwest ports.

Table 3.11. U.S. Gulf-Brazil Regularly Scheduled Direct Services

Liner	Service	Vessels	Frequency	Port Rotation
Aliança/ Hamburg Sud	UCLA	6 vessels	Weekly	Houston, Cartagena, Suape, Santos, Rio Grande, Navegantes, Paranagua, Santos, Cartagena, Veracruz, Altamira, Houston
BBC	Americana Line	2 vessels min.	Monthly	Northbound (Buenos Aires, Porto Alegre, Rio de Janeiro, Santos, Corpus Christi, Houston, Galveston, Veracruz, Newark) Soutbound (Houston, Itaqui, Vitoria, Rio de Janeiro, Buenos Aires)
Bossclip	South America-US Gulf	3 vessels	Fortnightly	Santos, Rio de Janeiro, Vitoria, New Orleans, Houston
Hapag Lloyd/ Libra	GS1	6 vessels	Weekly	Buenos Aires, Navegantes, Santos, Rio de Janeiro, Caucedo, Veracruz, Altamira, Houston, New Orleans, Caucedo, Suape, Santos, Buenos Aires
Intermarine	Monthly	4 vessels	Fortnightly	Southbound (Houston, Itaqui, Vitoria, Rio de Janeiro, Santos) Northbound (Itaqui, Rio de Janeiro, Buenos Aires, Santos, Houston)
MSC	BX1-Brazil Express Loop 2	7 vessels	Weekly	Navegantes, Santos, Rio de Janeiro, Salvador, Pecém, Caucedo, Freeport, Port Everglades, New Orleans, Houston, Altamira, Veracruz, Caucedo, Puerto Cabello, Vitória, Navegantes
Nordana	West Coast Africa Service, US Gulf	2 vessels	Fortnightly	Houston, Jacksonville, Onne (Nigeria), Lagos (Nigeria), Tema (Ghana), Abidjan (Ivory Coast), Paranaguá, Rio de Janeiro, La Guaira, Puerto Cabello, Rio Haina, Cartagena, Santo Tomas, Veracruz, Tampico, Houston
NYK Ro-ro	North/South American Trade-Loop 1	2 vessels	Monthly	Zarate, Paranagua, Santos, Puerto Cabello, Curacao, Aruba, Veracruz, Houston, Tampa, Miami, Nassau, San Juan, Santo Domingo, Port au Prince, Cartagena, Puerto Cabello, Vitoria, Santos, Paranagua, Zarate
Wallenius Wilhelmsen	South America-North America	3 vessels	Monthly	Rio Grande, Santos, Puerto Cabello, Cartagena, Manzanillo, Galveston, Altamira, Cartagena, Puerto Cabello, Itaqui, Vitoria, Santos, Rio Grande

Source: Various company websites, presentations and interviews.

In addition to the direct services, the rise of pendulum services and transshipment points in the Caribbean, Central America and North Coast of South America have made it possible for Houston and U.S. Gulf ports to be served by numerous indirect services. Increasingly, Caribbean feeder services are linking the East Coast South America to mainline Asia-U.S.-Europe trade lanes. Table 3.12 lists some of the indirect container services that link Brazil to the U.S. Gulf.

Table 3.12. Selected U.S. Gulf-Brazil Indirect Container Services

Liner	Service	Vessels/Capacity	Frequency	Port Rotation
CMA-CGM[1]	Brazex	5 vessels	Weekly	Itaqui, Sao Francisco do Sul, Santos, Rio de Janeiro, Salvador, Port of Spain, La Guaira, Puerto Cabello, Cartagena, Kingston, Guanta, Itaqui
	PEX3	5 vessels	Weekly	Shanghai, Chiwan, Hong Kong, Houston, Norfolk, Savannah, Kingston, Savannah
Mitsui O.S.K. (MOL)[2]	CSX	3 vessels	Weekly	Manaus, Vila do Conde, Manzanillo
	GEX	3 vessels	Weekly	Cartagena, Colombo, San Juan, Houston, Altamira, Veracruz, Puerto Limon, Manzanillo
Zim[3]	Amazon Express	3 vessels	Weekly	Kingston, Manaus, Belem, Kingston
	South America Express	5 vessels	Weekly	Kingston, Puerto Cabello, La Guaira, Vitoria, Rio de Janeiro, Santagonas, Santos, Fortaleza, La Guaira, Puerto Cabello, Kingston
	Asia Gulf Express	11 vessels	Weekly	Shanghai, Busan, Osaka, Yokohama, Panama Canal, Colon, Kingston, Mobile, Tampa, Houston, Kingston, Panama Canal, Shanghai

[1] CMA-CGM transships Southbound at Kingston and Northbound at Port of Spain or Kingston.

[2] MOL transships at Manzanillo, Panama.

[3] Zim transships to feeder/relay services at Kingston.

In addition to its Brazex and PEX3 services outlined in table 3.12, in January 2009, CMA-CGM announced its Gulf Bridge Express Intra-Caribbean service that links Houston with transshipment hubs in Kingston and Cartagena. This enables CMA-CGM to market indirect service to/from Houston and the East Coast of South America. But what may be even more interesting is how this intra-Caribbean feeder service now links Houston and the East Coast of South America to West Coast South America, Asia and Mediterranean Services.[75] The Gulf Bridge Express offers transit times of 22 to 30 days to/from Houston and the Brazilian ports of Rio de Janeiro, Santos, Salvador, Paranaguá, and São Francisco do Sul.

[75] CMA-CGM website, available at: www.cma-cgm.com/en/Images/ContentManagement/en-US/WorldwideNetwork/Local/USA/Schedule/New_CMA_CGM_Gulf_Bridge_Express_Service_-_February_2009.PDF, cited January 19, 2009.

Mediterranean Shipping Company Direct and Indirect Services

Speedy transit times are a strong determining factor as to what commodities will traverse a specific trade lane. Northeast Brazil, principal exporter of refrigerated perishable cargoes such as seafood and fruits has exceptionally fast transit times of seven to nine days to European port of Rotterdam or U.S. East Coast ports of Philadelphia and New York. For the U.S. Gulf ports of New Orleans and Houston to build a business in the reefer market, transit times must be cut. During the rise in oil prices, many lines were reducing vessel velocity to save on fuel costs. In order to maintain reliability of existing fixed day schedules, more vessels were brought into services. Now, with oil prices greatly reduced, the climate is more amenable to an express service linking Brazil and the U.S. Gulf. The direct service offered by Mediterranean Shipping Company is one possibility. The Port of Pecém is the last load port on MSC's northbound US Gulf Service. Were MSC to have an express service from Pecém to the U.S. Gulf, refrigerated cargoes could find a market in the U.S. Southwest. Table 3.13 illustrates the MSC BX1 Express Loop 2 Service, which deploys seven vessels, weekly, with capacity of 2,372 TEUs.

The U.S. Gulf can also be served by connectivity in MSC's network via Caucedo or Freeport on the BX1-Brazil Express Loop 1 deploying seven vessels of 3,700 TEUs with a weekly frequency serving the U.S. East Coast. Much faster transit times exist for northbound cargoes, including East Coast ports in less than 15 days. Table 3.14 shows the connectivity offered by the BX1-Brazil Express Loop 1. While the MSC service suffers from long transit times, it does serve important Brazilian export markets with some degree of exclusivity such as Vitória (coffee and granite) and Pecém.

Table 3.13. MSC BX1- Brazil Express Loop 2

BX2	Arrival Date (Day #)	Departure Date (Day #)
Port Everglades, Florida	Sunday (1)	Monday (2)
New Orleans, Louisiana	Wednesday (4)	Thursday (5)
Houston, Texas	Friday (6)	Saturday (7)
Altamira, Mexico	Sunday (8)	Monday (9)
Veracruz, Mexico	Tuesday (10)	Wednesday (11)
Caucedo, Dominican Republic	Sunday (15)	Monday (16)
Puerto Cabello, Venezuela	Tuesday (17)	Thursday (19)
Vitoria, Brazil	Friday (27)	Saturday (28)
Navegantes, Brazil	Monday (30)	Tuesday (31)
Santos, Brazil	Tuesday (31)	Thursday (33)
Rio de Janeiro, Brazil	Thursday (33)	Friday (34)
Salvador, Brazil	Sunday (36)	Monday (37)
Pecem, Brazil	Wednesday (39)	Thursday (40)
Caucedo, Domican Republic	Tuesday (45)	Thursday (47)
Freeport, Bahamas	Saturday (48)	Sunday (49)

Source: Hapag-Lloyd services map.[76]

[76] Note that Hapag-Lloyd has a slot agreement with MSC and markets MSC's service.

Table 3.14. MSC BX1-Brazil Express Loop 1

Port	Arrival Date (Day#)	Departure Date (Day#)
Savannah, Georgia	Sunday (1)	Monday (2)
Norfolk, Virginia	Wednesday (4)	Wednesday (4)
New York, New York	Thursday (5)	Friday (6)
Baltimore, Maryland	Saturday (7)	Sunday (8)
Freeport, Bahamas	Wednesday (11)	Thursday (12)
Caucedo, Dominican Republic	Saturday (14)	Monday (16)
Santos, Brazil	Wednesday (25)	Thursday (26)
Buenos Aires, Argentina	Saturday (28)	Monday (30)
Montevideo, Uruguay	Monday (30)	Tuesday (31)
Rio Grande, Brazil	Tuesday (31)	Thursday (33)
São Francisco do Sul, Brazil	Friday (34)	Saturday (35)
Santos, Brazil	Saturday (35)	Sunday (36)
Rio de Janeiro, Brazil	Monday (37)	Tuesday (38)
Suape, Brazil	Thursday (40)	Friday (41)
Freeport, Bahamas	Friday (48)	Sunday (50)

Source: Hapag Lloyd service profiles.

Hapag Lloyd Direct and Indirect Services

Hapag Lloyd and CSAV/Libra offer the greatest capacity direct service to/from Brazil and the U.S. Gulf on their joint GS1 Sling. Seven vessels of 4,100 TEUs service the U.S. Gulf with fixed day weekly schedules. In January 2009, the seventh vessel was added in order to ensure reliability and decrease costs by steaming at lower speeds. Table 3.15 shows the transit times and port rotation of the GS1 Sling. The GS1 service calls only three Brazilian ports northbound offering the most rapid southbound service of 14-15 days to Rio de Janeiro and Santos. Unlike MSC, the Hapag Lloyd GS1 service calls a rotation order of Montevideo-Buenos Aires-Rio Grande/Itajai-Santos-Rio de Janeiro-Caucedo-Veracruz-Altamira-Houston-New Orleans-Caucedo-Suape-Santos-Buenos Aires.[77]

[77] The flooding along the Itajaí-Açu River in November 2008 destroyed parts of the Port of Itajaí and changed the channel depths. GS1 sling is temporarily calling Rio Grande until Itajaí is restored to adequate draft.

Two other Hapag Lloyd services offer connectivity with Houston. The U.S. East Coast service runs a sling of Itajaí-Santos-Vitória-Caucedo-Norfolk-New York-Savannah-Puerto Cabello-Itajai. This service, however, in October 2008 is in process of being replaced. At Caucedo, Hapag Lloyd offers transshipment to Houston via feeder or picking up the GS1 allowing cargoes from Vitoria, for example, to be relayed to Houston. The Hapag Lloyd Gulf Caribbean Service also offers Houston-Brazil connectivity via Caucedo with its sling of Houston-Altamira-Veracruz-Puerto Limon-Manzanillo-Cartagena-Caucedo-San Juan.[78]

Table 3.15. Hapag Lloyd/CSAV-Libra GS1 Gulf Service Transit Times*

From/To	Caucedo	Veracruz	Altamira	Houston	New Orleans
Suape	23	26	27	29	31
Buenos Aires	13	17	18	20	22
Itajaí	10	14	15	17	19
Santos	8	12	13	15	17
Rio de Janeiro	7	11	12	14	16

* Before addition of seventh vessel and additional calls at Montevideo and Rio Grande.

Source: Hapag Lloyd service profiles.

Aliança-Hamburg Süd U.S. Gulf/Central America/Caribbean/East Coast South America String 1

Deploying seven vessels of 2,200 TEUs, the Aliança/Hamburg Süd String 1 U.S. Gulf Service is the smallest of the Brazil-Houston direct services. The service features the following:

- Port rotation: Houston-Cartagena-Suape-Santos-Rio Grande-Navegantes-Paranaguá-Santos-Cartagena-Veracruz-Altamria-Houston; and,
- Southbound, Houston connects to Santos in 19 days with first Brazilian port of call at Suape in 16 days;
- Northbound, Santos connects to Houston in 21 days and is last Brazilian load port.

[78] Hapag Lloyd service profiles.

This direct service is similar to Hapag Lloyd as it calls Altamira before Houston. MSC calls New Orleans before Houston. But a differential in the Aliança-Hamburg Süd service is its faster transit time northbound from Santos and its direct call at Rio Grande.[79]

By way of its ownership of Brazilian flag carrier Aliança, indirect service is also available for cargoes with origin and destination Manaus. These cargoes are transshipped at Suape and do not appear in the data presented in table 3.16 as Manaus cargoes. More than 85 percent of Suape imports from Houston are Manaus-bound cargoes served by Aliança's cabotage.

Houston-Brazil Container Trade Market Segmentation

Table 3.16 shows the segmentation of the U.S.-Brazil containerized seaborne trade market by carrier and port over eleven months of 2008. Data culled by Datamar Associates from vessel manifests shows services that not only call the Port of Houston Authority's Bayport and Barbours Cut Terminals, but also other public and private docks. This report covers the principal carriers that call the Port of Houston Authority container terminals. Clearly evident are the three main direct services: 1) Aliança-Hamburg Sud, 2) Hapag Lloyd/CSAV-Libra, and 3) MSC. The tendencies exhibited in chart 3.6 are clearly displayed. What is notable is the weight of Santos as the leading port for Brazil-Houston cargoes representing a market share of 54 percent of overall Houston-Brazil container trade. More pronounced is Houston exports to Santos, representing 37.5 percent of total Houston-Brazil trade. With close proximity to São Paulo and the greatest concentration of industry, a majority of services that call Brazil and Houston feature Santos.

[79] Aliança-Hamburg Süd Product and Service Guide 2008/09, available at Hamburg Süd website http://www.hamburgsud.com/RESOURCES/Common/Schedule/Service_PDFs/Mainliner_NorthAmerica_CentralAmerica_Caribbean_SouthAmerica.zip.

Table 3.16. Port of Houston Container Trade with Brazil by Carrier and Brazilian Port (January-November 2008)

Liner	Trade	Total TEUs	BEL	FOR	ITAJAI	ITAQUI	MANAUS	NAV	PNG	PECEM	ITAGUAI	RJ	RGS	SSA	SNT	SANTOS	SFS	SUAPE	VDC	VIT
ALIANCA	Import	5979			360			580	184			611	769	662		2812		1		
ALIANCA	Export	2242		57	32			269	156	6		220	75	70		836		521		
APL	Import	255			60			11				4				174			6	
APL	Export	593			33		2	1				9				548				
BBC CHARTERING	Export	16				16														
CEC SHIPMANAGEMENT NL	Import	3				3														
CMA-CGM	Import	126	100				4					11			7	4				
CMA-CGM	Export	873	2				230									640				
HAMBURG-SUD	Import	4580			105			219	85			584	549	80		2949		9		
HAMBURG-SUD	Export	14932		11	511			814	398	16	2	3292	692	611		8186		399		
HAPAG LLOYD	Import	9569			1914			906				412				5341				996
HAPAG LLOYD	Export	13921			1280			939				9				11387		5		301
INDL MARITIME CARRIERS	Export	3										3								
INTERMARINE INC	Export	113			46							67								
LIBRA	Import	502						222				19				261				
LIBRA	Export	485						77				8				400				
LIBRA URUGUAY	Import	8093			2881			1043				364				3805				
LIBRA URUGUAY	Export	9544			1249			903				637				6621		134		
MAERSK LINE	Export	330							304							26				
MITSUI OSK	Import	179					13												166	
MITSUI OSK	Export	49					45												4	
MSC	Import	9026						457		552	171	656	721	634		2462	887	176		2311
MSC	Export	24517						1724		1312		3631	1194	969		11177	478	1542		2490
NORDANA LINE	Import	2							2											
NYK LINE	Export	1														1				
TRINITAS MAR.CARRIERS	Export	1										1								
ZIM	Import	1705	20	5				531					116			179				854
ZIM	Export	1011		2			20	13					35			915				26
Totals		108651	122	75	8471	19	314	8709	1129	1886	173	10538	4151	3026	7	58724	1365	2787	176	6978

Port Abbreviations Key: Belém (BEL), Fortaleza (Mucuripe), Itajai (Itajai), Itaqui (São Luis), Manaus (Manaus), Navegantes (NAV), Paranaguá (PNG), Pecém (Pecém), Itaguai (Itaguai/Sepetiba), Rio de Janeiro (RJ), Rio Grande (RGS), Salvador (SSA), Santarem (SNT), Santos (Santos), São Francisco do Sul (SFS), Suape (Suape), Vila do Conde (VDC), Vitória (VIT).

Source: Datamar Consultores, DataFast Monthly Data, January-November 2008 (Rio de Janeiro, Brazil).

Table 3.17 segments the January-November 2008 Brazil-Houston container volumes showing Santos' dominant position. Also notable are the cluster of ports in the state of Santa Catarina (Itajaí, São Francisco do Sul, and Navegantes), which serve the same hinterland. Together these ports account for more more than 17 percent of containerized volume, second most important region for Houston-Brazil trade.

Table 3.17. Houston-Brazilian Port Comparison
(% share of total TEU volumes)

Port	Total
Belém	0.11%
Fortaleza	0.07%
Itajai	7.80%
Itaqui	0.01%
Manaus	0.29%
Navegantes	8.02%
Paranaguá	1.04%
Pecém	1.74%
Itaguai	0.16%
Rio de Janeiro	9.70%
Rio Grande	3.82%
Salvador	2.79%
Santos	54.05%
São Francisco do Sul	1.26%
Suape	2.57%
Vila do Conde	0.16%
Vitoria	6.42%

Source: Datamar Consultores Associados, DataFast monthly statistics (Rio de Janeiro, 2008).

Houston Intermodal Connectivity

A key driver to the Port of Houston's container growth is the new investment in capacity. Opened in February 2007, the Bayport Container Terminal adds to Barbours Cut Container Terminal giving the Port of Houston Authority an estimated 4 million TEU capacity at the buildout of Bayport in 10 to 15 years. While Houston consumes and produces a majority of its containerized volumes, via truck, rail, and inland waterway, Houston offers great intermodal connectivity for a wide hinterland with no competitor. The Port of Houston Authority attracts cargoes with destinations as far as the West Coast, Midwest, Southwest, and Canada. Table 3.18 lists origins and destinations served by Houston.

Table 3.18. Houston Intermodal Connectivity

City	Distance (miles)	Truck	Rail	Inland Waterway
Albuquerque	1015	2 days		n/a
Austin	166	3 hours		n/a
Brownsville	358	6 hours		3 days
Chicago	1092	2 days	3-4 days	22 days
Dallas	240	4 hours	1 day	n/a
Denver	1123	2 days		n/a
El Paso	748	1 day		n/a
Laredo	350	6 hours		n/a
Los Angeles	1552	3 days	4-5 days	n/a
New Orleans	350	6 hours		7 days
Oklahoma City	447	7 hours		n/a
Phoenix	1179	2 days		n/a
Portland	2372	4 days		n/a
San Antonio	198	3 hours	1 day	n/a
San Francisco	1933	3 days	5-6 days	n/a
Seattle	2446	4 days		n/a
St. Louis	892	2 days	2 days	

Source: Author's calculations.

Brazilian Efforts towards Increased Capacity

In September 2007, President Lula sanctioned the law that created the Special Secretariat for Ports, splitting maritime transport and ports from the Ministry of Transportation and granting ports that engage in international trade an executive cabinet distinction. Headed by the Minister of Ports Pedro Brito, the Brazilian Secretariat of Ports set out on a mission to modernize Brazilian ports, streamline and update the use of technology, and develop a strategic master plan to guide future public and private investment. One of the priorities of the Special Secretariat of Ports and a long-time demand of the maritime sector is the dredging of Brazilian ports. Through the National Dredging Program, Brazil is embarking on a program that will deepen and widen most all major ports.

Table 3.19. The Brazilian National Dredging Program

NATIONAL DREDGING PROGRAM – NEXT FIVE YEARS - PND

			MODERNIZATION WATER WAY ACCESS			
Group	Port	Invitation for International Bidding	Depth (m)	Dredging	Rock Removal	Estimated Investment (US$)
				Estimated Volume (m³)		(US$=R$2,00)
1	Recife – PE	SEP/2008	11,5	2.123.000	-	14,550,000
2	Rio Grande – RS	OCT/2008	16,0 / 18,0	16.000.000	-	80,000,000
3	Santos – SP	OCT/2008	15,0	9.135.000	33.000	83,600,000
4	Aratu – BA	NOV/2008	15,0	3.300.000	5.000	24,500,000
	Salvador – BA		12,0 / 15,0	2.986.000	-	25,000,000
5	Rio de Janeiro – RJ	NOV/2008	13,5 / 15,5	3.500.000	-	75,000,000
	Itaguaí – RJ		17,5	4.900.000	-	65,150,000
6	Suape – PE	NOV/2008	20,0	4.889.000	362.000	120,050,000
7	Paranaguá – PR	DEC/2008	16,0 / 15,0 / 14,5	9.000.000	-	26,500,000
8	Fortaleza – CE	DEC/2008	14,0	5.947.000	-	21,150,00
	Natal – RN		12,5	2.079.000	25.000	15,150,000
9	S. F. do Sul – SC	JAN/2009	14,0	3.200.000	72.000	42,950,000
	Itajaí – SC		12,0 / 12,5	3.060.000	-	11,650,000
10	Cabedelo – PB	FEB/2009	11,0	1.996.000	225.000	52,500,000
11	Imbituba – SC	FEB/2009	13,0	850.000	-	2,200,000
12	Vitória – ES	MAR/2009	14,0	1.866.000	96.000	47,600,000
		TOTAL GERAL - PND		74.831.000	818.000	707,550,000

Source: José Di Bella, Secretary, Special Secretariat of Ports, "Brazilian Port Dredging Program," European Road Show, November 3-10, 2008, available at: www.braziltradenet.gov.br/roadshoweurope.

As the major Brazilian container ports are dredged, container vessels will be able to load more cargoes and berth more fully loaded.

Reporto and Port Investment

A second Brazilian public policy that has brought more competition and spurred private investment in port infrastructure is the Reporto legislation (Incentivo à Modernização e a Ampliação da Estrutura Portuária) passed via Law 11.033 of December 21, 2004.[80] The Reporto legislation grants tax incentives to capital investment in port equipments, such as container-gantry cranes, reach-stackers, mobile harbor cranes, and rubber-tired gantry cranes to port and terminal operators. The incentive had been such a success in spurring port modernization and investment that the program was further strengthened in June 2008 with Law 11.726 of June 23, 2008.[81] The legislation has been extended for capital equipment acquisitions through December 31, 2011. Moreover, in September 2008, the program was modified to extend the benefits to rail concessionaires, inland dry ports, and logistics operators with port retroareas.

While Reporto legislation has been very popular among modernizing ports, terminal operators, logistics operators and railroads, the competition has been made even more fierce in port development owing to the recent migration of private firms to initial public offerings and listings on the Brazilian São Paulo Stock Exchange (BOVESPA) or the New York Stock Exchange via American Depository Receipts. Among the companies that have taken advantage of raising capital in this way and modernizing their infrastructure are:

- ALL (railroad);
- CSN (Itaguaí);
- LLX (Açu);
- Log-In (Vitória- port and railroad);
- MRS (railroad);
- Santos Brasil (Santos Tecon, Tecon Imbituba, Vila do Conde); and,
- Wilson Sons (Salvador, Rio Grande).

Of note, Santos Brasil is the closest to becoming a national container port operator with locations in three distinct regions (North-Vila do Conde, Southeast-Santos, and South-Imbituba).

[80] Brazilian Civil Household website, "Lei de 11.033 de 21 de dezembro de 2004," available at: www.planalto.gov.br/ccivil_03/_ato2004-2006/lei/l11033.htm, cited January 20, 2009.
[81] Brazilian Civil Household website, "Lei de 11.726 de 23 de junho de 2008," available at: www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11726.htm, cited January 20, 2009.

Implications of the New Port Decree on Brazilian Port System

With a race to invest in modern capacity and a government program to dredge to depths that would permit the large TEU vessels to call, a dozen ports are in heated competition regionally, nationally, and internationally. Framing the port investment is the 1993 Port Modernization Law, which created the creature of the private port with mixed cargoes. Under the 1993 Port Modernization Law, if a private company needed to vertically integrate and build a port terminal for its own use, it could do so and hire out non-union labor if the port was outside the organized port areas. This created the institution of the Management Labor Board or OGMO (Orgão Gestor de Mão de Obra). In a fierce break with tradition, the job of setting gang size fell to the OGMO and out of the hands of the longshoremen or stevedoring trade unions, though the stevedore and longshoremen still exert considerable influence. For companies dealing with bulk commodities, such as Vale, Samarco, Bunge, Petrobrás and Cargill, this enabled a wave of private investments. One very interesting loophole was that when a port terminal was built for private use of own-cargo, the company could also handle third-party cargoes. Thus, the race to build private terminals outside the organized port area began. Liner companies such as Mediterranean Shipping Company, Aliança-Hamburg Süd, and CMA-CGM have built partnerships under these rules of the game with cargo owners, in whose name a private terminal would be opened. As a result, the container lines could call a highly efficient and modern port terminal with state-of-the-art equipments and non-union labor.

These provisions allowing for the creation of private ports caused a war in the port community pitting the liner companies and private port operators against existing concession holders and trade unions. One project that has moved forward is Portonave, the MSC port at Navegantes, just across the Itajaí-Açu River from the Municipal Port of Itajaí, where APM Maersk operates a container terminal, Teconvi. MSC has migrated its services to Portonave and other liners have followed suit, such as Hapag-Lloyd. When MSC finishes its contractual obligation to the State of Santa Catarina Port São Francisco do Sul, it will concentrate its southern operations there. Giving own-source cargo legitimacy is the fact that Portonave is owned by refrigerated cargo owners in the chicken and meatpacking industry. Portonave concentrates reefer plugs and is an export base for Brazilian exports of frozen chicken, pork and beef.

Two areas where the stakes between private ports and public concessioned ports are greatest are in Santa Catarina and near Santos. First, the State of Santa Catarina will be a laboratory for port development. Not only is there the Portonave Navegantes development currently in opeation, Aliança-Hamburg Süd is developing a private port with Battistella (lumber) at Itapoa in Northern Santa Catarina, squarely between Paranaguá in Paraná State and São Francisco do Sul, both state administered ports. To the south of Navegantes and Itajaí is the public Port of Imbituba, another municipal port, where Santos Brasil has won a concession for operation of a container terminal. In Santa Catarina, there is a possibility of great saturation of port capacity with the following competitors:

- Imbituba (municipal, concessioned, Santos Brasil);
- Itajaí (municipal, concessioned, APM Maersk);
- Itapoa (private, Batistella/Aliança-Hamburg Süd;
- Navegantes (private, MSC); and,
- São Francisco do Sul (state);

The other battleground is in the São Paulo state where the Port of Santos has hegemony in container traffic, serving the São Paulo market and well beyond as data presented earlier clearly shows. A State administered Port of São Sebastião has a plan on expanding operations and adding a container terminal. The COIMEX Trading Group is building a $500 million private port terminal at Embraport to handle its biofuels, container cargoes at the Port of Santos. COIMEX has secured government loans in excess of $200 million to move ahead on construction. MSC in 2001 won a 20-year concession renewable for another 20 more via Brasil Terminais at the Port of Santos Alemoa area, where it plans to build a R$1.6 billion multiuse terminal for liquid bulk and containers.[82] While these investments in ports serving Santos and São Paulo are striking, the real issue surfaced as mega-billionaire investor Eike Batista and his LLX port company moved forward with plans to build a deep-draft private port at Peruibe, south of Santos. With 14 to 16 meters of draft, the LLX Group (Eike Batista, the Ontario Teachers Pension Fund and investors who bought LLX shares on BOVESPA) planned on building a non-union private port that would be capable of receiving the largest container vessels. Porto Brasil

[82] "MSC faz o maior investimento isolado em portos," Tiete-Parana Development Agency website referencing Santos Modal, December 8, 2008:, available at: www.adtp.org.br/artigo.php?idartigo=10849, cited January 20, 2009.

as it is called is a direct threat to the established port order of concessions and trade unions. The battle ensued, thusly, over the regulation of the 1993 Port Modernization Law.

With the newly installed Special Secretariat for Ports, the executive branch debated for most of 2008 the regulation of port modernization issuing a decree in October. By way of Decree 6620 of October 29, 2008, President Lula regulated the port modernization.[83] In so doing, future private investment is channeled under a concession model. Private ports with mixed use and third party cargoes can continue to be developed, but the development agent must submit its proposal to the Brazilian government for authorization, which would then be subject for public auction. This new requirement is a clear disincentive to private port investment in areas outside organized port areas. For example, if a port operator acquires land outside of the organized port area, it can propose a new private port, but it must then open itself up to public auction where other port interests could bid on the same project, leaving the possibility open, perhaps even likely, that the port sponsor might not be able to win or execute its own project, on its own land! The second big change, deterring private investment outside the publicly organized port, is that new private ports must hire union labor. With all new port developments subject to public auction and no possibility to escape hiring union labor, the new port decree basically buried projects like Porto Brasil, which had not advanced far enough to be grandfathered in. Projects, such as Portonave and Itapoa were grandfathered. The principal combatants in this port dispute were holders of public concessions, Santos Brasil and Multiterminais Group, and investment groups seeking to build private ports outside the concession system, such as the aforementioned LLX Group, led by Eike Batista.

The implications on U.S.-Brazil trade of these developments in port modernization and expansion are that there is a rush to build capacity. Competitiveness will not be as it may have been if new ports were allowed to develop under non-union hiring practices, but a few winners are clear. MSC at Portonave, Aliança-Hamburg-Süd at Itapoa and the Port of Santos container terminals, namely Embraport, Santos Brasil, Libra Terminals, and Brasil Terminais. Notwithstanding these temporary winners, the added capacity coming on line via dredging and equipment investment and tendency to bigger and larger ships means that Brazil should be favorable to the liner companies. And there will probably be some substantial losers in

[83] "Decreto No. 6620 de 29 de outubro de 2008," Brazilian Civil Household, Brazilian Civil Household website, http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6620.htm

government and the investment community who see massive capital expenditure with slow payoff. However, a hedge to that conclusion is that, as an emerging market, Brazil has cargo perhaps for all comers. For the U.S. Southwest, the port characteristics of the Brazilian ports are similar. Without a widening and deepending strategy at U.S. container ports, vessel size will likely top out at the 5,000 TEU vessel range. For the U.S. Gulf to best attract more Brazilian trade and bring economies of scale, the Houston Ship Channel should be dredged to 50 feet to match the possibilities brought by dredging in South America.

Considerations of Non-Containerized U.S.-Brazil Cargoes on U.S. Southwest

The U.S. Southwest ports defined as stretching from Louisiana to Texas handle expressive amounts of non-containerized trade with Brazil, principally related to petroleum and intermediate petrochemicals. As Houston is the U.S. energy capital, a great volume of project cargo and oil well equipment also exports to Brazil, where investment in offshore oil and gas is starting to boom. Table 3.20 illustrates the U.S. Southwest port profile for selected commodities by type of cargo shipped during 2008.

Table 3.20. Some U.S. Brazil Non-Containerized Cargoes at Selected U.S. Southwest Ports

Port	Breakbulk	Dry Bulk	Liquid Bulk
Beaumont, TX	Lumber, woodpulp,	Sulfur, wheat	Crude petroleum
Baton Rouge, LA		salt	
Baytown, TX			Crude petroleum
Brownsville, TX	Steel, oil well equipment		
Corpus Christi, TX		Aluminum, bauxite, petcoke	Crude petroleum, Caustic soda
Freeport, TX		petcoke	Sodium hydroxide, crude petroleum,
Galveston, TX	Power generation, tires, wind blades, earth moving equipment, vehicles		
Houston, TX	Pipe, steel, wind blades, tires, generators, oil well equipment, earth moving equipment, locomotives, rail equipment, motorized vehicles, lumber	Wheat, petcoke, coal	Ethanol, crude petroleum, petrochemicals
Lake Charles, LA	Lumber		Crude petroleum
New Orleans, LA	Lumber, steel,	Flour, salt, iron ore, pig iron, petcoke	ethanol
Point Comfort, TX		aluminum	
Port Arthur, TX	Lumber	Wheat, coal, petcoke, disodium carbonate	
Texas City, TX		Petcoke	Ethanol, crude petroleum

Source: Datamar Consultores Associados, DataFast Monthly Trade Statistics, Rio de Janeiro, 2009.

The U.S. Southwest is a leading supplier of petroleum and petroleum coke to Brazil. The Votorantim Group imports from U.S. Gulf ports more than a million tons each year alone to feed its cement making facilities throughout Brazil. Also clearly evident is the tie into to the aluminum industry. Corpus Christi and Point Comfort are inextricably linked to the aluminum

presence of Alcoa near Trombetas, Brazil and Vila do Conde. Pig iron as a raw material to the steel industry is clearly evident in the New Orleans profile. While Houston is so diverse it handles most all cargoes, it shares with Galveston a vocation for project cargoes and capacity for handling high value oil well equipment, wind blades and turbines, earth movers etc. Port Arthur, Beaumont, Lake Charles, and New Orleans also handle a lot of lumber and woodpulp. Finally, Brownsville, Houston, and New Orleans lead in steel handling with Houston leading the way in volume.

Taking into consideration the diversity of these cargoes handled between the U.S. and Brazil, the U.S. Southwest infrastructure needs to strike a balance between cargo types in order to maintain and attract these cargoes. A case in point is arising in 2009 with the collapse of the Argentine wheat harvest. Brazil relies on Argentina for a great deal of its wheat needs. As the drought and economic stress have brought a weak Argentine wheat harvest in 2009, it can be expected that Brazil will import from other sources. The U.S. Gulf an export outlet for wheat is a prime candidate for meeting this Brazilian demand if the port infrastructure and terminals are capable of servicing this demand.

With Brazilian development of its own oil and gas industry, the U.S. Gulf will be tied to Brazilian growth for decades. However, as Brazil matures its investment, many traditional U.S. exports will be substituted as Brazilian production comes online. Specifically, the added refining capacity under development in Brazil is likely to erode some market share of U.S. Gulf petcoke exports. Will Brazilian development grow sufficiently so that all volumes rise with the demand for cement tied closely to the demand for petcoke? According to Votorantim's next five year plan, the U.S. Gulf will export more than a million tons of petcoke annually for the short term. And with a crisis in liquidity slowing the pace of capital investments, this may strengthen the U.S. Gulf's position for the mid-term. However, in the long-term, more than ten years into the future, the U.S. Gulf stands to lose some of its market share with regard to U.S. exports to Brazil in some dry bulk commodities such as petcoke. Similarly in the petrochemical industry, companies such as Braskem with sizeable expansion investments in Brazil and Venezuela will see opportunities to source product domestically or from Venezuela.

Many of Brazil's exports to the United States fall under construction materials. Lumber and steel, for example, are linked to U.S. construction. While an improving U.S. dollar-Brazilian real exchange rate may spur Brazilian competitiveness, will the U.S. economy recover with

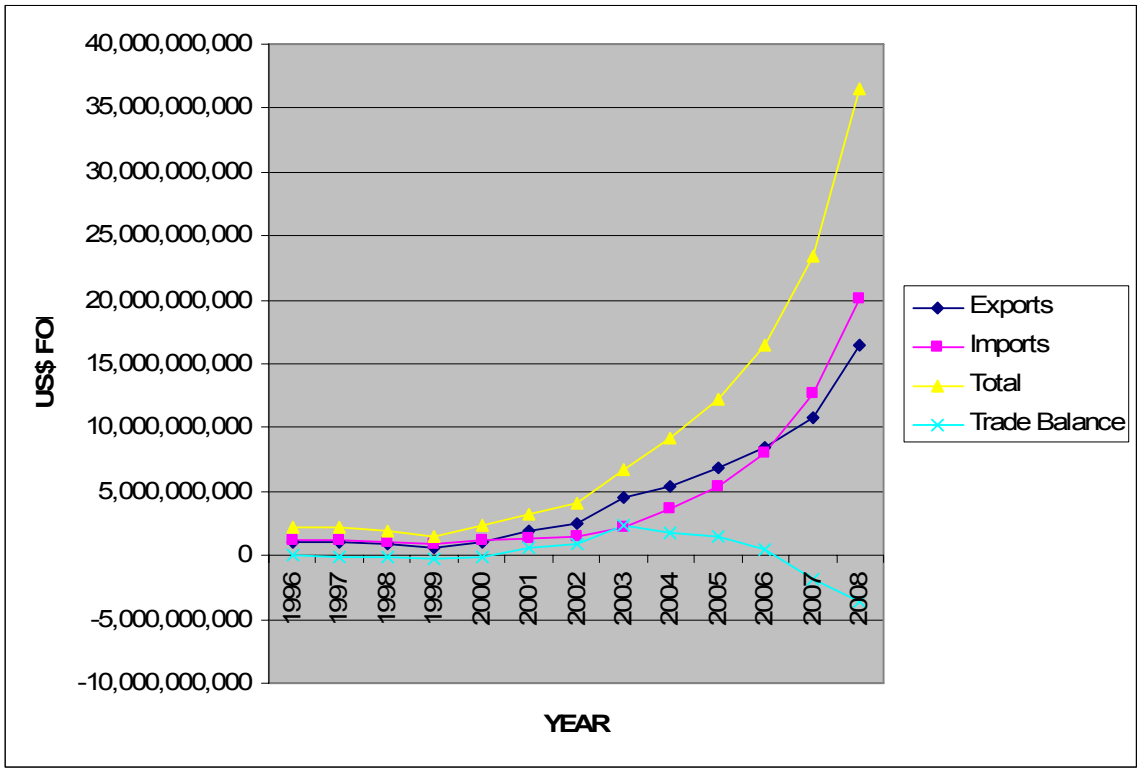
infrastructure investment to benefit the Southwest? Quite clearly, the U.S. Southwest is in a more favorable position versus other U.S. regions as seen in some of the port statistics presented earlier.

Chapter 4. Brazil-China Trade

Goldman Sachs Group Economist Jim O'Neill coined the acronym BRIC in 2001 to describe the rise of emerging markets Brazil, Russia, India, and China, and alert to the influence they would exert on future world trade and economic growth. With the role of the United States as leading trading partner to both China and Brazil, this report has sought to analyze and trace some of the implications of Chinese and Brazilian trade on the U.S., U.S. Southwest and its transportation infrastructure. However, the unprecedented emerging story is how trade among emerging markets with the U.S. on the sidelines is taking shape and how such may present opportunities or challenges for the United States. This chapter focuses on the interaction between Brazil and China. It can be argued that China and Brazil are the two most stable regimes in the BRIC and among emerging markets. China's trade with Brazil has grown almost exponentially since the 1990s bolstered by Chinese and Brazilian economic stabilization and market opening. Moreover, since China's 2001 adhesion to the World Trade Organization and Brazil's closer relationship pursued during the President Lula administration, most notably begun in 2003, trade has reached unheretofore seen levels.

Brazil and China have a complementary and unique relationship. As two countries with continental dimensions, both have a diversity of trade. Strained by distant geography, transit times are not as favorable for Brazil-China trade as compared to their trade with the U.S. Nevertheless, both Brazil and China have developed a specialization of trade where Brazil supplies China with much-needed raw materials that can fuel its growth. China produces semi-manufactured and manufactured goods back to Brazil. Brazil's competitiveness in raw materials and basic agricultural exports such as iron ore, crude oil, and soybeans fuels and feeds China's economy, which sends its manufactures of telecom equipment, electronics, textiles, iron and steel products, and toys to Brazil. Chart 4.1 illustrates the dramatic rise in Brazil/China trade.

Chart 4.1. Brazil-China Trade Balance

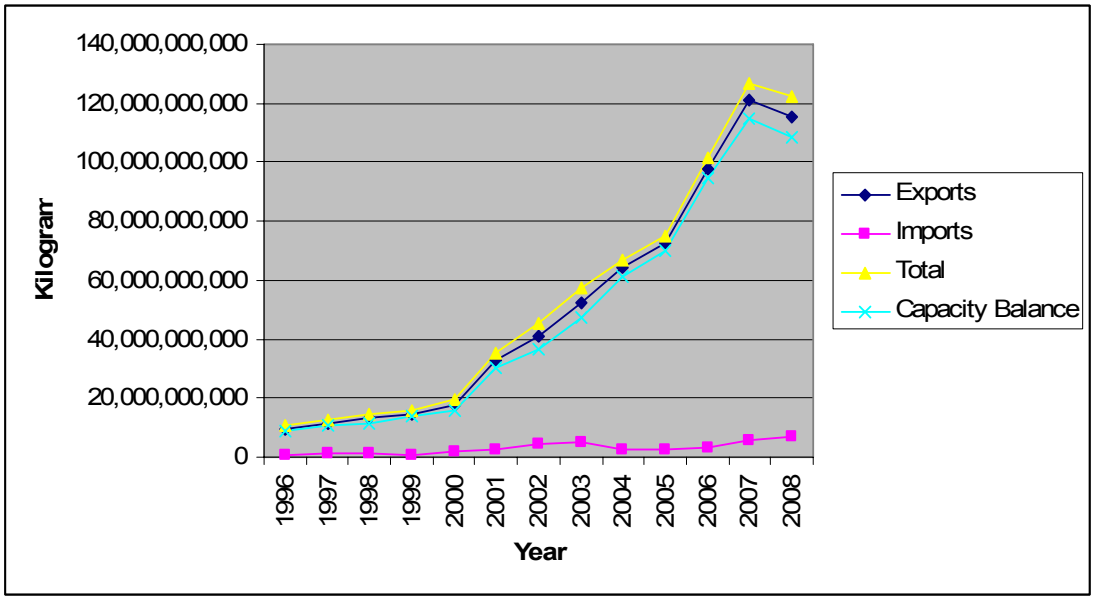


Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Chart 4.1 illustrates the rapid growth in Brazil-China trade by value. Brazil and China grow in stride with Brazil maintaining a slight trade surplus with China, benefiting from globally surging commodity prices for iron ore, raw material for the steel industry. In the 1990s, Brazil underwent the privatization of its steel, mining, railroad, port and petroleum sectors making Brazilian companies more efficient and competitive internationally and allowing for additional capacity to serve voracious Chinese demand. In value terms, the first Brazil-China take-off point is apparent around 2001, just when China adheres to the World Trade Organization. Brazil-China trade arrives at a second milestone point in 2003, where Brazil witnesses its largest trade surplus with Brazil. During the year 2003, China and Brazil made formal presidential trade missions to each other's countries and launched bilateral trade initiatives. These market opening moments had the most impact on facilitating access to the Brazilian market for Chinese exports of higher value goods, something that will be shown more clearly in the modal split of Brazil/China cargoes. From 2003-2006, there is yet another moment of take-off for both

countries exports with both trends running in parallel; while Brazil maintains a trade surplus, China begins to close the gap. Then, in the most striking moment, from 2006 to the present, Brazil-China trade reaches a new phase of explosive growth. Brazil loses its trade surplus and total trade passes the $35 billion level. Is this a permanent move with China now to run trade surpluses with Brazil as it does with the United States?

Chart 4.2. Brazil-China Trade Balance by Volume



Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

From chart 4.2, the remarkable specialization in China-Brazil trade can be viewed. While the combined Brazil-China trade reaches more than $35 billion in 2008, with China developing a growing trade surplus, the volume of trade most heavily favors Brazil, leaving a large capacity gap on the Brazil-China trade lane. Brazil is able to feed China's appetite for raw materials, such as iron ore, soybeans, and oil. These commodities are low value and shipped in bulk by large multinational corporations with a vertically integrated infrastructure seeking greater economies of scale. Much of Brazil's modernization in infrastructure, port, highway, and rail allowing scale economies is evidenced in the dynamic growth in volume terms witnessed from the year 2000 to present day.

The specialization apparent when comparing charts 4.1 and 4.2 lies in the Chinese specialization in higher, value-added products. Table 4.1 and 4.2 illustrate the leading

commodities traded. Analyzing the trend line, the tonnages for Chinese exports to Brazil hold stable, yet the value climbs meteorically. On a value per ton of cargo, this reflects China's increasing containerized trade outbound to Brazil and the higher values of cargo carried via container or by air, evidenced in table 4.1. Brazilian exports, on the other hand, demonstrate an ability to grow to meet demand with capacity increases made possible by more efficient ports, rail and larger vessels in both Brazil and China.

Table 4.1. Top 30 Brazilian Imports from China by Value (2008)

NCM	Commodity Description	Kilograms	% Vol.	USD$	% Value
85	Electrical machinery and equipment and parts thereof; soun	410,165,098	5.9%	$6,307,771,567	31.5%
84	Machinery and mechanical appliances; parts thereof	461,082,470	6.7%	$3,713,274,729	18.5%
29	Organic chemicals	224,617,388	3.3%	$1,195,305,375	6.0%
90	Optical, photographic, cinematographic, measuring, checkin	30,837,109	0.4%	$1,112,663,596	5.6%
27	Mineral fuels, mineral oils and products of their distillation	1,278,153,046	18.5%	$646,724,190	3.2%
72	Iron and steel	573,707,328	8.3%	$644,254,727	3.2%
87	Vehicles other than railway or tramway rolling stock	155,122,275	2.2%	$541,795,771	2.7%
73	Articles of iron or steel	323,727,717	4.7%	$508,927,956	2.5%
31	Fertilizers	627,461,663	9.1%	$457,828,834	2.3%
28	Inorganic chemicals	717,001,755	10.4%	$334,619,772	1.7%
39	Plastics and articles thereof	139,422,223	2.0%	$330,352,500	1.6%
95	Toys, games and sports requisites; parts and accessories th	58,182,139	0.8%	$327,297,950	1.6%
40	Rubber and articles thereof	107,154,428	1.6%	$318,749,649	1.6%
54	Man-made filaments	91,472,529	1.3%	$299,144,247	1.5%
62	Articles of apparel and clothing accessories, not knitted or c	17,970,320	0.3%	$272,452,456	1.4%
64	Footwear, gaiters and the like; parts of such articles	18,944,637	0.3%	$228,454,801	1.1%
60	Knitted or crocheted fabrics	48,499,426	0.7%	$222,867,545	1.1%
42	Articles of leather; saddlery and harness	69,368,941	1.0%	$214,344,442	1.1%
52	Cotton	30,025,085	0.4%	$145,078,316	0.7%
55	Man-made staple fibers	53,877,288	0.8%	$142,529,662	0.7%
82	Tools, implements, cutlery, spoons and forks, of base metal	36,060,345	0.5%	$124,075,016	0.6%
70	Glass and glassware	156,846,004	2.3%	$121,125,514	0.6%
07	Edible vegetables and certain roots and tubers	191,299,066	2.8%	$120,431,152	0.6%
94	Furniture; bedding, mattresses, cushions and similar stuffed	46,672,918	0.7%	$118,253,993	0.6%
83	Miscellaneous articles of base metal	45,498,694	0.7%	$113,759,974	0.6%
61	Articles of apparel and clothing accessories, knitted or croch	10,373,584	0.2%	$108,204,230	0.5%
69	Ceramic products	226,688,887	3.3%	$107,588,278	0.5%
96	Miscellaneous manufactured articles	28,137,934	0.4%	$101,612,388	0.5%
32	Tanning or dyeing extracts	18,974,342	0.3%	$86,026,281	0.4%
63	Other made up textile articles; sets; worn clothing and worn	17,869,598	0.3%	$75,701,614	0.4%

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

From these recent trading relationships, the questions can be raised whether Brazilian sales to China are hurting its manufacturing sector. By serving Chinese demand with ever increasing and efficient economies of scale, Brazil is accelerating and aiding the growth of

Chinese manufacture exports to Brazil and countries in South America in addition to the U.S., where Brazil competes with China. Whole sectors such as compressors, furniture, ceramic tile, steel, toys, textiles, footwear and apparel are in greater dispute between Brazil and China, with Brazil losing competitiveness. Brazilian sales of raw materials and basic agricultural goods aid the Chinese production sector to become more competitive. At the rate Brazil buys Chinese imports, a cycle may be in motion that fixes Brazil to a role of supplying raw materials and importing manufactures.

Table 4.2. Top 30 Brazilian Exports to China by Value (2008)

NCM	Commodity Description	Kilograms	% Vol.	USD$	% Value
12	Oil seeds and oleaginous fruits	11,823,582,243	10.3%	$5,324,123,392	32.5%
26	Ores, slag and ash	97,072,427,312	84.3%	$5,170,861,500	31.5%
27	Mineral fuels, mineral oils and products of their distillation	2,900,439,621	2.5%	$1,702,796,421	10.4%
15	Animal or vegetable fats and oils	720,593,849	0.6%	$839,139,854	5.1%
47	Pulp of wood or of other fibrous cellulose material	1,228,780,404	1.1%	$690,722,466	4.2%
72	Iron and steel	245,270,202	0.2%	$505,871,301	3.1%
41	Raw hides and skins (other than fur skins) and leather	109,915,638	0.1%	$374,995,294	2.3%
24	Tobacco and manufactured tobacco substitutes	54,329,255	0.0%	$367,315,281	2.2%
84	Machinery and mechanical appliances; parts thereof	31,530,676	0.0%	$293,059,994	1.8%
88	Aircraft, spacecraft, and parts thereof	243,191	0.0%	$250,165,461	1.5%
44	Wood and articles of wood; wood charcoal	127,390,456	0.1%	$93,441,247	0.6%
85	Electrical machinery and equipment and parts thereof; sound recorc	4,887,208	0.0%	$88,345,293	0.5%
25	Salt; sulfur; earths and stone; plastering materials	466,373,250	0.4%	$78,238,736	0.5%
29	Organic chemicals	46,158,541	0.0%	$66,026,253	0.4%
20	Preparations of vegetables, fruit or nuts	48,037,539	0.0%	$65,881,889	0.4%
39	Plastics and articles thereof	48,606,388	0.0%	$61,433,294	0.4%
74	Copper and articles thereof	8,512,819	0.0%	$54,723,556	0.3%
48	Paper and paperboard; articles of paper pulp, of paper or of paperb	55,715,556	0.0%	$51,122,954	0.3%
40	Rubber and articles thereof	14,469,757	0.0%	$41,905,677	0.3%
52	Cotton	23,738,707	0.0%	$32,478,019	0.2%
87	Vehicles other than railway or tramway rolling stock	3,186,486	0.0%	$25,029,371	0.2%
28	Inorganic chemicals	2,618,632	0.0%	$24,258,868	0.1%
17	Sugars and sugar confectionery	75,141,641	0.1%	$22,219,951	0.1%
73	Articles of iron or steel	1,343,656	0.0%	$16,395,696	0.1%
90	Optical, photographic, cinematographic, measuring, checking, preci	189,235	0.0%	$15,603,696	0.1%
53	Other vegetable textile fibers; paper yarn and woven fabric of paper	19,465,412	0.0%	$14,155,680	0.1%
21	Miscellaneous edible preparations	1,858,014	0.0%	$13,325,724	0.1%
81	Other base metals; cermets; articles thereof	1,022,070	0.0%	$10,515,252	0.1%
71	Natural or cultured pearls, precious or semi-precious stones	7,984,695	0.0%	$9,802,294	0.1%
32	Tanning or dyeing extracts	6,508,162	0.0%	$9,637,968	0.1%

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Notwithstanding the countries diverse economies, it is notable how the commodity mix concentrates in so few commodities. Approximately 97 percent of Brazilian export volume and 74 percent of export value concentrate in three commodity groups (ores, fuel, and soybeans).

Among the major exporters to China from Brazil from the mining sector are Vale, CSN, Samarco, USIMINAS/COSIPA, and MBR. From the agricultural sector, Bunge, Cargill, and ADM top the list. For the first time since 1997, China became the single largest importer of Brazilian agriculture and livestock product, surpassing the United States. From 2007 to 2008, China imported 70 percent more agricultural and livestock products, propelled by its import of soybeans to reach 11 percent of all Brazilian exports for these sectors amounting to $7.93 billion.[84]

Brazil/China Trade and Consumption of Transportation

When the modal split of Brazil-China trade is introduced, the growth of Chinese manufactures in electronics and high-value finished and intermediate goods and their implications on the transport network can be more fully understood. Table 4.3 introduces the volume and value of Brazilian exports/imports to/from China for the air mode. Both countries' trade grew at remarkable levels, with Brazil growing by almost 1,300 percent from 1996 through 2008 in value terms. But China exploded by nearly 5,000 percent over the same period. These figures are evidence of a number of factors such as more air services, economic stability in Brazil and China, and a greater opening of markets. What is more, many Brazilian firms such as Embraco have invested in outsourcing to China. In 1995, Embraco, now part of Whirlpool, paved the way for Brazilian outsourcing to China by establishing its Embraco Snowflake operation in Beijing to building compressors for refrigeration to be sold in the Chinese market and exported. The operation lasted 11 years before moving to a new facility in 2006 which added research and development. The new Embraco Snowflake developed a new compressor, which Embraco produces in plants in Italy and Brazil.[85] Overall, the Chinese expansion has enabled Embraco to double its production and expand into Asian markets.

[84] "China vira maior cliente do agronegócio do Brasil," *Valor Economico*, January 12, 2009.
[85] Embraco website, "China," available at: www.embraco.com.br, cited February 8, 2009.

Table 4.3. Brazilian Airborne Trade with China (Value-USD$ and Volume-kg)

	Exports to China (USD$)	Imports from China (USD$	Exports to China (Vol.)	Imports from China (Vol.)
1996	$14,009,333	$101,443,188	287,711	3,631,122
1997	$11,805,530	$105,411,466	216,922	3,919,247
1998	$10,257,655	$124,150,705	446,079	4,233,715
1999	$11,009,254	$155,877,764	371,127	3,231,762
2000	$26,718,454	$276,624,205	924,292	5,007,817
2001	$108,115,575	$247,698,716	2,549,300	6,018,179
2002	$74,260,055	$321,955,998	3,084,761	5,410,309
2003	$90,135,790	$541,661,126	3,458,347	7,365,457
2004	$105,441,004	$1,075,626,278	3,171,139	13,681,841
2005	$85,020,552	$1,830,991,840	2,420,400	20,205,873
2006	$114,906,305	$2,605,487,067	2,534,503	28,846,395
2007	$177,936,432	$3,623,760,221	3,720,139	42,102,312
2008	$181,538,524	$5,003,786,410	7,517,335	48,922,954

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Investigating the air cargo flows more fully, table 4.4 illustrates the top import destinations and table 4.5 illustrates the top export origins for Brazilian airborne trade with China. Chinese exports flow to the Brazilian airports that serve the manufacturing sectors and consumption centers, most notably Viracopos Airport at Campinas, Manaus, and São Paulo International Airport at Guarulhos. Viracopos and Guarulhos serve the large population and Southeast manufacturing centers. Viracopos, especially, outside of the heavy congestion of the City of São Paulo, is designed as an air cargo center. Major third-party logistics companies, such as Ceva, Hellmans, and FedEx have concentrated their Brazilian operations there. Farther south, the airport at Curitiba also serves the electronics industries. In Manaus, a free trade zone where many electronics companies have assembly operations explains their large volume. Companies such as Fuji, Honda, Nokia, LG, Panasonic, Philips, Pioneer, Samsung, Semp Toshiba, Sony, Traxx, and Yamaha all have manufacturing and assembly facilities in Manaus, where they benefit from exemptions on imports. China exports components to Brazil for final assembly in Manaus for sales and distribution in Brazil.

Table 4.4. 2008 Brazilian Airborne Imports from China by Airport (value and volume)

Airport (City, State)	Value (USD$ FOB)	Volume (KG)
1. Campinas-Viracopos-Sao Paulo	$2,010,152,732	19,054,839
2. Manaus, Amazonas	$1,287,233,405	14,116,468
3. Guarulhos, São Paulo	$975,278,268	7,749,121
4. Vitória, Espírito Santo	$227,219,178	1,793,655
5. Curitiba, Paraná	$186,008,377	2,005,126
6. Rio de Janeiro, Rio de Janeiro	$94,639,642	1,200,278
7. Belo Horizonte, Minas Gerais	$80,412,952	936,241
8. Salvador, Bahia	$74,524,893	736,691
9. Porto Alegre, Rio Grande do Sul	$32,270,471	766,481
10. Recife, Pernambuco	$10,903,535	108,459

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Table 4.5. 2008 Brazilian Airborne Exports to China by Airport (value and volume)

Airport (City, State)	Value (USD$ FOB)	Volume (KG)
1. Guarulhos-São Paulo	$125,738,857	1,923,101
2. Campinas-Viracopos, São Paulo	$35,280,365	597,174
3. Curitiba, Paraná	$10,458,922	106,987
4. Manaus, Amazonas	$4,489,553	22,098
5. Rio de Janeiro, Rio de Janeiro	$4,372,777	187,774

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

In 2008, Brazilian airborne exports to China amount to less than 4 percent of Brazilian airborne imports in value terms. This imbalance means return cargoes to China are difficult to find. One interesting insight from table 4.5 is the greater value of cargo exported to China from Manaus, evidence of high-value electronic products or components.

Table 4.6. Brazilian Seaborne Trade with China (Value-USD$ and Volume-Kg)

	Exports to China (USD$)	Imports from China (USD$)	Exports to China (Vol.)	Imports from China (Vol.)
1996	$1,098,762,662	$1,010,830,615	9,774,029,178	782,153,658
1997	$1,072,359,719	$1,032,315,180	11,566,591,534	1,059,311,053
1998	$891,772,428	$866,463,661	13,104,988,413	1,470,550,102
1999	$652,749,967	$685,029,553	14,757,903,119	873,784,727
2000	$1,007,666,437	$911,269,551	17,791,277,682	1,936,599,728
2001	$1,735,980,343	$1,057,853,531	32,722,550,843	2,684,965,324
2002	$2,423,828,019	$1,215,071,755	40,643,191,486	4,472,384,341
2003	$4,142,704,160	$1,592,878,530	52,224,509,273	4,780,623,753
2004	$5,290,337,700	$2,617,921,931	63,868,100,967	2,802,115,061
2005	$6,737,244,866	$3,499,303,844	72,465,850,645	2,678,982,860
2006	$8,257,932,479	$5,340,374,855	97,820,675,580	3,230,263,469
2007	$10,545,510,402	$8,915,859,481	120,744,068,960	5,870,966,215
2008	$16,002,099,326	$14,912,411,375	115,067,893,758	6,830,070,549

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

The striking growth in seaborne trade presented in table 4.6 shows that Brazil has doubled its exports to China more than three times in volume from 1996 to 2008, with the most impressive growth occurring between 2003 and 2008. The leading commodity driving this export bonanza is iron ore from Vale Mining Company, which will be featured as a case study in the next section. Not to be outdone, Chinese exports to Brazil also doubled more than three times over the same period. For purposes of illustration, since President Luís Inácio "Lula" da Silva assumed office on January 1, 2003, Brazilian seaborne trade with China has increased more than 538 percent in value terms and more than 210 percent in volume with Brazil specializing in low-value exports of basic commodities and China exporting to Brazil more intermediate and manufactured goods. On a value per ton basis, for 2008, Brazilian seaborne exports to China averaged $139 per ton compared to $2,138 per ton of Chinese seaborne exports to Brazil.

Tables 4.7 and 4.8 present the Brazil-China seaborne trade by Brazilian port of load and discharge. The three main iron ore ports of Sepetiba, Tubarão, and São Luis are clearly the top volume ports. Santos, with its concentration of breakbulk and container services, figures prominently in Brazilian exports of higher value cargoes. Worth noting are the ports that specialize in agribusiness, such as Paranaguá, Rio Grande, Santos, and São Francisco do Sul. Liquid bulk ports exporting to China are Salvador/Aratu and São Sebastião.

Table 4.7. 2008 Brazilian Seaborne Exports to China by Port of Loading (value and volume)

Port (City, State)	Value (USD$ FOB)	Volume (KG)
1. Itaguaí-Sepetiba, Rio de Janeiro	$3,811,905,457	44,538,033,906
2. Santos, São Paulo	$3,026,697,676	5,472,889,904
3. Vitória/Tubarão, Espírito Santo	$2,585,917,055	33,542,334,703
4. Rio Grande, Rio Grande do Sul	$1,855,781,836	2,599,158,017
5. São Luis/Ponta da Madeira, Maranhão	$1,804,041,058	23,887,780,959
6. Paranaguá, Paraná	$1,641,714,513	2,970,879,271
7. São Francisco do Sul, Santa Catarina	$537,631,799	1,042,821,359
8. Rio de Janeiro, Rio de Janeiro	$317,706,797	129,070,154
9. Salvador, Bahia	$173,222,900	169,550,168
10. São Sebastião, São Paulo	$81,621,820	133,635,014

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Brazilian seaborne imports from China share some similarities, but also present distinct differences over its maritime exports to China. Table 4.8 lists Santos as the most important Brazilian port for imports from China in volume and value. This comes as no surprise since all major container services call Santos on routes to/from Asia. Manaus is also expressive as an import destination having its assembly plants in the Manaus Free Trade Zone. Manaus cargoes more frequently come via the Panama Canal. As will be shown in a further section, the principal main line Brazil-Asia container services do not transit the Panama Canal. As a backhaul cargo from China to Brazil, the ports of Vitória/Tubarão and Sepetiba receive coal. For the agribusiness, China supplies the ports of Paranaguá and Rio Grande with fertilizers. Iron and steel are also prominent as Chinese exports to Pecém, Rio de Janeiro, Santos, and Vitória. Equipment manufactures for the energy sector, nuclear reactors and power generation are found in Chinese exports to Paranaguá, Rio Grande, Santos, and Sepetiba.

Table 4.8. 2008 Brazilian Seaborne Imports from China by Porto fo Discharge (value and volume)

Port (City, State)	Value (USD$ FOB)	Volume (KG)
1. Santos-São Paulo	$5,532,859,688	1,609,981,513
2. Manaus, Amazonas	$1,831,111,029	274,528,562
3. Vitória/Tubarão, Espirito Santo	$1,652,851,028	1,341,646,599
4. Paranaguá, Paraná	$1,384,726,459	742,427,785
5. Itajaí, Santa Catarina	$1,332,130,134	522,645,462
6. Itaguaí/Sepetiba, Rio de Janeiro	$751,778,960	427,036,711
7. Rio Grande, Rio Grande do Sul	$637,110,929	336,721,135
8. Rio de Janeiro, Rio de Janeiro	$622,447,998	285,664,851
9. Pecém, Ceará	$311,216,642	220,121,328
10. São Francisco do Sul, Santa Catarina	$224,702,096	93,652,771

Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Vale: Bookending the Trade Corridor

Iron Ore as Corridor Driver

The Chinese market is vitally important to Brazil's third largest company, mining giant Vale.[86] According to the China Iron and Steel Association, total seaborne iron ore trade amounted to 805 million tons with China the largest importer responsible for 383 million tons.[87] The Chief Executive Officer of Vale, formerly Companhia Vale do Rio Doce-CVRD, Roger Agnelli said, "We pray every day for China to continue growing."[88] Vale is indicative of the

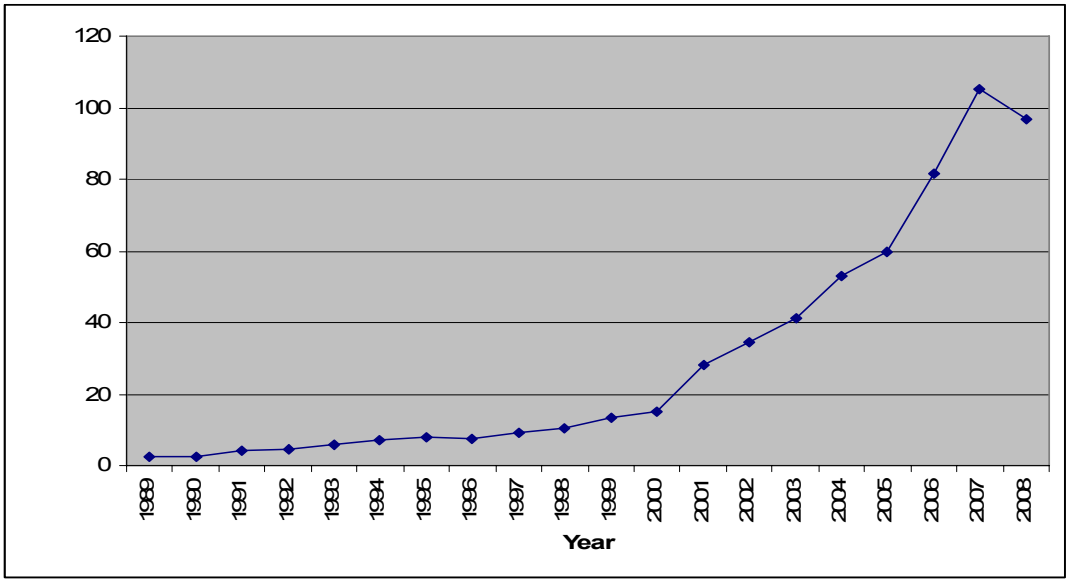
[86] *Valor Grandes Grupos,* December 2008, pg.8. Vale occupies third place behind oil conglomerate Petrobrás and banking leader Bradesco. Vale had gross revenues of more than R$66.3 billion and a net profit of R$20 billion in 2007.
[87] Xinhua News Agency, "Iron ore price rise could force China steel rationalization," Hellenic Shipping News website, February 27, 2008, available at: www.hellenicshippingnews.com, cited Feb. 27, 2008.
[88] Rafael Rosas, "Mineradora garante operação, diz Vale," *Gazeta Mercantil*, October 26, 2006, p. C-4.

route being traced in Brazil-China trade relations. At the time, Vale's purchase in October 2006 of Canadian Inco for $13.3 billion was the largest acquisition by a Brazilian company of a foreign company.[89] The plans are to use Vale Inco to compete in the Chinese market for exports of nickel.[90] Such a bold takeover of a foreign company already played into Vale's China strategy, bookending its business interests on both ends of the import-export trade corridors.

As a major supplier to the Chinese steel mills, Vale's strategy is via long-term contracts and annual price negotiations based on benchmark prices closed with steel mills during the first quarter of each year. News items that Vale has increased its sales to the Chinese steel industry are frequent.[91] In 2007, Vale alone sold 100 million tons of iron ore to China, representing 25 percent of its sales and, for China, 26 percent of its import demand.[92] Vale and China are highly dependent on each other now, but what is so notable is the recent emergence of this relationship. Chart 4.3 chronicles the explosive growth in Brazilian iron ore exports to China. This growth is basically attributable to one company, Vale.

[89] "Vale fecha a aquisição da Canadense Inco," October 25, 2006.
[90] "Vale vai usar Inco para disputer o Mercado Chines," *Gazeta Mercantil*, October 26, 2006, p. 1.
[91] Sabrina Lorenzi, "Vale aumenta vendas para as siderúrgicas Chinesas," *Gazeta Mercantil*, November 17, 2006.
[92] "Vale encomenda 5 navios visando reduzir frete para China," cited June 10, 2007

Chart 4.3. Brazilian Iron Ore Exports to China (millions of metric tons)



Source: Brazilian Ministry of Development, Industry and Trade, Sistema Aliceweb, available at: www.mdic.gov.br, cited February 9, 2009.

Vale is invested heavily in China with several joint ventures linking its production of raw materials to the Chinese industrial and steel sectors. In July 2004, Vale made its first direct industry investment in China, signing a contract with Yankuang Group Co., Ltd., a principal producer of coal in China, and Itochu Corporation, a Japanese trading company, to form the joint venture of the Shandong Yankuang International Coking Co., Ltda.[93] Vale participates with 25 percent of the capital. In December 2006, Vale inaugurated the venture and Shandong Yankuang International Coking Co. was launched with a production goal of producing 2 million tons of coke and 200,000 tons of methanol.[94] With coal as a principal input for the production of steel, Vale has secured return cargo for its iron ore exports. As Vale exports bulk iron ore in the largest dry bulk ocean-going vessels, the Shandong Yankuang JV gives Vale the rights to purchase Chinese coke and coal for sale to the Brazilian steel and cement industries. Vale also holds 25 percent stake in coal producer Henan Longyu Energy Resources Ltda., having received the first shipment of 40,000 tons of anthracite coal from Longyu in 2006.

[93] "CVRD associa-se para a produção de coque metalúrgico na China," Vale press release, July 13, 2004, available at: www.vale.com/vale/cgi/cgilua.exe/sys/start.htm?infoid=311&sid=116&print=1, cited February 8, 2009.
[94] "Vale inaugura produção de coque na China," *Gazeta Mercantil*, December 20, 2006, p. C-4.

More Vale investment in China has occurred in pelletization of iron ore into usable pellets for steel mills. Vale has invested in the construction of a Chinese pellet mill announced in September 2006. Through its subsidiary, MBR, Vale will have 25 percent participation in the Zhuhai YPM, controlling company for the Zhuhai pellet mill in Guandong Province. The production capacity of Zhuhai is initially placed at 1.2 million tons. Other joint venture participants are the Pioneer Iron and Steel Group and the Zhuhai Yueyufeng Iron and Steel Co. Ltd. With this investment, Vale will provide at least 70 percent of the iron ore used at the mill with a 30 year long-term contract.[95]

Vale and the Transportation Response to Demand

In order to meet this great demand, Vale has amassed a vertically integrated production and transportation system. Put simply, Vale owns and operates ports, railways, and mines. Its logistics network comprises:

- 9,863 km of railroads;
    - 5.1 billion ton-kilometers transported by the Carajás Railway;
    - 12.9 billion ton-kilometers transported by the Vitoria-Minas Railroad; and,
    - 11 billion ton-kilometers transported by the Center-Atlantic Railway.
- 6 port terminals;
    - 105 million tons loaded at the Tubarão Port Complex; and,
    - 81.7 million tons loaded at the Ponta da Madeira.

These volumes amount to 16 percent of all cargo transported in Brazil and 30 percent of the cargo transported through Brazilian ports.[96]

For its transport of iron ore, Vale employs the world's largest dry bulk vessel, the Berge Stahl to take iron ore from Ponto da Madeira, near São Luis, Maranhão to Majishan, China. The Berge Stahl requires a 23 meter draft and is capable of carrying 364,000 tons of iron ore. The other principal load port for Vale is the Port of Tubarão, near Vitória, Espírito Santo, where ships

[95] "CVRD anuncia joint venture na China," Brazil-China Chamber of Commerce website, excerpted from CVRD press release, available at: www.camarabrasilchina.com.br/pg_dinamica/bin/pg_dinamica.php?id_pag=2450.
[96] "Numbers," Vale website, available at: www.vale.com/vale_us/cgi/cgilua.exe/sys/start.htm?sid=82&print=1, cited February 7, 2009.

are capable of loading 150-200,000 tons.[97] Both ports are connected to the mines by Vale's own highly efficient rail systems, the Carajás Railway (Carajás, Pará to Ponto da Maderia, Maranhão) and the Vitória Minas Railway (Minas Gerais to Tubarão). Future demand prompted Vale in 2007 to sign with Norway's Bergesen Worldwide Ltd. an exclusive Brazil-China shuttle service over 25 years that would introduce the four largest iron ore carriers in the world (China max), approximately 388,000 tons with the first to be delivered in 2011.[98] The four vessels agreed to with Bergesen are complemented by a fifth large ore carrier Vale has ordered in partnership with NYK Japan with capacity for 300,000 tons. In December 2008, Vale paid $240 billion to Jiangsu Rongsheng Heavy Industry Group, headquartered in Rugan, Jiangsu Province, for 12 dry bulk vessels. The payment is part of the company's $1.6 billion contract, signed in August 2008, to build the vessels, each at approximately 400,000 tons capacity taking first delivery in 2011.[99]

Domestically, Vale is also building out its ability to service its iron ore supply chain. In January 2009, Vale signed with three Brazilian shipyards, Detroit in Santa Catarina state, Santa Cruz in Sergipe state, and Rio Maguari in Pará state to build 15 tugs, 2 pushboats and 32 barges. Detroit and Santa Cruz shipyards will build 11 tugs and 4 tugs, respectively, costing $118.6 million; Rio Maguari shipyard will build 32 barges evaluated at $52.5 million.[100] With these investments, Vale will be able to serve much its business with its own tonnage. Moreover, it will expand capacity and optimize the efficiency at the Brazilian and Chinese deep-water draft ports of Tubarão and Ponto da Madeira.

Baosteel's Entry to Brazil

Just as Vale has sought to secure its trade lane with complementary investments in China and expanded capacity in shipping, China's largest steelmaker Baosteel has also sought to push its borders outward into the global economy by seeking to build a steel mill in Brazil as a joint venture with Vale. In February 2004, Vale and Baosteel Shanghai Corporation signed an agreement to assess the feasibility of carrying out a joint venture to build and operate an

[97] "Maior navio granileiro do mundo leva minerio de ferro para a China," from China Brazil Business Council website, www.ccibic.com.br, cited July 25, 2006.
[98] Xinhua News Agency, "Brazil's mining giant CVRD signs freight contract to develop Brazil-China shuttle service," May 4, 2007.
[99] Helen Yuan and Cathy Chan, Bloomberg News, cited in "Vale paga US$ 240 bi por navios chineses," *Jornal do Commercio*, Rio de Janeiro, December 24, 2008, from Portos e Navios website, available at: www.portosenavios.com.br, cited February 7, 2009.
[100] Michelle Wiese Bockmann, "Vale in newbuilding bonanza worth $171 million," *Lloyd's List*, January 23, 2009.

integrated steel mill in the Maranhão state, in or near São Luis and the ports of Itaquí and Ponta da Madeira. The feasibility study involved German engineering services company, Ferrostaal AG, and Chinese engineering company CISDI Engineering Co.[101] The initial plans for the Maranhão plant were to produce 3.7 million tons of steel slabs with additional investments in capacity to yield 7.5 million tons per year.

The Vale/Baosteel joint venture suffered delays in environmental licensing that allowed another Brazilian state, Espírito Santo, to enter as suitor to the new plant. With Vale operations close by at the Port of Tubarão, a pellet mill at the Espirito Santo port of Ubu and iron ore mines in Minas Gerais state, Espírito Santo was also uniquely suited to host a steel mill. Espírito Santo made its bid with incentives to host the Vitória Steel Company in the municipality of Anchieta, near the Ubu industrial district. On October 3, 2007, Espírito Santo Governor Paulo Hartung, Vale CEO Roger Agnelli, Baosteel Group Chairman Xu Leijang, Baosteel Vice-General Manager Zhao Kun, and Chinese Ambassador to Brazil Chen Duqing were present at a ceremony unveiling the Baosteel Vitória Iron and Steel Company Ltd. With Baosteel holding 60 percent control and Vale 40 percent, the output of the new mill was set at 5 million tons of steel slabs, with construction to begin the first half of 2009 and production to be online by the end of 2011.[102]

Similar to what happened in Maranhão, alleged environmental concerns from Espírito Santo placed delays on the initial location of the new mill. In November 2008, the Espirito Santo Government vetoed the Ubu industrial district as the location for the mill, offering other alternatives. Among the reasons for halting the Vitória Steel Company were possible damaging environmental impacts to the region, which hosts a highly developed tourism complex near Guarapari. For Baosteel, this new requirement and the global economic slowdown were enough for Vale and Baosteel to part ways and cancel the project on January 18, 2009.[103] This story is emblematic of the difficulties of doing business in Brazil that the Chinese-led initiative had in meeting approval from its Brazilian counterparts. The impasses appear to be in the Brazilian governance structure and not with Vale or Baosteel. It is also evidence, though, of the desire for China to extend its trade corridor and secure its interest in steel production beyond its borders.

[101] PR Newswire, "CVRD and Baosteel sign a contract to assess project feasibility," February 2, 2004, PR Newswire website, available at: www.prnewswire.co.uk.
[102] Baosteel Group Corporation, "Baosteel's first overseas steel plant settled in Brazil," Baosteel website, available at: www.baosteel.com, cited February 8, 2009.
[103] "Vale desiste de projeto no ES," *Diario do Nordeste*, Fortaleza, Ceará, January 19, 2009.

As Madame Xie Qihua, Chairwoman and President of Baosteel said during the announcement of the intent to build a mill in Brazil in Maranhão, "this agreement will be the first of many opportunities for the Chinese iron and steel industry to take advantage of Brazilian capability as a low-cost producer of steel. More importantly, it shows a bright future for deeper economic relationship between Brazil and China."[104]

Profile of Brazil/China Maritime Services

Direct container services between China and Brazil transit via the Cape of Good Hope. The Brazilian port of Santos has the most sailings with all direct services making at least one vessel call per round trip voyage. Other Brazilian ports with direct service include Rio Grande, São Francisco do Sul, Itajaí, Paranaguá, Itaguaí (Sepetiba) and Rio de Janeiro. While the main Chinese ports of call are Shanghai and Hong Kong, Brazil-China direct services also call Chiwan, Ningbo, Quingdao, Shekou, Xiamen, and Yantian. The average vessel sizes tend to be larger than for the trades to/from the United States and Brazil, though the range is great with vessels from 2,000 TEUs to 5,900 TEUs. The benchmark transit times are:

- Santos to Hong Kong:
  - 27 days (ASAX Service-CSAV/Libra);
  - 26 days (ASAS3-Maersk);
  - 27 days (New Good Hope Express Sling 1B-Aliança-Hamburg Süd); and,
  - 18 days (SEAS Service –CMA CGM).
- Santos to Shanghai:
  - 30 days (ASAX Service-CSAV/Libra);
  - 32 days (ASAS3-Maersk); and,
  - 36 days (New Good Hope Express Sling 1B-Aliança-Hamburg Süd).
- Hong Kong to Santos:
  - 25 days (ASAX Service-CSAV/Libra);
  - 24 days (ASAS3-Maersk);
  - 25 days (ESA-Cosco/Evergreen); and,
  - 27 days (New Good Hope Express Sling 1B-Aliança-Hamburg Süd).

[104] PR Newswire, "CVRD and Baosteel sign a contract to assess project feasibility," February 2, 2004, PR Newswire website, available at: www.prnewswire.co.uk.

- Shanghai to Santos:
    - 28 days (ASAX Service-CSAV/Libra);
    - 27 days (ASAS3-Maersk);
    - 29 days (ESA-Cosco/Evergreen); and,
    - 30 days (New Good Hope Express Sling 1B-Aliança-Hamburg Süd).[105]

Most services run similar trade routes with slight variations. Table 4.9 presents the Brazil-China direct container services.

Indirect container services can connect in a variety of ways. For the East Coast of South America, transshipment in the Caribbean at ports like Caucedo, Kingston, Freeport and Panama (Manzanillo) connect to the ocean carriers, such as MOL, MSC, and Zim's global routes transiting the Panama Canal. Other routings for Brazilian ports on the East Coast of South America can connect via European ports such as Hamburg, Giora Tauro or Rotterdam. For the Northern Brazilian ports and those along the Amazon River, the indirect routing also feeds the major transshipment hubs in the Caribbean (Kingston, Caucedo, Freeport) or Central America (Panama-Manzanillo). Indirect service from Shanghai to Manaus with transit via the Panama Canal and transshipment at Manzanillo will take 23 days to transit from Shanghai to Manzanillo, 6 days to wait for new vessel to Manaus, and 9 days from Manzanillo to Manaus for a total of 38 days of transit time.[106] These transit times are still more favorable than direct service via East Coast South America ports and transshipment to cabotage routes. Indirect services also open up more Chinese ports, including Dalian, Guangzhou, Huang Pu, Macao, Tianjin, and Xingang.

[105] *Guia Maritimo* (various) and liner websites.
[106] Mol website, cited February 9, 2009.

Table 4.9. Brazil-China All-Water Direct Services

Service	Liners	Frequency	Port Rotation*
ASAS1 Large String	Maersk, Aliança-Hamburg Süd	Weekly	**Shanghai, Hong Kong**, Singapore, Tanjung Pelepas, **Itaguaí, Santos**, Buenos Aires, **Rio Grande, Paranaguá, Santos**, Port Elizabeth, Singapore, **Hong Kong, Shanghai**
ASAS2 Small String	Maersk, Aliança-Hamburg Süd, Safmarine	Weekly	Nagoya, Yokohama, Busan, **Hong Kong**, Singapore, Tanjung Pelepas, Durban, **Santos, Itajaí, Santos, Itaguaí**, Durban, Singapore, Nagoya
ASAS3 Westbound	Maersk	Weekly	Nagoya, Yokohama, Busan, **Shanghai, Hong Kong**, Tanjung Pelepas, Singapore, Durban, **Itaguaí, Santos**, Buenos Aires**, Rio Grande, Paranaguá, Santos**, Port Elizabeth, Durban, Singapore, **Hong Kong**, Nagoya
ASAX	CSAV/Libra	Weekly (10 vessels)	**Ningbo, Shanghai, Hong Kong, Chiwan**, Singapore, **Santos**, Montevideo, Buenos Aires, **Rio Grande, Itajaí, Paranaguá, Santos**, Durban, Singapore, **Hong Kong**, **Ningbo**
CSW	MOL	Weekly	Kobe, Yokohama, Nagoya, Kanmon, Pusan, **Shanghai, Yantian, Hong Kong**, Singapore, **Santos**, Buenos Aires, Montevideo, **São Francisco do Sul, Paranaguá, Santos, Rio de Janeiro**, Cape Town, Port Elizabeth, Singapore, **Hong Kong**, Kobe
ESA	COSCO/Evergreen	Weekly	**Shanghai, Ningbo, Yantian, Hong Kong**, Singapore, **Santos**, Montevideo, Buenos Aires, **Santos**, Singapore, **Hong Kong, Shanghai**
New Good Hope Express Sling 1A	Aliança-Hamburg Süd, Maersk, Safmarine	Weekly (11 vessels)	**Shanghai, Hong Kong**, Singapore, Tanjung Pelepas, Durban, **Itaguaí, Santos**, Buenos Aires, **Rio Grande, Paranaguá, Santos**, Port Elizabeth, Durban, Singapore, **Hong Kong**
New Good Hope Express Sling 1B	Aliança-Hamburg Süd, Maersk, Safmarine	Weekly (11 vessels)	**Shanghai, Hong Kong**, Singapore, Tanjung Pelepas, Durban, Itaguaí, Santos, Buenos Aires, **Rio Grande, Paranaguá, Santos**, Port Elizabeth, Durban, Singapore, **Hong Kong**, Nagoya, Yokohama, Busan
New Horizon Express	Hyundai, NYK Line	Weekly	**Shanghai, Ningbo, Hong Kong**, Singapore, Durban, **Santos**, Buenos Aires, Montevideo, **Navegantes, Paranaguá, Santos**, Singapore, **Hong Kong, Shanghai**
SEAS	CMA-CGM, China Shipping, K-Line, Maruba	Weekly (10 vessels)	**Qingdao**, Pusan, **Shanghai, Xiamen, Chiwan,** Port Kelang, **Rio de Janeiro, Santos**, Buenos Aires, Montevideo, **Rio Grande, São Francisco do Sul, Santos**, Port Kelang, **Hong Kong, Qingdao**
SEAS2	CMA-CGM	Weekly (10 vessels)	**Shanghai, Ningbo, Hong Kong**, **Shekou**, Port Kelang, **Santos**, Buenos Aires, **São Francsico do Sul, Paranaguá, Santos, Rio de Janeiro**, Durban, Port Kelang, **Hong Kong, Shanghai**

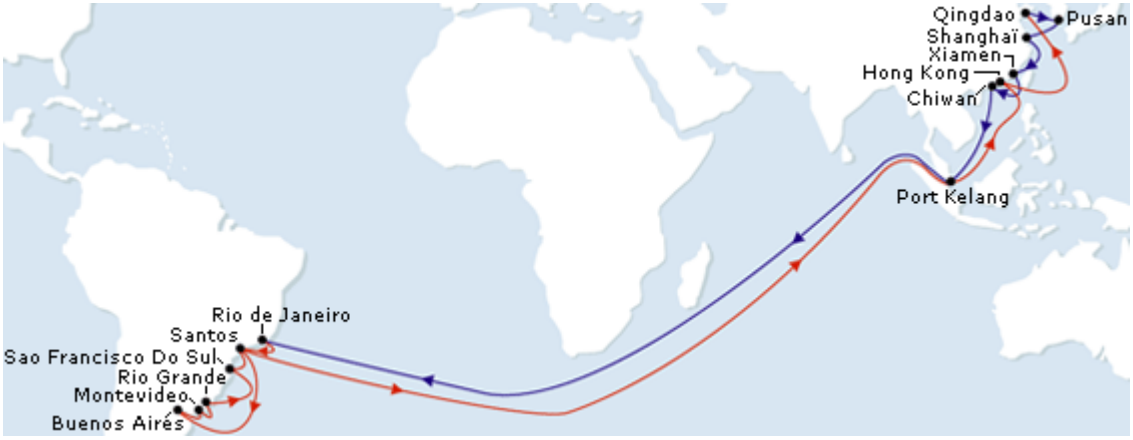
* Brazilian and Chinese ports in bold.

Source: *Guia Marítimo*, First Fortnight, February 2009 and various liner company websites.

Emblematic of the typical direct service, map 4.1 shows the CMA/CGM direct SEAS service. For indirect service, the case of Mitsui Orient Line is presented in maps 4.2 and 4.3,

where cargoes from Manaus transit to the Caribbean (Panama) to pick up mainline service to/from Asia.

Map 4.1. CMA-CGM SEAS Service Map



Source: CMA-CGM, CMA-CGM website, available at: www.cma-cgm.com, cited February 9, 2009.

Map 4.2. MOL CX1-Amazon Caribbean Service Map

Source: Mitsui Orient Line (MOL), MOL website, available at: www.molpower.com, cited February 9, 2009.

Map 4.3. MOL CNY-Asia-U.S. East Coast Service Map

Source: Mitsui Orient Line (MOL), MOL website, available at: www.molpower.com, cited February 9, 2009.

With the Panama Canal expansion, it is expected that larger vessels will make the trans-Pacific routing via the canal. However, it is unclear whether this will benefit most shippers in Brazil and China with access to markets. The Northern region and the Amazon River region will stand to benefit the most from more capacity, but the likelihood is that these new larger vessels will service the pendulum global routes, veering little from the equatorial lines. As a result, it can be expected that there will be more feedering via Central America and the Caribbean to catch the Brazil-China trade from the Northeast and Northern regions. To the South and Southeast, where Brazil concentrates its GDP, Brazil-China direct services will also see the possibility of capacity increases as Brazil embarks on dredging its major ports to drafts capable of receiving the larger 6000 TEU vessels. Dredging as outlined in chapter 3 and the creation of new container terminals are designed for that future. Similar to the North and Northeast, more feedering will also occur via cabotage on the East Coast of South America and intra-Mercosul services, linking Uruguay, Argentina, and Brazil. It is most interesting to note the few Brazilian ports that handle direct services to/from China. To the degree that Brazilian growth moves beyond São Paulo, other ports such as Vitória, Suape and Pecém may be considered. For now, though, the dichotomy for China-Brazil services splits with direct services to the

South/Southeastern ports and indirect services to the Northern and Amazon ports with transshipment and transiting the Panama Canal.

Chapter 5. The U.S.-Brazil-China Trade Triangle

The Dynamics of Triangular Trade

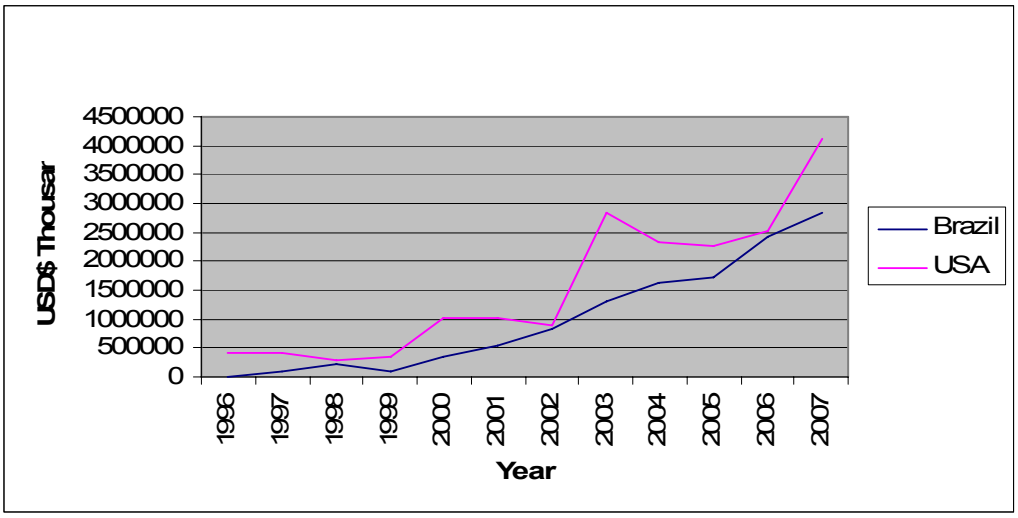
International trading patterns between the United States, Brazil, and China are shaping global trade lanes and transportation corridors. In this report, the remarkable degree to which the United States and Brazil provide China with the raw materials has been documented. Moreover, these raw materials are processed and return in the form of finished goods from China to the U.S. and Brazil. China, following the development strategies of Japan and South Korea, has moved from exporting cheap low-value added manufactures, such as textiles, footwear, and toys to higher priced more value-added items such as machinery, automobiles and computers.

Transportation infrastructure has adapted to the triangular demands of trade. Bigger and larger vessels are being built to serve the iron ore trade from Brazil to China and larger container fleets are under construction to send back containerized goods from China to the United States. While the trans-Pacific trade receives the greatest share of U.S.-China container trade, East Coast and U.S. Gulf Ports have embarked on large capital investments in additional capacity to receive more containers. The Panama Canal expansion is expected to drive the development of more all-water services from Asia to the U.S. Gulf and East Coast. What are the impacts of serving the transportation demand? This chapter explores selected cases of the U.S.-Brazil-China triangular trade.

The U.S. and Brazil are outsourcing manufacturing to China. China's rapid industrialization is also threatening to displace U.S. and Brazilian industries from competitiveness in their own domestic markets. What is more, China receives its fuel (raw materials) for its manufacturing complex from the U.S. and Brazil, among others. At once, both Brazil and the U.S. are selling to China and buying from China in a manner that facilitates the creation of a cycle resulting in reduced competitiveness. In this sense, the U.S. investment in logistics may be a factor expediting the reduction in U.S. competitiveness. It is far easier for foreign products to compete in the U.S. market with its transportation infrastructure, than for U.S. goods to compete in China and Brazil. In fact, the limitations of Brazilian logistics may

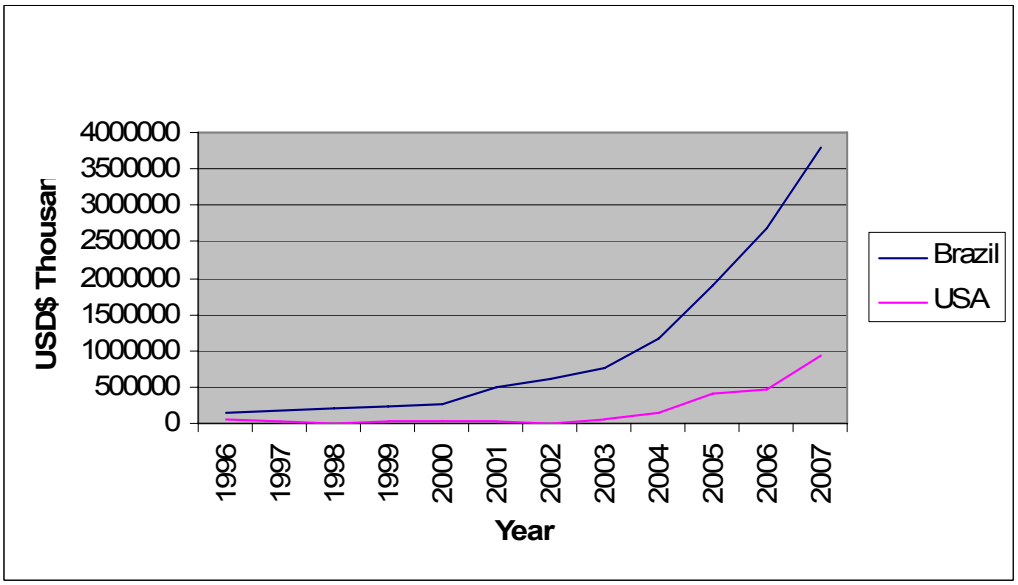
work as a natural barrier to inhibit the degree to which Chinese imports threaten Brazilian industry as they are in the U.S .

Chart 5.1. Chinese Imports of Soybeans (HTS#1201)



Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chart 5.2. Chinese Imports of Ores, Slag and Ash (HTS#26)



S
Aource: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade dministration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Charts 5.1 and 5.2 show the extent to which Brazil and the United States are fueling China. Soybeans and iron ore are two principal raw materials and the rapid increase from 2005 to present is clear evidence of an accelerating rate of industrialization and growth. Brazil has 25 percent market share in China's soybean imports and 23 percent participation as supplier of iron ore.[107] With rising prices, Brazil will benefit in 2009 from soybean exports to China, expected to amount to 12.5 million tons. However, with dropping prices in steel and iron ore, Brazil not see the same gains for its iron ore exports to China, estimated at 100 million tons in 2009.[108]

Turning to the implications on U.S. imports from China and Brazil, charts 5.3 to 5.6 present a snapshot of different commodities, namely those involved in civil construction. Brazil is well-known for exporting granite, ceramic tile, and iron and steel, especially to the U.S. Gulf and Southwest. What is striking in charts that follow is the degree to which China is creeping up on Brazil. In charts 5.3 and 5.4, Italy is included as the traditional leader in granite and ceramic tile. The leading machinery used to produce polished granite slabs and cut ceramic tile comes from Italy. Brazil and China are seen to compete directly for the U.S. market with China closing the gap and potentially overtaking Brazil.

Reverse Globalization

As it relates to steel, Brazil and China supply raw steel for finishing to the United States. As written earlier in this report, many Brazilian steel companies supply U.S. integrated mills. What is more, Brazilian steel companies such as CSN in Terre Haute, Indiana, Vale in Fontana, California, and Gerdau in Midlothian, Texas and Beaumont, Texas have U.S. firms. German steel maker Thyssen Krupp is also planning on sourcing its steel mill in Mount Vernon, Alabama with slabs from its new Brazilian mill in Rio de Janeiro state.

The major new development is that China steel pipemaker Tianjin Pipe Corp. (TPCO) has announced a $1 billion investment in a seamless pipe facility to serve the oil and gas industry at Gregory, Texas near Corpus Christi. This investment from TPCO is the largest single investment in a U.S. manufacturing facility ever made by a Chinese company. The 1.6 million square foot facility, located on 252 acres, will produce 500,000 metric tons of pipe from recycled

[107] Luciene Antunes, Fabiano Stefano and Tiago Maranhão, "A China Encara a Crise," *Exame*, February 25, 2009, pp. 26-27.
[108] Ibid.

scrap steel, employing 600 workers. It is estimated that the economic impact of this investment will be $2.7 billion in ten years.[109]

Collectively, the Brazilian investment in U.S. steel and Chinese investment in U.S. pipe can be seen as a type of reverse globalization, where emerging markets are executing foreign domestic investments to capture market share in destination markets. What is more, by way of the U.S. infrastructure, reverse globalization offers a better export platform for these companies to access markets in South America, the Caribbean, Mexico and Central America. Reverse globalization secures a company's trade corridor by bookending production and consumption with a presence at both ends.

Another clear example of reverse globalization comes in the form of Brazilian denim manufacturer Santana Textiles. Santana Textiles announced in July 2008 that it will invest $175 million in a state-of-the-art denim facility in Edinburg, Texas, near McAllen.[110] The objectives of Santana Textiles are to serve the Mexican market with denim for clothing, mainly jeans, and then export to Canada. The strategy of Santana lies in access to the North American markets of the North American Free Trade Agreement (NAFTA) and the Central America Free Trade Agreement (CAFTA). Over the course of three years, Santana will build the equivalent of two full-size factories. At build-out, the factories eye sales to the U.S. and Chinese markets. It cannot be lost here that the major U.S. textile firm, Springs Global, now controlled by Brazilian Coteminas, has been in the process of dismantling its production and sending looms and machinery to Argentina and Brazil. Now in reverse globalization, a company from the same emerging market seeks to capture market share in destination markets, deciding that it is more advantageous to add capacity in the U.S. than to build another plant in Brazil and suffer high labor costs and logistics problems. Moreover, by locating in Texas, Santana is close to its raw material, cotton produced in Tennessee and Texas.

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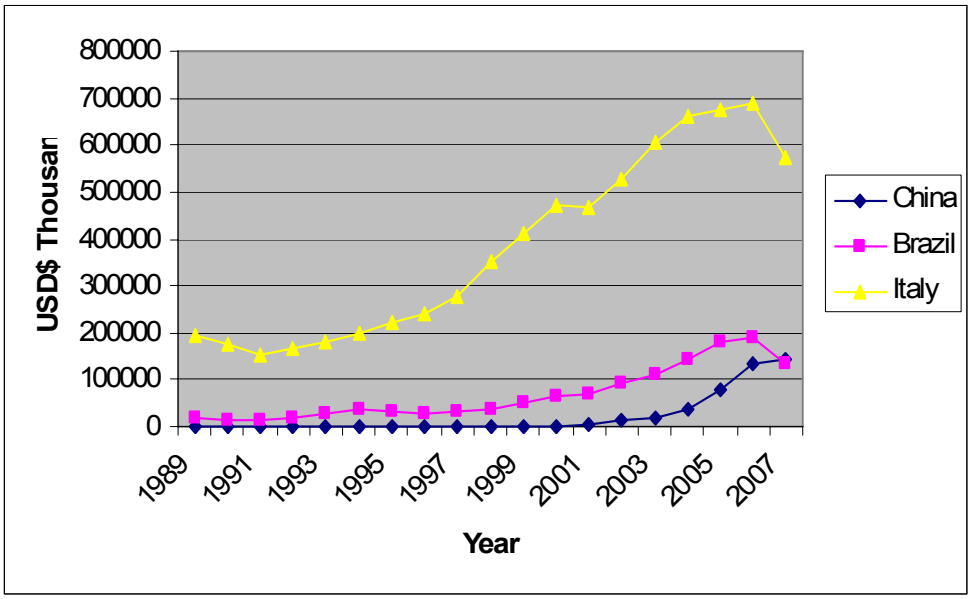
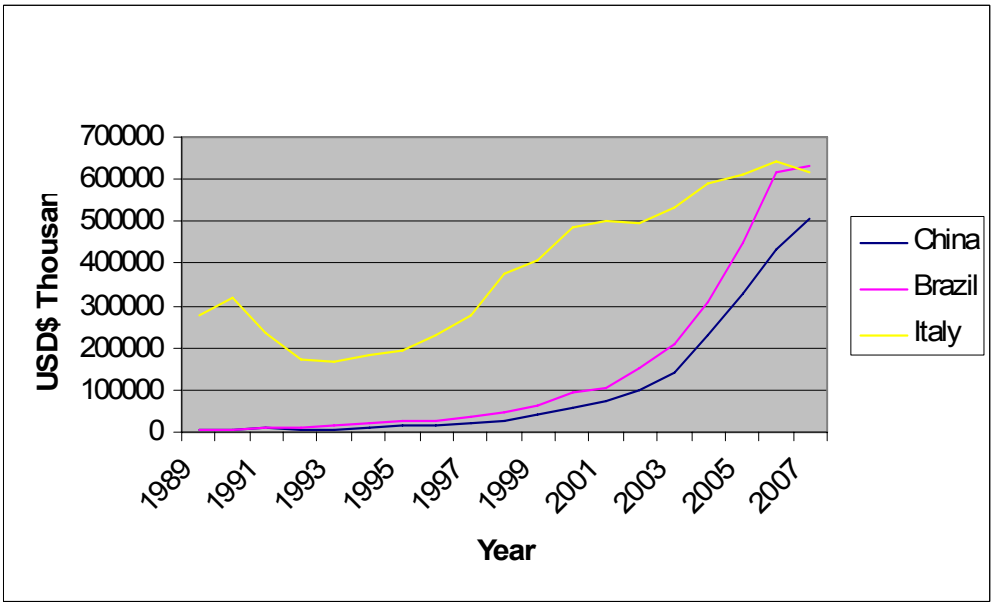
[109] Jack Lyne, "$1 billion in the Texas pipeline," *Site Selection*-Week of January 26, 2009, Site Selection Online, available at: www.siteselection.com/ssinsider/bbdeal/Billion-in-Texas-Pipeline.htm, cited March 5, 2009.
[110] "Texas Enterprise Fund helps land Santana Textiles," *Austin Business Journal*, July 3, 2008, Austin Business Journal Online, available at: www.austin.bizjournals.com/austin/stories/2008/06/30/daily35.html?t=printable, cited March 5, 2009.

Chart 5.3. U.S. Imports of Ceramic Tile (HTS#6908)



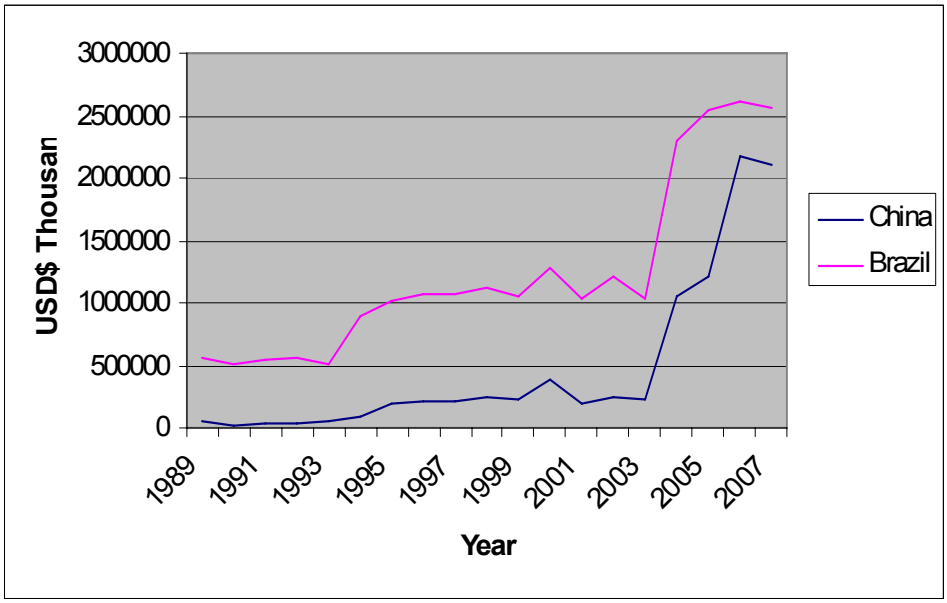
Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chart 5.4. U.S. Imports of Granite Slabs (HTS#6802)



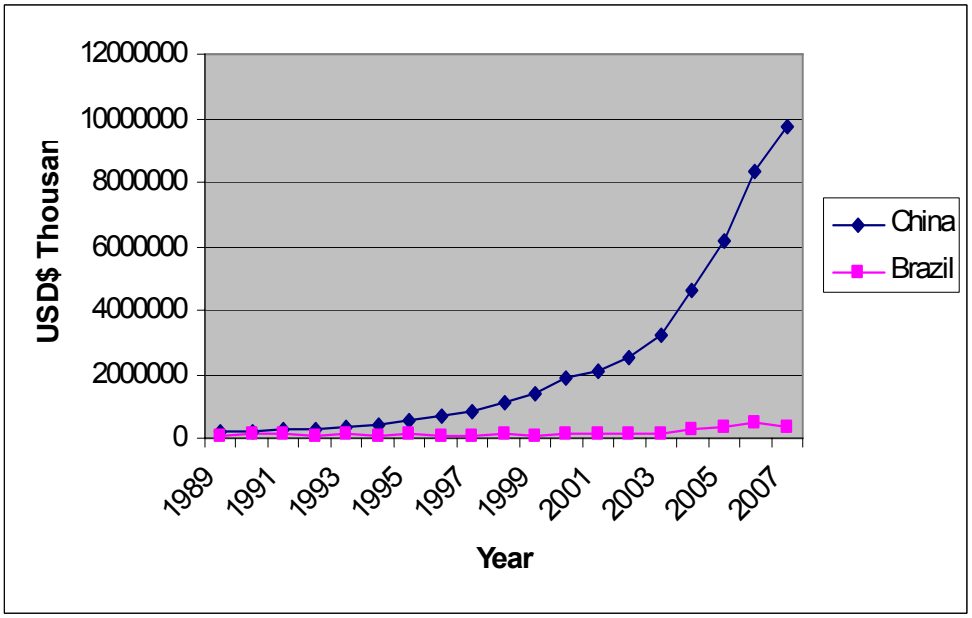
Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chart 5.5. U.S. Imports of Iron and Steel (HTS#72)



Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chart 5.6. U.S. Imports of Iron and Steel Products (HTS#73)



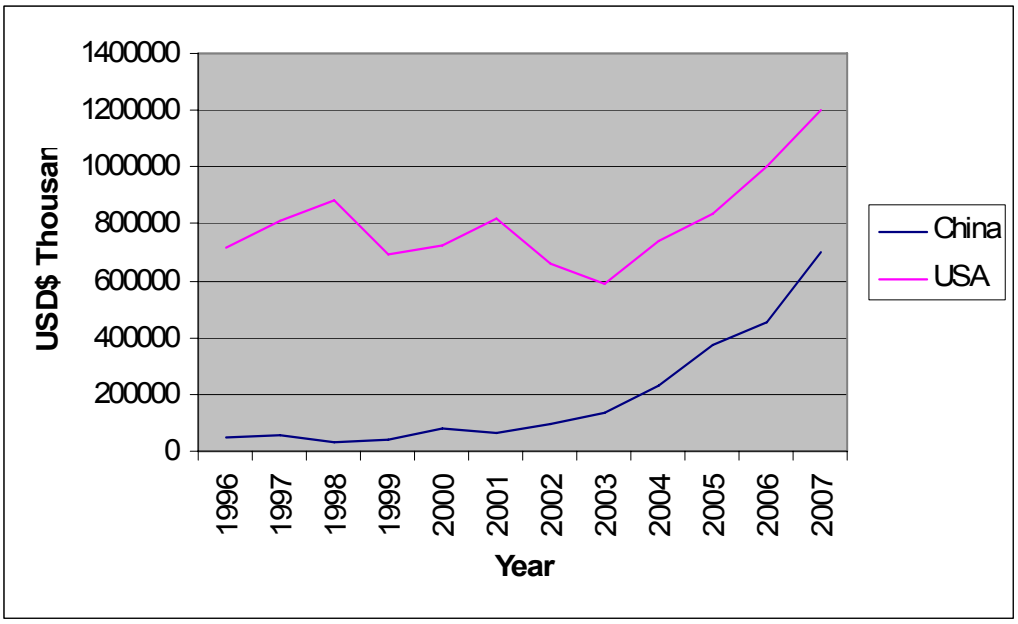
Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce; Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chinese Dominance in High-Value Manufactures

When it comes to more finished products, China sells to the U.S. and Brazil is barely visible. This is the consequence of the outsourcing of industry to China and the return of more value-added iron and steel products to the U.S. in HTS category 73. In all charts 5.3 to 5.6, the downturn in the U.S. housing market can be somewhat recognized. More striking perhaps is the trend in triangular trade where China may arrive at absolute advantage in areas of strategic high-technology. For example, chart 5.7 illustrates a situation where China and the United States compete for the Brazilian market in optical, surgical and medical equipment (HTS#90). As the Brazilian market grows so too is the rate of increase in exports from U.S. and China to Brazil. As yet, the United States is a larger supplier to Brazil than China. Will this change? Halting evidence from chart 5.8 is presented in another high-technology category that of electrical machinery (HTS#85). In 2004, China overtook the U.S. in its supply of the Brazilian market. Can Chinese dominance in medical equipment be too far away?

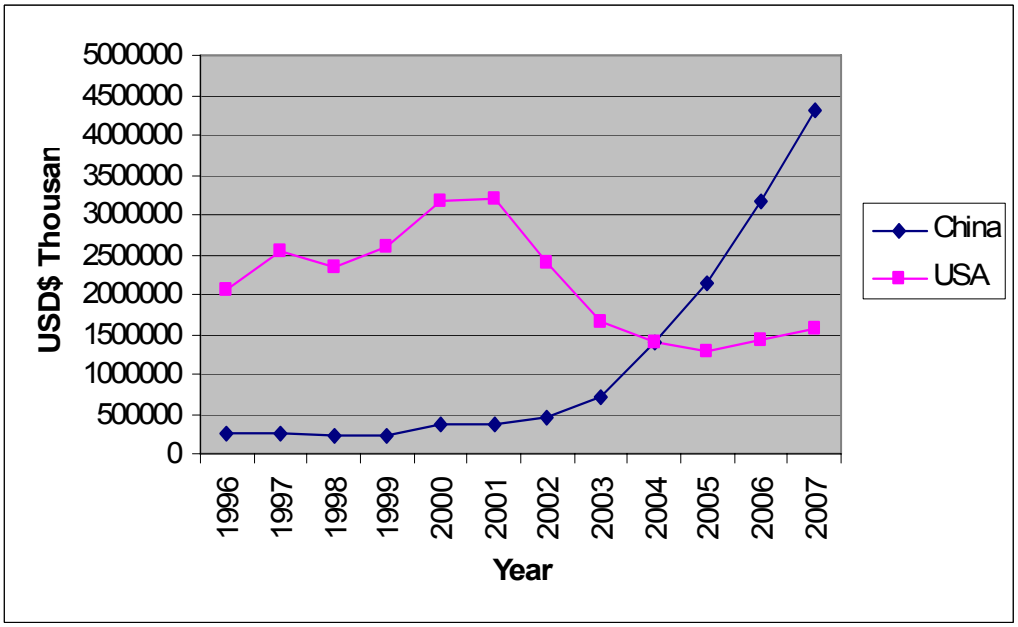
As globalization matures and more companies seek high-value products at low cost production, it may be inevitable that China comes to dominate most value-added industries. The migration of manufacturing from developed and emerging markets alike to China is happening and is being accelerated by the degree to which countries like Brazil and the United States build economies of scale in their ability to supply China with raw materials, thus increasing the capacity of China to supply Brazil and the United States with low cost manufactures. Transportation investment, then, can be seen to facilitate this global outsourcing shift, enabling great capacity for exporting raw materials, and offering an excellent infrastructure for processing and transporting containerized imports. The expansion of the Panama Canal will also permit a greater entry of Chinese manufactures to both Brazil and the United States. A consequence of any increase in the pendulum routes may be seen in increased feeder services in the U.S. Gulf, North Coast of South America and Central America. By virtue of expanded feedering, the U.S. may have more connectivity with Brazil. While the trunk cargoes are east-west Asia all-water service to the U.S. or East Coast of South America, Brazil-U.S. trade stands to benefit incrementally.

Chart 5.7. Brazilian Imports of Optical, Medical, or Surgical Equipment (HTS#90)



Source: Brazilian Ministry of Development, Industry and Commerce (MDIC).

Chart 5.8. Brazilian Imports of Electrical Machinery (HTS#85)



Source: Brazilian Ministry of Development, Industry and Commerce (MDIC).

Perspectives on Triangle and Global Economic Crisis on the U.S. Southwest

In late February 2009, U.S. Secretary of State Hillary Clinton traveled to China with an objective to attract continued Chinese investment in U.S. bonds. In December of 2008, China held $696.2 billion in U.S. bonds, an increase of 46 percent over 2007.[111] That same week, Petrobrás, Brazil's largest oil company, obtained a $10 billion loan from the Chinese Development Bank Corporation. The loan was secured by Petrobrás commitment to supply China with oil.[112] Industry analysts critical of the accord worry that this loan will also permit more Chinese equipment and service providers into the Brazilian oil and gas market, a dynamic area where Petrobrás alone plans on investing $174 billion in the next five years.[113] The ironic fact both of these developments occurred in the same week, reported on in the same day in the Brazilian press shows the interdependent and interconnected nature of international trade and investment. The impacts of this will be evident. China gains a supply of raw materials and the U.S. and Brazil win important structural finance to help pay for infrastructure development.

This paper has presented the international trade trends of the U.S.-Brazil-China trade triangle. As much as trends are leading to a conclusion that China may dominate manufactures and Brazil specialize in raw materials, the reverse globalization may also signal a counterflow where the emerging markets flip the terms of trade and invest directly into the U.S. Flipping the terms of trade can be seen in the Tianjin Pipe Company and Santana Textiles. It can also be seen in new investment in commercial representation, storage, warehousing, and distribution in the U.S. that would benefit the sale of Chinese and Brazilian exports. In the U.S. Gulf, Wal-Mart has invested heavily in new distribution centers. Others are following suit, and we may see a shift to international trade selling on a cost and freight basis (Incoterm CFR) rather than free-on-board (FOB). Under the CFR term, the exporter is responsible for arranging the logistics. For that added responsibility comes the added margin to sales. This would appear to be an inevitable tendency as the producers seek more control of their supply chains and revenue producing activities.

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[111] Claudia Trevisan, "Hillary pede a Pequim cooperação contra crise," *O Estado de São Paulo*, February 23, 2009, p. A9.
[112] Nicola Pamplona, "Indústria teme acordos entre Petrobrás e China," *O Estado de São Paulo*, February 23, 2009, p. B6.
[113] Nicola Pamplona, "País deve manter regra de exploração," *O Estado de São Paulo*, February 23, 2009, p. B6.

For purposes of future infrastructure planning and research, better information may come from analyzing specific industries and their companies using a trade corridor lens as presented in this paper. International trade trend lines will be unable to capture the paradigm shift that is occurring in reverse globalization, where a Chinese company invests $1 billion in U.S. manufacturing. To be attractive to future economic growth opportunities, U.S. transportation planning must be flexible enough to accommodate the changing priorities of global trade. Ports must be flexible and logistics available. Intermodal connectivity, in this sense, may de a determinant of the winners and losers in future economic development.

In closing, the U.S. stands poised to be in a better position to capture the counterflow investment of reverse globalization. However, as Brazil and China invest in their own transportation infrastructure, opportunities will again surface for more U.S. export trade and perhaps better outsourcing opportunities for U.S. companies again to seek low-cost labor. Right now, the bottlenecks in China and Brazilian infrastructure act as a buffer reserving their respective markets to domestic production. While the U.S. Southwest may need to invest in its infrastructure to facilitate triangular trade, the real benefit to the U.S. may be with the incremental improvements and market opening brought by Brazilian and Chinese investments in transportation infrastructure. To this effect, give pause to contemplate the $568 billion in investments that China announced in December 2008:

- $264 billion in transport infrastructure (high-speed rail $88 billion);
- $147 billion aid to Szechuan Province for earthquake reconstruction; and
- $54 billion in rural infrastructure.[114]

Since transportation is a function of derived demand, it may be as important for the U.S. Southwest to accompany Panama Canal expansion and Chinese and Brazilian investment in infrastructure in order to offer a flexible logistics that can take full advantage of the opportunities that arise with rapid changes in triangular trade.

[114] Luciene Antunes et. al., "A China encara a crise," *Exame, p. 25.*