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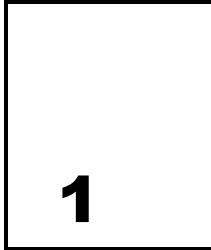
Assessment of the Impact of Panama Canal Transit Cost Changes on the Japanese Economy



MERCER
Management Consulting

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Executive Summary

In 2004, the Autoridad del Canal de Panama (ACP) performed a detailed analysis to determine the impact of Canal transit cost increases on the Canal's customers. This research indicated that an increase in Canal transit costs would not have significant adverse effects on traffic, although the impact would vary by Canal customer segment. Given the mix of commodities that transit the Canal and the political and economic importance of the countries of origin, the ACP determined that it was important to explicitly assess and understand the impact of different pricing options on the economies of stakeholder countries.

This report provides a high-level overview of Japanese trade in relation to the Panama Canal and a detailed analysis of the impact of potential new Canal pricing options on the export and import commodities transiting the Canal that are most important to Japan's economy, representing approximately 80 percent of total volume that trades through the Canal to and from the Japan. For each commodity, the analysis examines the relevance of Canal-based traffic to overall Japanese imports and exports and the impact of transit cost increases on overall landed costs and Japan's economy.

Japanese Waterborne Trade

With a GDP of US\$4.3 trillion in 2003, Japan is the world's third largest economy after the United States and China. Additionally, it is the world's third largest trading nation overall behind the United States and Germany. Since 1990, Japan's international trade has grown faster than GDP, and now accounts for 20 percent of GDP, with exports contributing slightly more than imports.

Waterborne trade is Japan's pre-eminent shipping mode in terms of both value and weight. In terms of modal share, water transport accounts for 99.7 percent of Japanese trade by weight, and 69 percent of trade by value. However, maritime's share of total

trade has been declining by 1 percent per year over the past decade and a half, with an increasing share of high-value commodities moving by air.

Over the past decade, Japan has consistently been a net exporter in value terms, exporting nearly a quarter more merchandise than it imports; in tonnage terms, however, its imports are five times the weight of its exports. This divergence is due to the nature of the commodities involved: A high portion of Japan's exports are manufactured goods shipped as containerized cargo, while much of its imports are bulk raw materials for consumption (food and energy), manufacturing, and production.

Eleven countries account for 70 percent for Japan's trade by value. The United States is Japan's largest single trading partner, and purchases a quarter of Japan's exports. China, however, provides slightly more Japanese imports than the US. Maritime trade has been shifting toward China, which is also increasingly replacing Japan as an exporter to the US market.

Japan's seaborne exports by weight have been growing faster than imports, by 3 percent per year versus 0.1 percent per year. Japan's fastest-growing seaborne exports by weight include containerized cargo and motor vehicles. On the import side, Japan's fastest growing imports by weight include coal and ores and containerized cargo.

Japanese Trade Through the Panama Canal

The vast majority of Japan's maritime trade that transits the Panama Canal moves to/from the East Coast of the United States: Eighty-four percent of Japan's exports and 90 percent of its imports transiting the Canal are traded with the United States.

Principal exports from Japan to the US East Coast that transit the Canal include coal-coke, container cargo, and autos and trucks. The principal imports coming from the US include corn, which makes up more than half of all Canal-relevant imports from the US, soybeans, and lumber. Japanese imports through the Canal are four times the weight of exports.

At the same time that Japan's seaborne trade has been growing, Canal-relevant Japanese exports and imports have been declining, by 10 percent and 5 percent per year, respectively, since 1999, primarily due to a shift in trade toward other Asian economies. Overall, Canal-relevant sea trade represents only 4 percent of Japan's total trade.

Methodology for Canal-Relevant Commodity Analysis

For the purposes of this study, the ACP analyzed Japanese export commodities and import commodities, representing 80 percent of Japanese trade volume through the Canal.

As mentioned previously, these commodities were analyzed with the objective of determining the potential impact of an increase in Canal transit costs on landed cost, and therefore the relevance of transit cost increases to Japanese trade and Japan's economy.

The methodology for analysis of export commodities was threefold:

1. The relevance of Panama Canal tonnage transits for 1999-2003 to the overall trade in the commodity for Japan was determined.
2. If the commodity tonnage transits through the Canal were above a certain threshold (percent of country trade, percent moving through the Canal) then the commodity was analyzed further to determine the relevance of a potential increase in Canal transit cost on landed cost. The components of total landed cost include FOB, Canal transit cost (toll plus other marine services), other freight costs, and insurance.
3. A sensitivity analysis was then applied to determine a range of impacts on landed cost given different Canal transit cost increase scenarios.

For imports, the ACP undertook a more general analysis of the impact of Canal transit cost increases, focused on the final landed cost of each commodity and the impact of the aggregated value of Canal-relevant imports on total Japanese imports and GDP.

Export Commodities Analysis

Overall, Panama Canal-relevant exports analyzed in this report make up only 3.9 percent of total Japanese exports.¹ As shown in Exhibit 1-1, the export commodities analyzed for this study represented approximately 50 percent of total Japanese export value in 2003; approximately 8 percent of this value transited the Panama Canal.

For seven of the eight commodities analyzed in this study, the portion of exports that transit the Canal represents less than one-fifth of each commodity's total export value. For the remaining commodity, natural coke-coal, 41 percent of exports in value terms transit the Canal.

Only two Canal-relevant commodities make up more than 5 percent of total Japanese exports: autos & trucks (21 percent) and machinery & mechanical appliances (20 percent). However, only 15 percent and 2.8 percent of Japan's exports of these two commodity groups transit the Panama Canal.

For 7 of the 8 analyzed commodities, the total Canal transit cost represents less than 0.5 percent of the commodity's CIF. Even with a 200 percent increase in the Panama Canal toll for these commodities, none of these commodities would experience an increase in total landed cost of more than 1.0 percent.

¹ All containerized cargo includes containerized commodities that were not examined individually in this report. The value of containerized commodities was calculated using a weighted average of analyzed container commodities.

Natural coke-coal is the one commodity for which a 200 percent increase in the Canal toll would have more of an impact, totaling 4.2 percent of CIF. However, the value of Canal-relevant coke-coal represents only 0.02 percent of Japanese exports.

Exhibit 1-1
Canal-Relevant Japanese Exports Analyzed

Commodity	1. FOB Value of Canal Exports (US\$B)	2. Canal Share of Total Exports	3. Total Export Value (US\$B)	4. Commodity Exports Share of Japanese Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
Natural coke-coal	\$0.1	40.7%	\$0.2	0.1%	2.5%	4.2%
Autos and trucks	\$14.1	14.6%	\$96.9	20.5%	0.4%	0.6%
Iron and steel	\$0.7	3.3%	\$20.9	4.4%	0.3%	0.5%
<i>Container Cargo</i>	\$6.6					
Machinery and Mechanical Appliances	\$2.6	2.8%	\$94.7	20.1%	0.1%	0.1%
Container iron and steel	\$0.2	17.1%	\$1.1	0.2%	0.3%	0.4%
Rubber	\$0.3	4.4%	\$6.9	1.5%	0.2%	0.4%
Paper & paperboard	\$0.2	9.0%	\$2.3	0.5%	0.2%	0.3%
Plastics	\$0.4	3.0%	\$12.2	2.6%	0.1%	0.2%

Source: ACP, Japan Customs Bureau, US Waterborne Commerce Databank, UN COMTRADE, US Census Bureau.

Description of columns:

- 1 The merchandise FOB value of the Canal-relevant portion of exports for each commodity
- 2 The percent of the total FOB export value for each commodity that transited the Canal
- 3 The total FOB value of all Japanese exports of each commodity, regardless of transportation mode or route
- 4 The percent of total Japanese exports FOB value (US\$472 billion) accounted for by each commodity
- 5 The percent of the final landed cost (CIF) of each commodity accounted for by the total Canal transit costs (toll, other marine services) of that commodity
- 6 The percent change in the CIF as a result of a 200 percent increase in the Panama Canal toll for ships carrying this commodity

Import Commodities Analysis

The import commodities analyzed in this study are shown in Exhibit 1-2. In 2003, Japanese imports transiting the Panama Canal accounted for 1.2 percent of total goods imports (CIF value). Additionally, imports transiting the Panama Canal represented 0.1 percent of Japan's GDP in 2003.

In 2003, Japan's current account was US\$136 billion, or 3.141 percent of GDP. The analysis determined that an increase in import prices, due to an increase in Canal tolls, would have a nearly imperceptible impact on Japan's current account and national income: Even if tolls were increased by 200 percent for all Japanese imports that transit the Canal, the cost of total goods imports would grow by only 0.018 percent, the current account would decrease slightly to 3.140 percent of GDP, and national income would drop by about 0.002 percent, with a negligible impact on inflation.

Exhibit 1-2
Canal-Relevant Japanese Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003 (millions)	Average CIF/Ton	CIF Value of Canal Transit Tons (US\$B)
Corn	52.4%	12.56	\$ 132	\$ 1.65
Soybeans	15.1%	3.61	\$ 278	\$ 1.00
Lumber	1.7%	0.41	\$ 350	\$ 0.14
Sorghum	3.3%	0.80	\$ 140	\$ 0.11
Container cargo	6.4%	1.54	\$ 1,078	\$ 1.66
Other	21.0%			
Total CIF Value of Panama Canal Transit Tons (US\$B)				\$ 4.58

Source: ACP, Japan Customs Data, US Census Bureau, US Waterborne Commerce Databank.

Conclusions

The analyses above demonstrate that given either the small proportion of a particular import/export commodity that transits the Canal, or the relatively small percentage of the landed cost represented by the Canal cost, the effect of a Panama Canal transit cost increase would not have a significant impact on Japan's economy, nor on the principal industries that provide Canal-relevant export commodities.

Finally, the larger question facing Japan's economy with regard to the Canal is less whether the transit cost changes examined would have a significant impact, but rather whether the Canal will have sufficient capacity available to meet demand in the future, while providing an adequate level service. The implications for the critical supply chains that serve the Japanese economy of a deterioration in service – due to increased wait times or decreased reliability, for example – in the event that capacity is insufficient to meet demand, would be substantially more important than the analyzed Canal transit cost increases. Hence, the need to add capacity to the Canal – recognizing that the capital expense will have to be paid for through tolls – is the more critical issue facing the portion of Japan's economy relevant to the Canal, rather than the essentially negligible impact of the transit cost increases examined in this study.

2

Introduction

2.1 Study Context

The Panama Canal is a critical and unique element of the global marine transportation industry. Its construction almost a century ago remains a well-known triumph of vision, engineering, and determination. Its efficient, safe handling of more than 13,000 transits per year has made the Canal an important element of the global transport network. Growing trade volumes, however, and the increasing reliance by shipping companies on vessels larger than can physically pass through the Canal's locks (post-Panamax vessels) have raised questions about what the Canal's future investments and pricing policies should be, including whether or when a third set of locks should be built.

In 2004, the Autoridad del Canal de Panama (ACP) performed a detailed analysis to determine the impact of toll price increases on the Canal's customers. This research indicated that an increase in Canal transit tolls would not have significant adverse effects on traffic, although the impact would vary by Canal customer segment. Given the mix of commodities that transit the Canal and the political and economic importance of the countries of origin, the ACP determined that it was important to explicitly assess and understand the impact of different pricing options on the economies of stakeholder countries.

This report provides a high-level overview of Japan's trade in relation to the Panama Canal and a detailed analysis of the impact of potential new Canal pricing options on the export and import commodities transiting the Canal that are most important to Japan's economy.

The overall objectives of this study were as follows:

- Generate a clear understanding of Japan's maritime trade

- Review historical Canal transit data to determine principal imported and exported commodities from Japan
- Determine the relevance of this Canal-based traffic to Japan's overall commodity imports and exports
- Develop an analysis of the impact of Canal transit cost increases on the overall landed costs of selected commodities
- Develop an analysis on the overall impact of the Canal cost increases on Japan's economy
- Appraise the ability of different industries within Japan to continue to compete despite the toll difference

2.2 Approach to the Study

To address the commodities that are the most relevant to Japan's economy, this report focuses on the highest-volume and highest-value imported and exported commodities that transit the Canal. The report assesses Japan's imports and exports at a commodity level, aiming for a detailed analysis of approximately 80 percent of total volume that trades through the Canal to and from Japan.

The analysis examines, for each commodity, the relevance of Canal-based traffic to overall country commodity imports and exports; the impact of transit cost increases on overall landed costs; the expected ability to pass on cost increases to end customers; and the overall impact on the country's economy.

The analysis involved the following work steps:

- *Overview of Japan's maritime trade:* Development of a high-level description of current Japanese sea trade, including commodities and main partners. This overview allowed the ACP to understand Japan's principal and alternative trade routes, the overall impact of the Panama Canal on shipping, and the impact of key commodity trades on Japan's economy.
- *Commodity identification:* Identification of the principal commodities to be analyzed, based on commodity volume and value transiting the Panama Canal.
- *Commodity analysis:* Two-part work step: 1) High-level analysis involving estimation of commodity value, principal transportation cost components, and the percentage of the commodity that transits the Canal. This analysis allowed the ACP to decide which commodities transiting the Canal are significant to Japan's economy. 2) For the selected key commodities, a more detailed analysis was completed to determine the impact on shipping costs of a change in Canal toll charges.

Assessment of Panama Canal Transit Cost Changes on the Japanese Economy

- *Economic impact on Japan:* Determined the possible economic impact of potential toll increases for Japan, based on the previous analyses, and assessed whether toll increases would have a significant impact on Japan's economy and foreign trade.

The ACP commissioned Mercer Management Consulting, Inc. to undertake the analyses involved in this project. Mercer, which has one of the largest consultancies in the world dedicated to transportation, provided a seasoned team of professionals with extensive knowledge of worldwide trade and transportation, and of the Panama Canal's market and customer base specifically.

3

Overview of Japan Sea Trade

3.1 Imports and Exports

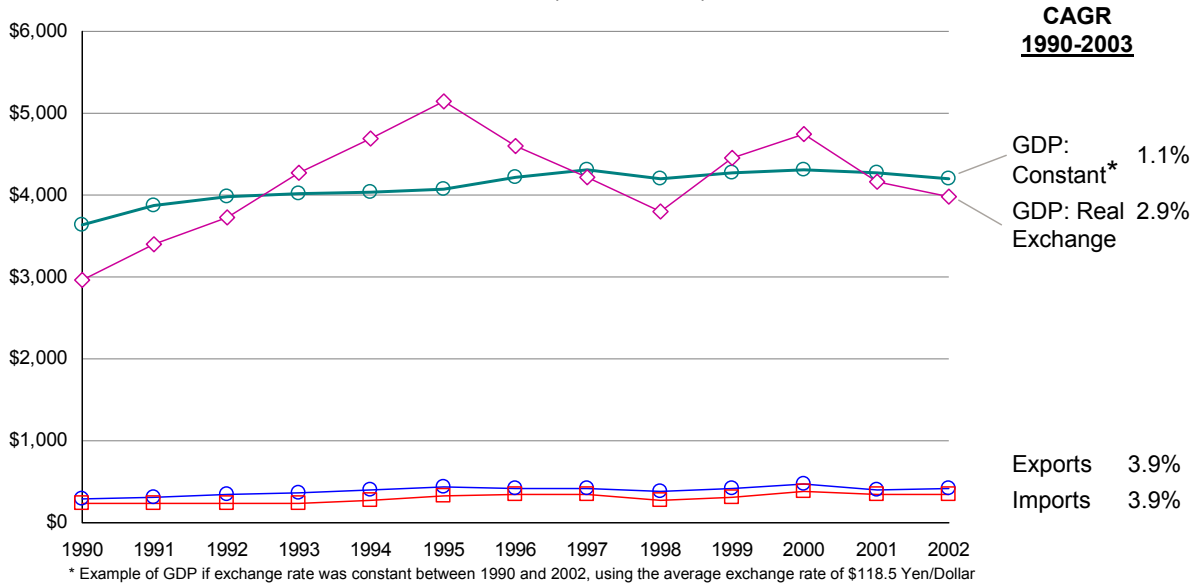
Since 1990, Japan's GDP has grown by 3 percent annually on average, to US\$4.3 trillion in 2003, making it the world's third largest economy behind the United States and China. Additionally, it is the world's third largest trading nation overall behind the United States and Germany. Since 1990, the value of Japan's international trade has grown by 64 percent in total, rising to US\$853 billion in 2003 (US\$472 billion in exports and US\$383 billion in imports). This makes it the third largest merchandise exporter and sixth largest importer by value.²

Since 1990, Japan's foreign trade has grown by 4 percent per year, 33 percent faster than GDP (which has experienced strong fluctuations in US dollar terms due to a volatile exchange rate – for example, between 1995 and 1997, Japan's GDP in yen grew by 5.5 percent, but in dollar terms it decreased by 18 percent, due to the decline in value of the yen versus the dollar).

Despite a 12 percent decline in 2001 and 2002 from year 2000 trade levels, following the terrorists attacks of September 11, 2001 against the United States and the technology-bust driven recession, total international Japanese imports and exports have grown by 3.9 percent per year since 1990 (Exhibit 3-1). Total international trade has grown from 18 percent of the nation's GDP in 1990 to 20 percent of GDP in 2003, with exports contributing slightly more than imports (Exhibit 3-2).

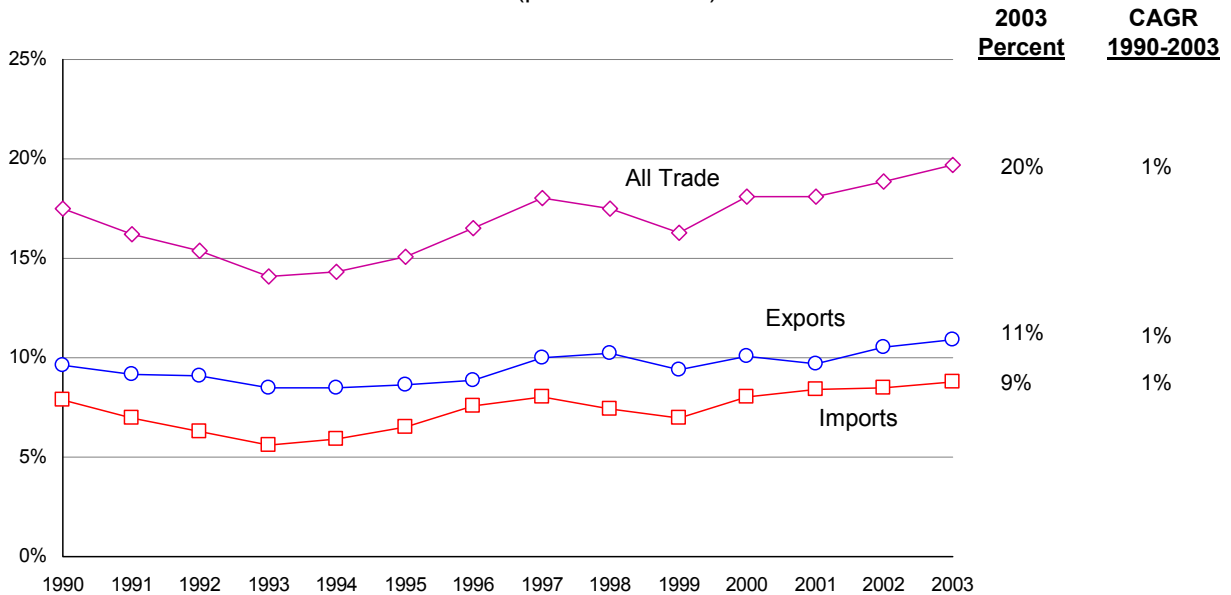
² World Trade Organization, International Trade Statistics, 2004.

Exhibit 3-1
Value of Imports and Exports Relative to Japan's Economy
 (US\$ billions)



Source: Japan Statistics Bureau, World Trade Organization.

Exhibit 3-2
Ratio of Imports and Exports to Japan's GDP
 (percent of GDP)

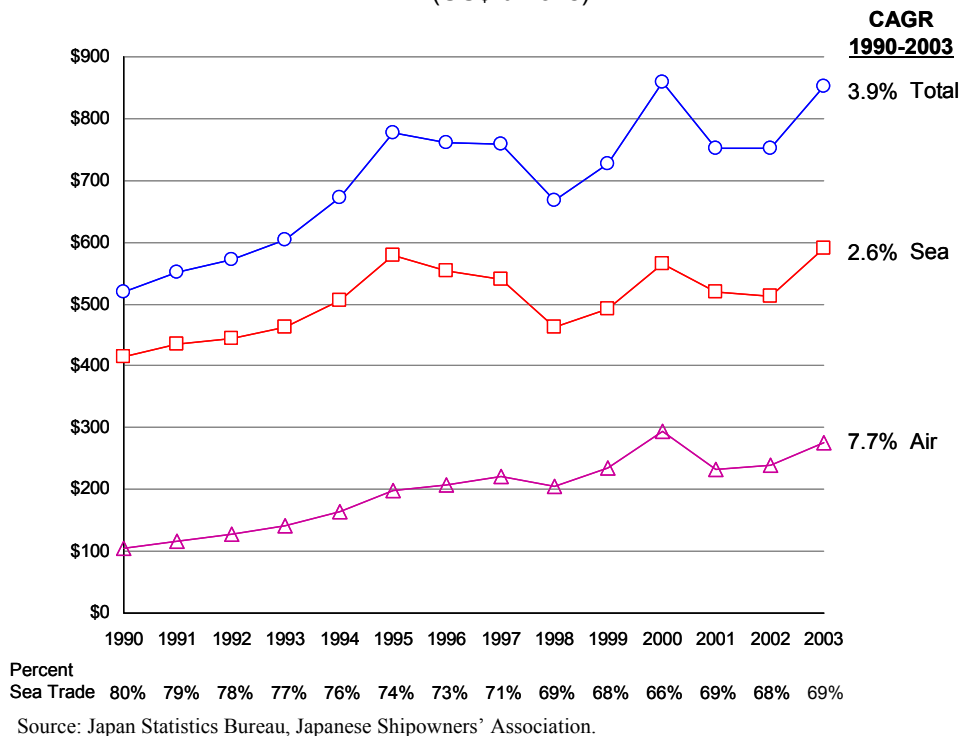


Source: Japan Statistics Bureau, World Trade Organization.

Japan's Maritime Trade

In 2003, waterborne commerce accounted for approximately 69 percent of Japan's total trade, rising from US\$415 billion in 1990 to approximately US\$578 billion in 2003, by an annual compound growth rate of 2.6 percent. However, maritime's share of total trade declined by approximately 1 percent per year, from a high of 80 percent in 1990 to 68 percent in 2003. Waterborne trade however is still the preeminent shipping mode in terms of both value and weight (Exhibit 3-3).

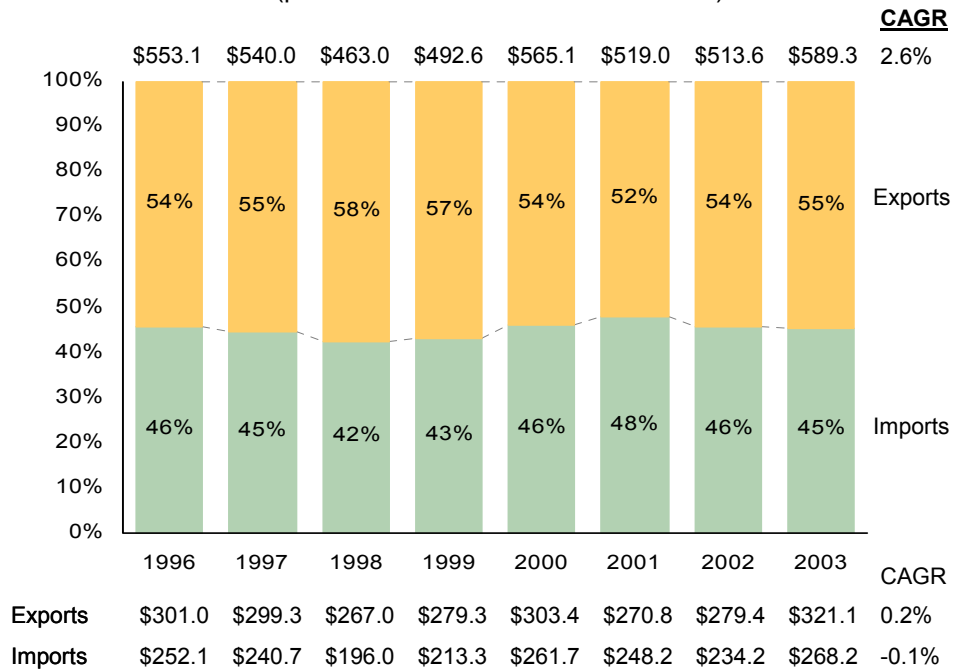
Exhibit 3-3
Value of Japan's Total Trade by Mode: 1990-2003
 (US\$ billions)



Over the past decade, Japan has consistently been a net exporter, with very little fluctuation in its trade deficit ratio (Exhibit 3-4). In 2003, Japan exported 23 percent more total merchandise in value than it imported. The same ratio exists within sea trade, with exports accounting for 55 percent of the US\$589 billion in maritime trade value.

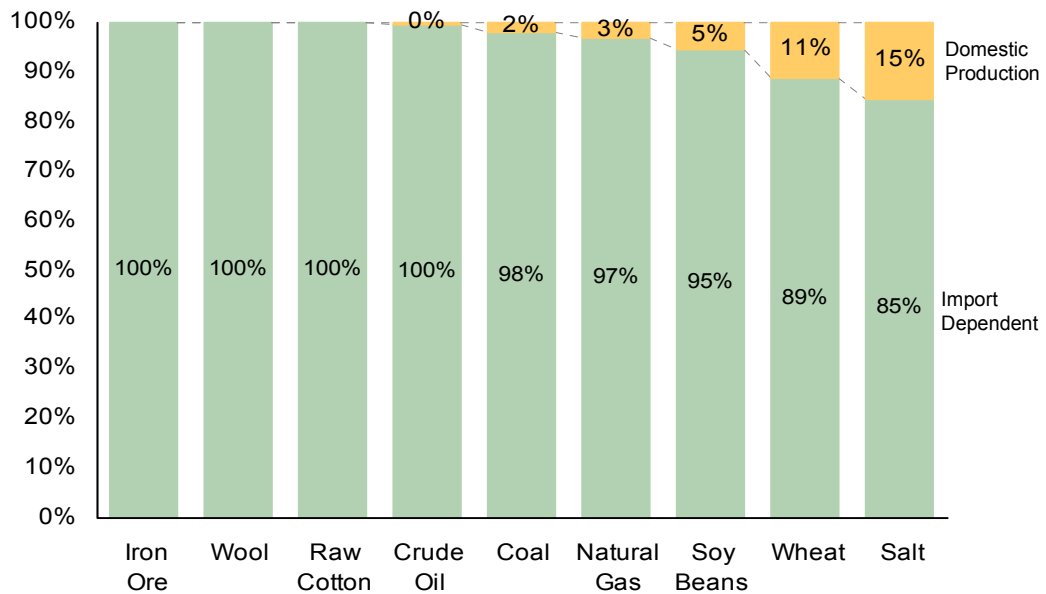
Despite the significant role that exports play in its economy, Japan's isolated geographical position and limited raw materials resources make imports vital to the country's success. In terms of weight, Japan imports five times more tonnage than it exports. This is due to the fact that while a high portion of Japan's exports are manufactured goods shipped as containerized cargo, much of its imports are bulk raw materials for consumption (food and energy), manufacturing, and production (Exhibit 3-5).

Exhibit 3-4
Japan's Waterborne Imports and Exports: 1996-2003
 (percent of waterborne trade revenue)



Source: Japanese Shipowners' Association, Japan Customs data (total trade, seaborne containerized, airborne).

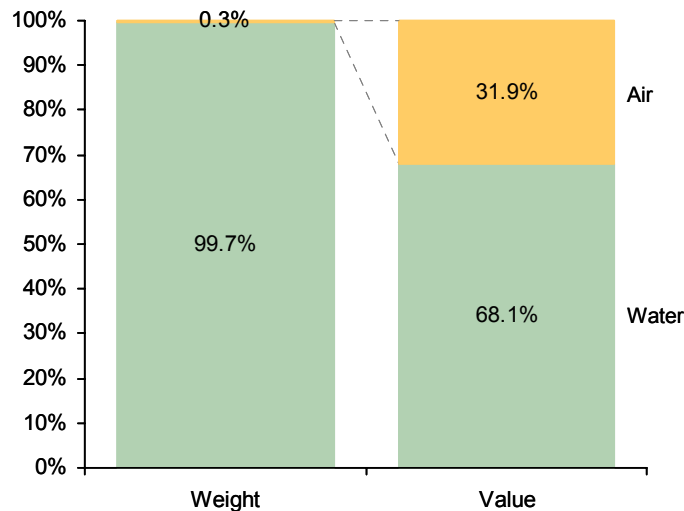
Exhibit 3-5
Critical Japanese Imports
 (percent of commodity imported)



Source: Japanese Shipowners' Association.

As a rule, it is more economically beneficial to transport lower-value commodities (per ton) through lower-cost maritime channels, and higher-value, more time-sensitive commodities via air or intermodal transportation. Exhibit 3-6 demonstrates this trend. In terms of freight transport modes, water accounts for 99.7 percent of Japanese trade by weight and 69 percent by value, while airborne freight makes up only 0.3 percent of trade by weight but 40 percent by value. This makes airborne merchandise approximately 150 times more valuable per ton than seaborne products.

Exhibit 3-6
Modal Shares of Japan's International Trade by Weight & Value: 2003



Source: Japanese Shipowners' Association, Japan Customs.

3.2 Key Trade Partners

Japan had significant international trade relationships with approximately 109 countries in 2003, of which the top 10 percent (11 countries) account for approximately 70 percent of total trade by value.

Overall, the United States is Japan's largest single trading partner, accounting for US\$174 billion of Japan's foreign commerce in 2003. For Japanese imports, however, China is currently the largest supplier, providing 20 percent of imports by value in 2003, while the United States provided 15 percent. The United States purchases 25 percent of Japan's exported commodities, more than double any other nation.

In recent years, Japan's trade with its top partners has shifted: Trade with the United States declined from 27 percent of Japan's total trade by value in 1999 to 20 percent in 2003, while China's trade with Japan grew from 9 percent to 16 percent of total trade over the same period. As Exhibits 3-7 and 3-8 show, trade with other top partners has been relatively stable.

Exhibit 3-7

Japan's Top 10 Trade Partners: Share of Imports by Value

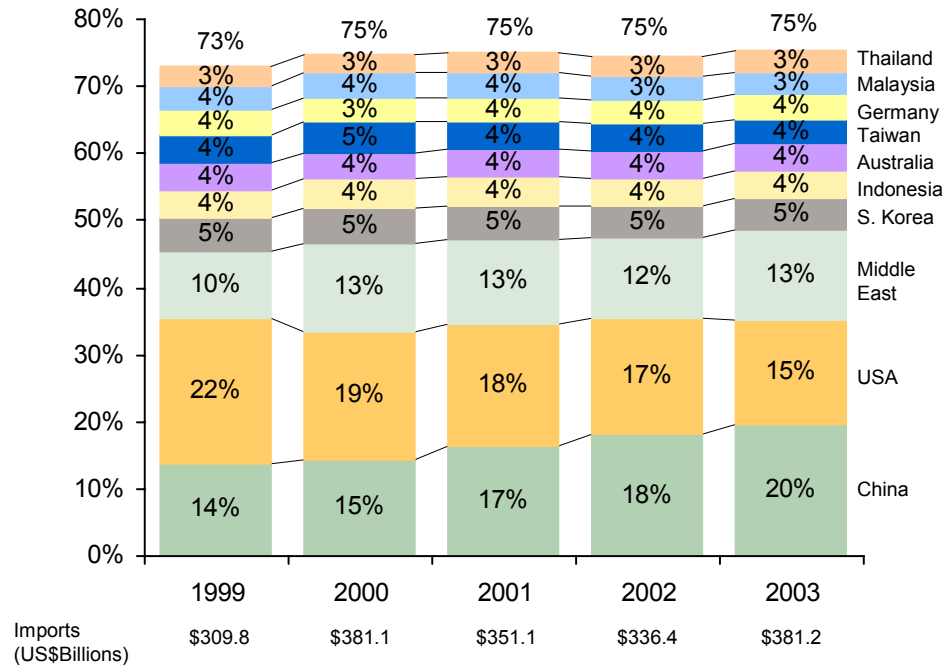
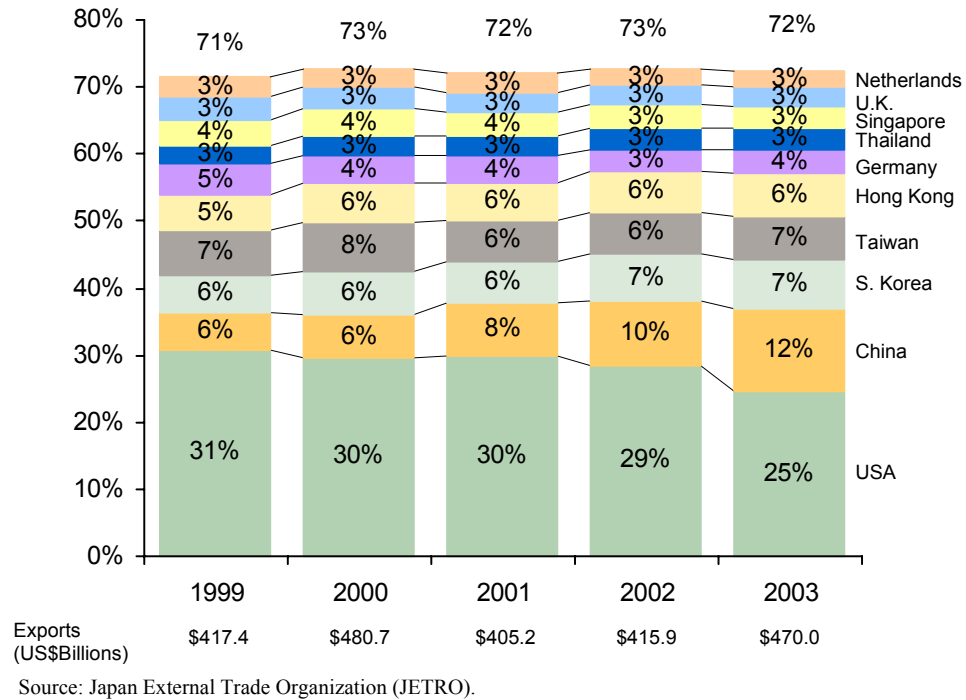


Exhibit 3-8

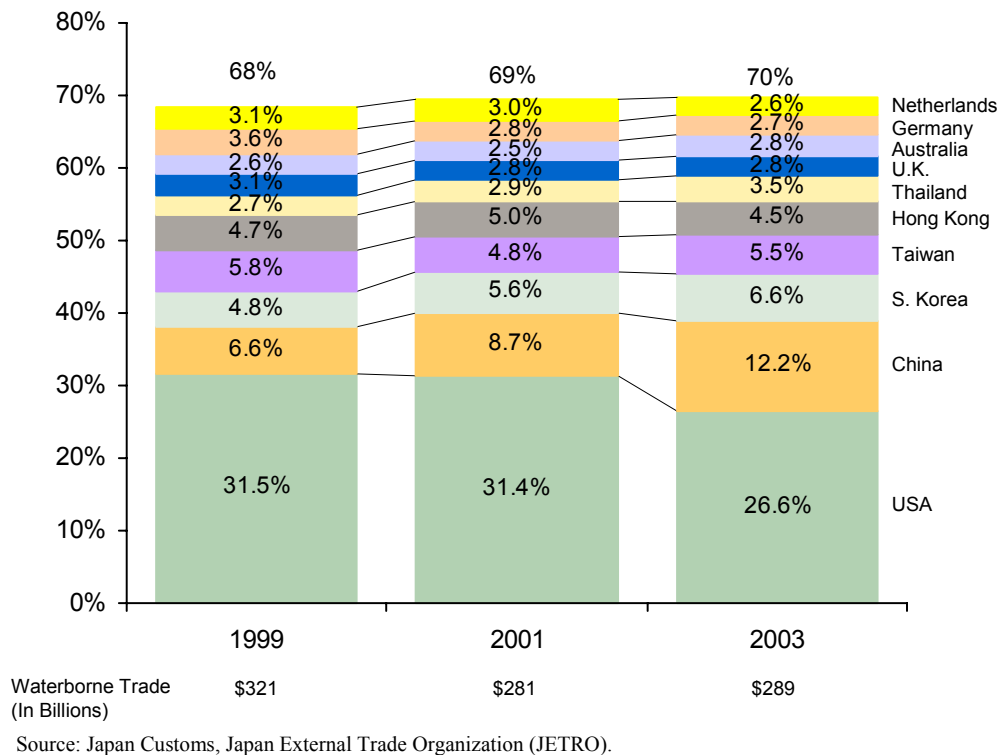
Japan's Top 10 Trade Partners: Share of Exports by Value



Japan’s maritime exports show a similar shift, with those destined for the United States declining from 32 percent to 27 percent during 1999-2003, while the share of seaborne exports to China nearly doubled, from 7 percent to 12 percent. China not only has begun to take a larger percentage of Japan’s exports, but is also increasingly replacing Japan as an exporter to the US market (Exhibit 3-9).

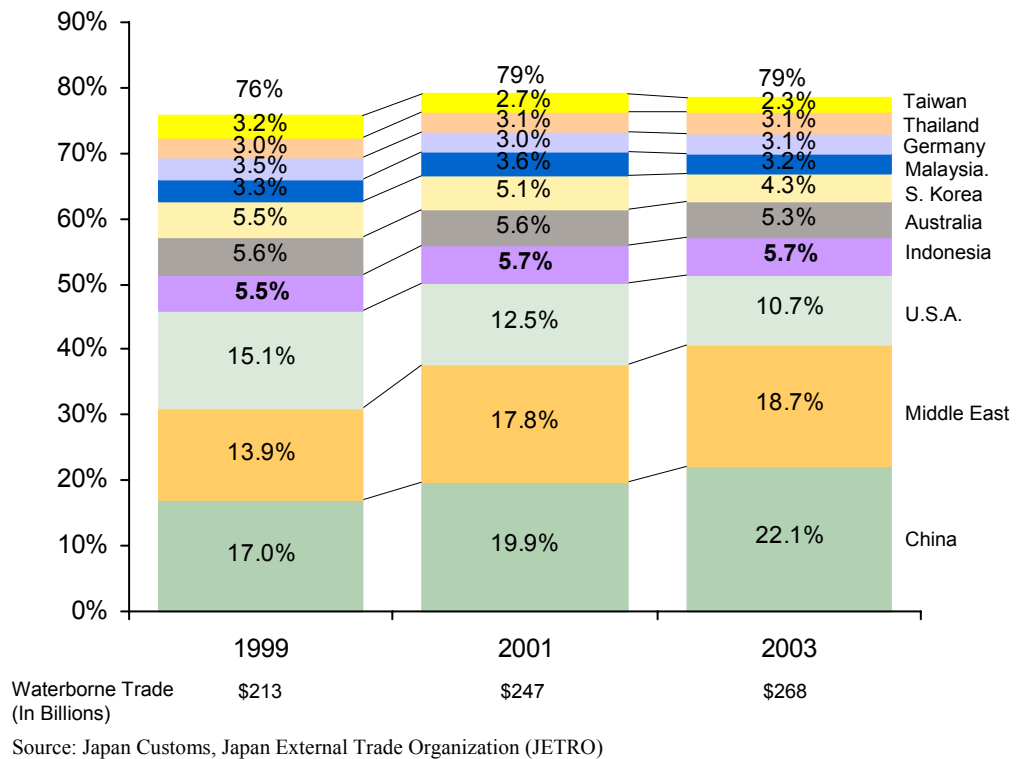
In 2003 the top 10 recipients of Japanese maritime exports accounted for 70 percent of commodity merchandise, showing slight growth since 1999.

**Exhibit 3-9
Top 10 Destinations for Japan’s Waterborne Exports by Value**



On the import side, the top 10 providers of Japanese imports in 2003 provided 79 percent of Japan’s imported goods by value (Exhibit 3-10). Since 1999, the share of Japanese seaborne imports coming from its top three trade partners has shifted considerably: imports from China grew by 5 percent, while US imports fell by 5.4 percent. In addition, Japan’s continued dependence on foreign energy sources caused strong growth in imports (e.g., petroleum) from the Middle East between 1999 and 2001; growth fell off however into 2003 as the economy slowed.

Exhibit 3-10
Top 10 Sources for Japan's Waterborne Imports by Value



Asian countries (including China) imported 41 percent of Japan's maritime exports by value in 2003, totaling US\$133 billion (more than any other region). The second and third largest recipients of Japanese sea exports were the United States and Europe, receiving US\$85 billion (27 percent) and US\$55 billion (17 percent) respectively (Exhibit 3-11).

The value by route is similar for the top producers of Japan's imports (Exhibit 3-12). In 2003, Asian countries exported US\$121 billion in merchandise to Japan (49 percent of this trade comes from China), accounting for 45 percent of its waterborne imports by value. Europe was the second largest exporter by sea, at US\$22 billion, accounting for 12 percent of Japan's imports. The United States was the third largest major trade partner for Japan's waterborne imports, accounting for 11 percent of its total or US\$21 billion.

Exhibit 3-11
Japan's Major Sea Trade Export Destinations: 2003
 (US \$billions)



Source: Japan Customs, Japan External Trade Organization (JETRO).

Exhibit 3-12
Japan's Major Sea Trade Import Sources: 2003
 (US \$billions)



Source: Japan Customs, Japan External Trade Organization (JETRO).

Region-Specific Sea Trade Partners

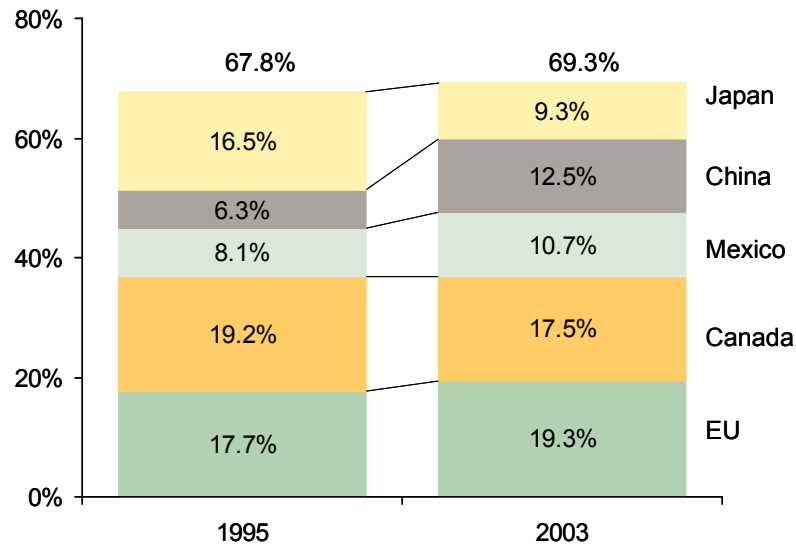
North America (United States)

The United States is Japan's largest trade partner, accounting for 19 percent of its total seaborne trade in 2003, and 27 percent of its seaborne exports. As mentioned previously,

the US share of Japan's imports and exports has declined as Japan's trade with China has grown.

Not only is China one of Japan's fastest growing customers and suppliers; it is also one of its fastest growing competitors, with Chinese export products increasingly replacing Japanese products on the world market and especially in trade to the United States (Exhibit 3-13).

Exhibit 3-13
Top Five US Trade Partners: Share of US Imports by Value



Source: WTO.

Overall from 1999 to 2003, Japan's total trade with the United States decreased by 2.8 percent per year, from US\$195 billion to US\$174 billion. Exports to the United States decreased in all categories, including transport equipment, non-electrical machinery, and electrical machinery. Imports from the United States also declined for the third straight year, in categories including machinery and equipment, textiles, and metals.

Asia

Of Japan's 10 largest waterborne import and export partners, five are Asian nations. In 2003, Japan's total trade with its Asian neighbors totaled US\$388 billion (US\$170 billion in imports and US\$218 billion in exports). Of this, 65 percent was waterborne.

The value of Japan's trade with China has grown tremendously over the past decade. It is now the largest exporter to Japan by value and the second largest importer of Japanese goods: Japan's imports from China were US\$75 billion and Japan's exports US\$57 billion in 2003. In sum, China represents over one-third of total commerce between Japan and other Asian countries, and 74 percent of its trade with Japan is waterborne.

Japan also has a trade surplus within Asia, and its growth in exports between 2002 and 2003 was primarily due to an increase in both electric and non-electric machinery and transport equipment.³

Europe

As Europe has decreased its internal trade barriers and strengthened its unity through the formation and advancement of the European Union (EU), it has become more influential in the world trade market. Trade between the EU and Japan, however, has grown relatively slowly recently, by slightly over 1 percent per year since 1999. In 2003, Japan's imports and exports with the European Union (25 nations) totaled US\$119 billion, up only four percent total since 1999.

Japan's strongest European trade partner in value terms is Germany, from which it received US\$14 billion in imports and to which it exported US\$16 billion in merchandise. However, no significant growth has occurred in trade with Germany over the past 5 years. Japan's next largest European trade partners are the United Kingdom at US\$20 billion, the Netherlands at US\$14 billion, and France at US\$13 billion in total foreign trade in 2003.

After a significant drop in trade between 2000 and 2002, Japan saw trade with Europe grow strongly between 2002 and 2003, by 19 percent overall and by 23 percent for exports. By commodity category, Japanese exports of transport equipment, electrical machinery and chemicals increased, while exports of non-electrical machinery decreased. Japan also increased its imports from the EU of chemicals and machinery & equipment, which offset a decrease in mineral fuel imports.⁴

3.3 Key Trade Commodities

Between 1995 and 2002, Japanese seaborne export commodities grew by 3.0 percent per year by weight. The strongest growth in seaborne tonnage was seen in containerized cargo, which increased by 5.1 percent per year over this period to 83.1 million tons in 2003, or 70 percent of Japan's total exports by weight. Motor vehicles also experienced strong 4.0 percent annual growth, to 6.1 billion tons or 5 percent of Japan's exports. The strongest declines were in cement and liquid bulk, which fell by compound annual rates of 8.0 percent and 3.9 percent respectively over the same period (Exhibit 3-14). These export trends (more containerized goods, less bulk material), can be expected to continue, given Japan's focus on high-value and technologically advanced goods.

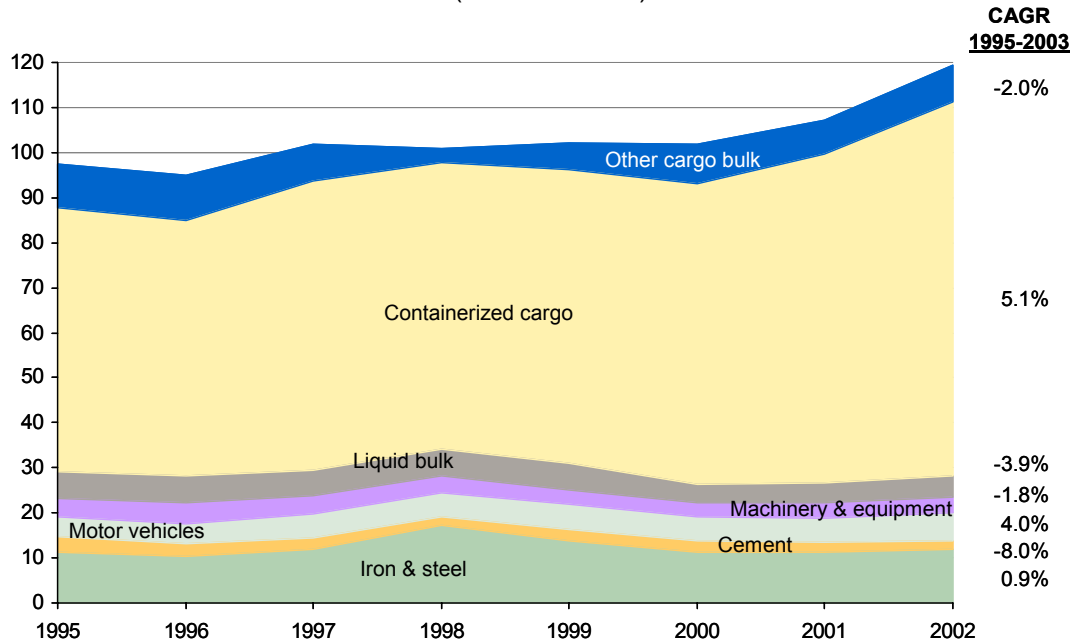
In terms of value, the three most significant export categories for Japan in 2003 were transport equipment (US\$113 billion or 24 percent of exported value), electrical

³ Japan Statistics Bureau.

⁴ Japan Statistics Bureau.

machinery (US\$110 billion or 24 percent of exports), and non-electrical machinery (US\$102 billion or 20 percent of exports). Combined, these top three categories account for over two-thirds of Japan's exports by value.

Exhibit 3-14
Total Japanese Waterborne Exports by Commodity Type
 (millions of tons)



Source: Japan Statistics Bureau.

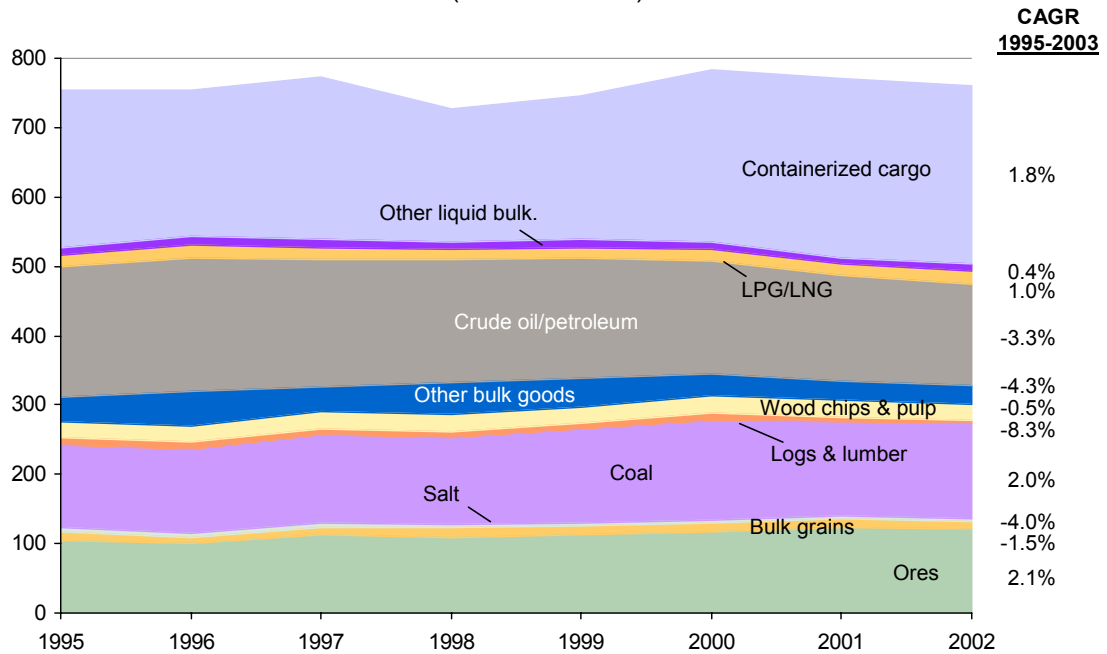
Japan's waterborne import commodities mix is quite different from its exports in terms of weight, and includes more raw materials used for goods production and for direct consumption (food and energy). Growth in overall tonnage imported, however, has been relatively flat, with waterborne imports increasing by only 0.1 percent per year by weight between 1995 and 2002.

The fastest growing imports between 1995 and 2002 were coal and ores, which increased by approximately 2 percent per year, and accounted for 16 and 18 percent of Japan's import tonnage in 2002, respectively. Containerized cargo also grew during this time, increasing by 1.8 percent per year to 256 million tons in 2002, or 34 percent of total imports by weight. Additionally, Exhibit 3-15 also shows a number of imported commodities that experienced declines during this period, including logs and lumber (-8.3 percent per year), salt (-4.0 percent per year), and crude oil and petroleum (-3.3 percent per year).

In value terms, Japan's top three import categories (including both airborne and waterborne trade) accounted for 64 percent of total imports in 2003. These were machinery and equipment (32 percent of total imports or US\$121 billion), mineral fuels

(21.1 percent of imports or US\$81 billion), and foodstuffs (12 percent of imports or US\$44 billion).⁵ Of the main Japanese import categories, only two experienced significant growth between 1995 and 2003, i.e., machinery and equipment grew by 7.4 percent annually and mineral fuels by 8.1 percent annually.

Exhibit 3-15
Total Japanese Waterborne Imports by Commodity Type
 (millions of tons)



Source: Japan Statistics Bureau.

3.4 Japan Market Trends and Challenges

Labor Trends

One key trend affecting not only Japan, but the Asian region in general, is shifts in the division of labor between countries with high and low labor costs. For example, Japan has historically imported raw materials from the United States and elsewhere to process, manufacture, and assemble into high-value merchandise for export. In recent years, however, as lower labor cost markets (e.g., China) have opened up to foreign trade and investment, Japan has altered its merchandise production chain, exporting domestically created high value-added components to these low-cost markets for final assembly, shipping, and delivery.

⁵ Japan Statistics Bureau.

China's Growth

For Japan, China presents both a challenge and an opportunity. As a growing trade partner, China is providing a large market for many Japanese products, and as a low-cost labor source, it is helping Japanese businesses lower costs and become more efficient. However, China is now becoming a significant threat to Japan as it continues to develop into a major world exporter. As has occurred over the past decade, it is expected that China will continue to increase its lower-cost exports to the United States, the European Union, and other major trade regions, at the expense of Japan.

Natural Resources

An additional challenge inherent to Japan is its lack of natural resources and raw materials. It is highly dependent on imports of food, energy, and raw materials for domestic production. For example, it imports 100 percent of its iron ore, wool, and cotton, 97.9 percent of its coal, 99.7 percent of crude oil, and 96.9 percent of its natural gas. It is important for Japan to ensure that the price of these commodities does not rise too quickly, as it would cause inflation to accelerate and present a serious challenge to the economy and domestic production.



Japan and the Panama Canal

4.1 Trade Routes Relevant to the Panama Canal

As an island nation, Japan must rely primarily on maritime channels for its international trade. The vast majority of Japan's maritime trade that transits the Panama Canal moves to/from the East Coast of the United States (Exhibit 4-1). This route is more economical than using transcontinental intermodal services for goods destined for or sourced from US eastern population centers (sea routes are generally less costly than combined land-sea routes). Shipping cost is particularly important for Japan's imported commodities, which include many raw materials and bulk foodstuffs, and thus generally have a lower value to ton ratio than its manufactured merchandise exports.

Exhibit 4-1
Japan Total Trade Through the Panama Canal: 1999-2003 Average
(millions of tons)



Source: ACP.

East Coast United States

Between 1999 and 2003, the US received an average of 5.7 million tons of exports annually from Japan via the Panama Canal (84 percent of Japan's total exports that transit the Canal). Additionally, 24 million tons or 90 percent of Japan's total imports passing through the Canal came from the United States.

The principal exports from Japan to the US East Coast that transit the Panama Canal include coal coke, which accounted for 22 percent of tonnage shipped to this region during 1999-2003, container cargo (19 percent share), and autos and trucks (16 percent share). The principal imports coming from the US during this time period included corn, which made up over half (52 percent) of all Canal-relevant imports from the United States, soybeans (14 percent), and miscellaneous lumber (8 percent).

In terms of growth in tons shipped per year, Canal-relevant Japanese exports to the US have declined by 10 percent annually since 1999, and imports have declined as well, by 5 percent per year.

Latin America

After the United States, Latin America (East Coast South America and East Coast Central America) is Japan's second largest Canal relevant trade partner. Between 1999 and 2003, average annual trade between Japan and Latin America through the Canal totaled 2.3 million tons, representing 7 percent of Japan's Canal trade. Exports accounted for 0.6 million tons, while imports made up the remaining 1.7 million tons.

Of this total Canal-relevant trade, East Coast Central America imported 0.4 million tons of Japanese commodities transiting the Canal, and exported 0.5 million tons to Japan. East Coast South America received the remaining 0.2 million tons of exports and shipped 1.2 million tons to Japan through the Canal

In terms of Canal-relevant trade growth with Japan, there has been a strong difference between Central America and South America. Between 1999 and 2003, while Canal relevant Japanese exports and imports to and from Central America declined by 8 percent and 21 percent per year respectively, exports grew annually by 7 percent and imports by 3 percent to and from South America. In fact, the East Coast of South America is the only region for which Japanese trade through the Canal increased.

The decrease in imports from the East Coast of Central America is primarily due to the fact that Japanese imports of gasoline from this region dropped from 436,843 tons in 1999 to zero in 2003. The decrease in exports to this region is due to a strong drop in demand for Japanese exports of miscellaneous refrigerated products, container cargo, and iron and steel.

The increase in imports from the East Coast of South America is due to the fact that imports of lumber, iron and steel, iron metal, and clay (fire & china) all experienced strong growth during this period. For example, in 1999, Japan imported 9,917 tons of iron and steel, while in 2003 it imported 29,953 tons of this commodity. The increase in exports to this region is due to slag, clinkers, and dross which went from zero tons in 1999 to 107,354 in 2003.

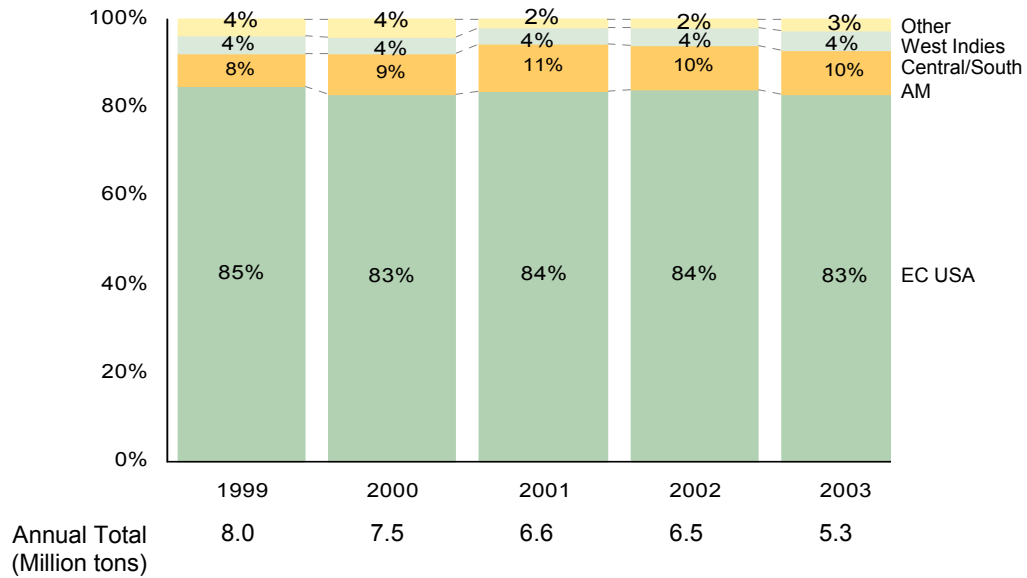
The principal exports from Japan to South America include iron and steel, which accounted for 71 percent of tonnage shipped to this region during 1999-2003; slag, clinkers and dross (13 percent share); and autos and trucks (6 percent share). Japan's exports to Central America through the Canal include container cargo (76 percent of this trade), iron and steel (17 percent), and miscellaneous refrigerated products (4 percent).

The principal imports coming from South America during this time period were nearly all raw materials and included aluminum metal (21 percent of all Canal relevant imports from SA), soybeans (18 percent), fire & china clay (17 percent), pulpwood (12 percent), and lumber (11 percent). From Central America, the main Japanese imports included gasoline (28 percent of Canal relevant imports from CA), container cargo (25 percent), and ores (23 percent).

Rest of World

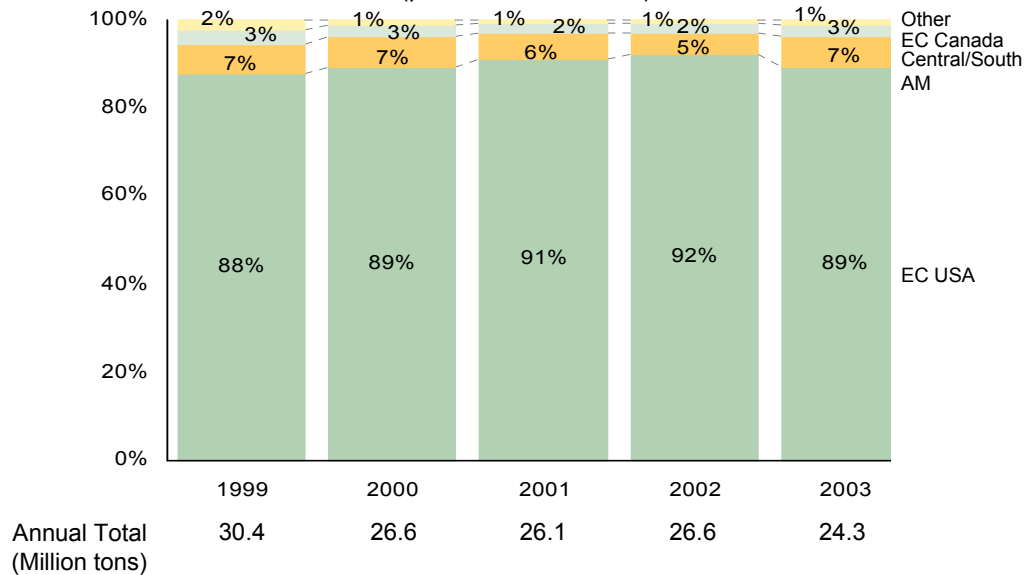
Beyond these few key geographies, Japan's other Canal-relevant imports and exports amount to only 1.5 million tons, or approximately 4.5 percent of total Canal-relevant trade. Exhibits 4-2 and 4-3 show the minimal share changes in Panama Canal-relevant trade lanes for Japan's imports and exports.

Exhibit 4-2
Japan's Exports Through the Panama Canal by Destination: 1999-2003
 (percent of total tons)



Source: ACP.

Exhibit 4-3
Japan's Imports Through the Panama Canal by Origin: 1999-2003
 (percent of total tons)



Source: ACP.

4.2 Japan's Imports/Exports through the Canal

For the purposes of this report, when analyzing specific Japanese trade commodities that transit the Panama Canal, we used the "80/20 rule," meaning that we analyzed the most prevalent commodities making up approximately 80 percent of Panama Canal tonnage moving to/from Japan.

Between 1999 and 2002, the aggregate weight of Japan's exports transported by sea grew by 5.4 percent per year and total seaborne imports grew by 0.6 percent annually. During approximately the same time period, however, exports transiting the Panama Canal decreased by 10 percent per year, and imports by 5 percent per year. In fact, from 1999 to 2003, Japan's Canal-relevant imports and exports decreased for every region except South America.

Key export commodities are listed in Exhibit 4-4. In 2003, the most prominent exports by weight were containerized cargo (24 percent), autos and trucks (22 percent), iron and steel (17 percent), and coke (24 percent), which together account for 87 percent of Japan's exports passing through the Canal.

The strongest annual growth in exported tons passing through the Canal between 1999 and 2003 occurred in miscellaneous machinery,⁶ which grew by 40 percent annually, from 18,400 to 71,800 tons, followed by autos and trucks, which grew by 3 percent, from 1.0 to 1.2 million tons. The largest declines in Japan's exports through the Canal by weight were in chemicals, which dropped by 54 percent per year during 1999-2003, iron and steel (21 percent), and other cargo (18 percent).

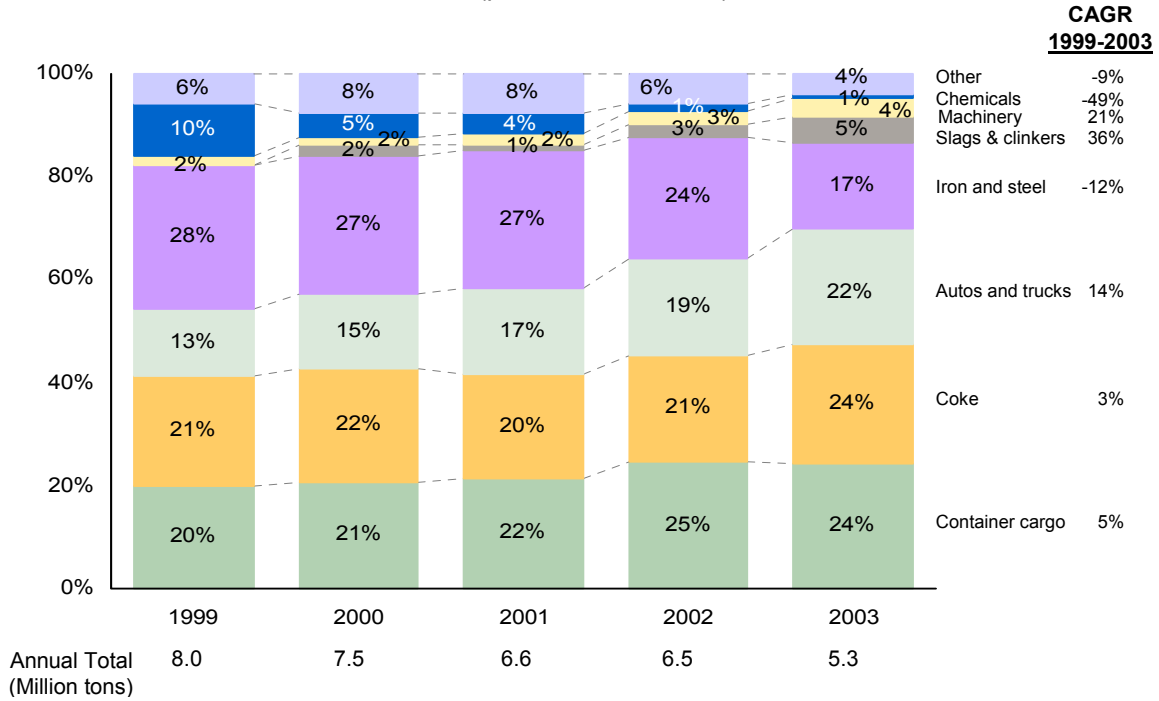
The relative share of various Canal relevant commodity exports changed significantly over this period as well (Exhibit 4-4). At the expense of chemicals and iron & steel, whose relative shares of exports fell by 49 percent and 12 percent respectively, autos and trucks experienced 14 percent annual growth and container cargo grew by 5 percent per year.

Two smaller commodities in terms of total tonnage, machinery and slags, clinkers, and dross, also experienced very strong growth, moving from a combined 2 percent of Japan's Canal relevant commodities in 1999 to 9 percent in 2003.

Exhibit 4-5 indicates that while both total Japanese trade and non-Canal seaborne trade increased between 1999 and 2002, the amount of tonnage passing through the Canal to and from Japan decreased from 1999 to 2002. Additionally, Canal relevant sea trade represents only 4 percent of Japan's total trade.

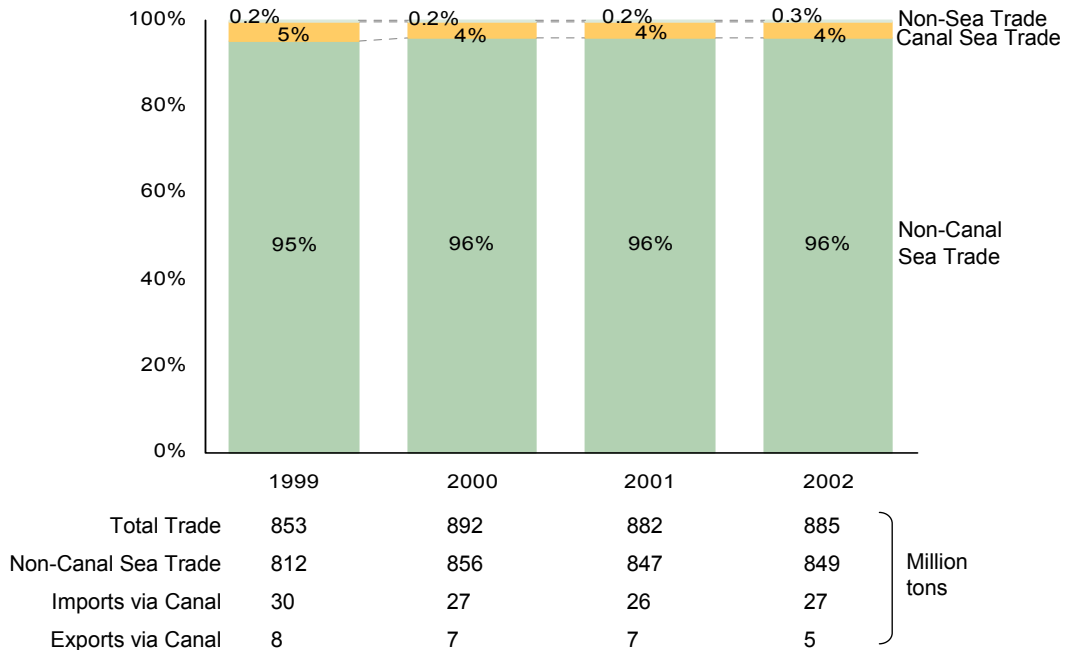
⁶ Miscellaneous machinery is a sub-category of machinery in Exhibit 4-4.

Exhibit 4-4
Japan's Exports Through the Panama Canal by Weight: 1999-2003
 (percent of total tons)



Source: ACP.

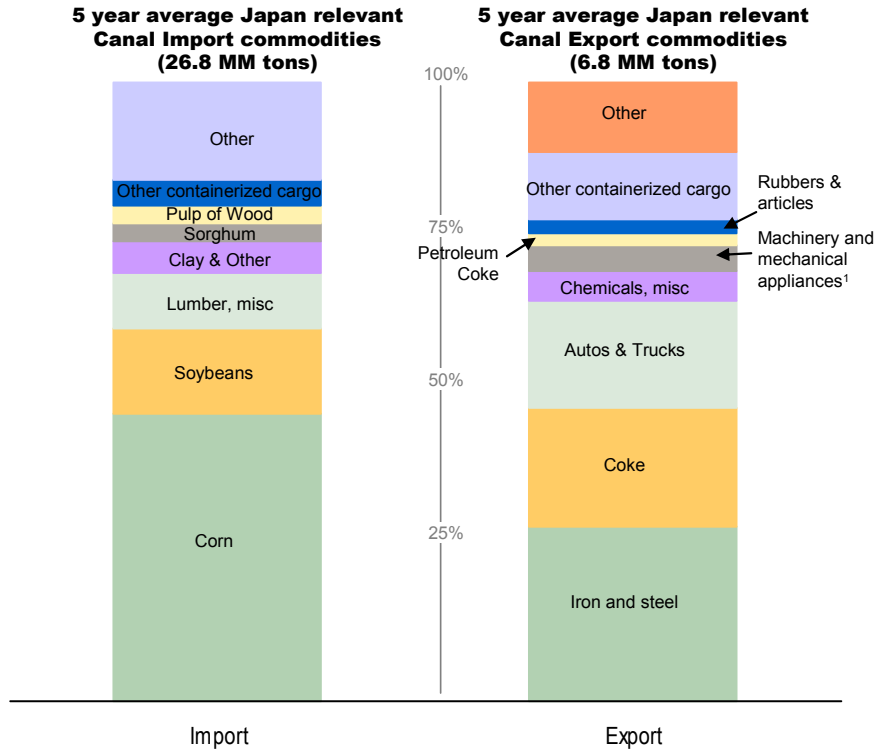
Exhibit 4-5
Japan Non-Canal and Canal Sea Trade: 1999-2002
 (percent of total tons)



Source: Japan Statistics Bureau, Japanese Shipowners' Association, ACP.

On average between 1999 and 2003, Japan imported four times more commodity merchandise by weight through the Panama Canal than it exported. This difference is primarily due to the large amount of dry bulk goods (e.g., corn and soybeans) and other raw materials (e.g., lumber) imported from the United States through the Canal (Exhibit 4-6).

Exhibit 4-6
Japan's Five Year Average Trade through the Panama Canal
 (millions of tons)



Source: ACP.

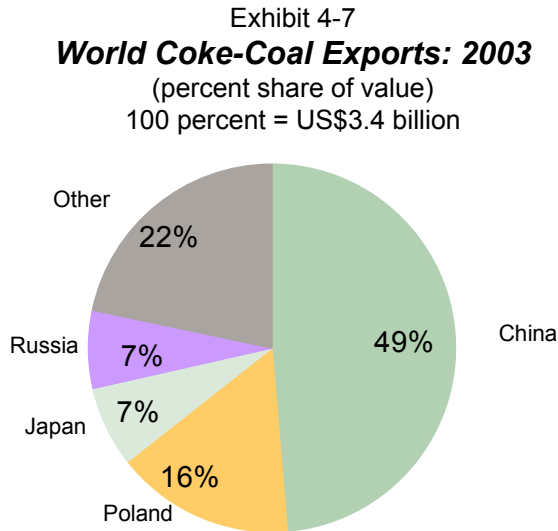
4.3 Canal-Relevant Japanese Export Commodities

4.3.1 Natural Coke

Coke-coal, also called natural coke, is mainly used in the iron and steel industries and as an energy source to generate electricity. Nevertheless, all type of industry use it: cement, chemicals, paper, and primary metals.

In recent years coke exports have experienced accelerating growth. Between 2000 and 2003, total world exports of coke-coal had an average compound annual growth rate of 17 percent, but grew by 44 percent between 2002 and 2003 alone.

The world's largest exporter of coke-coal was China, which accounted for half of the US\$3.4 billion in world coke exports in 2003. Other major exporters include Poland (16 percent or US\$0.5 billion), and Japan and Russia (each with 7 percent or US\$0.2 billion in exports).



Source: UN COMTRADE.

4.3.2 Autos and Trucks

The autos and trucks category includes both motor vehicles and parts. The value of world exports of autos and trucks has grown by 6.5 percent per year overall between 1990 and 2003, but increased rapidly in the latter part of this period, growing by 13.1 percent per year between 2001 and 2003.⁷ In 2003, auto/truck, exports represented nearly 10 percent of total world exports.⁸

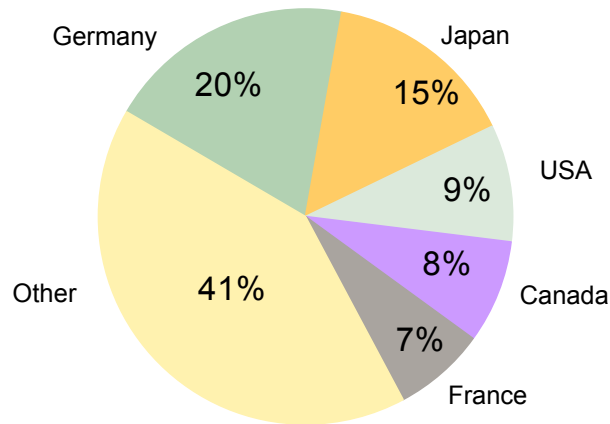
Japan is one of the largest exporters of autos and trucks in the world, with total exports valued at US\$97 billion in 2003, representing approximately 14 percent of world exports of this commodity.⁹ Other large exporters in 2003 included Germany (20 percent), the United States (9 percent), Canada (8 percent), and France (7 percent).

⁷ UN COMTRADE, WTO.

⁸ WTO.

⁹ UN COMTRADE.

Exhibit 4-8
World Auto and Truck Exports: 2003
(percent share of value)
100 percent = US\$702 billion



Source: COMTRADE UN.

4.3.3 Iron and Steel

Steel is derived from metallic iron that must first be extracted from iron ore. Currently it exists in thousands of products having diverse chemical compositions, forms, and sizes, and made by different types of casting, forging, and rolling processes. The main uses of iron and steel include automotive vehicles and parts, construction, and cans and containers.

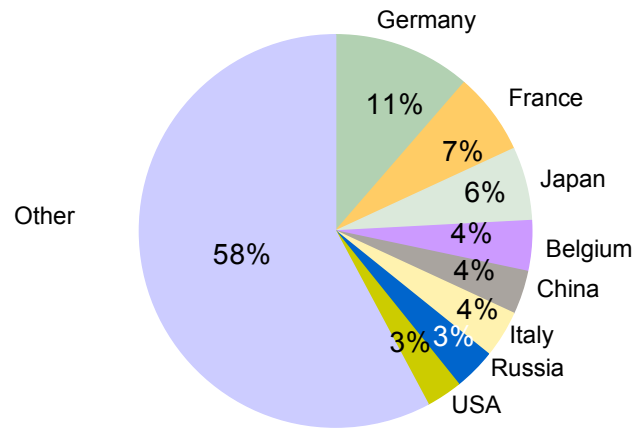
Iron and steel comprise about 95 percent of all the tonnage of metal produced annually in the world.

Japan exports iron & steel as both a bulk and containerized commodity. In total, 1.0 million tons of Japanese iron and steel exports passed through the Panama Canal, of which 88 percent was in bulk and 12 percent was containerized.

While world exports of iron & steel declined by 2.2 percent between 2000 and 2001, more recently they have grown significantly, increasing by 14 percent per year during 2001-2003.

In 2003, Japan was the third largest exporter of iron & steel, with US\$16 billion in exports (Exhibit 4-9), accounting for 6.3 percent of total world exports. Other top exporters of this commodity include Germany (11 percent), France (6.6 percent), Belgium (4.0 percent), and China (3.8 percent).

Exhibit 4-9
World Exports of Iron & Steel and Iron & Steel Products: 2003
 (percent share of value)



Source: UN COMTRADE.

4.3.4 Other Canal-Relevant Export Commodities

In addition to the detailed commodities listed above, there are a number of additional Canal-relevant commodities that Japan exports.

Machinery and Mechanical Appliances

This category is mainly composed of items such as industrial machinery, computer hardware, peripheral devices, data storage systems, networking equipment, point-of-sale (POS) devices, automated teller machines (ATMs), and other computer-based systems.

In 2003, Japan was the third largest exporter of machinery and mechanical appliances in the world, representing 10 percent of the world's US\$1,000 billion in exports of this commodity. Other key exporters include Germany (14 percent), US (13 percent), China (8.3 percent), and Italy (6.1 percent).

Rubber

This product includes natural rubber as well as articles of rubber.

In 2003, Japan was the world's second largest exporter of rubber and rubber products, with US\$6.9 billion in export value, accounting for 10 percent of world exports of this commodity. Other top rubber exporters include Germany with US\$7.7 billion or 12 percent of world exports, the United States (10 percent), France (8 percent), and Thailand (6.7 percent).

Paper and Paperboard

This commodity can be in the form of intermediate goods (products that have been partially developed and processed for consumer use) or end-product, consumer ready goods.

In 2003, Japan exported US\$2.3 billion worth of paper and paperboard, accounting for approximately 1.0 percent of world paper exports. The world's top paper exporters in 2003 included Germany with US\$16 billion, representing 14 percent of world paper exports, Canada with 10 percent of exports, the United States with 10 percent, Finland with 8.1 percent, and Sweden with 7.3 percent.

Plastics

In 2003, Japan was the world's fifth largest exporter of plastics, with exports valued at US\$12 billion or 5.5 percent of world exports of this commodity.

The world's largest exporters of plastics in 2003 included Germany with US\$32 billion in exports, representing 14 percent of world paper exports, the United States with 13 percent, Belgium with 8 percent, and France with 6 percent.

Over the past five years, Japanese total plastics exports have decreased very slightly, at an average annual rate of 0.09 percent per year. In particular, between 2001 and 2002, Japan's plastics production decreased by 5.5 percent, only to recover strongly in 2003, growing by 4.9 percent over the 2002 production level.¹⁰

4.4 Canal-Relevant Japanese Import Commodities

4.4.1 Corn

Corn is primarily used to feed livestock, but is also a major ingredient in food products for human consumption. It is used in many types of food, industrial, and everyday products, including starches, sweeteners, corn oil, fuel ethanol, cosmetics, and adhesives.

Corn products are also being used in place of petroleum in many industrial applications. Polylactide (PLA), a biodegradable polymer made from corn, is being used successfully in the manufacture of a wide variety of everyday items, such as clothing, packaging, carpeting, recreational equipment, and food utensils. Because these products are biodegradable and made from a renewable resource, they offer environmental benefits over petroleum-derived products.

¹⁰ The Japan Plastics Industry Federation - <http://www.jpif.gr.jp>.

In 2003, by value, Japan imported US\$2.4 billion worth of corn, accounting for approximately 30 percent of world imports of this commodity. Other top corn importers include South Korea, Mexico, and Spain.

Between 1999 and 2003 on average, 13 million tons of corn destined for Japan passed through the Panama Canal per year. During this period, the US supplied 99.6 percent of Japan's Canal-relevant corn imports, with the remaining 0.4 percent coming from Canada.

4.4.2 Soybeans

Like corn, soybeans make up a significant portion of the world's food supply. Soybeans are converted into a large variety of food and food-related products such as oil, crackers, vegetarian burgers, non-dairy cheese and milk, bread/flour, etc. Additionally, soybeans can be used to generate biodiesel fuel used for transportation and other energy needs. Processed soybeans are the largest source of protein feed and vegetable oil in the world.

In 2003, Japan imported US\$1.5 billion soybeans, accounting for 10 percent of the world's imports of this commodity. Other top importers by value included China, the Netherlands, and Germany.

Between 1999 and 2003, on average, 3.7 million tons of soybeans destined for the Japan passed through the Panama Canal. During this period the top suppliers of this commodity to Japan were the United States, which supplied 93 percent of Canal-relevant soybeans imports, Brazil (5.7 percent), and Canada (1.6 percent).

4.4.3 Miscellaneous Lumber

The miscellaneous lumber category includes wood chips, fuel wood, sawdust, wood charcoal, logs & poles, rough wood, wood wool, pallets, drums & crates, manufactured wood products, and other articles of wood. Japan imported US\$7.5 billion of miscellaneous lumber in 2003, accounting for roughly 12 percent of world imports. Other top importers of this commodity include the United States and China.

Between 1999 and 2003, on average, 2.3 million tons of miscellaneous lumber destined for Japan passed through the Panama Canal. During this period, the top suppliers of this commodity to Japan were the United States, which supplied 85 percent of Canal-relevant miscellaneous lumber imports, Canada (8.3 percent), and Brazil (5.6 percent).

4.4.4 Salt, Sulfur, Earth & Stone, Cement

This category encompasses products that are intended for general industrial applications and that are in either a completely raw state or that have been washed, crushed, ground,

powdered, levitated, sifted, screened, concentrated by flotation, magnetic separation or other mechanical or physical processes (except crystallization), but not products that have been roasted, calcined, obtained by mixing, or subjected to additional processing.

In 2003, Japan imported US\$1.2 billion of this commodity, accounting for 5.7 percent of world imports. Of this, 0.4 million tons transited the Panama Canal. Other top importers by value include China, the United States, Italy, and Germany.

4.4.5 Wood Pulp

Pulp is a generic term for a wide range of technically distinct products resulting from complex manufacturing processes that involve the chemical and/or mechanical treatment of various types of plant material. Wood currently provides the basis for approximately 90 percent of global pulp production. The primary use for wood pulp is in paper and paperboard products.

In 2003, Japan imported US\$1.2 billion of wood pulp, accounting for 5.5 percent of world imports of this commodity.¹¹ Of this, 0.2 million tons transited the Panama Canal. Other top importers by value include China, the United States, and Germany.

4.4.6 Paper and Paperboard

This commodity includes intermediate paper goods (products that have been partially developed and processed for consumer use) and consumer ready products. In 2003, Japan imported US\$2.4 billion of paper and paperboard, accounting for 2.1 percent of world imports. The world's top importers of paper included the United States, Germany, France, and the United Kingdom.

4.4.7 Edible Fruits and Nuts

Fruits and nuts are used either for personal consumption or as raw materials for the production of other food products. The world's largest fruit producers and exporters are the US, Spain, Italy, Belgium, and France, and the main importers are the US, Germany, and the United Kingdom.

In 2003, Japan imported US\$2.1 billion worth of containerized edible fruits and nuts. Of this, approximately 0.2 million tons transited the Panama Canal.

¹¹ Containerized and bulk wood pulp.

5

Canal-Relevant Commodities Analysis

5.1 Methodology for Export Commodities Analysis

This section provides the results of an analysis of Japan's Canal-relevant commodities discussed in section 4. These commodities were analyzed with the objective of determining the potential impact of an increase in the Canal toll on landed cost, and therefore the relevance of a toll increase to Japan's trade economy.

The methodology for analysis was threefold:

1. The relevance of Panama Canal tonnage transits for 1999-2003 to the overall trade in a particular commodity for Japan was determined. Where possible, commodities were matched to the ACP's description of each category and HS 6-digits.
2. If a commodity's tonnage transits through the Canal were above a certain threshold (percent of country trade, percentage passing through the Canal) then the commodity was analyzed further to determine the relevance of a potential increase in Canal toll on landed cost.
3. A sensitivity analysis was then applied to determine a range of impacts on landed cost given different toll increase scenarios.

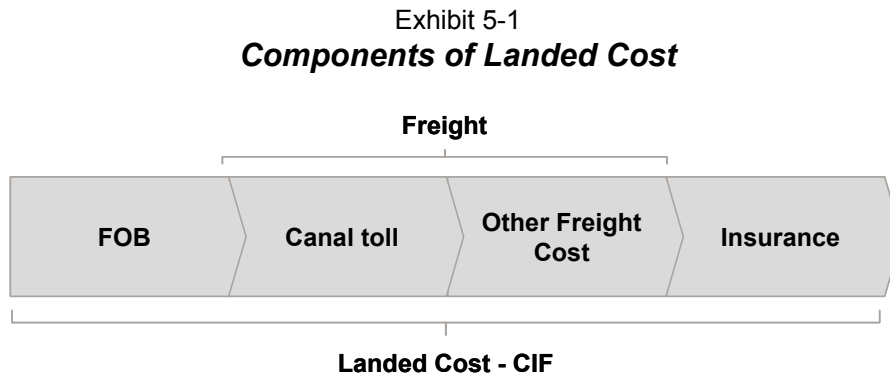
This methodology may have been slightly modified depending on the particular commodity analyzed (and if so, that information is noted below).

In most cases, the first step involved two analyses to determine the significance of a particular commodity's Panama Canal transits with respect to Japan's trade:

- Total value of the exports of a specific commodity compared to total Japanese exports

- Total value of the specific commodity transiting the Canal compared to the value of Japan's total exports of that commodity

ACP transit data was used to determine Panama Canal transits for each commodity. If the commodity tonnage transits through the Canal were above a certain threshold (percent of country trade or exports through the Canal), the next step involved first determining what percentage of total landed cost is represented by the Panama Canal toll. For the purposes of this analysis, landed cost was unbundled as shown in Exhibit 5-1.



To determine total landed cost (CIF) for each exported commodity, the FOB, tonnage, and freight and insurance charges were obtained from the US Census Bureau Foreign Trade Division by examining US imports of Japanese commodities. All costs are average values of all sea traded exports. The average Canal toll per ton for each commodity was calculated using ACP data from ships laden with that commodity.

A total CIF per ton was then calculated, and compared to the Canal cost (toll plus other maritime services) per ton for that commodity to determine the percentage share accounted for by the Canal cost out of the total landed cost, i.e.:

$$\text{Canal Cost} / (\text{FOB} + \text{Freight} + \text{Insurance} + \text{Toll} + \text{OMS}) = \text{Canal Cost as \% of CIF}$$

In the final step, a sensitivity analysis was applied to determine the potential increase in CIF for potential toll increase scenarios, including toll increases of 50, 100, 150, and 200 percent.

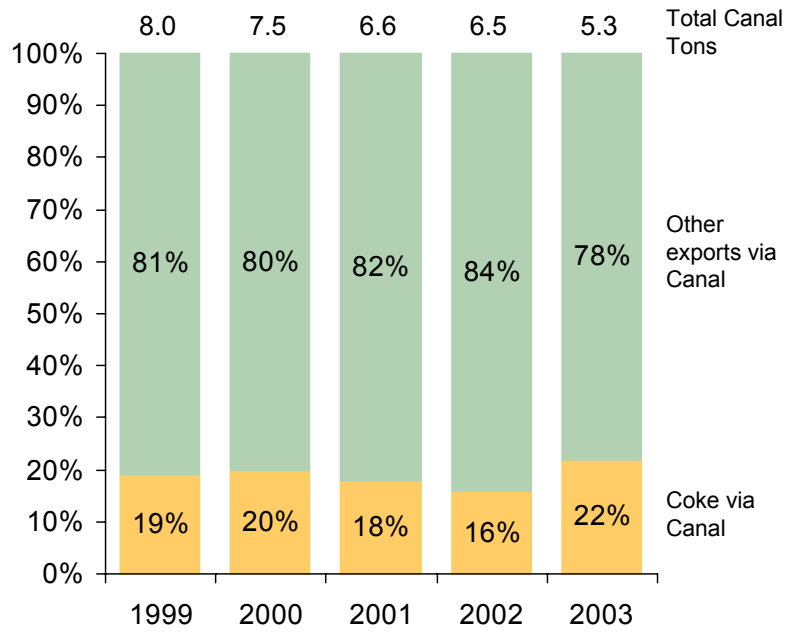
5.2 Natural Coke Analysis

5.2.1 Overview

The analysis for natural coke covered coke-coal and semi-coke of coal. In 2003, coke-coal accounted for 76 percent of Japan's total coke exports, while the remaining 24 percent was petroleum coke. Overall, US\$0.11 billion, or 44.2 percent of total coke value was exported by Japan via seaborne transport.

In 2003, Japan exported 1.2 million tons of coke-coal through the Panama Canal. This represents 22 percent of total Japanese Canal exports (Exhibit 5-2).

Exhibit 5-2
Natural Coke Share of Japan's Total Canal Exports: 2003
 (million tons)

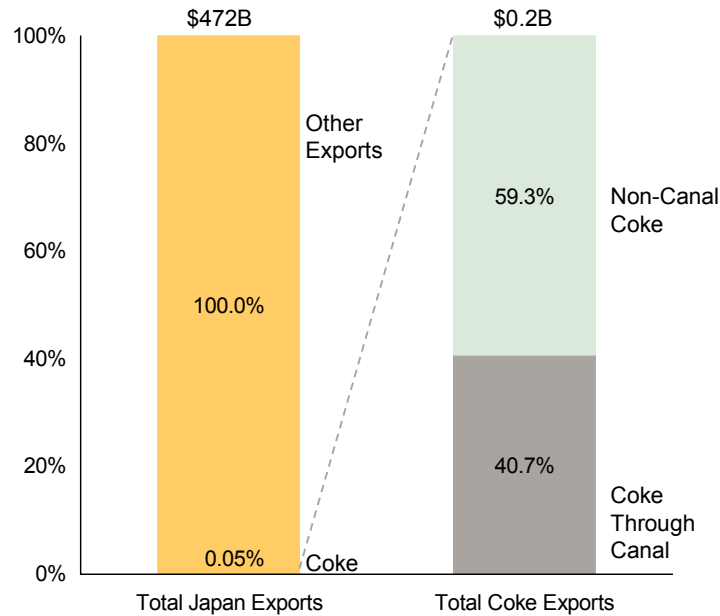


Source: ACP.

As described above, two types of analysis were carried out to determine the significance of Panama Canal coke transits with respect to Japan's international trade: the total value of coke exports was compared to total Japanese exports and to the value of coke transiting the Canal.

These analyses determined that the value of total Japan's coke exports in 2003 was US\$0.25 billion dollars, which represents approximately 0.05 percent of total Japanese exports (Exhibit 5-3). Of this, a high 41 percent transited the Panama Canal.

Exhibit 5-3
Panama Canal Transit Share of Total Japanese Coke Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.2.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-4 shows the cost components of the calculated CIF for natural coke. Using the methodology described in section 5.1, the analysis found that the total Canal cost represents 2.54 percent of the total landed cost for Japanese export coke.

Exhibit 5-4
Total Canal Cost Share of Japan's Exported Natural Coke CIF (Landed Cost)
 (2003 values in US\$/ton)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Coke	\$87	\$15.62	\$2.66	\$109	2.54%

Source: US Waterborne Commerce Databank, US Census Bureau, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting coke would have a moderate effect on the commodity's total landed cost.

Additionally, a sensitivity analysis shows that coke exports would be moderately affected by Panama Canal toll changes:

- Coke is a low-value bulk commodity, at US\$109 CIF per ton in 2003. Therefore, a large increase in the Canal toll, which represents 2.08 percent of the landed cost, would cause a moderate price change per ton (Exhibit 5-5).
- China accounts for half of the world's coke-coal exports, and Japan is the third largest exporter of this commodity, accounting for 7 percent. Since Chinese and Japanese coke-coal moving through the Canal would be equally affected by a toll increase, it is unlikely that an increase in the Canal toll would affect the competitive landscape.

Exhibit 5-5

Natural Coke Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	1.04%	2.08%	3.12%	4.16%

Source: Mercer analysis.

5.2.3 Analysis of Commodity Relevance

A significant portion of Japan's coke-coal exports pass through the Canal and coke's low-price makes the effect of a Canal toll increase significant in terms of the final landed cost. However, because coke-coal represents only 0.05 percent of Japan's total exports, the impact of a Canal toll increase would not be significant for Japan's trade or economy.

5.3 Autos and Trucks Analysis

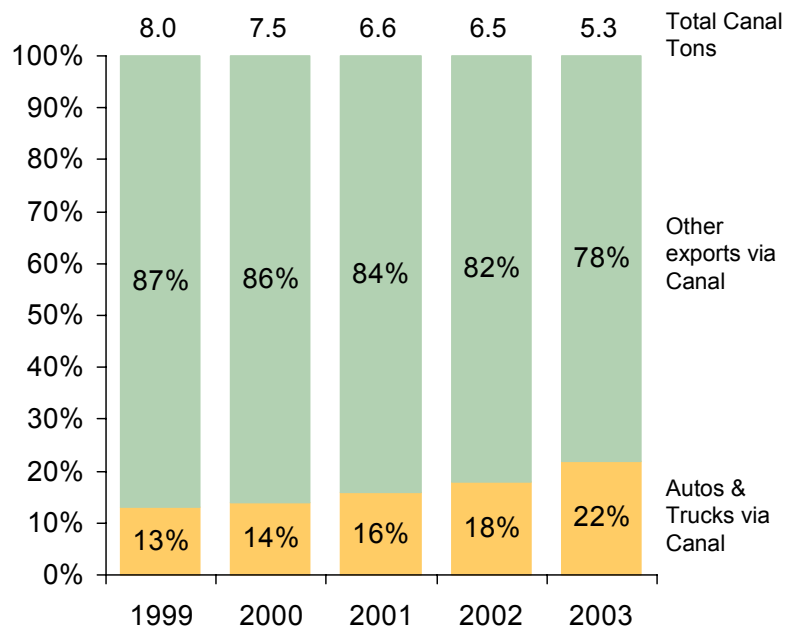
5.3.1 Overview

The analysis for autos and trucks covered boxed and unboxed autos and trucks and related parts. Overall, Japan exports US\$13 billion, or 14 percent of total auto and truck export value by sea.

In 2003, Japan exported 1.2 million tons of autos and trucks through the Panama Canal. This represents 22 percent of total Japanese Canal exports (Exhibit 5-6).

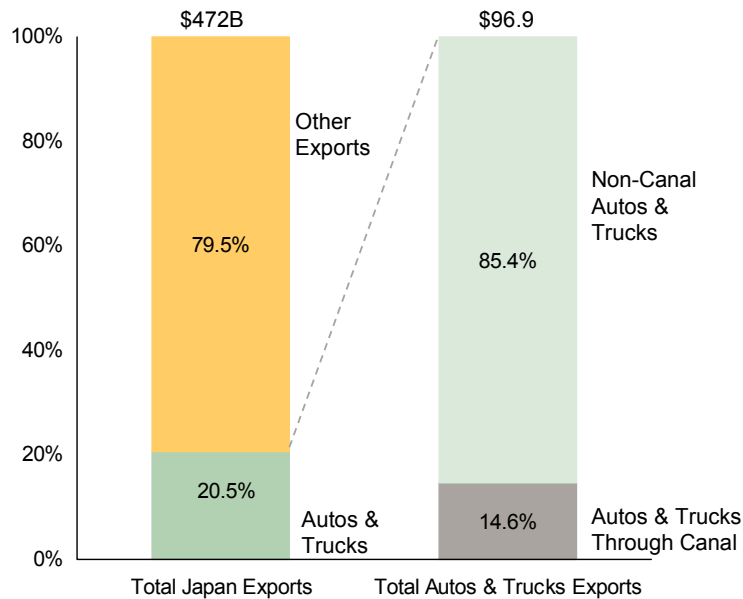
The value of Japan's auto and truck exports in 2003 was US\$97 billion dollars, which represented over one-fifth of total Japanese exports (Exhibit 5-7). Of this, a significant 15 percent transited the Panama Canal.

Exhibit 5-6
Auto/Truck Share of Japan's Total Canal Exports: 2003
 (million tons)



Source: ACP.

Exhibit 5-7
Panama Canal Transit Share of Total Auto and Truck Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.3.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-8 shows the cost components of the calculated CIF for Japanese auto and truck exports. The comparison of CIF to the total Canal cost determined that the Canal cost represents only 0.37 percent of the total landed cost for Japanese export autos and trucks.

Exhibit 5-8
Total Canal Cost Share of Japan's Exported Autos/Trucks CIF (Landed Cost)
 (2003 values in US\$/ton)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Autos and trucks	\$12,037	\$314	\$45.43	\$12,396	0.37%

Source: US Waterborne Commerce Databank, US Census Bureau, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting autos and trucks would have no significant effect on the commodity's total landed cost.

Additionally, a sensitivity analysis shows that exports of autos and trucks would be essentially unaffected by Panama Canal tolls changes. Autos and trucks have a very high value per ton, at US\$12,037 in 2003. Therefore, even a large increase in the Canal toll, would not cause a significant price change per ton (Exhibit 5-9).

Exhibit 5-9
Autos and Trucks Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.15%	0.30%	0.45%	0.60%

Source: Mercer analysis.

5.3.3 Analysis of Commodity Relevance

A significant portion of Japan's auto and truck exports pass through the Canal, and this commodity represents a large part of Japan's export economy. However, because of the very high value per ton of auto and truck exports, the impact of a Canal toll increase would be insignificant as a percentage of total landed cost, and therefore would not have a significant effect on Japan's trade or economy.

5.4 Iron and Steel Analysis

5.4.1 Overview

The analysis for this commodity includes both bulk iron and steel (iron and steel covered bulk, non-containerized iron and steel and articles of iron and steel) and containerized iron and steel and articles of iron and steel.

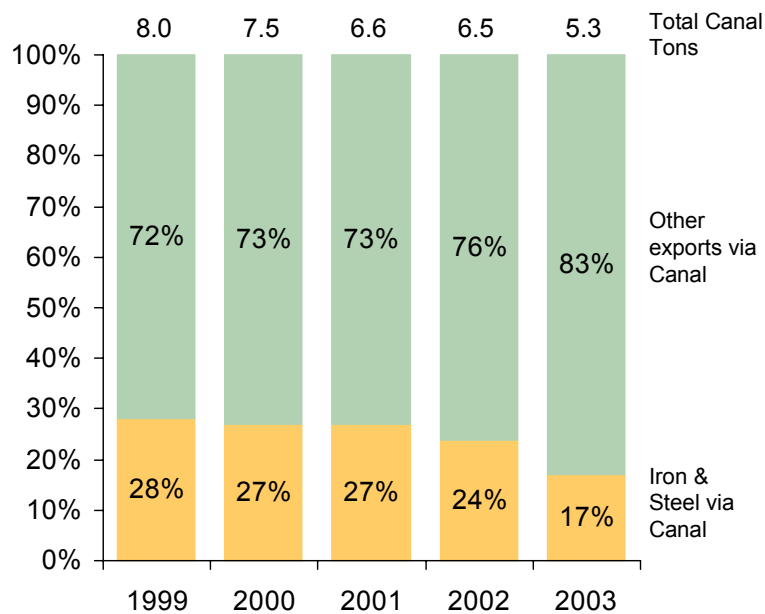
After declining by 21 percent per year since 1999, in 2003 Japan exported 0.9 million tons of bulk iron and steel through the Panama Canal. This represented 17 percent of Japan's total Canal exports by weight (Exhibit 5-10).

The value of Japan's bulk iron and steel exports in 2003 was US\$21 billion dollars, which represented 4.4 percent of Japan's total exports (Exhibit 5-11). Of this, only 3.3 percent of iron & steel export value transited the Panama Canal.

In 2003, Japan also exported 0.14 million tons of containerized iron and steel through the Panama Canal. This represented 2 percent of Japan's total Canal exports by weight.

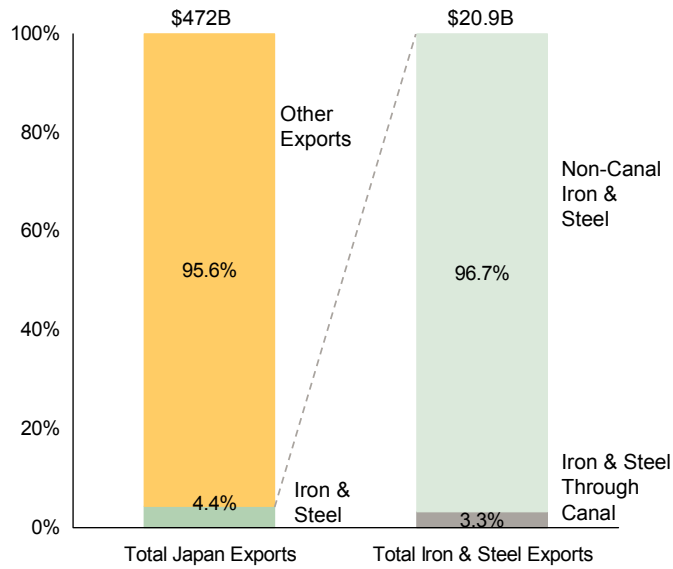
The value of Japan's containerized iron and steel exports in 2003 was US\$1.1 billion dollars, which represented 0.2 percent of Japan's total exports (Exhibit 5-12). Approximately 17 percent of containerized iron and steel exports by value transited the Panama Canal.

Exhibit 5-10
Bulk Iron and Steel's Share of Japan's Total Canal Exports: 2003
 (million tons)



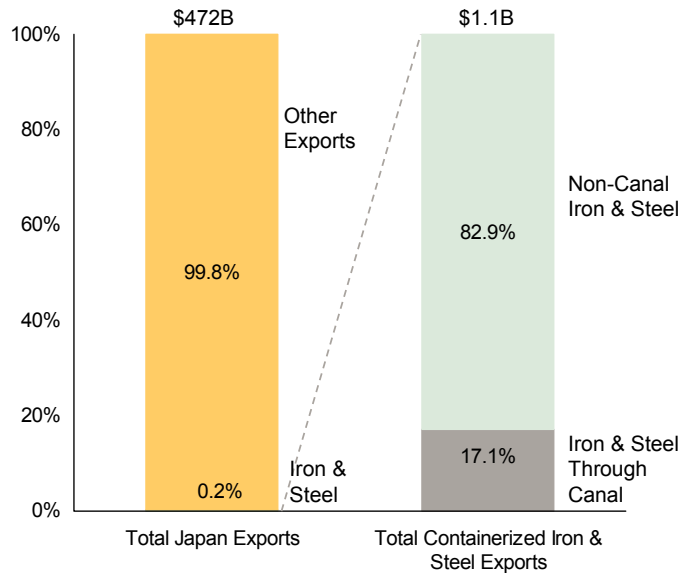
Source: ACP.

Exhibit 5-11
Panama Canal Transit Share of Bulk Iron and Steel Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

Exhibit 5-12
Panama Canal Transit Share of Containerized Iron and Steel Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.4.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-13 shows the cost components of the calculated CIF for bulk and containerized iron & steel. The comparison of CIF to total Canal cost determined that Canal cost represents only 0.34 percent and 0.28 percent, respectively, of the total landed cost (CIF) for Japanese export bulk iron and steel and containerized iron and steel.

Exhibit 5-13

Total Canal Cost Share of Japan's Exported Iron and Steel CIF (Landed Cost)

(2003 values in US\$/ton for bulk and US\$/TEU for containers)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Bulk iron and steel	\$789.14	\$78.80	\$2.95	\$870.89	0.34%
Containerized iron and steel	\$1,3460.42	\$1,104.56	\$41.33	\$14,606.31	0.28%

Source: US Waterborne Commerce Databank, US Census Bureau, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting iron and steel would have no significant effect on the commodity's total landed cost.

A sensitivity analysis shows that iron and steel exports would not be significantly affected by Panama Canal toll changes (Exhibit 5-14). Both bulk and containerized iron and steel have high commodity values per ton, at US\$789 and US\$1,408, respectively, in 2003, with a relatively low Canal toll per ton. Therefore, even a large percentage increase in the Canal toll would not cause a significant price change per ton.

Exhibit 5-14

Iron and Steel Sensitivity Analysis: CIF Increase vs. Toll Increase

Bulk iron and steel	Toll Increase	50%	100%	150%	200%
	CIF Increase	0.13%	0.26%	0.38%	0.51%
Containerized iron and steel	Toll Increase	50%	100%	150%	200%
	CIF Increase	0.11%	0.22%	0.33%	0.44%

Source: Mercer analysis.

5.4.3 Analysis of Commodity Relevance

A Canal toll increase would have very little effect on the final landed cost of Japan’s iron and steel exports, due to the high value per ton and low Canal toll per ton for both bulk and containerized iron & steel. Therefore, a Canal toll increase for ships loaded with this commodity would not have a significant effect on Japan’ trade or economy.

5.5 Machinery and Mechanical Appliances Analysis

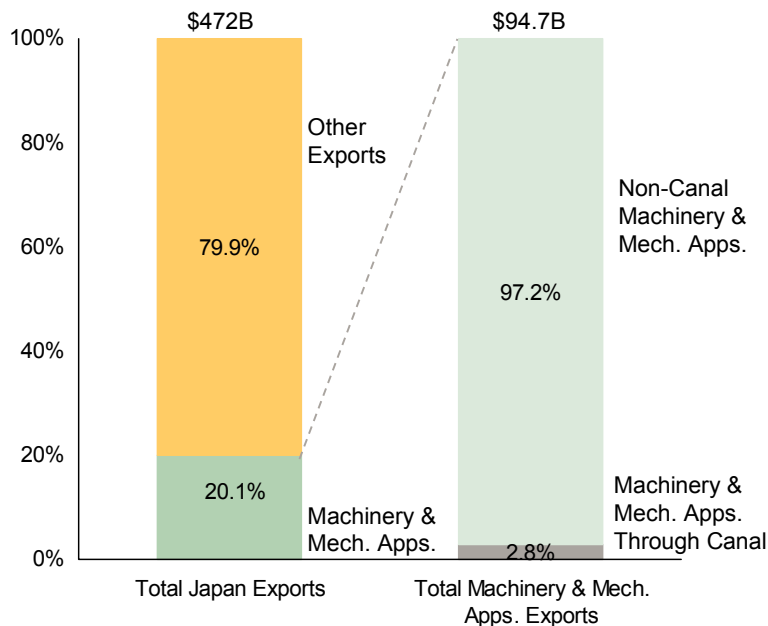
5.5.1 Overview

This analysis covered machinery and mechanical appliances and articles of machinery and mechanical appliances.

In 2003, Japan exported 0.26 million tons of bulk machinery and mechanical appliances through the Panama Canal. This represented 5 percent of Japan’s total Canal exports.

The value of Japan’s total containerized machinery and mechanical appliances exports in 2003 was US\$95 billion dollars, which represented one-fifth of Japan’s total exports (Exhibit 5-15). Of this, a very small 2.8 percent transited the Panama Canal.

Exhibit 5-15
Panama Canal Transit Share of Machinery and Mechanical Appliances Exports
(US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.5.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-16 shows the cost components of the calculated CIF for Japanese machinery exports. The comparison of total landed cost to the total Canal cost determined that the Canal cost represents only 0.07 percent of the total landed cost (CIF) for Japanese export machinery and mechanical appliances.

Exhibit 5-16

Total Canal Cost Share of Japan's Exported Machinery CIF (Landed Cost) (2003 values in US\$/TEU)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Machinery and mechanical appliances	\$57,595	\$1,730	\$41.33	\$59,366	0.07%

Source: US Waterborne Commerce Databank, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting machinery and mechanical appliances would have no significant effect on the commodity's total landed cost.

Additionally, a sensitivity analysis shows that machinery and mechanical appliance exports would not be significantly affected by Panama Canal toll changes: Machinery and mechanical appliances have a very high commodity value per TEU, at US\$57,595 in 2003, with a very low relative Canal transit cost per TEU. Therefore, even a large percentage increase in the Canal toll would not cause a significant price change (Exhibit 5-17).

Exhibit 5-17

Machinery Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.03%	0.05%	0.08%	0.11%

Source: Mercer analysis.

5.5.3 Analysis of Commodity Relevance

While machinery and mechanical appliances represent a large part of Japan's export economy, only a small portion of the total commodity export value transits the Canal. Additionally the commodity's very high value per ton makes the impact of a Canal toll increase insignificant as a percent of total landed cost. Therefore, any change to the toll

for ships carrying this commodity would not have a significant effect on Japan's trade or economy.

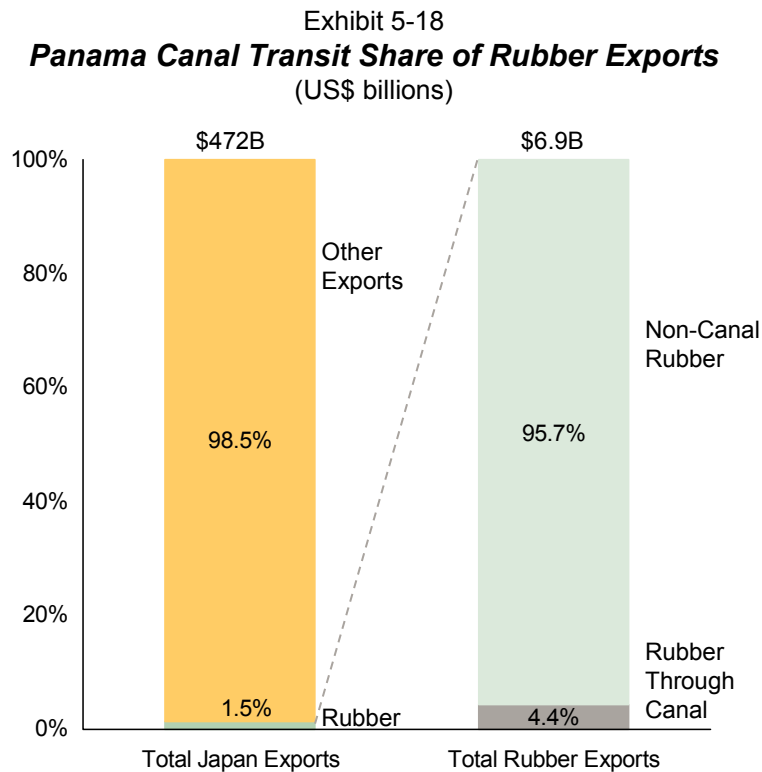
5.6 Containerized Rubber Analysis

5.6.1 Overview

The data analyzed for rubber includes natural rubber and rubber articles.

In 2003, Japan exported 0.13 million tons of rubber through the Panama Canal. This represented 2.4 percent of Japan's total Canal exports.

The value of Japan's total rubber exports in 2003 was US\$6.9 billion dollars, which represented 1.5 percent of Japan's total exports (Exhibit 5-18). Approximately 4 percent of Japan's rubber exports transited the Panama Canal.



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.6.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-19 shows the cost components of the calculated CIF for Japanese rubber exports. The comparison of total landed cost to the total Canal cost determined that Canal cost represents only 0.24 percent of the CIF for rubber.

Exhibit 5-19

Total Canal Cost Share of Japan's Exported Rubber CIF (Landed Cost)
(2003 values in US\$/TEU)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Rubber	\$15,265	\$1,606	\$41.33	\$16,916	0.24%

Source: US Waterborne Commerce Databank, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting rubber would have no significant effect on the commodity's total landed cost.

Additionally, a sensitivity analysis shows that rubber exports would not be significantly affected by Panama Canal toll changes: Rubber has a high value per TEU, at US\$2,385 in 2003, with a low relative Canal toll per TEU. Therefore, even a large percentage increase in the Canal toll would not cause a significant price change (Exhibit 5-20).

Exhibit 5-20

Rubber Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.09%	0.19%	0.28%	0.38%

Source: Mercer analysis.

5.6.3 Analysis of Commodity Relevance

Japan's rubber exports represent only a small portion of its total exports, and only a small percentage of rubber exports pass through the Canal. Additionally, a Canal toll increase would have very little effect on the final landed cost, due to rubber's high value per ton and low current Canal toll per ton. Therefore, a Canal toll increase for ships loaded with this commodity would not have a significant effect on Japan's trade or economy.

5.7 Containerized Paper and Paperboard Analysis

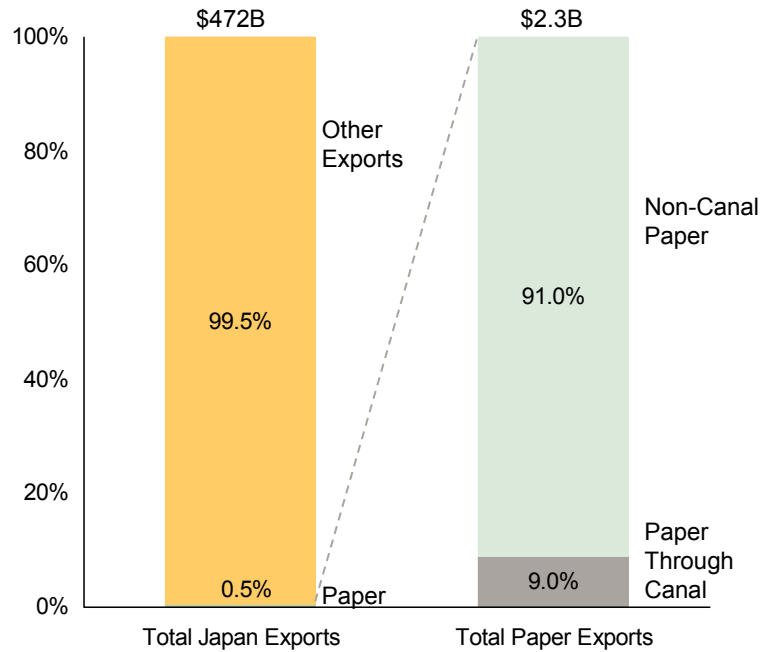
5.7.1 Overview

Data analyzed for paper covers both paper and paperboard products.

In 2003, Japan exported 0.11 million tons of paper through the Panama Canal. This represented 2.1 percent of Japan's total Canal exports.

The value of Japan’s total paper exports in 2003 was US\$2.3 billion dollars, which represented 0.5 percent of Japan’s total exports (Exhibit 5-21). Of this, 9 percent transited the Panama Canal.

Exhibit 5-21
Panama Canal Transit Share of Paper Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.7.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-22 shows the cost components of the calculated CIF for Japanese paper exports. The comparison of total landed cost to the total Canal cost determined that the Canal cost represents only 0.22 percent of the CIF for paper.

Exhibit 5-22
Total Canal Cost Share of Japan’s Exported Paper CIF (Landed Cost)
 (2003 values in US\$/TEU)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Paper	\$17,136	\$1,631	\$41.33	\$18,808	0.22%

Source: US Waterborne Commerce Databank, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting paper would have no significant effect on the commodity’s total landed cost.

Additionally, a sensitivity analysis shows that paper exports would not be significantly affected by Panama Canal toll changes: Paper has a high value per TEU, at US\$2,385 in 2003, with a low relative Canal toll per TEU. Therefore, even a large percentage increase in the Canal toll would not cause a significant price change (Exhibit 23).

Exhibit 5-23

Paper Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.09%	0.17%	0.26%	0.34%

Source: Mercer analysis.

5.7.3 Analysis of Commodity Relevance

As a result of these analysis it was determined that Japan’s paper exports represent a very small portion of its total exports, and that only a minor percentage of these exports pass through the Canal. Additionally, it was determined that a Canal toll increase would have very little effect on the final landed cost due to paper’s high value per ton and low current Canal toll per ton. Therefore, a Canal toll increase for ships loaded with paper would not have a significant effect on Japan’ trade or economy.

5.8 Containerized Plastics Analysis

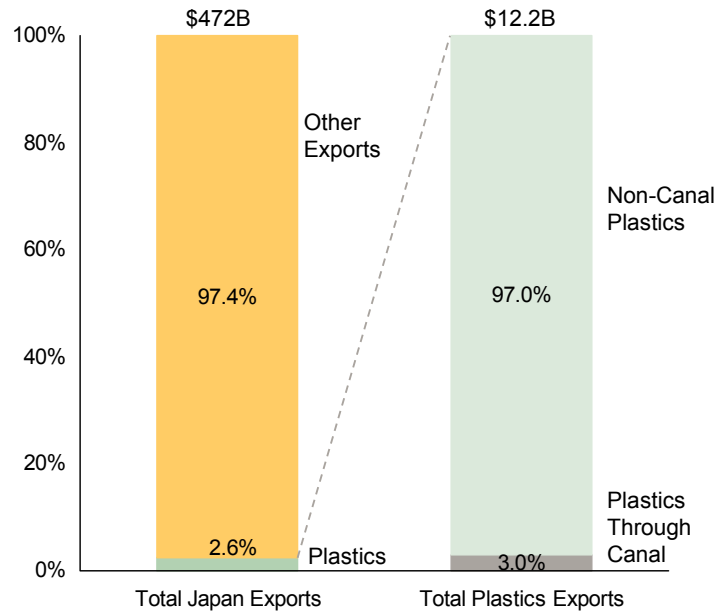
5.8.1 Overview

The data analyzed for plastics covers both bulk plastics and articles of plastic.

In 2003, Japan exported 0.09 million tons of plastics through the Panama Canal. This represented 1.8 percent of Japan’s total Canal exports.

The value of Japan’s total containerized plastics exports in 2003 was US\$12 billion dollars, which represented 2.6 percent of Japan’s total exports (Exhibit 5-24). Of this, only 3 percent transited the Panama Canal.

Exhibit 5-24
Panama Canal Transit Share of Plastics Exports
 (US\$ billions)



Source: World Trade Organization, UN COMTRADE, US Waterborne Commerce Databank, ACP.

5.8.2 Panama Canal Cost Share of Landed Cost

Exhibit 5-25 shows the cost components of the calculated CIF for Japanese exported plastics. The comparison of total landed cost to the total Canal cost determined that the Canal cost represents only 0.14 percent of the CIF for plastics.

Exhibit 5-25
Total Canal Cost Share of Japan's Exported Plastics CIF (Landed Cost)
 (2003 values in US\$/ton)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Plastics	\$28,868	\$1,494	\$41.33	\$30,404	0.14%

Source: US Waterborne Commerce Databank, ACP.

Based on this analysis, it can be expected that a significant increase in the toll for ships transporting plastics would have no significant effect on the commodity's total landed cost.

Additionally, a sensitivity analysis shows that plastics exports would not be significantly affected by Panama Canal tolls changes: Plastics have a very high value per TEU, at US\$3,849 in 2003, with a low relative Canal toll per TEU. Therefore, even a large

percentage increase in the Canal toll would not cause a significant price change (Exhibit 5-26).

Exhibit 5-26

Plastics Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.05%	0.11%	0.16%	0.22%

Source: Mercer analysis.

5.8.3 Analysis of Commodity Relevance

Japan's plastics exports represent only a small portion of its total exports, and only a very small percentage of these exports pass through the Canal. Additionally, a Canal toll increase would have very little effect on the final landed cost due to plastics' high value per ton and low current Canal toll per ton. Therefore, a Canal toll increase for ships loaded with this commodity would not have a significant effect on Japan's trade or economy.

5.9 Analysis of Total Relevant Japanese Imports

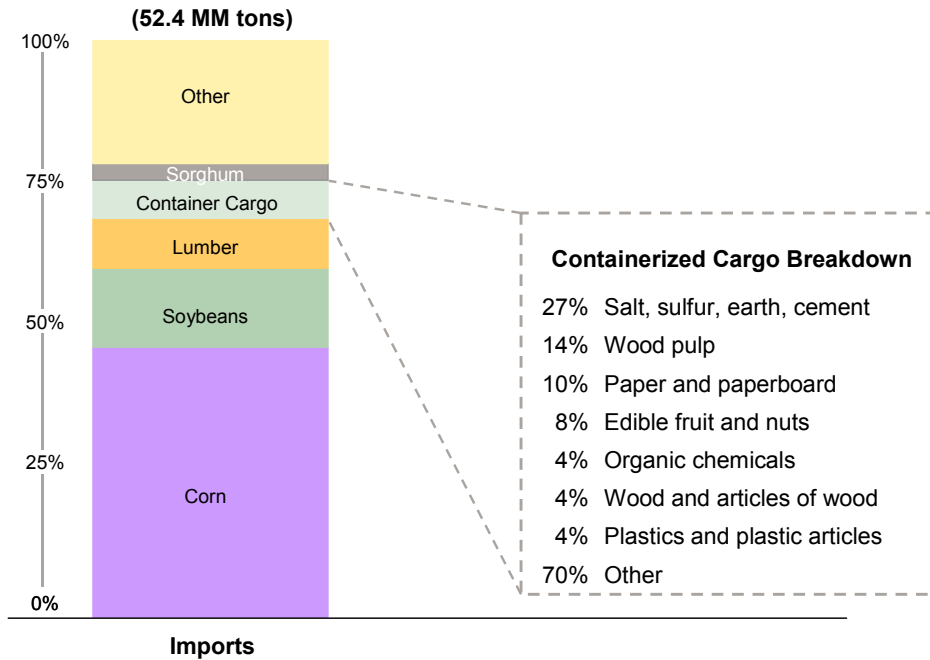
To ensure a thorough analysis of the effects of an increase in Panama Canal tolls, Japanese commodity imports were analyzed in addition to exports. For the purposes of this analysis, only the most significant commodities, representing approximately 80 percent of Japanese import tons passing through the Panama Canal, were analyzed.

Exhibit 5-27 shows a breakdown of commodities imported into Japan.¹² The largest Canal-relevant imports for Japan include bulk commodities such as corn, soybeans, and lumber, accounting for nearly 70 percent of imports. Additionally, over 6 percent of imports arrive in containers, including salt, sulphur, earth, & cement, wood pulp, and paper.

¹² Containerized imports were broken down using the US Maritime Administration's Waterborne Commerce Databank of US imports for 2003.

Exhibit 5-27

Canal-Relevant Japanese Imports: 1999-2003 Average
(percentage of tons)



Source: ACP

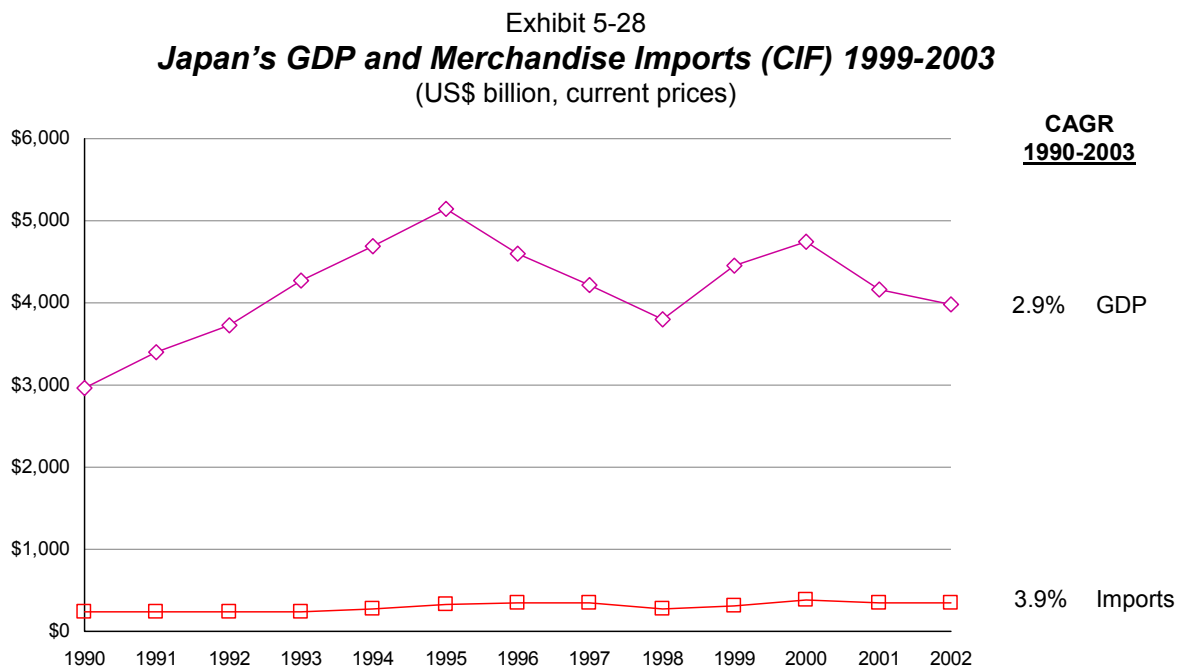
An increase in Canal tolls will increase the final landed price for imported commodities. There are various methods by which the impact of such increases on the Japanese economy can be evaluated:

- One approach would be to examine the effect of the Panama Canal toll increases on the final consumer price for all of the relevant commodities imported. This method would evaluate the impact of a Canal toll increase relative to import tariffs, inland transportation costs, distribution and retailer mark-ups, and final state and federal taxes, and would take into account the total impact on Japan's CPI (Consumer Price Index) and consequently on inflation.
- A more technical approach would be to evaluate the impact of a Canal toll increase on Japan's inflation and GDP by performing an analysis to capture the relationship between major Japanese macroeconomic variables.
- A third option would be to focus on the final landed cost of each commodity. An increase in the cost of imports from a Canal toll increase will reduce the current account (exports minus imports), which is part of national income, and as a result reduce the output (GDP) of the Japanese economy, assuming that everything else is constant. Therefore, a Panama Canal toll increase would be equivalent to a transfer of income from Japan to Panama through a shift in the terms of trade.

After considering the above approaches within the context of the scope and goals of the present study, the ACP decided to pursue the third option, a general analysis of the impact of toll increases on the final landed cost of significant import commodities. The magnitude of the direct effect (e.g., inflation) of a given toll increase depends mainly on:

- The share of Japanese national income represented by the imports that are passing through the Panama Canal
- The Japanese economy's degree of dependence on these imports
- The ability of end-users to reduce their consumption and/or substitute alternative products or sources

Exhibit 5-28 shows the relative significance of international import trade to Japan's economy. From 1999 to 2003, Japan GDP grew by 2.9 percent per year, approximately 25 percent slower than merchandise imports over that same time period.



Source: Japan Statistics Bureau, World Trade Organization.

As mentioned above, approximately 80 percent of the commodities which are imported to Japan and transit the Canal were analyzed in order to determine their share in CIF value of total imports and of GDP. The following table, Exhibit 5-29, illustrates the relevant values used for this analysis.

Exhibit 5-29

Canal-Relevant Japanese Imports Analyzed
(US\$, current prices)

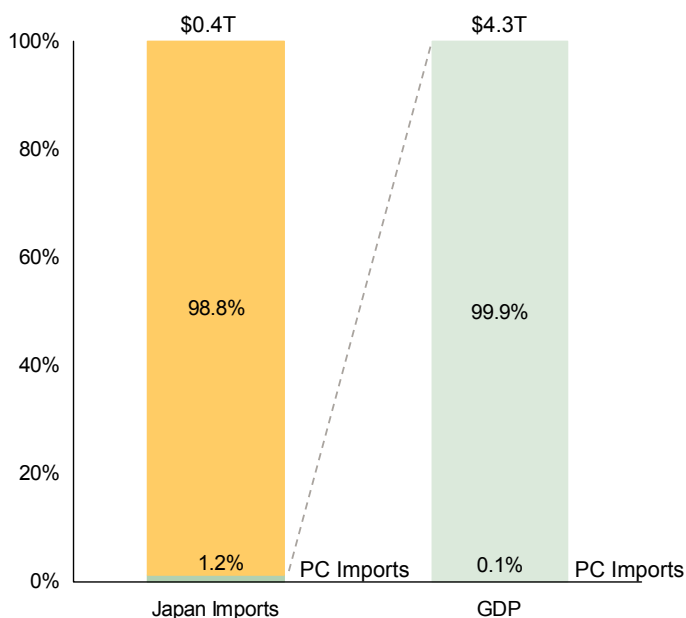
Commodity	Canal Share	Canal Transit Tons 2003	Average CIF/Ton	CIF Value of Canal Transit Tons
Corn	52.4%	12,558,242	\$ 132	\$ 1,652,901,617
Soybeans	15.1%	3,614,117	\$ 278	\$ 1,004,366,998
Lumber	1.7%	406,830	\$ 350	\$ 142,298,453
Sorghum	3.3%	798,908	\$ 140	\$ 111,617,787
Container cargo	6.4%	1,544,190	\$ 1,078	\$ 1,664,851,654
Other	21.0%			
Total CIF Value of Panama Canal Transit Tons				\$ 4,576,036,508

Source: ACP, Japan Customs Data, US Census Bureau, US Waterborne Commerce Databank.

In 2003, Japanese imports transiting the Panama Canal accounted for 1.2 percent of total goods imports (valued in CIF terms). Additionally, imports transiting the Panama Canal represented 0.1 percent of Japan’s GDP in 2003. This shows that Japan has a very low dependence on Panama Canal imports, and that these imports have a low impact on Japan’s GDP (Exhibit 5-30).

Exhibit 5-30

Canal Relevant Imports and Japan’s GDP and Goods Imports: 2003
(US\$ trillion, current prices)



Source: ACP, WTO, World Bank, Japan Customs Data, and US Waterborne Commerce Databank.

In 2003, Japan's current account was US\$136 billion, or 3.141 percent of GDP. An increase in imports prices, due to an increase in Canal tolls, will increase the deficit and reduce the national income. Our analysis, however, determined that the impact would be nearly imperceptible – even if tolls were increased by 200 percent for all Japanese imports that transit the Canal, the cost of total goods imports would grow by 0.018 percent, the current account would decrease slightly to 3.140 percent of GDP, and national income would drop by 0.002 percent.

With a drop in national income of only 0.002 percent, the impact on inflation would also likely be imperceptible. To put this in perspective, in the case of past oil price shocks, a decrease of 0.4 percent of GDP was required to generate an 0.5 percent increase in inflation in OECD countries.

6

Assessment of Impact of Panama Canal Transit Cost Changes

The analysis in section 5 determined that an increase in the Panama Canal tolls would not have a significant effect on the final landed cost of Japan's Canal-relevant import and export commodities. In this section, we summarize the impacts of Panama Canal transit cost changes on Japan's economy as a whole.

6.1 Impact of Transit Cost Changes for Exports

Eight major export commodities (representing approximately 80 percent of Japan's export tonnage that transits the Panama Canal¹³) were determined to be significantly Canal-relevant and analyzed in detail in this study. The following factors were analyzed for each of these commodities to determine the impact of an increase in the Canal toll on related industries and the Japanese economy as a whole:

- The portion of the exported commodity that transits the Canal
- The relative importance of the commodity to total Japanese exports
- The Canal transit cost impact on the final landed cost of the commodity (CIF)

6.1.1 Exported Commodities that Transit the Canal

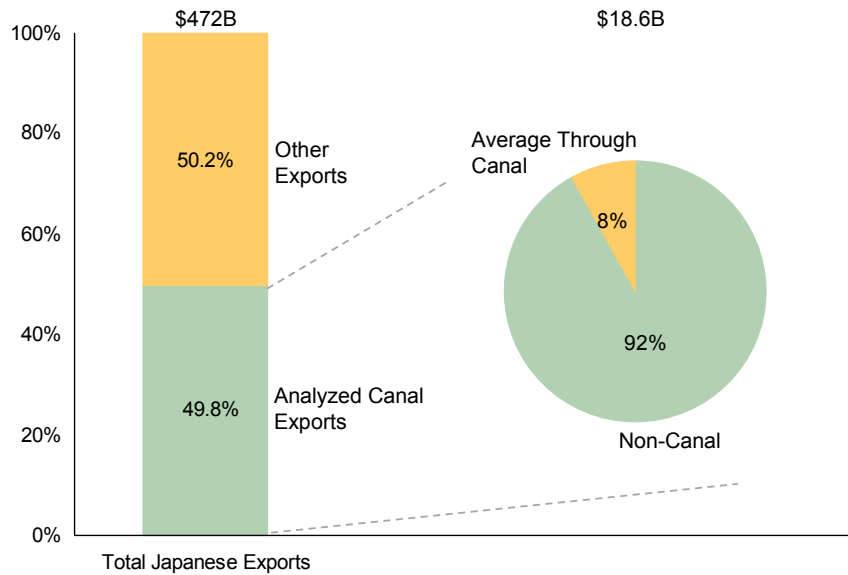
Overall, Panama Canal relevant exports analyzed in this report make up only 3.9 percent of total Japanese exports. As shown in Exhibit 6-1, the analyzed export commodities

¹³ This 80 percent includes total tons of containerized exports, although not all containerized exports were analyzed individually in this report.

represented approximately 50 percent of total Japanese export value in 2003; approximately 8 percent of this value transited the Panama Canal.

For seven of the eight commodities, the portion of exports that transit the Canal represents less than one-fifth of each commodity’s total export value. For the remaining commodity, natural coke-coal, 41 percent of exports in value terms transit the Canal.

Exhibit 6-1
Panama Canal Transit Share of Analyzed Exports
 (US\$ billions)



Source: ACP, US Waterborne Commerce Databank, WTO, US Census Bureau.

6.1.2 Commodity Importance Relative to Japan’s Exports

In 2003, only two of the Canal-relevant export commodities analyzed made up more than 5 percent of total Japanese exports. Combined, these two exports, autos & trucks (21 percent) and machinery & mechanical appliances (20 percent), accounted for 41 percent of Japan’s total exports. However, only 15 percent and 2.8 percent of Japan’s exports of these two commodity groups transit the Panama Canal.

Natural coke-coal, for which a significant portion of total exports move through the Canal, does not represent a significant portion of total Japanese exports. Total exports of natural coke accounted for only 0.05 percent of Japan’s total exports, and the portion passing through the Canal accounted for only 0.02 percent.

6.1.3 Canal Transit Cost Impact on Final Landed Cost

For each export discussed in this report, Canal transit cost was analyzed to determine its importance to the final landed cost (CIF) of the commodity. The analysis determined that the total Canal transit cost for 7 of the 8 analyzed commodities represented less than 0.5 percent of the commodity's CIF. Therefore, even with a 200 percent increase in the Panama Canal toll (the highest increase calculated in the study) for these 7 commodities, none of these commodities would experience an increase in total landed cost of more than 1.0 percent.

In the case of autos & trucks and machinery & mechanical appliances, which as noted above are significant exports relative to Japan's total exports, a Canal toll increase of 200 percent would cause CIF to rise by only 0.6 percent for autos & trucks and 0.1 percent for machinery & mechanical appliances. While both trades have high CIF values per ton, making them significant to the Japanese economy overall, this also serves to reduce the impact of a Canal toll increase on final landed cost (CIF) – since generally the higher a commodity's total CIF, the lower the Canal transit cost (toll plus other marine services) will be as a percentage of CIF.

Exhibit 6-2
Summary of Canal Relevant Exports Analysis by Commodity
 (US\$ billions)

Commodity	1. FOB Value of Canal Exports	2. Canal Share of Total Exports	3. Total Export Value	4. Commodity Exports Share of Japanese Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
Natural coke-coal	\$0.1	40.7%	\$0.2	0.1%	2.5%	4.2%
Autos and trucks	\$14.1	14.6%	\$96.9	20.5%	0.4%	0.6%
Iron and steel	\$0.7	3.3%	\$20.9	4.4%	0.3%	0.5%
<i>Container Cargo</i>	\$6.6					
Machinery and Mechanical Appliances	\$2.6	2.8%	\$94.7	20.1%	0.1%	0.1%
Container iron and steel	\$0.2	17.1%	\$1.1	0.2%	0.3%	0.4%
Rubber	\$0.3	4.4%	\$6.9	1.5%	0.2%	0.4%
Paper & paperboard	\$0.2	9.0%	\$2.3	0.5%	0.2%	0.3%
Plastics	\$0.4	3.0%	\$12.2	2.6%	0.1%	0.2%

Source: ACP, Japan Customs Bureau, US Waterborne Commerce Databank, UN COMTRADE, US Census Bureau.

Description of columns:

- 7 The merchandise FOB value of the Canal-relevant portion of exports for each commodity
- 8 The percent of the total FOB export value for each commodity that transited the Canal
- 9 The total FOB value of all Japanese exports of each commodity, regardless of transportation mode or route
- 10 The percent of total Japanese exports FOB value (US\$472 billion) accounted for by each commodity

Assessment of Panama Canal Transit Cost Changes on the Japanese Economy

- 11 The percent of the final landed cost (CIF) of each commodity accounted for by the total Canal transit costs (toll, other marine services) of that commodity
- 12 The percent change in the CIF as a result of a 200 percent increase in the Panama Canal toll for ships carrying this commodity

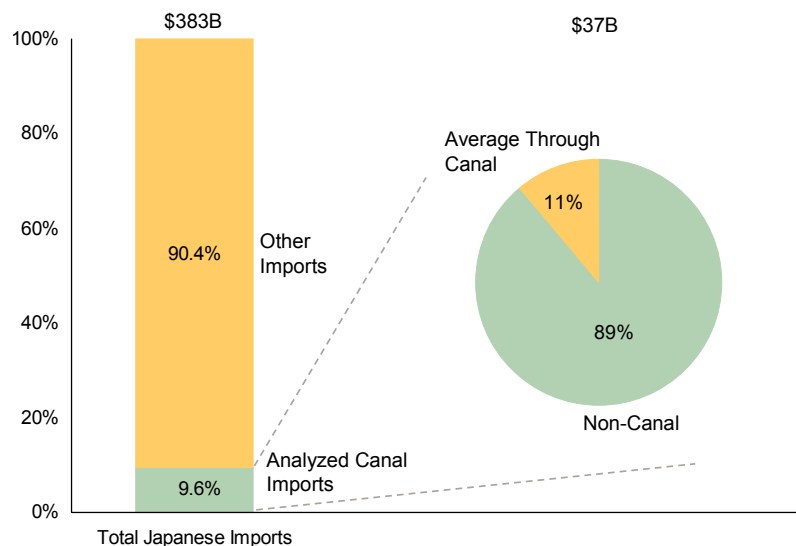
Natural coke-coal is the one commodity for which a 200 percent increase in the Canal toll would have a significant impact, of 4.2 percent, on its CIF. However, natural coke has a very low value per ton, does not make up a significant portion of Japan's exports in value, and therefore, would not significantly impact the Japanese economy. In fact, as described in the previous section, the Canal-relevant portion of Japan's natural coke exports accounted for only 0.02 percent of total exports in 2003.

6.2 Impact of Transit Cost Changes for Imports

The total value of the Canal-relevant import commodities analyzed in this report account for approximately 10 percent of Japan's total US\$383 billion in imports, and only 11 percent of the value of these analyzed commodities transited the Canal (Exhibit 6-3).

An analysis of Japan's Canal-relevant import commodities determined that the effect of a Canal toll increase on the total cost of Japan's imports and on GDP would be negligible. If the toll were to increase by 200 percent, the cost of total Japanese imports would increase by only 0.018 percent, causing a very slight decline in GDP of 0.002 percent.

Exhibit 6-3
Panama Canal Transit Share of Analyzed Imports
(US\$ billions)



Source: ACP, US Waterborne Commerce Databank, WTO, US Census Bureau.

Considering the very small increase in import cost represented by an increase in Canal transit costs, and the fact that the Canal toll is only one of many costs involved in bringing a commodity from origin to destination and impacting a commodity's final cost

to the end consumer, the Canal transit cost increase would not be a significant contributor to inflation.

6.3 Conclusions

The effect of a Panama Canal toll increase would not have a significant impact on Japan's economy, or on the principal industries that provide Canal-relevant export commodities.

For imports, the Canal toll represents a very small portion of the final landed cost (CIF) and the most significant Canal-relevant imports that were analyzed in the report only account for 4 percent of total Japanese imports. Additionally, even a large Canal toll increase would have virtually no effect on the cost of total Japanese imports or on GDP. For exports, seven out of eight of the analyzed Canal-relevant commodities transit less than 20 percent of their value through the Canal. For the remaining commodity, natural coke-coal, 41 percent of exports value transits the Canal. However, this commodity represents only 0.02 percent of Japan's total exports.

Finally, the larger question facing the Japanese economy with regard to the Canal is less whether the transit cost changes examined would have a significant impact, but rather whether the Canal will have sufficient capacity available to meet demand in the future, while providing an adequate level service. The implications for the critical supply chains that serve Japan's economy of a deterioration in service – because of increased waiting times or decreased reliability, for example – in the event that capacity is insufficient to meet demand, would be substantially more important than the cost increases that have been examined. Hence, the need to add capacity to the Canal – recognizing that the capital expense will have to be paid for through tolls – is the more critical issue facing the Japanese economy, rather than the essentially negligible impact of the transit cost increases examined in this study.

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