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Assessment of the Impact of Changes in Canal Transit Costs on the Economies of Ecuador, Chile, Peru, China, US, and Japan

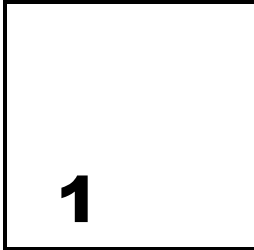


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Executive Summary

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.

The ACP therefore commissioned Mercer Management Consulting, Inc. to undertake such an analysis. Mercer is one of the largest consultancies in the world dedicated to transportation, and assisted the ACP in the development of the 2004 Panama Canal Demand Forecast Study.

The ACP selected six countries for analysis: the United States, China, Japan, Chile, Ecuador, and Peru. Mercer undertook a separate study of each country, which included:

- A high-level overview of that country's sea trade and trade in relation to the Panama Canal
- 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 the country's economy (representing in most cases approximately 80 percent of total volume that trades through the Canal to and from that country)

For each commodity, the analysis examined the relevance of Canal-based traffic to overall country imports and exports and the impact of transit cost increases on overall landed costs and the country's economy.

Finally, Mercer developed a robust report for each country that can serve as communication and lobbying tool to address the major concerns around Canal transit cost increases and their impact on trade.

Mercer's analysis determined that the United States, China, and Japan should not have major concerns regarding Canal transit cost increases, as their economies have a relatively low dependence on the Canal. In most cases, only a small portion of export/import commodities traded by these countries transit the Canal, or those goods moving through the Canal represent a very small portion of the country's GDP.

Chile, Ecuador, and Peru have a higher sensitivity to Canal cost increases, particularly for certain export commodities. Overall, however, their economies will not be materially affected by Canal toll increases.

United States

The United States is moderately dependent on sea trade, but has little dependence on the Panama Canal. US merchandise exports are also decreasing relative to total trade as the US moves increasingly toward a service economy. The US remains however the world's largest exporter of a number of agricultural products and natural resources, including corn, soybeans, wheat, lumber, and petroleum coke.

Twelve Canal-relevant export commodities were analyzed for this study. Only three commodities – corn, soybeans, and wood pulp – have more than a quarter of export value transiting the Canal. Corn and wood pulp account for a very small percentage of total US exports, while the impact of up to a 200 percent Canal toll increase on landed costs for soybeans would be very low, and therefore unlikely to impact trade or the economy.

On the import side, a 200 percent increase in Canal tolls would increase total import costs by only 0.0028 percent and decrease GDP by 0.003 percent, with a negligible impact on inflation.

China

China is highly dependent on sea trade, but has little dependence on the Panama Canal. Manufactured goods make up nearly half of Chinese exports, and China is the largest exporter of many containerized commodities, including furniture, toys & games, footwear, and apparel.

Fourteen Canal-relevant export commodities from mainland China were analyzed for this study. None make up a significant portion of China's total exports; therefore up to a 200 percent Canal toll increase on landed costs for these commodities would be unlikely to impact trade or the economy.

Hong Kong exports were not analyzed, as domestic Hong Kong exports transiting the Canal represent only 0.15 percent of total Chinese exports. An increase in tolls for Hong Kong exports would not affect China's trade or economy

On the import side, a 200 percent increase in Canal tolls would increase total import costs by 0.007 percent and decrease GDP by 0.003 percent, with a negligible impact on inflation.

Japan

Japan is highly dependent on sea trade, but has little dependence on the Panama Canal. Ninety percent of Japan's Canal-relevant trade is with the United States. Japan has been increasingly exporting components to countries with lower labor costs for final assembly, and as a result is losing export market share for manufactured goods, particularly to China. Containerized cargo and autos & trucks make up a significant share of Japan's exports.

Eight Canal-relevant export commodities were analyzed for this study. One commodity, natural coke-coal, has a large proportion of exports transiting the Canal, but overall represents a very small portion of Japan's exports. An increase in Canal tolls therefore would be unlikely to impact trade or the economy.

On the import side, a 200 percent increase in Canal tolls would increase total import costs by only 0.0018 percent and decrease GDP by 0.002 percent, with a negligible impact on inflation.

Chile

Chile's trade is moderately dependent on sea trade and on the Panama Canal. Total sea trade has grown faster than trade transiting the Canal, however, mainly due to a shift in trade supply and demand to Asia. Chile's main exports are raw materials and natural resources; it is the world's largest exporter of copper.

Thirteen Canal-relevant export commodities were analyzed for this study. The landed cost of only one commodity, salt, would be highly impacted by an increase in Canal tolls, but this commodity represents a very small portion of Chile's exports. Additionally, fruit, copper, and wood exports make up a significant portion of Chile's total exports; however, the impact of up to a 200 percent Canal toll increase on landed costs would be very low, and therefore unlikely to impact trade or the economy.

On the import side, a 200 percent increase in Canal tolls would increase total import costs by only 0.11 percent and decrease GDP by 0.03 percent, with a negligible impact on inflation.

Ecuador

Ecuador's trade is highly dependent on waterborne cargo and moderately dependent on the Panama Canal. Ecuador mainly exports bananas, petroleum, and coffee, but in recent years has begun to diversify its exports in order to stabilize its economy.

Five Canal-relevant export commodities were analyzed for this study. Crude oil and bananas make up a significant portion of Ecuador's total exports. An increase in the Canal toll would not affect Ecuador's crude oil exports overall, but would likely change the transportation mode from waterborne to pipeline. For bananas, a 200 percent Canal toll increase would be minimal compared to recent increases in ocean freight rates; since these much larger rate increases have not affected demand growth, a toll increase also is unlikely to impact demand. Anticipated European tariff increases also will have a much larger impact on the cost of bananas.

On the import side, a 200 percent increase in Canal tolls would increase total import costs by 0.18 percent and decrease GDP by 0.04 percent, with a negligible impact on inflation.

Peru

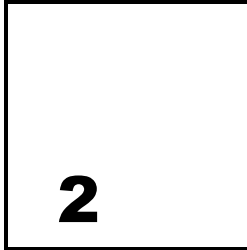
Peru's trade is highly dependent on sea trade and moderately dependent on the Panama Canal. Canal exports have been growing faster than total trade, but demand for Peruvian exports is gradually shifting to Asia. Peru's main exports are raw materials and natural resources; it is the world's largest exporter of fishmeal.

Seventeen Canal-relevant export commodities were analyzed for this study. The landed cost of only two commodities, salt and iron ore, would be highly impacted by an increase in Canal tolls, but these commodities represent a very small portion of Peru's exports. Additionally, zinc, copper, and fishmeal exports make up a significant portion of Peru's total exports; however, the impact of up to a 200 percent Canal toll increase on landed costs would be very low, and therefore unlikely to impact trade or the economy.

On the import side, a 200 percent increase in Canal tolls would increase total import costs by only 0.17 percent and decrease GDP by 0.02 percent, with a negligible impact on inflation.

* * * * *

In summary, given the analyses described above, it appears that there will be little impact on any of the countries' overall economies when tolls are raised. Some industries are highly cost sensitive, however, and thus the decision on increasing tolls should take into account possible demand shifts which could affect Canal transits and revenue.



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.

The ACP therefore commissioned Mercer Management Consulting, Inc. to undertake such an analysis. 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.

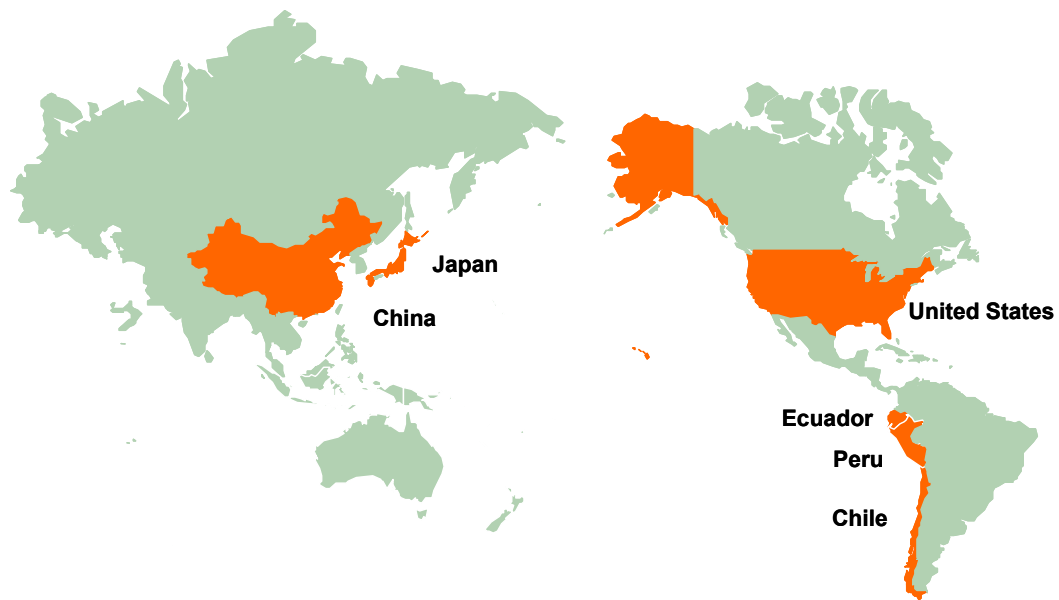
Mercer developed analyses for six stakeholder countries identified by the ACP: the United States, China, Japan, Chile, Ecuador, and Peru (Exhibit 2-1). For each country, Mercer developed a high-level overview of the country's trade in relation to the Panama

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 the country's economy.

The overall objectives of the study were as follows:

- Generate a clear understanding of each country's maritime trade
- Review historical Canal transit data to determine principal imported and exported commodities for each country
- Determine the relevance of this Canal-based traffic to the country'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 the country's economy
- Appraise the ability of different industries within the country to continue to compete despite the toll difference

Exhibit 2-1
Analyzed Stakeholder Countries



2.2 Approach to the Study

To address the commodities that are most relevant to each country's economy, Mercer focused on the highest-volume and highest-value imported and exported commodities that transit the Canal. Mercer aimed for a detailed analysis of approximately 80 percent of

total volume, where possible, that trades through the Canal to and from a particular country.

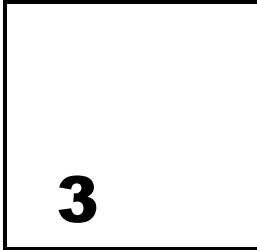
The analysis examined, for each commodity, the relevance of Canal-based traffic to overall country commodity imports and exports; the impact of transit cost increases on overall landed costs; the expected ability to pass on cost increases to end customers; and the overall impact on the country's economy.

The analysis involved the following work steps:

- *Overview of country's maritime trade:* Development of a high-level description of current sea trade, including commodities and main partners. This overview provides an understanding of the country's principal and alternative trade routes, the overall impact of the Panama Canal on shipping, and the impact of key commodity trades on the country'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 Mercer to decide which commodities transiting the Canal are significant to the country'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.
- *Economic impact on the country:* Determined the possible economic impact of potential toll increases for the country, based on the previous analyses, and assessed whether toll increases would have a significant impact on the country's economy and foreign trade.

Sources utilized by Mercer in developing its analyses included country transport and economy ministries, statistical databases, and customs bureaus; ACP databases, Eurostat, and the US Maritime Administration Waterborne Commerce databank. Specific sources used for each country analysis are cited in the report for that country.

Upon completion of the analysis for an individual country, Mercer developed a robust report for each country that can serve as a communication and lobbying tool to address the major concerns around Canal transit cost increases and their impact on trade. Approach and methodology information applicable across the country reports is detailed in section 3. The summary findings for each country report are presented in section 4.



Approach and Methodology for Individual Country Reports

This section provides an overview of the framework used for description and analysis across all of the individual country reports, together with the specific approaches and methodologies used to assess Canal-relevant commodities and the impact of Canal transit cost changes.

3.1 Country Reports Framework

Each country report contains the following major sections:

- 1. Executive Summary**
- 2. Introduction:** study context and approach
- 3. Overview of Country Sea Trade:** overview of principal imports/exports, key trade partners, key trade commodities, market trends and challenges
- 4. Country Trade and the Panama Canal:** overview of Canal-relevant trade routes, imports/export trade through the Canal, and key import/export commodities
- 5. Canal-Relevant Commodities Analysis:** methodology and individual analysis of principal export commodities and methodology and aggregate analysis of principal import commodities (see section 3.2 and 3.3 below for methodology)
- 6. Assessment of the Impact of Panama Canal Transit Cost Changes:** summary assessment of the overall impact of Panama Canal transit cost changes on exports,

imports, and the country's overall trade and economy (see section 3.4 below for approach)

3.2 Methodology for Analysis of Canal-Relevant Export Commodities

As mentioned previously, each principal Canal-relevant export commodity was 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 the country's trade and economy.

The methodology for analysis of export commodities was threefold:

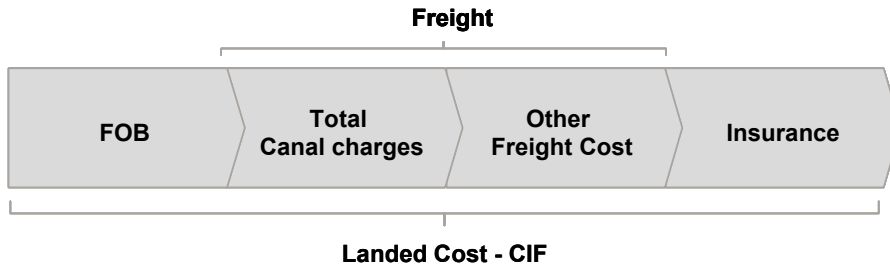
1. The relevance of Panama Canal tonnage transits for 1999-2003 to the overall trade in the commodity for the country was determined. Where possible, commodities were matched to the ACP's description of each category and HS 6-digits.
2. If the commodity tonnage transits through the Canal were above a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

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

- Total value of the exports of a specific commodity compared to total country exports
- Total value of the specific commodity transiting the Canal compared to the value of the country'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 transit cost. For the purposes of this analysis, landed cost was unbundled as shown in Exhibit 3-1.

Exhibit 3-1
Components of Landed Cost (CIF)



To determine total landed cost (CIF) for each exported commodity, the FOB, tonnage, and freight and insurance charges were obtained from data sources referenced in each individual country report. All costs are average values of all sea trade 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.:

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

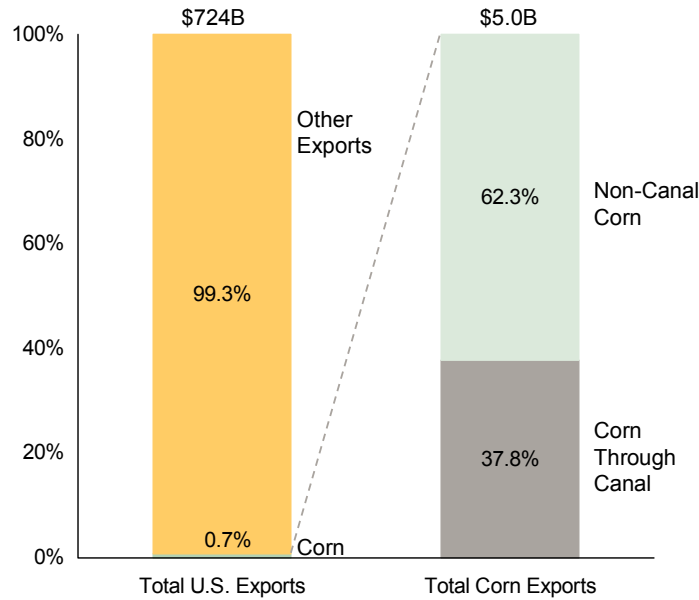
In the final step, a sensitivity analysis was applied to determine the potential increase in CIF for potential toll increase scenarios, including toll increases of 50, 100, 150, and 200 percent.

Example Analysis: US Corn Exports

The following example – US corn exports – demonstrates how this methodology was applied.

As described above, two analyses were carried out to determine the significance of Panama Canal corn transits with respect to the United States’ trade: total value of corn exports was compared to total US exports, and to the total value of corn transiting the Canal. These analyses determined that the value of total US corn exports in 2003 was US\$5.0 billion, which represented 0.7 percent of total US exports (Exhibit 3-2). Of this, 37.8 percent transited the Panama Canal.

Exhibit 3-2
Panama Canal Transit Share of Total US Corn Exports
 (US\$ billions)



Source: World Trade Organization, US Census Bureau of Statistics, US Waterborne Databank, ACP.

Exhibit 3-3 shows the cost components of the calculated CIF for US corn exports. Using the methodology described above, the analysis found that the total Canal transit cost represents 1.53 percent of the total landed cost for US export corn.

Exhibit 3-3
Total Canal Cost Share of US Exported Corn CIF (Landed Cost)
 (2003 values, US\$/ton)

	FOB	Charges (Freight & Insurance)	Canal Cost (Toll + OMS)	Total CIF	Canal Cost as % of CIF
Corn	\$111.99	\$17.62	\$2.01	\$131.63	1.53%

Source: US Census Bureau of Statistics, US Waterborne Databank, ACP.

A sensitivity analysis was then undertaken to determine the range of impacts of Panama Canal toll changes:

- Corn is a low-value bulk commodity, at US\$112 per ton FOB in 2003. Therefore, a large increase in the Canal toll, which represents 1.21 percent of the landed cost, would cause a moderate price change per ton (Exhibit 3-4).
- However, the United States is a dominant corn trading nation, with few alternative sources or product substitutes, and thus an increase in Canal toll would not affect the competitive landscape (i.e., no new producers or sources would emerge).

Exhibit 3-4

US Corn Exports: Sensitivity Analysis: CIF Increase vs. Toll Increase

Toll Increase	50%	100%	150%	200%
CIF Increase	0.60%	1.21%	1.81%	2.41%

Source: Mercer analysis.

In analyzing the commodity’s overall relevance to the US economy, it is evident that the US is the dominant producer of exported corn, and corn represents only 0.7 percent of US exports. Therefore, the impact of a Canal toll increase would not have a significant effect on the United States’ trade and economy nor on the industry’s role in the US economy.

3.3 Methodology for Analysis of Canal-Relevant Import Commodities

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

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 a country’s 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 CPI (Consumer Price Index) and consequently on inflation.
- A more technical approach would be to evaluate the impact of a Canal toll increase on inflation and GDP by performing an analysis to capture the relationship between major 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 a country’s economy, assuming that everything else is constant. Therefore, a Panama Canal toll increase would be equivalent to a transfer of income from an analyzed country 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, Mercer in conjunction with 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 a country's national income represented by the imports that are passing through the Panama Canal
- The country's economy's degree of dependence on these imports
- The ability of end-users to reduce their consumption and/or substitute alternative products or sources

Example Analysis: US Imports

The following example – US imports – demonstrates how this methodology was applied.

In 2003, US imports transiting the Panama Canal accounted for 6.4 percent of total goods imports (CIF value). Additionally, imports transiting the Panama Canal represented only 0.8 percent of US GDP in 2003. Thus, the Canal (and associated toll increases) are relevant for only a small portion of US imports, which represent an even smaller contribution to US GDP.

In 2003, the US current account deficit was US\$530.7 billion, representing 4.877 percent of GDP. An increase in import prices, due to an increase in Canal tolls, would increase the deficit and reduce national income. Our analysis, however, determined that the impact would be nearly imperceptible – even if tolls were increased by 200 percent for all US imports that transit the Canal, the cost of total goods imports would grow by 0.028 percent, the current account would increase to 4.8805 percent of GDP, and national income would drop by about 0.003 percent.

With a drop in national income of only 0.003 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 needed to generate an 0.5 percent increase in inflation in OECD countries.

3.4 Approach to Summary Assessment of the Impact of Canal Transit Cost Changes

After determining the impact of a Canal cost increase on the final landed cost of Canal-relevant country import and export commodities, Mercer summarized the impacts of Panama Canal transit cost changes on the country's overall trade and economy.

Impact of Transit Cost Changes for Exports

The following factors were analyzed for export commodities to determine the impact of an increase in the Canal toll on related industries and the country's economy:

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

For example, in the case of the United States:

- For nine of the twelve analyzed commodities, the portion of exports that transit the Canal represents less than one-quarter of each commodity's total export value. Only three commodities have more than a quarter of their export value moving through the Canal: containerized wood pulp, corn, and soybeans – and none of these represent a significant portion of total US exports.
- Of the 12 Canal-relevant commodities analyzed, total exports of only two are significant in relation to total US exports: miscellaneous chemicals and plastics. However, a Canal toll increase of 200 percent would cause total landed cost (CIF) to rise by less than 0.5 percent.
- For 11 of the 12 analyzed commodities, even with a 200 percent increase in the Panama Canal toll, none of these commodities' would experience an increase in total landed cost of more than 2.5 percent. For petroleum coke, a 200 percent increase in the Canal toll would be equal to 5.8 percent of CIF, but Canal-relevant petcoke represents only 0.02 percent of US exports, and therefore, an increase in Canal transit costs for this commodity would not significantly impact the US economy.

Impact of Transit Cost Changes for Imports

The following factors were analyzed for import commodities to determine the impact of an increase in the Canal toll on related industries and the country's economy:

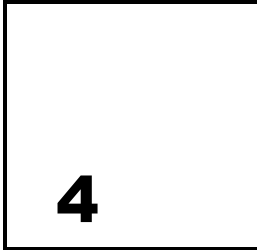
- The portion of imported commodities that transits the Canal
- The relative importance of the analyzed commodities to total imports
- The Canal transit cost impact on the total cost of imports, GDP, and inflation

For example, in the case of the United States:

- The total value of the Canal-relevant import commodities analyzed account for 57 percent of the United States' total imports of US\$1.3 trillion, but only 6 percent of the value of these analyzed commodities transited the Canal.
- An analysis of US Canal-relevant import commodities determined that the effect of a Canal toll increase on the total cost of US imports and on GDP would be negligible. If the toll were to increase by 200 percent, the cost of total US imports would increase by only 0.028 percent, with a minimal impact on GDP of -0.003 percent.
- 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.

Overall Impacts of Transit Cost Changes

Finally, Mercer determined the overall effect of a Panama Canal toll increase on the analyzed economies. Mercer also assessed the impact of transit cost increases in relation to the larger issue of the potential impact on critical supply chains and countries' economies should Canal capacity become constrained.



Summary Findings for Individual Country Analyses

4.1 United States

Mercer analyzed approximately 80 percent of total volume that trades through the Canal to and from the United States.

US Waterborne Trade

The United States is the world's largest trading nation. Total international US trade has been growing nearly twice as fast as GDP since 1990 and accounted for 18 percent of GDP in 2003. US imports have been increasing faster than exports over the past decade, and currently account for 63 percent of US international trade by value. Nevertheless, US merchandise exports continue to rise compared to the production of tradable goods.

Waterborne commerce accounts for approximately 60 percent of US international trade, or approximately US\$807 billion in 2003; three-quarters of this trade is imports. Maritime imports have grown by 7.1 percent while exports have declined by 1.5 percent annually since 1997. In terms of modal share, water transport accounts for 78 percent of US trade by weight, and 41 percent of trade by value.

The United States' top 25 maritime trade partners account for nearly 80 percent of trade value and tonnage. On the export side, the Asian countries as a trading bloc import more from the United States than any other region, with Europe (including the UK) as the second largest destination for maritime exports. Asia (particularly China) and Europe are also the major sources for US imports. In terms of growth, US trade has been gradually shifting away from traditional partners such as Europe and Japan, and toward industrializing economies such as China and Mexico.

Overall, the mix of commodities making up US imports/exports has shifted considerably in the past two decades, and will likely continue to shift due to changing consumer demand, the opening of more global markets, and the need for new energy sources. One area of strong growth has been manufactured goods, which accounted for 85 percent of the value of US merchandise trade in 2001. At the same time, trade in natural resources and raw minerals has declined in share.

US Trade Through the Panama Canal

The majority of US trade that passes through the Panama Canal travels between East Coast US and Asia, East Coast US and South America, and West Coast US and Europe. By far the largest recipients of US exports passing through the Panama Canal are the North Pacific Asian nations, primarily China, Japan, and South Korea. In 2003, this region received more than half of the weight of total US exports to the rest of the world that travel through the Canal.

Since 1999, the aggregate weight of US exports transported by sea, and the amount of tons passing through the Panama Canal specifically, have both declined at approximately 1 percent per year. The most prominent exports by weight are corn, soybeans, and containers, which together represent over half of US exports transiting the Canal. Containers, petroleum, soybeans, and scrap metal have grown in terms of share of US export tonnage transiting the Canal during 1999-2003, while lumber, corn, chemicals, wheat, and phosphates have lost share. On average during 1999-2003, 50 percent more US exports by weight than imports moved through the Panama Canal.

Export Commodities Analysis

Overall, Panama Canal relevant US exports, including all containerized cargo, make up only 3.4 percent¹ of total US exports. As shown in Exhibit 4-1, the export commodities analyzed for this study represented approximately 13 percent of total US export value in 2003.

For nine of the twelve commodities, the portion of exports that transit the Canal represent less than one-quarter of each commodity's total export value. Only three commodities have more than a quarter of export value moving through the Canal – containerized wood pulp, corn, and soybeans.

Only two Canal-relevant commodities are significant in relation to total US exports: miscellaneous chemicals (3.4 percent of total US exports) and plastics (3.9 percent). However, a Canal toll increase of even 200 percent (the maximum analyzed in this study, with other marine services cost held constant) would cause total landed cost (CIF) to rise

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

by only 0.3 percent for misc. chemicals and 0.4 percent for plastics. While both trades have high CIF values per ton, making them significant to the US economy overall, this also serves to reduce the impact of a Canal transit cost increase on final landed cost (CIF) – since generally the higher a commodity’s total CIF, the lower the Canal transit cost will be as a percentage of CIF.

For 11 of the 12 analyzed commodities, the total Canal transit cost represents less than 2.0 percent of the commodity’s CIF. Even with a 200 percent increase in the Panama Canal toll for these 11 commodities, none of these commodities would experience an increase in total landed cost of more than 2.5 percent.

Petroleum coke is the one commodity for which a 200 percent increase in the Canal toll would have more of an impact, totaling 5.8 percent of CIF. However, the value of Canal-relevant petroleum coke represents only 0.02 percent of US exports.

Exhibit 4-1
Canal-Relevant US Exports Analyzed²

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 US Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
Corn	\$1.89	37.8%	\$5.02	0.7%	1.5%	2.4%
Soybeans	\$3.31	41.7%	\$7.94	1.1%	0.7%	1.2%
Miscellaneous chemicals	\$5.16	20.9%	\$24.62	3.4%	0.2%	0.3%
Miscellaneous fertilizers	\$0.51	22.0%	\$2.34	0.3%	1.4%	2.1%
Petroleum coke	\$0.13	11.8%	\$1.13	0.2%	3.7%	5.8%
Wheat	\$0.41	10.4%	\$3.96	0.5%	1.2%	1.9%
Miscellaneous lumber	\$0.05	1.2%	\$3.75	0.5%	0.9%	1.5%
Scrap metal	\$0.75	16.0%	\$4.73	0.7%	0.6%	1.0%
<i>Container Cargo</i>	\$13.60					
Wood pulp	\$0.39	28.4%	\$1.37	0.2%	1.9%	2.9%
Salt, sulfur, earth, cement	\$0.18	12.0%	\$1.53	0.2%	1.2%	1.8%
Paper	\$1.05	10.2%	\$10.26	1.4%	0.5%	0.7%
Plastics	\$2.91	10.4%	\$27.92	3.9%	0.3%	0.4%

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

² Description of columns for all analyzed export tables presented in this report section:

1. The merchandise value of the Canal-relevant portion of exports for each commodity
2. The percent of the total export value for each commodity that transits the Canal
3. The total value of all exports of each commodity, regardless of transportation mode or route
4. The percent of total exports value accounted for by each commodity
5. The percent of the final landed cost (CIF) of each commodity accounted for by the total Canal transit cost (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 4-2. In 2003, US imports transiting the Panama Canal accounted for 6.4 percent of total goods imports (CIF value). Additionally, imports transiting the Panama Canal represented 0.8 percent of US GDP in 2003.

In 2003, the US current account deficit was US\$ -530.7 billion, or 4.877 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 the US deficit and national income: Even if tolls were increased by 200 percent for all US imports that transit the Canal, the cost of total goods imports would grow by only 0.028 percent, the current account would increase from 4.8770 to 4.8805 percent of GDP, and national income would drop by about 0.003 percent, with a negligible impact on inflation.

Exhibit 4-2
Canal-Relevant US Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003 (millions)	Average CIF/Ton	CIF Value of Canal Transit Tons (US\$B)
Iron and Steel	10.9%	5.74	\$ 748	\$ 4.23
Salt	7.7%	4.05	\$ 21	\$ 0.08
Crude Petroleum	5.5%	2.89	\$ 208	\$ 0.59
Petroleum Products	2.0%	1.03	\$ 303	\$ 0.31
Coke-Coal	4.2%	2.22	\$ 109	\$ 0.24
Petroleum Coke	0.6%	0.34	\$ 64	\$ 0.02
Gasoline	4.8%	2.54	\$ 222	\$ 0.55
Ores	4.7%	2.49	\$ 48	\$ 0.12
Chemicals Misc.	4.1%	2.17	\$ 1,093	\$ 2.33
Cement	3.9%	2.06	\$ 48	\$ 0.10
Autos and Trucks (Boxed and Unboxed)	3.3%	1.72	\$10,618	\$ 18.02
Container Cargo	26.3%	13.81	\$ 4,177	\$ 56.81
Other	21.9%			
Total CIF Value of Panama Canal Transit Tons (US\$B)				\$ 83.40

Source: ACP, Mercer analysis.

4.2 China

Mercer analyzed approximately 70 percent of total volume that trades through the Canal to and from China.

Chinese Waterborne Trade

In 2003, with a GDP of US\$1,412 billion, mainland China's economy was the seventh largest in the world. In the last decade, China has taken important steps to open its economy to foreign nations and integrate itself into the world trading system. Mainland Chinese exports have been growing by 21 percent a year recently, more than twice as fast as GDP. Exports now represent a third of GDP and total trade nearly two-thirds of GDP. In 2003, China transported around 89 percent of its international trade volume by sea.

To ensure a thorough analysis of China's trade, the ACP also analyzed international trade for Hong Kong, which became a Special Administrative Region (SAR) of China in 1997. During the last decade, Hong Kong's merchandise domestic exports declined by 4 percent annually while its merchandise imports grew by 6 percent. Re-exportation represents nearly all of Hong Kong's international trade; as part of China, Hong Kong's contribution to total³ Chinese domestic exports is only 3 percent. Hong Kong's key role is primarily as a source for advanced services and a provider of modern maritime transportation infrastructure. Hong Kong transports about 59 percent of its trade volume by sea.

In 2003, mainland China's main trade partners were Japan, the United States, the European Union, Hong Kong, and the Republic of Korea. Those five regions/countries represent about 62 percent of China's merchandise trade. Hong Kong's main trading partners are mainland China, the United States, and the European Union.

Mainland China is expected to continue to primarily produce consumer goods with imported components; thus the manufacturing industry is a main driver for exports and imports. Top export commodities by value include office and telecommunications equipment, textiles, electrical machinery and computer equipment, and toys. Mineral products, however, make up 45 percent of China's seaborne exports by weight. Hong Kong's main domestic exports are clothing and accessories, which represent 40 percent of total domestic exports.

Chinese Trade Through the Panama Canal

The majority of mainland Chinese and Hong Kong trade that passes through the Panama Canal travels to/from the East Coast US, with smaller trades to East Coast South America, East Coast Canada, and the West Indies. In 2003, mainland Chinese trade transiting the Canal

³ Hong Kong and mainland China.

represented 5 percent of Chinese sea trade. Total Chinese trade (mainland China and Hong Kong) represented 19 percent of the total tonnage transiting the Panama Canal.

During the last five years, total Chinese export Canal traffic grew by an average of 22 percent annually. Mainland China imports more than it exports through the Canal in tonnage terms, however. Key exports transiting the Canal include natural coke, ores, iron and steel, furniture, and a range of containerized commodities. Soybeans, misc. fertilizers, and phosphates make up more than half of mainland China's Canal-relevant import commodities.

Hong Kong exports and imports mainly containerized merchandise through the Canal. It should be noted, however, that Hong Kong's domestic exports transiting the Canal represent only 0.15 percent of total Chinese exports. Thus it does not appear that an increase in the Canal transit cost for Hong Kong's domestic exports would have a significant impact on the Chinese economy as a whole. Therefore, this study did not further directly analyze domestic Hong Kong production or the impact of a potential increase in the Canal toll for Hong Kong trade, but focused on analyzing mainland Chinese trade and its impact on the Chinese economy.

Export Commodities Analysis

Overall, Panama Canal-relevant Chinese exports, including all containerized cargo, make up only 3.1 percent of total Chinese exports. The analyzed export commodities represented approximately 66 percent of total Chinese export value in 2003; approximately 5 percent of this value transited the Panama Canal (Exhibit 4-3).

For 13 of the 14 commodities, the portion of exports that transit the Canal represents less than one-fifth of each commodity's total export value. Only one commodity has slightly more than a fifth of export value moving through the Canal: toys, games & sports requisites (21.5 percent of exports by value).

In 2003, no Chinese export commodity constituted more than 1 percent of total Chinese exports. Of the fourteen Canal-relevant commodities analyzed, only three accounted for 0.5 percent or more of Chinese exports: toys, games & sports requisites, furniture and light fittings, and machinery and mechanical appliances. The small volume of each commodity's exports that transit the Canal, however, reduces the impact of any transit cost changes on the Chinese economy as a whole.

For all of the analyzed commodities, the total Canal transit cost represents less than 2.0 percent of the commodity's CIF. Therefore, even with a 200 percent increase in the Panama Canal toll, none of these commodities would experience an increase in total landed cost of more than 2.5 percent.

Exhibit 4-3
Canal-Relevant Chinese Exports Analyzed²

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 China Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
Natural coke	\$ 169	10%	\$ 1,675	0.4%	1.4%	2.3%
Iron & Steel: Bulk	\$ 92	1%	\$ 12,863	2.9%	1.0%	1.5%
Misc. Ores	\$ 107	19%	\$ 568	0.1%	1.2%	1.9%
Petroleum products (incl. gasoline)	\$ 147	3%	\$ 5,401	1.2%	0.9%	1.4%
Misc. Fertilizers	\$ 23	3%	\$ 738	0.2%	1.3%	2.1%
Coke Petroleum	\$ 16	19%	\$ 88	0.02%	1.6%	2.5%
<i>Containerized cargo</i>						
Furniture & Lighting Fittings	\$ 2,435	19%	\$ 12,899	2.94%	0.4%	0.5%
Toys, Games & Sports Requisites	\$ 2,852	21%	\$ 13,282	3.03%	0.2%	0.3%
Plastics & Plastics Products	\$ 861	9%	\$ 9,990	2.28%	0.2%	0.4%
Machinery & Mechanical Appliances	\$ 2,383	3%	\$ 83,406	19.02%	0.1%	0.2%
Electrical Machinery & Equipment	\$ 1,935	2%	\$ 89,040	20.31%	0.1%	0.2%
Footwear	\$ 1,007	8%	\$ 12,957	2.96%	0.1%	0.2%
Paper & Paperboard Articles	\$ 145	8%	\$ 1,709	0.39%	0.2%	0.3%
Articles of Apparel & Clothing Accessories	\$ 628	1%	\$ 45,772	10.44%	0.1%	0.1%
Iron and steel: Containerized cargo	\$ 602	5%	\$ 12,864	2.93%	0.2%	0.3%

Source: ACP, US Waterborne Databank, UN COMTRADE.

Import Commodities Analysis

The import commodities analyzed in this study are shown in Exhibit 4-4. In 2003, Chinese imports transiting the Panama Canal accounted for 0.7 percent of total merchandise imports (valued in CIF terms). Additionally, Chinese imports transiting the Panama Canal represented only 0.3 percent of Chinese GDP in 2003. Thus, the Canal (and associated toll increases) are relevant for only a small portion of Chinese imports, which represent an even smaller contribution to China's GDP.

In 2003, China's current account surplus was US\$60.1 billion, or 3.8 percent of GDP. The analysis determined that an increase in import prices, due to an increase in Canal tolls, would have a very small impact – even if Canal tolls were increased by 200 percent for all Chinese imports that transit the Canal, the cost of total goods imports would grow

by 0.007 percent, the current account would remain at 3.8 percent of GDP, and national income would drop by about 0.003 percent, with a negligible impact on inflation.

Exhibit 4-4

Canal-Relevant Chinese Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003 (millions)	CIF/Ton	CIF Value of Canal Transit Tons (US\$M)
Soybeans	27%	3.92	\$ 261	\$ 1,023.07
Fertilizers, misc.	15%	2.19	\$ 194	\$ 424.87
Scrap metal	4%	0.60	\$ 258	\$ 154.74
Iron & steel	3%	0.39	\$ 535	\$ 205.92
Chemicals	3%	0.41	\$ 1,631	\$ 661.17
Petroleum coke	1%	0.09	\$ 56	\$ 5.09
Container cargo	18%	2.67	\$ 790	\$ 2,110.81
Other	30%	2.19		
Total CIF Value of Panama Canal Transit Tons (US\$M)				\$ 4,585.67

Source: Mercer analysis, UN COMTRADE and US Waterborne Commerce 2003 database.

4.3 Japan

Mercer analyzed approximately 80 percent of total volume that trades through the Canal to and from the Japan.

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.

Export Commodities Analysis

Overall, Panama Canal-relevant exports analyzed in this report make up only 3.9 percent of total Japanese exports. As shown in Exhibit 4-5, 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.

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 4-5
Canal-Relevant Japanese Exports Analyzed²

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.

Import Commodities Analysis

The import commodities analyzed in this study are shown in Exhibit 4-6. 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 4-6
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.

4.4 Chile

Mercer analyzed approximately 80 percent of total volume that trades through the Canal to and from Chile.

Chilean Waterborne Trade

Chile is one of South America's strongest economies, with GDP of US \$89 billion in 2004. Chile's total international trade grew by an annual compound rate of 2 percent during 1996-2004, with exports growing more than twice as fast as imports. Chile is highly dependent on exports for continued growth, as its internal consumption rate is lower than its production capacity. Waterborne commerce accounts for approximately 69 percent of Chile's international trade, including 80 percent of exports and 50 percent of imports.

The Asociación Latino Americana de Integración⁴ (ALADI) countries, the United States, the European Union, Japan, China, South Korea, and Taiwan account for the majority of Chile's sea trade. Asia is the top destination for Chilean exports by sea, followed by Europe. The EU is also Chile's largest source of imports by sea.

Chile's major exports by sea include copper and other minerals, forest products, chemicals, and agricultural products. On the import side, major import categories include fuels, grain, chemicals, and containerized cargo. Key trends that are expected to drive

⁴ México, Cuba, Venezuela, Colombia, Ecuador, Perú, Bolivia, Paraguay, Uruguay, Argentina, Chile and Brazil.

growth in Chilean imports/exports going forward including Chile's improving competitiveness in merchandise manufacture and exporting, the signing of new free trade agreements with the US and Europe, and the continued expansion of newly industrializing economies, particularly in Asia.

Chilean Trade Through the Panama Canal

The majority of Chilean trade that passes through the Panama Canal travels to/from the East Coast US, Europe, and East Coast South America/Central America. More than a quarter of Chile's sea imports/exports by weight transit the Canal. The East Coast US accounts for nearly half of Chile's Canal-relevant exports and nearly a third of its imports; Europe accounts for 30 percent of Chile's Canal-relevant exports and 23 percent of its imports.

Chile's overall sea export tons increased by 6 percent a year during the past decade, while exports through the Panama Canal increased by 7.8 percent per year. The most prominent exports by weight transiting the Canal include salt, container cargo, copper ore/metal, and fruit, which together represent nearly three-fourths of Chilean exports transiting the Canal.

Chile's imports through the Canal, on the other hand, decreased by an average 8 percent per year over the past decade, while total sea imports increased by 3 percent per year. The main reason for this difference in growth rates has been an increase in sea imports from South American and Asian countries that do not necessarily transit the Panama Canal. Container cargo, petroleum products, and fertilizers make up half of Chile's Canal-relevant imports.

Export Commodities Analysis

Overall, Panama Canal-relevant Chilean exports, including all containerized cargo, make up 27 percent of total Chilean merchandise exports. As shown in Exhibit 4-7, the export commodities analyzed for this study represented approximately 23 percent of total Chilean merchandise export value in 2003.

Of the 13 commodities analyzed in this report, Canal exported quantities account for different shares of each commodity's total exports. In some cases, like salt and containerized maize, all of Chile's exported quantities are transported through the Panama Canal. In other cases, only 20-50 percent of that commodity's exports are transported through the Panama Canal, including copper metal, copper ore, fruit, and wood products.

Exhibit 4-7

Canal-Relevant Chilean Exports Analyzed²

Commodity	1. FOB Value of Canal Exports (US\$M)	2. Canal Share of Total Exports	3. Total Export Value (US\$M)	4. Commodity Exports Share of Chile's Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
<i>Bulk</i>						
Salt	\$43.19	97.1%	\$44.50	0.2%	9.2%	14.2%
Copper metal	\$1,969.48	39.4%	\$5,001.06	9.5%	0.1%	0.2%
Copper ore	\$450.98	18.7%	\$2,410.36	2.2%	0.5%	0.8%
Fruit, refrigerated	\$466.50	29.2%	\$1,597.85	2.3%	1.0%	1.7%
Chemicals	\$24.85	1.4%	\$1,744.60	0.1%	1.4%	2.0%
Boards and planks	\$167.32	42.6%	\$393.05	0.8%	0.8%	1.2%
Pulpwood	\$41.21	4.6%	\$895.70	0.2%	1.0%	1.5%
Plywood and veneers	\$38.73	32.0%	\$121.21	0.2%	0.8%	1.2%
<i>Container</i>						
Wood products	\$589.45	48.2%	\$1,223.33	2.9%	0.6%	0.9%
Juice	\$69.67	28.7%	\$243.00	0.3%	0.4%	0.6%
Wine	\$315.70	46.6%	\$676.79	1.5%	0.2%	0.3%
Fruit	\$455.34	28.5%	\$1,597.85	2.2%	0.3%	0.5%
Maize seed	\$93.43	100.0%	\$93.43	0.5%	0.2%	0.3%

Only three Canal-relevant commodities are significant in relation to total Chilean exports: In 2003, total copper exports accounted for 35 percent of Chile's total exports, wood products exports accounted for 7 percent, and fruit accounted for 7 percent. The other analyzed commodities represent less than 4 percent of total exports each.

With the exception of salt, the Canal cost is not a significant portion of the CIF for any of the analyzed commodities; however, given the importance of copper, fruit, and wood to the Chilean economy, further analysis was carried out to understand the potential effects of an increase in Canal tolls on these commodities' demand.

- Copper:** Copper exports transiting the Canal are about 9.8 percent of total exports. This is a high value commodity and thus the Canal cost is a small portion of the total CIF cost; a maximum increase in Canal tolls of 200 percent would impact the refined copper CIF by only 0.22 percent and the copper ore CIF by 0.78 percent. Additionally, market dynamics, i.e., increasing European and Asian demand for copper and stable US demand, indicate that the market is not sensitive to small price increases, and that the larger challenge for Chile will be delivering sufficient copper to meet demand.

- **Fruit:** Fruit exports transiting the Canal represent four percent of total exports. Fruit transits as bulk and in containers. If Canal tolls were increased by 200 percent, the bulk fruit CIF would increase by 1.69 percent and container fruit CIF by 0.45 percent. Chilean fruit transiting the Canal mainly competes with New Zealand fruit, which would also be affected by an increase in tolls. Additionally, most fruit travels on bulk reefer trade routes that are captive to the Canal and not sensitive to small toll increases.
- **Wood:** Wood exports transiting the Canal are a relatively small percentage of total exports. A 200 percent increase in Canal tolls would increase the CIF by a maximum of only 1.5 percent, due to the high value of wood products. For all wood products, the most critical factor for Chilean exports is demand growth from Asian countries, which is not relevant to the Canal.
- **Salt:** Nearly all Chilean salt exports transit the Canal bound for the East Coast US. The landed cost of salt is highly sensitive to Canal toll increases: A 200 percent increase in tolls would affect the CIF price of salt by 14.21 percent or US\$3.1 per ton. Further analysis determined that it would likely take an increase in CIF price of US\$8 (the difference between the CIF of imported salt and salt at the mine mouth) however to shift imports. Additionally, salt represents only 0.2 percent of total exports, so a toll increase would not material affect the Chilean economy.

Import Commodities Analysis

The import commodities analyzed in this study are shown in Exhibit 4-8. In 2003, Chilean imports transiting the Panama Canal accounted for 20.6 percent of Chile's total goods imports (valued in CIF terms). Additionally, imports transiting the Panama Canal represented only 5.5 percent of Chile's GDP in 2003.

In 2003, Chile's merchandise trade deficit (current account) was US\$3 billion, or 4.6 percent of GDP.⁵ An increase in import prices, due to an increase in Canal tolls, would have a nearly imperceptible impact on Chile's deficit and national income: Even if tolls were increased by 200 percent for all Chilean imports that transit the Canal, the cost of total goods imports would grow by 0.11 percent and national income would drop by only 0.03 percent, with little or no impact on inflation.

⁵ Banco Central de Chile.

Exhibit 4-8

Canal-Relevant Chilean Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003	Average CIF/Ton	CIF Value of Canal Transit Tons (US\$M)
Coal	9%	481,969	\$ 38	\$ 18.13
Fertilizers, misc.	9%	541,842	\$ 202	\$ 109.22
Crude petroleum	7%	194,475	\$ 167	\$ 32.53
Corn	4%	52,293	\$ 109	\$ 5.68
Diesel oil	4%	167,229	\$ 249	\$ 41.57
Wheat	4%	261,956	\$ 175	\$ 45.85
Chemicals, misc.	3%	122,171	\$ 137	\$ 16.73
Iron and steel	2%	90,234	\$ 410	\$ 36.95
Gasoline	2%	47,934	\$ 261	\$ 12.53
Phosphates	2%	80,776	\$ 170	\$ 13.76
Liquefied gas	2%	17,266	\$ 111	\$ 1.91
Container cargo	33%	1,209,240	\$ 2,973	\$ 3,595.06
Other	19%			
Total CIF Value of Panama Canal Transit Tons (US\$M)				\$ 3,929.93

Source: ACP, 2003 US Waterborne Commerce imports and exports, DIRECTEMAR, Mercer analysis.

4.5 Ecuador

Mercer analyzed approximately 80 percent of total volume that trades through the Canal to and from Ecuador.

Ecuadorian Waterborne Trade

Between 1993 and 2003, Ecuador's GDP grew by an average of 5.9 percent per year, to US\$26.8 billion. Total international Ecuadorian trade has grown faster than GDP over the past decade, with imports outpacing exports. In 2003, Ecuadorian exports and imports each represented nearly 23 percent of the country's GDP.

Approximately 80 percent of Ecuador's international trade value, and 76 percent of trade tons, move by sea. Between 2000 and 2002, seaborne export tons declined by 0.5 percent per year, while seaborne imports grew by 21 percent per year.

Ecuador's three largest trading partners are the United States, the European Union, and the Andean Community (Peru, Colombia, Bolivia, and Venezuela). On the export side, the US, EU, and Andean Community account for 75 percent of total exports. For imports,

trade originating in the US has decreased significantly since 1999, while Asia has become a more important source of imports for Ecuador.

Ecuador's exports are primarily composed of raw materials and natural resources; in particular, Ecuador is one of Latin America's largest crude oil exporters, and is the world's largest exporter of bananas. Together, minerals and fruits account for 62 percent of total exports. In contrast to its exports, Ecuador's imports are composed primarily of manufactured goods and industrial products.

Ecuadorian Trade Through the Panama Canal

Ecuador's most important Canal-relevant sea trade lanes are to/from the East Coast US, Europe, and East Coast South America. In 2003, more than half of Ecuador's Canal-relevant imports and 80 percent of its exports by weight were traded with the US and Europe. The East Coast South America also accounts for nearly a third of imports.

Ecuador's total sea trade in 2002 was 24.7 million tons, of which 12 million tons or 48 percent transited the Canal. Canal-relevant exports have been decreasing by 1 percent per year since 1999, while imports have grown by 4 percent per year. Approximately 35 percent of Ecuador's exports pass through the Canal, with bananas making up nearly half of export tons, and crude oil 28 percent. Additionally, three-quarters of Ecuador's imports transit the Canal. Principle import commodities include containerized cargo, fuels, and fertilizers.

Export Commodities Analysis

Overall, Panama Canal-relevant Ecuadorian exports represent 23 percent of Ecuador's total goods exports by value. As shown in Exhibit 4-9, the export commodities analyzed for this study represented approximately 67 percent in value of total Ecuador merchandise exports in 2003; approximately 34 percent of this value transited the Panama Canal.

Of the five commodities analyzed in this report, the most important in terms of high Canal share is bananas, of which 72 percent of total exports by value transit the Canal. In the case of three other commodities, only 20-50 percent of exports transit the Panama Canal (wood & wood articles, fish & crustaceans and vegetable & fruit preparations). For crude oil, only 14 percent of exports transit the Canal.

Some of the analyzed commodities represent an important portion of total Ecuadorian exports: In 2003, crude oil exports accounted for 39 percent of total Ecuadorian exports by value, and bananas accounted for 18 percent. The other analyzed commodities represent less than 6 percent of total exports each.

With the exception of bananas, the analysis determined that even a Canal toll increase of 200 percent would have an impact on the landed cost of each commodity of less than 2

percent. Further analysis was carried out to understand the potential effects of an increase in Canal tolls on the demand for both bananas and crude oil, given the relevance of these two commodities to Ecuador’s economy.

- **Bananas:** Bananas are transported as bulk in reefer vessels or in refrigerated containers. If Canal tolls were increased by 200 percent, CIF would increase by 2.6 percent for bulk bananas and 1.9 percent for containerized bananas.

Bulk bananas represent 91 percent of Ecuador’s total banana exports transiting the Canal, and 90 percent of these were destined for Europe in 2003. An analysis of ocean freight rates determined that the time charter rate alone have increased the CIF price for bulk bananas by 7 percent in the last four years, more than two times the estimated 2.6 percent impact of a 200 increase in the Canal toll. And despite this significant increase in ocean freight rates, exports to Europe still increased by 65 percent between 2001 and 2003. Therefore, a Canal toll increase would be unlikely to affect the Ecuadorian banana trade.

- **Crude oil:** Crude oil is a medium value commodity and a 200 percent increase in Canal tolls would impact the CIF of crude oil by only 1.8 percent. A more important issue, however, is the reopening of the Trans-Panama Pipeline. ACP studies estimate that the cost to move crude via the PTP is slightly lower than present Canal toll levels. Therefore, the increase in the Canal toll would not affect Ecuador’s crude oil exports but would potentially change the transportation mode from waterborne to pipeline.

Exhibit 4-9

Canal-Relevant Ecuadorian Exports Analyzed²

Commodity	1. FOB Value of Canal Exports (US\$M)	2. Canal Share of Total Exports	3. Total Export Value (US\$M)	4. Commodity Exports Share of Ecuador Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
Crude Oil	\$ 338	14%	\$ 2,372	39%	1.1%	1.8%
Banana - Reefer Bulk	\$ 718	65%	\$ 1,099	18%	1.6%	2.6%
<i>Containerized cargo</i>						
Bananas	\$ 77	7%	\$ 1,099	18%	1.3%	1.9%
Wood & Wood Articles	\$ 39	46%	\$ 85	1%	0.4%	0.8%
Fish & Crustaceans	\$ 166	45%	\$ 372	6%	0.0%	0.1%
Vegetable & Fruit Prep.	\$ 21	20%	\$ 102	2%	0.3%	0.7%

Import Commodities Analysis

In 2003, Ecuador’s imports transiting the Panama Canal accounted for 16 percent of its total merchandise imports (valued in CIF terms) (Exhibit 4-10). Additionally, Ecuador’s imports transiting the Panama Canal represented 4 percent of Ecuador’s GDP in 2003.

In 2003, Ecuador's current account deficit was US\$461 million, or 1.7 percent of GDP. The analysis determined that an increase in import prices, due to an increase in Canal tolls, would have a minimal impact on Ecuador's deficit and national income: Even if tolls were increased by 200 percent for all Ecuadorian imports that transit the Canal, the cost of total goods imports would grow by only 0.18 percent, the current account would increase to 1.8 of GDP, and national income would drop by about 0.04 percent, with an negligible impact on inflation.

Exhibit 4-10

Canal-Relevant Ecuadorian Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003 (thousands)	Average CIF/Ton	CIF Value of Canal Transit Tons (US\$M)
Gasoline & Diesel oil	18%	699.29	\$ 347	\$ 238.51
Iron & steel	13%	485.79	\$ 470	\$ 228.49
Liquefied gas	9%	344.32	\$ 382	\$ 131.62
Fertilizers, misc.	9%	319.99	\$ 188	\$ 60.24
Corn	6%	209.07	\$ 139	\$ 28.97
Paper and paper products	5%	180.06	\$ 497	\$ 89.48
Container cargo	4%	141.30	\$ 2,037	\$ 287.82
Other	37%	1,776.96		
Total CIF Value of Panama Canal Transit Tons (US\$M)				\$ 1,065.13

Source: Mercer analysis, UN COMTRADE, US Waterborne Commerce 2003.

4.6 Peru

Mercer analyzed approximately 80 percent of total volume that trades through the Canal to and from Peru.

Peruvian Waterborne Trade

During 2001-2003, the Peruvian economy was one of the fastest growing in South America, with an average growth rate of 4.8 percent. The Peruvian economy is not highly dependent on international trade, given that its total trade accounts for less than 30 percent of GDP. Exports have been growing nearly twice as fast as imports over the past 10 years.

Approximately 95 percent of Peru's international trade by weight and 71 percent of trade by value move by sea. Between 2000 and 2002, Peru was a net exporter with respect to sea trade, with exports accounting for 53 percent of total waterborne goods trade.

Peru's major trade partners are Asia, Europe, and South America, which accounted for 89 percent of Peru's exports by value in 2002. Asia (China and Japan) is the most important

market for Peruvian exports, followed by Europe. On the import side, Asia and South America are Peru's largest import partners.

Peru's exports are primarily composed of raw materials and natural resources, particularly mineral and metal ores, petroleum products, and fishmeal. Mineral ores make up 53 percent of export tons. On the import side, approximately 75 percent of Peru's total sea import tons are raw materials and capital goods for Peru's industrial sector. Oil products and grain account for more than half of total import tonnage.

Peruvian Trade Through the Panama Canal

Peru's major Canal-relevant trade lanes are to/from the East Coast US, Europe, and the East Coasts of South and Central America. East Coast US and Europe account for more than two-thirds of export tons, while East Coast South America and East Coast US account for two-thirds of import tons.

Panama Canal-relevant Peruvian exports were 35 percent of Peru's total sea exports in 2003, while Canal-relevant imports were 40 percent of total sea imports. Container cargo, zinc, iron and copper ores, and salt make up half of Canal-relevant export volumes, while container cargo, crude oil, wheat, and diesel oil make up half of import volumes.

Export Commodities Analysis

Overall, Panama Canal-relevant exports, including all containerized cargo, make up 27 percent of total Peru merchandise exports. As shown in Exhibit 4-11, the export commodities analyzed for this study represented approximately 53 percent of Peru's total merchandise exports in 2003; approximately 33 percent of this value transited the Panama Canal.

Of the 17 commodities analyzed in this report, Canal exported quantities account for different shares of each commodity's total exports. In some cases, like salt, zinc metal, coffee, and fish, more than 50 percent of Peru's exports of this commodity transit the Panama Canal. In other cases, only 20-50 percent of a commodity's exports are transported through the Panama Canal, including bulk copper metal, copper ore, gasoline, fishmeal, fish oil, zinc ore, wood, and vegetable preparations.

Some of the analyzed export commodities also represent an important portion of total Peruvian exports. In 2003, copper (refined copper and copper ore) exports accounted for 15 percent of Peru's total exports, fishmeal exports accounted for 8.5 percent, zinc (refined zinc and zinc ore) accounted for 7 percent, and vegetables accounted for 4.3 percent. The other analyzed commodities represent less than 4 percent of total exports each.

Exhibit 4-11

Canal-Relevant Peruvian Exports Analyzed²

Commodity	1. FOB Value of Canal Exports (US\$M)	2. Canal Share of Total Exports	3. Total Export Value (US\$M)	4. Commodity Exports Share of Peru's Exports	5. Canal Transit Cost Share of CIF	6. 200% Toll Increase Impact on CIF
<i>Bulk</i>						
Copper metal	\$1,727.62	34.5%	\$913.9	10.4%	0.1%	0.22%
Copper ore	\$403.27	34.2%	\$421.9	4.8%	0.5%	0.76%
Crude petroleum	\$170.30	16.3%	\$266.2	3.0%	1.0%	1.57%
Gasoline	\$224.38	47.2%	\$76.4	0.9%	1.2%	1.84%
Residual fuel oil	\$178.75	15.5%	\$324.7	3.7%	1.2%	1.89%
Fishmeal	\$541.00	21.2%	\$742.0	8.5%	0.5%	0.73%
Fish oil	\$432.57	37.0%	\$80.1	0.9%	0.5%	0.69%
Iron ore	\$18.50	11.8%	\$94.05	1.1%	8.0%	12.75%
Salt	\$8.40	100%	\$3.3	0.04%	8.3%	12.93%
Zinc metal	\$840.25	98.7%	\$163.1	1.9%	0.3%	0.38%
Zinc ore	\$216.77	33.9%	\$430.1	4.9%	1.0%	1.44%
<i>Container</i>						
Vegetables	\$564.41	9.1%	\$374.7	4.3%	0.5%	0.74%
Coffee	\$1,160.04	80.4%	\$181.05	2.1%	0.3%	0.44%
Fruit	\$787.57	15.4%	\$111.2	1.3%	0.4%	0.58%
Fish and crustaceans	\$2,205.54	57.6%	\$240.0	2.7%	0.2%	0.37%
Wood	\$1,306.79	26.0%	\$97.3	1.1%	0.4%	0.62%
Copper metal	\$1,971.42	15.3%	\$913.9	10.4%	0.3%	0.43%
Vegetable prep.	\$963.55	41.7%	\$135.8	1.6%	0.3%	0.52%

With the exception of salt and iron ore, Canal cost is not a significant portion of the analyzed commodities' CIF. Salt, iron ore, and certain other commodities that are important to the Peruvian economy (copper, zinc, and fishmeal) were further analyzed to understand the potential effects of an increase in Canal tolls on demand.

- Copper:** Copper exports transiting the Canal are about 6.8 percent of total exports. This is a high value commodity and thus the Canal cost is a small portion of the total CIF cost; a maximum increase in Canal tolls of 200 percent would impact refined copper CIF by only 0.22 percent and copper ore CIF by 0.76 percent. Additionally, market dynamics, i.e., increasing European and Asian demand for copper and stable US demand, indicate that the market is not sensitive to small price increases, and that the larger challenge for Peru will be delivering sufficient copper to meet demand.

- **Zinc:** Peru is the dominant producer of exported zinc, with few alternative sources of supply. Canal transit cost represents only 0.38 percent of zinc metal and 1.44 of zinc ore CIF, thus an increase in the Canal toll would not materially affect landed cost or the competitive landscape. Additionally, zinc represents only 6.7 percent of Peru's total exports, and thus the impact of a Canal toll increase would not have a significant effect on Peru's economy.
- **Fishmeal:** Peru is the world's dominant producer and exporter of fishmeal. Canal cost represents only 0.73 percent of fishmeal's CIF, thus an increase in the Canal toll would not materially affect landed cost or the competitive landscape. Furthermore, Peruvian fishmeal exports transiting the Panama Canal represent only 1.8 percent of Peru's exports, and thus the impact of a Canal toll increase would not have a significant effect on Peru's economy.
- **Iron ore:** Even though a 200 percent increase in Canal tolls would highly impact the CIF price of iron ore, only a small percentage of iron ore exports transit the Canal (12 percent), representing 0.1 percent of total Peruvian exports, and thus the impact of a Canal toll increase would not have a significant effect on Peru's economy.
- **Salt:** All Peruvian salt exports transit the Canal, bound for the East Coast US. The landed cost of salt is highly sensitive to Canal toll increases: A 200 percent increase in tolls would affect the CIF price of salt by 12.93 percent or US\$3.1 per ton. Further analysis determined that it would likely take an increase in CIF price of US\$8 (the difference between the CIF of imported salt and salt at the mine mouth) however to shift imports. Additionally, salt represents only 0.04 percent of total exports, so a toll increase would not material affect the Peruvian economy.

Import Commodities Analysis

In 2003, Peru's Canal-relevant imports accounted for 14 percent of its total merchandise imports (valued in CIF terms) (Exhibit 4-12). Additionally, Peru's imports transiting the Panama Canal represented only 2 percent of Peru's GDP in 2003.

In 2003, Peru's current account deficit was US\$1 billion, or 1.7 percent of GDP. The analysis determined that an increase in import prices, due to an increase in Canal tolls, would have a minimal impact on Peru's deficit and national income: Even if tolls were increased by 200 percent for all Peruvian imports that transit the Canal, the cost of total goods imports would grow by only 1.2 percent, the current account would remain at 1.7 percent of GDP, and national income would drop by about 0.02 percent, with an negligible impact on inflation.

Exhibit 4-12

Canal-Relevant Peruvian Imports Analyzed

Commodity	Canal Share	Canal Transit Tons 2003 (thousands)	Average CIF/Ton	CIF Value of Canal Transit Tons (US\$M)
Crude petroleum	11%	634.10	\$ 201	\$ 127.31
Wheat	11%	969.96	\$ 162	\$ 157.18
Diesel oil & gasoline	10%	523.68	\$ 286	\$ 149.96
Fertilizers, misc.	8%	424.44	\$ 175	\$ 74.18
Coal	7%	355.28	\$ 44	\$ 15.76
Corn	5%	82.86	\$ 131	\$ 10.83
Iron and steel	5%	259.24	\$ 583	\$ 151.11
Soybeans	2%	5.51	\$ 252	\$ 1.39
Liquefied gas	2%	202.06	\$ 368	\$ 74.28
Container cargo	4%	207.33	\$ 2,181	\$ 452.17
Other	36%	2,097.33		
Total CIF Value of Panama Canal Transit Tons (US\$M)				\$ 1,214.15

Source: Mercer analysis, UN COMTRADE , ACP database and US Waterborne 2003.

4.7 Conclusions

In all cases, Mercer determined that the effect of a Panama Canal toll increase would not have a significant impact on the analyzed economies, nor on the principal industries that provide Canal-relevant export commodities.

Mercer determined that for all of the countries analyzed, the larger question 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 these economies of a deterioration in service – because of 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 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 these economies, rather than the essentially negligible impact of the transit cost increases examined in this study.

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