

**Container Cabotage Policy and its Impact on Western Canadian Pulse Exports:  
A Gravity Model Approach**

**BY**

**Erica Vido**

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University  
of Manitoba in partial fulfillment of the requirements of the degree  
of**

**MASTER OF SCIENCE**

Department of Agribusiness and Agricultural Economics  
University of Manitoba

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I am grateful to the many individuals and firms who provided information for this thesis through completing the surveys and the endless follow up phone calls and emails. I am particularly grateful to Mike Dobell at Kuehn and Nagel, Dave Smith at Panalpina and Yanke Transport for supplying me with the confidential freight rate data upon which the analysis is built.

To my parents, Blaza and Rudy, in addition to your patience and guidance, your financial support has made this thesis possible. Thank you for being such great parents. To Marc and Marcy, my two best friends, thanks for your patience and encouragement. Finally, I would be remiss if I failed to acknowledge the contribution of my best friend and life partner, Andrea. Your confidence, patience and encouragement have been of immeasurable importance.

## Abstract

Containerized shipping of specialty agricultural products from western Canada is hampered by the high costs of obtaining empty equipment. An avoidable barrier to cost-effective container shipping is the out-dated Customs regulations on container cabotage. These regulations, originally intended to protect domestic industry, provide for strict use requirements for internationally owned containers in Canada and require many shippers and carriers to reposition empty equipment. This negatively impacts the costs of container transportation for specialty agricultural products.

A series of in-depth interviews were conducted with various industry stakeholders. This was followed up by a self-administered, faxed-out questionnaire to gather more detailed information. Following this, a gravity model for the eastbound lentils export market was developed with the aim of quantifying the freight rate elasticity. The information obtained from the survey process was used to quantify the effects of container cabotage policy on lentils export volumes.

Canadian lentils exports are highly elastic to freight rates and suggest that reducing freight rates for this market could have great appeal to shippers and carriers. A 5% reduction in freight rates, which could arise from deregulating the cabotage market, could induce lentil exports to increase by about 10%. This translates into an expected increase of about \$10 million in improved export sales.

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## **Chapter 1:**

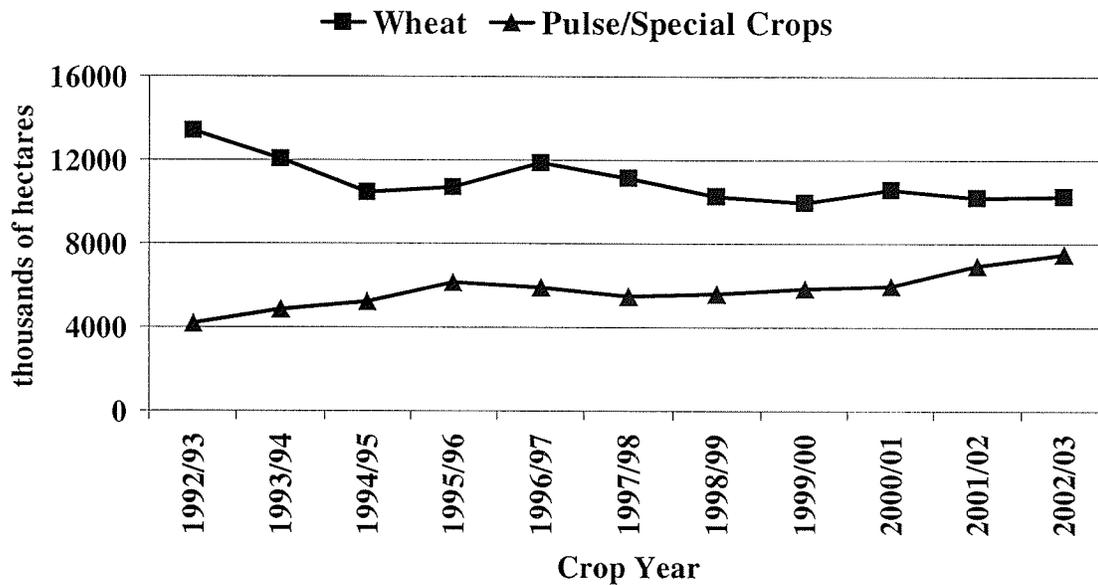
### **Problem Statement and Thesis Hypothesis**

#### **1.0 Introduction**

Ending the *Western Grain Transportation Act* (WGTA) in 1995 eliminated \$750 million in transport subsidies and launched a new reality for western Canadian farmers. No longer can they afford to produce low-valued grains destined for highly subsidized and volatile global commodity markets. Increasing global agricultural development, freer trade, coupled with costly agricultural policies in the United States and European Union have made commodity markets a losing proposition for Canadian farmers. The future of Canadian agriculture depends on its ability to adapt to these disparate forces.

In response, the landscape of prairie agriculture has changed. As shown in Figure 1.1, pulses, special crops and forages have replaced a significant amount of Prairie acreage previously allocated to wheat. The Prairies have also seen a dramatic increase in livestock and potato production. Over 80% of these value-added products are exported in containers.

**Figure 1.1.**  
**Seeded Area by Crop Type**  
*Western Canada*



Canadian grain handling and transportation has responded to global market conditions by tinkering with the bulk system in the hopes of reducing inland transport costs. Rationalization of the prairie elevator system, and closure of high cost branch lines have extracted incremental efficiencies, but the industry now faces a new challenge in handling value-added production and Identity Preserved (IP) products. IP grains and special crops are a promising avenue for increasing producers' incomes.

Catering to niche markets is an answer for some producers struggling to survive in the tough global agricultural climate. Identity preservation, Just-In-Time inventory techniques and attribute specific input sourcing are becoming increasingly important for

producers and processors. A practical way to ship these products is in containers. Perhaps improving access to and the efficiency of Canada's intermodal system could provide a more profitable alternative to producers of specialty products.

An avoidable barrier to cost-effective container shipping in Canada is the out-dated Customs regulations on container cabotage. In general, cabotage refers to the carriage of domestic cargo on sovereign territory by a foreign conveyance. These regulations, originally intended to protect domestic industry, provide for strict use requirements for internationally owned containers in Canada. The implicit hypothesis of this thesis is that Canadian container cabotage restrictions, which require many shippers and carriers to reposition empty equipment, negatively impacts the costs container transportation for specialty agricultural products.

Ocean carriers spend an estimated US\$1.6 billion annually to reposition empty equipment.<sup>1</sup> The tight restrictions placed on foreign-owned containers are a source of economic inefficiency that cannot be discounted. This policy causes containers to accumulate at the ports and to move empty, taking up rail capacity, burning fuel and costing shippers if repositioned. Carriers charge (build in their rates) the cost of these empty repositioning moves. The higher cost of operating container equipment in Canada relative to the more liberal U.S. regulations makes it less desirable for the shipping lines to position equipment in the Canadian interior.

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<sup>1</sup> Bangsberg, P.T. "Carriers urged to embrace e-logistics." *JoC Online*, February 2001.

This thesis focuses on this regulatory barrier faced by shippers of intermodal freight. Cabotage restrictions reduce the flexibility of carriers to position equipment in demand areas, creating unnecessarily high costs for container services. Reduced transport costs would make Prairie exports more attractive to importers and more profitable to farmers. The objective of this research is to calculate the economic impact this barrier has on Canadian transport operations and on pulse exports. Lentils are used as a test commodity to model this market.

### **1.1 Objectives**

By making Canadian regulations more consistent with the U.S. container regulatory system, it is hypothesized that the costs of container service on the Prairies will decline, creating opportunities for export growth. A gravity model is used to test the sensitivity of pulse crop exports to freight rates. As a test commodity, the change in lentil export volumes owing to lower transport costs arising from a revised regulatory environment provides an estimate of the economic impact.

The specific objectives of this thesis are:

1. To research and analyze Canada's cabotage restrictions on international containers,
2. To assess the sensitivity of shipping lines to relaxing cabotage restrictions, with respect to container availability and cost,

3. To measure the resultant impact on freight rates and volume of pulse crop exports from Western Canada with the aid of a gravity model.

## **1.2 Scope and Methodology**

Many specialty agricultural products have unique logistical requirements that cannot be satisfied by the status quo bulk handling system. Pulses are more prone to product degradation and require gentler handling than the major grains and oilseeds. For that reason, containers are the dominant mode of transport for many pulse exports. Reducing transportation costs and improving access to intermodal equipment is a key to expanding exports to an elastic global market. Improving access to containers for these shippers could aid in developing new markets and in strengthening existing ones.

Shippers always prefer to source-load containers because they can avoid the transshipment costs (stuffing) and be certain of quality and count. The unfavourable cost trade off of having the empty container repositioned inland means that a significant amount of containerized Prairie exports are stuffed at the ports after arriving by other means. Transshipping adds to the handling costs and complexity of tracing, and also increases the risks of product damage. This thesis attempts to quantify the transport cost savings that could be obtained if Canadian cabotage restrictions on international containers were relaxed to the equivalent of U.S. cabotage restrictions. Lentils are used as a test commodity because the market is well established and geographically diverse.

A gravity model is employed to estimate the change in lentil exports from reduced transport costs arising from a deregulated container market. Gravity models have a long history in the analysis of commodity flows and market penetration. A gravity model can estimate sensitivities to freight rate changes, and identify market opportunities.

### **1.3 Organization of the Study**

This thesis begins with a review of the literature on gravity models in Chapter 2. The chapter also lays down the theoretical framework for this evaluation of cabotage policy.

A review of Canadian and U.S. container cabotage regulations is presented in Chapter 3. The similarities and the differences in cabotage restrictions in both countries are highlighted with reference to U.S. and Canadian customs legislation.

Chapter 4 discusses the 2002 container cabotage survey undertaken for this thesis. Some of the issues discussed include: the problems identified by carriers and other stakeholders from the cabotage restrictions, the estimated repositioning cost reduction from liberalizing the regulations and global competitiveness issues faced by Canadian shippers.

In Chapter 5, the gravity model for lentils exports is developed and the estimate results analyzed. The model produces quantitative estimates of the sensitivity of lentils export volumes to changes in freight costs, or the freight rate elasticity.

In Chapter 6, the impact on lentil exports is determined. The elasticities derived from the gravity model are applied to the calculated transport cost savings as anticipated in a deregulated cabotage environment. The change in export volumes associated with a transport cost reduction can be used as a proxy for all pulse crops.

Finally, a summary of the findings, the major conclusions and recommendations for further research are discussed in Chapter 7.

## **Chapter 2:**

### **The Theory of Trade and Transport Costs - A Gravity Model Analysis**

#### **2.0. Introduction**

Economic gravity models can be used to examine the role played by transportation costs in determining the volume of commodity flows in international trade. Although inspired by the laws of gravity, economic gravity models assume that the Law of One Price applies. Specifically, trade between two regions depends on the economic distance between them, and their relative sizes. Under the Law of One Price, markets are at equilibrium when price differences are equal to or greater than the cost of moving goods between them.

Information data requirements are less burdensome for gravity models. Traditional trade equilibrium models require commodity prices in different regions that represent the appropriate market level (wholesale or retail) and similar value-added quality. Economic gravity models require only an accurate measure of commodity flows and transportation costs between origins and destinations. This is a significant advantage for quantitative analysis.

This chapter reviews the literature on the micro-foundations and estimation issues in gravity model analysis. In addition, it introduces the theoretical foundations of the impact of transport costs on trade. The empirical model is developed later in Chapter 5.

## **2.1. Micro Foundations of the Gravity Model**

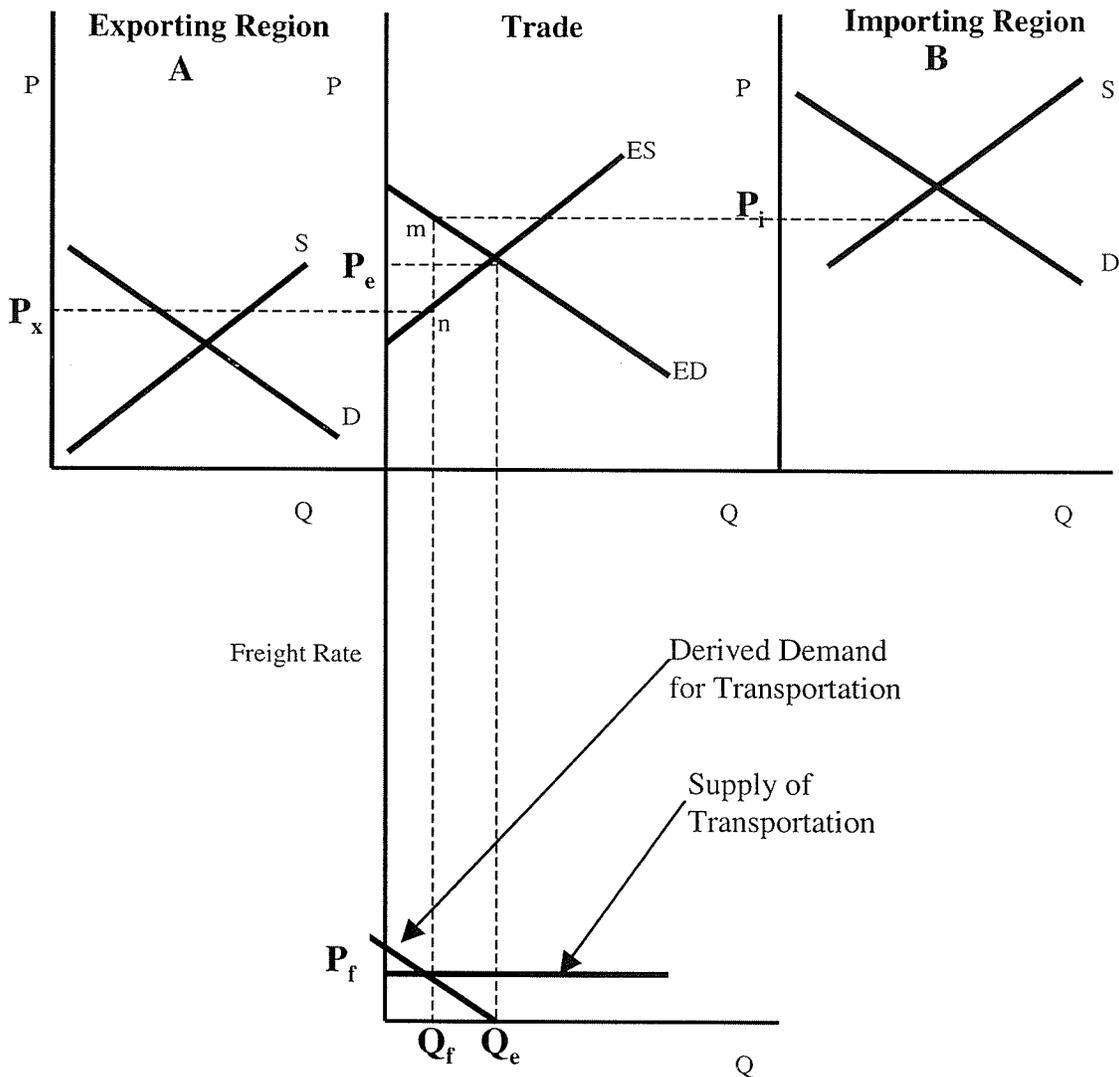
Gravity Models were first applied to international trade by Tinbergen (1962), Poyhonen (1963) and Linneman (1966) who proposed that the volume of trade is an increasing function of the national incomes of the trading partners, and a decreasing function of the distance between them. The empirical success of gravity models was hard to deny but they were criticized by economists because they seemed to lack theoretical foundations. These foundations were subsequently developed by, among others, Anderson (1979) and Bergstrand (1985), who derived gravity models from models of monopolistic competition, and Deardorff (1998), who demonstrated that the gravity model could be derived within Ricardian and Heckscher-Ohlin frameworks.

Prentice *et al* (1998) and Urbina (1996) use the Law of One Price as a theoretical base for the gravity model. In a world of one commodity and two regions where price differences exist in the absence of trade, this difference would give rise to potential trade flows from where price is low to where price is high. Assuming that exchange rates are fixed and that free trade is negotiated between the two regions, the Law of One Price dictates that trade flows would increase until the prices differed exactly by the transportation and logistics

costs associated with transfer. The gravity model represents the derived demand for transportation from the low price market to the high price market.

Figure 2.1.

Derivation of Transport Demand Schedule



The upper panel in the interregional trade model shown in Figure 2.1, illustrates a two-nation case where Nation A, the Exporting Region, enjoys a comparative advantage over

Nation B, the Importing Region, in producing pulse crops. The international price for pulse crops is higher than the available domestic price in the Exporting Region. Sellers in this region will wish to earn the higher international price and will divert supplies to the world market. This will reduce the domestic demand in the Exporting Region, driving domestic prices up toward the international price. This surplus production at the prevailing international price creates an excess supply, which is derived from the horizontal difference between the supply and demand functions. The excess supply function is depicted in the central panel of Figure 2.1.

In the Importing Region, the international price is lower than the domestic price, encouraging cheaper imports to enter the market. The influx of cheap imports will put pressure on domestic prices to fall, creating an excess demand for pulse crops in the Importing Region. The excess demand function depicted in the central panel of Figure 2.1 is derived from the horizontal difference of the demand and supply functions. The excess demand and excess supply functions depend on all properties and parameters that lie behind the domestic demand and supply schedules in the respective regions. Superimposing the importing region's excess demand curve over the exporting region's excess supply curve, at zero transport costs, an equilibrium trade flow, ( $Q_e$ ) is determined at  $P_e$ .

Now, let us relax the assumption of zero transport costs and assume that the costs of transfer are equal to the value  $mn$ . The domestic prices in the two nations in equilibrium will then differ by this amount. The price in the Exporting Region ( $P_x$ ) is  $mn$  units lower

than the price in the Importing Region ( $P_i$ ). Thus,  $P_x + mn = P_i$ . The trade volume at which the difference in the two prices is exactly equal to  $mn$  is  $Q_f$ .

Vertically subtracting the excess supply curve from the excess demand curve creates a derived demand for transportation services, and is depicted in the lower portion of Figure 2.1. The derived demand for transportation captures the relationship between transport costs and quantities of transport services demanded. If supply of transportation is assumed to be perfectly elastic at  $P_f$ , the trade will equal  $Q_f$ . Commodity prices in the importing ( $P_i$ ) and exporting ( $P_x$ ) regions will differ by the transport cost ( $P_i - P_x = P_f$ ). Observation reveals that the derived demand for transport is essentially a gravity model,  $Q_e = f(P_f)$ .

The significance of this observation is important. The gravity model gives trade economists a new method for studying interregional commodity flows. The gravity model can be used to estimate the demand for interregional trade of commodities. In essence, it is the reduced form equivalent of the interregional trade models excess supply and excess demand curves (Prentice *et al* (1998), Urbina (1996)).

## **2.2. The Role of Transport Costs in Trade**

The previous section explored the micro-foundations of gravity models and introduced the concept of transport costs. This section takes a closer look at transport costs and more closely explores the impact that these costs have on trade.

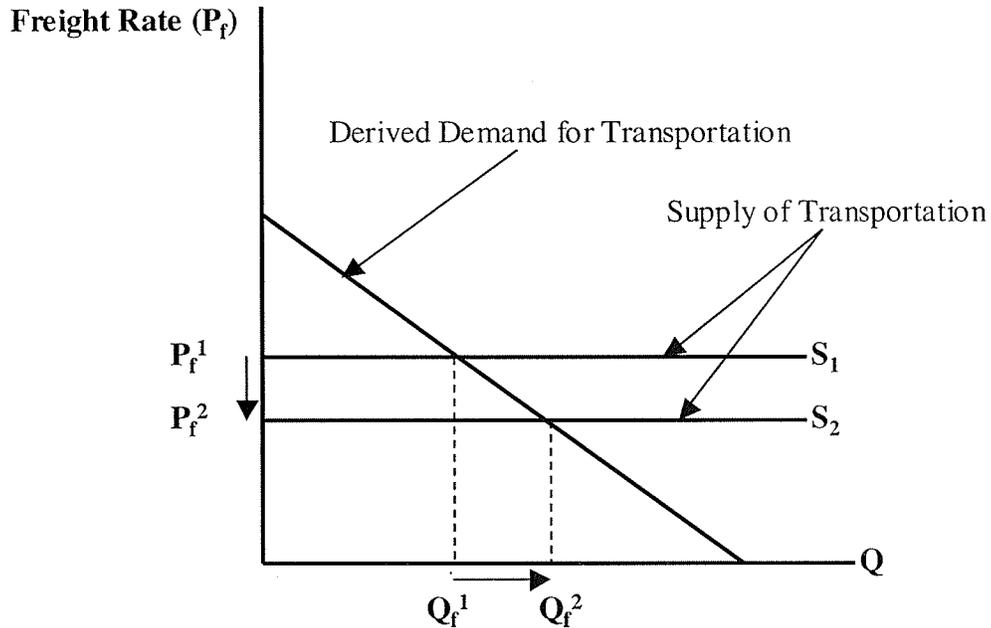
This thesis uses freight rates as an estimate of the costs of transfer in international trade. However, freight rates are only what shippers see. They are a complex structure of costs composed of such components as fuel, labour and the regulatory environment. Regulations that impose costs on service providers can include a variety of factors like cabotage restrictions, excessive administrative requirements, tariff and non-tariff trade barriers, etc.

Historically, transportation markets have been heavily regulated, and as discussed, this impacts the costs faced by transportation providers. These market conditions determine the quantity of services that firms can supply to the market. The transportation supply schedule is the relation between the market price and the amount of services that transportation companies could supply, given the costs they face.

Figure 2.2 illustrates the derived demand and supply of transportation as depicted in the lower panel of Figure 2.1. In this example, the supply of transport function ( $S_1$ ) is assumed to be perfectly elastic at freight rate of  $P_f^1$  per unit (container). The supply function reflects the market conditions in which companies operate. The price of imports in the importing region ( $P_i$  in Figure 2.1) and the price of exports in the exporting region ( $P_x$  in Figure 2.1) differ by the freight rate,  $P_f^1$ . The intersection of the derived demand and supply functions at  $P_f^1$  results in a shipment of  $Q_f^1$  containers.

Figure 2.2.

The Market for Transportation Services



Now, suppose there is a change in the transportation industry that reduces costs for carriers. An example of such a change could be a relaxation of the cabotage restrictions on international containers. This new regulatory environment allows foreign liner companies to compete for domestic traffic in the Canadian interior. By relaxing these restrictions, the cost faced by carriers at every level of services they provide is reduced. This puts pressure on the transportation supply function to shift downward to  $S_2$ . This new supply function places downward pressure on the price of transportation services and freight rates decrease to  $P_f^2$ .

At  $P_f^2$  shippers will demand more freight services as the costs of transport become more affordable. The volume increase is determined at the intersection of the derived demand for transportation schedule and the new supply of transportation schedule,  $Q_f^2$ . The level of  $Q_f^2$  as the supply schedule shifts will depend on the slope of the derived demand for transportation schedule, or the freight rate elasticity. With an elastic demand for transport, the volume of transportation services will increase in larger proportion than the decrease in freight rates. The opposite holds true in inelastic markets.

### **2.3. Estimation Issues of the Gravity Model**

A significant advantage of the gravity model is that its data requirements are easy to obtain. Gravity models require only an accurate measure of commodity flows and transportation costs between origins and destinations. Nevertheless, data on transport costs are often unavailable or difficult to obtain. Consequently, distance has been used as a proxy in previous studies.

Gravity models do not require market prices, but do require a consistent measure of the commodity flows. Both the volume of goods traded or the value of goods traded could be used as the dependant variable. However, volume data is likely to be more independent of transport costs, to the extent that carriers are known to try to extract higher freight rates when commodity prices rise, and vice versa.

The remainder of this chapter discusses gravity model specification issues as it relates to the quality of data.

### **2.3.1. Impedance Factor Specification**

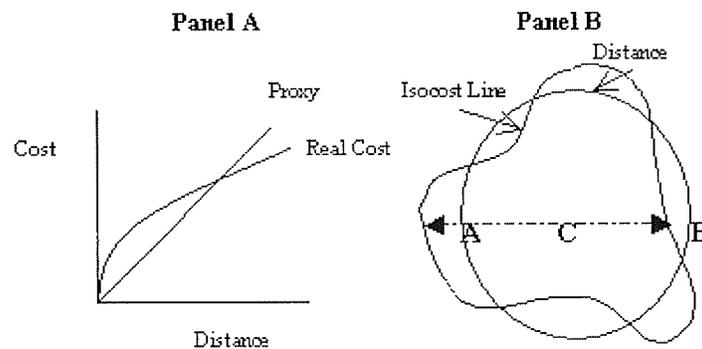
Linneman (1966) uses distance between trading countries as a proxy variable for the total natural trade impediments, in their widest sense. It embodies three elements; transport costs, transport time and psychic distance, constituting together the obstacles to trade due to the existence of space. Over the years, many other economists have adhered to this method.

Several problems exist when using distance as a proxy for transport costs. First, no distance may be representative for countries that share long borders with goods moving across many entry points. Second, problems arise when allowing for variation in the cost of alternative means of transport. Land transport is more expensive than ocean transport and air transport is more expensive than land transport. Distance measures cannot account for these cost differences. Third, improvements in transportation technology affects the cost of producing these services and consumer demand for goods through the level of services provided (Bandyopadhyay, 1999). A fall in transportation costs because of a more efficient distribution sector will lower the final prices of goods and increase their quantities demanded. Finally, an elasticity with regard to distance is difficult, if not impossible to interpret.

Geraci and Prewo (1977) and Ferguson (1972) observe other reasons that make distance measures a poor proxy for transport costs. First, freight rates are influenced by factors other than distance, such as the value, weight and bulk of the commodity being transported, as well as the mode of transportation used. Second, the use of distance assumes that freight rates are the same in either direction. In many trade lanes there is a front haul and a back haul, with higher rates on front haul moves.

Figure 2.3 illustrates the relationship between transport cost and distance. In panel A, the proxy variable (distance) is assumed to exhibit a linear relationship. The real transport cost, on the other hand, does not lend itself to such simplicity. In this specific example, transportation costs are greater for shorter distances and begin to taper off as the distance increases. For shorter routes, the proxy variable underestimates the effect of transfer costs on export flows and the opposite holds true for longer routes. Only on mid-range routes would the proxy variable accurately reflect the impact of transfer costs on export flows.

**Figure 2.3. The Relationship Between Transport Cost and Distance**



*Source: Vido and Prentice, 2003*

Panel B outlines this same relationship, but includes other factors such as the level of infrastructure and the direction of travel. The smooth circle represents distance and every point on the circle is equidistant from the center, point C. The warped circle represents an isocost line where the transportation costs from point C to any point on the isocost line are equal. Let us assume that a shipper at point C has goods to deliver to points A and B, both of which are equidistant from point C. The route to point B is through a mountainous region where the road twists and turns and travel speed is slow. On the other hand, the route to point A is through a plain where the road is generally flat and straight and travel speed is fast. For a given level of costs (the isocost line) the distances travelled toward points A and B are different. In this example, the route toward point B is more costly than the route toward point A. Again; a proxy variable like distance would not distinguish between these cost differences.

Distance measures fail to account for currency exchange rates and do not reflect technological advances that impact the shippers' decisions about mode choice. Mode choice, in turn, depends on the particular trade corridors used, the availability of equipment and infrastructure, freight rates, and the volumes and types of commodities being shipped. Finally, the estimated relationships between trade flows and static variables such as distance are not very helpful in predicting future trade levels or for policy analysis (Geraci and Prewo, 1977).

Wall (1999) attempted to overcome the problems associated with using distance as a proxy for transport costs by using a fixed-effects method to allow for country specific

intercepts. According to Wall, the fixed-effects method controls for omitted variables that are unobservable or difficult to measure such as historical links, cultural similarities, etc. With this approach “fixed economic distance variables are subsumed into the trading-pair intercept, instead of being proxied for by geographic distance.” A major disadvantage of this approach is that the results do not provide any information on the sensitivity of exports to transport costs.

The primary reason for the use of distance as a proxy in previous studies is that reliable data on transport costs are unavailable or difficult to obtain. Beckerman (1956) suggests using the difference between the F.O.B. and C.I.F.<sup>2</sup> values as a proxy for transportation costs. However, this procedure is subject to limitations. For instance, the time period used in recording trade statistics may not be the same for both the importing and exporting country. Product classification may differ across countries and weight changes during transit may affect the accuracy of data. Furthermore, goods that move in transit through another country may be officially counted as imported and subsequently exported, putting further doubt on the reliability of the data.

Alcaly (1967) estimated a gravity model using travel cost as the impedance factor instead of distance. The inclusion of cost tends to make the equations somewhat more specific to each mode of transport and more like traditional demand equations. Depending on the research objectives, different specifications of the model may be appropriate. Aggregate models with distance as the impedance factor help to explain aggregate trade flows as a

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<sup>2</sup> F.O.B. (free on board) value excludes international transportation and insurance costs. C.I.F. (cost, insurance and freight) is the value at the importers customs frontier and includes international transportation and insurance costs.

function of distance, but do not provide useful results for marketers and policy analysts. Disaggregated models with a transport cost factor as an explanatory variable applies more to traditional demand analysis.

Prentice *et al* (1998) and Urbina (1996) both use actual freight rates paid by shippers as the impedance factor variable. Their analyses concentrated on estimating the derived demand for transport, or the freight rate elasticity, for the Canadian chilled pork export market. Because they used actual transport costs in a disaggregated model, their model performed more like a traditional demand model and their results are more meaningful to marketers, transportation service providers and policy analysts.

Alcaly (1967) points out that the relationship between distance and export volumes are likely to be different for different transportation modes. Air travel, for example is the most expensive form of transport, reserved mainly for time sensitive and/or high valued commodities. Aggregating these commodities with low valued, bulk commodities, which generally face much lower freight rates, would tend to make the characteristics of each commodity category less distinct, and thus less useful for understanding specific trade relationships. Furthermore, aggregate equations reflect the responsiveness of the dominant mode of travel, leading Alcaly to suspect that what was being demonstrated may actually be the applicability of gravity models to the dominant mode of travel as opposed to travel by all modes and commodities.

Hillberry (2001) demonstrated that aggregating data across sectors contributes to estimation bias because the border effect induces the commodity composition of trade to differ by direction and to change across national, provincial and state borders. His analysis concentrated on shipments traveling by truck or rail, since only land-based trade can be reliably assigned to a specific province or state of entry. His results suggest that borders affect the number of commodities that are traded in both level and composition. He concluded that gravity models that utilize data aggregated across either transport mode or commodity bundle are “quite likely to lead such models to overstate the welfare consequences of geographic trade frictions” (Hillberry 2001, page 15).

### **2.3.2. Dependant Variable Specification**

A gravity model requires some measure of the goods shipped as the dependent variable. The dependent variable in Bergstrand’s (1985) gravity equation was specified as  $PX_{ij}$ , where  $PX_{ij}$  is the U.S. dollar value of the flow of goods from country  $i$  to country  $j$ . If prices have been relatively stagnant throughout the time series,  $PX_{ij}$  is merely the volume of exports multiplied by some constant. No doubt it is more difficult to get quantity data of trade flows, but price data is a questionable substitute in a gravity model if prices have great flexibility. For instance, the 1970’s saw a tripling of grain prices within a couple of years. A model using the value of exports as the dependent variable would treat this as a tripling of trade volumes, but the impact of transport costs on this trade is unlikely to have changed as much. As a proportion of the delivered price, transport costs almost certainly fell during this period. The fluctuations in market prices and trade volumes

could as easily move in opposite directions than move in tandem. By adding a volatile price variable into the equation, as in  $PX_{ij}$ , the results become less clear.

Both the value of goods traded or the volume of goods traded could be used as the dependent variable. However, volume data are more independent of transport costs. In addition, the burden of transport costs is greater for low value commodities, especially if they are heavy or bulky, which is most often the case.

Aggregate trade could include all goods, ranging from high-valued manufactured items, such as computers, and low-valued raw materials, like wheat. The valuation of goods provides a common unit of measure that is more easily analyzed and compared. The problem that arises is the relationship between some aggregate value and its sensitivity to transportation costs. A unit train of wheat (100 rail cars) has about the same value as a truckload of computers, but the absolute costs of transport are about 30 times greater for the wheat.

Linneman (1966) points out the difficulty in measuring the value of aggregate exports. Apart from the differences in valuation – exports are valued at F.O.B. prices, and imports usually at C.I.F. prices – these difficulties take into account the minor differences due to the time factor in the distribution sector, and these measurements rarely give the same result. Furthermore, in many of the trade statistics, the smallest unit reported is \$0.1 million (which may have been obtained by rounding off a number larger than \$50,000), creating further problems with accuracy of the data.

Alcaly's (1967) gravity model was used to understand passenger travel between cities in the state of California. The dependent variable was specified as the volume of travel, in passenger miles. Prentice *et al* (1998) and Urbina-Olano (1996) use volume of pork exports measured in metric tonnes in their analyses. Using this specification helps the authors to answer the fundamental question; what volume of goods (passengers) are expected to move and where are they expected to move to, based on the cost of moving them?

#### **2.4. Chapter Summary**

This chapter provided the theoretical framework upon which this thesis is built. Gravity models can be reconciled within the economic framework of the Law of One Price and relate exports to the costs of moving products from origin to destination. By determining the effect of transport costs on export volumes, the gravity model can be applied to the evaluation of transportation cost components, like cabotage.

## **Chapter 3:**

### **An Assessment of North American Container Cabotage Regulations**

#### **3.0. Introduction**

This chapter offers a discussion of the container cabotage policies of the United States and Canada. The discussion that follows is derived from the author's previous work on container cabotage and readers are encouraged to consult Vido, Prentice and Kosior, 2001. The chapter begins with a brief background on the origins and rationale of cabotage policies, followed by a detailed breakdown of the regulations.

#### **3.1. Background**

The word cabotage that comes from the French verb, *caboter*, refers to ocean pick-up and delivery of goods along a coastline. In modern practical terms, it refers to the restriction of foreign carriers from entering into domestic services. Many centuries ago, sailors from northern Europe en route to the Mediterranean Sea would stop along the Atlantic coast to drop off and pick up cargo and passengers, making their trips more profitable. In an effort

to protect their own sea trade, the Portuguese restricted this practice to vessels that were locally owned and operated. As a result, they were the first to develop cabotage laws.

Cabotage regulations have been a part of North American history since the implementation of the *Navigation Acts* (1651). These acts regulated the shipping of goods in Great Britain and its colonies by restricting this trade to British and colonial ships. It was justified in terms of ensuring a sufficient marine capacity in order to meet defence needs. While cabotage became a regulated activity in ocean vessel shipping through the restrictions of foreign-flagged vessels on a particular coastline, the term came to be used in description of all forms of transport activity that took place on sovereign territory by a foreign conveyance. As alternative modes of transport developed, the same protections were transferred to them. Today, both Canada and the United States (U.S.) outline cabotage regulations in their respective *Customs Acts*.

The literature concerning cabotage deals primarily with aviation, trucking and marine transportation. No literature on container cabotage currently exists. The consistent theme among the available literature relates to bilateral relationships between two different countries. The container cabotage issues examined in this thesis focuses on third party relationships. International ocean carriers that serve North America call on both Canadian and U.S. ports when moving containers around the world. Differences in how the U.S. treats a third party and how Canada treats a third party affect this country's competitiveness in global markets.

The word “cabotage” does not appear in the *Customs Act* as administered by Canada Customs and Revenue Agency (CCRA). Cabotage activity is, however, duly addressed. The act treats a foreign-based container as an import, albeit a temporary one, under tariff item *9801.10.00*. Generally, the purpose of these cabotage regulations is to protect the domestic transportation industry from foreign competition. If domestic transportation were restricted to solely domestically owned equipment, shippers in Canada’s interior would face higher freight costs and reduced access to intermodal equipment.

Some exemptions to Canadian cabotage restrictions on international containers exist, but are subject to ambiguities that make compliance difficult. The remainder of this chapter outlines the legislation in both Canada and the U.S. that governs cabotage activity for foreign-based intermodal containers and highlights the differences between the policies of the two nations.

### **3.2. U.S. Container Cabotage Regulations**

Containers in the U.S. are designated as “instruments of international traffic” and are exempt from the application of customs laws as laid out in *Title 19* of the *U.S. Code (Customs)* in *section 1322 (a)*. Foreign-based containers designated as instruments of international traffic can enter the U.S. without payment of any duties or taxes and remain there for a period not exceeding 365 days from the date of their importation. The container is deemed to remain in international traffic during this time and may engage in unrestricted point-to-point domestic moves. If the container remains in the U.S. for a

period exceeding 365 days it will have been diverted from international traffic and the appropriate duty and taxes must be paid.

Containers must follow U.S. coastwise laws. A U.S. flagged vessel must be used to carry a foreign-based container loaded with domestic U.S. goods for point-to-point moves along a U.S. coast or river. The mode of transport moving the container determines which regulations apply. The container simply “goes along for the ride.”

In the case of failing to export the container after 365 days, or of failing to report its diversion from international traffic, the penalty imposed is a sum equal to the value of the container plus the duties and taxes. Should the container be imported, the rates of duty are low; indeed they are free for most countries. According to U.S. customs officials, the sheer number of containers moving goods into and out of and around the U.S. makes it impractical to track the movements of every container. Effectively, there are no restrictions concerning cabotage moves. The only real restriction is a 1-year time limit.

### **3.3. Canadian Container Cabotage Regulations**

In Canada, foreign-based containers, including any ancillary equipment, are provided for under tariff item *9801.10.00*. Containers imported under tariff item *9801.10.00* may enter Canada without payment of duties or taxes. This duty free status is conditional upon the following circumstances: (1) the container is owned or leased and imported by a person who is not a resident of Canada; (2) in normal operations, the container leaves from and

returns to the foreign country; (3) main control of the container is from the foreign country; and (4) the container must leave Canada within 30 days from the date of its importation. This 30-day grace period may be extended, under extraordinary circumstances and at the full discretion of the customs official, for up to 24 months. Extraordinary circumstances include adverse weather, equipment breakdown, legal action involving the conveyance and delays in the delivery of goods to be loaded into the container.

If a foreign container enters Canada for the purpose of import-export moves and fails to leave Canada within 30 days, its duty-free status is forfeited. For integration into the Canadian economy, containers can be imported under tariff item *8609.00.90* and the appropriate duty and taxes paid. Chapter 98 of the *Customs Tariff* contains provisions for goods that have been previously imported. If it can be proven that a particular container had been previously imported and the duty paid, the provisions in Chapter 98 will permit the re-importation of the container without the payment of any additional duties. Then, each imported container not originating in Canada can exit the country for the purposes of international commerce and can re-enter Canada under tariff item *9814.00.00* duty free, as long as it has not been advanced in value or improved in condition while abroad, and CCRA is satisfied that a similar quantity of containers has been exported.

Tariff item *9813.00.00* refers to containers that originate in Canada and are used for the international transportation of goods. Containers entering Canada under tariff item *9813.00.00* or *9814.00.00* can leave and re-enter Canada duty-free at any time and move

all goods throughout Canada freely and without restrictions. These provisions outlined in Chapter 98 of the *Customs Tariff* may involve considerable internal controls for container owners and many may not consider employing them.

A foreign-based container may engage in “incidental” domestic transportation during its maximum 30-day duration in Canada. The incidental domestic transportation must take place totally within Canada’s boundaries on a route that is consistent with the international route, with only minor deviations being acceptable. As well as being incidental to the international traffic of the goods, the transportation service of the domestic goods must not, at any time occur outside the territorial limits of Canada. Additionally, the container must not have entered Canada for the purpose of an in-transit movement through Canada.

CCRA defines transportation “incidental to the international traffic of the goods” as the transportation of goods between points in Canada occurring immediately before or after the container is used for import or export service. Foreign containers laden with domestic goods must move in the general direction of the import delivery or export loading point and follow a route that is similar and consistent with the international load. While “similar and consistent” can be subject to interpretation, acceptable cabotage practices are at the full discretion of customs officials.

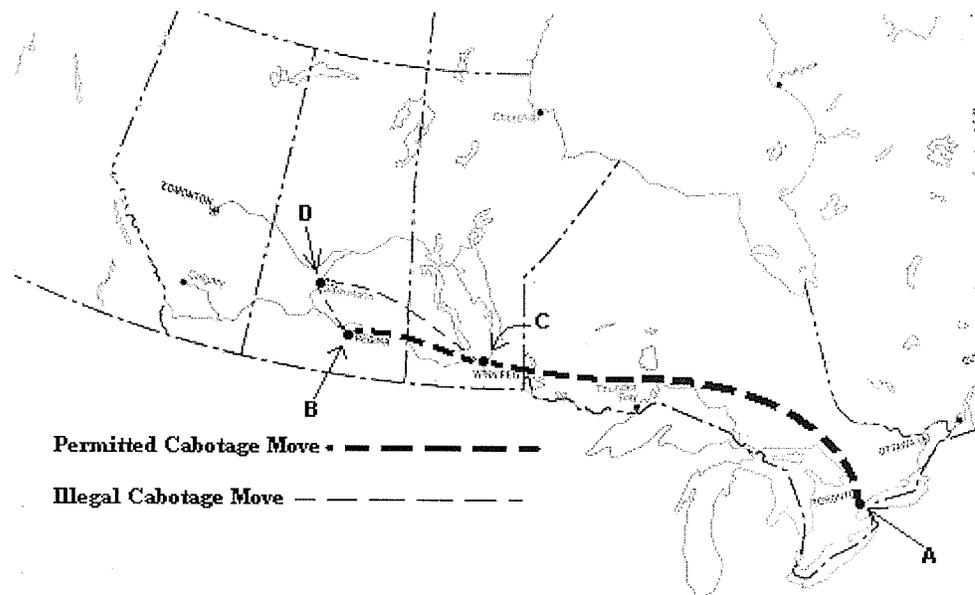
To elaborate further on these concepts, between import load drop-off point (A) and export load pick-up point (B), the repositioning move must occur with only a minor

deviation off of the A to B direct line and the repositioning drop-off need not be anywhere near B, it just has to be in direct line (collinear) to it and point A. One can also conclude that “transportation incidental to the international route” will require that the export load to be picked up at point (B) must have been scheduled prior to undertaking any cabotage activity. Furthermore, it can be deduced that doubling back is not allowed, meaning the export load pick-up point (B) must be reached with the repositioning drop-off point in between point (B) and point (A). Furthermore, the length of the move is unrestricted. Also, the direction of the repositioning move is unrestricted so long as doubling back is not occurring. Only one point-to-point domestic move is allowed throughout the containers maximum 30-day duration in Canada, because a cabotage move must occur immediately before or immediately after the transportation of the international load. By and large, container-repositioning moves will follow east-west patterns.

Figure 3.1 highlights these concepts in greater detail. In this example, a container laden with imported goods is discharged in Toronto (Point A). The container is then faced with one of three options; to return to the port empty to wait for an export load, pick up a load in the Toronto area for export or move empty/loaded to pick up an export load elsewhere in the country. The ideal scenario would be to find an export load in the Toronto area for furtherance to the port and beyond. However, the carrier may not be able to locate suitable export cargo in the Toronto area to load into the container. Frequently, containers will head back to the port empty to await loads to be transloaded (stuffed) at the port.

This is a less efficient use of resources, but many carriers prefer this option in order to minimize the opportunity costs of longer container dwell times.

**Figure 3.1.**



The third option requires the carrier to find a suitable export load elsewhere in the country. Suppose, for example, that the carrier located suitable export cargo in Regina, (Point B). Carriers can instruct the railways to reposition the container in Regina.

If the railways or other service providers reposition this container empty, resources are wasted and costs are increased. However, CCRA regulations allow limited movements of domestic freight in international containers. In order to facilitate the empty container's journey to Regina, the carrier may choose to load the container with westbound domestic cargo. According to CCRA regulations, this domestic cargo must be either Winnipeg-bound (Point C) or Regina-bound (Point B) because these are the only cities with intermodal terminal facilities on the Toronto-Regina direct route.

If Winnipeg-bound domestic cargo were loaded at Point A, the container would have to complete the remainder of its journey from Point C to D (Regina) empty. In addition, the export freight in Regina must have been booked with the container line prior to the container's departure from Toronto.

Suppose that no suitable Winnipeg-bound or Regina-bound domestic freight were available in Toronto. The carrier would be forced to reposition the container to Regina empty – an expensive proposition. Although Saskatoon (Point D) is not far from Regina, Saskatoon-bound cargo would not be permitted, since it is not on the direct route between Regina and Toronto, and would, besides, entail doubling back, which is prohibited. Due to the complexity of these scenarios, some ocean carriers may avoid serving source-loaded Prairie exports altogether.

Finally, a foreign container entering Canada empty can partake in cabotage moves on the inward leg of the journey provided it has entered Canada to pick up an export load. However, the export load must have been scheduled prior to the container's entry into Canada. In addition, the cabotage move must follow a route that is "similar and consistent" with the origin of the export load. Again, the container will be restricted to one domestic movement during the international journey. The movement of an empty foreign-based container between two points in Canada is not considered "transportation incidental to the international traffic of the goods" and can move throughout Canada freely and without restrictions.

A “sufferance warehouse pick-up” is a type of cabotage move sanctioned by CCRA. Frequently, carriers operate terminals, warehouses, or drop yards as intermediate points to consolidate or deconsolidate shipments and to pick-up or deliver goods. After international goods have been delivered to a sufferance warehouse to await customs release, any foreign-based container entering Canada may be used to pick-up or deliver goods from that location, to any location, for the remainder of its permitted 30-day period. This is allowed only if the container is being used to deliver imported goods or to pick-up and deliver export goods to the warehouse.

Canadian regulations also permit equipment switching. During transportation, goods may be transferred from one conveyance to another. The regulations do not limit the number of times international or domestic goods are transferred from container to container, so long as each foreign-based container follows the cabotage regulations set out in the *Customs Act*. This means that, during its maximum 30-day duration, the movement must be “incidental to the international load” and only one such movement is undertaken.

### **3.4. Customs Post Audit System**

All foreign goods entering Canada must be reported at the border and any relevant duties and taxes must be paid before the goods can proceed into Canada. Carriers can apply for Customs Post Audit Carrier status to defer the payment of duties. Several conditions must be met and a bond must be posted. Post Audit Carriers must still report the goods

entering Canada at the border but the payment of duties and taxes can be deferred to a later date upon the arrival of the goods to an inland destination in Canada. The Customs Post Audit System allows qualifying companies to transport goods in bond under limited physical control as long as there exists suitable records for audit by customs officials to ensure the cargo was disposed of according to the regulations set out in the *Customs Act*. The result is faster release times at the border.

Container leasing companies maintain inventories of containers for lease to shippers and carriers. If they maintain suitable records of containers under their ownership or control from which CCRA auditors can track container movements in Canada, they can be considered for post audit container operator or container pool operator status.

Containers operated under the Customs Post Audit System are subject to the same cabotage restrictions as all other foreign containers under tariff 9801.10.00, with one notable difference – the duty-free status is extended to 6 months. During this 6-month period they may partake in one domestic move en route to the repositioning of the container for export. The domestic load must be incidental and must follow a route that is similar and consistent with the international load. This does not include movements where a container pool in one part of Canada is merely being supplemented by containers from another.

Repositioning containers operated by container pool operators over a route outside Canada is also permitted on the following conditions: (1) the container entered Canada to

deliver imported goods; (2) the container is being repositioned to pick-up an export load; (3) the route taken is incidental to the repositioning; (4) the equipment used to move the container is of Canadian origin or has been fully duty-paid in Canada; and (5) the container is under the control of the Customs Post Audit System.

All containers are nevertheless subject to the coastwise laws of Canada as well as other regulations that outline the acceptable practices of foreign-based carriers operating in Canada. The origin-destination of the cargo, as determined by the bill of lading, is the principle for cabotage regulations, rather than just the nationality of the container used in the transport.

### **3.5. Penalties**

Prior to October 2002, the maximum penalty for an illegal cabotage move was a fine of an amount equal to the market value of the container. However, CCRA has recently implemented a policy that will increase penalties for contraventions of the *Customs Act*. The new Administrative Monetary Penalty System (AMPS) is part of a modern sanctions program for CCRA. Its purpose is to promote compliance with Canada's customs legislation and financial penalties for contraventions will increase with each infringement. In CCRA's *AMPS Master Penalty Document*, contraventions of container cabotage regulations are assessed penalties of \$1,000 for the first violation, \$2,000 for the second violation and \$3,000 for the third and all subsequent violations. These penalties are applied against the carrier or agent that diverted the container into domestic service.

### 3.6. Chapter Summary

Canadian legislation limits the amount and type of cabotage moves that may be undertaken by a foreign-based container. Two specific types of cabotage moves are allowed: the repositioning move – solely domestic transport between an import move and an export move; and the sufferance warehouse pick-up – equipment switching at sufferance warehouse stations. The U.S., on the other hand, has no such restrictions on foreign-based containers. The only real restriction imposed by U.S. legislation is a 1-year time limit for completion of its services. These regulations are outlined in the *Customs Acts* of both countries. For Canada, a foreign-based container is considered a temporary import and no duty is charged during the first 30 days of cabotage activity. It is governed under tariff item 9801.10.00. The U.S. also considers a foreign-based container a temporary import, but for a maximum period of 1 year. No other restrictions are placed on foreign-based containers with respect to acceptable cabotage moves. In both countries, foreign-based containers are subject to their applicable coastwise laws.

## **Chapter 4:**

### **Cabotage Liberalization – The Financial and Operational Impact to Canadian Transport Operations**

#### **4.0. Introduction**

Presumably, Canadian cabotage laws are in place to protect domestic container carriers from foreign competition and mirror the restrictions that other countries impose on Canada. The first half of this chapter explores two alternatives for cabotage reform and provides a discussion on the impacts to stakeholders from the reform proposals. The remainder of the chapter discusses the results from a survey of stakeholders conducted by the author in 2002.

#### **4.1. Background**

Ocean carriers can switch ports, railways or trucking companies, but their relationships with the trucking industry are the most tenuous. Immense competition exists among truckers, which allows ocean carriers to change trucking partners quickly.

Canada has only two national railways with similar service levels and rates. Some foreign ocean carriers perceive Canada's railways as a homogeneous service. These container carriers may take a more long-term approach with the railways. The volume of containers that an ocean carrier can divert to a railway is so large that they are granted great leverage. Service contracts between ocean carriers and the railways are worth a great deal of money and can result in substantial revenue losses to the railway if the ocean carrier chooses to switch to another rail company. Large international liner companies can more easily induce competition between Canadian rail carriers than is the case with shippers. Reducing costs and improving efficiency of the entire network is thus in the best interests of all parties concerned.

Intermodal is becoming increasingly important to the Canadian freight market. In 2000, CP Rail announced that intermodal container traffic had become its largest single source of revenue.<sup>3</sup> CN Rail announced in 2003 that intermodal traffic is its fastest growing business segment.<sup>4</sup> The railways have important equipment investment decisions to make in order to accommodate the increasing demand for intermodal services. They could use existing foreign-owned equipment to increase capacity in order to accommodate this growth, rather than invest in domestic assets. This may help reduce the movement of empty international containers.

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<sup>3</sup> [www.cpr.ca](http://www.cpr.ca)

<sup>4</sup> [www.cn.ca](http://www.cn.ca)

Extending both the number of allowable domestic movements and the period of time that containers can remain in Canada duty-free may benefit carriers and shippers. If Canadian laws paralleled those to our southern neighbor, triangulations or other diversions of containers, as they makes their way back to international commerce could provide cost-saving opportunities for Canadian shippers, carriers and intermediaries. Enhancing the efficiency of the total network, especially in the areas of transportation and supply chain management, contributes more broadly to improving the competitiveness of export goods.

## **4.2. Cabotage Liberalization – Alternatives for Reform**

Two possible container deregulation scenarios are considered in this chapter. The first scenario considers harmonizing Canadian laws with U.S. laws, called “unlimited cabotage liberalization.” The second scenario, “limited cabotage liberalization” is a combination of the status quo and “unlimited cabotage liberalization”, sanctioning a relaxation of the restrictions to allow for triangulation. The following section is derived from discussions with stakeholders on the effects to shippers and carriers of the two liberalization scenarios.

### **4.2.1. Relaxing Cabotage Restrictions – Implications for Shippers**

Shippers can benefit most from unlimited cabotage liberalization. Containerized freight traffic in Canada is primarily east-west movements concentrated mostly in urban areas

located in a line north of the U.S. border. The opportunities for movements to more remote locations in Canada can be enhanced if the more complete liberalization of a whole North American regime were established, rather than just advancing a merely incremental adjustment to the current regulations. Given that carriers could take advantage of multiple moves over an extended period of time, container equipment of specific sizes and types could be more readily available to remote shippers. Furthermore, carriers could operate in a more cost effective manner, and pass along efficiencies to shippers. The potential to reduce both domestic freight costs and international import and export freight costs is enhanced under the more complete liberalization.

During the 30-day window, containers are likely to be limited for domestic use. The 180-day window under the Customs Post Audit System improves the possibility of improving shippers' transportation efficiencies, but may not be sufficient to improve the supply of containers on the Prairies<sup>5</sup>. The U.S. allows a 1-year period of entry of the equipment. Some U.S. container depots have had a surplus of containers that had been idle and available for export for more than 5 years.<sup>6</sup> The import – export imbalance led to such a state of affairs. The U.S. situation suggests that the one-year time period is ample, but this still may not be sufficient as increasingly specialized equipment requirements make management of an idle fleet more difficult. Even if all containers were fully interchangeable between carriers, transport operators or agents, there will always be a headhaul and a backhaul where surpluses of equipment build up due to lack of demand.

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<sup>5</sup> Suitable, empty containers are in short supply on the Canadian Prairies. Due to this region's low population density and its relatively small demand for goods, it is an ideal example of an inland, remote location.

<sup>6</sup> Profits are a function of a carrier's ability to minimize container dwell times. Maintaining inventories of idle containers is certainly not a situation the ocean carriers would like.

#### **4.2.2. Relaxing Cabotage Restrictions – Implications for Carriers**

Canadian ocean and surface carriers could benefit from relaxing container cabotage restrictions. However, some carriers would be more inclined to prefer limited cabotage liberalization. This community may like to maintain protection of the equipment supply advantage they currently enjoy, and thus seek to maintain this subtle protectionism.

It makes economic sense to have only one set of rules because of the volume of intermodalism between the U.S. and Canada. Unlimited cabotage liberalization would give carriers more opportunities to reposition equipment to demand areas. Furthermore, load factors and empty mile ratios could improve substantially when compared with more restrictive scenarios. Capacity available to domestic shippers could increase. Given that surface carriers could use equipment belonging to container pool operators and liner companies, this could be achieved without any significant investments in new equipment and infrastructure.

Internationally based carriers might benefit most from the complete cabotage liberalization. For these carriers, the ability to most economically operate a fleet of intermodal equipment relies on the opportunities to generate multiple revenues and to minimize positioning times and costs. Ocean carriers spend close to \$10 billion a year operating container assets, including ships, containers and trucks. It is estimated that about 16 percent of that gross expenditure is directly attributable to the cost of

repositioning empty equipment.<sup>7</sup> These repositioning costs can be mitigated by minimizing the time and numbers of units that sit idle and cost effectively positioning units toward demand areas.

Canadian long-haul over-the-road carriers would have to adjust to the relaxation of container cabotage restrictions. The addition of previously unused capacity would inherently reduce long haul rates in a market that is immensely competitive with slim margins. On the other hand, the replacement of motor carrier transport by rail would contribute to a reduction in greenhouse gas emissions. Moreover, the trucking companies could have more short haul drayage if more containers were loaded. On balance, this could alleviate the chronic shortage of long haul drivers that plagues the industry.

#### **4.3. The 2002 Container Cabotage Survey**

In an attempt to quantify the effects of container cabotage regulations, the author undertook a survey of stakeholders during the months of November and December 2002. Information was gathered via a self-administered questionnaire. A series of follow-up phone calls and emails facilitated much of the qualitative discussion found in this chapter.

In order to acquire accurate information, it is important to survey as many industry participants as possible, particularly from the largest, most important players. Because the focus of this thesis is on the costs of international container service, input from the container liner companies operating in Canada was viewed as key to obtaining relevant

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<sup>7</sup> Bangsberg, 2001.

information. In Canada, 27 different liner companies operate out of the ports of Vancouver, Montreal and Halifax. These companies and their global operating capacities are outlined in Table 4.1.

<b>Table 4.1. Container Lines with Canadian Operations</b>				
<b>Carrier</b>	<b>Total TEU Cap.</b>	<b>Global Rank</b>	<b>% Global Cap.</b>	<b>In sample?</b>
Maersk-Sealand	840,308	1	9.6%	Y
Mediterranean Shipping Company (MSC)	404,827	2	4.6%	
Evergreen America Corp.	402,113	3	4.6%	Y
P&O Nedlloyd	395,780	4	4.5%	
Hanjin / Senator Lines	361,841	5	4.1%	Y
APL	272,768	6	3.1%	
COSCO	253,713	7	2.9%	
China Shipping (Canada) Agency	246,433	8	2.8%	Y
CP Ships	237,565	9	2.7%	Y
NYK Line	226,767	10	2.6%	Y
CMA/CGM	225,691	11	2.6%	
OOCL	216,329	12	2.5%	
MOL/Mitsui O.S.K. Lines	199,555	13	2.3%	Y
K Line	188,669	14	2.2%	Y
Hapag Lloyd	173,545	15	2.0%	Y
Hyundai Merchant Marine	160,913	16	1.8%	Y
Zim Container Lines	140,568	17	1.6%	
Norasia Container Lines	91,897	19	1.1%	
Oldendorf Carriers (Indotrans) Ltd.	32,075	N/A	0.4%	
Costa Container Lines	31,500	N/A	0.4%	
National Shipping Company of Saudi Arabia	25,653	N/A	0.3%	
Wallenius Wilhelmsen Lines America	16,980	N/A	0.2%	
Atlantic Container Line	15,500	N/A	0.2%	Y
Westwood Shipping	14,203	N/A	0.2%	
Coral Container Lines	1,870	N/A	0.0%	
Melfi Marine	1,350	N/A	0.0%	
Samskip	N/A	N/A	0.0%	
<i>TOTAL Canadian Operations</i>	<i>5,178,413</i>		<i>59.3%</i>	
<i>TOTAL Global Capacity</i>	<i>8,735,915</i>		<i>100.0%</i>	
<b>TOTAL survey sample - Global</b>	<b>3,053,209</b>		<b>35.0%</b>	
<b>TOTAL survey sample - Canada</b>	<b>3,053,209</b>		<b>59.0%</b>	

*Sources: Compiled from Containerization International, Kosior, J.M., 2002, ports of Vancouver, Montreal and Halifax websites and company websites*

The container companies that operate in Canada control over 5 million TEU's globally, almost 60% of global TEU capacity. Of these companies, Maersk-Sealand is by far the

largest player in the container liner sector with almost 10% of global TEU capacity. They possess more than twice the capacity of the next largest company, Mediterranean Shipping (MSC).

Of the 27 container liner companies contacted, 11 chose to respond to the survey, a response rate of 41%. A small sample size such as this corresponds to a 23% margin of error – far too large to make statistical inferences about the population. For a margin of error of 5% at the 95% confidence interval, a sample size of at least 25 respondents, or a census of the liner industry would be required.<sup>8</sup> Several reasons for non-response exist. First, most of these carriers, particularly the global top 10, are controlled outside of Canada. Their Canadian presence is comprised largely of sales and marketing offices. Attempts at contacting relevant personnel who could offer insight into the effects of cabotage regulations within these companies proved to be a daunting task. Second, this non-response reflects the sensitivities some of these companies have to sharing what they essentially view as confidential information.

Collectively, the 11 carriers represented in this sample control over 3 million TEUs globally, which represents 59% of the Canadian container liner market, or 35% of global TEU capacity. Whether or not this sample can allow us to make statistical inferences about the container carrier industry, this survey yielded interesting insights on Canada's

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<sup>8</sup> Standard practice is to take a conservative approach and assume the greatest variation possible – which occurs when a 50/50 split occurs. A margin of error of 5% means that if 50% of respondents answer “yes” to a given question, there is a 95% certainty that the correct value for the population is between 45% and 55%. However, when different splits occur, the margin of error declines.

container logistics system that suggests removing Canadian cabotage restrictions could have great appeal to shippers and domestic and international carriers.

Container liners rely on sector partners to assist in landside strategies. This large and varied group generally includes such intermediaries as surface carriers, container terminal operators and freight forwarders. Of the many rail carriers operating in Canada, only two are national in scope, CN and CP. Ten container terminals operate out of the ports of Vancouver, Montreal and Halifax, with a few smaller inland terminals scattered throughout the country. Finally, many freight forwarders have operations in Canada of varying sizes and global reach. Of this entire grouping of intermediaries, five are included in the sample of survey respondents, bringing the total survey sample size to 16 respondents. A high self-selection bias makes statistical inferences about stakeholders' perspectives of cabotage regulations unreliable, although some useful insights and anecdotal observations were obtained. As such, the discussion that follows should be used with caution since a qualitative approach on stakeholder perceptions is taken.

<b>Table 4.2.</b>			
<b>Survey Sample</b>			
<b>Operation</b>	<b>Frequency</b>	<b>%</b>	<b>Cum. %</b>
Container Line	11	68.8%	68.8%
Other Intermediary	5	31.3%	100.0%
<b>Total Sample</b>	<b>16</b>	<b>100.0%</b>	

Table 4.2 summarizes the survey sample by operation. The container lines represent more than two thirds of the sample. The remainder of the sample is comprised of other

intermediaries, which include both Class I railways, a container terminal operator and two global freight forwarders.

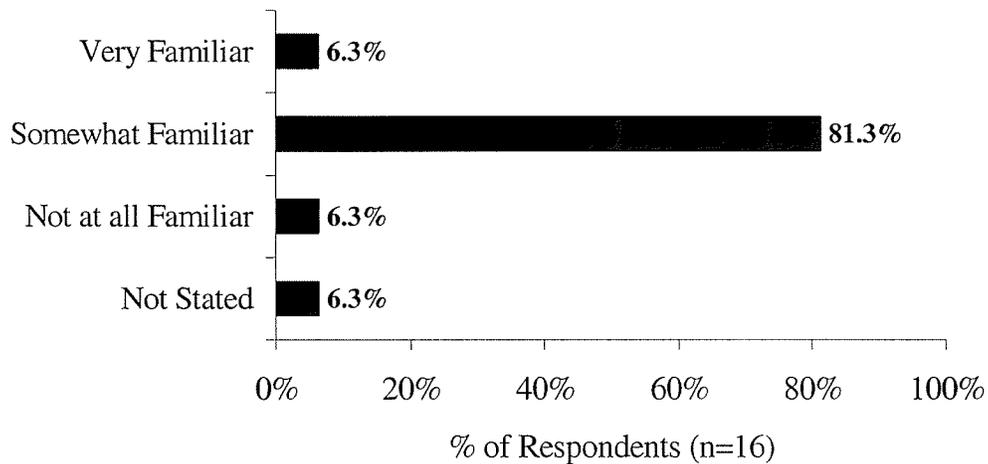
#### **4.3.1. Results and Discussion**

Respondents were asked to state their degree of familiarity with the differences between U.S. and Canadian container cabotage regulations. The results are shown in Figure 4.3.

Surprisingly, only 1 of the respondents claimed they were “very familiar” with the differences between U.S. and Canadian container cabotage regulations. Eighty percent of the sample indicated that they were somewhat familiar with the differences in the regulations. The respondent claiming to be not at all familiar with these regulations is a major container line. The large self-selection bias in this survey may indicate that the many companies which did not respond, may have done so due to lack of knowledge on this topic.

A low degree of familiarity on this topic indicates the level of confusion surrounding this policy. The respondent claiming a high degree of familiarity with the regulations incorrectly interpreted the policy by assuming that Canadian rail carriers are exempt from these laws.

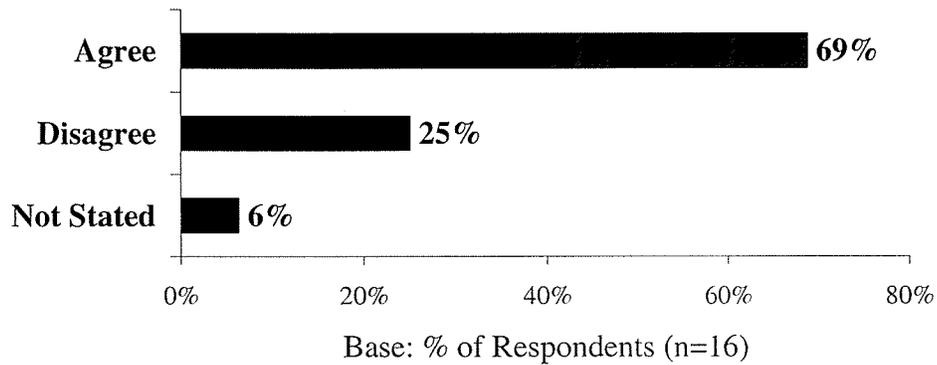
**Figure 4.3.**  
**Degree of Familiarity with Cabotage Regulations**



By restricting container mobility, carriers are limited in the locations that can be economically served. Figure 4.4 shows that over two thirds of the sample feel that Canadian cabotage regulations are more restrictive in practice.

Sixty-three percent of the container lines in the sample agreed that Canadian regulations are more restrictive in practice, as did four out of the five respondents who are classified as “other”. These seven container lines represent 39% of Canadian ocean-borne TEU capacity. It is not surprising that the majority (80%) of the “other” respondents feel these regulations are restrictive because these companies coordinate much of the container repositioning and may more frequently encounter problems associated with cabotage.

**Figure 4.4.**  
**Canadian Cabotage Regulations Are More Restrictive  
in Practice**



The quarter of respondents that do not feel restricted by these regulations provided an explanation. For many carriers, the revenue leg is the import load. Westbound containerized exports to Asia face backhaul rates, which are much lower compared to the backhauls associated with eastbound import rates. Many shipping lines that offer Asia-North America service endeavour to target the Canadian export cargo to areas that have high demand for eastbound freight (North American imports). This is called match back.

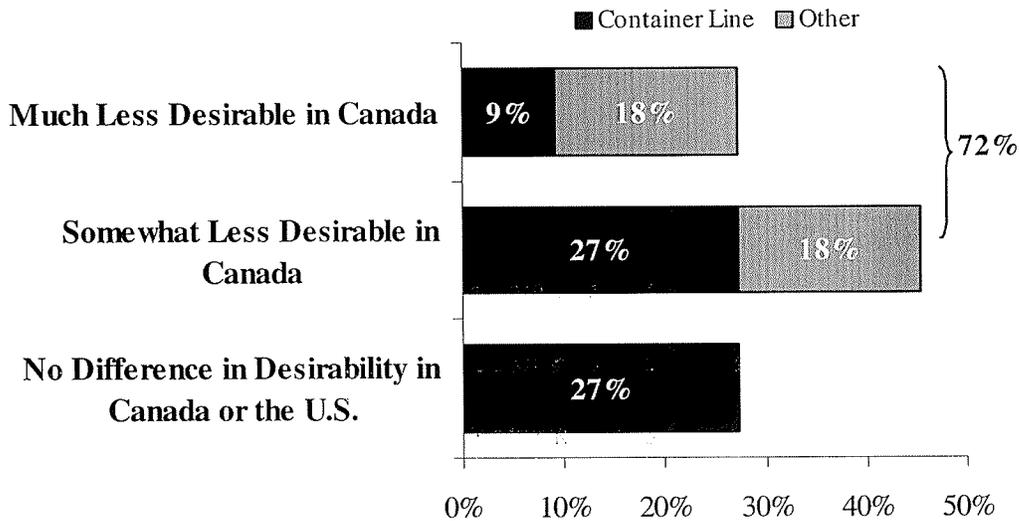
The match back of Canadian exports to an Asian point that allows quick cycle time of a container is very desirable. Such areas in Asia are Hong Kong, Taiwan, Singapore, Thailand and parts of Indonesia, China and South Korea. The long recession in Japan has reduced their exports to Canada. A 40-foot container to Tokyo usually has to be moved empty by the shipping line to Hong Kong or another supply area for the next eastbound move. As a result, most lines focus marketing efforts on attracting export cargos to areas that do not require an extra empty repositioning move in Asia.

Generally, the maximum amount of time for a container to remain out of revenue service is 21 days – much lower than the Customs Post Audit System time frame of 180 days. Twenty-foot containers are inadequate for most domestic uses due to their reduced payload carrying capability and higher trucking costs (the trucking costs for a 20-foot container are only marginally cheaper than for a 40-foot marine container, and 53-foot domestic trailer, both of which can carry twice as much product as a 20-foot container). The reduced payload capacity of 20-foot containers negatively affects the demand for 20-foot containers in favour of the larger 40-foot boxes. Therefore, domestic repositioning of 20-foot containers in Canada's interior is only minimally done. Furthermore, the volume of domestic repositioning is directly proportional to incoming demand, which is a function of population size. Most agricultural areas in Canada do not have the domestic demand to attract full containers, so they must reposition empties.

As shown in Figure 4.4, almost three quarters (72%) of those respondents who agree that Canadian regulations are more restrictive in practice also feel that these regulations make it less desirable to operate container traffic in Canada versus the U.S. However, the container lines were more inclined to feel that there is no difference in the desirability of operating container traffic in Canada than were the other stakeholders. This may be because members of the “other” group are responsible for inland equipment repositioning on behalf of the container lines. The container line's primary role is transporting international traffic. They are less interested in moving domestic traffic and would prefer land-based carriers to deliver import/export goods to/from inland locations. Improving

the mobility of their assets inland would benefit the container lines, but ultimately, international goods will make their way to port locations regardless of whether they are source loaded or not.

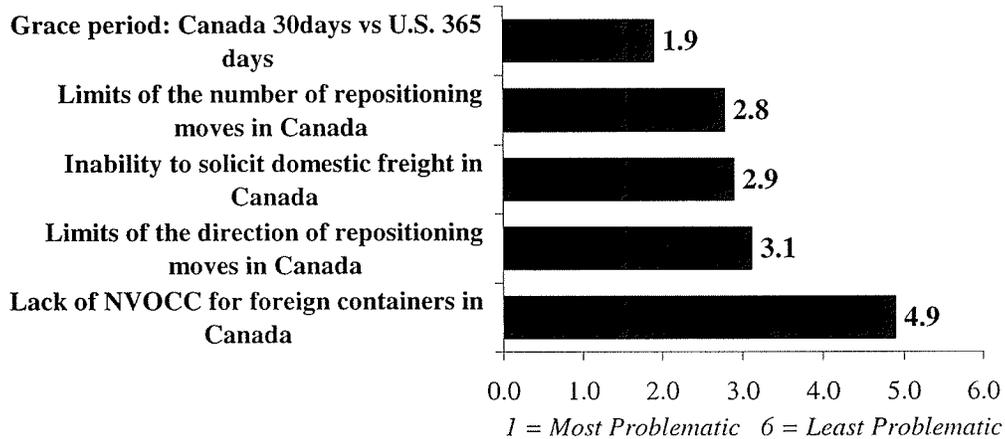
**Figure 4.4.**  
**Desirability of Operating Container Traffic in Canada**  
**versus the U.S.**



Base: % of Respondents Who Agree That Cabotage Regulations are More Restrictive (n=11)

Respondents were asked to rank some differences between Canadian and U.S. container regulations that are most problematic, with lower values representing the more difficult problems. The results are illustrated in Figure 4.5.

**Figure 4.5.  
Ranking of Most Problematic Differences between  
Canadian and U.S. Container Regulations**



Base: % of Respondents Who Agree That Cabotage Regulations are More Restrictive (n=11)

Respondents ranked the 30-day grace period for duty-free status of containers as most problematic. Over half (55%) of the respondents who agree that cabotage regulations are more restrictive in practice assigned the 30-day limit a 1 or 2 rank. This may again be based on limited knowledge of the respondents. Many container operators in Canada are in the Customs Post Audit System that increases the duty-free status of containers to 180 days. The increased time frame allowed under the Customs Post Audit System benefits carriers since a 30-day time window is viewed as too short.

Limits on the number of repositioning moves ranked second with 36% of those that feel Canadian regulations are more restrictive giving it a number 1 or 2 rank. Allowing containers to undergo 2 or 3 repositioning moves as it makes its way back to international traffic gives operators the opportunity to make use of triangular strategies – a potential cost saving measure. However, many international carriers endeavour to keep containers

in international revenue service. The more domestic moves a container makes on its way to export demand areas, the longer it will invariably take to get it back their ships. Eliminating restrictions on cabotage may not automatically increase the utilization of containers. The ship owners have to trade off their costs and benefits when they design routing.

The inability to solicit domestic freight placed a very close third as the most problematic difference between U.S. and Canadian container regulations. Respondents were very divided on the issue of soliciting domestic freight, with 46% of those that feel Canadian regulations are more restrictive allotting this a number 1 or 2 rank. Although using domestic freight as a means to reposition equipment is seen as important to operational efficiency, many container lines prefer not to participate in the Canadian domestic market. About half of the container lines surveyed felt that the railways have the most to gain from liberalizing the cabotage barriers but are nonetheless very supportive of removing these restrictions.

Limits on the direction of repositioning moves came in fourth with only 18% giving it a number 1 or 2 rank. Since foreign containers are restricted in the direction that repositioning moves can take, this may create unnecessarily complex route planning arrangements for carriers. Finally, the lack of NVOCC's<sup>9</sup> in Canada ranked a distant fifth,

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<sup>9</sup> In the United States, "the Non-Vessel Operating Common Carrier consolidates and dispenses container that originate at or are bound to inland points. The need for these firms arose from the inability of shippers to find outbound turnaround traffic after unloading inbound containers at inland points. Rail and truck carriers often charge the same rate to move containers, whether they are loaded or empty. To reduce these costs, the NVOCC disperses inbound containers and then seeks outbound shipments in the same containers. The shippers and receivers of international shipments gain from the shipping expertise NVOCCs possess

with none of the respondents assigning it a number 1 or 2 rank. NVOCC's can function as middlemen in reconciling international and domestic freight. The Canadian operating environment is different from the U.S. in that there are no NVOCC's buying and selling freight from carriers and shippers to reconcile import/export imbalances with domestic freight movements.

Stakeholders were asked to consider the ease of repositioning 20 versus 40-foot containers to Prairie locations. The results are illustrated in Figure 4.6.

None of the respondents felt that it is easier to reposition 20-foot containers to the Prairies. This is not surprising considering the small and specialized domestic freight market for the smaller containers. Twenty-foot containers are suited to heavy or bulky freight such as agricultural commodities, which tend to be Prairie exports. Therefore, the demand for goods to Prairie locations shipped in 20-foot containers is limited.

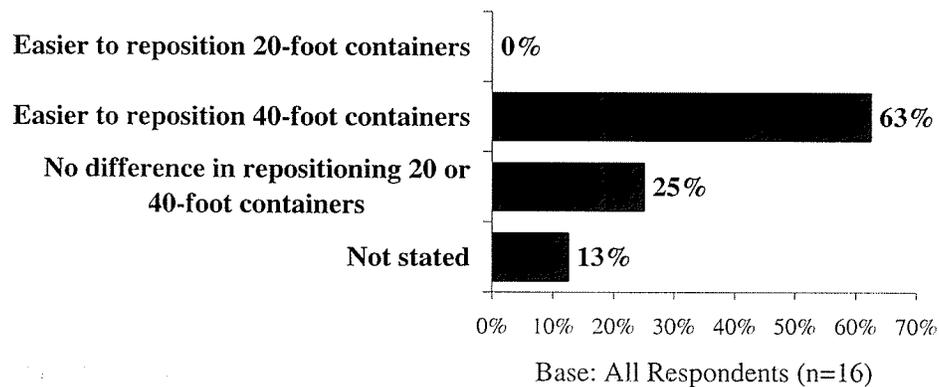
Over 6 in 10 (63%) stakeholders feel that repositioning 40-foot containers to Prairie locations is easier. Again, this is not surprising since most overseas imports arrive in 40-foot boxes and domestic freight generally moves in 40-foot or 53-foot domestic equipment. This is a significant factor to consider when repositioning equipment. A container will only move to locations where there is a demand for the goods in shipment. Even though significant demand exists on the Prairies for empty 20-foot containers for agricultural exports, the backhaul does not justify the fronthaul to such low demand

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and from the expanded and simplified import and export opportunities. The ocean carrier gains from the increased market area made possible by NVOCCs solicitation services." (Coyle, Bardi, Langley, 2003)

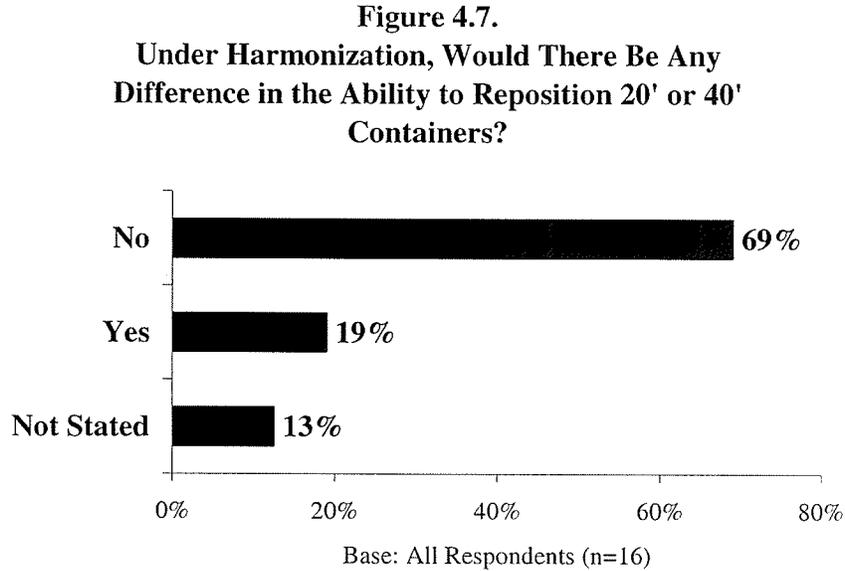
areas. The high costs of repositioning suitable equipment to the Prairies must be shared by all parties, possibly rendering source-loaded agricultural shipments less competitive with exports that can be stuffed at the ports.

**Figure 4.6.**  
**Ease of Repositioning 20 vs 40-foot Containers**



Respondents were asked to consider how the ease of repositioning 40-foot versus 20-foot containers would be affected if Canadian container regulations were changed to match those in the U.S. The results are illustrated in Figure 4.7. Over two thirds (69%) felt that harmonizing the regulations would have no effect on the ability to reposition 20-foot containers versus 40-foot containers. It is interesting to note that of those respondents that feel it is easier to reposition 40-foot containers to the Prairies, 20% feel this would change under cabotage deregulation. A couple of reasons were given to explain why harmonization would affect ease of repositioning. Under harmonization, operators would be in a position to solicit half loads (a role of the NVOCC). This would provide more opportunity to locate suitable payloads for repositioning. Additionally, allowing multiple domestic moves would increase flexibility in positioning containers in demand areas. It

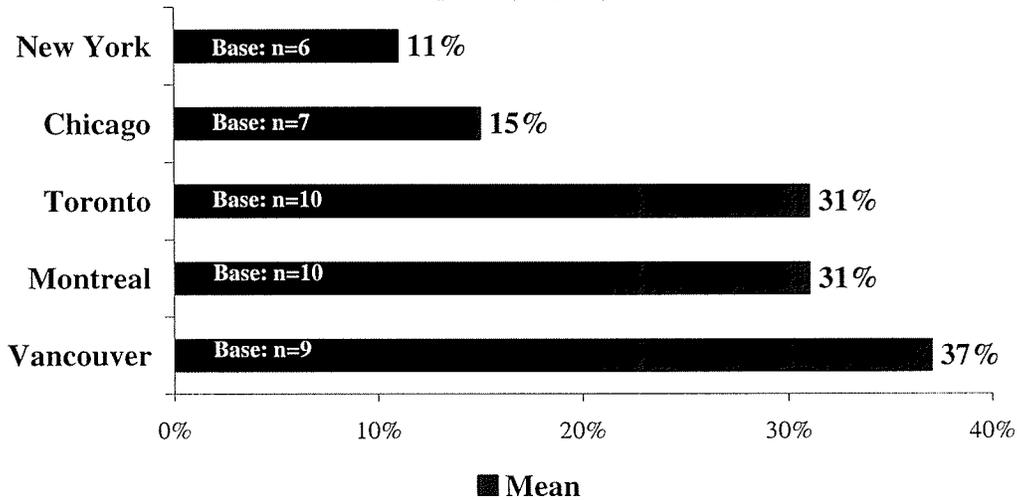
was recognized, however, that locating suitable domestic freight for 20-foot containers might pose a challenge since this market is small and specialized.



However, the high proportion of respondents that feel deregulation would have no impact on the ability to reposition equipment indicates that harmonization may have little, if any, impact to container supply on the Prairies. Traffic flows determine where containers are positioned. Increasing the supply of empty 20-foot equipment requires that suitable imports must be located. For example, steel is a type of heavy, bulky cargo shipped into the Prairies in 20-foot equipment. Policy makers should consider these issues when developing economic diversification strategies. Diversifying the sources of and types of imports is crucial to developing suitable container supplies on the Prairies.

If container cabotage were deregulated, the cost of repositioning containers to the Prairies could decrease. Respondents were asked to estimate this cost decrease from various port locations, the results are shown in Figure 4.8.

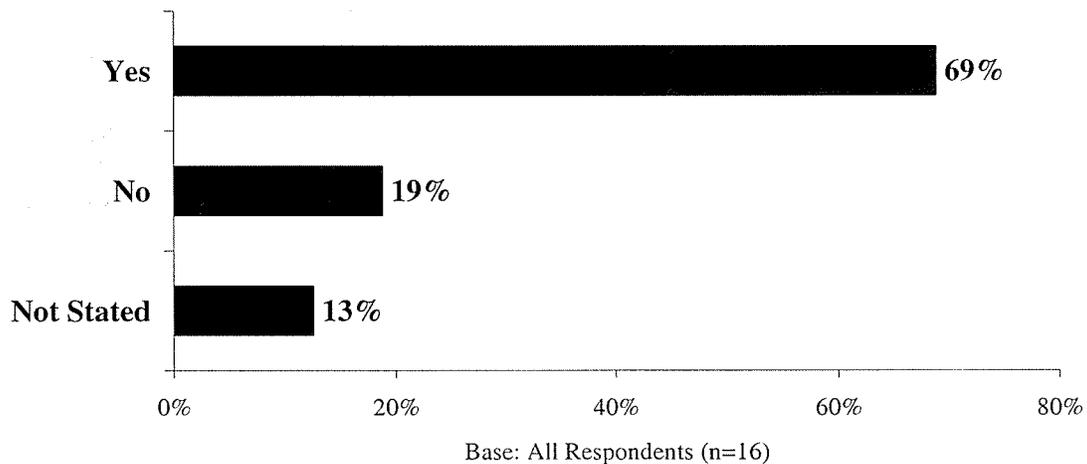
**Figure 4.8.  
Estimated Reduction in Repositioning Costs Under  
Harmonization**



The results suggest that repositioning costs can be reduced by as much as 37% if cabotage restrictions were lifted. Two container lines felt that lifting the restrictions would not change the cost of repositioning equipment from the three Canadian locations. Again, this is likely due to the current profitability of the Asia-Pacific trades. The market for Asian exports to North America is substantial and the companies with significant operations on this trade route prefer to stay out of the Canadian domestic market in favour of more lucrative international service. Of those that estimate a cost decrease, 88% estimate a cost decrease of between 10% and 50% for containers originating in Eastern Canada (Toronto and Montreal) and a cost decrease of between 20% and 80% for containers originating in Western Canada (Vancouver). For containers originating in the U.S. (New York and Chicago), it was less certain if the costs would decrease. Of those that responded to the question, about 60% felt the costs would not change at all.

Over two thirds (69%) of the respondents feel that Canadian routes to Asia are competitive with U.S. routes to Asia, as illustrated in Figure 4.9. Almost 20% of the respondents disagreed with this assertion. However these respondents feel the reason for Canada's reduced competitiveness is not a result of cabotage restrictions; rather, it is due to lower throughput of the Port of Vancouver as compared with some U.S. west coast ports.

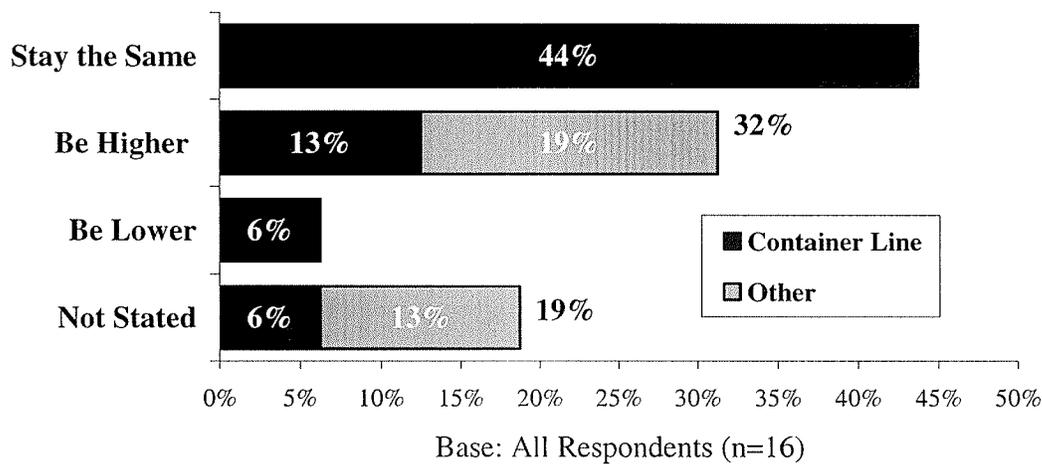
**Figure 4.9.**  
**Are Canadian Routes to Asia Competitive With U.S. Routes to Asia?**



Respondents were asked to consider if the cost of repositioning a container to the Prairies under deregulation would be different if the ultimate port of export were for Europe/North Africa rather than Asia. As shown in Figure 4.10, respondents were divided on the issue. Forty-four percent felt the repositioning costs would not be different for Eastbound exports and Westbound exports. On the other hand, 31% felt the repositioning costs would be higher. A higher repositioning cost estimate for eastbound exports as compared to westbound exports is not surprising. Some container lines are

likely more inclined to position containers in the highly profitable Asia/Pacific trade corridor where freight is easier to find and turnaround times are shorter. The trade-off between container turnaround times and repositioning costs can be a strategic component of liner profitability. Very few respondents (6%) felt the repositioning costs for eastbound exports would be lower and almost 20% were unsure.

**Figure 4.10.**  
**If Eastbound Exports, How Would Repositioning Costs Change**

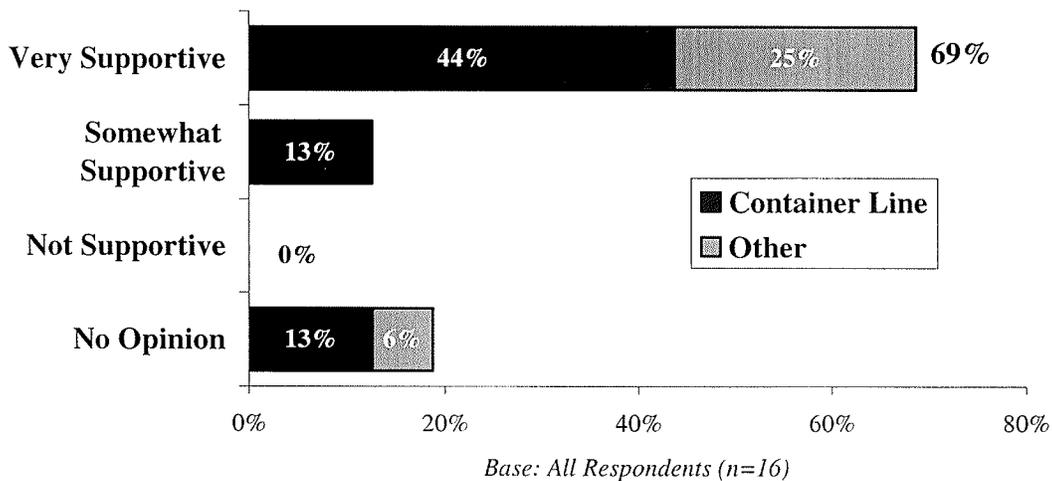


The respondents were asked to estimate by how much the repositioning costs would be different for eastbound exports versus westbound exports. The results, illustrated in Table 4.3, suggest that repositioning costs could be up to 9% higher for eastbound containers. Thirty-eight percent of respondents estimate the repositioning cost difference for eastbound exports versus westbound exports could range from 12.5% lower to 50% higher and almost half (44%) felt there would be no difference in repositioning costs. Based on the information obtained from this survey, it is suggested that if container cabotage regulations were changed to match those in the U.S., repositioning costs for

Westbound exports could decrease by up to 37% and repositioning costs for Eastbound exports could decrease by up to 26%, depending on the source-location of the container.

<b>Table 4.3.</b>	
<b>Under Harmonization, By How Much Would Repositioning Costs for Eastbound Exports be Different?</b>	
<i>Base: % of respondents that felt repositioning costs for eastbound exports would be either different, or stay the same (n=11)</i>	
<b>Mean Reposition Cost Difference</b>	<b>9.1%</b>
Mode	0%
Minimum	(12.5%)
Maximum	50%

**Figure 4.11.**  
**Level of Support for Cabotage Regulation Harmonization**



Finally, the respondents were asked to state their degree of support for the harmonizing of Canadian container cabotage regulations with those of the more liberal U.S. system. As illustrated in Figure 4.11, more than 80% of respondents support harmonizing

Canadian cabotage regulations with U.S. regulations. None of the respondents are unsupportive of harmonization.

#### **4.4. The Impact on Canadian Transport Operations from Current Regulations**

Opinions on the effects of container cabotage regulations on Canadian transportation operations were solicited from various industry representatives. A series of in-depth interviews and inquiries were conducted via telephone and email with ocean and land-based transportation service providers, container pool operators and government officials beginning in late 2000 through the end of 2002. The goal was to determine whether cabotage rules were viewed as an advantage or disadvantage to the Canadian transportation industry. Stakeholders were asked to share their experiences with the current regulatory environment, and to provide some insight on how these regulations affect Canadian operations. What follows in this section is mostly the anecdotal views on several related issues that were expressed to the author by the bulk of the firms involved in this interview process.

The current regulatory environment for containers does enable carriers to reposition containers in Canada while carrying a payload, helping them generate revenues on assets. In addition, repositioning containers from import points to other areas helps steamship companies take better advantage of export bookings.

On the other hand, some view the regulations as being overly restrictive, creating operational difficulties not experienced in the U.S. These restrictive regulations compromise the ability of some ocean carriers to reposition containers to demand areas. The 30-day maximum may be a significant problem since long-term storage beyond 30 days may be required. In addition, efficient repositioning of containers in the vast expanse of Canada frequently requires the use of triangular and quadrangular strategies, which the regulations do not permit. This negatively affects cost structures and the ability of liner companies to offer competitive rates.

Many ocean carriers charge or build empty repositioning moves into their freight rates. Repositioning charges add costs for shippers and consequently reduce their competitiveness in export markets. Shippers also face implicit costs because their flexibility to move goods by containers is limited. Flexibility is lost when shippers are limited to specific routes, or the required equipment is not available at the desired location in a timely fashion. Many shippers must stuff their goods into containers at the ports rather than source-loading because equipment is frequently not available in the interior.

The differences in U.S. and Canadian legislation also create problems for Canadian shippers. In the U.S., international container shipping lines are granted the opportunity to move their containers, with multiple use from place to place and without limitation to the means by which the unit is transported, or the place idled. This flexibility provides a competitive advantage to remotely located U.S. shippers when moving their freight,

because headhaul and backhaul are not strictly discreet between international and domestic movements. U.S. shippers enjoy lower container costs, making U.S. export goods more price competitive in global markets.

#### **4.4.1. Transportation Network Efficiency**

Container cabotage regulations are a source of network inefficiency. They inhibit equipment from being efficiently located to demand areas and may contribute to regional equipment imbalances in Canada. These regulations increase the magnitude of empty mileage by carriers because many containers must be repositioned without carrying a payload. Moving empty equipment consumes capacity and wastes fuel and other resources. If rail carriers were able to reposition marine containers while carrying cargo, their available capacity could increase as cargo is diverted from other means. Administrative costs are another source of network inefficiency. Monitoring and recording the movements of each foreign-based container in Canada is cumbersome and creates additional “red tape” costs.

Current regulations do not reflect the needs of the North American market. The foundations of an efficient transportation network involve a pricing system based on supply and demand. Where containers are needed and how they are moved as instruments of international commerce is supported by landside positioning strategies, which may require multiple movements over a period longer than 30 days. In addition, carriers must have more opportunities to supply empty containers in the locations as they are needed. An efficient and reliable supply chain requires the right equipment to be available at the

appropriate time for scheduled export moves. A continual shortage of 20-foot containers exists on the prairies while an excess supply is found in eastern Canada. Under current Canadian regulations, the liner companies can only reposition containers to demand areas when they have booked export loads. Allowing containers to be used in domestic services would give the ocean carriers companies the means to position appropriate equipment to demand areas in advance of export bookings.

Rural or remote shippers in Canada may benefit most from relaxing the cabotage rules. As long as this market is protected, they are forced to find alternative means to move goods to the seaports. More immediate access to equipment in remote locations can avoid the transloading costs at the port and the incidence of shrinkage and damage. Shippers of more fragile cargo are particularly affected by these practices. Accordingly, the closer the equipment supply can be made available to shippers, the better will be their cost competitive access to international trade lanes. An empty container would not have to be positioned from port locations if the international and domestic traffic flows can take container equipment into the vicinity of the shipper.

Besides the obvious capability of providing a more gainful provisioning of equipment in an otherwise imbalanced market, a more cost effective means of positioning equipment will enhance carrier competitiveness vis-à-vis other shipping origins. Differences in U.S. cabotage regulations have an effect on the efficiency of Canadian operations. Shipping lines call at both Canadian and U.S. ports when delivering containers worldwide. If their U.S. operations are more profitable because they have the opportunity of positioning their

equipment close to demand areas, empty containers from Canada might flow to U.S. destinations.

The efficiency of Canadian operations is further diminished because international carriers are effectively prohibited from competing in Canadian domestic services. There are more costs, controls and restrictions associated with Canadian movements than there are in the U.S. Ultimately; these cost differences are passed on to Canadian shippers.

#### **4.4.2. Impact on Freight Rates**

Equipment-repositioning expenses can be reduced through cabotage deregulation. These cost savings can then be passed on to shippers in the form of lower rates. Deregulation may also affect domestic freight rates. Economic theory dictates that an influx of previously underutilized equipment supply, which becomes available to the shipping public, would put pressure on domestic rates and service to adjust.

#### **4.4.3. Government Fiscal Considerations**

The level of enforcement by CCRA of container cabotage regulations is key to whether the regulations are merely a “paper tiger” or a real rule to be followed. CCRA only moderately enforces the regulations with periodic audits, creating opportunities for uneven enforcement across stakeholders. A foreign-based liner company openly admitted to the author that containers sometimes undergo 2, 3 or 4 repositioning moves while

carrying domestic cargo before arriving at the export pick-up point, and most containers remain in Canada beyond 30 days. Their last audit by CCRA was more than 10 years ago. Considering the ever-increasing amount of container traffic in Canada, it is possible that CCRA may have limited resources for this type of enforcement. However, this could change with heightened security concerns after the September 11, 2001 terrorist attacks in the U.S. It is not difficult to envision a day when each container is equipped with an electronic tag and its whereabouts is recorded and tracked by an online computer system.

The problem in enforcement may be directly related to tracking movements of each individual container. For example, the containers move from mode to mode throughout Canada and may be interchanged between different carriers at a variety of different locations. In many instances no financial transaction may take place between the different carriers. Factor in a number of freight forwarders, container service contractors and other groups that may be involved in container movements, as well as the number of times that the containers are in storage, it is evident that the task may become quite daunting.

Equipment tracking and enforcement requires extensive auditing and oversight, yet operators/stakeholders have access to creative means by which to operate at the fringes of the regulations. In the past, the return on investment for CCRA may not have made it viable to enforce these regulations. However, in October 2002 CCRA implemented an Administrative Monetary Penalty System, a civil penalty regime that will secure compliance with customs legislation through the application of monetary penalties.

#### **4.4.4. Environmental Considerations**

Repositioning empty containers uses fuel and other resources. As a consequence, the Canadian transportation industry produces higher Green-House Gas emissions levels. This is an environmental concern and affects all Canadians.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change negotiated in December 1997, establishes a commitment period between 2008 and 2012 in which industrialized nations are to reduce Greenhouse Gas Emissions (GHE's) to 94.8 percent of 1990 levels. Canada is to reduce its emissions by six percent. The Kyoto Protocol is just one of a series of promises to reduce GHE's made by the federal government. "Unless steps are taken now to begin to coordinate municipal, provincial, federal and even trans-national matters in transportation, we will likely fall considerably short of the mark".<sup>10</sup> Reducing GHE's will require more efficient engines and improved fuel technology; there are, however, other avenues that could be pursued to the benefit of societies as a whole. One example is eliminating regulations that prohibit efficiency.

#### **4.4.5. Are the Railways Interested?**

Foreign liner companies that operate in Canada rely on Canadian surface carriers or freight consolidators to move their freight and reposition their equipment. Current cabotage laws permit Canadian carriers and freight consolidators to load domestic cargo

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<sup>10</sup> Bronstone, A. and Butt, M., 1999.

into empty international containers for repositioning. However, rail companies own domestic intermodal equipment that they utilize for the same market. The domestic containers are 53 feet long, whereas the ISO equipment is 40 and 20 feet long. This gives the rail equipment an advantage in moving bulky cargo, which is the majority of domestic freight.

International containers owned and operated by foreign shipping lines are usually placed under the management of a Canadian carrier or freight consolidator to move import and export freight within Canada. Upon delivery of the import load, the liner company has several options. They can attempt to locate export freight in the vicinity to load into the container. This is an ideal situation because there is a quick turn around time and the shipping lanes are easily balanced. If the company is unable to locate an export load they can move the empty container back to the port or within Canada to an export load pick-up point. This situation is costly and inefficient because the containers may have to travel great distances without carrying a payload.

The liner companies can offer the container to the railways to reposition it on their behalf. The railway can reposition this equipment with domestic cargo, if they wish. For example, a foreign-based container laden with import goods will enter Canada at a Canadian port (usually Vancouver, Montreal or Halifax). A Canadian carrier assumes custody of the container and delivers it to the import load drop-off point (A). The liner company instructs the carrier to reposition the container to the export load pick-up point (B) by a certain date. During this time the carrier is responsible for the container. If the

carrier has a domestic load to move between A and B they can load the container with this domestic cargo. Presumably, both parties benefit under this scenario. The steamship company gets their container repositioned for free, or at a reduced fee. The carrier benefits because they receive revenue from the domestic movement using another company's assets. The export shipper may benefit if the repositioning charges for that container are reduced or waived. This cooperation between the steamship company and the carrier can be beneficial to all parties involved.

Rail companies' intermodal equipment competes with international containers for domestic traffic. A conflict for Canadian railways may lie with the utilization of international versus their own domestic containers. Both sets of equipment can be used to move the same goods. Consequently, an empty international container may sit in a rail yard that could be used for domestic traffic and reduce costs for shippers and carriers alike. The current regulations give the railways the option of selecting either international or their own containers to move domestic freight. However, the larger 53 foot containers could be more profitable to use unless the freight density is above a level that enables a 40 foot container to reach its full weight limit.

In certain situations, the railways do not have this luxury. For example, merchandise of some Canadian shippers cannot be easily transported in domestic containers. Steel, for example, is a heavy commodity and marine containers are ideally suited to this cargo. In fact, carriers and freight forwarders have built shipping programs around this type of movement. By utilizing foreign equipment for domestic services the number of empty

repositioning moves are reduced. This facilitates efficiencies in the transportation network and helps to reduce costs for carriers and shippers.

Empty international containers move from Toronto to Vancouver that could be used for westbound domestic traffic. Several possible reasons explain why they are not being employed. First, there may be no export traffic for them in Vancouver due to the current import/export imbalance on the Asia-Pacific trades. Second, there may be no suitable domestic freight with which to reposition these containers. Finally, the overall supply of domestic and international equipment dictates which containers are employed in domestic traffic. For instance, international marine containers are usually employed only when the overall supply of available domestic containers is low. When the domestic freight market for the railways is sluggish more international containers are repositioned empty, resulting in higher revenues for the railways. Revenues from repositioning empty containers supplement domestic freight revenues when the market is in decline. Furthermore, the costs for repositioning the empty equipment are paid by ocean carriers and ultimately passed on to shippers.

The railways' interest depends on what operating strategy they choose to employ. When moving domestic traffic, rail carriers have the option of utilizing their domestic fleet or employing the containers owned by steamship companies. Using their own equipment helps railways improve asset utilization rates. However, by using another company's assets, railways can increase their carrying capacity without having to invest in more equipment.

#### 4.5. Barriers to Cabotage Reform

The results of this survey suggest that there is significant support within the ship-owner community for liberalized container cabotage regulations. However, under Canadian policy, containers that are imported into Canada are dutiable, generally at 6.5% under the Most Favoured Nation (MFN) Tariff, and subject to the GST<sup>11</sup>, creating barriers to cabotage reform. A letter to the author from the Canadian Department of Finance states “the existence of a duty and the application of the GST precludes U.S.-type treatment.”<sup>12</sup> In another letter, the deputy minister of national revenue states “the Excise Tax Act does not provide any relief from the GST on importation of conveyances and transportation equipment to be used specifically for [cabotage].” (Prokop and Dean, 1999).

The Canadian and U.S. markets are merging into a single, integrated North American market. Developing a seamless flow of goods requires similar regulations on both sides of the border. Revenue Canada’s administrative position on the applicability of duty and GST to foreign-based containers could frustrate any attempt to create a truly continental container fleet. If it is possible to extend the duty-free period and mobility of the equipment under the Customs Act, it should also be possible to avoid GST subjectivity.

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<sup>11</sup> In Canada, the GST was introduced by Parliament in 1993 as a tax to assist the federal government in eliminating a budget deficit of \$42 billion. The GST now brings in excess of \$30 billion to the government treasury. It has been referred to as a cash cow for government and is unlikely to be discarded or replaced.

<sup>12</sup> August 8, 2003.

In addition to the application of duties and GST, cabotage reform could be hampered by industry's lack of understanding on this topic. Although an overwhelming majority of respondents indicate some support in cabotage reform, efforts to lobby government for change have not materialized. The Department of Finance states in their letter to the author that the federal government has "discussed the [cabotage] matter with officials of the Shipping Federation of Canada, who advise that their membership is generally satisfied with the current regime and is not seeking any changes to the treatment for containers."<sup>13</sup> Unless stakeholders express an interest in exploring the costs of container cabotage to industry, reform is unlikely to happen.

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<sup>13</sup> August 8, 2003.

## **Chapter 5:**

### **The Gravity Model - Derivation and Results**

#### **5.0. Introduction**

This chapter develops the gravity model that will be used as a measuring tool in this evaluation of container cabotage policy. The results of the lentils freight rate elasticity estimates are then discussed. These estimates will be used to assess the impact on export volumes that could arise from a decrease in freight costs.

Using lentils as the test commodity has several advantages. They are the most widely exported pulse crop and they have the longest history, which produces a better data series for cross-sectional, time-series gravity model analysis. Due to the similarities of different pulse crops, the gravity model estimates for lentils can be used as a proxy for all pulse crops.

The experiment was designed to minimize other sources of variation. The test commodity (lentils) was chosen because it moves almost exclusively by one mode of ocean-borne transport and lentils are very similar in quality. To test the sensitivity of location, the

marine transport of lentils model is first estimated aggregately and then disaggregated into Atlantic-based and Pacific-based trade.

## 5.1 Empirical Model

This discussion of the model and results are based on the author's previous work on gravity models. This analysis does not consider the use of distance and value as proxy variables. Readers are encouraged to review Vido and Prentice, 2003 for a comprehensive evaluation of the estimation and specification issues raised in Chapter 2.

The model as derived in Prentice *et al* (1998) is used in this analysis. It is the simplest form of the gravity model:

*Volume = f(freight rates):*

$$(1) \quad \ln Q_{ijt} = \alpha + \beta_1 \ln F_{ijt} + \beta_2 \ln Y_{jt} + \delta_1 B_{1jt} + \delta_2 B_{2jt} + \delta_3 B_{3jt} + \delta_4 B_{4jt} + e_{ijt}$$

$Q_{ijt}$  is the quantity of lentil exports, in terms of container loads, from Canada to 97 different countries worldwide, obtained from the Canada Grains Council (2001).  $F_{ijt}$  are actual, confidential, ocean-leg container freight rates from the ports of Montreal or Vancouver to the destination markets. These data were obtained on a confidential basis from a large international freight forwarder that is active in this trade. In addition, the inland transport cost is added to the ocean-leg rates to test the sensitivity of the inland portion (from Regina to Vancouver or Montreal). The inland rates were developed in

consultation with a freight forwarder and are a weighted average of the rates for source-loaded marine containers and domestic intermodal (“piggy back”) from the prairies to the ports.  $Y_{jt}$  is defined as importing countries’ income (GDP) in constant U.S. dollars as obtained from the World Bank (2000).

A dummy variable,  $B_1$ , is used to identify competing lentil production in importing countries. The dummy variable was set to unity if the importing country produced lentils domestically, and zero otherwise. This model uses two dummy variables to distinguish high-volume, relational trade linkages, from low-volume spot market trade flows. Discussions with exporters revealed that they enjoy long-term relations with some markets, while other markets may only emerge at random when some local shortage appears. These markets are consistent importers and import disproportionately large volumes. The “spot market” regions have relatively small volumes and do not import every year.  $B_2$  identifies those markets that consistently import Canadian lentils every year, irrespective of actual volumes, it is set to unity if countries import every year, and zero otherwise.  $B_3$  distinguishes large importers from small importers, it was set to unity if imports exceed 500 container loads per year, and zero otherwise.  $B_4$  distinguishes rich countries from poor countries. It was set to unity if the importing country is a member of the OECD, and zero otherwise. The above dummy variable approach best explains the diverse platform of the global lentil trade.

There are 97 countries (cross-sections) and 8 time periods (1991-1998). Two sub-models were estimated for Atlantic-based and Pacific-based trade, as well as the aggregate model.

The pooled cross-section, time-series technique, as described by Kmenta (1986) and Greene (1993), is used to estimate the derived transport demand equations. It employs a set of assumptions on the disturbance covariance matrix that gives a cross-sectionally heteroskedastic and time-wise autoregressive model. The pooling technique is especially needed for agricultural commodities because weather conditions make annual trade flows highly volatile in importing and/or exporting countries. A particular year may not provide accurate information to evaluate trade flows of a commodity with cross-section data only. Therefore, a pooling technique that combines the cross-section and time series data was considered appropriate to estimate the parameters.

## **5.2. Results and Discussion**

The regression results for the marine and inland transport gravity models are presented in Table 5.1. Standard criteria were used in evaluating the performance of the different gravity models such as agreement of the signs with theoretical expectations, the magnitude of the coefficients, the statistical significance of the coefficients and the explanatory power of the entire relationship. Given the consistency of the data, we would expect a similar level of performance from each of the different gravity models.

**Table 5.1. Estimation Results for the Marine Transport of Lentils  
(Volume as Dependent Variable)**

<b>Model 1: Volume = f(Ocean Leg Freight Rates)</b>			
<b><math>\ln Q_{ijt} = \alpha + \beta_1 \ln F_{ijt} + \beta_2 \ln Y_{jt} + \delta_1 B_{1jt} + \delta_2 B_{2jt} + \delta_3 B_{3jt} + \delta_4 B_{4jt} + e_{ijt}</math></b>			
Elasticity	Aggregate Trade	Atlantic Trade	Pacific Trade
Intercept ( <i>t-ratio</i> )	0.36928 (0.1556)	7.4544 (2.703)*	7.5732 (0.9395)
Ln(Freight Rate) ( <i>t-ratio</i> )	-0.15718 (-0.6567)	-1.2156 (-4.078)*	-0.69965 (-0.8212)
Ln(Income) ( <i>t-ratio</i> )	0.057064 (1.523)	0.11562 (2.941)*	-0.097373 (-0.8904)
B <sub>1</sub> (Competitive) ( <i>t-ratio</i> )	0.7675 (4.083)*	0.29566 (1.559)	1.6783 (2.529)*
B <sub>2</sub> (Consistent) ( <i>t-ratio</i> )	4.9416 (23.42)*	3.4192 (14.39)*	6.2502 (12.34)*
B <sub>3</sub> (Large Importer) ( <i>t-ratio</i> )	3.1328 (13.12)*	3.6074 (14.26)*	2.9061 (4.575)*
B <sub>4</sub> (OECD Member) ( <i>t-ratio</i> )	-0.065657 (-0.2654)	-0.64908 (-2.106)*	-0.89595 (-1.255)
Observations	776	584	192
R-square	0.7629	0.7929	0.7842
<b>Model 2: Volume = f(Freight Rates: Inland + Ocean Leg)</b>			
<b><math>\ln Q_{ijt} = \alpha + \beta_1 \ln F_{ijt} + \beta_2 \ln Y_{jt} + \delta_1 B_{1jt} + \delta_2 B_{2jt} + \delta_3 B_{3jt} + \delta_4 B_{4jt} + e_{ijt}</math></b>			
Elasticity	Aggregate Trade	Atlantic Trade	Pacific Trade
Intercept ( <i>t-ratio</i> )	0.43017 (0.1333)	14.727 (3.468)*	13.063 (1.196)
Ln(Freight Rate) ( <i>t-ratio</i> )	-0.16573 (-0.4983)	-2.0419 (-4.33)*	-1.2711 (-1.112)
Ln(Income) ( <i>t-ratio</i> )	0.060047 (1.545)	0.10853 (2.749)*	-0.13232 (-1.115)
B <sub>1</sub> (Competitive) ( <i>t-ratio</i> )	0.75841 (4.061)*	0.26513 (1.392)	1.7575 (2.747)*
B <sub>2</sub> (Consistent) ( <i>t-ratio</i> )	4.9536 (23.55)*	3.4261 (14.59)*	6.2446 (12.76)*
B <sub>3</sub> (Large Importer) ( <i>t-ratio</i> )	3.141 (13.13)*	3.6045 (14.42)*	2.9583 (4.655)*
B <sub>4</sub> (OECD Member) ( <i>t-ratio</i> )	-0.049989 (-0.2101)	-0.63581 (-2.115)*	-0.75516 (-1.035)
Observations	776	584	192
R-square	0.7631	0.795	0.7863

\*Denotes the coefficient estimate is significant at the 5% level.

### 5.2.1. Impedance Factor Elasticity

The impedance factors used in the estimate are ocean-leg container freight rates to international ports and also includes a separate analysis to incorporate the cost of the inland transport portion. A negative sign is expected for these variables because trade would tend to decrease as the cost of transport increases. All of the estimates of the freight rate variable have the expected sign, however, this variable is statistically significant only on the Atlantic trade routes. This indicates that there may be some inherent differences in the structure of ocean-leg container rates on Atlantic versus Pacific trade corridors.<sup>14</sup>

Because transportation costs make up a significant component of the final cost of the delivered product for agricultural commodities, we would expect the freight rate elasticity for lentils to be elastic (i.e.  $>-1$ ). This means a one percent decline in freight rates on a given trade lane would induce exports to increase by more than one percent. The two statistically significant freight rate elasticity estimates (appearing in the Atlantic trade) are both greater than unity (-1.22 and -2.04), suggesting that lentils exports are quite sensitive to the cost of freight.

When inland transportation costs are included in the analysis, the freight rate elasticity almost doubles, suggesting that exports are as sensitive to inland transportation costs as

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<sup>14</sup> Global containerized trade imbalances are a significant influence on freight rate structures. In the westbound trade to Asia, the equivalent of one empty container is returned for every two full containers coming across the Pacific to North America. Whereas eastbound to Europe, empty returns account for roughly only 20 percent of all slots on containerships (The Economist, 2002). These imbalances, combined with intermodal equipment shortages on the Canadian Prairies create an ambiguous outcome.

they are to ocean-leg freight rates. Although the Pacific trade regressions produced insignificant estimates, the results suggest that lentils, and by proxy other value-added agricultural exports like pulse and special crops, are very sensitive to freight costs.

The export demand for agricultural products is generally elastic, so it follows that the derived demand for transport would also be elastic. As illustrated in Table 5.2, elasticity is important because it has a direct relationship with revenue.

<b>Table 5.2. Interpreting Freight Rate Elasticity</b>			
<b>If demand for transport is...</b>	<b>and if freight rates...</b>	<b>then the quantity of transport services demanded...</b>	<b>and then freight revenues will...</b>
Elastic (it is > -1)	↑	↓ <u>more than</u> in proportion to the price change	↓
	↓	↑ <u>more than</u> in proportion to the price change	↑
Unitary (it is = -1)	↑	↓ <u>in exact proportion</u> to the price change	Remain constant
	↓	↑ <u>in exact proportion</u> to the price change	Remain constant
In-elastic (it is < -1)	↑	↓ <u>less than</u> in proportion to the price change	↑
	↓	↑ <u>less than</u> in proportion to the price change	↓

With an elastic demand for transportation, a reduction in transport costs increases total revenue for transportation companies that provide services for special crops/pulse exporters. This suggests that railways, container lines and exporters all have a mutual interest in exploring means to lower freight costs.

### **5.2.2. Income Effect**

Total disposable income reflects both the size of the human population and per capita income and is a natural candidate to represent potential market size. The income coefficients represent the percentage change in quantity of lentils exported in response to a 1% change in importers' income. Thus, a positive sign is expected, which occurs in 4 of the 6 regressions. Of the 6 regressions, 4 produced an insignificant estimate of income elasticity. The two significant income elasticity estimates are positive and less than unity. These results suggest that lentils exports are inelastic to changes in foreign incomes. This may be because lentils are a protein-rich, staple food source for many of the world's poor, and are time sensitive with a high demand near Easter. This could make lentil consumption more inelastic to income changes. A second problem may lie in the mix of very high-income European countries, with very low-income African and Asian countries. The OECD Member dummy was intended to capture this phenomenon but was statistically significant in only two of the regressions.

### **5.2.3. Dummy Variables**

The Competitive dummy variable ( $B_1$ ) was intended to capture the effects of competing domestic supply sources. It is statistically significant and positive in all but two of the regressions. The positive result may seem surprising at first, but upon further examination, the positive elasticity suggests that lentil-producing countries have a higher propensity to consume lentils, than countries with no local production. When local

production does not satisfy domestic demand, lentils must be purchased from international markets.

The dummy variables Consistent ( $B_2$ ) and Large Importer ( $B_3$ ) were intended to distinguish the larger import markets from the smaller ones. As expected, all the estimates are positive and highly significant. This suggests that countries that import consistently and/or in large quantities have a higher propensity to import Canadian lentils, than do small and/or inconsistent importers.

#### **5.2.4. Explanatory Power**

Finally, an examination of the explanatory power (R-square) of the entire relationship reveals a similar level of performance of each model. However, the Model 2 regressions where inland freight rates are specified as the independent variable have slightly higher R-squares than the Model 1 regressions where only ocean-leg freight rates are specified as the independent variable.

### **5.3. Chapter Summary**

Six gravity model regressions were examined for both marine and inland transport of lentils. One variation of the model used ocean-leg freight rates while the other included the costs of inland transport. The results of both models suggest that lentils are quite

elastic to freight costs. Comparisons of the results of the two model specifications were discussed with regard to the performance of the proxy variables and quality of estimation.

The aggregate trade regressions performed poorly in comparison with the disaggregate trades. As discussed, this is likely due to the inferior quality of the Pacific freight rate data, which negatively affects the performance of the aggregate trade models. As Vido and Prentice (2003) note, aggregation is the soft underbelly of the gravity model. The analyses show that even aggregating the shipping locations of an exporter can produce inferior results. The specification of a more defined gravity model to a single shipping point improves the accuracy and utility of the results.

Commodity specific gravity models with a single transport mode (i.e. marine container) are likely to be more accurate, regardless of data specification, because the market under analysis is more consistent. Freight rate data that apply to a specific mode are more representative of the actual transportation costs. As discussed in Chapter 2, when the model includes actual transport costs instead of distance as the impedance factor, it more closely resembles traditional demand equations, and is thus more useful for marketers, transportation service providers, and policy analysts.

## **Chapter 6:**

### **The Lentils Case Study**

#### **6.0. Introduction**

This chapter analyses the impact on lentils exports that could result from reforming cabotage policy. The industry survey suggested that repositioning costs for empty containers could decrease from 26% to 37%, depending on the cargo's destination. This chapter assesses the impact of this cost decrease on lentils export volumes. Using the freight rate elasticities developed in Chapter 5, the impact on lentils exports is estimated and analyzed in a global context.

#### **6.1. Inland Freight Rate Analysis**

Freight rates for the inland movement of containers are under confidential contract and the railways do not release their freight rate structures to the general public. Publicly available information on domestic intermodal tariff rates represent the maximum amount that a shipper can pay. Shippers could pay up to 50 percent less than the published tariff, however, depending on the volume and frequency of their shipments. The proportion of lentil exports that were source-loaded versus those that were stuffed at the ports weighted

the inland freight rates considered in this thesis. These weights were applied to the average rates for source-loaded marine containers and domestic intermodal (“piggy back”) rates from the prairies to the ports and were developed in consultation with freight forwarders.<sup>15</sup>

<b>Table 6.1.</b>		
<b>Freight Rate Analysis and Estimated Reduction from Cabotage Deregulation</b>		
	<b>Eastbound</b>	<b>Westbound</b>
	<i>Regina - Montreal</i>	<i>Regina - Vancouver</i>
<b>+ Total Inland Freight Cost</b> <sup>(1)</sup>	\$962.00	\$649.00
<b>- Estimated Repositioning Cost</b> <sup>(2)</sup>	\$387.50	\$337.50
<b>= Inland Outbound Freight Cost</b>	\$574.50	\$311.50
<b>Estimated Reposition Cost Decrease (%)</b> <sup>(3)</sup>	26%	37%
<b>Estimated Reposition Cost Decrease (\$)</b>	\$100.75	\$124.88
<b>New Repositioning Cost</b>	\$286.75	\$212.63
<b>New Total Inland Freight Cost</b>	\$861.25	\$524.13
<b>% Change of inland freight cost</b>	<b>-10%</b>	<b>-19%</b>

(1) *Weighted Average. Source: International Freight Forwarder*

(2) *Average. Source: Trucking Industry officials (email conversations).*

(3) *Source: 2002 Cabotage Survey (Chapter 4)*

The calculation of the anticipated change in inland freight rates from a reduction in container repositioning costs is presented in Table 6.1. The inland freight costs used in this study are \$962 for eastbound containers and \$649 for westbound containers, originating in Saskatchewan.<sup>16</sup> The costs to reposition a 20’ container from Montreal/Toronto into Saskatoon/Regina would be approximately \$375 - \$400. The costs from Vancouver to Saskatoon/Regina would be approximately \$325 - \$350 per 20’

<sup>15</sup> Freight Forwarder sources: Kuehne & Nagel and Panalpina

<sup>16</sup> These costs that were obtained in 2001 are dated, but are consistent with the other data used for export volumes, etc.

container.<sup>17</sup> These numbers would also depend on the rail line the specific ocean carrier partnered with. For simplicity, this analysis uses the midpoints of these cost ranges. Also for simplicity, another assumption is made: westbound containers would have containers repositioned from Vancouver and eastbound containers would have containers repositioned from Montreal/Toronto. Under a more liberal regime containers could be repositioned from Chicago, but this requires stronger assumptions than the domestic moves.

Subtracting the repositioning cost from the inland freight rate produces the outbound freight cost portion, \$574 for eastbound containers and \$311 for westbound containers. The repositioning cost decrease, as estimated in the 2002 container cabotage survey, is 26% and 37% for eastbound and westbound, respectively. Subtracting this amount from repositioning costs, the expected inland freight cost drops to \$861 for eastbound traffic and \$524 for westbound traffic, or a reduction of 10% and 19%.

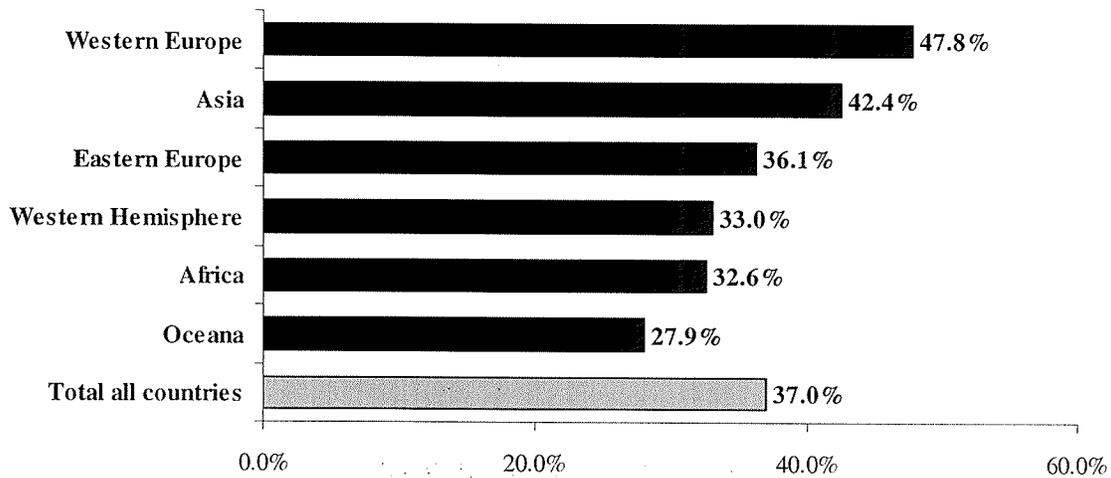
Inland freight rates, as quoted by railway officials, depend on the origin and destination of the cargo within Canada and are not likely affected by the international destination of the cargo. However, various ocean carriers and intermediaries partner with a railway resulting in the ability to offer all-inclusive through-rates. These landside-positioning strategies may give the carrier flexibility in trading off inland and ocean-leg costs. As discussed earlier in this thesis, the structure of ocean-leg freight rates is complex and varies considerably between trade lanes, depending on the profitability of each corridor.

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<sup>17</sup> Source: Yanke Transport

As a result, inland freight costs as a proportion of the entire freight bill also varies considerably from one market to another. Figure 6.1 illustrates these differences.

**Figure 6.1.**  
**Inland Freight Cost As % of Total Freight Bill**



Overall, inland freight costs average 37% of the total freight bill; suggesting that ocean-leg rates are 26% higher than inland rates on average. Of course, this varies considerably between regions. Shipments to Western Europe face the lowest relative ocean-leg freight rates where inland costs make up almost half the total freight bill. Shipments to Oceana face the highest average ocean-leg rates. This is important because the reduction of the total freight bill is related to the relative impacts of inland and ocean-leg rates to the total freight bill.

## 6.2. Impact on Lentils Export Volume

A reduction in freight costs encourages an increase in exports of lentils, and by proxy, all pulse crops. The export increase depends on the impedance factor elasticities developed

in Chapter 5. Model 2 (Table 5.1) contains the estimation result for the volume of lentils exports as a function of the total freight costs, including the inland portion. The Atlantic Trade corridor produced a statistically significant estimate of  $-2.0419$ . This estimate fits with our expectations - it is a negative number and greater than unity. It means that a 1% reduction in freight costs will result in a 2% increase in export volumes. A large impact, but consistent with economic logic. Although the magnitude and sign of the Pacific trade corridor parameters are consistent with our expectations, the regressions produced insignificant estimates. This trade corridor is therefore excluded from the analysis. Pacific corridor lentil exports account for only 27% of total lentil exports (6,073 containers, or about 127,000 tonnes).

<b>Table 6.2.</b>				
<b>Calculation of Expected Exports</b>				
<b>Eastbound</b>				
freight rate (% change)	x	-2.0419	=	expected exports (% change)
expected exports (% change)	x	2001 exports	=	expected export volume (under cabotage deregulation)
<b>Calculation of Freight Rate (% Change)</b>				
<b>Eastbound</b>				
Total freight rate (inland + ocean-leg	-	\$100.75	=	Expected freight rate (under cabotage deregulation)
$\frac{\text{Expected freight rate} - \text{Total freight rate}}{\text{Total freight rate}} \times 100 = \text{freight rate (\% change)}$				

In order to determine the impact on exports, the expected percent change in freight rates is multiplied by the freight rate elasticity. This provides the expected percent change in

exports, which can then be applied to current exports to determine the expected export volume that would result from cabotage deregulation. The percent change in freight rates arising from cabotage reform is determined by subtracting the calculated reduction in eastbound repositioning costs from the total freight rate (inland and ocean-leg). Table 6.2 illustrates these calculations in greater detail.

By applying these calculations to the export volumes destined to each country included in the analysis, the expected impacts in a deregulated cabotage environment can be measured. Table 6.3 lists these results by country and also calculates the impact to total Western Canadian lentils export volumes (eastbound only).

<b>Table 6.3. Expected Change in Lentils Exports from Cabotage Deregulation</b>				
<i>Volume of Containers</i>				
<b>country</b>	<b>2001 Exports</b>	<b>Freight Rate</b>	<b>Expected Exports</b>	
	<i>containers</i>	<i>% change</i>	<i>% change</i>	<i>containers</i>
<b>Western Europe</b>				
Austria	5	-3.97%	8.00%	6
Belgium	3,192	-6.06%	12.21%	3,582
Denmark	5	-4.80%	9.68%	5
Finland*	1	-4.09%	8.25%	1
France	422	-6.06%	12.21%	474
Germany	561	-5.97%	12.03%	628
Greece	470	-4.66%	9.39%	514
Italy	972	-5.27%	10.62%	1,075
Netherlands	125	-6.06%	12.21%	140
Norway*	0	-4.66%	9.39%	0
Portugal	40	-5.14%	10.35%	44
Spain	710	-5.41%	10.90%	787
Sweden	17	-4.45%	8.97%	19
Switzerland	20	-4.09%	8.25%	22
United Kingdom	115	-6.06%	12.21%	129
<b>Total</b>	<b>6,654</b>	<b>-5.75%<sup>(1)</sup></b>	<b>11.59%<sup>(1)</sup></b>	<b>7,425</b>
<b>Eastern Europe</b>				
Bulgaria	77	-3.53%	7.11%	82
Czech Republic	73	-3.78%	7.63%	78

**Table 6.3. Expected Change in Lentils Exports from Cabotage Deregulation**

<i>Volume of Containers</i>				
country	2001 Exports	Freight Rate	Expected Exports	
	<i>containers</i>	<i>% change</i>	<i>% change</i>	<i>containers</i>
Georgia	35	-3.93%	7.92%	38
Hungary	29	-3.78%	7.63%	31
Poland	15	-3.71%	7.49%	16
Romania*	0	-3.78%	7.63%	1
Russia*	5	-4.31%	8.69%	6
Slovakia	5	-3.78%	7.63%	5
Slovenia	1	-4.01%	8.08%	1
Ukraine*	0	-3.40%	6.85%	0
Yugoslavia*	21	-3.75%	7.55%	23
<b>Total</b>	<b>262</b>	<b>-3.73%<sup>(1)</sup></b>	<b>7.52%<sup>(1)</sup></b>	<b>282</b>
<b>Africa</b>				
Algeria	3,013	-3.71%	7.49%	3,238
Angola*	18	-3.19%	6.42%	19
Benin*	6	-3.40%	6.85%	6
Burundi*	4	-2.54%	5.12%	4
Cape Verde*	2	-3.71%	7.49%	3
Djibouti*	9	-2.91%	5.86%	9
Egypt	1,884	-4.66%	9.39%	2,061
Ethiopia*	4	-3.19%	6.42%	4
Guinea*	10	-3.29%	6.63%	11
Kenya*	47	-4.09%	8.25%	51
Libya*	1	-2.95%	5.94%	1
Morocco	956	-4.45%	8.97%	1,042
Mozambique*	73	-3.65%	7.35%	78
Reunion*	13	-2.91%	5.86%	14
South Africa	100	-4.18%	8.42%	108
Sudan*	32	-3.47%	7.00%	34
Tanzania*	17	-4.09%	8.25%	19
Tunisia	39	-3.71%	7.49%	42
<b>Total</b>	<b>6,228</b>	<b>-4.12%<sup>(1)</sup></b>	<b>8.30%<sup>(1)</sup></b>	<b>6,744</b>
<b>Asia</b>				
Bahrain*	0	-3.71%	7.49%	0
Cyprus	27	-4.45%	8.97%	30
Iran	8	-3.71%	7.49%	9
Israel	197	-4.55%	9.18%	215
Jordan	39	-3.78%	7.63%	42
Kuwait	13	-3.40%	6.85%	14
Lebanon	126	-4.89%	9.84%	138
Pakistan	450	-5.64%	11.36%	501
Saudi Arabia	199	-3.71%	7.49%	214
Turkey	543	-4.89%	9.84%	596
United Arab Emirates	123	-3.71%	7.49%	133
Yemen*	3	-3.75%	7.55%	3

**Table 6.3. Expected Change in Lentils Exports from Cabotage Deregulation**

<i>Volume of Containers</i>				
country	2001 Exports	Freight Rate	Expected Exports	
	<i>containers</i>	<i>% change</i>	<i>% change</i>	<i>containers</i>
<b>Total</b>	<b>1,727</b>	<b>-4.78%<sup>(1)</sup></b>	<b>9.62%<sup>(1)</sup></b>	<b>1,893</b>
<b>Western Hemisphere</b>				
Argentina	89	-4.55%	9.18%	97
Barbados	1	-2.91%	5.86%	1
Belize*	2	-3.78%	7.63%	2
Brazil	437	-4.36%	8.78%	475
Cuba	0	-4.45%	8.97%	0
Dominica	3	-2.48%	5.00%	3
Dominican Republic	7	-4.27%	8.59%	8
Grenada	0	-3.00%	6.04%	0
Guadeloupe*	1	-2.71%	5.47%	1
Guatemala	185	-3.78%	7.63%	199
Guyana*	0	-3.58%	7.22%	0
Martinique*	5	-3.52%	7.09%	5
Saint-Lucia	2	-2.75%	5.54%	2
Saint-Vincent Gren*	1	-2.75%	5.54%	1
Surinam*	0	-3.58%	7.22%	0
Trinidad-Tobago	82	-3.65%	7.35%	88
Uruguay	133	-4.66%	9.39%	145
Venezuela	574	-4.55%	9.18%	627
<b>Total</b>	<b>1,524</b>	<b>-4.35%<sup>(1)</sup></b>	<b>8.76%<sup>(1)</sup></b>	<b>1,657</b>
<b>GRAND TOTAL</b>	<b>16,394</b>	<b>-4.87%<sup>(1)</sup></b>	<b>9.80%<sup>(1)</sup></b>	<b>18,001</b>

<sup>(1)</sup>weighted average

\* Indicates 10 year average in lieu of 2001 export volume

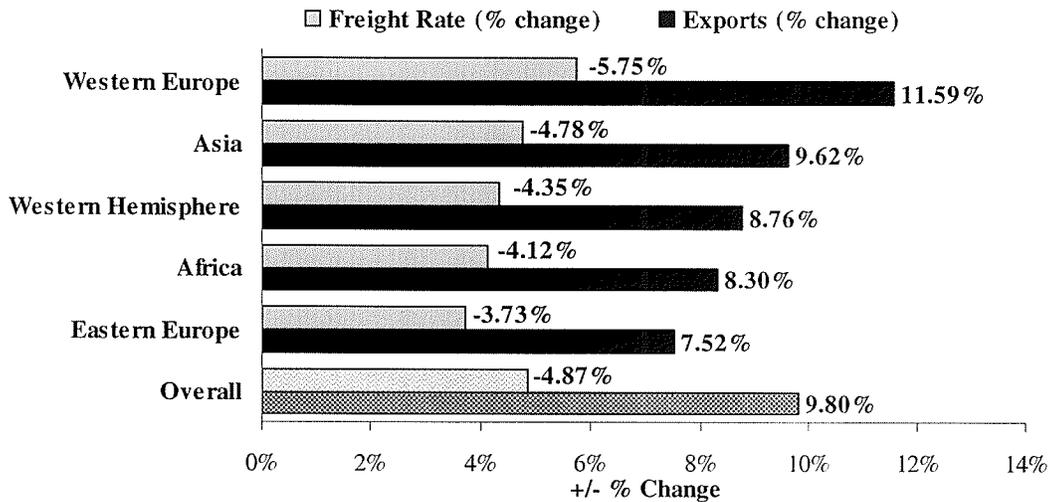
\*\*Source: Canadian Grain Commission

The change in freight rates varies considerably, ranging from a low of -2.5% for Dominica to a high of -6.1% for a handful of Western European nations.<sup>18</sup> Overall, eastbound freight rates can be expected to decline by about 4.9%. This results in a total expected increase in eastbound exports of approximately 9.8%, or an increase of just over 1600 containers (about 34,000 tonnes). At 11.6%, Western European destinations

<sup>18</sup> Belgium, France, Netherlands and United Kingdom.

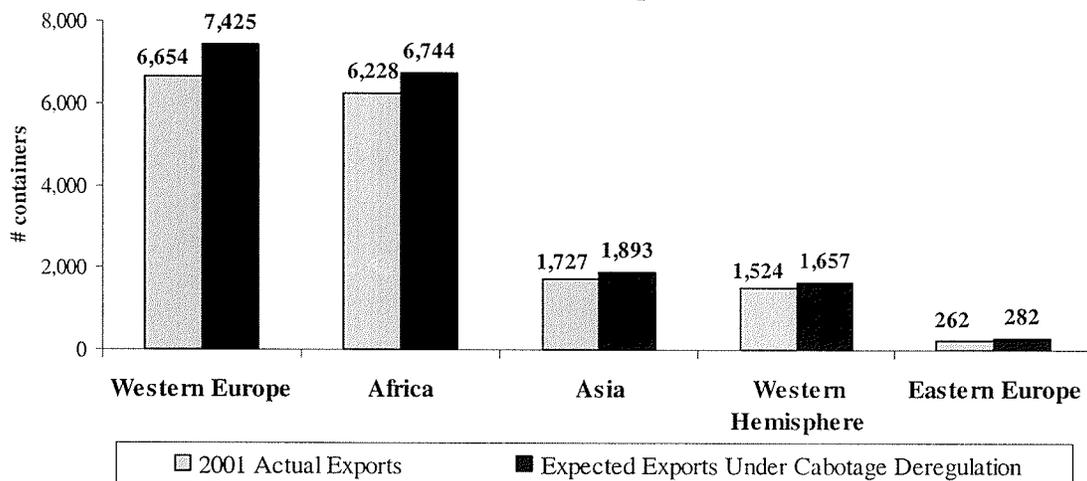
experience the largest growth in exports, followed by Asia (9.6%). A comparison of freight rate reductions to expected export increases is illustrated in Figure 6.2.

**Figure 6.2.**  
**Percent Change**



In terms of the level of impact on lentils exports from a reduction in export freight rates, Western Europe would be most affected. Reducing rates on this corridor by a mere 5.8% would cause exports to jump by 11.6%. Asia is the second most sensitive market to freight costs. Rates to this continent would be required to decline by 4.8% to experience a jump in exports of 9.6%. Figure 6.3 illustrates this in greater detail.

**Figure 6.3**  
**Volume of Lentils Exports**



While Western Europe experiences the highest growth in exports, it also is the largest export market in terms of volume of exports. Africa is also very significant in terms of volume. Rates to Asia (Near East) decline by about 4.8%, the second highest rate decrease, but Asia remains only the third largest market. Eastern European markets experienced some of the lowest freight rate declines and expected export growth rates and thus remain small and insignificant in terms of market opportunity.

<b>Table 6.4. Top Ten Markets</b>		
<i>Based on volume shipped</i>		
<b>Country</b>	<b>2001 Exports</b>	<b>Expected Exports</b>
	<i>containers</i>	<i>containers</i>
Belgium	3,192	3,582
Algeria	3,013	3,238
Egypt	1,884	2,061
Italy	972	1,075
Morocco	956	1,042
Spain	710	787
Germany	561	628
Venezuela	574	627
Turkey	543	596
Greece	470	514

A country-by-country examination reveals the top ten eastbound export markets. Countries from Europe, Africa, the Western Hemisphere and Asia all appear in this list, as illustrated in Table 6.4. At just over an expected 3,500 containers, Belgium is the largest market for exports of Canadian lentils. In order to reach this full potential, a freight rate decrease of about 6% would be required. Algeria is the second largest lentils export market, but would require a freight rate decrease of only 3.7% to reach it's full potential for growth.

<b>Table 6.5. Top Ten Markets</b>		
<i>Based on Expected % Change</i>		
<b>Country</b>	<b>2001 Exports Expected Increase</b>	
	<i>containers</i>	<i>% change</i>
Belgium, France, Netherlands, U.K.	3,854	12.21%
Germany	561	12.03%
Pakistan	450	11.36%
Spain	710	10.90%
Italy	972	10.62%
Portugal	40	10.35%
Turkey, Lebanon	668	9.84%
Denmark	5	9.68%
Egypt, Greece, Uruguay, Norway	2,487	9.39%
Venezuela, Israel, Argentina	860	9.18%

In terms of growth potential (as measured by expected percent change in exports), a slightly different story unfolds and is shown in Table 6.5. As indicated in Table 6.5, Belgium is shaping up to be a lucrative market opportunity. Belgium remains at the top of the list as an export volume increase of about 12.2% is predicted. This market is number one in terms of volume shipped and in terms of growth rates. Carriers and shippers would have a mutual interest in exploring means to lower freight rates to this market as the economic opportunities could be substantial. Deregulating the cabotage market could be sufficient to accomplish this objective. France, the Netherlands and the U.K. also experience significant growth and share first place with Belgium. In order to reach these volumes, freight rate decreases of about 6% would be required. Denmark appears in the top ten list with an expected change in exports of about 9.7%. However, with a full potential of only 5 containers per year, pursuing such an opportunity would be a fruitless effort.

### 6.3. Equipment Analysis

This thesis has established that by reforming container cabotage laws lower freight rates to various destinations could result. This freight rate decline would stimulate exports of lentils to increase by about 10%, or 1600 containers. One question remains: can the shipping industry supply enough empty containers to satisfy the needs of the pulse industry?

Data on the availability of empty containers that leave western Canada (specifically Saskatchewan) on CPR lines for furtherance to the ports was obtained. The total empties available positioned and loaded, in a one-year period (2000) were 6,300 units, comprising 4,300 20' containers and 2,000 40' containers. In addition to the empties that were placed for loading, there was another 16,000 containers that traversed through Saskatchewan empty to be repositioned at Vancouver. The break down was 4,000 20' containers and 12,000 40' containers.<sup>19</sup> These containers could be potentially redirected. Table 6.6 shows the backhaul of empty containers, on CPR lines, through Saskatchewan that could have been potentially loaded during 2000.

<b>Table 6.6.</b>			
<b>CPR Empties Through Saskatchewan, 2000</b>			
	<b>20'</b>	<b>40'</b>	<b>Total</b>
Empties from East to West	2,626	7,390	10,016
Empties from USA to West	1,783	4,538	6,321
<b>Total</b>	<b>4,409</b>	<b>11,928</b>	<b>16,337</b>
<b>Total by Month</b>	<b>367</b>	<b>994</b>	<b>1,361</b>

*Source: Saskatchewan Agrivision Corporation, SK Container Pilot Project Draft, 2001.*

<sup>19</sup> Saskatchewan Agrivision Corporation, Saskatchewan Container Pilot Project Draft, July 2001.

Table 6.7 shows that during 1999, 6.4% of the containers handled at the ports of Montreal and Vancouver were empties, totalling 115,000 TEU's. If we can assume a 50/50 split between 40' and 20' containers, empty containers available for pulse exports total 38,300 units. It would appear that the capacity for export growth is available.

<b>Table 6.7.</b>					
<b>TEUs Handled at Ports: International Shipping, 1999</b>					
<i>'000 TEUs</i>					
	<b>Loaded</b>	<b>Unloaded</b>	<b>Total</b>	<b>% Empty</b>	<b>Empty TEUs</b>
Vancouver	516	338	854	8.4%	72
Montreal	461	466	927	4.6%	43
<b>Total</b>	<b>977</b>	<b>804</b>	<b>1781</b>	<b>6.4%</b>	<b>114</b>

*Source: Statistics Canada, Shipping in Canada, Table H3, 1999.*

#### **6.4. Chapter Summary**

The sensitivity of lentil exports, and by proxy all pulse crops, to small changes in freight rates suggests that pulse exporters, carriers and government all have a mutual interest in lowering rates for export shipments. Removing antiquated cabotage regulations seems to be sufficient in achieving this objective. Export freight rates could decline by almost 5%, translating into an increase of over 1600 export containers, or about 34,000 tonnes, for the eastbound lentils market alone. In 2001, the average farm price for lentils was \$320/tonne.<sup>20</sup> The improved export sales would put more than \$10 million into farmers' pockets.

<sup>20</sup> Source: Agriculture and AgriFood Canada, Market Analysis Division.

## **Chapter 7:**

### **Summary, Conclusions and Recommendations**

#### **7.0. Summary of Findings**

Containerized shipping of agricultural products from Western Canada is hampered by the high costs of obtaining empty equipment. Trade flows are such that potential exports from the Prairies are many times greater than imports. In addition, commodity export trade favours 20' containers, while importers prefer to use 40' containers because their products are less dense. The resultant mismatch of equipment types and availability means that empty containers must be repositioned on the Prairies from other locations.

Canada's container cabotage regulations restrict the mobility of container equipment. This impedes operational flexibility for carriers and could contribute to problems in container access that some Prairie shippers experience. Improving the mobility of containers can increase efficiency and reduce costs. An estimated 26%-37% reduction in repositioning costs for carriers could translate into a 5% reduction in freight rates for Prairie shippers of containerized agricultural products. This has the potential of placing

Canadian shippers on an improved footing with U.S. shippers, whose inland transport costs are generally 5 to 10 percent lower (Modern Purchasing 1995).

Transportation costs are a large component of the final cost of agricultural exports making shippers especially vulnerable to changes in freight rates. Furthermore, pulse crops and other specialty products are becoming a more important avenue for farm profitability. Efforts to nurture these exports could begin with evaluating the pipeline through which these products are shipped. A 5% reduction in freight costs that could arise from reforming cabotage policy could boost eastbound exports of lentils and other pulses by almost 10%.

Restricting the mobility of containers hinders the efficient flow of goods. These frictions harm shippers and reduce the competitiveness of their goods in global markets. Containers are instruments of international commerce. They allow diverse goods to be loaded inside standard-sized units that could be handled and transported with greater efficiency. In essence, they are simply reusable packaging.

Most cabotage regulations deal with both immigration and customs issues. Container cabotage regulations deal only with customs. Furthermore, most cabotage issues involve bilateral and reciprocal arrangements between two trading partners. Container cabotage, on the other hand, is distinct because it affects third party relationships. The U.S. is Canada's largest trading partner and regulations on container cabotage are not reciprocal.

Differences in how the U.S. treats a third party and how Canada treats a third party affects the competitiveness of Canadian goods in global markets.

Finally, many operators are only somewhat familiar with these regulations and have a limited appreciation of their impact to inland container operations. A few carriers disregard these regulations entirely and suggest enforcement efforts by CCRA are negligible. This will likely all change in a post-September 11<sup>th</sup> world where security concerns are heightened and efforts to patrol containers increase.

## **7.2. Conclusions**

The problem with the regulations is that they impose a small individual penalty on a large volume of activity by hindering operational flexibility. Container operations in Canada are inherently more costly and less flexible than in the U.S., but the impact is hidden in the slightly higher costs imposed in individual Canadian shippers. With containerization and trade significantly rising, carriers, shippers and intermediaries are in a position to take advantage of the increase in shipping opportunities afforded in a deregulated environment. The tangible rewards from cabotage liberalization include a reduction in freight rates, an increase in rail capacity as well as reducing empty mile ratios for carriers. Furthermore, it can be expected that service levels would improve given that shippers would have better access to equipment. Imbalances in equipment availability could be mitigated because carriers would enjoy more freedom to position equipment toward demand areas. Both shippers and carriers alike can profit from this.

### **7.3. Limitations of the Research**

The international container liner market is very concentrated. Only a few very large players dominate the market. Obtaining information and statistically significant data would require a census – an expensive, time consuming and impossible task, given the available resources. The information obtained and disseminated from the 2002 Container Cabotage Survey took a qualitative approach. Repositioning cost reductions are averaged from respondent estimates. The results are directional in nature and should be used with a degree of caution.

The focus of this thesis is to highlight the sensitivity of agricultural products to freight costs. These costs are a function of many components, including the regulatory environment in which transportation companies operate. Some regulations, like container cabotage restrictions, are poorly understood and not generally recognized. Exploring ways to improve efficiency and reduce costs can benefit all stakeholders, especially the volatile agricultural industry. Container cabotage regulations do impose real costs on carriers, these costs are passed on in the form of higher prices for shippers, and reduced competitiveness in export markets.

#### **7.4. Recommendations for Further Research**

While this thesis confirmed the impact of container cabotage policy on container availability and cost for agricultural products on the Canadian Prairies, exploring the impact of removing these regulations on other sectors of the economy could prove beneficial. For example, relaxing cabotage restrictions for international containers would increase the available equipment capacity for domestic freight shippers, particularly in Eastern Canada where many containers must return to port locations empty. Assessing the benefits to domestic freight shippers in Eastern Canada would aid policy makers in making revisions to the regulatory environment. Likewise, the benefits to Prairie receivers would provide a more comprehensive evaluation.

A few carriers indicated to the author that Canada's west coast ports make Canadian export freight uncompetitive relative to U.S. west coast ports. An evaluation of the benefits to west coast ports if empty containers were funnelled from U.S. locations, such as Chicago or Detroit, could be undertaken.

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**APPENDIX A**

**Canadian and U.S. Container Cabotage Legislation**

<b>CUSTOMS RULES</b>	
<b>CANADA</b>	<b>UNITED STATES</b>
<p><b>Customs Act:</b></p> <ul style="list-style-type: none"> <li>• Definition of imported good and container and applies duties</li> </ul> <p><b>Customs Tariff:</b></p> <ul style="list-style-type: none"> <li>• Item 9801.10.00 provides a zero rate of duty on conveyances that enter Canada for international commerce.</li> </ul> <p><b>Memorandum D3-3-3</b></p> <ul style="list-style-type: none"> <li>• Customs Cargo Control Procedures</li> </ul> <p><b>Memorandum D3-1-5</b></p> <ul style="list-style-type: none"> <li>• International Commercial Transportation</li> </ul> <p><b>Memorandum D3-1-6</b></p> <ul style="list-style-type: none"> <li>• Customs Post Audit System</li> </ul> <p><b>Memorandum D3-7-1</b></p> <ul style="list-style-type: none"> <li>• Cargo Containers Used in International Service</li> </ul>	<p><b>Title 19 United States Code (Customs):</b></p> <ul style="list-style-type: none"> <li>• Section 1322 (a)               <ul style="list-style-type: none"> <li>- Allows for vehicles and other instruments of international traffic to be exempt from the application of the customs laws.</li> </ul> </li> </ul> <p><b>Title 19 United States Code of Federal Regulations:</b></p> <ul style="list-style-type: none"> <li>• Section 10.41a               <ul style="list-style-type: none"> <li>- Regulations</li> </ul> </li> </ul>

**Appendix B**  
**Assessing the Impact of U.S. and Canadian Container Regulations**  
**An Industry Survey**

**Date:** \_\_\_\_\_

**Name:** \_\_\_\_\_ **Email:** \_\_\_\_\_

**Company:** \_\_\_\_\_

**Telephone:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **City:** \_\_\_\_\_

**Introduction**

In early 2001, the Transport Institute conducted a study on North American container cabotage regulations. The report, which is available on the Transport Institute's website ([www.umti.ca](http://www.umti.ca)), highlighted the differences between Canadian and U.S. container cabotage regulations.

Canadian legislation limits the amount, type and direction of foreign-owned container moves for domestic freight movements. U.S. regulations place no limits on the movement of foreign-owned containers while in the U.S., as long as the container is moved on a U.S. carrier. The foreign container owner is allowed to offer freight services to domestic shippers. Foreign-owned containers are also allowed to remain in the U.S. for up to 12 months versus 30 days in Canada.

The purpose of this survey is to collect information, which could be used in determining the impact on Canadian container service of making the Canadian regulations more consistent with the U.S. container regulatory system.

**The survey is short and should only take 5 minutes to complete.** Please complete it to the best of your ability and fax the pages back to the Transport Institute at (204) \_\_\_\_\_ or email it back to \_\_\_\_\_

**All individual answers will remain strictly confidential**

1. Are you familiar with the differences between U.S. and Canadian container cabotage regulations?

Please check one:

- Very Familiar.....
- Somewhat Familiar.....
- Not at all Familiar.....

2. Notwithstanding the differences between Canadian and U.S. regulations, do you agree or disagree that Canadian regulations are more restrictive in practice?

Please check one:

- Agree.....
- Disagree..... (Please Go to Question 5)

3. To what extent do the more restrictive Canadian container regulations reduce the desirability of operating container traffic in Canada versus the U.S.?

Please check one:

- Much less Desirable in Canada.....
- Somewhat Less Desirable in Canada.....
- No Difference in Desirability in Canada or the U.S.....

4. Which differences between Canadian and U.S. container regulations are most problematic?

*Please rank: 1=most problematic, 6=least problematic*

Grace period: Canada 30 days versus U.S. 365 days.....\_\_\_\_\_

Inability to solicit domestic freight in Canada.....\_\_\_\_\_

Lack of NVOCC for foreign containers in Canada.....\_\_\_\_\_

Limits on the number of repositioning moves in Canada.....\_\_\_\_\_

Limits on the direction of repositioning moves in Canada.....\_\_\_\_\_

Other: \_\_\_\_\_

5. If Canadian container regulations were changed to match those in the U.S., by how much would the repositioning cost of moving containers to the Prairies (assume Regina) change?

Please enter your estimate of the change in repositioning rates under harmonized regulations

Repositioned from:	Estimated change in repositioning rate (Percent)
Montreal	
Toronto	
New York	
Chicago	
Vancouver	
Los Angeles	
Other:	

6. Is it easier to reposition 20-foot containers or 40-foot containers to the Prairies (assume Regina)?

*Please check one:*

- Easier to reposition **20**-foot containers.....
- Easier to reposition **40**-foot containers.....
- No difference in repositioning 20 or 40-foot containers.....

7. If Canadian container regulations were changed to match those in the U.S., would it make any difference in the ability to reposition 20-foot containers versus 40-foot containers?

*Please check one:*

Yes.....

No.....

**8. If yes, how?**

---

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**9. All things considered, how supportive are you with the idea of changing Canada's container regulations to match those in the U.S.? Are you very supportive, somewhat supportive, not very supportive, not supportive at all, or do you have no opinion on the issue?**

Very Supportive.....

Somewhat Supportive.....

Not Very Supportive.....

Not Supportive at all.....

No Opinion.....

**10. In your opinion, are Canadian routes to Asia competitive with U.S. routes?**

*Please check one:*

Yes.....

No.....

**11. If no, why not?**

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---

**12. If the ultimate port of export were for Europe/North Africa rather than Asia, would you expect the cost of repositioning a container to the Prairies (assume Regina) to be higher, lower or the same?**

Higher....., by how much \_\_\_\_\_%

Lower....., by how much \_\_\_\_\_%

Same.....

This brings us to the conclusion of this survey. Thank you for taking the time to complete it. Please fax back all the pages to (204) \_\_\_\_\_, or you can email it to \_\_\_\_\_, as soon as is possible.

If you have any questions or would like to discuss this study further, please contact Erica Vido at (204) \_\_\_\_\_ or \_\_\_\_\_

**Thank you very much for your time!**

**All individual answers will remain strictly confidential.**