THE UNIVERSITY OF MANITOBA

Transport Costs as a Barrier to U.S. Exports of

Fresh Fruit and Vegetables to Canada

by

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A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements for the Degree
of Master of Science

DEPARTMENT OF AGRICULTURAL ECONOMICS
AND FARM MANAGEMENT

WINNIPEG, MANITOBA

May 1990

Canada

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ABSTRACT

Fresh fruit and vegetables are the dominant component of U.S. agricultural exports to Canada. These exports, which have increased over thirty percent in fifteen years to over four billion pounds in 1987, represent the largest export market for U.S. fruit and vegetable growers. Moreover, Canada's per capita consumption of U.S. fresh fruit and vegetables is likely to continue increasing with rising Canadian incomes and dietary health concerns.

Fresh fruit and vegetables are sensitive to freight costs because they are relatively low-valued, perishable commodities. Transport of fresh fruit and vegetables is especially costly because these products must travel long distances in refrigerated trucks from the major production areas in the southern United States to Canadian destinations. Despite technological innovations in highway transport, transport costs represent a large proportion of the selling price of U.S. fresh fruit and vegetables exported to Canada.

Under the Canada-U.S. Trade Agreement (CUSTA), Canadian tariffs on U.S. fresh fruit and vegetables will be removed over a twenty year period. As tariff barriers are reduced, non-tariff barriers to U.S. exports of fresh fruit and vegetables take on added significance. Transport costs can include disguised non-tariff barriers to trade. Conceptually, transport costs can be divided into real and man-made

components. The real costs of transport are fuel, equipment
and labor; man-made costs are generated by a need to comply
with inspections and regulations.

This thesis tested the hypothesis that transport costs,
beyond the physical cost of moving commodities, represent a
barrier to U.S. exports of fresh fruit and vegetables to
Canada. This institutional, or man-made barrier, was examined
using data from a city pair - Winnipeg-Minneapolis/Fargo and
regression analysis on a regional level.

Based on freight rate analysis for the Winnipeg-
Minneapolis/Fargo traffic lane, this study concluded that
transport costs do not contain any significant non-tariff
barriers to U.S. exports of fresh fruit and vegetables to
Canada. Regression analysis further supported this finding.
Further research is required to determine if the conclusions
from this thesis can be applied to other Canada-U.S. city
pairs, Canadian refrigerated food exports to the United
States, and other truck types.

This thesis also contains an analysis of the fresh fruit
and vegetable truck haulers and their backhaul loads. In
addition, it reviews the progress of the Motor Vehicle
Transport Act 1987, which is scheduled to deregulate Canadian
trucking over the 1988-1993 period.

ACKNOWLEDGEMENTS

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Chapter 1

INTRODUCTION

The Canada-U.S. Trade Agreement (CUSTA) eliminates or reduces many barriers to agricultural trade between Canada and the United States. Over a period of ten years, all tariffs will be removed and many regulatory and inspection procedures will be harmonized. As a result of CUSTA, however, the remaining non-tariff barriers take on added significance. In particular, transport costs will become relatively more important as a trade constraint when other trade barriers decline.

From an economic perspective, the barrier to trade posed by the cost of transport is equivalent to a tariff of equal magnitude.[1] Previous studies have shown that transport costs and regulations serve as non-tariff barriers that inhibit trade. Agricultural trade is most affected by this form of non-tariff barrier because the low value to weight ratio of food products makes exports very sensitive to freight costs.

Refrigerated trucking is responsible for the movement of a significant volume of processed and packaged food products

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[1] R.M. Conlon, "Distance and Duties: Determinants of Manufacturing in Australia and Canada", Ottawa: Carleton University Press, 1985.

between Canada and the United States. In 1987, Canada imported 4,242,709,803 pounds of fruit and vegetables from the United States. During the same year, Canadian exports of fresh and frozen beef and pork to the United States were 369,036,800 pounds.[2] Using an average payload weight of 42,500 pounds, imports of fresh fruit and vegetables and exports of red meats represent 99,828 and 8,683 truckloads, respectively. At the present time, over 95 percent of these imports and exports are moved between Canada and the United States by refrigerated trucks.

Although CUSTA acknowledges the role of transport in Canada-U.S. trade, there is no provision for transport in the agreement. Ostensibly, prior regulatory changes in transport were assumed to create "freer" trade in transport services.[3] In Canada, the Motor Vehicle Transport Act of 1987 (MVTA) created the framework for freer access to Canadian shippers by U.S. motor carriers matching the access provisions provided to Canadian carriers by the U.S. Motor Carrier Act of 1980.

Under the terms of the Canadian MVTA, a U.S. carrier may apply for an operating authority to carry goods between Canada and the U.S., but is still restricted from carrying loads within Canada. This restriction, known as "cabotage rights", also applies to Canadian motor carriers that operate between

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[2] Statistics Canada, Exports by Commodity, #65-004.

[3] The Canada-U.S. Free Trade Agreement and Agriculture, pp.31.

Canada and the United States. In addition to this restriction, carriers operating in the transborder market must also deal with licenses, fees, and regulations in both provincial and state jurisdictions. The additional costs associated with transborder operations are shown by Prentice and Hildebrand to be reflected in freight rates for transborder movements that are greater than equivalent shipments in either Canada or the United States.

1.1 RESEARCH PROBLEM

By dealing with specific border irritants, Canada and the U.S. have agreed to minimize the impact of technical regulations and standards on trade in agricultural, food, and beverage goods. The Harmonized System[4] adopted by the world's major trading partners is consistent with the thrust of the Canada-U.S. Trade Agreement for a more liberalized trading environment between Canada and the United States.

Non-tariff barriers to trade related to transport exist because of differences in transport regulation, documentation and delays in crossing international borders. In addition, the administrative costs of providing transborder freight services may be reflected in transport pricing. Deregulation

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[4] On January 1, 1988 a new customs coding system was adopted by the world's major trading partners, except the United States which included HS in their controversial Omnibus Trade Bill.

as a result of the Motor Vehicle Transport Act 1987[5] should help to reduce these non-tariff barriers.

The research problem addressed in this thesis is to determine whether the regulatory system associated with the truck transport of refrigerated foods presents a non-tariff barrier to Canada-U.S. agricultural trade. Although it is generally recognized that some costs are unavoidable at international borders, it is uncertain whether higher transborder freight rates are significantly correlated with border crossings costs. This research should indicate the likelihood of freight rates dropping significantly because of increased competition resulting from the full implementation of Canadian transport deregulation.

1.2   HYPOTHESIS

Economic activity varies with region examined and the resulting freight imbalances can affect transport rates. As the lenght of transport haul increases, fixed costs tend to be spread over larger distances. The result is rate tapering. Freight imbalances affect transport rates because motor carriers negotiate their prices based on the likely revenue

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[5] Although the new Motor Vehicle Transport Act 1987 is federally legislated, as its predecessor of 1954, it is provincially administered and therefore interpretation and compliance by the individual provinces is not likely to be identical.

earned for the round trip. The comparison of domestic and transborder freight rates for refrigerated food products must, therefore, be of similar distance and for a specific traffic lane. This study proposes the following hypothesis: for a particular traffic lane, freight rates for U.S. exports of fresh fruit and vegetables to Canada are significantly higher than those for domestic movements of similar distance.

1.3   SCOPE AND OBJECTIVES

This research proposal aims to build on a previous study by Prentice and Hildebrand that made a preliminary attempt to quantify the extra costs of transborder truck movements of agricultural goods between Canada and the United States. In the light of recent regulatory reform of the new Motor Vehicle Transport Act of 1987, this study focuses on the relatively costly refrigerated trucking service. By concentrating on one type of truck, this study attempts to overcome some of limitations experienced by Prentice and Hildebrand: the paucity of observations, especially in some truck type categories; the consequent inability to make definitive statements for these certain categories; and the problems inherent in combining and averaging data of different truck types.

This study further focuses on refrigerated truck shipments of U.S. fresh fruit and vegetables to Canada. Data

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collection and analysis is on a regional basis; the hypothesis is tested and comparisons made with respect to the various geographically separate regions of Canada. Further comparisons are made between Canadian and northern mid-west U.S. cities sharing locational similarities. In addition to examining non-tariff barriers to U.S. exports of fresh fruit and vegetables to Canada, this research examines current backhaul practices to determine if opportunities exist for Canadian shippers of refrigerated food products.

The overall objective of this study is to assess the transport-related barriers to U.S. exports of fresh fruit and vegetables to Canada that remain in the aftermath of the Motor Vehicle Transport Act of 1987. Specifically, the objectives of this study are as follows:

1. to determine the number of carriers that are applying for new operating authorities to carry refrigerated food products in the individual provinces;

2. to gauge carriers' perceptions of the revised transport regulatory system and border crossings, especially with respect to time required to pass through customs;

3. to explore the freight rate structure for transborder shipments of fresh fruit and vegetables and to determine if the potential for lower transborder freight rates exists as a result of the MVTA 1987; and,

4. to examine the effects of geographic factors, e.g., whether the transport-related barriers to Canada-U.S. agricultural trade in Western Canada are different from those existing in Eastern Canada.

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1.4   IMPORTANCE OF TOPIC

Agricultural production often occurs large distances from consumption markets and, combined with product persishability, requires specialized equipment and handling techniques during transit and at points of transshipment and warehousing. Existing and new technologies in transport have created logistical opportunities for producers and processors of refrigerated food products wanting to compete within regional, national, and international markets. The extent to which producers and processors can exploit these opportunities depends on relevant information and analyses available with respect to refrigerated tranport systems.

Trade distortions reduce industry specialization, efficiencies, and economies of scale for manufacturers and processors. Given that the United States is the second largest consumer and the largest importer of red meats in the world, improved access for Canadian products should enhance the potential for exports. Thus, refrigerated transport costs have an important bearing on market development. Moreover, of considerable importance to Canada, the use of backhaul capacity of refrigerated fruit and vegetable trucks has potential to assist Canadian export market development.

The food and beverage processing industries provide direct employment for over 200,000 Canadians.[6] These industries compete in domestic and international markets; barriers to extra-provincial trade, whether tariff or non-tariff, provide protection for domestic industries and inhibit industries from exploiting international market opportunities.

A study, such as the present one, of the transborder movement of processed and packaged food products by refrigerated truck is pertinent to the Canada-U.S. Trade Agreement because it is these higher value goods that typically have been most protected. Moreover, difficulty in obtaining new operating authorities, which constrained U.S. carriers from operating in transborder markets, has been more restrictive for higher value cargoes that require refrigerated transport. Hence, it is likely that regulatory change and CUSTA may have the greatest impact on the refrigerated transport industry.

1.6   PREVIEW OF STUDY

Chapter 2 contains a description of the refrigerated food industry followed by a discussion of the refrigerated trucking industry in Chapter 3. A review of the literature is presented in Chapter 4. The research methodology and

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[6] Statistics Canada, Trade of Canada, Catalogue #31-203

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technique are described in Chapter 5. Research results and analysis are presented in Chapter 6 followed by a freight rate analysis in Chapter 7. Chapter 8 contains the summary, conclusions and suggestions for further research.

Chapter 2

THE REFRIGERATED FOOD INDUSTRY

2.0   INTRODUCTION

    This thesis examines the role of transport costs in
Canada-U.S. trade in refrigerated food products. To gain a
better understanding of the refrigerated food industry, this
chapter contains the following sections:

    1.   a discussion of Canada-U.S. trade patterns for
          refrigerated food products. Changing trends in food
          consumption are also examined; and,

    2.   a survey of Canada-U.S. trade barriers prior to
          CUSTA as it relates to this research.

    This chapter highlights the growing importance of Canada-
U.S. trade in refrigerated food product.   By examining
specific elements of transborder movements of refrigerated
food products, a clearer picture emerges of the role transport
costs play in encouraging or inhibiting trade.

2.1   CANADA-U.S. PATTERNS OF EXCHANGE

    This section provides an indication of the volumes of
refrigerated food products traded between Canada and the
United States. Data for the year 1987 are presented for their

completeness and because these figures represent trade between Canada and the U.S. prior to the MVTA 1987 and the Canada-U.S. Trade Agreement.

2.1.1   Canada-U.S. Trade in Fresh Fruits and Vegetables

Canada's horticultural sector, which produces fruit, vegetables, honey, ornamentals and nursery products, accounts for a total of 5.7 million tonnes, or a farmgate value of approximately $1.7 billion.[7] Domestic production accounts for only a fraction of Canada's total annual consumption of fresh fruit and vegetables. Canada imports approximately four times more than it exports.[8]

The increasing trend in Canadian imports of fresh fruit and vegetables from the United States during the period 1974 to 1987 is presented in Figure 1. These data illustrate the steady increase of Canadian consumption that has expanded by one-third during this fourteen year period. Fresh fruit and vegetables are the largest components of the U.S. agricultural exports to Canada, and Canada is the most important export market for U.S. fruit and vegetable growers.

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[7] Statistics Canada, Agricultural Economic Statistics, 23-001.

[8] Statistics Canada, Trade of Canada, #65-202 and 65-203.   The   unloads   at   these   major   cities   account   for approximately 95 percent of total fresh fruit and vegetable imports.

Figure 1

Canadian Imports of Fresh Fruit and
Vegetables From the United States
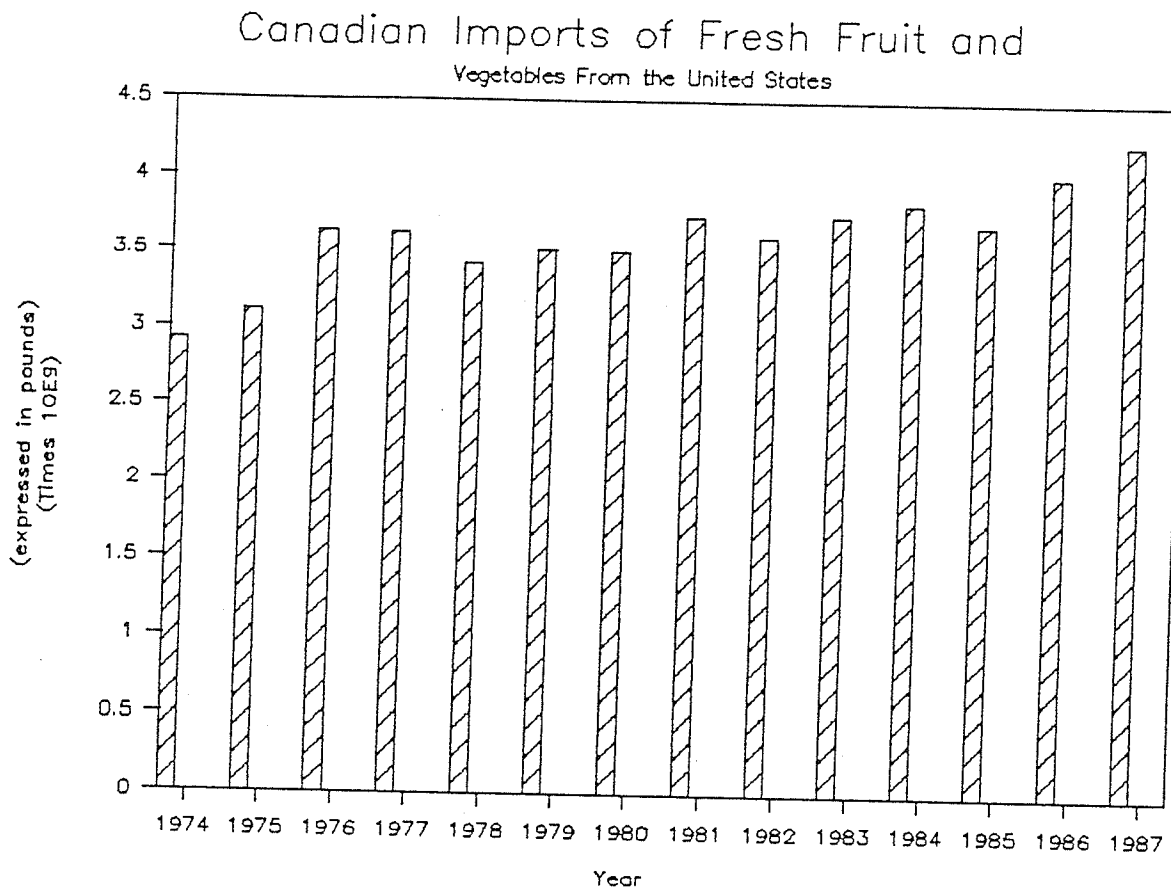
     In 1987 California provided 39 percent of Canada's fresh

fruit and vegetable imports from the United States. Florida,

Washington, and Texas provided 14.4 percent, 5 percent, and

4.5 percent respectively.[9]   Table 1 lists the shipments

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[9] Agriculture Canada, Annual Unload Report: Fresh Fruit
and Vegetables, 1987.

received by major Canadian cities and the major sources of these shipments in 1987.

Table 1

Canadian Imports of U.S. Fresh Fruit and Vegetables in 1987

('000 pounds)

City	Fruit and Vegetable Imports	Major Import Sources
Toronto	1,366,014	California, Florida
Montreal	777,180	California, Florida
Vancouver	572,702	California, Washington
Edmonton	256,185	California, Washington
Calgary	229,405	California, Washington
Winnipeg	195,583	California, Florida
Ottawa	189,733	California, Florida
Saskatoon	88,953	California, Florida
Halifax	82,211	California, Florida
Quebec City	76,810	California, Florida
Regina	58,511	California, Florida
St. Johns	15,232	California, Florida

Source: Agriculture Canada, Annual Unload Report: Fresh Fruit and Vegetables, 1987.

Of the four billion pounds of fresh fruit and vegetables Canada imports from the U.S. annually, the Toronto market is the largest consumer with annual imports of nearly 1.5 billion pounds.   Montreal, imports just over three-quarters of a billion pounds annually.   Vancouver is third with over one-half billion pounds of imports.   Edmonton is a distant fourth place importer of U.S. fresh fruit and vegetables at just over

a quarter billion pounds annually. Winnipeg imports 196 million pounds of fresh fruit and vegetables annually.[10]

2.1.2   Canada-U.S. Trade in Red Meat and Fish

Canada's red meat processing industry, which is the third largest manufacturing industry, is characterized by overcapacity despite considerable rationalization in recent years.[11] Canada continues to maintain a strong position as a net exporter of meat products to the U.S., providing about 50 percent by volume of U.S. imports of fresh and processed pork. In 1987, Canada exported 224 million pounds of fresh and frozen pork compared to just over 8 million pounds in imports from the U.S.[12]

Canadian exports of fresh and frozen red meats to the United States are illustrated in Figure 2. These exports have risen dramatically from 41,518,800 pounds in 1974 to 369,036,800 pounds in 1987. This growth in Canadian meat exports parallels the devaluation of the Canadian dollar

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[10] A more detailed treatment of Canadian market destinations for fresh fruits and vegetables produced by California, Florida, Washington and Texas is available in the Appendix.

[11] The closure of the Winnipeg Canada Packers' plant in April 1987 was partially offset by the earlier opening of the Springhill Farms plant in Neepawa, which is currently experiencing financial difficulty.

[12] Statistics Canada, Exports by Commodity, #65-004 and Imports by Commodity, 65-007.

during this same period. From being valued at par in 1974, the Canadian dollar dropped to an unprecedented $.72 U.S. in 1985. The Canadian dollar has since recovered and Canadian exports of fresh and frozen meats to the United States have levelled off.

Figure 2

Canadian Exports of Fresh and Frozen
Meats to the United States
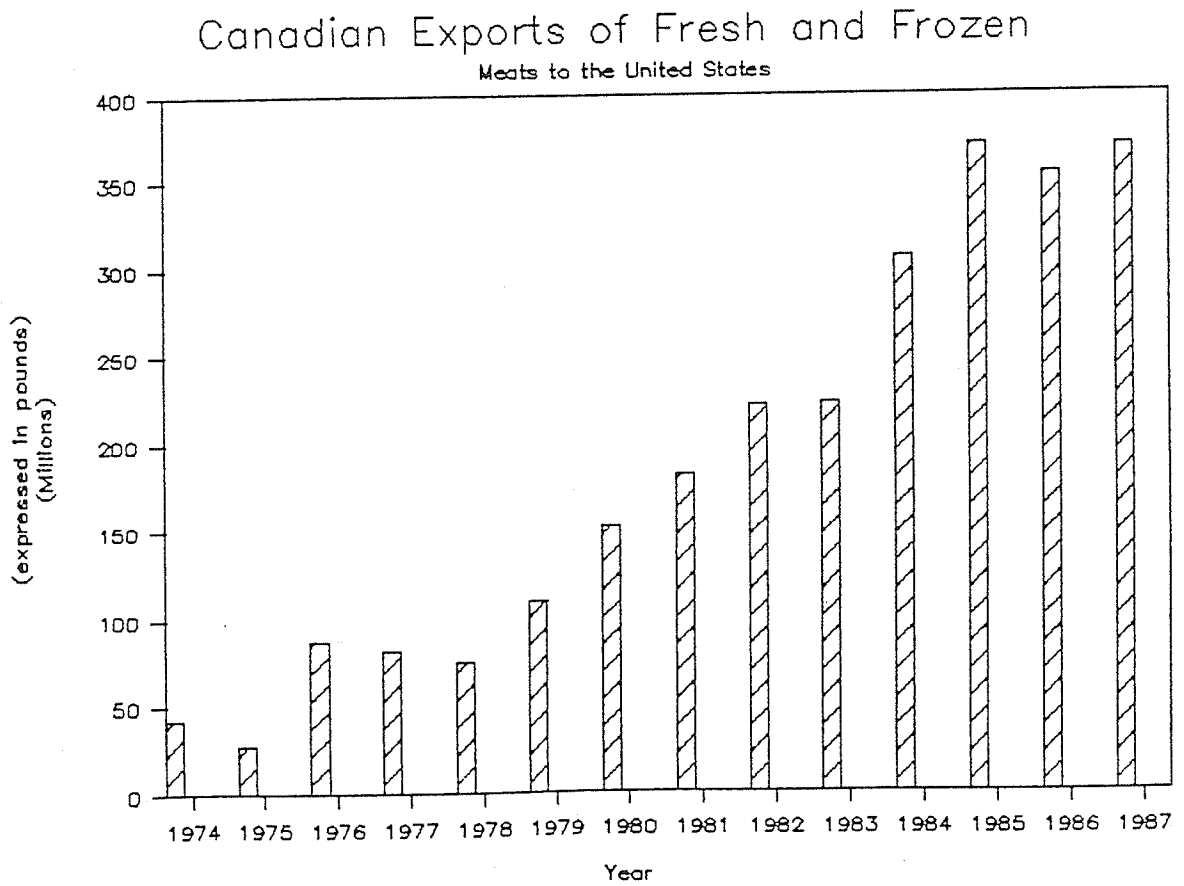
Figure 3 demonstrates the growth in Canadian pork exports to the United States. From 557,200 pounds in 1974, pork exports increased at an annual average of ten percent to reach 224,318,100 pounds in 1987. This huge increase in pork exports to the U.S. may be explained by the devaluation of the Canadian dollar and a 4.5 cents per pound U.S. countervailing duty (c.v.d.) imposed on live Canadian hogs. The c.v.d. on live hogs, which was imposed in 1985 following allegations of unfair subsidy to Canadian hog producers, provided an economic incentive for the slaughter of hogs in Canada and export of fresh and fozen pork to the United States. Consequently, Canadian exports of fresh and frozen pork have increased despite the revaluation of the Canadian dollar, which has climbed steadily in relation to the U.S. dollar.

Figure 3

Canadian Exports of Fresh and Frozen
Pork to the United States
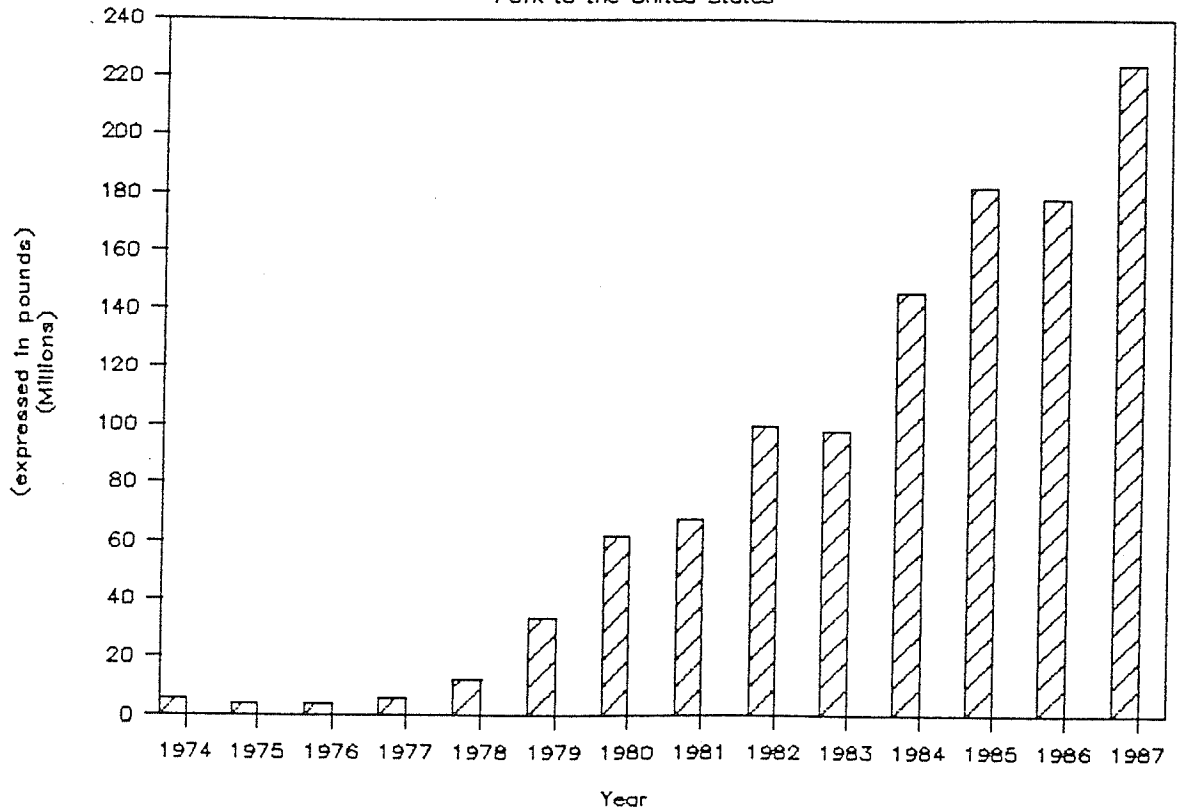
Canadian beef is generally recognized as leaner and of higher quality than U.S. beef.[13] Figure 4 demonstrates Canadian exports of fresh and frozen beef to the United States. Despite a decline since 1985, overall beef exports

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[13] The Canada-U.S. Free Trade Agreement and Agriculture, pp. 30.

increased from 35,946,700 pounds in 1974, to 144,718,700
pounds in 1987 (an eleven percent average annual increase).

Figure 4
Canadian Exports of Fresh and Frozen
Beef to the United States
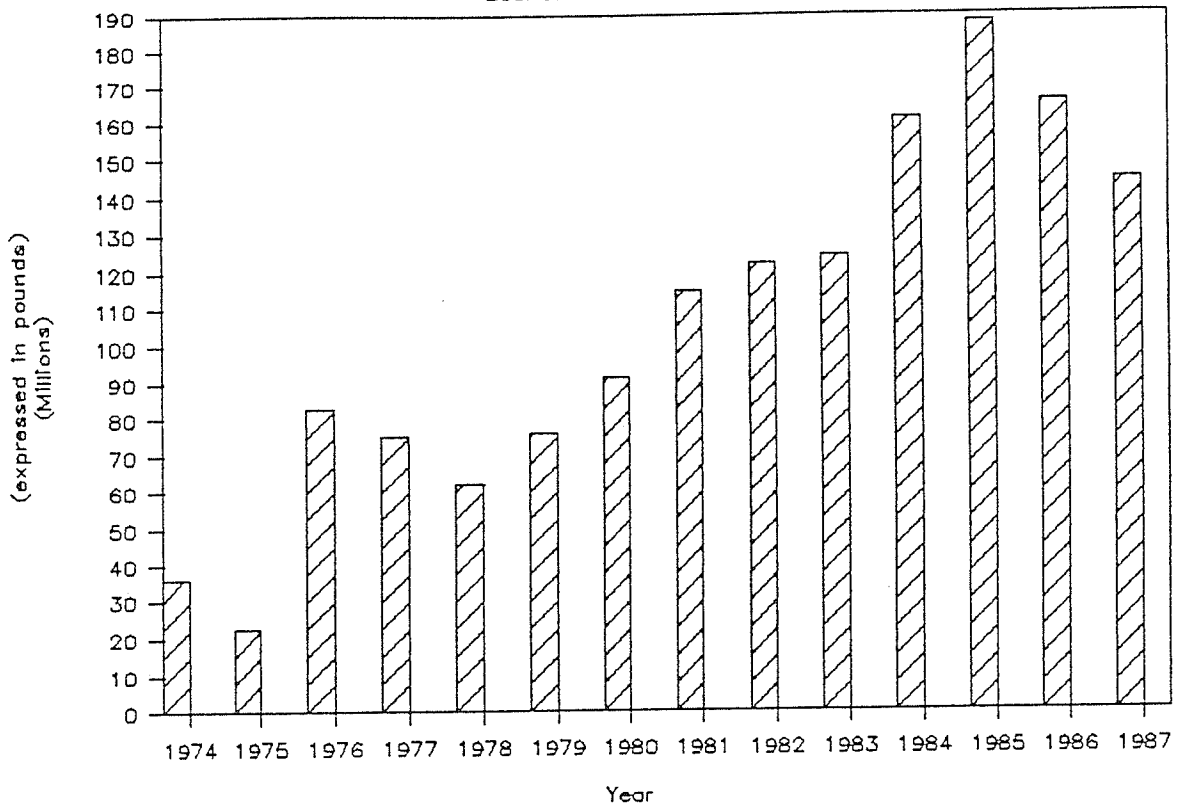
Table 2 documents Canada's position as a net exporter of
fresh and processed red meats to the United States in 1987.
In this year, Canada's red exports to the U.S. were
approximately five times U.S. imports to Canada.

Table 2

Canadian Trade With U.S. in Red Meats in 1987
('000 pounds)
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	Canadian Imports	Canadian Exports
beef, fresh or frozen	61,204	144,718
pork, fresh or frozen	8,096	224,318
TOTAL, red meats	69,300	369,036

Source: Imports by Commodity, SC 65-007, and Exports by
          Commodity, SC 65-004.

Canada is a net exporter of fish as well as red meats. In 1987, 564 million pounds of fish were exported to the United States. Table 3 lists provincial exports of fish and red meats to the United States. These data highlight the importance of fresh and frozen fish exports to the economies of the Atlantic provinces and British Columbia.

Table 3

1987 Exports of Red Meats and Fish to the U.S.
by Province
(expressed in $'000)

Province	Meat, fresh and chilled	Other meat	Fish, fresh or frozen	Fish fillet
Nfld.	82		11,988	460,209
N.S.	339		74,174	217,409
P.E.I.	1,964	54	4,849	15,911
N.B.	195	27	14,426	44,914
Que.	291,936	4,779	3,829	49,310
Ont.	186,259	21,806	21,551	24,592
Man.	66,314	1,205	16,557	18,422
Sask.	59,042	6,049		100
Alta.	133,997	13,755	190	113
B.C.	15,997	14,789	67,489	21,487

Source: Exports by Country, Statistics Canada #65-004.

2.2   EXAMINING CANADA-U.S. TRADE BARRIERS

This section identifies and discusses various barriers to Canada-U.S. trade and the potential effect of CUSTA on trade in refrigerated food products.   Trade barriers are important because they provide a measure of price protection to the domestic industry.   These barriers may be institutional, i.e., created to achieve certain political objectives, or they may be natural or unavoidable such as transport costs.   Trade barriers generally fall into two categories: permanent and temporary/contingent.

2.2.1   Permanent Trade Barriers

Permanent trade barriers include tariffs imposed on imports as well as non-tariff barriers such as quantitative restrictions and government procurement policies. Table 6 illustrates relatively permanent barriers to Canada-U.S. trade in refrigerated food products prior to CUSTA. Quantitative and government procurement restrictions have been converted to tariff equivalent form.

Table 4

Permanent Trade Barriers
(expressed as a percentage)

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CANADA	Tariff Rate	Quantitative Restriction	Federal Procurement
Meat products	1.9	0.0	0.0
Fish products	1.9	0.0	0.0
Fruit and vegetables	9.5	0.0	0.0
U.S.			
Meat products	1.1	12.2	0.4
Fish products	1.6	0.0	0.0
Fruit and vegetables	8.1	0.0	0.6

Sources: Department of Finance and the Institute for Research on Public Policy.

Canadian and U.S. tariff rates for refrigerated food products are similar, but there is a marked difference in

quantitative restrictions and procurement policy between the two countries. The elimination of these permanent tariff barriers is likely to affect Canada-U.S. trade in refrigerated food products.[14]

2.2.1.1   Tariff Barriers

Although tariffs are the most easily identified trade barriers, their effect is not precisely measured. Industry tariff rates are derived by aggregating individual commodity tariff rates; the aggregate data are then weighted by actual imports. An inherent problem with this method is that tariffs providing most effective trade protection inevitably get the lowest weight and, therefore, tend to be underestimated. Production data for various commodities would be more suitable but often are not available. There are shortcomings in assessing the effects of even the most obvious trade barriers such as tariffs.

2.2.1.2   Non-tariff Barriers

Many domestic industries are protected by tariff and non-tariff barriers. Non-tariff barriers (NTB) may be expressed

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[14] With respect to fresh fruit and vegetables, a conditional "snapback" to the Most Favored Nation (MFN) rate of duty will be allowed for 20 years to protect Canada's seasonal horticulture production.

in tariff equivalent form, which is a measure of their effect on import prices. To avoid double-counting, the tariff equivalent of a NTB has to exceed that of a tariff rate before it is considered. For instance, if transport costs were to be identified and quantified as a non-tariff barrier to trade, this NTB would have to exceed the existing tariff rate. The potential for exposing transport costs as a NTB increases as Canadian and U.S. tariffs on refrigerated food products are removed with CUSTA.

In the area non-tariff barriers, CUSTA addresses technical barriers to trade that are considered to pose no threat to human, animal or plant health.[15] There is bilateral agreement to minimize the negative impact of certain technical regulations and standards on Canada-U.S. trade. Specific border crossing irritants have been resolved including the following:

1. the U.S. threat to implement a full meat inspection system at the border;

2. setting criteria for regional recognition of disease-free areas; and,

3. provision for mutual accreditation of inspectors for issuing phyotosanitary certificates.

Although time-consuming meat inspections and other non-tariff barriers to Canada-U.S. trade have been addressed in CUSTA, inspections remain a contentious issue, especially for southbound border crossings. Some Canadian meat exporters

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[15] The Canada-U.S. Free Trade Agreement Synopsis, pp.24.

complain about the inordinate frequency of full meat inspections since the United States partially privatized the meat inspection service.[16]   If there is truth to these allegations of unfairness, Canadian meat exporters may be facing a non-tariff barrier to trade.

2.2.2   Contingent Protection

In contrast to permanent trade barriers, contingent protection is subject to proof of injury to a domestic industry. Contingent protection may be a countervailing duty or a temporary quantitative restriction on imports; anti-dumping and countervailing duties may be expressed in tariff equivalent form. Countervailing duties have been, and continue to be, a threat to Canadian exports of red meats to the U.S. market.

2.2.3   Tariffs Prior to CUSTA

Tariffs on Canadian and U.S. red meats vary considerably as illustrated in Table 7; the elimination of these Most Favoured Nation (MFN) tariffs is expected to simplify trading and ease pressures on traditionally tight sales margins.

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[16] Manitoba Co-operator, January 4, 1990.

Table 5

MFN Tariffs on Red Meats
(prior to CUSTA)

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Commodity	Canadian Tariff	U.S. Tariff
Beef	2 cents/pound	2 cents/pound
Beef/portion controlled cuts	2 cents/pound	4 %
Beef and veal, cured	1 cent/pound	10%
Pork	Free	Free

Source: The   Canada-U.S.   Free   Trade   Agreement   and Agriculture.

The elimination of formal barriers to Canada-U.S. trade in refrigerated food products, specifically red meats, will expose many non-tariff barriers that remain. As mentioned in a previous section on non-tariff barriers, many of the NTB's have been disregarded because they did not exceed the tariff barriers in existence at that time. Once the NTB's in question have been exposed, it is likely that they will have to be accurately quantitfied in order that they be eventually eliminated.

Chapter 3

THE REFRIGERATED TRUCKING INDUSTRY

This chapter describes physical and economic aspects of the refrigerated trucking industry as they apply to Canada-U.S. trade in agricultural products requiring a temperature-controlled environment. Physical constraints facing the refrigerated trucking industry are presented briefly, but economic considerations are dealt with in detail and include the following:

1. product sensitivity to freight cost;
2. determining the effective rate of protection;
3. the role of truck brokers;
4. turnaround time;
5. empty miles or deadhaul;
6. economic regulations of the trucking industry; and,
7. customs regulations and inspection considerations.

By examining the refrigerated trucking industry, a clearer picture emerges as to the role of transport in Canada-U.S. trade in refrigerated food products.

Refrigerated trucking is important because it is used for over 95 percent of the shipments of fresh fruit and vegetables imported from the United States; this mode is equally important for moving Canadian fresh and processed pork, beef, and fish to U.S. destinations. Table 8 demonstrates highway transport domination of the movement of

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refrigerated food products to the U.S. during the period from 1965 to 1985.

Table 6

Canadian Exports to the U.S. (1965-85)

(Expressed as Percentages)

Commodity	Mode	1965	1975	1985
Meats	rail	7.6	1.3	.5
	truck	92.3	98.7	99.3
	water	.1	0	0
Fresh Fruits and berries	rail	22.0	8.4	3.0
	truck	76.8	91.3	96.9
	water	1.2	0	.1
Fresh Vegetables	rail	23.7	2.9	.1
	truck	54.2	96.7	99.7
	water	22.1	.4	.1

Source: Statistics Canada, Catalogue No. 65-202 and 65-206

The service provided by refrigerated trucking is generally more expensive than than that of dry vans; the extra cost is attributed to the higher capital cost for the trailers and cooling unit and the additional fuel required to operate refrigeration equipment.   In addition to a temperature-controlled environment, certain commodities may also require a cushioned ride, and special racks or hooks.   Similar amenities may be required at terminal and transshipment facilities.

For research purposes, the physical characteristics of refrigerated trucks allow easy identification - the trailer usually has a refrigeration unit mounted at the front of the trailer.[17]   Although refrigerated trucking service is generally more expensive than dry van service, refrigerated truckers have more payloads available to them because they can also haul dry goods.

Refrigerated trucks typically haul a wide range of dry or unrefrigerated freight as a backhaul. The refrigerated trucking industry is, therefore, linked to transport systems for a diverse set of commodities. It follows, then, that the fortunes of refrigerated food producers are closely tied to the backhaul opportunities for their region.

3.1   Product Sensitivity to Freight Cost

A product's sensitivity to freight cost is determined by the ratio of transport cost to the product's landed (or selling) price. In other words, as the value of the product increases, transport costs represent a smaller proportion of the product's final selling price -ultimately, transport cost changes are likely to have less effect on demand for the

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[17] The exception to trailers with easily visible front mounted refrigerator units are marine containers travelling by surface transport, which may have bottom mounted refrigerator units.

higher valued products.[18]   The freight rate sensitivity of various refrigerated food products is illustrated by the data in Table 9.   These are U.S. intercity percentages, which are much lower than those of transborder movements, however, they demonstrate individual products' sensitivity to freight costs.

Table 7

Contributions of Intercity Transportation

Costs to Retail Food Prices, 1980

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Product	Intercity Transport Costs as Percentage of Retail Price
California oranges	14.2%
Broilers	2.4%
Pork	1.1%
Beef	1.6%

===

Source: Marketing of Agricultural Products, Kohls and Uhl

Table 9 demonstrates that meat products, which are of relatively high value, are much less freight sensitive than fruit products such as oranges.   Freight sensitivity for different meat products can vary considerably depending on final selling price of the particular product.

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[18]   It is assumed that there is no price discrimination, that trucking firms are not charging higher rates for the higher valued commodities transported.

<u>Determining the Effective Rate of Protection</u>

W.M. Corden defined the effective rate of protection index as "the proportionate increment in value added per unit level of an activity brought about by the tariff structure over its free-trade value."[19]   In the same way that tariffs create a barrier against foreign goods trying to enter the domestic market, transport costs also present a barrier to this transborder activity.

Research can determine the effective rate of protection (ERP) that transport costs and regulation provide against imports, but it cannot begin to separate out the various components such as the following: unavoidable costs of border crossings, psychological barriers to trade, and regulatory issues affecting transborder trade.   Transport researchers acknowledge the existence and effects of these factors, but there still remains a need for quantitative methods to deal with them.

Because of border crossing fees, extra time and documentation involved, the costs of transborder shipments of refrigerated food products may be higher than costs for similar domestic movements.   Conceivably, overhead costs solely attributed to transborder operations can be borne by

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[19] W.M. Corden, "The Structure of a Tariff System and the Effective Protective Rate." *Journal of Political Economy,* 1966, pp. 128-131.

the entire trucking operation (domestic and international) and thus not captured in freight rates for the respective movements.[20] This dilution of costs attributed to transborder trucking would tend to lessen the effective barrier to trade posed by transport costs and regulations.

Furthermore, the ERP for transborder movements may be indistinguishable from the extra costs generally involved with shipping goods north-south compared to the lower costs of east-west movements. East-west lanes tend to have higher volumes and because they are more competitive, the rates tend to be lower.[21]

3.3   The Role of Truck Brokers

Truck brokers play an important role in the transport of refrigerated food products; for instance, brokers arranged some 66 percent of the fruits and vegetables shipped from Florida in 1985 and 1986.[22] By monitoring rate changes and informing shippers, carriers, and receivers of these changes,

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[20] Barry E. Prentice and Marvin Hildebrand, "Transborder Trucking: Institutional Barriers to Canada-U.S. Trade of Agricultural Goods", Journal of the Transportation Research Forum, Vol.29, #1, pp.65-72, 1988.

[21] Richard Beilock, Nicholas Powers, and James MacDonald, "Freight Rates: Their Importance to Fresh Produce Prices", National Food Review, USDA, Oct-Dec 1988, Vol. II, Issue 4. pp.7.

[22] Ibid, pp.6.

the truck brokers help to establish market information which determines trucking rates.

3.4   Turnaround Time

In determining the compatibility of a backhaul load with the economic fronthaul, turnaround time is important. The economic fronthaul is defined as the major source of revenue for the trucking firm - it does not necessarily imply that the source of the load is domestic or foreign. The potential backhaul must fit within the time constraints of the trucker with respect to available fronthauls and the ability to make these deliveries on time.

Schedules demanded by produce shippers and receivers make it difficult for refrigerated carriers to adhere to speed and hours-of-work regulations. Beilock compared the schedules of refrigerated and non-refrigerated haulers. His analysis suggests that, on the average, refrigerated carriers have much tighter schedules.[23] Consequently, produce haulers are more vulnerable to stricter safety regulation enforcement.

Produce haulers' schedules place narrow limits on the time they have available to find and load an appropriate backhaul shipment. In order to maintain tight schedules, truckers often take whatever load is available at their last

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[23] R. Beilock, "Are Truckers Forced to Speed?", The Logistics and Transportation Review, 21,3 (1985), pp. 277-291.

drop, or they proceed empty to a location where loads are readily available.

3.5   Empty Miles or Deadhaul

Either expression - "empty miles" or "deadhaul" - is self explanatory in describing the process of moving an expensive highway tractor and temperature-controlled trailer without a payload.   Reasons for "deadhauling" may be one or more of the following:

1.   there are no loads available because of the traffic imbalance;

2.   the trucker does not have the operating authority to haul any of the available commodities;

3.   the trucker does not have time to wait for the load because he is scheduled to pick up another load and cannot risk being late; or

4.   "cabotage restrictions" (customs requirements and/or immigration) restrict him from moving an intra-national load.

Refrigerated food haulers still face unnecessary empty mileage while repositioning between loads despite transport deregulation in Canada and the United States.   "Cabotage rights" restrict foreign carriers from moving goods within a country and result in deadhaul miles if they are unable to secure a backhaul to their country.

In the case of an alien trucker, the number of "deadhaul" miles travelled depends on the distance from the international border or the availability of transborder loads in the

vicinity of the last drop. The domestic trucker has the advantage of being able to move some goods within the country in order to cut down "deadhaul" miles to the next pick-up.

In examining the costs of transborder trucking of refrigerated food products from the U.S. perspective, the extra cost imposed by deadhaul miles plays is likely most important for Edmonton, which is 290 miles from the U.S. border. Table 10 list major Canadian cities and their distance to the nearest U.S. border point.

Table 8

Potential Deadhaul Miles
for U.S. Drivers

Canadian City	Distance to U.S. Border Point
Edmonton, Alta.	467 km. (290 miles)
Quebec City, Que.	171 km. (106 miles)
Halifax, N.S.	169 km. (105 miles)
Calgary, Alta.	168 km. (104 miles)
Moncton, N.B.	154 km. (96 miles)
Regina, Sask.	147 km. (91 miles)
Toronto, Ont.	120 km. (75 miles)
Ottawa, Ont.	84 km. (52 miles)
Winnipeg, Man.	70 km. (43 miles)
Hamilton, Ont.	60 km. (37 miles)
Kingston, Ont.	45 km. (28 miles)
Thunder Bay, Ont.	44 km. (27 miles)
Montreal, Ont.	40 km. (25 miles)
Vancouver, B.C.	36 km. (22 miles)
Windsor, Ont.	8 km. (5 miles)
Sarnia, Ont.	3 km. (2 miles)
Sault Ste. Marie, Ont.	2 km. (1 mile)

Source: Canadian Trucking Association on Transborder Trucking Study: Motor Carrier Taxes and Fees, FHWA Docket No. 86.4, Dec. 1986.

U.S. truckers have an advantage over Canadian truckers in the transborder market because they are seldom more than one or two hundred miles away from the Canada-U.S. border when delivering goods to major Canadian cities. Canadian truckers, on the other hand, can be 1500 or more miles away from the border after making their last delivery in the U.S.; this represents a large cost to Canadian truckers if a load for the return portion of the trip is not available within a reasonable amount of time.

A similar and perhaps more important problem in the fruit and vegetable trade is getting south in the first place. If a Canadian trucker cannot find a load in Canada, he cannot afford to go south to pick up a northbound load. In contrast, the U.S. trucker has a much larger market and range of potential "backhaul" goods in the northern United States.

3.6   Economic Regulations of the Trucking Industry

Truckers require licenses or "operating authorities" to pick up and deliver goods in Canadian and U.S. jurisdictions. The difficulty in obtaining these operating authorities depends on the jurisdiction, the commodities applied for, and the financial and safety fitness of the carrier. The ease of gaining an operating authority also depends on the geographic scope of the application: intra-provincial (intra-state) or extra-provincial (extra-state).

In Canada, designated (or exempt) commodities are those for which operating authority to haul the particular commodity can be obtained simply by applying. An applicant does not have to prove a need for his service and carriers already in possession of that operating authority cannot contest the application. In the U.S., with the passing of the Motor Carrier Act of 1980, all commodities are designated.

Provided that the carrier can prove "fitness"[24], operating authority to transport designated commodities is relatively easy to obtain in Canada. By comparison, operating authority to haul non-designated commodities such as meat and fish is difficult to obtain; the process is complicated by "reverse onus"[25], which is more favourable than the previous regulation, but still offers no guarantee of success to the applicant.

The provincial motor transport boards in Canada publish a list of designated commodities for extra-provincial carriage. In the U.S., there are no designated commodities for inter-state hauling because authorities are readily granted as if everthing was "designated." The criteria for determining what commodities fall under the designated or non-

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[24] "Fitness", according to the MVTA 1987, is defined as the ability of the motor carrier to meet safety, licensing, and insurance requirements.

[25] "Reverse public onus" means that fit applicants will be granted authority unless an opponent to the application can demonstrate that the granting would not be in the public interest.

designated classification may not be immediately obvious, however, they tend to be of relatively low value.

During the five year transition period of the MVTA from January 1, 1988 - January 1, 1993, persons objecting to a licence application in the name of public interest may do so before a provincial or territorial transport board. If the regulatory authority (a provincial motor transport board) determines that the opposition to the application is sufficient, it may hold public hearings to decide whether the application for authority should be granted. The MVTA will be monitored during the five year transition period and it is expected that, after 1993, trucking will be completely deregulated, subject to a final review of the legislation.

3.7   Customs Regulations and Inspection Considerations

Canadian and U.S. truckers have complained about the discrepancies and costly delays associated with regulations and inspections involved at border crossings.[26] Complaints centred around the inflexibility and insensitivity of the system to the needs of the trucking firms to make the crossings with a minimal amount of lost time and cost. Provisions in CUSTA for standardizing inspections should

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[26] Transborder Trucking: Impacts of Disparate U.S. and Canadian Policies, United States General Accounting Office, July 1987.

alleviate some of the problems encountered at border crossings.

A world-wide Harmonized System (HS) to facilitate international trade went into effect January 1, 1988. HS[27] allows companies and governments to consolidate paperwork, simplify tracking goods between countries, and to improve and expand automated data collection and commodity tracking. HS is designed to take the guesswork out of merchandise codes and licensing compliance, and to speed clearance of shipments. The implementation of the world-wide Harmonized System sets the stage for advanced, automated U.S. Customs clearance of goods and eliminates metric conversion. HS is consistent with CUSTA is is likely to stimulate trade between Canada and the United States.

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[27] According to a pamphlet prepared by the Department of the Treasury, United States Customs Service, the Harmonized System is referred to as 'a common language for international trade and worldwide merchandise tracking.'

Chapter 4

LITERATURE REVIEW

4.0   INTRODUCTION TO CANADA-U.S. TRUCKING

Trucking represents the largest proportion of traffic, in terms of commodity value moved in Canada. From the beginning of the century and through the 1920's, the Canadian trucking industry grew and gradually replaced the horse-drawn delivery wagon. The depression of the 1930's resulted in excess capacity for all modes of transportation including trucking. Concern that excess capacity would result in unreliable service and unstable prices provided the impetus for government regulation in the form of entry restrictions.

In the 1950's and 1960's, technological innovation and large public investments in highway infrastructure permitted a rapid expansion of the trucking industry. More efficient and dependable highway units were developed that allowed trucking to compete with rail on the shorter hauls. A much improved highway infrastructure, the Trans-Canada Highway, enabled trucking to compete with railways over longer distances. Similarly, in the United States, the construction of the Inter-State Highway System permitted trans-border trucking to compete favourably with rail networks.

Figure 5 demonstrates the dramatic shift from rail to truck in the transport of U.S. fresh fruit and vegetables to Canada during the period 1955 to 1985.

Figure 5

U.S. Fruit & Vegetable Exports to Canada by Mode
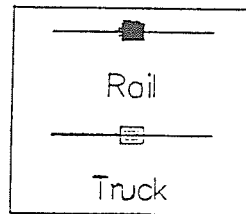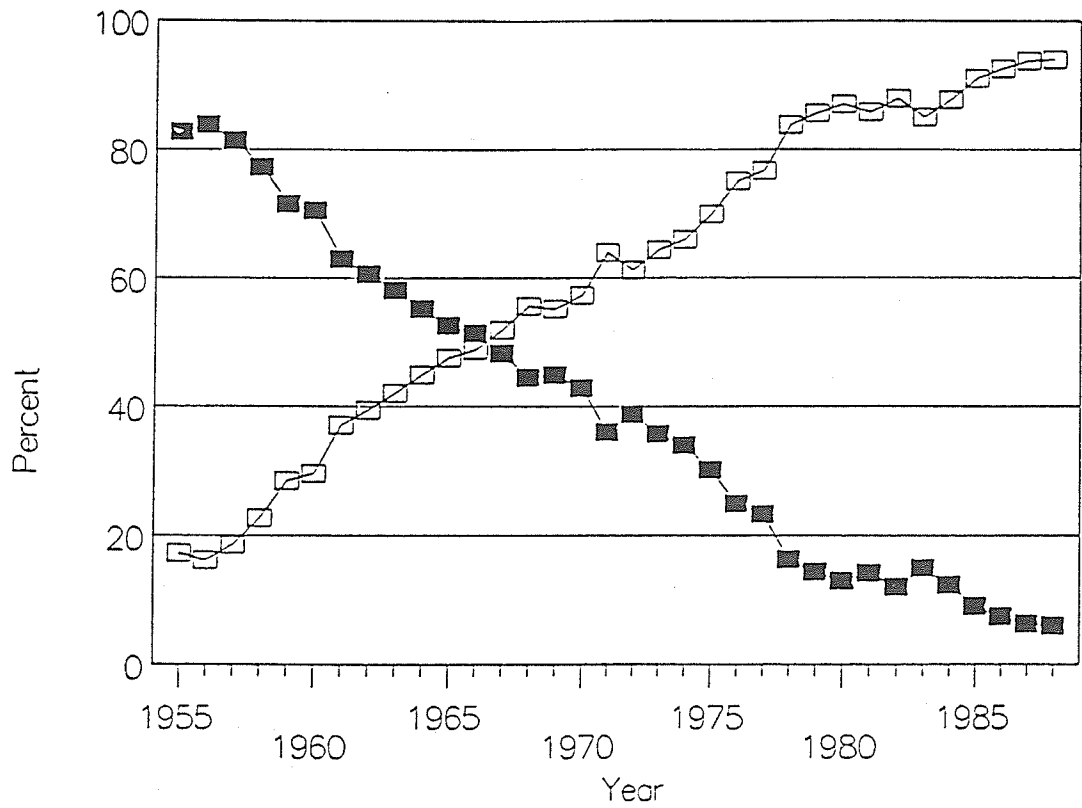
Accompanying the technological changes in trucking has been a plethora of regulations regarding vehicle weights, dimensions and safety. As trucking moved through the various stages of its development, it was subjected to new sets of regulations. These combined regulations can be categorized as following: vehicle related regulations; taxes, fees and other charges; border crossing regulations; and driver related regulations.[28]

Canada and the U.S. maintained similar policies for nearly half a century. The U.S. Motor Carrier Act of 1980, or "deregulation" as it is commonly referred to, signalled a new era in trucking. This new period had far reaching consequences amongst which were the disparate entry policies of the U.S. and Canada.

American truckers complained that they were at a competitive disadvantage because of differences in policies regarding market entry, combined with other differences in rules, regulations and practices affecting transborder traffic. In response to these complaints, Congress passed a moratorium on new operating authorities for Canadian drivers. A report prepared by the United States General Accounting Office examined Canadian and U.S. transport regulations and

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[28] Barry E. Prentice and Marvin Hildebrand, "Transportation Barriers to Canada-U.S. Trade of Agricultural Products", Research Paper, University of Manitoba Transport Institute, July, 1987.

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concluded that, despite disparate policies, Canadian transport regulations did not discriminate against U.S. drivers.[29] The moratorium against granting new operating authorities to Canadian drivers was lifted with the signing of the Brock-Gotlieb Agreement of 1982. The agreement set up a consultative mechanism to deal with the problems created by traffic shifts resulting from regulatory differences.

In response to U.S. Motor Carrier Act of 1980, Canada also chose to deregulate the transport industry. While still in the drafting stage, the Motor Vehicle Transport Act of 1987 drew responses as diverse as the groups affected by the legislation. This is to be expected because the MVTA 1987 is federal legislation that is administered provincially and the effects of transport deregulation are likely to differ from province to province.

The criteria used in granting operating authorities vary from province to province. For instance, the Manitoba Motor Transport Board stated that the loss of business to a new entrant is not necessarily considered contrary to the public interest; factors taken into consideration are layoffs, deteriorating working conditions, terminal closings, and the effect of balancing headhaul and backhaul loads.[30] Alberta,

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[29] Transborder Trucking: Impacts of Disparate U.S. and Canadian Policies, United States General Accounting Office, July 1987.

[30] Winnipeg Free Press, Sept.24, 1988.

by contrast, has virtually allowed open entry to extraprovincial trucking in their province.

Just as provincial motor transport boards have reacted differently to the new legislation, shippers' and truckers' groups have also reacted differently. Shippers' reaction to the MVTA 1987 was unfavourable. A spokesperson for the Canadian Industrial Transportation League (CITL) stated the following:

> "the vacuum of the MVTA public interest test has been filled by the Canadian Conference of Motor Transport Administrators. It has developed entry guidelines which pay lip service to the user but underlines traditional regulatory concerns which will ensure, in certain provinces at least, that trucking will not be seen as a business but as a provincial institution, protected from normal competition."[31]

CITL is generally disappointed with the slow pace of transport regulatory change in Ontario. Truckers are perceived as using every opportunity - legal, economic, or sociopolitical - to maintain the status quo.[32]

On the other hand, the Ontario Trucking Association (OTA) believes that "deregulation will throw open the door to U.S. truckers" and mean a "loss of cream" of Ontario's trucking jobs. Although U.S. trucking companies are bound by immigration laws to use Canadian drivers and equipment, marketing, accounting, and general management functions would

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[31] Transportation Business, February 1988, pp.13.

[32] Transportation Business, September 1988, pp.26.

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be performed south of the border.[33] The OTA was, therefore, planning to oppose the first group of new applications for extraprovincial operating authorities.

Most recently, the Manitoba Court of Appeal ruled that the Manitoba Motor Transport Board erred in denying two trucking firms authority to haul non-exempt commodities extraprovincially;   the   legislation   is   considered insufficiently specific to be interpreted uniformly across Canada.[34] The two trucking firms had applied for operating authority to haul fresh and frozen foods to the United States.

In conclusion, truckers generally have reacted with apprehension and a commitment to fight the new legislation. Conversely, shippers feel that the legislation is not being enacted quickly enough.

4.1   A REVIEW OF RELEVANT TRUCKING STUDIES

4.1.1   Clayton and Sem

A 1985 study of the Manitoba-Minnesota trucking lane by Clayton and Sem[35] addressed regulatory issues and was motivated by the following factors:

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[33] Materials Management and Distribution, April 1988, pp.32.

[34] Winnipeg Free Press, September 14, 1989, pp.10.

[35] A. Clayton and J. Sem, "Regulatory Issues in Transborder Trucking: A Case Study Referencing Trucking Between Manitoba and Minnesota", Annual Conference, Canadian Transportation Research Forum, Toronto, Ontario. May, 1985

1. the huge trade flows between Canada and the U.S. carried to a large extent by transborder trucking;

2. the effects of U.S. deregulation (1980 Motor Carrier Act) and the forthcoming Canadian transport deregulation, combined with proposed relaxation of weights and dimension regulations;

3. the question of fairness raised by the Canadian and U.S. trucking industry with respect to accessibility of one country's carriers to the other country's business; and,

4. a need to clarify issues governing transborder shipments by truck and the accompanying regulatory environment.

The study was limited in that the research results could not necessarily be applied to general traffic between Canada and the United States.

Using data from a four week sample truck surveys that were made available by the Manitoba Department of Highways and Transportation, Clayton and Sem were able to determine the level of trucking activity in the Manitoba-Minnesota trucking lane. The surveys were administered at the Emerson border crossing in 1974, 1975, 1978, and 1981.

The Clayton and Sem study recognized the complex mix of legislation, regulation, policy, and procedural considerations governing most aspects of the transborder trucking industry, specifically the trucking firms operating between Manitoba and Minnesota. The study concluded that economic regulatory issues tend to be more of an annoyance to most truckers than regulatory provisions with respect to weights and dimensions, customs, permits, and taxation.

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4.1.2   Prentice and Hildebrand

Using a mail survey and personal interviews, Prentice and Hildebrand[36] examined the various transport related barriers to Canada-U.S. trade in agricultural products. The study differentiated between the natural barrier to trade due to actual transport costs and the man-made barrier to trade resulting from institutional factors often designed to achieve certain policy objectives. The institutional or man-made component of transport barriers to agricultural trade was further divided into the following four categories: vehicle related regulations; taxes, fees and other charges; border crossing regulations; and driver related regulations. The study involved only trucking firms because more than ninety percent of the transborder trade in agricultural trade between Canada and the U.S. is carried by trucks.

Prentice and Hildebrand found a significant difference between domestic and transborder fronthaul rates and that the same held true for domestic and transborder backhaul rates. As a result of these man-made or institutional components of trade barriers to agricultural trade, domestic producers enjoy a level of protection against imports; this protection was estimated to be an extra cost of between fifteen and twenty

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[36] Barry E. Prentice and Marvin D. Hildebrand, "Transborder Trucking: Institutional Barriers to Canada-U.S. Trade of Agricultural Goods", Journal of the Transportation Research Forum, Vol.29, #1, pp. 65-72, 1988.

cents per mile on a payload of agricultural products transported between Canada and the United States. The researchers did note that these extra costs could not be eliminated entirely as the international boundary between Canada and the U.S. must be monitored for obvious reasons. They did suggest, however, that inequities and inconsistencies in regulatory environments in the two countries could be modified to reduce the transportation barriers.

4.1.3   Beilock's Conjoint Analysis

Beilock et al[37] used conjoint measurement, or trade-off analysis, to test the hypothesis that variations in freight rates are a result of normal competitive profit-maximizing behaviour. The testing concerned the following two types of variations in freight rates:

1.   variations in freight charges correlated with the value of the commodity; and

2.   variations in freight charges among destinations and attributed to the availability of backhauls.

This study, which focused on the movement of fresh Florida produce by truck, was hampered because some of the key variables in the model were not observable. Although conjoint analysis was initially developed in mathematical psychology,

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[37] Richard Beilock, Peter Garrod, and Walter Miklius, "Freight Charge Variations in Truck Transport Markets: Price Discrimination or Competitive Pricing?", American Journal of Agricultural Economics, 1986, pp. 226-236.

it has since been used in a number of marketing studies as well as some transportation studies.

Using a two step procedure, Beilock et al derived a preference or ordinal utility function where a set of exogenous factors x are assigned corresponding weights w based on individual preference. Since over 60 percent of Florida's produce shipments are arranged by brokers, panels of brokers and independent truckers were used for the purpose of data collection. Essentially, members of the different panels were presented with several decision-making scenarios and asked to rank these choices. Empirical results consisted of binary responses to the alternative scenarios and the probit algorithm Shazam was used to estimate the parameters.

Beilock et al concluded that the observed variation in freight rates among commodities was not inconsistent with competitive markets - that the correlation between freight rates and value of the commodity did not imply price discrimination. Rather, they suggested that shippers with high valued commodities would bid up the price of truck carriage during periods when trucks were scarce. In addition, shippers were willing to pay more to guarantee prompt and dependable deliveries when faced with declining produce prices.

Research results on backhaul availability and the subsequent freight rates were presented. With respect to variations in freight rates among destinations, Beilock et al

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suggested that there was no evidence of price discrimination
even though lower rates were generally available to market
points where backhauls were more readily available. Carriers
simply took into account the imputed cost of waiting for the
next load when deciding on the destination and rate.

4.1.4   The Determinants of Full-Empty Truck Movements

Recognizing that many interregional trade models treat
transport supply as perfectly elastic and often fail for this
reason, Beilock and Kilmer focused their efforts on
understanding the determinants of full-empty truck
movements.[38] Given that the marginal cost of obtaining and
carrying a load is slightly higher than the cost of running
empty, there was a need to explain why 20 percent of the
refrigerated trailers on interstate highways were empty. The
researchers believed that their findings would help explain
seasonal swings in freight rates, tapering freight rates, the
impact of regulatory controls, and the role of expectation in
carrier decision making.

Beilock and Kilmer proposed the following hypothesis:
motor carrier decisions depend on the differential between
rates received and the costs associated with the load,

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[38] Richard Beilock and Richard L. Kilmer, "The Determinants
of Full-Empty Truck Movements", American Journal of Agricultural
Economics, 1986, pp. 67-76.

opportunity cost of waiting for the load, carrier regulatory status, firm characteristics, and carrier familiarity with the market. An empirical model was formulated and, using logit analysis, correctly categorized 86 percent of the carriers sampled.

Although research results are obtained from studying particular Florida routes, the conclusions may apply to other regions and are as follows:

1. Rates rise more quickly with distance than does the increment in costs from running full rather than empty;

2. Expected variations in rates at remote points impact upon carrier full-empty movement decisions, i.e., expected rises in rates in remote points lower the opportunity cost of seeking out and carrying a load to that point, and vice versa.

3. Ownership of Interstate Commerce Commission (ICC) authority plays an important role in determining full-empty movements, i.e, the interstate regulatory structure contributes to unnecessary empty movements despite the Motor Carrier Act of 1980.

Beilock and Kilmer's research provides a better understanding of carriers' decisions with respect to full-empty truck movements. They go on to suggest that rate tapering should be examined further on the basis of net exporting and net importing regions. In Florida, for instance, where there is more freight incoming than outgoing, rates may show very high taper with greater distance as more carriers committed to travel this route seek backhaul loads.

Chapter 5

RESEARCH APPROACH AND METHODOLOGY

The scarcity of reliable information to assess the impact of transport deregulation on Canada-U.S. trade required primary data collection. Data were obtained using in-person surveys of Canadian and U.S. truckers that haul fresh fruit and vegetables to major Canadian cities. A similar survey conducted in Fargo, North Dakota and Minneapolis, Minnesota was modified to exclude questions with respect to border crossings.

The hypothesis proposed by this research is that transport costs for U.S. exports of fresh fruit and vegetables to Canada are significantly higher than U.S. domestic movements of similar distance. If the hypothesis is correct, Canadian transport deregulation may result in reduced rates and improved levels of service for Canadian and U.S. users of transport services. By comparing intranational and international rates for the Winnipeg-Minneapolis/Fargo traffic lane, it is possible to determine whether transborder freight costs inhibit U.S. exports of fresh fruit and vegetables to Canada.

As a supplement to the analysis of freight rates between Winnipeg, and Minneapolis and Fargo, regression analysis is

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used to derive parameter estimates for the components of freight rates for fresh fruit and vegetables. The purpose of the regression analysis is to further verify or refute, on a larger scale, the results from the Winnipeg-Minneapolis/Fargo traffic lane. Using data from major Canadian cities and Minneapolis and Fargo, the model incorporates freight rates on a regional and national basis and tests the hypothesis.

To gain a shippers' perspective of transport issues, data gathered by the author for another UMTI research project were used.[39] Manitoba users of transport services, specifically those involved in transborder shipments of refrigerated food products, were questioned with respect to transport services currently provided and future concerns.

The provincial transport boards responsible for granting extra-provincial operating authorities provide some information as to the number of new applications and approvals under transport deregulation. In addition, Transport Canada has been monitoring the effects of the MVTA during its five-year transition period. Interviews with truckers further determine their awareness of the new transport regulations that have eased entry requirements, whether they have applied for new operating authorities, and if they have not applied, their reasons for not doing so.

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[39] John Heads, "Manitoba Transportation Action Plan to the Year 2000", University of Manitoba Transport Institute, prepared for TIDAC (Transportation Industry Development Advisory Committee), forthcoming.

5.1   LIMITATIONS OF THE RESEARCH PROJECT

5.1.1   Problems of Data Availability

The dearth of data available from published sources presents limitations in terms of time and money for the study of transborder trucking. Missions to collect data at major Canadian cities required air travel, local accomodations, and ground transport. The length of time available to collect data at each city was affected by the "busy" days at the warehouses. Finally, given the very competitive nature of the trucking industry, data collection efforts are often limited because of confidentiality.

5.1.2   Seasonal Variations

It is important to emphasize that this study is a "snapshot" of the refrigerated trucking industry and does not take into account seasonal fluctuations in traffic volumes and the possible variations in freight rates. The results, therefore, may not apply to a year-round situation. For example, Beilock et al[40] report that freight rates are highest during the late spring and early summer, which coincides with the highest traffic volume. This research does

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[40] Richard Beilock, Nicholas Powers, and James MacDonald "Freight Rates: Their Importance to Fresh Produce Prices", National Food Review, USDA, Oct-Dec 1988, Vol. 11, Issue 4.

not attempt to account for seasonal variations in freight rates.

5.1.3   Product Value

It is likely that value-of-service freight rates exist in competitively structured transportation markets. Beilock et al[41] found freight rates varied with the type of produce - not just with respect to product value, but susceptibility to damage as well. In this research, payload values were estimated using Statistics Canada annual volume and dollar value figures for imported fruit and vegetables from the United States. These estimated values for the individual fruit and vegetables are listed in Appendix 5.

5.2   DATA COLLECTION TECHNIQUE

Warehouses servicing major grocery retailers in Winnipeg, Toronto, Montreal, Regina, Saskatoon, Calgary, and Edmonton were selected for personal surveys of drivers delivering fresh fruit and vegetables. In addition to questions with respect to freight rates, distance travelled, backhaul availability, time required to cross the border, and perceptions of new trucking regulations, drivers were encouraged to comment on

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[41] Ibid, pp.6

any problems or obstacles encountered with fronthauls and backhauls. Large terminal facilities in Minneapolis and Fargo were also selected for conducting the survey.

5.2.1   Survey Questions

Survey questions were designed to extract as much information as possible in a short amount of time and to facilitate further research in that area, e.g., names and addresses of truck brokers to be used for further surveys. The surveys were designed to be administered at a loading dock, inside a trailer, or tractor cab, or in the comfort of a coffee shop.[42]

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[42] The Canadian and U.S. survey questionnaires are included in the Appendix.

Chapter 6

RESEARCH RESULTS AND ANALYSIS

6.0   INTRODUCTION

     This chapter examines the characteristics of the
refrigerated trucking industry that serves the U.S. fruit and
vegetable export trade to Canada, and the progress of Canadian
regulatory reform that affects these carriers. The results
of a survey of refrigerated truck drivers that haul U.S. fresh
fruit and vegetables to Canada are presented. This is
followed by an analysis of applicants' success in obtaining
new operating authorities in Canada.

6.1   TRUCKING SURVEY RESULTS

6.1.1   Driver Categories by Location

     Using the Canadian survey results, Canadian and U.S.
drivers classified by operating category. These separate
classifications, by location, are presented in Table 9.

Table 9

Operating Categories
(by location)

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CANADIAN DRIVERS (83)

	Independent	Owner/operator	Company
Toronto	2	1	3
Montreal	0	0	1
Edmonton	3	3	15
Calgary	0	11	9
Saskatoon	0	5	10
Regina	0	1	2
Winnipeg	4	7	7
% of total	11	34	55

U.S. DRIVERS (212)

Toronto	9	15	37
Montreal	0	4	33
Edmonton	1	3	10
Calgary	1	6	11
Saskatoon	0	0	12
Regina	0	4	3
Winnipeg	8	13	42
% of total	9	21	70

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In terms of driver category, approximately the same proportion
of independent drivers operate in Canada as in the U.S. There
is a slightly higher proportion of owner-operators in Canada
but these numbers are not statistically significant.

There are more U.S. drivers than Canadian drivers
delivering fresh fruit and vegetables to Canadian cities.
Results with respect to backhaul availability and type of

backhaul, driver awareness of the MVTA, and border crossing times may reflect the fewness of Canadian drivers - those results will be examined in later sections. The proportion of Canadian drivers delivering fresh fruit and vegetables, however, increases for cities in western Canada.

6.1.2   Backhaul Availability

Although fronthaul loads are, by definition, the most important source of revenues for truckers, backhaul loads are also very important. The type of backhaul available, and the corresponding freight rate, determines how competitive the carrier can be in providing fronthaul service. If a higher value backhaul, which is likely to have a higher freight rate, is available, the trucker can afford to move the fronthaul at a lower rate and vice versa.

The availability of backhaul loads may vary with nationality of the trucker and ownership of the company. Backhaul availability is likely to differ by geographic location. These topics are examined in this section.

6.1.2.1   Canadian Locations

The availability of a backhaul load differs with drivers' residency. Table 10 contains confirmed backhauls at time of unloading according to drivers' residency and the type of operation.

Table 10

Backhaul Availability (Canadian Survey Locations)

(by category)

	Confirmed Backhaul-Yes	Confirmed Backhaul-No
Canadian Driver[1]		
Independent	8	0
Owner/operator	21	7
Company driver	34	14
Total	63	21
U.S. Driver[2]		
Independent	14	3
Owner/operator	27	15
Company driver	83	67
Total	124	85

[1] Backhauls are all from Canadian origins.
[2] Backhauls are not necessarily of Canadian origin.

With respect to confirmed backhaul availablility at the time of interview, 124 or 59.3% of the 209 U.S. drivers responded positively compared to 63 or 75% of the 84 Canadian drivers interviewed. The difference with respect to backhaul

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availability for Canadian and U.S. drivers is not statistically significant. It should be noted that many of the U.S. drivers had confirmed backhauls lined up in the U.S. and intended to leave Canada empty.

Independent operators may be be more successful at securing backhaul commodities at Canadian cities surveyed than owner-operators and company drivers. Although the samples are small and the results not statistically significant, Canadian and U.S. independent operators register larger backhaul availability than other driver categories.

Confirmed backhaul availability at time of unloading varies with location because of the diverse nature of Canadian cities with respect to distance to the U.S. border, natural resources, manufacturing, and areas of agricultural production, In Table 11, backhaul availability is further disaggregated for Canadian and U.S. drivers by location of the interview.

Table 11

Backhaul Availability (Canadian Survey Locations)

(by location)

Canadian Driver[1]	Confirmed Backhaul-Yes	Confirmed Backhaul-No
Winnipeg	15	3
Toronto	2	4
Edmonton	18	2
Calgary	18	3
Saskatoon	9	6
Regina	1	2
Montreal	0	1
Total	63	21
U.S. Driver[2]		
Winnipeg	53	10
Toronto	35	26
Edmonton	7	4
Calgary	11	7
Saskatoon	8	4
Regina	5	2
Montreal	5	32
Total	124	85

[1] Backhauls are all from Canadian origins.
[2] Backhauls are not necessarily of Canadian origin.

In Winnipeg, 84.1% of the U.S. drivers reported a confirmed backhaul, however, most of these drivers were "deadheading" to North Dakota for a load of potatoes destined for southern U.S. markets. Canadian drivers interviewed in Winnipeg registered an equally favourable confirmed backhaul of 83.3%. Canadian drivers' success in obtaining backhaul loads is likely as a result of "cabotage rules", which allow

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them to haul interprovincial loads not available to U.S. drivers.

Overall, nearly twice as many U.S. trucks as Canadian trucks deliver fresh fruit and vegetables to the Canadian cities surveyed. Edmonton, Calgary and Saskatoon, to a lesser extent, are the exceptions - there were nearly twice as many Canadian drivers as U.S. drivers delivering to these cities. The large number of Canadian truckers interviewed in Edmonton, Calgary and Saskatoon may be attributed to any of the following reasons:

1. U.S. drivers face the potential for a large deadhaul distance because they do not have the intraprovincial and interprovincial opportunities of Canadian truckers. For instance, a U.S. driver may be reluctant to deliver fresh fruits and vegetables to Edmonton if the potential exists for a "deadhaul" of 290 miles;

2. Alberta has a much more liberalized regulatory regime that has permitted entry by more small Canadian carriers - if they can get a southbound load, then they can compete for the northbound cargo; or,

3. If a U.S. trucker has to deadhead south of the border, there are not likely to be many good loads available in Montana.

6.1.2.2   U.S. Locations

In the U.S. survey, backhaul availability varies with location and driver category. Table 12 contains U.S. drivers'

response to confirmed backhaul at time of unloading at Fargo, North Dakota and Minneapolis, Minnesota.

Table 12

Backhaul Availability (U.S. Survey)

===

	Confirmed Backhaul-Yes	Confirmed Backhaul-No
Drivers		
Independents	6	1
Owner/operators	13	10
Company drivers	23	18
Total	42	29
Drivers[1]		
Fargo, North Dakota	13	9
Minneapolis, Minnesota	29	20
Total	42	29

===

[1] Because of cabotage rights, all drivers interviewed in Fargo, N.D. and Minneapolis, Minnesota are U.S. residents.

Of the 71 U.S. drivers surveyed in Fargo and Minneapolis, 59.2% reported having a confirmed backhaul (next load); this proportion does not vary significantly by location nor driver

category.[43]   Some drivers interviewed in Minneapolis have lucrative contracts to haul higher-valued products out of the Minneapolis area and the fresh produce they had just delivered was therefore a backhaul.

6.1.2.3   Backhaul Commdities

Although the list of backhauls reported by Canadian and U.S. drivers contains at least 65 different commodities, Table 13 indicates the dominant commodities for Canadian and U.S. cities.[44]

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[43] The question with respect to backhaul had to modified because, in some cases, the designations backhaul and fronthaul did not apply. A load considered a fronthaul for some drivers was often a backhaul for others. The drivers were, therefore, questioned if their next load was available at the time of unloading.

[44] A list of all commodities reported as a backhaul, by Canadian and U.S. drivers, is found in the Appendix.

Table 13

Backhaul[1] Commodities
Available from Canadian and U.S. Cities

(in order of frequency)

Canadian cities[2]	U.S. cities
1. peat moss	1. meat
2. potatoes	2. potatoes
3. meat	3. cheese
4. grain	

[1]   U.S. drivers referred to their next load rather than backhaul.

[2]   Not necessarily Canadian products.

Peat moss is the mostly frequently mentioned backhaul commodity at Canadian locations, while meat is the dominant backhaul at U.S. locations. This inclination towards lower valued Canadian backhauls is likely attributed to the difficulty drivers have in seeking out higher valued, non-exempt loads and the operating authority required.

6.1.2.4   Destinations for Backhauls of Meats

If drivers delivering fresh fruit and vegetables to Canadian cities do not have the same backhaul opportunities as their counterparts delivering in the U.S., this situation may represent a non-tariff barrier to Canada-U.S. trade. Alternatively, the lack of meat shipments for U.S. and

Canadian fruit haulers could be a function of trade flows and competition. This section examines the patterns of southbound meat movements in fruit and vegetable trucks. The destinations for meat shipments, from Canadian and U.S. cities are presented in Table 14. California, Louisiana, and Texas are mentioned most often as markets for meat products.

Table 14

Destination for Meat Shipments
(by frequency of driver response)

Source of Meat	Destination				
	Calif.	Louisiana	Texas	Other	Total
Alta.	19	0	1	6	26
Sask.	12	0	1	5	18
Que.	5	0	8	0	13
Man.	1	0	1	2	4
Other	1	0	0	3	4
Iowa	4	2	1	1	8
N.Dak.	1	0	0	4	5
S.Dak	9	4	2	4	19
Other	8	3	3	3	17
Total	60	9	17	28	114

Table 14 demonstrates the importance of California as a destination for meat shipments out of north central U.S. and the Canadian Prairie Provinces. Of the 114 responses

indicating meat products as a backhaul (or next load),
California is listed as a destination for 52.6 percent of that
total.

6.1.2.5   Carriers with Authority to Haul Meat out of Canada

Drivers were asked if they have authority to haul meat
products out of Canada.   Because ability to obtain operating
authority to haul non-exempt commodities varies from province
to province, the responses reflects these differences, shown
in Table 15.

Table 15

All Carriers With Authority to Haul
Meat Out of Canada

(by Province and State)

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	Total	Yes	Percentage-Yes
Alta.	55	47	85.4%
Sask.	29	25	86.2%
Que.	41	20	48.8%
Ont.	17	6	35.3%
Man.	56	14	25.0%
N.Dak.*	14	3	21.4%
Minn.*	35	5	14.3%

==

*All U.S. drivers.

Table 15 demonstrates Canadian and U.S. carriers' success in obtaining operating authority to haul non-exempt commodities, specifically meat, out of Canada. The percentage of drivers with authority to haul meats out of each province is consistent with the province's approach to the implementation of the MVTA. Alberta, Quebec and Saskatchewan, which are more liberal, have granted more authorities than Manitoba and Ontario, which tend to be protectionist. This is discussed further section 6.4.

6.1.3   Border Crossings

Border crossings are time consuming and in some cases, prohibitive. Canadian and U.S. drivers provided information on average time to cross the Canada-U.S. border, northbound and southbound. The results, which are drivers' perceptions and not actual times registered in border crossings, are reported in Table 16.

Table 16

Canada-U.S. Border Crossings
(expressed in hours)

	n	Northbound	Southbound
Combined	248	.76 (.560)	.41 (.396)
Eastern Canada	99	.97 (.529)	.54 (.465)
Western Canada	149	.62 (.534)	.32 (.312)
U.S. driver	177	.82 (.613)	.38 (.383)
Canadian driver	71	.62 (.356)	.48 (.415)

* Standard deviation in parentheses

Contrary to previous perceptions, delays at international borders are relatively infrequent. The combined average time for Canadian and U.S. drivers to cross from the U.S. to Canada is .76 hours, and .41 hours when travelling in the opposite direction. This difference is statistically significant. The difference between southbound and northbound border crossing times is statistically significant for all categories listed in Table 17.

The difference in border crossing times between Eastern Canada and Western Canada, for all drivers, is statistically

significant, northbound and southbound. The difference in amount of time Canadian and U.S. drivers spend crossing the Canada-U.S. border is statistically significant only for northbound traffic.

Exceptions to a quick border crossing may be explained by first-time entrants, drivers with criminal records, and truckers with improper paperwork. During the survey, an actual case was reported of a U.S. driver who was refused entry because of a criminal record. As a result of this incident, a Canadian driver had to be dispatched to the Canada-U.S. border to bring the trailer to Winnipeg.

6.1.4   Driver Awareness of MVTA 1987

6.1.4.1   Canadian Locations

Many U.S. drivers are unaware of the MVTA, especially those interviewed in the United States. Using data from the Canadian survey, Table 17 indicates awareness of Canadian transport deregulation by operator category and residency.

Table 17

Driver Awareness of MVTA 1987 (Canadian Survey)

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Canadian Drivers(83)	Yes	No	Percent-Yes
Independent	9	0	100
Owner/operator	23	4	85
Company driver	39	8	83
Total	71	12	
(as percentage)	85%	15%	

U.S. Drivers(207[1])	Yes	No	Percent-Yes
Independent	11	5	69
Owner/operator	21	25	46
Company driver	60	85	41
Total	92	115	
(as percentage)	44%	56%	

==
[1] Out of 212 U.S. drivers surveyed, 207 responses were recorded.

Of the 290 Canadian and U.S. drivers interviewed at Canadian locations, 85% of the Canadian drivers are aware of the MVTA 1987 compared to 44% U.S. drivers who responded positively. Although almost three-quarters of U.S. independent truckers operating in Canada are aware of the new transport legislation, the sample size is too small for the numbers to be statistically significant.

Although this information is not well documented, drivers' comments suggest that the most informed drivers are those that had formerly operated as independents, but are now leased to a company or working as company drivers. Some company drivers, uninterested in the regulatory aspect, candidly admit that they only want to move product from source to destination.

6.1.4.2   U.S. Locations

The U.S. survey gauges driver awareness of the MVTA 1987. In Table 18, the data are further disaggregated by location.

Table 18

Driver Awareness of MVTA 1987 (U.S. Survey)
(by location)

Location	Yes	No	Percent-Yes
Fargo, North Dakota	8	14	36.3%
Minneapolis, Minnesota	23	26	46.9%
Total	31	40	
(by percentage)	44%	56%	

Of the 86 U.S. drivers interviewed in Fargo and Minneapolis, 44% are aware of the MVTA 1987, compared to 53% of the U.S. drivers who responded positively in the Canadian

survey but this difference is not statistically significant. Drivers interviewed in Minneapolis tend to be more aware of Canadian transport deregulation than those interviewed in Fargo, but there is no statistical significance to that observation.

6.2   RESULTS OF SHIPPER SURVEY

Shippers are important in determining how successful truckers are in seeking out better backhaul opportunities and if they apply for new operating authorities. If shippers are satisfied with freight rates and the levels of service provided by truckers, they are likely to maintain the status quo and, therefore, not seek the services of new entrants. On a small scale, the shipper survey attempts to gauge how willing Manitoba shippers are to provide backhauls for fruit and vegetable haulers.

Of the 14 Manitoba firms in the food and beverage sector interviewed with regards to transport concerns, only six met the following two criteria: (i) significant export volumes of fresh and processed food products to the U.S.; and (ii) the need for temperature controlled transport. For reasons of confidentiality, the firms are identified by numbers only. The traffic managers were queried with respect to the following:

1.   the percentage of the final product being exported to the U.S.;

2.   outbound freight costs as a percentage of product selling price;

3.   rating the importance of freight rates vis-a-vis quality of service considerations (P=price, Q=quality of service, and Both); and,

4.   overall satisfaction with the trucking services provided based on freight rates and the services provided (yes or no).

The results of the shipper survey are presented in Table 20.

Table 20

Users of Transport Services

(requiring refrigerated trucking)

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.....percent.....

Firm	Exports to U.S.	Freight Rate	Price,Quality or Both	Service Satisfaction
1	1	3	Q	yes
2	75	5	Q	yes
3	57	5	Both	no
4	10	9	Both	yes
5	10	2	Q	yes
6	8	3	Q	yes

===
Source: TIDAC Transportation Action Plan to the Year 2000.

To preserve confidentiality, the shippers surveyed were asked to express outbound freight costs as a percentage of

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product selling price rather than disclosing freight rates. This percentage serves as a measure of sensitivity to freight rates. One major shipper of refrigerated food products to the U.S. did volunteer rates; these freight costs averaged $2350 U.S. for a 43,000 pound load to Texas and $2528 U.S. for an equivalent load to California. Compared to the California route, the Texas route is more direct and the rate is more favourable. Given that these rates include the extra costs of drop-loads, they are only slightly higher those reported by fruit and vegetable haulers.

There is a fundamental difference between meat haulers and fruit and vegetable haulers with respect to freight rate as a percentage of product selling price or sensitivity to freight costs. Table 21 shows that Manitoba shippers reported outbound freight costs as high as 9% of product selling price and as low as 2%. In contrast, Beilock et al reported on fruit and vegetables that "transportation represents nearly one-third of the cost that retailers pay for delivered produce."[45]

Five of the six firms surveyed expressed satisfaction with the levels of service provided by the current carriers

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[45] Richard Beilock, Nicholas Powers, and James MacDonald, "Freight Rates: Their Importance to Fresh Produce Prices", National Food Review, USDA, Oct-Dec 1988, Vol.11, Issue 4, pp.6.

and four firms rate quality of service factors more important than freight rates. The aforementioned responses include those of a firm that exports 75% of its production to the United States.

6.3   COMPATIBILITY OF BACKHAUL SHIPMENTS

Compatibility of backhaul shipments is assessed on the basis of physical and economic compatibility. There is little indication of problems concerning compatible shipments. The exception is the transport of raw hides, which tends to contaminate the trailer, and this load is generally avoided at almost any cost. Drivers tend to avoid "hanging" or "swinging" beef because of problems in road handling. Compared with boxed beef, "hanging" beef is unstable and shifts during transit. Most refrigerated food products, including fish, do not seem to represent any problems in terms of trailer contamination.

Although meat and fish shipped to the U.S. and fresh fruit and vegetables imported from the U.S. share a common trailer type, the requirement for a temperature controlled environment is essentially the only common denominator. The difference between Canadian refrigerated food products

exported and those imported can probably be explained in terms of exempt and non-exempt categories.

Exempt or designated commodities generally tend to have a lower value and, therefore, are more sensitive to freight rates.[46] By comparison, non-exempt commodities such as fish and meat tend to be of higher value and therefore less sensitive to freight rates. The shipper survey indicates that shippers of these higher valued commodities emphasize quality of service more than shippers of lower valued products, but do not dismiss the importance of freight rates. Quality of service factors often cited include the following:

1. dependability and speed of delivery;

2. trailer availability for extra storage space. Some shippers require that the trailer be left on the premises for up to three days, effectively to provide shippers with extra storage space. This arrangement is not acceptable to fruit and vegetable haulers who cannot afford the waiting time nor the extra trailer required; and,

3. the involvement of sales representatives and company executives in the activities associated with the transport of non-exempt commodities makes for a more sophisticated industry. By comparison, the fruit and vegetable trucking industry is less structured and less likely to be involved in public relations activities.

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[46] Sensitivity to freight rates is generally determined by expresssing freight rate as a percentage of product selling price.

The physical characteristics of the exempt and non-exempt commodities trucking industries are identical in their requirements for a temperature controlled environment. The element of time sensitivity in terms of spoilage and being at the market on time is also important. Environmental conditions, which affect product quality, are monitored without exception for both exempt and non-exempt commodities.

6.4   RESULTS FROM MOTOR VEHICLE TRANSPORT BOARDS

Survey data indicate the proportion of carriers with authority to haul meat out of Canada varies by location. In Manitoba, 25 percent of the drivers responded positively compared to a high of 85 percent in Alberta. Only 14 percent of the drivers interviewed in Minneapolis have authority to haul meat out of Canada.

Provincial transport boards were contacted to determine the number of applicants for new operating authorities, specifically those for hauling non-exempt commodities such as meat and fish. These efforts were, however, frustrated by a lack of such information.

The data reported in this section are too sparse for serious analysis, but are presented for information as a guide to future research in this area. Of the ten provinces

solicited for information with respect to applications and approvals of operating authorities, New Brunswick, Prince Edward Island, and Ontario were the only ones to provide such information. Efforts to present and analyze the available data are limited by a lack of standard format for gathering and reporting these data.

Ontario supplied detailed annual reports for the years 1986, 1987 and 1988 and some of that information is presented in Table 21. The 1987 report did note the following:

> "there was a slight decline in applications for operating authorities toward the end of this calendar year which decline was attributed to the fact that carriers were delaying the filing of new applications in anticipation of the coming into force on January 1, 1988 of the Motor Vehicle Transport Act, 1987."

Table 21

Ontario

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Year	Total	Granted	Denied
Jan. 1, 1986 - Dec. 31, 1986	1479	1272	207
Jan. 1, 1987 - Dec. 31, 1987	1970	1715	255
Jan. 1, 1988 - Dec. 31, 1988	1720	1690	30

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The Ontario figures for 1988 show a dramatic decrease over the previous year in the number of applications denied.

Just as in the case of Ontario, the figures obtained from Prince Edward Island and New Brunswick do not indicate whether applications and approvals are for exempt or non-exempt commodities. According to the results in Table 22, Prince Edward Island shows a steady decline in the number of new applications for operating authority and the total number issued during the period from 1986 to 1988.

Table 22

Prince Edward Island

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Year	New Applications	Total Issued(incl new)
April 1, 1985 - March 31, 1986	68	496
April 1, 1986 - March 31, 1987	43	472
April 1, 1987 - March 31, 1988	38	353

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Table 23 shows that it is difficult to determine if there has been a significant increase in the number of applications for additional operating authority in New Brunswick.

Table 23

New Brunswick

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Year	New Applications	Results
April 1, 1986 - March 31, 1987	177	118 granted as applied 42 granted w/amend 2 denied 15 withdrawn
April 1, 1987 - March 31, 1988	147	107 granted as applied 26 granted w/amend 7 denied 7 withdrawn
Jan. 1, 1988 - Dec. 31, 1988	188	127 granted as applied 56 granted w/amend 3 denied 4 withdrawn 7 in progress

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The Manitoba Motor Transport Board could not indicate whether applications for operating authority to haul non-exempt commodities, such as meats and fish, had increased. According to their spokesman, many new applications for hauling general freight include the non-exempt commodities. Determining the effect of deregulation would be extremely time consuming because the applications would have to be examined on an individual basis. It was also suggested that further communication with the individual applicants might be required in order to determine the specific intent of the application.

<u>TRANSPORT CANADA DATA ON APPLICATIONS FOR AUTHORITY</u>

Transport Canada is monitoring the MVTA through its transition period and has gathered data from all provinces. The following tables, which provide entry statistics for 1988, were prepared for the National Transportation Agency and Consumer and Corporate Affairs.

Table 24

MVTA Entry Statistics for 1988

Applications for Operating Authority

Province	New	Intra to Extra	Amended	American	Total
Nfld.	–	21	–	–	–
N.S.	62	9	191	9	271
P.E.I.	31	0	38	3	72
N.B.	59	55[1]	129	n/a	188
P.Q.[2]	2325	n/a	753	178	7196
Ont.[2]	187	30	260	n/a	2550
Man.[3]	–	–	–	–	344
Man.[3]	33	27[4]	91	12	124[5]
Sask.	–	–	–	–	688
Alta.	198	–	512	36	746[6]
B.C.	407	24	–	–	1558

[1] Also included in new and amended totals.
[2] Processed applications only in sub-total categories.
[3] Sept.1 - Dec.31; total is included in year total in preceding line.
[4] Also included in new and amended totals.
[5] Manitoba also reported 85 ease of entry applications in the same time period.
[6] Alberta also reported 255 ease of entry applications in 1988.

Table 24 indicates a relatively liberal transport regulatory environment in Alberta and Quebec, which is in sharp contrast to that in Manitoba. Table 25 provides statistics for out-of-province and U.S. applicants for operating authority and further demonstrates the liberal regulatory envirnoments of the aforementioned provinces.

Table 25

MVTA Entry Statistics for 1988

Applicant Domicile

Province	Domestic	Other Province	U.S. Carrier
Newfoundland	-	-	-
Nova Scotia	152	39	9
P.E.I.	12	57	3
New Brunswick	55	116	17
Quebec	5790	702	524
Ontario[1]	241	110	126
Manitoba[2]	75	37	12
Saskatchewan	-	-	-
Alberta[3]	307	348	91
B.C.	-	-	-

[1] Figures are for processed applications only.
[2] Figures are for Sept.1 - Dec. 31 only.
[3] Figures do not include ease of entry applications.

Table 26 shows that Alberta, Quebec, and B.C. have a large proportion of applications to haul commodities internationally.

Table 26

MVTA Entry Statistics for 1988
Application Type

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Province	Domestic	International	Both
Newfoundland	- not applicable -		
Nova Scotia	- not applicable -		
P.E.I.	- not applicable -		
New Brunswick	23	0	165
Quebec	353	143	2480
Ontario[1]	90	n/a	n/a
Manitoba[2]	43	29	52
Saskatchewan	-	-	-
Alberta[3]	6	117	624
B.C.	814	744	-

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[1] Figures are for processed applications only.
[2] Figures are for Sept.1 - Dec.31 only.
[3] Figures do not include ease of entry applications.

Additional MVTA entry statistics provided by Transport
Canada are located in the Appendix.

6.6   PERCEPTIONS OF TRANSPORT ISSUES

Since 1963, all provinces except Alberta and Newfoundland
have required "for-hire" carriers to obtain operating
authority or certificates of public convenience and

necessity.[47]   This requirement was designed to "ensure a reasonably high standard of service along the route concerned." Otherwise, regulators believed, unlimited entry would result in unstable rates, low wages, poorly maintained trucks, and long working hours.

To promote innovation and competition in the industry, transport deregulation was introduced in Canada effective January 1, 1988 and is being phased in over a five year period. Because the legislation is only two years old and there are limited published data for comparison, it is difficult to determine its effects on the transport industry in terms of prices and levels of service. This research, however, has examined many issues affecting refrigerated trucking of food products between Canada and the United States from the perspective of carriers and shippers.

6.6.1   Truckers' Perspective

Truckers' reactions to the MVTA depend on their residency and the interview location. More Canadian truckers than U.S. truckers are aware of the MVTA but, that does not imply that they would be more likely to seek out new operating

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[47]   A.W. Currie, Canadian Transportation Economics, University of Toronto Press, pp. 453.

authorities. Similarly, U.S. drivers interviewed at Canadian locations demonstrated a higher awareness of the MVTA than their counterparts delivering at U.S. locations. Except in Alberta and Quebec, where regulations were relaxed prior to the MVTA, most truckers feel that little has changed to help them obtain additional operating authorities.

Despite the "reverse onus" test, new applicants have generally been unsuccessful in penetrating new areas previously protected by existing operating authorities. In an interview with an unsuccessful applicant for additional operating authority to haul non-exempt commodities out of Manitoba, the carrier stated that, under true transport deregulation, he should be able to "haul anything, anywhere, and at anytime."[48] That comment expressing disappointment was made in spite of the fact that Canadian trucking deregulation, while in the drafting stage, had been touted as "the biggest thing since the oil shock of the 70's".[49]

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[48] John Heads, "Manitoba Transportation Action Plan to the Year 2000", **University of Manitoba Transport Institute Research Paper**, 1989.

[49] Transportation Business, April 1988, pp. 20.

Although total Canadian deregulation[50] in 1993 may open up some opportunities for smaller, independent operators, the overall effect is likely to be less than dramatic. Given the five year adjustment period during which key players in the Canadian and U.S. trucking industry will have had the opportunity to solidify their respective positions in the marketplace, it is unlikely that new entrants will be able to penetrate established markets.

Trucking, including that of refrigerated food products, is a mature transport industry that has experienced massive growth and technological development in the last three decades. Although entry requirements have been eased, competition has eliminated many participants because of lower freight rates, increased capital investment requirements, and higher operating costs.

The transport industry has changed because many independent operators can no longer compete and are seeking work with the larger trucking firms. With this shift to owner-operators and hired drivers, the independent operators represent a smaller proportion of the total drivers involved

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[50] The "fitness" test still holds and refers to safety and insurance obligations the trucker must meet. There will be a review in 1993 to determine whether the "fitness" test only will stand.

in hauling refrigerated food products between Canada and the U.S.[51]

Drivers favor improved facilities and services to coordinate fronthaul and backhaul loads. A more developed broker system on the Canadian side would help trucking firms to seek out backhaul loads. A significant number of truckers expressed an interest in expanding their operating authorities but did not know what loads were available or how to get them. Canadian and U.S. drivers suggested a need for central warehousing to avoid the costly and time-consuming drop-loads associating with hauling meat products to the U.S. Such a system would likely encourage more truckers to seek out these higher valued backhauls rather than the traditional low valued backhauls that, in their words, barely cover operating costs. A central warehouse would enable drivers to coordinate fronthaul and backhaul loads so that they fit in with the drivers' turnaround time.

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[51] Several drivers indicated that, until recently, they had operated as independents but have since been hired on as company drivers or owner-operators.

Chapter 7

FREIGHT RATE ANALYSIS

7.0   <u>INTRODUCTION</u>

Of the 385 truck drivers interviewed in Canada and the U.S., 185 were able (willing) to provide freight rates for the goods they carried. All rates are expressed in U.S. dollars using the conversion factor of $1 Canadian = $.84 U.S., which was relevant at the time when the data were collected.

In the first section of this chapter freight rates for the Winnipeg-Minneapolis/Fargo traffic lane are analyzed to test the research hypothesis. Regression analysis is used in the following section to further examine refrigerated trucking rates on a regional basis.   This equation estimates the economic importance of the components that determine freight rates for shipments of fresh fruit and vegetables to Canadian and U.S. cities.   It also serves to indicate whether the research hypothesis can be extended beyond the Winnipeg-Minneapolis/Fargo traffic lane.

7.1   A COMPARISON OF CANADA-U.S. RATES

To test the hypothesis that transport costs for U.S. exports of fresh fruit and vegetables to Canada are significantly higher than U.S. domestic rates of similar distance, Winnipeg rates are compared with those obtained in Minneapolis and Fargo. Winnipeg freight rates are classified transborder while those registered in Minneapolis and Fargo are domestic. All fruit and vegetables loads originate exclusively from southern U.S. sources.

It is common for most modes of transportation to employ freight rate tapering. Tapering occurs because, as fixed costs of operations are spread over longer distances, the cost on a per mile basis tends to decrease. As a result, care must be taken to standardize the distance travelled in comparing "mileage" rates. Standardized subsets created for Winnipeg, and Minneapolis and Fargo data eliminate distances less than 1000 miles and more than 2100 miles. To deal with geographic differences and shifts in origins for the fruit and vegetable loads, all rates are expressed on a per truck-mile basis and in U.S. dollars.

Freight rates, the corresponding mileage, and the calculated per mile rate for Winnipeg, Minneapolis, and Fargo are listed in the Appendix. The differences between freight rates gathered in Winnipeg, and Minneapolis and Fargo are tested for statistical significance. The subset rates, marked

with an asterisk, are compared to further determine whether the results are being biased by the presence of freight rate tapering. Table 27 contains a detailed comparison of the Canadian and U.S. data.

Table 27

CANADA-U.S. FREIGHT DATA
(for Winnipeg-Minneapolis-Fargo lane)

	Number of Observations	Average Rate	Average Mileage	Average Cost Per-mile
Winnipeg	43	2252 (436)	1977 (370)	1.14 (.157)
Winnipeg*	25	2158 (343)	1833 (173)	1.16 (.158)
Minn/Fargo (combined)	52	1606 (590)	1435 (504)	1.12 (.178)
Minn/Fargo* (combined)	35	1782 (466)	1588 (349)	1.12 (.118)
Minneapolis	33	1609 (611)	1473 (512)	1.09 (.181)
Fargo	19	1637 (553)	1386 (478)	1.20 (.146)

Standard deviations in parentheses.
* Indicates subset data for the locations.

The costs of refrigerated trucking on a per mile basis are virtually identical for Minneapolis and Fargo, and Winnipeg, i.e., the mean values are $1.12 and $1.14

respectively. These freight rates are not significantly different.

Turning to the asterisked subset figures, which eliminate mileage figures below 1000 and above 2100, average mileage recorded in Winnipeg drops from 1977 to 1833, while U.S. numbers increase from 1435 to 1588 miles. In these subsets, the Winnipeg per-mile cost increases from $1.14 to $1.16 while the Minneapolis and Fargo value remains unchanged at $1.12. The difference between Winnipeg, and combined Minneapolis and Fargo per-mile freight rates is not statistically significant. This suggests that, for the distances involved, there is no bias because of rate tapering.

Rates are then compared on the following basis: Winnipeg versus Fargo; and Winnipeg versus Minneapolis. The differences between Winnipeg and Minneapolis, and Winnipeg and Fargo per-mile freight rates are not statistically significant and, therefore, suggest that border crossings are not a non-tariff barrier to U.S. exports of fresh fruit and vegetables to Canada.

The difference between Fargo and Minneapolis rates is statistically significant. Because Minneapolis has a much larger population and its economic activity surpasses that of Fargo, refrigerated truckers delivering fresh fruit and vegetables to Minneapolis have higher-valued backhaul loads available to them. In Fargo, potatoes are the most frequently mentioned backhaul load. The load of fresh fruit and

vegetables delivered to Minneapolis may be an economic backhaul for some carriers and this may explain the significantly lower freight rates in Minneapolis.

On the basis of the aforementioned tests for the Winnipeg-Minneapolis/Fargo traffic lane, the thesis hypothesis that transport costs are a barrier to U.S. exports of fresh fruit and vegetables to Canada, is rejected. To offer support for the conclusion, the freight rate data are plotted and examined for evidence of freight rate tapering.

Figure 6 illustrates, for comparison purposes, the scatter maps for Winnipeg, and for Minneapolis/Fargo. These scatter maps plot average per mile costs against the corresponding mileage figures, and the distribution of freight rates is noticeably different. Winnipeg rates are concentrated in the 2000 mile range, which is in contrast to the larger mileage spread for the Minneapolis/Fargo data.

Figure 6

Winnipeg Rates (Average)
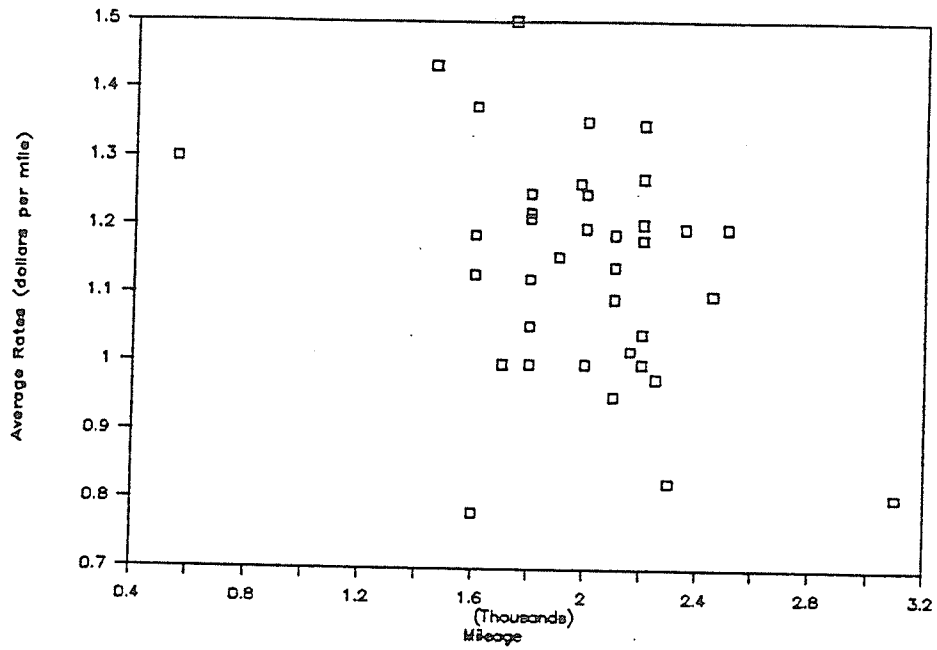
Minneapolis–Fargo Rates (Average)
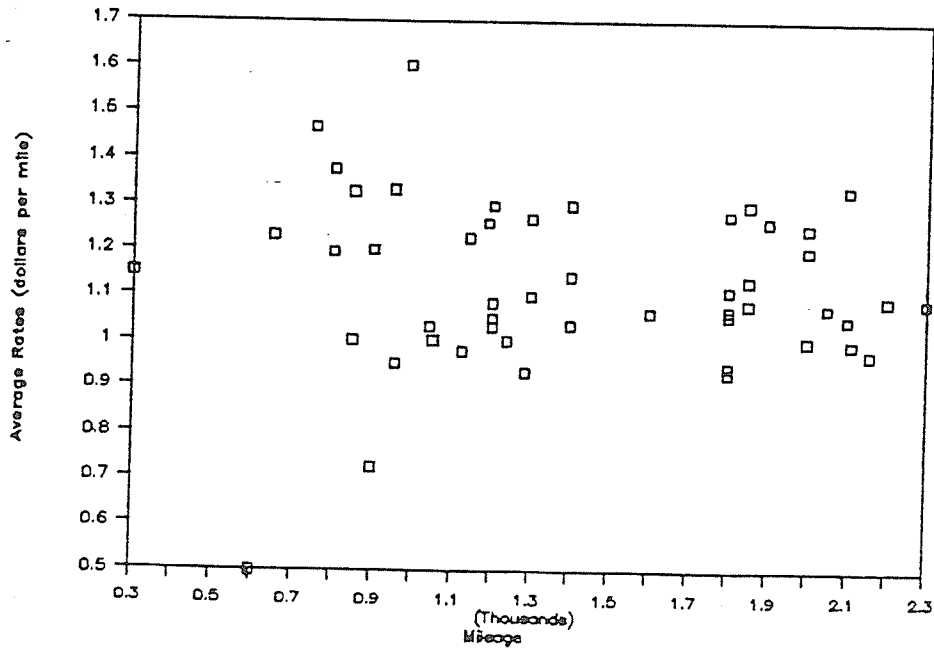
Figure 7, which plots actual freight rates against their respective distances, allows visual examination of data for rate tapering. Rate tapering occurs when fixed costs are spread over larger distances and the result can be a non-linear relationship between freight rates and distance travelled. The evidence of freight rate tapering is not immediately obvious and the distribution of freight rates supports the notion that rates increase proportionately with distance.

Figure 7

Winnipeg Rates (Actual)
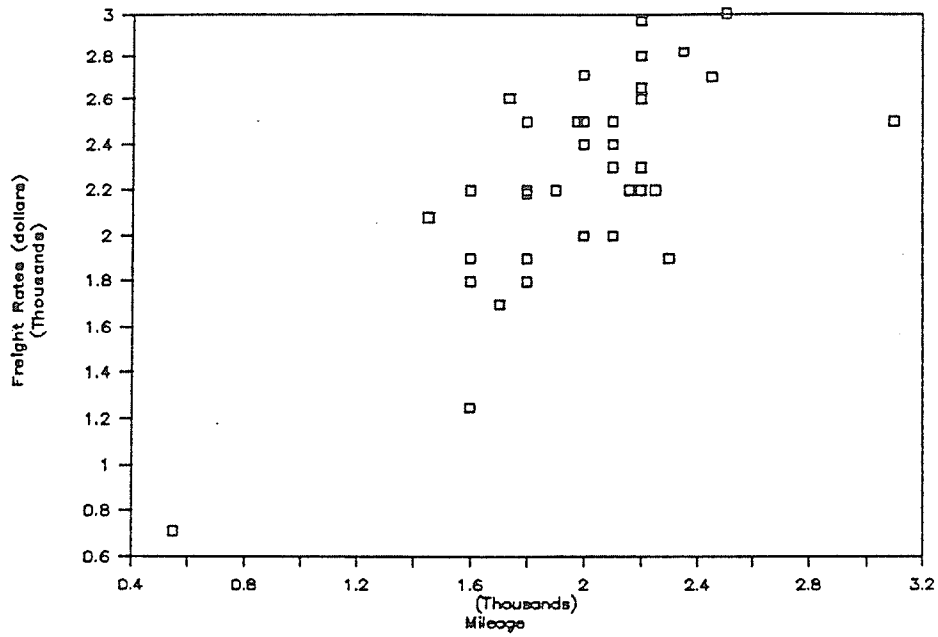
Minneapolis—Fargo Rates (Actual)
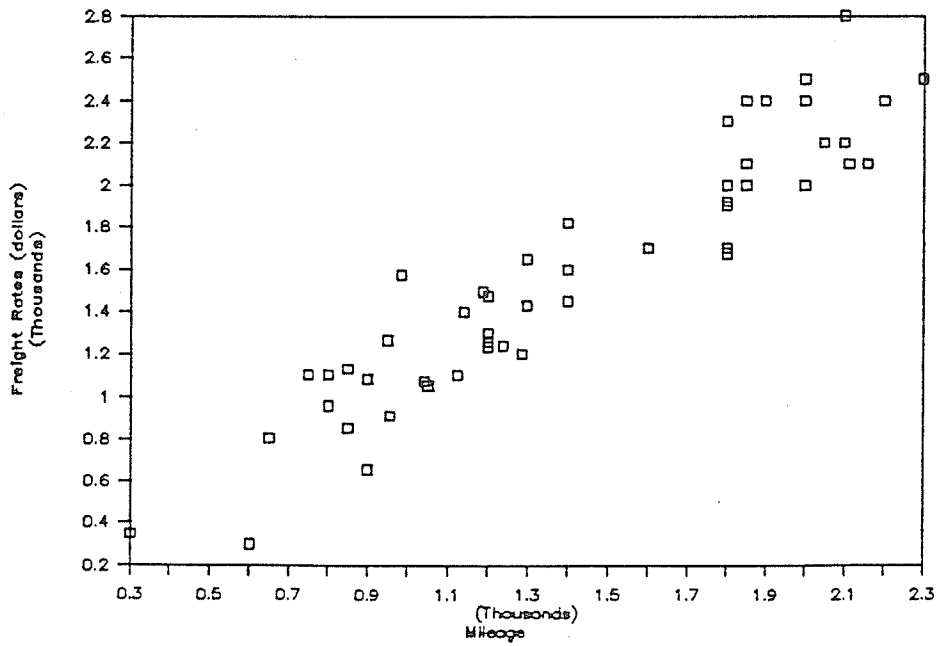
Based on an analysis of U.S. domestic and transborder freight rates, this thesis concludes that transport costs are not a barrier to U.S. exports of fresh fruit and vegetables to Canada for the Winnipeg-Minneapolis/Fargo traffic lane. Whether this conclusion can be generalized to all of Canada is uncertain. The subsequent regression analysis of freight rates indicates that regional differences within Canada and the United States are likely greater than transborder "city pairs."

7.2   FREIGHT RATE ANALYSIS ON A REGIONAL BASIS

An examination of freight rates, mileage figures, average per-mile costs and driver residency indicates some major regional differences. Table 28 contains the data for the major Canadian cities surveyed.

Table 28

Freight Rate and Residency Data by Location

	n	Av. Rate	Av. Miles	Av. Cost Per Mile	...percent... Canadian Driver
Edmonton	11	2500 (648)	1868 (381)	1.33 (.26)	60
Calgary	7	2054 (702)	1528 (539)	1.35 (.16)	53
Winnipeg	43	2252 (436)	1977 (370)	1.14 (.16)	22
Toronto	39	2343 (518)	2282 (597)	1.07 (.21)	9
Montreal	17	2634 (619)	2514 (609)	1.05 (.06)	3

* Standard deviations in parentheses.

With respect to regional differences, Table 27 draws attention to the following observations:

1. the percentage of Canadian drivers decreases from west to east;
2. average per-mile freight rates also decrease from west to east;
3. average distance generally increases from west to east, with the exception of Edmonton; and,
4. there are enough observations at each location, with the exception of Edmonton and Calgary, to examine "city" rates individually.

For the purposes of regression analysis, Edmonton and Calgary are combined to the "West" and Toronto and Montreal are combined to be the "East".

7.2.1   The Purpose of Regression Analysis

The previous section examined freight rates for the Winnipeg-Minneapolis/Fargo traffic lane and concluded that transborder freight rates for U.S. fruit and vegetables exported to Canada were not significantly different from U.S. domestic rates. The thesis hypothesis was, therefore, tested and the conclusion was drawn that, for this specific traffic lane, transport costs do not represent a barrier to U.S. exports of fresh fruit and vegetables to Canada.

As a further test of the hypothesis, regression analysis is used to examine regional and national survey data on freight rates, distance travelled, backhaul availability, regional differences, payload value, and weight of the payload. In this instance, regression analysis is used to derive parameter estimates for the components of freight rates for fruit and vegetables transported to Canadian and U.S. cities. The regression analysis suggests whether or not the research hypothesis can be extended to the national and regional level.

The regression analysis incorporates the following explanatory variables: regional surveyed[52]; distance

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Data for Western Canada do not include Winnipeg, which is used as a comparison point.

travelled; backhaul availabiliy; payload value; and weight of the payload. These exogenous, or explanatory variables, are regressed against the endogenous, or dependent variable, freight rate.

The Model

Freight rate = f(regional difference, distance travelled, backhaul availability, payload value, and weight of the load).

Dummy variables are used to represent regional differences, and backhaul availability. WEST represents western Canada (excluding Winnipeg), EAST represents eastern Canada (Toronto and Montreal), and SOUTH represents rates for Fargo and Minneapolis. A dummy variable is also included to represent whether the driver had a confirmed "backhaul" load. The weight of the load is expressed in pounds, while the payload value, estimated with Statistics Canada data, is expressed on a per pound basis.

Expected Parameters Signs

INTERCEPT
-   (+) the sign for the intercept, which contains Winnipeg freight rates, is expected to be positive because it represents the fixed components of the freight charge (e.g. loading costs).

EAST -   (-) freight rates in eastern Canada, where there is a higher traffic density, are likely to be lower than those in Winnipeg.

WEST –   (+) freight rates in western Canada are expected to be higher than those for Winnipeg, which has less potential for costly deadhaul.

SOUTH–   (–/+) there should be no difference between SOUTH and the INTERCEPT, which contains Winnipeg rates.

MILE –   (+) a positive correlation should exist between mileage and freight rates to coincide with variable costs of operations.

BACK –   (–) confirmed backhaul at time of unloading should be associated with a lower freight rate because rates are influenced by the profitability of the round trip.

VALUE–   (+) freight rates may reflect value of the payload, i.e., shippers of higher valued commodities are likely to bid up transport prices.

WT   –   (+) there should be a positive correlation between weight of the payload and associated freight rate even though domestic U.S. and transborder movements of fresh fruit and vegetables are generally recognized as truckload.

7.2.1   Regression Results

The regression results are presented in Table 29.[53]

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The detailed computer ouput is found in the Appendix.

Table 29

REGRESSSION RESULTS

n	185	
R-square[54]	.7897	
Adj R-sq	.7814	
INTERCEPT	59.6	
(std.dev)	(225.4)	
EAST	-186.6	**
(std.dev)	(68.3)	
WEST	303.8	**
(Std.dev)	(70.8)	
SOUTH	-139.1	**
(std.dev)	(70.9)	
MILE	.920	**
(std.dev)	(.047)	
BACK	-75.3	
(std.dev)	(53.6)	
VALUE	20.0	
	(114.6)	
WT	.010	**
(std.dev)	(.005)	

** Statistically significant at the 95% level of confidence.

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[54] With the addition of a regressor, R-squared never decreases because the total sum of squares (SST) is the same and the addition will not reduce the deviations of Y explained by the original regressors. With adjusted R-squared, the addition of a regressor can decrease its value.

7.2.2   Testing Statistical Acceptability

The model is tested for statistical acceptability. Since the computed value of F is higher than the "critical value" in the table of F-values, the overall fit of the equation is declared to be statistically acceptable.

7.2.3   Testing for Heteroskedasticity

Heteroskedasticity is a non-constant variance in the error term over n observations and this problem is particularly endemic to cross-sectional models. The result of heteroskedasticity is unbiased, but inefficient, estimates of the parameters.

Goldfeld and Quandt Test

Two sub-samples are derived arbitrarily from the original sample, separate regressions are fitted to each sub-sample, and the sum of squared residuals are obtained for the two sub-samples. Since the computed F-value is less than the "critical value", the regression is homoskedastic. The computer output, which contains the test for heteroskedasticity, is found in the Appendix.

7.2.4   Testing for Multicollinearity

Multicollinearity suggests a linear (or non-linear) relationship among the explanatory variables and can impair the accuracy and stability of the parameter estimates. The Pearson correlation coefficients, which are derived by SAS and presented in Table 30, are compared with "critical values" for the significance of Pearson correlation coefficients.[55]

Table 30

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 185

	RATE	MILE	VALU	BACK	WEST	SOUTH	WT	EAST
RATE	1.00000	0.84325	0.00804	-0.11403	0.13802	-0.49883	0.16850	0.28402
	0.0000	0.0001	0.9135	0.1222	0.0610	0.0001	0.0219	0.0001
MILE	0.84325	1.00000	0.03489	-0.16412	-0.13159	-0.47038	0.09030	0.48833
	0.0001	0.0000	0.6373	0.0256	0.0742	0.0001	0.2215	0.0001
VALU	0.00804	0.03489	1.00000	-0.08305	-0.04155	0.09388	-0.08018	0.07507
	0.9135	0.6373	0.0000	0.2611	0.5744	0.2037	0.2779	0.3099
BACK	-0.11403	-0.16412	-0.08305	1.00000	0.15835	-0.00302	0.04765	-0.36984
	0.1222	0.0256	0.2611	0.0000	0.0313	0.9675	0.5195	0.0001
WEST	0.13802	-0.13159	-0.04155	0.15835	1.00000	-0.29800	0.06010	-0.32234
	0.0610	0.0742	0.5744	0.0313	0.0000	0.0001	0.4164	0.0001
SOUTH	-0.49883	-0.47038	0.09388	-0.00302	-0.29800	1.00000	0.09162	-0.41169
	0.0001	0.0001	0.2037	0.9675	0.0001	0.0000	0.2149	0.0001
WT	0.16850	0.09030	-0.08018	0.04765	0.06010	0.09162	1.00000	-0.10535
	0.0219	0.2215	0.2779	0.5195	0.4164	0.2149	0.0000	0.1535
EAST	0.28402	0.48833	0.07507	-0.36984	-0.32234	-0.41169	-0.10535	1.00000
	0.0001	0.0001	0.3099	0.0001	0.0001	0.0001	0.1535	0.0000

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[55] Koutsoyiannis, A., Theory of Econometrics, pp. 432.

Multicollinearity has not affected the accuracy and stability of the parameter estimates.

7.2.5   Analysis of Regression Results

This single equation regression method, with an adjusted R^2 value of .78, effectively tests the rate structure of fruit and vegetable truckers. Five explanatory variables, distance travelled, region (South, East and West), and weight of the payload, are found to be significant at the 5% level of significance. The parameter estimates for backhaul and value of the load are not statistically significant.

There is a strong correlation between the distance of the haul and freight rate. Rates increase $.92 U.S. for every additional mile travelled. The average per mile freight rates for Winnipeg, and Minneapolis and Fargo of $1.14 and $1.12, respectively. The average per mile figures for Toronto and Montreal are $1.07 and $1.05, respectively. These results are consistent with previous findings.[56] Newkirk and Casavant estimated total per mile costs to be $.973 per mile, which

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[56] Jonathan Newkirk and Kenneth Casavant, "An Evaluation of Motor Carrier Performance in Moving Washington Fresh Fruits and Vegetables", **Transport Research Forum**, 1987, pp. 179-186.

were determined by adding short run fixed costs ($.435) to the variable costs ($.538) per mile.

Although movements of fresh fruit and vegetables are categorized as truckload, there is a significant correlation between weight of the load and the associated freight rate.[57] Regression results suggest that freight rates increase one cent per pound of payload and this is consistent with what one would suspect in terms of additional loading and unloading time, increased fuel costs, and extra wear and tear on the transport unit.

Freight rates in eastern Canada are significantly lower than those Winnipeg. Rates increase as we move westward and freight rates in western Canada are significantly higher from those in Winnipeg. This upward trend in freight rates for western Canadian cities is likely attributed to lack of backhaul loads, cabotage restrictions, and the fact that Canadian and U.S. drivers face a shortage of higher valued backhaul commodities.

Improved backhaul opportunities often reduce fronthaul freight rates and the regression yields the correct sign for the parameter estimate, however, the coefficient is not significant at the 95% level of confidence. Similarly, the coefficient for value of the load has the expected sign, but it is not significant at the 95% level of confidence.

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[57] In Canada, any load over 10,000 pounds is considered truckload.

The results of regression analysis are consistent with previous freight analysis of the Winnipeg-Minneapolis/Fargo traffic lane, which refuted the thesis hypothesis that transport costs are a barrier to U.S. exports of fresh fruit and vegetables to Canada. Although the parameter estimate for SOUTH (Minneapolis and Fargo freight rates) is statistically significant at the 95% level of confidence, the magnitude of the parameter estimate (-139.1) does not represent a non-tariff barrier to trade when compared to the average Winnipeg freight rate of $2252. These findings, however, cannot be extended to the rest of Canada and more research is necessary.

Comparisons of transborder and domestic freight rates and regression results in this thesis are not consistent with findings from an earlier study by Prentice and Hildebrand, who found that transborder freight costs for agricultural products were significantly higher than domestic movements of similar distance. This inconsistency may be attributed to the differing scopes of the two studies. Prentice and Hildebrand looked at the transport of agricultural products by several truck types, while this research focuses on fresh fruit and vegetables transported by refrigerated truck.

Chapter 8

SUMMARY AND CONCLUSIONS

8.0   <u>INTRODUCTION</u>

Canada-U.S. trade in refrigerated food products has increased steadily over the last three decades. In addition to increasing incomes and changing consumer tastes, this increase in trade has been facilitated by the technological improvements in trucking equipment allowing perishable food items to move large distances in a relatively short time. The improved highway infrastructure, in Canada and the U.S., has also contributed to attaining the current levels of Canada-U.S. trade in refrigerated food products.

In an effort to encourage specialization and to take advantage of economies of scale, Canada and the U.S. signed the Canada-U.S. Trade Agreement, which eliminates agricultural tariffs within ten years. Consistent with the thrust of CUSTA, the Harmonized System for customs coding and the Canadian MVTA (1987) have been introduced to streamline border crossings and promote a freer trade in transport services.

This thesis has examined transport costs for U.S. exports of fresh fruit and vegetables to Canada to determine whether the costs of transborder shipments are an impediment to trade.

This research is particularly important in light of the recent Canadian regulatory changes in transport, the gradual elimination of tariff barriers, and an effort by both countries to reduce border crossing times.

8.1   SUMMARY AND PRINCIPAL FINDINGS

Food products, which require costly temperature-controlled environment, are more sensitive to freight costs than most manufactured products traded between Canada and the United States.   In Chapter 1 the problem of freight rate sensitivity of refrigerated food products was identified, and the following hypothesis was proposed: freight rates for U.S. exports of fresh fruit and vegetables to Canada are significantly higher than rates for similar movements within the United States.   The overall objective of the study was to assess the transport related barriers that exist in the aftermath of the Motor Vehicle Transport Act of 1987.   The specific objectives of the study were as follows:

1.   to examine the number of U.S. carriers applying for new operating authorities to carry refrigerated food products in the individual provinces;

2.   to obtain drivers' perceptions of the revised regulatory system and to gauge drivers' perceptions of border crossing especially with respect to time required to pass through customs.

3.   to explore the freight rate structure for transborder shipments of refrigerated food products, and to determine if the potential for lower transborder freight rates exists as a result of the MVTA;

4.   to examine the effects of geographic factors, e.g.,
     whether the transport-related barriers to Canada-
     U.S. agricultural trade in western Canada are
     different from those in eastern Canada.

A description of Canada-U.S. trade in refrigerated food

products is presented in Chapter 2 followed by an in-depth

look at the refrigerated trucking industry in Chapter 3. The

literature review in Chapter 4 contains an introduction to

Canada-U.S. trucking and trucking studies by Clayton and Sem,

Prentice and Hildebrand, and Beilock et al.

The research method and data collection procedure are

described in Chapter 5.   The limitations of the research

project are identified and the questionnaire is described

briefly.

Chapter 6 contains results and analysis of the Canadian

and U.S. trucking surveys, interviews with Manitoba users of

transport services, and contact with the provincial transport

boards. The trucking surveys yielded important information

on freight rates, distances travelled, information on backhaul

opportunities, time required to cross the Canada-U.S. border,

and drivers' perceptions of Canadian transport deregulation.

Provincial motor transport boards were contacted to

determine Canadian and U.S. truckers' response to MVTA 1987

in terms of new applications for operating authority. In

addition, Transport Canada data on applications for operating

authorities by Canadian and U.S. drivers provide some

indication of the effects of the MVTA during the five-year transition period.

A freight rate analysis of the survey results is presented in Chapter 7. The trucking survey provided data on freight rates that were used to compare Winnipeg rates to those in Minneapolis and Fargo. As a further test of the research hypothesis, a linear regression model was specified and used to derive parameter estimates for the components of freight rates for fresh fruit and vegetables shipped to Canadian and U.S. cities.

8.2   CONCLUSIONS

The results of this thesis do not suggest that full implementation of the MVTA 1987 will lead to lower freight rates for exports of fresh fruit and vegetables to Canada from the United States. There is likely to be a change in the mix of carriers serving this transborder traffic as more Canadian carriers apply for and obtain Canadian operating authorities to haul higher-valued non-exempt commodities such as meat and fish to the United States. Reductions in freight rates, to the extent that some may occur, would be the result of improved coordination of fronthauls and backhauls.

Transport costs for U.S. exports of fresh fruit and vegetables to Canada appear to be no higher than the costs for shipping these products equivalent distances within the United

States.   This conclusion is based a comparison of average freight rates on a per mile basis for the Winnipeg-Minnneapolis/Fargo traffic lane.   Given the lack of statistical difference in mean values for domestic and transborder rates on this traffic lane, there is no evidence that U.S. exports of fresh fruit and vegetables experience any disguised non-tariff barrier in the form of freight rates.

Southbound border crossings times are significantly shorter than northbound. Many U.S. drivers, who represent 72 percent of drivers delivering fresh fruit and vegetables to Canada, return to the U.S. with empty trailers and simply drive right through. Except for isolated cases of drivers with criminal records, drivers refusing to leave their firearms behind, and drivers who simply don't like crossing into Canada, northbound border crossings do not appear to take an inordinate amount of time.

Because Canada relies heavily on imports of U.S. fruit and vegetables, there is little need to protect domestic horticulture producers except during the short production season, and this explains the virtual non-existence of non-tariff barriers.   Research needs to determine the role of backhaul rates in Canada-U.S. trade in refrigerated food products.

8.2.1   Study Limitations

Many carriers delivering fresh fruit and vegetables operate in transborder and domestic U.S. markets. It is possible that overhead costs of transborder operations could be cross-subsidized by their domestic operations. Hence the test for non-tariff barriers used in this thesis is not definitive because trucking firms could adjust to the impact of regulations through their profit margins.

Freight rate tapering also weakens the strength of this test for non-tariff barriers. Rate tapering occurs when fixed costs of trucking operations are spread over an increasing number of miles travelled. This decrease in freight rates, as distance increases, may be gradual. Furthermore, rate tapering may occur at any point on the average cost curve, i.e., not only on shorter distances, but possibly for longer distances, and distances in between the two. The lack of difference between Winnipeg and Minneapolis/Fargo rates could be influenced by the four to eight hours of extra driving required to get to Canada.

Regression analysis appears to contradict the earlier comparison of freight rates for the Winnipeg-Minneapolis/Fargo traffic lane. The parameter estimate for U.S. rates, as compared to Winnipeg rates, is statistically significant at a 95 percent level of confidence. The regression analysis suggests that U.S. freight rates in Fargo and Minneapolis are

approximately $140 less than those in Winnipeg. Because the average freight rate for Winnipeg is $2252, U.S. rates are only six percent less and, therefore, tend to support the earlier analysis of the Winnipeg-Minneapolis/Fargo traffic lane.

Based on regression analysis, there are regional differences in refrigerated freight rates to Canadian cities. The rates registered in western Canada are significantly higher that those in Winnipeg, which in turn are significantly higher than those in eastern Canada. These regional differences are likely attributed to decreased backhaul opportunities, cabotage restrictions, and the potential for deadhaul miles as we move from east to west. There is a higher proportion of U.S. drivers in eastern Canada - the increased competition may explain lower rates, or the U.S. drivers may be attracted to these cities because of backhaul opportunities immediately south of the border. High population density and economic activity likely result in increased competition in transport services, which results in lower freight rates.

8.3 FUTURE PROSPECTS FOR THE REFRIGERATED FOOD INDUSTRY

The MVTA 1987 may lead to increased competition and freight rate reductions for some Canadian exports of

refrigerated food products to the United States, but these reductions would depend on the following:

1. trucking firms', especially those from the U.S., willingness to pursue new clients and the required operating authorities;

2. federal and provincial governments' willingness to promote the MVTA 1987;

3. the amount of time provincial motor transport boards take to implement Canadian transport deregulation; and,

4. whether Canadian shippers of refrigerated food products accept the services of new entrants into the market and the lower freight rates resulting from increased competition.

8.4   SUGGESTIONS FOR FURTHER RESEARCH

There is a strong need for the National Transportation Agency to continue monitoring the effects of the MVTA 1987 as it passes through its five year phase-in period. Researchers should continue gathering data on freight rates on a year-round basis in order to capture the seasonal aspects of freight rates.

As a further test of the research hypothesis, freight rates for fruit and vegetables shipped to other U.S. border cities should be gathered. It would be useful to compare rates between Vancouver and Seattle, Toronto and Detroit/Buffalo, and Calgary and Great Falls, Montana to see if the difference in rates is statistically significant.

The results obtained from this study are not necessarily applicable to different truck types and commodities currently traded between Canada and the U.S. - hopper bottom trucks and dry vans are such examples. An examination of different truck types has indicated that transport costs for transborder shipments of agricultural products are significantly higher than those for domestic movements of approximately the same distance.[58] Research should be expanded to other agricultural commodities, which often require specialized transport equipment.

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[58] B.E. Prentice and Marvin D. Hildebrand, "Transportation Barriers to Canada-U.S. Trade of Agricultural Products", Research Paper, University of Manitoba Transport Institute, July, 1987.

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Appendices

Appendix 1

Sources and Destinations for Fresh
Fruits and Vegetables

Canadian Destinations for U.S. Fruit and Vegetable 1987 Exports ('000 pounds)

	Hal	St.J	Ott	QueCt	Toron	Regin	Sask	Mont	Wpg	Eda	Calg	Van
Arizona	1044	64	1964	1049	24898	13	476	12243	2076	1478	522	886
California	29235	4945	57211	14364	522368	28511	42260	177421	85074	138345	132423	306817
Delaware	0	0	725	8	2301	0	0	3830	0	0	0	0
Florida	22197	3608	34930	24461	231899	5106	7880	172979	15229	13566	9891	20951
Georgia	219	92	721	370	11644	0	0	5997	115	0	0	0
Idaho	553	0	846	134	2658	0	0	321	155	60	232	2729
Louisiana	42	0	0	0	0	0	14	17	117	0	32	0
Maine	221	197	0	0	0	6	0	0	294	66	154	40
Massachuse	1	14	114	0	458	30	37	478	100	170	83	0
Michigan	30	3	87	3	1328	21	6	1028	805	17	0	0
Minnesota	0	0	60	0	538	405	253	0	4324	124	124	0
New Jersey	2104	230	1200	2646	20373	0	11	19128	17	24	0	0
New Mexico	0	0	370	209	1753	0	0	4267	37	0	0	0
New York	357	63	236	155	576	95	137	1238	313	755	113	252
N. Carolin	993	130	2802	190	9565	0	31	5627	218	22	232	0
Ohio	48	35	28	33	325	0	484	5053	0	198	295	0
Oregon	468	53	470	175	5813	7	1405	2694	1499	1054	1505	5410
Pennsylvan	0	2	18	0	0	0	0	3139	0	0	0	0
S. Carolin	788	143	659	1504	7954	0	40	5214	40	0	0	0
Texas	1781	122	1210	849	29074	3493	3767	11498	13356	4750	4167	3510
Virginia	174	112	539	1961	4668	0	0	2885	24	0	11	0
Washington	872	338	7912	393	51837	3424	6615	5682	11433	19389	14688	59916
Wisconsin	72	2	498	0	4598	0	0	262	6	25	0	0
Total#	82211	15232	189733	76810	1366014	58511	88953	777180	195583	256185	229405	571702

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Appendix 2

List of Backhual Commodities
(Canada and U.S.)

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Apples	Meat (beef and pork)
Asbestos	Mineral water
Batteries	Muffins
Bird seed	Mustard seed
Building felt	navy beans
Car parts	Noodles
Cardboard	Paper
Carrots	Pastry
Chain	Peat moss
Charcoal	Pickles
Cheese	Plastic
Chemicals	Plastic film
Clocks	Plastic jugs
Cosmetics	Popcorn
Cowhide	Potatoes
Dairy products	Powdered milk
Doors	Powdered resin
Drilling mud	Rice
Egg cartons	Rubber hose
Fish	Seed beans
Floor tiles	Seed potatoes
Flour	Steel
Flowers	Styrofoam
French fries	Sugar
Furniture	Sunflower seeds
Grain	Tortilla chips
Hash browns	Turkey
Honey	Vacuum cleaners
Horse Meat	Vinyl flooring
Insulation	Whiskey
Lumber	Wood pulp
Machine parts	Zucchini

Appendix 3

Winnipeg-Minneapolis/Fargo Freight Rates

WINNIPEG RATES

===

Rate	Mileage	Rate/Mile (dollars)
2800	2200	1.273
2000*	2100*	.952
1800*	1800*	1.000
2970	2200	1.350
2400*	2100*	1.143
2820	2350	1.200
1800*	1800*	1.000
2200*	1900*	1.158
2000*	2000*	1.000
2700	2450	1.102
1900*	1800*	1.056
3000	2500	1.200
1700*	1700*	1.000
2500*	2100*	1.190
2600	2200	1.182
2500*	2000*	1.250
1800*	1800*	1.000
1900	2300	.826
1900*	1600*	1.188
2200*	1800*	1.222
2710	2000	1.355
2300	2200	1.045
2200*	1600*	1.375
2650	2200	1.205
2500*	1800*	1.125
1250*	1600*	.781
0715	0550	1.300
2200	2200	1.000
2500*	2000*	1.250
2500	3100	.806
2300	2106	1.095
2600	2200	1.182
2200	2250	.978
2200	2160	1.019
1800*	1600*	1.130
2300	2200	1.045
2500*	1975*	1.266
2079*	1450*	1.434
2500*	1800*	1.125
2184*	1800*	1.213
2604*	1734*	1.500
2184*	1800*	1.213
2400*	2100*	1.143
----	----	-----
2253	1977	1.141
2158*	1833*	1.164*

MINNEAPOLIS AND FARGO RATES (COMBINED)

==

	Rate	Mileage	Rate/Mile(dollars)
1	1100	800	1.375
2	2800*	2100*	1.333
3	1600*	1400*	1.143
4	1450*	1400*	1.036
5	1650*	1300*	1.270
6	1820*	1400*	1.300
7	345	300	1.150
8	1430*	1300*	1.100
9	1575	984	1.601
10	1265	950	1.332
11	0650	900	.722
12	1700*	1600*	1.063
13	2500	2300	1.087
14	2400*	1850*	1.300
15	1236*	1200*	1.030
16	1260*	1200*	1.050
17	2400*	2000*	1.200
18	2400*	2000*	1.200
19	1128	850	1.327
20	1300*	1200*	1.083
21	1100*	1125*	.978
22	1240*	1240*	1.000
23	1700*	1800*	.944
24	2100	2158	.973
25	2200*	2050*	1.073
26	2200*	2100*	1.048
27	1100	750	1.467
28	850	850	1.000
29	2500*	2000*	1.250
30	1080	900	1.200
31	2000*	2000*	1.000
32	1073*	1042*	1.030
33	956	800	1.195
34	300	600	.500
35	1475*	1200*	1.299
36	1400*	1141*	1.227
37	2400	2200	1.090
38	2100	2111	.995
39	2400*	1900*	1.263
40	1920*	1800*	1.067
41	1050*	1050*	1.000
42	1900*	1800*	1.056
43	2000*	1800*	1.111

MINNEAPOLIS AND FARGO RATES (COMBINED)

	Rate	Mileage	Rate/Mile(dollars)
44	2000*	1800*	1.111
45	2000*	1850*	1.081
46	2100*	1850*	1.135
47	2300*	1800*	1.278
48	800	650	1.231
49	908	957	.950
50	1200*	1288*	.932
51	1495*	1188*	1.260
52	1200*	1288*	.930
	----	----	-----
	1606	1435	1.119
	1782*	1588*	1.122*

FARGO RATES

	Rate	Mileage	Rate/Mile(dollars)
1	2800	2100	1.333
2	1600	1400	1.143
3	1450	1400	1.036
4	1650	1300	1.270
5	1820	1400	1.300
6	1430	1300	1.100
7	1100	800	1.375
8	345	300	1.150
9	1575	984	1.601
10	1265	950	1.332
11	800	650	1.231
12	1920	1800	1.067
13	1050	1050	1.000
14	1900	1800	1.056
15	2000	1800	1.111
16	2000	1800	1.111
17	2000	1850	1.081
18	2100	1850	1.135
19	2300	1800	1.278
	----	----	------
	1637	1386	1.181

MINNEAPOLIS RATES

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	Rate	Mileage	Rate/Mile(dollars)
1	2400	2000	1.200
2	1700	1600	1.063
3	2400	1850	1.300
4	1236	1200	1.030
5	1200	1288	.932
6	1495	1188	1.260
7	1674	1800	.930
8	1260	1200	1.050
9	2400	2000	1.200
10	1300	1200	1.083
11	1000	1125	.978
12	1240	1240	1.000
13	1700	1800	.944
14	2200	2050	1.073
15	2200	2100	1.048
16	2500	2000	1.250
17	2000	2000	1.000
18	1073	1042	1.030
19	1475	1200	1.299
20	1400	1141	1.227
21	2400	1900	1.263
22	908	957	.950
23	650	900	.722
24	2500	2300	1.087
25	2100	2111	.995
26	1128	850	1.327
27	2100	2158	.973
28	1100	750	1.467
29	850	850	1.000
30	1080	900	1.200
31	956	800	1.195
32	300	600	.500
33	2400	2200	1.090
	----	----	-----
	1609	1476	1.087

Appendix 4

Transport Canada MVTA Entry Statistics

MVTA ENTRY STATISTICS

Protests and Safety Ratings

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Province	Number of Applications Protested	Protests Withdrawn	Hearings Ordered	Safety Ratings
Nfld.	7	5	2	11C
N.S.	68	0	1	11C
P.E.I.	0	0	0	5C
N.B.	84	69	11	21C
P.Q.	175	9	3	N/A
Ont.[1]	311	N/A	2	154C;2U[3]
Man.	124	N/A	135[2]	2C[3]
Sask.	30-40	-	10[4]	-
Alta.	192	61	69	-
B.C.	-	-	-	N/A

Safety Ratings: C-Conditional
                          U-Unsatisfactory

[1] Figures are for processed applications only.
[2] Hearings on sections of applications; hence number greater than that of applications posted.
[3] Sept.1-Dec.31 period only.
[4] 5 PC&N hearings reported.

Appendix 4

MVTA ENTRY STATISTICS

Disposition of Applications I

==

Province	Licenses Granted Unopposed	Opposed	Partial	Sub-total
Nfld.	–	–	–	–
N.S.	183	67	0	250
P.E.I.	63	0	0	63
N.B.	107	11	56	174
P.Q.	5970	186	14	670
Ont.	166	214	97	477
Man.	183	9	1	191
Sask.	226	339	0	565
Alta.	557	76	63	693
B.C.	–	–	319	–

Disposition of Applications II

Province	Licenses Withdrawn	Licenses Denied	Total Processed	Licenses Pending
Nfld.	–	0	–	–
N.S.	1	1	252	21
P.E.I.	0	0	63	9
N.B.	4	3	181	7
P.Q.	245	552	7048	421
Ont.	10	2	489	2061
Man.	0	1	192	119
Sask.	38	22	605	83
Alta.	3	0	696	–
B.C.	5	1	–	–

Appendix 4

MVTA ENTRY STATISTICS

Hearings

Province	Number Held	Applications Granted	Applications Denied
Nfld.	1	1	0
N.S.	1	1	0
P.E.I.	0	0	0
N.B.	4	3	1
P.Q.	–	–	–
Ont.		-irrelevant-	
Man.	1	2	1
Sask.	6[1]	4[2]	2[3]
Alta.	7	7[4]	0
B.C.	–	–	–

[1] Includes 4 reported PC&N hearings.
[2] 2 after PC&N hearing.
[3] Both after PC&N hearing.
[4] 2 as amended.

Appendix 5

Estimated Values of Fruit and Vegetables

Appendix 5

Estimated Values of Fruit and Vegetables

==
...dollars...

Carrots	.47	Cucumbers	.49
Potatoes	.40	Tomatoes	.35
Onion	.53	Garlic	1.41
Sweet Corn	.97	Cauliflower	.81
Brussel Sprouts	.76	Cabbage	.58
Lettuce	.56	Peas	1.30
Asparagus	2.11	Celery	.49
Mushrooms	2.33	Peppers	1.00
Spinach	.66	Mixed Veg.	.74
Bananas	.50	Pineapple	.76
Avacados	1.44	Oranges	.59
Grapefruit	.61	Grapes	1.19
Melons	.67	Apples	.85
Pears	.92	Apricots	.95
Cherries	1.65	Peaches	.92
Plums	.93	Strawberries	1.25

source: Statistics Canada, Imports by Commodity #61-204.

Appendix 6

Trucking Surveys

(Canadian and U.S. Versions)

SURVEY QUESTIONNAIRE FOR REFRIGERATED TRUCK DRIVERS

1.   What is the base city for your operations?

2.   How would your classify your operation?

   a. Independent hauler

   b. Company driver

   c. Owner/operator leased to a trucking firm

   d. Other

3.   Driver name:

   Name of Company (or driver if independent hauler) :

   Address of Company :

   Phone number:

   Name of contact person :

4.   What load did you just bring in?

   Where was it picked up?

   What are the freight costs for the load you just brought in?

   What was the net weight?

   What distance did you travel on this trip (origin to destination)?

   What is the maximum payload for your rig?

5. Do you have a backhaul? YES___ NO___

   <u>What</u> is the load and <u>where</u> are you picking it up?

   What is the <u>destination</u> for the load?

   What is the <u>distance</u> for this trip?

   What is the freight rate?

   What is the net weight?

6. What other backhauls could you have?

   Destination:

   Freight rate:

   Distance:

   Which load do you prefer, and <u>why</u>?

7. Do you ever haul meat out of Canada? Yes___ No___

   Do you have authority to haul meat out of Canada?
      Yes___   No___   In what province(s)?

   Would you like to be able to haul meat?
   Yes___   Why?

   No___   Why not?

8. How long, on average, does it take from the time you arrive at the city to unload, until you are back on the road again?

   waiting time _____ hours   unloading time _____ hours

9. How much time can you afford to spend looking for a backhaul load? (Is there a critical date i.e. day of the week, by which you must return in order to be guaranteed a good load?)

If <u>no</u>, why not?

9. How much time does it take you, on average, to cross the border? (in hours)

Crossing into Canada _____

Crossing into U.S. _____

10. Do you use the services of a broker?   Yes___   No___

Name of broker(s):

Address:

Telephone no.:

How much do these brokers charge:

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SURVEY QUESTIONNAIRE FOR REFRIGERATED TRUCK DRIVERS

1. What is the base city for your operations?

2. How would your classify your operation?

    a. Independent hauler

    b. Company driver

    c. Owner/operator leased to a trucking firm

    d. Other

3. Driver name:

    Name of Company (or driver if independent hauler) :

    Address of Company :

    Phone number:

    Name of contact person :

4. What load did you just bring in?

    Where was it picked up?

    What are the freight costs for the load you just brought in?

    What was the net weight?

    What distance did you travel on this trip (origin to destination)?

    What is the maximum payload for your rig?

5. Do you have a backhaul?   YES___   NO___

   What is the load and where are you picking it up?

   What is the destination for the load?

   What is the distance for this trip?

   What is the freight rate?

   What is the net weight?

6. What other backhauls could you have?

   Destination:

   Freight rate:

   Distance:

   Which load do you prefer, and why?

7. Do you ever haul meat out of Manitoba?   Yes___   No___

   Do you have authority to haul meat out of Manitoba?
      Yes___   No___

   Would you like to be able to haul meat?
   Yes___   Why?

   No____   Why not?

8. Are you aware that under Canada's deregulation (1987 Motor Vehicle Transport Act) it is easier and cheaper to apply for additional operating authority?
   YES___   NO___

   If yes, have you applied for new authority?
   YES___   NO___

   Do you intend to apply?
   YES___   NO___

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10. Are you aware that under Canada's deregulation (1987 Motor Vehicle Transport Act) it is easier and cheaper to apply for additional operating authority?
YES___ NO___

If yes, have you applied for new authority?
YES___ NO___

Do you intend to apply?
YES___ NO___

If no, why not?

How much do you think it could cost you to obtain an authority?

11. How much time does it take you, on average, to cross the border? (in hours)
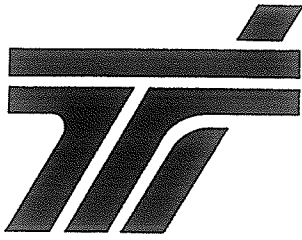
Crossing into Canada _____
Crossing into U.S. _____

12. Do you use the services of a broker? Yes___   No___

Name of broker(s):

Address:

Telephone no.:

How much do these brokers charge:

Appendix 7

Computer Output

OBS	RATE	MILE	VALU	BACK	WEST	SOUTH	WT	EAST
1	1100	800	0.74	0	0	1	43500	0
2	2800	2100	0.74	1	0	1	46000	0
3	1600	1400	0.85	1	0	1	48500	0
4	1450	1400	0.92	1	0	1	45000	0
5	1650	1300	0.74	1	0	1	44000	0
6	1820	1400	0.74	0	0	1	45000	0
7	345	300	0.87	0	0	1	30000	0
8	1430	1300	0.85	1	0	1	43560	0
9	1575	984	0.49	1	0	1	40000	0
10	1265	950	0.67	1	0	1	46000	0
11	650	900	0.74	0	0	1	35000	0
12	1700	1600	0.74	1	0	1	43000	0
13	2500	2300	0.74	0	0	1	43000	0
14	2400	1850	1.35	1	0	1	24000	0
15	1236	1200	0.50	1	0	1	44000	0
16	1260	1200	0.74	1	0	1	42275	0
17	2400	2000	0.67	1	0	1	45000	0
18	2400	2000	0.67	1	0	1	45500	0
19	1128	850	0.67	1	0	1	45100	0
20	1300	1200	0.50	1	0	1	42000	0
21	1100	1125	0.50	1	0	1	42000	0
22	1240	1240	0.50	0	0	1	44000	0
23	1700	1800	0.97	1	0	1	45000	0
24	2100	2158	1.19	0	0	1	45000	0
25	2200	1050	0.85	0	0	1	46000	0
26	2200	2100	0.67	1	0	1	44000	0
27	1100	750	0.81	1	0	1	44000	0
28	850	850	0.67	0	0	1	47000	0
29	2500	2000	0.74	0	0	1	46000	0
30	1060	900	0.67	0	0	1	48000	0
31	2000	2000	0.74	1	0	1	43000	0
32	1073	1042	0.67	1	0	1	45700	0
33	956	800	0.67	0	0	1	47800	0
34	300	600	0.74	1	0	1	13000	0
35	1475	1200	0.50	0	0	1	44000	0
36	1400	1141	0.50	1	0	1	42200	0
37	2400	2200	0.74	1	0	1	46000	0
38	2100	2111	0.92	0	0	1	44000	0
39	2400	1900	0.74	1	0	1	46000	0
40	2604	1734	0.53	1	0	0	45000	0
41	2500	1975	0.58	1	0	0	45000	0
42	2184	1800	0.50	1	0	0	41000	0
43	2000	1800	0.58	1	0	0	42800	0
44	2184	1800	0.50	1	0	0	41000	0
45	2600	2200	0.85	1	0	0	40000	0
46	1700	1300	0.74	0	0	0	48000	0
47	1000	600	0.85	1	0	0	35000	1
48	1000	550	1.19	0	0	0	38000	1
49	2720	1800	0.74	1	1	0	43000	0
50	2720	2400	0.85	0	1	0	38000	0
51	2720	1900	0.67	1	1	0	46000	0
52	3000	1850	0.49	1	1	0	40000	0
53	2635	1900	0.40	1	1	0	44000	0
54	672	790	0.74	1	1	0	45000	0
55	2975	1900	0.67	1	1	0	45000	0

OBS	RATE	MILE	VALU	BACK	WEST	SOUTH	WT	EAST
56	2200	1900	0.40	1	1	0	46200	0
57	2344	2170	0.93	1	1	0	48000	0
58	2310	2100	0.93	1	1	0	43000	0
59	828	650	0.74	1	1	0	30000	0
60	1200	850	0.85	1	1	0	43210	0
61	2635	1800	0.74	1	1	0	41000	0
62	2800	2200	0.85	1	0	0	46000	0
63	2300	2200	0.74	1	0	0	38000	0
64	2000	2100	0.50	1	0	0	43200	0
65	1800	1800	0.76	1	0	0	46000	0
66	2970	2200	0.74	1	0	0	40000	0
67	2400	2100	0.50	1	0	0	46000	0
68	2820	2350	0.50	1	0	0	43500	0
69	1800	1800	0.49	1	0	0	41000	0
70	2200	1900	0.59	1	0	0	40000	0
71	2000	2000	0.61	1	0	0	43200	0
72	2700	2450	0.74	1	0	0	47000	0
73	1900	1800	1.00	1	0	0	47000	0
74	3000	2500	0.59	1	0	0	45000	0
75	1700	1700	0.40	1	0	0	45000	0
76	2500	2100	0.59	0	0	0	46500	0
77	2600	2200	0.74	1	0	0	40000	0
78	2500	2000	0.74	1	0	0	42000	0
79	1800	1800	0.76	1	0	0	43000	0
80	1900	2300	0.74	1	0	0	46000	0
81	1900	1600	0.50	1	0	0	44800	0
82	2200	1800	0.50	1	0	0	44200	0
83	2710	2000	0.56	1	0	0	41500	0
84	2300	2200	1.00	1	0	0	43000	0
85	2200	1600	0.50	1	0	0	43000	0
86	2650	2200	0.56	1	0	0	38000	0
87	2500	1800	1.19	1	0	0	45500	0
88	1250	1600	0.74	1	0	0	43000	0
89	715	550	0.74	1	0	0	14000	0
90	2200	2200	0.61	1	0	0	37000	0
91	2500	2000	0.58	0	0	0	40000	0
92	2500	3100	0.74	1	0	0	36000	0
93	2300	2100	0.74	1	0	0	35000	0
94	2600	2200	0.74	1	0	0	45000	0
95	2200	2250	0.74	1	0	0	43000	0
96	2200	2160	0.50	1	0	0	42700	0
97	3200	1835	0.85	0	1	0	44000	0
98	3200	1835	0.81	0	1	0	44000	0
99	2350	1750	0.74	1	1	0	43500	0
100	2350	1650	0.74	1	1	0	45000	0
101	2350	2300	0.74	0	1	0	38000	0
102	3000	1896	0.59	1	1	0	45000	0
103	2300	1600	0.74	1	1	0	44000	0
104	2650	1800	0.81	1	1	0	43000	0
105	2700	2400	0.74	0	0	0	45630	1
106	2600	3000	0.85	0	0	0	44000	1
107	1700	1600	0.67	1	0	0	42166	1
108	3000	2900	0.81	0	0	0	45800	1
109	3000	2500	0.59	0	0	0	45000	1
110	2400	2700	0.74	0	0	0	44000	1

OBS	RATE	MILE	VALU	BACK	WEST	SOUTH	WT	EAST
111	2500	2200	0.74	0	0	0	45000	1
112	2300	2418	0.74	1	0	0	43000	1
113	1750	1675	2.11	1	0	0	45000	1
114	2250	2300	0.74	1	0	0	38000	1
115	2400	2300	0.81	0	0	0	35000	1
116	3038	2700	0.74	0	0	0	47700	1
117	2550	2800	0.81	1	0	0	45000	1
118	2000	1400	0.74	0	0	0	41000	1
119	1600	1450	0.74	1	0	0	44000	1
120	2400	2600	0.50	1	0	0	45000	1
121	2500	2400	0.81	1	0	0	43000	1
122	3038	2700	0.50	1	0	0	48000	1
123	2300	2500	0.49	0	0	0	40000	1
124	2400	3000	0.81	1	0	0	40000	1
125	2400	2300	0.85	1	0	0	42000	1
126	2300	1800	1.19	1	0	1	46000	0
127	800	650	0.74	1	0	1	47000	0
128	2100	1800	0.85	1	0	1	46000	0
129	2000	1800	0.51	1	0	1	45500	0
130	2000	1850	0.74	1	0	1	46000	0
131	2000	1850	0.59	1	0	1	45500	0
132	1900	1800	0.74	1	0	1	46400	0
133	1050	1050	0.85	1	0	1	45000	0
134	1920	1800	0.61	0	0	1	49000	0
135	2184	1800	0.85	1	1	0	45000	0
136	2604	1734	0.50	1	1	0	46400	0
137	2184	1800	0.74	1	1	0	41000	0
138	2079	1450	0.50	1	1	0	46500	0
139	2500	1975	0.74	1	1	0	45000	0
140	2500	1800	0.74	1	1	0	47500	0
141	2400	2000	0.50	1	1	0	45000	0
142	1200	1288	0.74	1	0	1	35500	0
143	1495	1188	0.74	1	0	1	42000	0
144	1674	1800	0.85	1	0	1	44000	0
145	2100	1600	0.92	1	1	0	40000	0
146	1615	1900	0.74	1	1	0	35000	0
147	1275	1500	0.49	1	1	0	45000	0
148	2300	1500	0.61	0	1	0	38000	0
149	2150	1400	0.59	1	1	0	44500	0
150	2300	1500	0.74	1	1	0	44000	0
151	2800	1700	0.58	1	1	0	44500	0
152	1455	1435	0.56	0	0	0	46000	1
153	2900	2900	0.74	1	0	0	45000	1
154	3400	2700	0.66	1	0	0	42000	1
155	2400	2850	0.85	0	0	0	44600	1
156	2500	2500	0.74	0	0	0	43000	1
157	2400	2523	0.74	0	0	0	45000	1
158	2700	2600	0.58	1	0	0	46000	1
159	1600	1550	0.67	1	0	0	45000	1
160	2500	2500	0.50	0	0	0	30000	1
161	2400	2550	0.85	1	0	0	43000	1
162	2500	2500	0.50	1	0	0	43000	1
163	1750	2100	0.49	1	0	0	38000	1
164	1600	1550	0.50	1	0	0	44000	1
165	2180	1500	0.85	1	0	0	35000	1

OBS	RATE	MILE	VALU	BACK	WEST	SOUTH	WT	EAST
166	2500	2673	0.74	1	0	0	45000	1
167	2700	2700	0.74	1	0	0	31000	1
168	2500	2300	0.49	0	0	0	42000	1
169	2000	1700	0.49	0	0	0	35000	1
170	3410	3100	0.61	1	0	0	41000	1
171	3000	2900	0.67	0	0	0	38000	1
172	1815	1650	0.58	0	0	0	40000	1
173	3100	2900	1.44	0	0	0	42000	1
174	3360	3200	0.74	0	0	0	42000	1
175	2900	2900	0.81	0	0	0	42000	1
176	2530	2300	0.56	0	0	0	40000	1
177	3000	2800	0.74	0	0	0	45000	1
178	3000	3000	1.00	0	0	0	40000	1
179	1300	1300	0.50	0	0	0	45000	1
180	1700	1800	0.50	1	0	0	45000	1
181	3000	2950	0.74	0	0	0	38000	1
182	2950	2950	0.74	0	0	0	35000	1
183	3100	3000	0.85	0	0	0	42000	1
184	2700	2588	0.76	0	0	0	31000	1
185	1920	1700	0.49	1	0	0	43000	1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	60508554.91	8644079.27	94.950	0.0001
ERROR	177	16113749.69	91038.13382		
C TOTAL	184	76622304.59			

ROOT MSE	301.7253	R-SQUARE	0.7897	
DEP MEAN	2140.405	ADJ R-SQ	0.7814	
C.V.	14.09664			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	60.59839040	225.37095	0.269	0.7883
MILE	1	0.92000046	0.04617219	19.925	0.0001
VALU	1	19.99922782	114.62083	0.174	0.8617
BACK	1	-75.28421006	53.63910342	-1.404	0.1622
WEST	1	303.75535	70.75889273	4.292	0.0001
SOUTH	1	-139.09262	70.86672270	-1.963	0.0512
WT	1	0.009864952	0.004613330	2.138	0.0339
EAST	1	-186.63488	68.33972425	-2.731	0.0070

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ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	16845877.33	2406553.90	39.612	0.0001
ERROR	85	5163957.60	60752.44232		
C TOTAL	92	22009834.92			

ROOT MSE	246.4801	R-SQUARE	0.7654	
DEP MEAN	1637.441	ADJ R-SQ	0.7461	
C.V.	15.05276			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	56.44433089	228.64489	0.247	0.8056
MILE	1	0.82495601	0.06628080	12.446	0.0001
VALU	1	-13.24906295	118.13168	-0.112	0.9110
BACK	1	-48.67718508	68.31165242	-0.713	0.4781
WEST	1	76.27546811	94.82822645	0.804	0.4234
SOUTH	1	-88.73955286	75.25905508	-1.179	0.2416
WT	1	0.01031703	0.004963786	2.078	0.0407
EAST	1	-9.58353051	83.66493803	-0.115	0.9091

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	7	1928130.81	275447.26	4.220	0.0005
ERROR	86	5613772.01	65276.41876		
C TOTAL	93	7541902.82			

ROOT MSE	255.4925	R-SQUARE	0.2557	
DEP MEAN	2641.415	ADJ R-SQ	0.1951	
C.V.	9.672562			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	1425.24136	399.85705	3.564	0.0006
MILE	1	0.45587369	0.11103013	4.106	0.0001
VALU	1	-94.95814862	161.19833	-0.589	0.5574
BACK	1	-70.93169775	63.53569407	-1.116	0.2674
WEST	1	159.32167	85.05337740	1.873	0.0544
SOUTH	1	-59.05189158	106.91436	-0.552	0.5822
WT	1	0.007087721	0.006572991	1.078	0.2839
EAST	1	-124.11491	92.71513932	-1.339	0.1842