THE GEOGRAPHY OF CANADA – UNITED STATES TRADE

by

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ABSTRACT

My dissertation is an empirical analysis of the geography of international trade that is primarily focused on the interregional trade flows within Canada and the United States, but begins with an analysis of international trade flows at the international level to place Canada – United States interregional trade in a global context. Throughout my dissertation empirical methods are not only employed, but extended and developed to address issues with past research.

At the international level, I find that globalization defined as an integrated global economy is not present. Rather, international trade flows are intensely regionally focused and the intensity of that focus has not decreased over time. In fact, distance and proximity have become more important in determining trading regions since 1981.

At the national level, I find that there was substantial change occurring within the Canada – United States trading relationship prior to the establishment of the Canada – United States Free Trade Agreement (CUFTA). Prior to the establishment of the CUFTA, Canada appeared to be moving into the lower-end of product quality trade relative to the United States. However, since the establishment of the CUFTA that pattern has reversed. Now, Canada appears to be moving into higher-end product quality trade with the United States. This is altering the spatial division of quality-based production in North America.

And at the regional level, Canada – United States interregional trade flows have altered their spatial configuration since the establishment of free trade. Prior to the establishment of the free trade agreements, the Canadian provinces were overwhelmingly focused on interprovincial trade. However, with the removal of trade barriers to the U.S. states, Canadian provinces are now trading significantly more with the southern neighbours. The levels of interprovincial trade remain high, but the shares of provincial trade to and from the United States are now increasing.

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DEDICATION

For my wife and son, Katrina and Matthew.

CHAPTER 1[1]

Introduction

1.1. INTRODUCTION

This dissertation examines the economic geographical effects of international trade flows between Canada and the United States over the past fifteen years. More specifically, the purpose is to investigate the sub-national (regional) effects of the establishment of free trade between Canada and the United States, 1989 – 2003. I will argue that only through a geographical approach can Canada's international trading relationship with the United States be properly understood.

Despite the sweeping nature of current international trading agreements, the trading relationship between Canada and the United States began modestly and pre-dates Canada's confederation in the 19th century. It only began to intensify from the 1960s forward. This intensification began formally in 1965 with a trading arrangement involving trade in automotive products (The Canada – United States Automotive Products Agreement of 1965, hereafter known as the Auto Pact). In 1988, the Canada – United States Free Trade Agreement (CUFTA) was signed, and five years later the North American Free Trade Agreement (NAFTA), essentially adding Mexico to CUFTA. These trading agreements all had provisions for reducing barriers to trade (both tariff and

[1] Portions of this chapter have been published in the following: Andresen, M.A. (2010). Geographies of international trade: theory, borders, and regions. *Geography Compass* 4(2): 94 - 105.

non-tariff barriers), increasing cross-border investment, and more recently, enhancing the temporary cross-border flow of skilled labour.

As a result of the Auto Pact, and reinforced by these later free trade agreements, Canada and the United States are each other's top international trading partner for both exports and imports, with automotive products trade dominating trade flows on both sides of the border. While it is true that the trading relationship between Canada and the United States occurs at a national level, the argument of this dissertation is that the national scale of analysis shrouds a more geographically differentiated (regional) nature. Canada, as well as the United States, has a geography of industrial production. And because of this geography of production, trading patterns of sub-national regions within each country differ (different sub-national regions trade different products and services), translating into a geography of trade. These two geographies led the Canada – United States' free trade agreements to have regionally differentiated consequences. Tariff and non-tariff barriers, for example, are lowered at the national level but do not impact equally for all sub-national regions within each country. Consequently, there are geographical differences implicitly embedded within free trade agreements. The purpose of my dissertation is to present a sub-national (regional) analysis of Canada – United States trade, 1989 – 2003. It is only at the sub-national scale, my dissertation argues, that the full impact of free trade agreements between Canada and the United States trade can be appropriately assessed.

1.2. WHY DOES INTERNATIONAL TRADE (AND ITS GEOGRAPHY) MATTER?

In 2004 total global merchandise exports were valued at over US$9.1 trillion, with more than half of that international trade flowing between developed countries (such as Canada and the United States), less than 15 percent between developing countries, with the remainder flowing between developed and developing countries (Helpman 1999; International Monetary Fund 2005a, 2005b). As shown in Figure 1.1, the average growth rate of international goods and services exports is more than twice the average growth rate of gross domestic product from 1985 to 2001. Additionally, services[2] occupy an increasing share of total output for most industrialized nations (particularly in North America and Europe) and have even a faster export growth than merchandise trade flows (Dicken 2003). Perhaps most important, international trade flows are positively associated with economic growth (Frankel and Romer 1999; Noguer and Siscurt 2005).[3] For these reasons international trade flows are central to national economies.

<See Figure 1.1, page 332>

The rapid growth in international trade flows is largely regarded a result of successive rounds of negotiations of the General Agreement on Tariffs and Trade (GATT, established in 1947), now known as the World Trade Organization (Helpman 1999). Central to the GATT was the principle of non-discrimination in trade relations among the GATT members, also known as the principle of multilateralism—that is

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[2] In the context of international trade, services include telecommunications, financial services, management, and advertising (Dicken 2003).

[3] There are, of course, potential downsides resulting from countries being too open, such as vulnerability to international market crises.

global free trade or the move toward it (Bhagwati 1999). Trading blocs or zones, usually placed in opposition to multilateralism (protectionism is truly the opposite of multilateralism), represent the move toward free trade within a limited set of countries in the world, but maintaining tariffs for all remaining countries not in the trading bloc.[4] However, trading blocs are better viewed as limited forms of free trade: a form of multilateralism that does not include the entire global economy.

Trading blocs are not all the same. We can recognize five general types, what is order of complexity they comprise: preferential trading agreements, free trade areas, customs unions, a common market, and an economic union—which includes a common currency for the region (OECD 1993). The first, preferential trading agreements, are a mild form of integration. They involve lower trade barriers to member countries, which may or may not include free trade for certain goods. Second, a free trade area, however, entails the elimination of barriers, tariff and non-tariff, to trade between member countries, with or without the requirement that there be a common barrier to all non-member countries. These agreements may include investment liberalization and harmonization of technical standards, but do not usually include the free movement of productive factors, particularly labour. Third, a customs union extends the free trade area so that all member countries agree to a common tariff scheme against non-member countries. Fourth, a common market extends a customs union to include the free mobility of factors. And finally, an economic union extends the common market to include the harmonization of economic policies among member countries, which may include a

[4] The Asia-Pacific Economic Cooperation (APEC) is another form of regionalism that relies upon non-binding commitments to facilitate economic growth, international trade, and investment (APEC 2006).

common currency (OECD 1993). One should not consider these categories as rigid however, but as points along a continuum that measures degrees of regional economic integration. In 1985, there were 26 supra-national Regional Trade Agreements (RTAs) in force in the global economy. As shown in Figure 1.2, that number rose to 189 by the end of 2003, with 100 of the RTAs established during the past seven years.[5]

<See Figure 1.2, page 333>

The thesis of this dissertation is that international trade flows in the global economy and the simultaneous rise of regional trade blocs demonstrate the importance of geography. Patterns of international trade flows are highly related to spatial proximity (contiguity) and distance (Frankel *et al.* 1995; Poon 1997). Such features are also found in RTAs. By definition, RTAs have a high degree of intra-RTA trade flows with some of the more well-known examples including the European Union, MERCOSUR (South America), the Association of Southeast Asian Nations (ASEAN) Free Trade Area, and with more relevance to this dissertation, first the Canada – United States Free Trade Agreement (CUFTA) and later the North American Free Trade Agreement (NAFTA). This high degree of intra-RTA trade flows heightens the economic importance of RTAs. Indeed, intra-RTA trade growth is typically higher than the average growth for international trade as a whole (Frankel 1997).

[5] Over 250 RTAs have been notified to the GATT/WTO as of December 2002. This number was expected to approach 300 by the end of 2005 (WTO 2006).

1.3. GEOGRAPHY AND TRADE

The relationship between RTAs and trade growth has spawned a plethora of research by both geographers and economists. Economists typically investigate the non-spatial determinants of intra-RTA trade flows asking what drives these trade flows (see Frankel 1997, 1998), whereas geographers typically investigate the geographical dimensions asking where that trade flows (see Dicken 2003, Michalak and Gibb 1997, and Poon et al. 2000). Curiously, most of the attention geographers have paid to international trade flows has been at the nation-to-nation scale (see Dicken 2003; Gaile and Grant 1989; Hanick 1987, 1988, 1989; Michalak and Gibb 1997; Nierop and De Vos 1988; and Poon et al. 2000), despite the fact that sub-national regional production systems are at the heart of economic geography (Walker 2000).[6] In this light, the geographer Tony Hoare (1993) notes that ``a little-explored facet of the global economy is the way regions within nations and different parts of the international community interact through trade flows. ... Given the well-established tendency for any one country to trade more with some overseas nations than with others we should expect at least as much and probably more trading-partner specialization on the part of that country's constituent localities'' (Hoare 1993: 701). However, even studies concerned with sub-national regions (see Bauer and Eberts 1990; Hoare 1985; Smith 1990) tend to examine trade flows of those regions with the ``rest of the world'' rather than with other sub-national regions (Hoare 1993: 702). In short, within the geographical trade literature, the sub-national region is a relatively unexplored research area.

An exception is the research of Erickson and Hayward (1991) that examines the destinations of United States' regional export flows. Through their recognition that the

[6] It should be noted that most international trade data is measured at the national level only.

United States is an ``economy organized over [a] large…geographical area…stretching from one side of the continent to the other, [and that] it is probable that substantial differences in export destination patterns do exist," their regional analysis of export flows shows that regional differences in trade patterns are strong (Erickson and Hayward 1991: 372).

<See Table 1.1, page 230>

As shown in Table 1.1, after aggregating the U.S. states into nine regions defined by the United States' Bureau of Economic Analysis, Erickson and Hayward (1991) find that spatial proximity to markets is a critical factor in determining the spatial pattern in export destinations: U.S. region to country international trade flows. For example, the United States' Western region (comprising Washington, Oregon, California, and Nevada) trades more than average with Asia, the Great Lakes region (comprising Wisconsin, Illinois, Indiana, Ohio, and Michigan) trades more than average with Canada, the New England region (comprising Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) trades more than average with Europe, and the Southwest region (comprising Arizona, New Mexico, Oklahoma, and Texas) trades more than average with Mexico (Central America). This geographical pattern should not be surprising given the force of proximity and distance. Erickson and Hayward's (1991) results, of course, pose the question: why is the nation the unit of analysis in most North American studies of international trade flows, and not the region?[7] Canada, too, undoubtedly has great

[7] They pose this question despite the fact that they only disaggregate the U.S. states and not their trading partners. This lack of disaggregation, however, is likely a limitation of their data.

variation in the destinations of its provincial exports, but it is most often treated as a single spatial unit of analysis.

More recently, economists have begun to pay attention to the sub-national regional scale when investigating international trade flows between Canada and the United States, particularly in the study of changes in international trade flows due to the NAFTA. Most of the research done on the effects of the NAFTA are conducted at the national level and conclude that the NAFTA has had an insignificant effect on the national aggregates of Canada – United States international trade flows. This conclusion is the result of a lack of significant differences between the CUFTA and the NAFTA (Cox and Harris 1992; Gould 1998; Krueger 2000). However, allowing the effect of the NAFTA to vary regionally, Wall (2003) finds that there is a strong geographical component to the effects of the NAFTA. Similarly, Coughlin and Wall (2003), by treating Canada is a single spatial unit, find geographical differentiation in the effect of the NAFTA on U.S. states. What seems to be happening is that a national scale of analysis washes out the regional effects of the Canada – United States free trade agreements, leading to false conclusions—positive and negative effects of the NAFTA that are present at the sub-national level are averaged out when the analysis is at the national scale. As a result, there is a compelling need for a comprehensive two-way sub-national study of the geography of Canada-United States trade flows in order to reveal the regional effects of trade agreements. For Canada – United States' international trade flows, the sub-national region is the place where change manifests itself and, hence, it is only at the sub-national (regional) scale that the full impact of free trade agreements between Canada and the United States trade can be appropriately assessed.

1.4. SPATIAL UNIT OF ANALYSIS: THE SUB-NATIONAL REGION

Since the early 1980s, there has been substantial interest in the role played by the sub-national region in the process of economic growth and development—the resurgence of regional economies (Storper 1997). The sub-national region has always been considered important, but increasingly it is seen as central to the economic performance of the nation as a whole. However, these dynamic sub-national regions are not omnipresent. They are found in particular places, and never permanent. There are several different literatures that discuss the importance of regional economies: economics, economic geography, and social-political policy. Each is discussed in turn.

Despite the recent focus on sub-national regions and international trade flows showing strong regional effects of trade policy, regional economies are an old idea in the study of international trade in economics, though seldom now discussed. Over 65 years ago, Bertil Ohlin stated that "[s]pace is important in economic life for two chief reasons: the factors of production are to some extent confined to certain localities and move only with difficulties; and costs of transport and other impediments prevent free movement of commodities" (Ohlin 1967: 5). Ohlin goes further to state that the region, the spatial unit of analysis in his trade theory, must be a congruent spatial unit such that any differences within the region must be smaller than the differences that exist between regions. In this context, the analysis of interregional trade is only "helpful in a study of trade between nations…[when those nations]…fulfill…the conditions established for regions" (Ohlin 1967: 49). In these cases, inter*national* trade is a specific, or special, case of inter*regional* trade. The important implication for my dissertation is that the nation is not the natural spatial unit of analysis for international trade flows, even at the abstract level used in the economic theory of international trade.

The second literature operates at a more concrete level of analysis that has its intellectual beginnings with the work of Alfred Marshall, a nineteenth century economist, who investigated concentrations of economic activity that were specialized in particular industries—industrial districts (Amin 2000). These districts typically contained many small and highly specialized firms in close proximity to one another, and were the centres of economic activities in their industries. The geographic proximity minimized transportation costs, provided access to specific forms of labour, produced a division of labour at the level of the firm, and what Marshall called spillover effects that are economic gains from close proximity and interactions with other firms. This work by Marshall, however, was done in the early part of the twentieth century, not attracting much attention until recently.

Marshall's work on industrial districts was revitalized though the work of Piore and Sabel (1984) on industrial restructuring in Italy. Amin (2000) indicates their work as the turning point, or catalyst, for the discussion of the resurgence of regional economies in academic research. Historically, industrialization resulted in intra-national spatial unevenness because of market structures and resource availability (Scott 1988; Scott 1998), and in turn producing marked regional differentiation (Walker 2000). The industrial restructuring that occurred during the 1970s and 1980s, the concern of Piore and Sabel (1984), was expressed spatially as "old" manufacturing regions losing their dynamic character in favour of "new" manufacturing regions. As a result, the regional geography of advanced capitalist countries changed, significantly. The new industrial regions, formerly peripheral (or non-existent) to the economy, currently function as the "new engines of the global economy" (Scott 1998: 22). The work of Scott (1988; 1998) further shows that as the resource needs of industry changes in the new global industrial economy, so do the places in which industry operates.

Building on the work of Piore and Sabel, Storper (1999; 2000) further argues that critical to understanding why the region has become central in dynamic capitalist economies are cultural factors, what he calls untraded interdependencies that generate regional-specific assets in production. As the technological aspects of production become increasingly complex, the ability to perform one aspect of production is predicated on knowing how to do another—technological spillovers. This knowledge, or know-how, is the essence of the interdependencies that exist both within and between firms. These interdependencies are largely intangible aspects of the production process—labour market operations, customs, understandings, and values—that makes them untraded and, therefore, regionally specific (Storper 1999). These untraded interdependencies are precisely why there have been difficulties transplanting technology into another region, only to have that technology fail or flounder (Gertler 1997).

Though this literature is confined to examining high technology sectors of the economy, its relevance to my dissertation is in highlighting the region-specific assets of production. The new industrial economy is not only located in particular places or regions that are different from the old industrial economy, but contains forces that continually reproduce the regional character of production and, therefore key for my dissertation, promote international trade flows. Regardless of the sector of the economy, it is regions not nations that trade.

The final relevant literature on the region comes from social-political policy, and is framed in terms of the decline of the nation state. The primary argument is that while the economic significance of the nation state has withered through the globalization process, sub-national regions such as the Third Italy, California's Orange County, and Route 128 have become critical for economic growth. This hypothesis is particularly associated with Kenichi Ohmae (1993, 1995), who defines regions as "natural economic zones…[that]…may or may not fall within the geographic limits of a particular nation" (Ohmae 1993: 78 – 79). Ohmae (1993: 78) has even gone as far to say that the nation is a "dysfunctional" spatial unit of analysis for human activities. He writes: ``[e]ach [nation] is a motley combination of territories with vastly different needs and vastly different abilities to contribute'' (Ohmae 1995: 12). Certainly, Canada and the United States are both defined by tremendous regional economic diversity. For Ohmae (1993) a sustainable region must be small enough to exhibit similarity in both its human and physical geographical spaces (a criterion not so different from Ohlin), but large enough to have the infrastructure to be able to participate in the global economy. By their very nature, regions are the centre of economic action within nations, are international in scope, and are not dependent on the nation state for the necessities of production (investment, industry, information, and individuals)—Ohmae's 4 "I's" of the global economy. The days of the nation state setting policy for regional economic development are no longer with us. Regions, through their own economic dynamism are the places that attract investment, industry, information, and individuals (Ohmae 1995). These regions possess the most dynamic trading relationships.[8]

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[8] Also relevant to the concepts outlined by Kenichi Ohmae is the cross-border trade region. Such regions,

In summary, the three literatures I have briefly reviewed each point in different ways to the centrality of the region to international trade. It is not nations as such that trade, but regions. My purpose in this dissertation is to take this insight and apply it to understanding the *geography* of international trade flows between Canada and the United States. The theory behind the importance of the sub-national region is not itself evaluated or extended, but that literature is used as a point of departure to show the importance of a sub-national approach to the study of international trade.

Additionally, the sub-national approach to the study of trade flows between Canada and the United States is an under-developed literature. The volume of literature investigating the effects of free trade agreements on Canada – United States international trade flows is quite large. However, these studies analyze trade at the national (Krueger 2000, Clausing 2001), industry (Trefler 2004), and product (Romalis 2005) levels. These are only four studies of trade flows between Canada and the United States, but are typical in the way this trading relationship is studied. This is despite the fact that each province within Canada has a different industrial mix and, therefore, tariff and non-tariff structure. Consequently, when these barriers to trade are reduced or eliminated through national policy, there are going to be differential effects across the economic landscape. Very little research analyzes the geographical aspects of Canada – United States international trade flows.

Coughlin and Wall (2003) and Wall (2003) investigate the geographical effects of the NAFTA, finding strong support for their respective geographical approaches. Polèse

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by definition, contain a national border. See Edgington (1995) and Wright (1999) for North American examples of the cross-border trade regions: Cascadia and the Mexican maquiladoras, respectively.

(2000) and Acharya et al. (2003) also take a geographical approach to Canada – United States international trade flows, but use aggregated sub-national regions rather than individual provinces and states. There are a few other geographical studies of Canada – United States international trade (see Brown 1998, Norcliffe 1996, and Brown and Anderson 1999), but they do not investigate this geography over time. Consequently, very few studies have investigated this phenomenon. Therefore, there are not only theoretical motivations for studying trade at the sub-national region, but motivations from a lack of relevant research in this area.

1.5. MY GENERAL RESEARCH QUESTIONS AND CHAPTER OUTLINES

Given the nature of my goal, the dissertation is overwhelmingly empirical involving a comprehensive sub-national numerical study of the geography of Canada – United States international trade flows. More specifically, my intent is to uncover the regional trading patterns between Canada and the United States to establish if these trading patterns have changed as a result of the CUFTA and/or the NAFTA.

Stemming from this general intent are four sub-questions, each of which raise different concerns: (1) How important is geography to international trade in general? (2) What is the current state of knowledge regarding the trading relationship between Canada and the United States? (3) What is the geography of trading patterns between Canada and the United States? And (4), how has the changing geography of Canada – United States international trade flows impacted the trading relationships within these two countries?

(1) *How important is geography for international trade in general*? The answer to this question is first undertaken at the international scale by placing Canada – United States international trading relationship within a global context (chapter 2). My point of departure in this chapter is to search for a geography of international trade that is distinct from that of the geography of production. If the geography of international trade is simply the mirror of the geography of production (the countries that produce the most trade the most) then the study of the geography of international trade is merely the study of the geography of production: international trade is governed by production, so the factors that produce the geography of production should be analyzed. Once the distinction between the geography of international trade and production is established, bilateral trading relationships are analyzed to uncover the importance of geographical relationships in establishing bilateral trade. Is international trade determined by economic and/or political factors, or is international trade more a result of geographical factors? If so, what are those factors?

(2) *What is the current state of knowledge regarding the trading relationship between Canada and the United States?* This second sub-question is dealt with in chapter 3, 4, and 5. The answer to this question is first undertaken as a review of the history of Canada – United States international trade flows, beginning before Canada's confederation and ending with the Canada – United States Free Trade Agreement and the North American Free Trade Agreement. The literature investigating the effects of these two recent free trade agreements is also reviewed to provide context for the changes from 1989 – 2003. Additionally, in order to compare with the regional results, a national level of analysis is carried out in chapter 4. International trade flows between Canada and the

United States are investigated at the industrial sector level to search for changing patterns at the national-industrial level. This analysis both complements and extends beyond research on the study of Canada – United State international trade flows, by analyzing international trade itself. Finally, chapter 5 resolves two outstanding issues contained within the literature on international trade between Canada and the United States: the border effect and the NAFTA effect.

(3) *What is the geography of trading patterns between Canada and the United States?* With the baseline study at the national level, and outstanding issues resolved, the analysis turns to the regional geography of Canada – United States international trade flows in chapter 6. Rather than using the nation as the spatial unit of analysis or the sub-national region composed of many Canadian provinces or U.S. states, this geographical analysis takes advantage of the most geographically disaggregated data available for Canada's international trade: international trade flows measured at the Canadian province and U.S. state levels of analysis. By undertaking this geographical approach, the varied effects of the free trade agreements are uncovered, revealing that not all provinces are experiencing the same effects from the free trade agreements. Additionally, through this geographical approach, I show that the factors behind the changing spatial distribution of international trade flows since the establishment of the free trade agreements are not restricted to changes contained within the free trade agreements themselves. Rather, changing spatial patterns are, in part, a result of industrial restructuring that pre-dates the negotiations of the free trade agreements.

(4) *How has the changing geography of Canada – United States international trade flows impacted the trading relationships within these two countries?* This last sub-

question is addressed in chapter 7 that contains two analyses. First, through the development of a new spatial pattern change test, the degree of spatial change in interregional trade for each Canadian province is investigated, uncovering that different provinces have undergone different degrees of spatial change with regard to their trading relationships within Canada and the United States. Using this spatial differentiation of change as a stepping stone, the analysis of the changing geography of Canada – United States international trade flows turns to trading regions within these two countries. Using the methodology developed in chapter 2 at the international level, trading regions are identified within Canada and the United States for both 1989 and 2001 to show the changing geography of their trade.

After these questions have been answered in chapters 2 through 7, chapter 8 evaluates the answers to these four questions. I conclude that only through a geographical approach can a true understanding of the trading relationship between Canada and the United States take place. Both Canada and the United States are too large to be analyzed each as one spatial unit, and that such analyses hides the dynamic nature of the sub-national regions. The chapter finally notes some of my overall conclusions and provides some directions for future research.

The answers to the questions posed above provide the first comprehensive account of the sub-national (geographical) trading patterns between Canada and the United States. Essential to this account of Canada-United States international trade flows is geographic information systems (GIS). The management of the different data, particularly the topographical relationships between the many regions in these two countries, is greatly simplified within a GIS, allowing for a richer analysis of the topic at hand. The result is an appropriate understanding of the geography of international trade, a greater understanding of the historical circumstances of the trading relationship between Canada and the United States, a detailed account of the geography of Canada – United States international trade flows, and an understanding of the changing geography of those international trade flows.

CHAPTER 2[9]

In search of the global triad: does trade have its own geography?

2.1. INTRODUCTION

In this first analytical chapter of my dissertation, the geography of global trade flows is investigated to place Canada – United States international trade flows within a global context. As discussed above in the introduction, global international trade flows are increasing rapidly, so any changes in the patterns of Canada – United States international trade flows are not occurring in isolation. Though the geography of Canada – United States international trade flows is the result of particular local and historical outcomes in these two countries, some of these outcomes may be resulting from more global trends such as an increasing presence in the international economy. Therefore, understanding the nature of the geography of global international trade flows may be instructive to understanding the geography of international trade flows between Canada and the United States.

As stated in the introduction, over the past 20 years the international exports of merchandise more than doubled while world output increased by approximately 50 percent (IMF 2005a; IMF 2005b), and trade in services, though a relatively smaller

[9] Portions of this chapter have been published in the following: Andresen, M.A. (2009). Regionalizing global trade patterns, 1981 - 2001: application of a new method. *Canadian Geographer* 53(1): 24 - 44.

portion of international trade, is growing at an even faster rate (Dicken 2003). Yet, as stated by Dicken (2004), this geographical process is relatively unexplored by geographers. International trade is an increasingly important component (both directly and indirectly) of our economic livelihood at every scale and international trade volumes are increasingly centred on Western Europe, North America, and East Asia. This regionalization of the world economy led Ohmae (1985) to describe the world economy as a global triad: international trade and investment dominanted by the United States Germany, and Japan—Ohmae (1985) was the first of many to describe the world economy in this manner. Both the importance of international trade and its regionalization makes international trade an obvious avenue of research for (economic) geographers despite Dicken's (2004) finding that geographers are largely not included in the discussions around global trade.

Globalization, however, is not a process occurring impromptu, but a process that is increasingly institutionalized through international negotiations regarding international trade and investment, manifesting in regional trading agreements. With both international trade volumes and a large portion of these regional trade agreements centred on Europe, North America, and East Asia the global triad is not only a *de facto* regionalization project, but a regionalization project that is now largely formally institutionalized.

Poon et al. (2000) outlines the major formal institutionalization in each of the three triad regions since 1985: the Single European Act of 1986, the 1992 single European market programme, the launch of the Euro currency in 1999, the establishment of the North American Free Trade Agreement (NAFTA) in 1994, the advent of the

Southern Common Market (Mercosur) in 1991, and the expansions of the Association of South East Asian Nations (ASEAN) with its affiliated free trade agreement. Despite this large number of significant moves toward formally institutionalizing the global triad from 1985 to 2000, the six years since Poon et al. (2000) wrote have also seen considerable movement toward formal institutionalization in all three global triad regions.

North America has seen the least formal expansion of its triad region, but has been in negotiations to form the single most important economic region in the world—the Free Trade Agreement of the Americas (FTAA). Encompassing thirty-four countries in North, Central, and South America, the economic size of the FTAA would dwarf that of the current European Union—the countries forming the NAFTA are economically larger than the current European Union. Containing some of the largest international trade flows in the world, the FTAA would be formidable in the world economy. Because of massive protests to the FTAA in most negotiating countries, its implementation at the end of 2005 had been delayed, however (FTAA 2006).

The European Union has now incorporated ten countries in Central and Eastern Europe, the CEEC-10, expanding its membership to twenty-five nation-states. Though the economic component of this expansion is smaller than the expansion to occur with the FTAA the expansion solidifies the European Union's place in the world economy as the second largest free trade area in the world.

In East Asia, Japan and Singapore formed Japan's first region-specific trade agreement in 2002. Singapore also established free trade agreements with New Zealand (2001) and Australia (2003)—Thailand also entered into a free trade agreement with Australia in 2005 (WTO 2006). However, probably the most significant free trade agreements established are those involving China, a country that is increasingly becoming an economic behemoth in the global economy. In 2004, China signed free trade agreements with two of its special economic zones, Hong Kong and Macau. But in 2003, China entered into a free trade agreement with ASEAN (WTO 2006). All of these regional trade agreements, aside from those involving New Zealand and Australia, are particularly significant to East Asia because of its military and economic history. The Japanese military domination in East Asia in the first half of the 20th century and the concern over the potential future economic domination by China, has made many East Asian countries leery of formal regional economic integration (Korhonen 1998; Kwan 1997; Narine 1999). Therefore, these moves toward the formal institutionalization of East Asian regional trade agreements is significant, and, as with North America and the European Union, lends support to Ohmae's (1985) thesis.[10]

There are, of course, critics of the global economy as a global triad. The increasing presence of the triad regions leads some to warn of possible protectionism (Aho 1994) as well as the possibility of triad-based international agreements superseding bilateral discussions not covering the same international concerns (Lawrence 1994; Wei and Frankel 1997). Such fears cause some to believe that the formation of the global triad in particular, or regional trading agreements in general, are deleterious for economic welfare (see Bhagwati (1999) for a discussion on these issues). However, the presence of the global triad or any other regional trading agreement is not a sufficient condition for

[10] It should be noted that many free trade agreements have also been established between countries in each of the triad regions, triad region – non-triad region countries, and non-triad region – non-triad region countries.

these concerns. The WTO, and the GATT preceding it, requires all of its members entering into regional trade agreements to satisfy particular criteria. For example, all countries in a regional trade agreement cannot on average increase their trade barriers to non-member countries. Of course there are interpretations involved in many of these rules set out by the WTO and any given country may chose to act unilaterally despite the WTO rules, but there are no *a priori* justifications for these concerns.

Given the importance of the international economy to most countries and the attention paid to issues surrounding regional trading agreements (see Bhagwati 1999; Gibb and Michalak 1996; and Michalak and Gibb 1997) one would expect there to be a great deal of attention paid to the formation of the triad regions themselves by both geographers and economists. As noted by Poon et al. (2000), however, this is not the case.[11] Very few empirical studies have been undertaken to investigate the existence of the global triad. And those studies that have investigated the existence of the global triad (Anderson and Norheim 1993a; O'Loughlin and Anselin 1996; Poon 1997; and Poon et al. 2000) find little evidence to support its existence—evidence of clustering in international trade and trading regions are found, but not the global triad itself.

This chapter adds to the existing limited literature in two ways. First, I analyze the geography of international trade flows from a different perspective than past research. Past research has focussed on international trade shares without appropriately considering the economic sizes of trading economies. The present analysis suitably accounts for these economic sizes. Second, I identify those regions in the world that trade intensely

[11] There are many studies investigating international trade patterns within each of the triad regions. The studies relevant for North America are discussed in chapter 6.

with each other to evaluate whether the global triad exists by using a methodology to establish economically meaningful trading regions. The following section reviews the empirical literature investigating the global triad. Section 3 presents the data, measurement, and methodology employed. The empirical results are reported in Section 4. And Section 5 concludes that the global triad is the result of not considering trade intensity in terms of both the intensity of trade shares and trade volumes.

2.2. PAST RESEARCH ON THE REGIONALIZATION OF THE WORLD ECONOMY

The literature attempting to establish empirically the existence of the global triad, or the regionalization of international trade flows in general, has two fundamental issues to review: the measurement of trade and the method of regional assignment. The measurement of international trade is critical to establishing whether or not the global triad exists and, hence, varies from study to study as different authors attempt to capture international trade flows. Similarly for the method of regional assignment, depending on the method used to assign nations to regions the resulting regions may differ substantially. Each issue is discussed, in turn.

2.2.1. Measurement

Trade intensity refers to how intensely one country trade with another country. The type of measurement used to investigate the global triad is the trade intensity index. The index is based upon the degree to which any two or more countries trade with one another more or less than expected. If two countries have an intense trading relationship, this represents a geographical bias in international trade flows: one country sends and/or receives a larger portion of its trade to and/or from one particular place than would be expected.

The basic trade intensity index—used by O'Loughlin and Anselin (1996), Poon (1997), and Poon et al. (2000)—is computed as:

$$I_{ij} = {x_{ij}}/{m_j}, \qquad (2.1)$$

where x_{ij} is the share of country i's exports to region j and m_j is the share of world imports destined for region j. Essentially, this index captures whether or not a country sends a disproportionate share of its exports to a particular region, relative to the rest of the world. If I_{ij} is equal to one, country i exports proportionately to region j, relative to the rest of the world; if I_{ij} is greater than one then country i exports a disproportionately larger share of its exports to region j, relative to the rest of the world; and if I_{ij} is less than one, country i exports a disproportionately smaller share of its exports to region j, relative to the rest of the world.[12] Therefore, this index measures the degree of trade specialization of one country with another. As an index, it has the same interpretation as the location quotient. However, this index has two limitations stemming from the fact that any geographical bias found in country i's exports is measured relative to all other countries' trade.

The first limitation is that if all (or most) countries exhibit a geographical bias in their trade with region j, as may be expected if the world is indeed breaking into triad-based regions, then country i may not appear to trade intensely with region j even if it does so at the same degree as the rest of the world. For example, if all of the countries in the world export 50 percent of their trade to one country, a clear indication of a

[12] Region j may be a country.

geographical bias in international trade, and country *i* also exports 50 percent of its trade to this country, then I_{ij} does not indicate any trade intensity or specialization. But clearly trade specialization is occurring, country *i* simply is not different than the rest of the trading countries of the world.

The second limitation is that I_{ij} only considers export flows to identify a geography of international trade. However, this is despite the fact that the spatial distribution of production shows that particular countries produce disproportionate shares of the global output. For example, in 2001, the United States contained approximately 5 percent of the world's population but accounted for over 27 percent of the world's gross domestic product. This geography of production is a long-standing fact in economic geography that operates at all scales, whether it be at the local, national, or international (Walker 2000). Therefore, the geography of production shows a small proportion of the world's countries producing the vast majority of the world's output, one would expect that global trade is dominated by these same countries simply due to their economic size. If the geography of international trade follows the same spatial pattern as the geography of international production, then it is very likely that there is no geography of international trade independent of the geography of international production—countries simply export their largest shares of trade to the economically largest countries in the world, and similarly to the economically smallest countries in the world. If it is the case that there is no independent geography of international trade, then to understand the geography of trade flows we need to understand the geography of international production. However, if an independent geography of international trade does exist, there is a need to study its specific spatial pattern separate from the spatial pattern of production. Herein lays the limitation of I_{ij}: this measurement only considers export flows without incorporating the geography of international production.

In an attempt to control for the geography of international production using economic size, Anderson and Norheim (1993a; 1993b) and O'Loughlin and Anselin (1996) compute the following trade intensity index:

$$P_{ij} = t_i I_{ij}, \tag{2.2}$$

where t_i is the ratio of country i's exports to the world to country i's gross domestic product, GDP_i, and I_{ij} is the same as Equation 2.1. However, using x_{ij} to represent the volume of exports from country i to region j, Equation 2.3 shows that P_{ij} is problematic for interpretation:

$$\begin{aligned} P_{ij} = t_i I_{ij} &= \left(\frac{x_i}{GDP_i}\right)\left(\frac{x_{ij}/x_i}{m_j}\right) = \frac{x_{ij}}{GDP_i}\frac{x_{ij}}{x_i}\frac{1}{m_j} \\ &= \frac{x_{ij}}{GDP_i}\frac{\text{Total World Exports}}{\text{World Exports } j} \end{aligned} \tag{2.3}$$

The first term in Equation 2.3 does have the interpretation of country i's dependence on region j through trade, but the second term in the equation is the inverse of m_j and which confounds the interpretation of P_{ij}.

Therefore, I_{ij} does have a natural interpretation with its location quotient form, but P_{ij} does not have a natural interpretation. P_{ij} changes due to country i's changes in its economic dependence on region j through trade, but also from changes in global exports to region j and total global exports. The consequence, as recognized by O'Loughlin and Anselin (1996) themselves, is that the value of this index cannot be meaningfully compared between regions that are of a different size.

The use of I_{ij}, by Anderson and Norheim (1993a) and O'Loughlin and Anselin (1996), does find that exports are focussed on geographically close countries, particularly in North, Central, and South America, but there is not any evidence of the increasing presence of the global triad over a time period spanning 25 years (1968 – 1992). This time period may not include much of the more recent formal institutionalization discussed above, but it does span the time period which Ohmae (1985) made the first claim of the global triad. With regard to P_{ij}, there is evidence of this index increasing over the same study period but, as stated above, the interpretation of this trend must be done with caution. The total exports from country i to region j and world exports to region j may have stayed exactly the same given the fact that total world exports have grown faster than GDP over this entire time period—such a phenomenon would actually indicate a decrease in the regionalization of global trading patterns. Therefore, as stated by Anderson and Norheim (1993a) and O'Loughlin and Anselin (1996), the use of these indices alone provides no evidence of an increasing presence of the global triad.

2.2.2. Regional Assignment

The five empirical investigations of the regionalization of the global economy discussed above, use their respective trade intensity indices to aggregate individual countries into trade regions. These trading regions are then compared to the global triad countries to see whether or not the claims of the global triad's existence are supported empirically.

This research investigating the formation of the global triad has used two methods of regional assignment. The first, only used by O'Loughlin and Anselin (1996), is a spatial statistical method used to search for clustering in the export and import shares of the United States, Germany, and Japan—with these three countries representing the global triad regions. And the second, used by Poon (1997) and Poon et al. (2000), is the Intramax method in conjunction with the trade intensity index, I_{ij}, that assigns every country in the world to a regional trade bloc. Each is discussed in turn.

O'Loughlin and Anselin (1996) use two spatial statistical measures to assess the existence of the global triad, one global and one local.[13] The global measure is the commonly used Moran's *I*, a global measure of spatial autocorrelation, and the local measure is the G_i* statistic of Getis and Ord (1992), one of the local indicators of spatial association (Anselin 1995). That the use of Moran's *I* indicates evidence of the clustering of exports for each of the United States, Germany, and Japan, is consistent with their prior findings when using both I_{ij} and P_{ij}. However, as with the trade intensity indices there is no evidence of increased spatial clustering over their study period. Clustering is present but it existed long before any claims of the global triad with no evidence that clustering increases over time. The results from the analysis of the G_i* statistic are qualitatively similar to that of Moran's *I*, though more pronounced: strong statistical evidence of the clustering of exports, but no significant changes since the late-1960s.

Though the use of spatial statistics does seem appropriate for analyzing a spatial phenomenon, the spatial statistical methods are used to search for the global triad in cartographic space. Therefore, spatial contiguity and cartographic distance are used for

[13] Global spatial statistical measures, in the present context, will identify the clustering (or lack thereof) of international trade flows for the world as a whole. The concentration of international trade flows for all countries does not vary. Local spatial statistical measures, however, allow for the identifications of clustering of international trade flows in multiple places on the same map, with that clustering being able to vary in intensity across space.

the identification of regions. However, as noted by Allen et al. (1998), regions are not necessarily spatially contiguous arrangements of economic space, they may have holes within them such that the region is not continuous—Allen et al. (1998) are working in the context of the sub-national region, but the concept applies at the supranational scale as well. This regional typology is particularly instructive for East Asia. Many of the countries in what some consider an East Asia region share no common boundaries with any of their fellow neighbours. Consequently, searching for regions in cartographic space may not identify the formation of regions (the global triad) because not all countries are spatially contiguous, both within and outside of the global triad regions.

The second method of regional assignment does not rely on the strict cartographic relations of contiguity and distance and it called the Intramax method. The Intramax method used by Poon (1997) and Poon et al. (2000) is a clustering algorithm that uses the trade intensity index, I_{ij}, to form trading regions. This algorithm has the advantage of allowing the data to determine the nature of the regional formation, rather than relying on an *a priori* designation of regions—the algorithm determines trading regions endogenously. As such, if the global triad exists, regional trading blocs centred on the United States, Germany, and Japan will emerge, rather than being imposed on the data.

This method identifies two countries that have the greatest intensities of trade and then collapses them to form a region—they are hereafter treated as a single spatial unit with their exports aggregated together. With this reduced set of countries, the trade intensity index is recalculated and the next greatest intensity of trade between two countries (or regions) is identified and they are collapsed again to form a larger region. This second region may or may not include the first two countries that themselves form a region. This procedure is repeated iteratively until all of the countries in the data set are assigned to a region (Poon et al. 2000) (see Masser and Brown (1975) and Fischer *et al*. (1993) for more detailed accounts of this algorithm).

The general result employing from this procedure is an increase in the regionalization of global trade since 1985, but still a global triad had not been established by 1995. In 1985, the year of Ohmae's (1985) claim of the global triad, there were seven trading regions in the world, with three of those regions being centred on countries in the European Union: the United Kingdom, Germany, and France. This leads Poon et al. (2000) to claim that the evidence for the establishment of the global triad is weak, but there is a definite increase in the regionalization of global trade since Ohmae's (1985) first claim of the global triad's existence. As with the spatial statistical methods of O'Loughlin and Anselin (1996), there are some methodological concerns around the Intramax method. The first is that all countries are assigned to a trading region. And the second is the use of trade intensity to establish those regions.

The necessity of all countries being assigned to a region does not explicitly conflict with the endogenous nature of regional assignment using Intramax (no regions are imposed *a priori*), but it does go against the principle. It is possible that all countries are involved in a trading region, but more likely there are countries that are effectively not part of the global trading system. This is not to say that these countries have no trade, but that they are not part of a group of countries that trade intensely among themselves. And this is precisely why there is concern regarding the regionalization of the global economy in the first place (see Bhagwati 1999). If the global triad is indeed established, and the global triad regions are, as claimed, becoming insular with respect to trade, the countries outside of the strict global triad regions (such as South America, Africa, and South Asia) do not likely belong to a global triad-based trading region. Therefore, there must be a point at which countries are no longer assigned to regions.

Trade intensity is clearly an important criterion for the establishment of a region, but that intensity alone may be misleading. For example, in Poon et al. (2000), the first region to be identified is the Ivory Coast and Burkina Faso. As shown below, these two countries do form a region in 1981 and 2001, but the volume of trade flowing between these two countries is incredibly small in the context of world trade. The Ivory Coast and Burkina Faso may trade very intensely with each other, but their presence in the global economy is of little consequence. Poon et al. (2000, 431) notes that the absolute volume of trade may ``obscure regional patterns because they do not normalize for country size,'' but this is an issue with the measurement of trade intensity and should not be ignored in regional assignment. Not considering the volume of trade in regional assignment led Poon et al. (2000) to assign France and Germany to different trading regions in 1985, when these two countries had the second largest bilateral trading volumes in the world in that year. It may be the case that France and Germany each have different countries that are highly dependent on trading with them due to their different histories, but any economically meaningful trading region must have France and Germany together because of the magnitude of their trade with each other. In other words, there is a great difference between economic dependence and economic integration. If international trade only flows in one direction between two countries, then one of those countries is likely dependent on the other. But if those two countries trade intensely with each other such that each country is dependent on the other country through trade, then the two countries are integrated. This issue of trade reciprocity is discussed further below.

Previous analyses of the existence of the global triad have shown that there is some evidence of clustering in international trade flows. However, little evidence of increased clustering and the global triad itself is present. The measurement of trade intensity and the methodology for regional assignment are problematic in terms of interpretation and economically meaningful trading regions, respectively. These limitations are both dealt with in the present analysis, discussed in the following section.

2.3. DATA, MEASUREMENT, AND METHODOLOGY

In order to address the issues of the interpretation of trade intensity and the establishment of economically meaningful trading regions, the appropriate data are needed to make empirical measurement of trade intensity and the method of regional assignment must be developed. As such, data, measurement, and the regional assignment methodology are respectively discussed here.

2.3.1. Data

The data on aggregate cross-national and bilateral international trade used in the present empirical investigation of the regionalization of the global economy come from Statistics Canada's (2004a) *World Trade Database, 1980 – 2001* and data for gross domestic product (GDP) come from the International Monetary Fund's (2005a) *International Financial Statistics*. Further data selection is based on the availability of both bilateral trade flow data and GDP for each country for the years 1981, 1991, and 2001. For reasons of comparability over time, the countries that formed the former Czechoslovakia, Yugoslavia, and Soviet Union are combined, as are China and Hong Kong. The final data set consists of 152 countries,[14] covering the vast majority of global international trade flows—as shown in Table 2.1, more than 96 percent of global imports and 97 percent of global exports are represented for all years. With respect to the global triad, all North American and European Union[15] countries are represented. The ASEAN-10,[16] China, South Korea, Japan, Australia, and New Zealand represent East Asia (EA-ANZ). Hong Kong is included in China for data comparability and Taiwan is absent due to the unavailability of gross domestic product measures. Due to the importance of these two special economic zones in China and their significantly different trading behaviours than China as a whole, this absence is problematic. However, this is a limitation in the data that is unavoidable.

<See Table 2.1, page 231>

2.3.2. Two Measures of Trade Intensity

The measurements used in this analysis are similar to those used in past research investigating the regionalization of the global economy. However, the particular measurements used in this analysis provide a much clearer interpretation with respect to the geography of international trade that is distinct from the geography of international production. The first measurement, though not a location quotient in its pure form, is interpreted in the same way as the location quotient so it is referred to as the trade location quotient, LQT_i. The LQT_i only measures a single country's exports and imports

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[14] Within the country aggregations, there are actually 178 countries represented.

[15] The European Union countries represented are the EU-15: Belgium-Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

[16] Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

(as opposed to a bilateral relationship) to investigate how intensely a country is involved in the global economy in general, and is calculated as:

$$\mathrm{LQT}_i = \left(x_i / X_w \right) \Big/ \left(GDP_i / GDP_w \right), \tag{2.4}$$

where x_i is the value of exports (or imports) from country i, X_w is total world exports (or imports), GDP_i is the gross domestic product of country i, and GDP_w is the gross domestic product of the world. Therefore, the LQT_i index measures the percentage of world exports (or imports) from country i relative to its share of world GDP. Herein lies its ability to distinguish a geography of international trade as distinct from the geography of international production. If the LQT_i index is equal to unity, a country exports (or imports) proportionately to its share of world GDP; if the LQT_i index is less than unity, a country exports (or imports) disproportionately less than its share of world GDP; and if the LQT_i index is greater than unity, a country exports (or imports) disproportionately more than its share of world GDP. Therefore, a geography of international trade distinct from that of the geography of production exists if countries exhibit LQT_i values different from unity. From a theoretical standpoint, the LQT_i index is able to account for the well-established (see Walker 2000) geography of production. As discussed above, the United States is the largest economy in the world, so one would expect, *a priori*, that the Untied States' international trade volumes are also the largest in the world. The LQT_i index accounts for the size of the United States and measures its trade activity relative to its economic size rather than only considering trade volumes.

For descriptive and mapping purposes, the categories for the trade location quotient follow Miller et al. (1991) used in their analysis of regional economic development: if the LQT_i index is less than 0.70, a country is very underrepresented; if the LQT_i index is 0.70 – 0.90, a country is moderately underrepresented; if the LQT_i index is 0.91 – 1.10, a country has average representation; if the LQT_i index is 1.11 – 1.30, a country is moderately overrepresented; and if the LQT_i index is greater than 1.30, a country is highly overrepresented. All of the maps presented below used these ranges as legend categories for ease of comparison between different regions of the world.

This first measurement is instructive to search for the overall pattern of the geography of international trade, but it is limited because it does not consider bilateral trading relationships. Hence, the LQT_i index cannot be used for regional assignment because it does not measure each individual country's geography of international trade with all other countries of the world. In order to mediate this limitation and allow for regional assignment, a bilateral version is calculated as:

$$\mathrm{LQT}_{ij} = \left({x_{ij}}/{x_{iw}} \right) \Big/ \left({GDP_j}/{GDP_w} \right), \tag{2.5}$$

where x_{ij} is the value of exports from country i to country (or region) j, x_{iw} is country i's total exports to the world, GDP_j is the gross domestic product of country j, and GDP_w is the gross domestic product of the world. The LQT_{ij} index, then, measures the percentage of country i's exports sent to country j relative to country j's share of world GDP. If the LQT_{ij} index is equal to unity, country i exports to country j proportional to country j's share of world GDP; if the LQT_{ij} index is less than unity, country i exports to country j disproportionately less to country j relative to country j's share of world GDP; and if the LQT_{ij} index is greater than unity, country i exports to country j disproportionately more to country j relative to country j's share of world GDP.

Therefore, the LQT_{ij} index measures the geography of international trade as distinct from the geography of international production from each country to each individual country in the world. In the present analysis, each country has 151 trading partners and, therefore, 151 LQT_{ij} index values. For each country, the LQT_{ij} index measures the degree of trade intensity with each individual country in the world, with the geography of production considered in each and every case. The primary advantages of the LQT_{ij} index for regional assignment are that it maintains the interpretation of the I_{ij} index, but it also controls for regional economic size. This controlling for regional economic size was captured by P_{ij}, but at the cost of interpretability.

2.3.3. The Regional Assignment Algorithm

As discussed above, the Intramax method has two limitations: all countries are assigned to a trading region and only trade intensity is used to determine the order of regional assignment. The algorithm developed for the present analysis addresses these two limitations while maintaining the strength of the Intramax method: the algorithm used to form trading regions does not use the global triad as its point of departure, and it is an endogenous data-driven algorithm that assigns countries to regions based only on the criteria set out below.

In order to address the first issue of all countries assigned to a trading region, the concept of a reciprocal bilateral trading relationship is introduced. A reciprocal bilateral trading relationship is established if and only if both the LQT_{ij} and LQT_{ji} for two countries are greater than a pre-determined threshold value. This criterion requires not only for one country i to export disproportionately more to another country j more than would be expected based on country j's share of world GDP, but also for country j to export disproportionately more to country i based on country i's share of world GDP. The pre-determined threshold value of 1.30 is used in the analysis below to capture highly overrepresented reciprocal bilateral trading relationships, followed by a sensitivity analysis using the values of 1.20 and 1.10 to ensure that the finding presented here are not sensitive to changes in the critical threshold value.

This reciprocal bilateral trading relationship is the natural point of departure to search for the global triad. Large volumes of trade flows originating from the global triad regions are not enough to establish the existence of the global triad. Each triad region contains the largest economies in the world so it is expected that large volumes of trade originate and are destined for these countries. Therefore, reciprocity in intra-triad regional trade must be established to confirm or deny the existence of the global triad. Otherwise, countries are simply exporting large volumes of trade to other large economies that happen to be in their ``triad'' region.[17] Once a reciprocal bilateral trading relationship is established, the LQT_{ij} index is no longer used in the analysis. Whether a country exports disproportionately more to another country by 30 percent or 100 percent does not matter. The two countries simply have to have an intense trading relationship. More important at this stage is to incorporate the volume of trade between these two countries.

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[17] This condition of reciprocity in trade flows is particularly important for the determination of a trading region. For example, suppose that Canada exports to the United States without reciprocity, the United States exports to Mexico without reciprocity, and Mexico exports to Canada without reciprocity. Also suppose that each of these exports is considered ``intense''. Would it make sense to consider these countries a region? Each country may be dependent on another country through trade, but to classify this, albeit connected, dependence as a trading region is suspect. It is possible that such a relationship may be a trading region if the connection is through a production chain. However, such a claim cannot be made with relatively coarse aggregate trade flow data.

As stated above, not considering the volume of trade generates a regional assignment algorithm making some curious regional assignments: France and Germany are in separate regions, and the first regional assignment involves two countries with very low volumes of trade. To prevent such curiosities, the volume of trade within reciprocal bilateral trading relationships is used to assign the regions. The reciprocal bilateral trading relationship with the largest volume of international trade is used to assign countries to a region rather than the magnitude of their trade intensity. Therefore, the iterative regional assignment algorithm employed is as follows: using the LQT_{ij} index, identify all reciprocal bilateral trading relationships; aggregate the trade flows within each reciprocal bilateral trading relationship and rank them by the magnitude of their aggregate trade flows; classify the largest magnitude aggregate trade flow as a region; recalculate the LQT_{ij} index treating the region as one spatial unit; repeat until there are no reciprocal bilateral trading relationships. The temporal component of this analysis (1981, 1991, and 2001) serves to show any changes in trading regions over time.

The combination of the LQT indices and the regional assignment algorithm provides a trade intensity measure and regions that are economically meaningful—the largest bilateral trading relationship in the world, Canada and the United States, is the first region identified. Rather than only considering the relative intensity of international trade flows, the methodology presented here uses relative intensity to establish reciprocal trading regions and then incorporates trading volumes into regional assignment. In this manner, the present methodology uses both relative and absolute measures of international trade flows to establish trading regions. Given the nature of the regional assignment algorithm, using reciprocal bilateral trading relationships, the trading regions established are referred to as reciprocal trading regions in the results below.[18]

2.4. EMPIRICAL RESULTS

2.4.1 The Trade Location Quotient, Global Imports, and Global Exports

The foundation for the claim of a global triad is shown in Table 2.2. Despite the spike in 1991, the share of world imports and exports of North America, EU-15, and EA-ANZ is increasing steadily such that more than 80 percent of international trade flows move to and from these nations. However, such an interpretation is premature. As stated above, it is the bilateral relationships that define a global triad and all the concerns associated with such a relationship. Also shown in Table 2.2 is the world share of GDP for these three regions. As with exports and imports, they comprise of more than 80 percent of the world's economic activity. Therefore, it should be no surprise that these same countries comprise the majority of global international trade flows. The United States, for example, is the largest economy in the world (27.1 percent of world GDP in 2001), so it has the world's greatest capacity to absorb global imports (18.6 percent in 2001) and to

[18] This method of regional assignment does have a bias toward larger economies in region formation, much like the Intramax method has a bias toward smaller (though extremely open) economies. The present regional assignment algorithm may exclude some small economies from regions because they do not have sufficiently large trade volumes with the economically large countries. However, as shown below, the vast majority of countries are assigned to a trading region or reciprocal bilateral trading relationship, including many small economies. Therefore, this potential bias toward larger economies is believed to be of lesser concern than the issues of bias found within the Intramax method.

ship global exports (12.2 percent in 2001). However, the United States will appear to be a focal point of international trade simply due to its massive economic size.

<See Table 2.2, page 232>

The existence of a unique geography to international trade is evident in Figures 2.1 – 2.3. From 1981 to 2001, Canada, Northern Europe, and East Asia maintained their overrepresentation in both exports and imports with East Asia increasing its overrepresentation in the most recent years. Africa has seen the most radical changes having their representation of exports and imports fall significantly in Western and Sub-Saharan Africa for exports and essentially the whole continent for imports.

With respect to the three regions of the triad, North America is rather underrepresented in both imports and exports. Canada, the only North American nation consistently labelled as "highly overrepresented" has relatively low LQT index scores with respect to other countries in the world. Mexico has only recently (1996) moved into the status of high overrepresentation, and the United States is consistently very underrepresented for both imports and exports. The United States' lack of relative standing in international trade flows is likely due to the vast size of its internal market.

<See Figures 2.1 – 2.3, pages 334 – 336>

The EU-15 countries, with the exception of Italy, are all overrepresented with respect to imports; and with the exception of Greece, Italy, and Spain all EU-15 countries are overrepresented with respect to imports. Related to the finding with the United States, the larger EU-15 countries (such as France, Germany, and the United Kingdom) have lower magnitudes of the LQT indices, whereas the smaller EU-15 countries (such as

Belgium-Luxembourg, Ireland, and the Netherlands) have the highest magnitude of the LQT indices.

The EA-ANZ countries are far less consistent. The economically largest country in EA-ANZ, Japan, is highly underrepresented for both imports and exports in all years. But one of the smallest countries, Myanmar, is also highly underrepresented in exports and imports for all years. Notably high representation in exports and imports are Indonesia, (exports only), Malaysia, Singapore, and Vietnam (only in 2001).

The correlations for the LQT indices over time and between exports and imports are all positive and significance at the one percent level—though qualitatively similar to the parametric correlation coefficients, the nonparametric results are presented here due to concerns regarding the normality of the data. Not surprisingly, due to substantial differences in Figures 2.1 – 2.3, the Spearman's correlation coefficients decrease in magnitude over time for both imports and exports. For imports, the correlation coefficients range from a high of 0.773 to a low of 0.610, and for exports the high is 0.683 and the low is 0.656. Perhaps more interesting is that the correlations between the LQT indices for imports and exports of the same year also fall over time: decreasing from 0.617 to 0.546. Given the relatively high correlation coefficients, one measure of representation is still a good predictor of the other, the similarity of import and export representation is decreasing over time.

Though instructive on its own to show the specific geography of international trade not performed in previous research, the above analysis tells us nothing of the existence or establishment of the global triad. As such, the analysis now turns to the establishment of bilateral and regional trading relationships.

2.4.2 The Trade Location Quotient and Bilateral/Regional Trading Relationships

As shown in Table 2.3, using the methodology outlined above, relatively few reciprocal bilateral trading relationships are found—10.0, 10.2, and 11.2 percent of all 11 476 possible trading relationships for 1981, 1991, and 2001, respectively. Of course, by definition, there cannot be 11 476 reciprocal bilateral trading relationships—this can only occur if all countries traded with all other countries proportionally more than their gross domestic product—but given the attention to globalization and the increases in international trade, this number is surprisingly low. As a percentage of reciprocal bilateral trading relationships, the global triad international trade dominates overwhelmingly. Very little trade flows between the three regions of the global triad, but a vast majority of trade occurs within each of those three regions. There has been a sharp increase in international trade within the three regions of the global triad from 1981 – 1991, but little has changed since then. The remaining dominant portion of international trade flows from the global triad to countries outside of the global triad, with very little trade (less than 8 percent in all years) flows to and from non-triad countries. Once again, the global triad appears to be a dominant force in the international economy, and contrary to the findings of O'Loughlin and Anselin (1996), international trade is increasingly clustered around the three regions of the triad.

<See Table 2.3, page 233>

This view of international trade is a very limited one, however. As mentioned above, if the point of departure is the existence of the global triad—with each triad region centred on one of the three largest economies in the world—it should come as no surprise that the global triad dominates in international trade. Having the reciprocal bilateral trading relationships as the point of departure and assigning countries to regions using the methodology described above, an entirely different view of the international relationships become manifest.

<See Table 2.4, page 234>

Table 2.4 summarizes the results from the regional assignments. The results clearly indicate no evidence of a global triad, based on reciprocal trading relationships—a result much closer to the spatial statistical results of O'Loughlin and Anselin (1996) than the movement toward a global triad found in Poon (1997) and Poon et al. (2000). With there being 24, 24, and 26 reciprocal trading regions in 1981, 1991, and 2001, respectively, and over 100 countries involved in these reciprocal trading regions, the average number of countries per region remains relatively constant over the entire study period. Additionally, there are very few bilateral trading relationships operating outside of the reciprocal trading regions, leaving approximately 20 countries without any reciprocal trading partners. The reciprocal trading regions are shown in Tables 2.5, 2.6, and 2.7.

Overall, geography and history clearly play the dominant roles in regional assignment. Particularly in 1981 (see Table 2.5), colonial patterns are evident for France, Portugal, Spain, and the United Kingdom. France (Reunion), Portugal (Angola and Guinea-Bissau), Spain (Cuba, Equatorial Guinea, and Mexico), and the United Kingdom (Cyprus, Saint Kitts and Nevis, and Sierra Leone) all have reciprocal trading regions in 1981 based on their colonial past. Though most of these formal colonial ties were broken only between 10 and 20 years prior to 1981, Cuba and Mexico had been independent from Spain respectively for almost 100 and 200 years. Clearly, historical ties remained important at least until 1981 for some countries with regard to international trade flows. Evident in all years, however, is that geographically close countries tend to have reciprocal trading relationships and geographically distant countries do not. This phenomenon, though present in most of the reciprocal trading regions is particularly present in Central and South America. The Central American countries and their geographically close Caribbean countries form one region, the more northern Caribbean countries form a region, the northern countries of South America and their geographically close Caribbean countries form a region, and the central and southern countries in South America form another region. Clearly, geographic distance is a powerful force in the establishment of reciprocal trading regions. Though a very intuitive outcome for some, this result shows that the forces of globalization by and large are bound by geographical relations, not only encompassing distance and proximity, but geographically defined relations involving social, political, and institutional aspects of each country with many of these relations seemingly related to former colonial relations.

<See Table 2.5, page 235>

Turning to the regional assignments in the specific years, there is significant spatial reorganization occurring within some of the reciprocal trading regions despite little change in their numbers. North America experienced the least change over the study period. Canada and the United States are always a region—the largest in magnitude reciprocal bilateral trade flow in all years—with Mexico joining the North American region by 1991 (see Table 2.6). This joining of Mexico with Canada and the United States (though primarily with the United States) precedes the NAFTA by three years and is only one year after the United States and Mexico began to move toward a free trade agreements of their own (Cameron and Tomlin 2000). Therefore, the integration of these economies had begun years before any formal institutionalization had taken place.

The European countries have experienced substantial change over the 20 year study period. In 1981, the European-based reciprocal trading regions were centred on Germany, the United Kingdom, and Norway, with a few colonial ties (see Table 2.5). Spain and Portugal, although they did not join what was to become the European Union until 1986, each had no ties back to Europe, or each other, aside from Portugal-Iceland. Italy, a founding member of the European Union, had no reciprocal trading relationships with any other European countries. But unlike Spain and Portugal that have their 1981 trading relationships defined through former colonial ties, Italy has trading relationships defined geographically by its larger region: the Eastern Mediterranean, the Middle East, and Northern Africa. Curiously, in the twenty-five years since the beginnings of the European Union, little integration has actually taken place.

<See Table 2.6, page 236>

By 1991, the European countries began to show more reciprocal trading relationships (see Table 2.6). The regions centred on Germany, Norway, and the United Kingdom changed little, but Spain and Italy shared a common region as did Austria and Switzerland with Hungary and the former Czechoslovakia—the latter country joining the European Union in 2004. Portugal continues to remain outside of any European region, and Greece, a member of the European Union since 1981, is in a region that is mainly composed of its immediate neighbours, none of which are part of the European Union. In 2001, Italy, Portugal, and Spain are all common to a region, and Greece emerged in a region with Cyprus that joined the European Union in 2004. Needless to say, Europe does not show itself to be a region of any global triad, but even in 2001 has six reciprocal trading regions involving European Union countries (see Table 2.7).

One may interpret this set of reciprocal trading regions involving European Union countries as not challenging the global triad thesis, but supporting it. Perhaps not all European countries trade intensely with each other, but the six reciprocal trading regions in 2001 encompass the European countries and, therefore, show the European triad region. This interpretation, however, would be premature. Many of the countries involved in the European reciprocal trading regions are outside of the European Union, and there is little evidence of that pattern decreasing over time. Many of the non-European Union countries in the years of regional assignment have now become members of the European Union (the CEEC-10), but these are countries traditionally considered distinct from the European triad region by those that speak of the existence of the global triad.

East Asia is also undergoing significant adjustment. The first phenomenon to note is that South Pacific countries (namely Australia and New Zealand, with respect to the above analysis) should be grouped together with East Asia cautiously. Aside from 1991 (see Table 2.6), there is no overlap between East Asian and South Pacific countries, but the South Pacific countries are small in a global context so any chances of bias are small. Japan, the largest country in East Asia (3rd largest in the world), only has a reciprocal trading relationship with Indonesia. However, Japan's relationship with Indonesia is dominated by petroleum products. Therefore, this international trade relationship is likely related more to its ties with oil-producing nations for natural resources, than a relationship based on the global triad thesis. South Korea has a similar relationship in 1981 and 1991 with petroleum-producing countries, but by 2001 does settle into an East Asian trading relationship with China and Mongolia (see Table 2.7).

The most pronounced regional grouping in East Asia involves the ASEAN countries. In 1981, five of what was to become the ASEAN-10 were in a reciprocal trading region, and by 2001 that number had increased to seven – other non-ASEAN countries are also in this reciprocal trading region making it the largest in East Asia (see Tables 2.5, 2.6, and 2.7). By 2001 there appears to be both a North- and a South-East Asian region, but neither of them includes Japan. Of course, Japan was the first country in East Asia to experience rapid industrialization and to establish relationships outside of East Asia with other industrialized countries. Indonesia, a large component of the ASEAN, lies outside of these reciprocal trading regions due to its being a petroleum-producing nation. And China, now a formidable presence in the global economy, once part of a reciprocal trading region involving a number of the ASEAN countries, is involved in a reciprocal trading region with only South Korea and Mongolia by 2001. This result is a prime example of a country with many large trade volumes that flow in one direction, and few *reciprocal* trading relationships.

<See Table 2.7, page 237>

Though not included as one of the three regions in the global triad, Central America, South America, and the Caribbean are some of the largest reciprocal trading regions—Central America being the largest. In 1981, South America was separated into three regions, and both Central America and the Caribbean formed a fourth region (see Table 2.5). In 1991, there were the same number of reciprocal trading regions, but the countries had spatially reorganized (see Table 2.6). Part of this spatial reorganization involved the Mercosur countries plus their associated members (Bolivia and Chile) forming a reciprocal trading region of their own. Incidentally, 1991 was the year Mercosur was established and the remaining countries in this area became much more tightly clustered in space, forming a Central American region, a northern South American region, and a Caribbean region. By 2001, South America had essentially been split into a northern and southern region (see Table 2.7). And by that same year, the Caribbean and Central America formed the largest reciprocal trading region in the world in terms of the number of members.

The former Soviet Union and former Eastern European Socialist countries form a reciprocal trading region in 1981, but by 1991 that region began to break apart (see Tables 2.5 and 2.6). Hungary and the former Czechoslovakia form a region with Austria and Switzerland, whereas the former Yugoslavia joined Greece's region. Both of these moves are likely due to history (Austria-Hungary) as well as geographical proximity. However, by 2001 the former Yugoslavia joined the reciprocal trading region centred on Austria, leaving Poland as the only country maintaining a reciprocal trading relationship with the former Soviet Union (see Table 2.7). Greater detailed bilateral trade data that separates all of the former Soviet Union may prove to be instructive in Europe's spatial reorganization of international economic relations, particularly with the Central and Eastern European countries (CEEC-10) joining the European Union in 2004.

One of the most dynamic areas with regard to changing reciprocal trading relationships over the study period has been Africa. In 1981, the eastern coast of Africa was in a reciprocal trading region, two other trading regions on the western coast and the island nations off the south eastern coast formed a fourth reciprocal trading region (see Table 2.5). By 1991, the reciprocal trading region on the eastern coast all but disappeared, while the trading regions on the western coast (though losing some members) solidified into one trading region, the trading region off the south eastern coast expanded, and South Africa emerged as a reciprocal trading region from a bilateral trading relationship (see Table 2.6). Ten years later much had changed again. The reciprocal trading region centred on South Africa grew substantially since 1991, likely due to the abolition of apartheid and the accompanying trade liberalization. The eastern African trading region has re-emerged with another smaller trading region to the north, and the reciprocal trading regions on the north western coast have largely split into eastern and western reciprocal trading regions. No doubt, as the African economies continue to advance and political conditions continue to stabilize spatial reorganization will also continue.

And finally, we turn to the Middle East and South Asia. Very little regionalization materialized in these two areas in 1981. One reciprocal trading region emerged centred on India, but the development of reciprocal trading regions had not occurred until 1991 (see Table 2.6). By that year, in addition to a reciprocal trading region centred on India, the majority of the small independent states in the Middle East formed a trading region centred on Pakistan. In 2001, there were four reciprocal trading regions in the Middle East, all centred on petroleum-producing nations and India (see Table 2.7). Though most of these countries are not considered a region—outside of the Organization of Petroleum Exporting Countries—this area's dynamic likely changed shortly after the 11 September 2001 terrorist attacks and the U.S. presence in the Middle East.

2.4.3. Sensitivity Analysis

The critical threshold value of 1.30 used to establish reciprocal bilateral trading relationships is admittedly arbitrary. A 30 percent overrepresentation in international trade flows is unlikely to be considered too low a threshold but it may be considered too high. As such, the critical threshold values are lowered to 1.20 and 1.10 for a sensitivity analysis. Tables 2.8 – 2.13 show the regional assignments for 1981, 1991, and 2001 using both 1.20 and 1.10 as critical threshold values.

<See Tables 2.8 – 2.13, pages 238 – 243>

Curiously, changing the critical threshold values barely changes the results. Overall, in all three years and all critical threshold values, there is some minor re-shifting of countries between reciprocal trading regions in Central America, South America, and East Asia. Europe does undergo some re-shifting of countries as well, but the European Union does not emerge as ``Fortress Europe'' even when the critical threshold value is 1.10. The most striking consistency is in the overall nature of the reciprocal trading regions themselves (Table 2.14).

<See Tables 2.14, page 244>

Using lower critical threshold values to establish reciprocal bilateral and regional trading relationships one would expect more countries to be involved in reciprocal trading regions and the that the reciprocal trading regions themselves would have more country members. This, however, is not the case. As shown in Table 2.14, there are essentially no changes in the total number of countries involved in reciprocal trading regions (120 – 130) or in the average number of countries per region, approximately five. With such small change in both the number of countries within the reciprocal trading regions, and the nature of the reciprocal trading regions themselves, all of the analyses and interpretations discussed above are considered robust.

2.5. SUMMARY AND CONCLUSIONS

This chapter, using a new metric to measure the spatial relationship of international trade that controls for country size has shown that there is a geography of international trade distinct from the geography of production. By 2001, the geography of international trade indicates that the three regions of the global triad engage in intense interactions, but they are clearly not the only areas of the world with a high intensity of international trade. Central America, South America, and parts of Africa also exhibit very strong international trade intensities, higher in magnitude than many countries in the three regions of the global triad, though not in terms of volume.

Extending the international trade location quotient into reciprocal bilateral and regional trading relationships finds absolutely no evidence of the existence or movement toward the global triad. Instead, reciprocal trading relationships are governed quite strictly by geographical space and, to some extent in the early years of the study, by history (i.e. colonialism). Additionally, the number of countries per reciprocal trading region remains relatively constant over time indicating no increased clustering of regionalization from 1981 – 2001.

With respect to reciprocal trading regions and international trading agreements, there are three reciprocal trading regions that correspond well to their respective international trading agreements by 2001. The NAFTA countries are involved in a reciprocal trading region by 1991, three years before the NAFTA entered into force—the United States and Canada were already involved in a free trade agreement in 1989, however. And this reciprocal trading region is the largest in magnitude in the world despite there only being three members. The Canada – U.S. and U.S. – Mexico bilateral trading relationships are the two largest international trade flows in the world since 1991, dwarfing most other bilateral trade flows by orders of magnitude. The Mercosur countries and associated members (Bolivia and Chile) form the second international trading agreement that corresponds to reciprocal trading regions. This region is one of the largest economic entities in the world and has clearly been successful in establishing and maintaining reciprocal trading relationships since its inception. And contrary to previous research, this region has emerged as a trading region independent of its North American neighbours.

Though all of the ASEAN-10 countries are not represented in a single region by 2001, the majority of the member countries are involved in a reciprocal trading region (see Table 2.7). A north eastern reciprocal trading region has also emerged by 2001, but Japan is essentially absent from East Asia with respect to reciprocal bilateral trading relationships. The only exception to this result is Japan and Indonesia. But as discussed above, this is not surprising given Japan's relatively poor abundance of energy resources.

Overall, this analysis has shown that the geography of international trade not only exists but is incredibly dynamic. Political, historical, and economic forces continue to change, leading to a spatial reorganization of the international economy. Though some areas of the world appear to be stabilizing with respect to reciprocal trading regions, many areas are undergoing significant spatial reorganization. Additionally, areas commonly grouped together, such as the European Union member countries, are shown to not be nearly as integrated through trade as other areas such as the NAFTA and Mercosur countries. The European Union has also recently expanded into Central and Eastern Europe, potentially altering the geography of international trade in that area. With the establishment of the NAFTA as the top reciprocal trading region in the world, the analysis now moves to a more detailed study of the top bilateral trading relationship in the world operating within the NAFTA—Canada and the United States.

Chapter 3[19]

A history of Canada – United States trade relations

3.1. INTRODUCTION

Canada and the United States not only have the top bilateral trading relationship in the world, based on international trade volumes, but they were found in the previous chapter to be part of the most significant reciprocal trading region in the world—by 2001 the North American reciprocal trading region contained the largest flows of international trade in the world. This trading relationship, however, is defined through formal institutionalization (free trade agreements) at both the industry and national level. It is the purpose of this chapter to outline this formal institutionalization.

The chapter is organized as follows. The next section briefly outlines early attempts at free trade between Canada and the United States. Section 3 outlines the Canada – United States Automotive Products Agreement of 1965. Section 4 reviews the socio-economic and political context of the free trade agreements, the free trade agreements themselves, and the empirical studies investigating the effects of these free trade agreements. Section 5 summarizes and concludes.

[19] Portions of this chapter have been published in the following: Andresen, M.A. (2009). A history of Canada – United States trade relations. In W.R. Stevens (ed.) *Trade and Development: Focus on Free Trade Agreements*. Hauppauge, NY: Nova Science Publishers, 179 - 198.

3.2. EARLY ATTEMPTS AT TRADE LIBERALIZATION

The Canada – United States international trading relationship began in the middle of the nineteenth century before Canada was even an independent nation. With the United Kingdom bargaining on behalf of Canada in 1854, the Elgin – Marcy Reciprocity Treaty (EMRT) was signed and entered into force between the United States and the colonies of Upper and Lower Canada. These colonies included the contemporary provinces of Ontario, Quebec, New Brunswick, Nova Scotia, PEI, and Newfoundland, which among themselves had entered into a free trade agreement in 1850 (Crookwell 1990).

This free trade agreement was established for two primary reasons: first, the economic depression in the 1840s led the United Kingdom to fear that the provinces would move toward a union with the United States; and second, the Agreement was expected to resolve a North Atlantic fishing rights dispute with the United States.

In order to mitigate the potential merging of the Canadian colonies with the United States, the United Kingdom entered into negotiations with the United States for a trading agreement. The hope of the United Kingdom was to provide the Canadian colonies with the benefits of access to the U.S. market, without severing their ties to the United Kingdom. As a colony of the United Kingdom, the Canadian colonies were directly linked to the economy of the United Kingdom, providing valuable primary resources. If the Canadian colonies formed a union with the United States this valuable economic link would be at risk, however. This issue, along with the need for negotiations regarding North Atlantic fishing rights prompted the negotiation of free trade so the United Kingdom could maintain its colonial presence in North America (Crookwell 1990).

The EMRT was concerned with only natural resources and agricultural products, but as a portion it represented two-thirds of all Canadian merchandise trade at the middle of the nineteenth century. During the tenure of the EMRT, the issue of a customs union emerged repeatedly, predominantly urged by the United States. But the Canadian colonial tie to the United Kingdom was a major stumbling block to any such union.

Despite its popularity, the EMRT was terminated by the U.S. Senate in 1866. This was partly because of the United Kingdom's support for Confederates during the United States Civil War, and partly because of the general rise of protectionism (Crookwell 1990; Fry 1987; Stevens 1987; Velk and Riggs 1987). Canada repeatedly tried to re-establish the treaty without success. But when the United States moved to re-establish the treaty in the 1880s, Canada had begun its own protectionism as it strove to develop its own indigenous manufacturing industries rather than fostering international trade (Crookwell 1990).

Within the Colonial Conference of 1907, having the goal of stimulating international trading agreements with other countries, the Canadian government reconfigured its tariff structures with the world. This reconfiguration instituted a new tariff level for all countries with which Canada did not have an international agreement (bar the United Kingdom). Canada had some success in establishing international trading agreement with France, Italy, and Japan during this time. But because of the colonial nature of the conference, the United States was not included in any of Canada's international trading agreements. Consequently, the United States accused Canada of discriminatory trading practices, setting off a tariff war between the two countries. In order to resolve the dispute, the two nations entered into negotiations for an international trading agreement of their own, covering tariff and non-tariff barriers, to be established in 1911, after a Canadian election. The Conservative Party that won the 1911 election never put the agreement to a vote, although the Agreement was passed in the United States. The Canadian public view was that a free trade agreement with the United States would threaten Canadian nationality and the Canadian connection to the United Kingdom (Stevens 1987). This was despite the fact that the 1911 agreement was more modest than the EMRT, though broader in scope (Crookwell 1990; Fry 1987).

The 1930s saw two trade agreements between Canada and the United States (1935 and 1938). Both these agreements were largely negotiated to counter the extreme protectionism that both countries were practicing in the early 1930s following the Great Depression, rather than a move towards free trade as such (Fry 1987). The extreme protectionism that arose in the 1930s was the result of trying to insulate local economies from the oscillations in the global economy. It was believed that the effects of the Great Depression could be mitigated by trade protectionism that isolated the national economy from the troubled international economy outside (Fry 1987).

Although there was a failed attempt at free trade negotiations with the United States in 1948, Canada's international trading relationships in the immediate post-war years focussed on the General Agreement on Tariffs and Trade (GATT). The GATT was established in the wake of the Second World War (1947) to foster a multilateral trading system. Initially, the GATT mainly dealt with tariff reductions, but later moved into non-tariff barriers to trade, as well as rules of international competition (WTO 2006). From 1947 through to the mid-1960s, Canada was involved in the six GATT negotiations on tariff reductions. Only when industry crisis emerged in the mid-1960s did Canada's international trade attention turn from global free trade to the possibility of free trade with the United States. This occurred through negotiations of the Auto Pact.

3.3. THE AUTO PACT

3.3.1. Automotive Trade Before the Auto Pact

The automobile industry in Canada had modest beginnings in 1904 when the Ford Motor Company of Canada came into being. In order to protect the new industry from international competition, Canada imposed a tariff rate of 35 percent on the United States (though this number appears to be arbitrarily high, it was inherited from the carriage building industry). Additionally, Great Britain was not immune, having a lower, though significant, 22.5 percent tariff imposed by Canada. These tariff rates were extremely high compared to tariff rates today, but they were comparable, or lower, than the rates imposed at the time by other automobile producing nations such as the United States, Great Britain, and France. Though there were small changes, the tariff rate scheme for the industry was completely overhauled in 1936, and these tariffs remained fundamentally unchanged until the 1960s (Bladen 1961). The new scheme granted tariff free status to automobiles and parts originating from Great Britain and a 17.5 percent tariff for other countries, including the United States. Some Canadian automotive production sectors deemed sensitive to import competition, however, were protected by a 22.5 percent tariff rate for countries aside from Great Britain (Wonnacott 1965).

While the Second World War disrupted demand in general, once hostilities ceased the pre-war pattern resumed in which Canada and the United States essentially possessed two separate automotive operations although dominated by the same firms. With high tariffs still holding, Canada in effect had a miniature version of the automotive industry in the United States (Holmes 1983; Holmes 1992). General Motors, Ford, and Chrysler (hereafter referred to as Big Three) invested in Canada's industry because of a potentially lucrative market, despite inefficient production levels resulting from the high degree of protection and a small market size. The Big Three all found this satisfactory: firms had an oligopolistic market structure and high profits; automotive workers' unions and automotive parts producers did not compete internationally; and the Canadian government had a national industry. The losers, however, were the consumers who paid high prices for finished automobiles (Nelson 1996).

However, the market would not stay lucrative for long. Because of the high degree of protection and corresponding lack of investment, the Canadian automobile industry's international competitiveness faltered during the 1950s. Though the Canadian industry was protected, its productivity was too low to compete with imports, even after the tariff was considered. Without investment in Canada because of its small market and lack of sufficient investment returns, the productivity of Canadian automotive producers fell significantly behind that of other countries—high unit costs in Canada were also due to short production runs. Simultaneously, and most likely because of the rapid economic expansion in the post-war period, strong domestic demand forced Canada increasingly to import automobiles, despite the high tariffs (Holmes 1993). Even with the high tariffs imposed on outside automobile manufacturers selling to Canada, they were still able to compete. The result was that even though domestic demand for automobiles was rising, Canadian output and employment in the automobile sector fell: from 1955 – 1960, output fell from 375 000 to 326 000 units and employment fell from 53 000 to 42 000 (Holmes 1983).

For the first time since its inception, the Canadian automobile industry was facing international competition. Because of the importance of the automobile industry to Canadian employment, income, and international trade, political pressure mounted for a Royal Commission to investigate the competitive position of the Canadian automobile industry. The result was *Report: Royal Commission on the Automotive Industry*, hereafter referred to as the Bladen Report.

The Bladen Report made seven recommendations for the automotive industry. They were based on the assumption that it was necessary for the number of firms within the industry to decline in order to increase the length of production runs. In turn, this would allow such firms to take advantage of economies of scale and reduce their unit cost, becoming more internationally competitive. The first six of these recommendations involved changes in the automotive industry at both the domestic (sales and excise taxes) and international levels (tariff rate changes). Although the first six recommendations were important, the most important and original recommendation was the ``extended content plan'' (Johnson 1963: 212). This plan was meant to increase the level and efficiency of protection for the automotive industry through a balance of free trade and protectionism.

As the name of the recommendation suggests, the (Canadian) content of the imports determined whether or not the item imported fell under free trade or protectionism. If sufficient Canadian content was present in the imported item, it would receive duty-free status. If the Canadian content requirement was not satisfied, the standard customs tariff would apply. The content requirement was ``extended" because it did not matter where the automobile or automotive parts were produced, only that a certain portion of the final factory cost was produced in Canada. The purpose of this aspect of the recommendation was to promote Canadian exports of automotive parts that would be used in final automotive product imports (Bladen 1961). Following this *Report*, important changes to the automotive industry were implemented with positive results for Canada.

In Canada, both employment and output increased, pleasing the Canadian final assembly firms and their labour unions. In the United States, however, automotive parts manufacturers complained about the new Canadian competition. These firms lobbied the United States government for a countervailing duty (Nelson 1996). The upshot was that both governments began negotiations for an automotive trade agreement: the Canada-United States Automotive Products Trade Agreement of 1965.

3.3.2. The Auto Pact

The Auto Pact was a ``managed trade agreement that permits the duty-free movement of automotive parts and assembled vehicles between the two countries [Canada and the United States] subject to certain safeguards" (Holmes 2000, 651). The result was the Big Three were able to rationalize and integrate the production of automobiles and their parts within a single tariff-free market. Firms that qualified under the Auto Pact were not restricted to the Big Three; there were over one hundred such firms, such as Volvo Canada and American Motors (Canada) Ltd., but the dominant players were the Big Three.

The Auto Pact did far more than simply create a tariff-free region. The safeguards in the agreement specifically protected automotive production in Canada. The United States granted duty-free access for Canadian automobiles and automotive parts provided they met a 50 percent North American content requirement—only original equipment parts were included, not replacement parts. Canada, on the other hand, granted duty-free access to the United States on the condition that a certain proportion of production and value added was guaranteed to take place in Canada. Specifically, American firms needed to achieve a certain level of production to domestic sales ratio (in the case of passenger cars, the required level is more than 100 percent); the amount of value-added for automotive production in Canada must be at least the value achieved in 1964; in each year, automotive production was to achieve a certain level of Canadian value added (CVA), which is not limited to the value of Canadian car components, but includes services supplied in Canada (generally, more than 60 percent of the production is required); and finally, there would be a one time increase in the Canadian value added to occur over a three year period (Fuss and Waverman 1992). These production safeguards clearly distinguish the Auto Pact from a free trade agreement, hence my use of the more restrictive term tariff-free region, above.

These stipulations were viewed as quite onerous by the United States. In fact, the United States argued that they should be considered temporary and phased out over time. But, no such phasing out was agreed upon. Despite these concerns by the United States, restrictions on the automotive industry have not been binding. In fact, the production to sales ratio had generally increased from approximately 100 percent in 1980 to almost 250 percent by 1996—the latest available data. The Canadian value-added requirement, though more volatile than the production to sales ratio, has also remained well above its minimum level. It should be noted, however, that the only stipulation in the Auto Pact were the minimum threshold levels. These thresholds could be exceeded, but any increases over the minimum levels were not to become binding.

International trade in the automotive industry for Canada saw significant expansion from the mid-1960s to the mid-1970s, and is continuing today. The particular nature of the international trade flow expansions favoured exports over imports, improving Canada's international trade balance with the United States, and the world. With the implementation of the Auto Pact, the Canadian industry experienced a significant rationalization of production. The number of models produced in Canada, and specifically within each firm, drastically reduced in order to take advantage of economies of scale.

As a result, the Canadian automotive industry became relatively competitive and efficient. Despite this competitive advantage, however, the Canadian industry was limited (Holmes 1996). The government provision of medical health care, and later the relatively low value of the Canadian dollar, provided Canada with a relatively inexpensive labour force (15 – 20 percent labour costs savings over the United States). Consequently, Canada attracted a disproportionately large share of labour intensive production such as final assembly and particular labour intensive automotive parts, whereas the high value added production of body stampings, engines, and transmissions were located in the United States. This geographical division of labour of operations led to a ``distinctive pattern of trade between Canada and the United States'' (Holmes 1993, 26): an international trade surplus in automobiles and an international trade deficit in automotive parts for Canada. The decision making processes were also geographically segregated because the head offices of the Big Three were all in the United States.

Despite Canada's position in the geographical division of production in the automobile industry, this first move toward integration with the United States through free trade agreements have been a success (Holmes 1996). Production, employment, imports, and exports have all expanded significantly since the inception of the Auto Pact, increasing the wealth of the Canadian economy. These expansions dominated in particular regions, namely central Canada, and Southern Ontario especially. However, the development of economic instabilities beyond that of the automobile industry led Canada to push for a free trade agreement at the national level with the United States rather than being circumscribed to one (albeit important) industry.

3.4. FREE TRADE IN NORTH AMERICA

3.4.1. Why Free Trade? Why Now?

The early-1980s were a time of great socio-economic and political uncertainty for Canada. Four factors were important. First, the 1981 – 1982 recession with its corresponding high interest rates, high unemployment, and particularly important for Canada, volatility in commodity prices. By the early 1980s, Canada – Untied States international trade flows were the largest international trade flow in the world, in large part because of the Auto Pact. Consequently, 70 percent of Canadian exports and imports were sent to and from the United States which meant that almost 20 percent of the Canadian economy was directly tied to the United States through international trade flows—a great deal of Canadian economic dependency on the United States

(International Monetary Fund 2005a, 2005b). And because of this dependency, the need for open and assured access to the U.S. market for exports was reinforced.

Second, during the recession, the United States began to move toward protectionist trade policies. United States' industries that were considered vulnerable to international competition fell under protectionist policies call ``trade remedy" laws. Many of these industries were particularly important for Canadian exports such as softwood lumber, fish, pork, and steel. Though there was no immediate threat for any of these exports at the time, Canada clearly needed to limit the scope of any unilateral trade restrictions made by the U.S. policy-makers.

Third, on the international front, there was a perceived decline in the GATT's ability to regulate world trade effectively as well as protecting Canada's international trade interests. Specifically, the Tokyo Round of the GATT had failed to advance trade rules to foster international trade, and most of the ``trade remedy" laws against Canadian exports were consistent with the GATT through an escape clause that allowed GATT members to temporarily escape from their GATT responsibilities if domestic industries were suffering serious injury from import competition.

And finally, the emergence of new international competition in world markets because of multilateralism that was successful through the GATT forced Canada to consider its place in a globally competitive world (Smith and Stone 1987). Canada may have had a strong economic relationship with the United States, but its exports were threatened by new competition from East Asia. As with the automotive sector in the 1950s and 1960s, Canada's manufacturing sector was partially confined to its small domestic market. Therefore, Canada needed to expand its free trade relationship with the

United States far beyond the narrow, though significant, scope of the automotive industry. This would potentially increase economies of scale and encourage the rationalization of many industries in order to benefit them as the automotive industry benefited from these same changes years before. Therefore, Canada either had to become more global or tie itself more directly to the United States. The Canadian Conservative government at the time chose the latter.

In 1985, in hopes of reducing Canada's socio-economic and political uncertainties, the Canadian government requested a comprehensive free trade agreement with the United States. The request was made despite the fact that in 1985, 85 percent of all Canadian exports to the United States crossed the border duty free, with the remaining average (value-based) tariff rate being 4 percent—these zero and low tariff rates were in large part due to the Canada – United States Automotive Products Agreement of 1965 and Canada's dedication to the successive rounds of the GATT negotiations. Given the high degree of economic dependence on the United States, Canada was vulnerable to unilateral action from the United States through foreign trade policy changes without the protection of the GATT, and sought to minimize this vulnerability through a negotiated free trade agreement so Canadian exports to the U.S. economy would not be lost (Coffey et al. 1999).

Thus, Canada's primary objectives in free trade negotiations were greater certainty in U.S. trade laws and market access to the United States through decreased tariff rates. The United States, on the other hand, was not faced with the socio-economic and political uncertainties of Canada. Consequently, the United States was more focused on rule-making in trade relations: no new trade barriers; agreements on services, investment, and intellectual property rights; and resolutions to long-standing trade disputes, particularly automotive subsidies to non-Auto Pact automotive producers in Canada. These issues were of prime concern for the United States because of its increasing trade in services, the desire to be able to invest without restrictions in Canada, to protect the ever-increasing role of less tangible subject matters such as performances and digital media, and to mitigate international competition in the automotive industry that was channelled through Canadian investment incentives to Japanese automobile producers.

In general, both countries hoped the CUFTA would further the multilateralism process by stimulating more free trade agreements, as well as functioning as a ``fallback'' if the GATT (WTO) process broke down. At the domestic level, both Canada and the United States also aimed for inter- and intra-industry specialization (the rationalization of production) in order for both countries to benefit from the Agreement. This rationalization would, in turn, increase the competitiveness of each country in a global context to promote export-led growth and reduce each country's trade imbalance with the rest of the world, particularly the United States (Schott 1991). Additionally, the rationalization of production would mitigate the threat of U.S. foreign trade policy changes, decreasing the need for the GATT to intervene in Canada-U.S. trade relations.

3.4.2. The Canada-U.S. Free Trade Agreement

At the time, the CUFTA was the most comprehensive free trade agreement negotiated and implemented between any two nations. For the first time, the CUFTA established a bilateral and contractual institutional base to manage a bilateral trade and economic relationship. The Agreement also introduced the concept of non-discrimination: a firm's nationality would not determine competitive bidding prospects (Hart 1989; Waverman 1991). And importantly, for the international trading regime and multilateralism in general, the CUFTA is consistent with the GATT/WTO. Tariff barriers between Canada and the United States were negotiated to fall, but non-member tariffs remained unchanged. Despite the obvious discrimination in tariff rates, no new barriers were created with the rest of the world, so the average tariff rate for the world fell (see Bhagwati (1999) for a critical discussion of this issue). In fact, because of increased efficiency and productivity through rationalization, and the Agreement countering the worldwide short-run protectionist trend resulting from global economic recession, some argued that the CUFTA's `` new agreements on dispute settlement, services, and investment…[could be a basis]…on which GATT negotiators c[ould] build and develop better multilateral accords" (Schott 1991: 81).

The CUFTA as a free trade agreement can be broadly classified into three conceptual categories: trade liberalization, rule-making, and standstill. Trade liberalization is probably the most ``visible'' portion of the CUFTA. Tariffs on most goods were to become zero within ten years—less progress was made with non-tariff barriers. More government contracts were to be opened to competitive bidding, which is the so-called national treatment of firms that states any firm from either Canada or the United States is to be treated without consideration of their nationality.

With respect to rule-making, the CUFTA established: legal frameworks that allow businesses to operate in both Canada and the United States; a trade dispute resolution mechanism; investment policies; government policies that prevent national bias (similar to the national treatment of firms); and, cross-border travel by businesspersons to stimulate the trading and investment relationships between the two countries.

Finally, standstill refers to aspects of the CUFTA that preclude any return to protectionist policies by stating that any new restrictions and/or barriers cannot be greater in magnitude than before the Agreement. It should be noted that the CUFTA does not prevent future attempts at protectionism, but requires that policies be transparent (Schott 1991).

Despite these great strides forward in trade liberalization, rule-making, and standstill the CUFTA has significant limitations and comes nowhere near the level of trade/economic integration present in the European Union (Waverman 1991). Admittedly, the purpose of the CUFTA was not to attain the level of integration in the European Union, but to solidify an already existing trading relationship. Nevertheless, there was still much work on trade relations to be done: agriculture is only partially covered; the textiles industry is severely constrained, and beer is excluded from the Agreement completely; the liberalization of services and investment is quite limited; the CUFTA is not concerned with the liberalization of the factors of production, particularly labour mobility; and barriers to international trade with third parties are not covered (Waverman 1991). However, whether the CUFTA is judged by its great strides forward or its limitations, it is a document that has a significant role in the nature of the Canadian economy because of the high degree of economic interaction with the United States.

3.4.3. The Effects of the CUFTA

Because the Canada – United States Free Trade Agreement (CUFTA) is still quite recent, research on the effects of this free trade agreement on the members' national economies is not in great abundance. However, research on the CUFTA has emerged in the past few years.

One of the prime concerns regarding regional trade agreements, or regionalism, such as the CUFTA and the NAFTA, is that member countries will concentrate their international trading relationships solely with member countries, leading to decreased multilateralism and decreased world welfare (Bhagwati 1999). With respect to the CUFTA, very little meaningful evidence is found to date to justify this concern. Clausing (2001) finds that there is substantial trade creation (intra-regional international trade growth) resulting from the CUFTA, with little evidence of any trade diversion. Supporting this claim, Krueger (2000) finds that not only is there little evidence of trade diversion in the aggregate, but this result holds across almost all commodity categories as intra-North American trade increased as a whole. Using a finer degree of data aggregation, Fukao et al. (2003) finds that there is significant evidence of trade diversion for U.S. international trade flows in textiles, apparel, and footwear products, particularly to Asia. Rather than previously importing these goods from Asia, they are now being sourced from NAFTA countries, predominantly Mexico.

However, as pointed out by Coughlin and Wall (2003) and Wall (2003), a preferential trading area such as the CUFTA or the NAFTA may alter the spatial distribution of production in one of two related ways. First, with the addition of Mexico to the preferential trading area in North America, the mean centre of the NAFTA countries' consumers shifted south by a large degree. In order to minimize transportation costs to all potential consumers a firm may choose to relocate further south, from New Jersey or Ontario to Arizona, for example. In so doing, the firm alters its transportation costs to non-partner areas as well such as to Asia and Europe: reduced transportation costs to Asia and increased transportation costs to Europe—of course, this all depends on where the new centre is located. This adjustment, in turn, may alter the sourcing of imports giving the illusion of trade diverting behaviour. And in the context of Canada and the United States, the effect of this spatial re-distribution of firms is only amplified if the focus is the provinces and states. So, even if non-partner country international trade does not change, there will be the illusion of trade diverting behaviour at the subnational level (provinces and states) (Coughlin and Wall 2003; Wall 2003). Secondly, the firm may relocate directly into Mexico without being punished by tariff barriers. This alters the flows of commodities potentially turning exports from the United States to imports to the United States from Mexico. If the United States initially imported that commodity from outside of the NAFTA and then exclusively imported its ``own" commodity from Mexico after the NAFTA due to a lower cost, trade diversion will also appear to be taking place (Coughlin and Wall 2003; Wall 2003).

Despite the geographical complications to measure and assess trade diversion it is commonly investigated in studies on the effect of the NAFTA (see Fujita et al. 1999, Hanson 1996, 1998a, 1998b, Krugman 1998, and Krugman and Hanson 1994). The phenomenon of measuring trade creation and trade diversion is also particularly curious because neither the CUFTA nor the NAFTA stipulated any changes in non-member tariff rates. In fact, tariffs between the NAFTA countries and the rest of the world continue to fall through the trade negotiations within and through the World Trade Organization (WTO 2006). Therefore, the appearance of any trade diversion is likely due to the geographical complications in measuring trade diversion outlined above. As such, the investigation of trade diversion is not undertaken in the present analysis.

With regard to the expected rationalization of production resulting from decreased trade barriers (Schott 1991), Head and Ries (1999) find that Canadian manufacturing output per plant has increased dramatically (about 34 percent) and the number of plants has decreased dramatically (about 21 percent) during the six years after the CUFTA came into effect. However, the CUFTA is only partially responsible. The substantial rationalization in Canadian manufacturing is partially due to the measurement error on the part of Statistics Canada and also because of industrial re-organization and the reduction of (U.S.) tariff rates. Consequently, the CUFTA was only found to have been responsible for less than 10 percent of the increased labour productivity in Canadian manufacturing firms.

Overall, the measured effect of the CUFTA on Canada is positive at the national level. Trefler (2004) notes that manufacturing output and employment decreased in the years following the CUFTA, but it is difficult to assess the independent effect of the CUFTA because of the recession that ensued at the same time it entered into force (Gaston and Trefler 1997). International trade flows, on the other hand, have increased in magnitude much greater than expected, with more than one-half of the international trade flow increases attributable to the CUFTA (Clausing 2001; Schwanen 1997). The industrial sectors that achieved the most significant tariff decreases typically had the greatest growth in international trade flows. And for these industries that were substantially impacted by the CUFTA, the tariff cuts not only explain almost all of Canada's increased international trade flows with the United States, but also the increased share of the United States in Canadian international trade flows (Clausing 2001; Schwanen 1997; Trefler 2004). Not surprisingly, Canada experienced unprecedented import and export expansion during the 1990s that cannot be explained without considering the CUFTA.

3.4.4. Another Free Trade Agreement in North America?

No sooner did the CUFTA enter into force then negotiations began over another free trade agreement in North America. In March 1990, the United States and the United Mexican States (Mexico) announced their intention to establish a free trade agreement of their own (Cameron and Tomlin 2000). Superficially, the agreement was of little concern to Canada. In 1993, the year before Mexico entered into a free trade agreement with the United States, the vast majority of Canada's 1993 international trade flows were with the United States (exports = 79.8 percent, imports = 67 percent), followed by East Asia (exports = 9.0 percent, imports = 14.8 percent), the European Union (exports = 6.2 percent, imports = 9.7 percent), and finally Mexico (exports = 0.5 percent, imports = 2.3 percent). Trade access with Mexico was simply not an issue for Canada.

However, access to the U.S. economy was important. If the United States and Mexico established a comprehensive free trade agreement, similar to that of the CUFTA, Canada's access to the U.S. economy may have been threatened. Just as the CUFTA had the potential to be trade diverting for non-CUFTA countries, so could the United States – Mexico free trade agreement. Mexico had a significant labour cost advantage over Canada that would only be increased through efficiency and productivity gains resulting from the rationalization of production (Cadsby and Woodside 1993; Hart 1989; Waverman 1993; Weintraub 1991).

Consequently, in January 1991, Canada sought negotiation status with the United States and Mexico to ensure access to the U.S. market yet again. Rather than having foreign trade policies of other nations dictate Canada's role in the global economy, Canada played an active role in those foreign policies potentially achieving further gains in efficiency and productivity from scale economies and rationalization, improving Canada's overall position in the global economy. (Coffey et al. 1999; Whalley 1993).

3.4.5 The North American Free Trade Agreement

The result of the negotiations between Canada, Mexico, and the United States was the North American Free Trade Agreement (NAFTA). The document is over 1000 pages long and was negotiated during a recession among very unequal (in terms of economic power) nations. Historically speaking, the NAFTA became the most comprehensive free trade agreement negotiated between regional trading partners, superseding the CUFTA, and is the first free trade agreement negotiated between an industrializing country and industrialized countries (Hufbauer and Schott 1993). Moreover, the NAFTA extended the scope of the CUFTA with respect to Canada – United States international trading relations.

The negotiations of the CUFTA went rather unnoticed by the U.S. public, with lively debate on the Agreement in Canada—the CUFTA became an election issue in 1988. The NAFTA, on the other hand, was different. The Canadian public saw it as just another international trade agreement with the United States. The U.S. public saw it differently. The most remembered public debate on the NAFTA in the United States revolved around Ross Perot's attacks on the NAFTA and the ``giant sucking sound'' of U.S. jobs moving to the Mexican economy. For Canada, the NAFTA incorporated the

CUFTA and allowed the Canada - U.S. negotiations to be re-opened on subsidies, countervailing duties, anti-dumping duties, and intellectual property rights (Coffey et al. 1999). The first three of these trade issues were particularly important for Canada, whereas the last issue was particularly important for the United States.

The most notable aspect of the NAFTA is the trade liberalization through tariff reduction between the three countries: tariff rates eliminated over a 10 – 15 year period, with products that were deemed more sensitive to import competition maintaining tariff protection for a longer period of time. Despite this lengthy transition, 50 percent of all tariff rates were eliminated as of 1994, and Canada – United States tariffs continued on their complete tariff rate phase-out according to the CUFTA, and completed in 1998. The Agreement also included a commitment to decrease non-tariff barriers such as quotas and import licenses, particularly with United States – Mexico trade in agriculture, and to permit an easier flow of business and professional people across both national borders through the use of temporary migration VISAs (Coffey et al. 1999; Hufbauer and Schott 1993; Weintraub 1993).

As with the CUFTA, the NAFTA contains rules of origin in determining whether or not a product qualifies for the NAFTA tariff rate—essentially, a certain portion of the product must be produced within the free trade area to qualify. These rules of origin increased significantly in the automotive and textiles/apparel sectors—viewed as increases in the degree of protectionism between members of a free trade agreement (Cadsby and Woodside 1993). In the automotive sector, the ``domestic'' content of the automobiles and engines went from 50 percent (1994) to 56 percent (1998) to 62.5 percent (2002). This increase is believed to be significant because any domestic content requirement above 60 percent requires large investments in power train manufacturing (engines and transmissions), potentially having a deleterious effect on Japanese automotive investment in Canada (Waverman 1993). Due to increases in Japanese automotive investment in Canada, however, those concerns were premature. Similarly with textiles and apparel, the rules of origin became more restrictive as a result of the NAFTA. Even though there has been the elimination of tariff rates and non-tariff barriers on NAFTA trade, very few products qualify under the NAFTA within textiles and apparel. For example, textiles and apparel products must be produced from yarns made in one of the NAFTA countries to qualify for the full NAFTA benefits. This is considered a ``schizophrenic result'' of the Agreement (Hufbauer and Schott 1993: 3).

Other aspects of the NAFTA include: agreements on labour and the environment, though considered more ``symbolic gestures'' than substantive agreements (Cadsby and Woodside 1993); an expansion of the dispute settlement procedures to include Mexico, but to include a permanent supranational institutional body that may be effective in government trade relations for the member countries; a slight broadening of the scope for financial service liberalization, as well as services in general; moderate liberalization in land transportation services; and the explicit protection of intellectual property rights, a U.S. objective in the CUFTA negotiations (Cadsby and Woodside 1993; Hufbauer and Schott 1993).

Notable omissions from the NAFTA include the energy sector and the exclusion of future tariff and non-tariff abrriers to international trade flows. The energy sector, aside from moderate access to the Mexican oil and gas market (Hufbauer and Schott 1993) and a provision for U.S. utility companies to honour existing contracts with

Canadian energy providers, is generally immune to free trade. Significant impediments to international trade flows, also unresolved in CUFTA negotiations, such as anti-dump and countervail procedures against member countries continues to be an issue in Canadian trade—softwood lumber, for example. Regardless of the fact that a large portion of the NAFTA documents deals with exceptions to free trade and the restrictions/limitations therein, the NAFTA is a ``move toward greater freedom in economic relations among the three [member] countries'' (Weintraub 1993). The obvious question to ask now is what effect the NAFTA has had on Canada – United States international trade flows

3.4.6. The Effects of the NAFTA

Gould (1998) is the first study to test the independent effect of the NAFTA. Though Gould (1998) only has international trade data through to 1996, his data are measured quarterly to obtain a large number of post-NAFTA observations for statistical testing. In order to control for the general rise in international trade flows over the study period, Gould (1998) investigates the quarter-to-quarter changes in international trade flows. Additionally, Gould (1998) only uses trade flows both originating and destined for the NAFTA countries. Using a 90 percent confidence interval to determine whether or not the NAFTA has impacted international trade, Gould (1998) does find statistical support for the NAFTA producing increases in United States – Mexico international trade flows, particularly imports from Mexico, but finds that the impact of the NAFTA has been statistically insignificant for Canada with both the United States and Mexico. Despite this statistically insignificant finding, the effects of the NAFTA on Canada are found to have positive signs and are likely due to the relatively small number of post-NAFTA observations.

Krueger (1999) comes to a similar conclusion for Canada using a gravity model of international trade. This study differs from Gould's (1998), aside from the statistical model, in that it contains data for the NAFTA countries' international trade flows with non-NAFTA countries, and the Canada – United States, United States – Mexico, and Canada – Mexico effects are not measured separately. Though finding that the NAFTA has decreased NAFTA country imports from non-members, the NAFTA has an insignificant, though positive, effect on the NAFTA countries. The results for Krueger (1999) are substantially different for the case of United States – Mexico international trade flows than those found by Gould (1998). This difference is likely due to aggregation bias. Gould (1998) finds that the effects of the NAFTA on Canada are all statistically insignificant, whereas United States' exports to Mexico are marginally significant and United States' imports from Mexico are statistically significant—if Gould (1998) had used a 95 percent confidence interval, United States' exports to Mexico would not have experienced a statistically significant positive effect from the NAFTA. The entire effect of the NAFTA is insignificant for Krueger (1999) and Canada – United States international trade flows dominate the international trade flows within North America as a whole. Therefore, within Krueger's analysis, the insignificant effect of the NAFTA on Canada – United States dominates Krueger's (1999) total intra-NAFTA effect. Additionally, Krueger (1999) only had four yearly post-NAFTA observations in her data set, likely contributing to the insignificant results.

The last national analysis of the effect of the NAFTA, by Romalis (2005), is the most comprehensive—Fukao et al. (2003) investigate the effects of the NAFTA, but only regarding trade diversion. Romalis (2005) states that empirical studies investigating the effect of the NAFTA have had difficulty identifying such an effect using nationally aggregated trade data for two reasons. First, Mexico's economy began to internationalize in 1986 and, second, the Peso devaluation that occurred in 1994 – 1995. Consequently, Romalis (2005) uses commodity level data to bypass these national effects. Using a sophisticated theoretical model and corresponding estimation procedure—sophisticated relative to the previously discussed studies—Romalis (2005) finds that the NAFTA has had a substantial impact on international trade flows, but only a modest impact on welfare in the NAFTA countries. This establishment of the positive impact on international trade flows is critical because as stated by Gould (1998), the NAFTA can only impact welfare if it alters international trade flows.

Romalis (2005) is the first national level analysis of the effect of the NAFTA to find an overall positive effect, but it does have its limitations—the unit of analysis for Romalis (2005) is the commodity, and he aggregates those results to the national level. First, Romalis (2005) states that the use of commodity level data avoids the difficulties with the internationalization of the Mexican economy since 1986 and the Peso devaluation from 1994 – 1995. This may be the case, but there are other ways to control for these effects and maintain a more aggregate level of analysis. Most of the studies discussed above use either a time trend variable or year specific dummy variables to control for the general increase in global international trade flows and, hence, the opening up of the Mexican economy during that period. If the Mexican growth of internationalization is considered as potentially biasing the statistical results, a time trend variable or year specific dummy variables specific for the Mexican economy may be included, and tested for significance. Similarly, most studies of the effects of the NAFTA either include an exchange rate variable or they adjust trade volumes based on the exchange rate. Either of these techniques, particularly the former, would capture the Peso devaluation. The use of commodity level data then is not strictly speaking a limitation but it was not necessary to control for the effects of Mexico's internationalization and currency issues. Therefore, the problems associated with Mexico's case are easily avoided.

The second limitation lies in the specification of Romalis' (2005) trade model and relates back to the difficulties in measuring trade diversion. Romalis (2005) does find a positive effect for the NAFTA, but also finds significant trade diversion as well. Previous analyses of the effects of the NAFTA have found little support for any trade diversion under the NAFTA, a result that is intuitive given that neither the NAFTA, nor the CUFTA before it, contain any stipulations regarding non-member tariff barriers. Romalis' (2005) finding of significant trade diversion is most likely linked to his specification of product variety. He assumes for simplicity in modelling that product varieties are horizontally differentiated based on the country of origin. This means that all varieties are considered to be the same quality, but differentiated only on the ``Made in …'' label—the same type of product differentiation is used in Krugman's (1979, 1980, 1981) model of international trade flows with increasing returns to scale, a type of horizontal product differentiation that is usually put in terms of blue cars versus red cars. This is precisely the difficulty discussed above regarding product quality, commodity classifications, and trade diversion. Therefore, though instructive with the positive effect of the NAFTA at a national level, Romalis (2005) introduces just as much potential for error in his use of commodity level data as he tries to avoid from the use of aggregate trade data.

Coughlin and Wall (2003) is the first paper to study the geography of the effects of the NAFTA, albeit on the U.S. states. Employing a rather parsimonious gravity model of international trade, Coughlin and Wall (2003) find that the overall effect of the NAFTA on United States' exports to Canada are positive and statistically significant, a 15 percent increase in international trade flows. Though a modest increase in international trade flows resulting from a free trade agreement, this increase is significant as it is in addition to the gains from the CUFTA. Geographically, thirty-six U.S. states had a greater than 10 percent increase in international trade flows with Canada, while eleven U.S. states exhibited little change (- 10 to 10 percent), and four U.S. states had a decrease of more than 10 percent. When the individual U.S. states are aggregated into the nine Bureau of Economic Analysis regions, however, all U.S. regions indicate positive change for international trade flows with Canada resulting from the NAFTA. This is clearly a result of aggregation bias and the modifiable areal unit problem that shrouds the geography of the effects of the NAFTA, that is, the sub-national regional results are not genuine.

And lastly, with a Canadian geographical focus on the effects of the NAFTA, Wall (2003) investigates the effects of the NAFTA on three Canadian regions (western, central, and eastern Canada) on international trade flows with the nine Bureau of Economic Analysis U.S. regions using a parsimonious gravity model of international trade similar to that of Coughlin and Wall (2003). Overall, Canada's exports and imports to and from the United States are up respectively 29 and 14 percent, as a result of the NAFTA representing a large magnitude change for Canadian exports to the United States. Geographically, the effects of the NAFTA vary substantially. Eastern Canada undoubtedly suffered in both their exports and imports to and from the United States resulting from the NAFTA respectively down 9 and 13 percent. In contrast, central Canada exhibits large increases in both exports to and imports from the United States resulting from the NAFTA respectively, up 43 and 18 percent. And western Canada demonstrates a 0.9 percent increase in exports to the United States and a 0.5 percent decrease in imports from the United States leading Wall (2003) to claim that the overall impact of the NAFTA on western Canada is insignificant.

Though extremely instructive regarding the geography of the effects of the NAFTA on Canada's economic landscape, Wall (2003) uses relatively coarse Canadian regions to investigate the effects of the NAFTA on Canada. When Coughlin and Wall (2003) aggregated the individual U.S. states into nine regions their results changed significantly, no longer showing that some U.S. states traded less with Canada after the NAFTA entered into force—likely shifting their trading relationships southward to Mexico. Likewise, a similar effect can be expected to be present for Canada because the provinces within each of Wall's (2003) Canadian regions are also individually diverse economies.[20]

[20] Another issue regarding the political geography of Canada – United States international trade, undertaken most notably by McCallum (1995) and Helliwell (1996, 1998), is the so-called ``border effect''. However, this issue is covered in chapter 5.

3.5. CONCLUSION

This chapter has provided a brief outline of the history of Canada – United States international trade relations with the presentation of empirical evidence of the effects of the CUFTA and the NAFTA for reference in the following chapters. The formal institutionalization of the relationship between Canada and the United States dates to the 19th century before Canada's confederation, but began its present trajectory in 1965. The Auto Pact and the CUFTA have been found to have a positive impact on international trade flows between Canada and the United States, but the effects of the NAFTA n Canada have been more elusive.

With this background of the international trading relationships between Canada and the United States in mind, the following chapters of my dissertation will analyze the impact of free trade in detail at both the national and sub-national scales of analysis. The first analysis is undertaken at the national scale to act as a benchmark for further geographical analyses.

Chapter 4[21]

A national analysis of Canada – United States international trade, 1979 - 2003

4.1. INTRODUCTION

It should be clear from Chapter 3 that profound economic regulatory changes have occurred with establishment of the free trade agreements between Canada and the United States. Previous research has investigated the effects of these free trade agreements on the Canadian and U.S. economies, but such analyses are typically undertaken using international trade flows aggregated to the national level, or aggregated to the industry

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Andresen, M.A. (2006). The effects of North American trade on the Canadian economy. In K. Froschauer, N. Fabbi, and S. Pell (eds.) *Convergence and Divergence in North America: Canada and the United States*. Burnaby, BC: Centre for Canadian Studies, Simon Fraser University, 83 - 110.

Andresen, M.A. (2008). The evolving quality of trade between Canada and the United States. *Canadian Geographer* 52(1): 22 - 37.

level for the nation as a whole. Though such aggregate analyses are instructive and undertaken here, within such aggregations great variation in the type of trade exists.

The international trade in goods is generally separated into inter-industry trade and intra-industry trade. Inter-industry trade is based on comparative advantage: each country exports the good it has a comparative advantage in to the other country. Therefore, the goods traded are distinct from each other, originating from different industries, trading food for clothing for example. This type of trade is a reciprocal relationship, but because each country imports and exports different goods, this type of trade is referred to as one-way trade: each good only travels in one direction.

In contrast, intra-industry trade is not based on comparative advantage. Rather, the more similar the countries are the more intra-industry trade the two countries will partake. The goods traded are generally not distinct from each other, but differ based on characteristics. Those characteristics may be based on quality, trading a Mercedes-Benz for a Yugo, or based on other attributes not related to quality, such as colour, shape, sound, etc. Those intra-industry goods differentiated based on quality are called vertically differentiated goods, whereas goods differentiated based on non-quality attributes (similar quality goods) are called horizontally differentiated goods. Many analyses investigating the effect of free trade agreements such as those established between Canada and the United States have used measures to distinguish between inter- and intra-industry trade, but none to date have made any distinctions between vertically and horizontally differentiated goods. This chapter employs a measurement system of international trade that distinguishes intra-industry trade flows based on quality, providing a rich assessment of the changing patterns of international trade flows between Canada and the United States.

The primary purpose of this chapter is twofold: first, to provide a comparison of Canada – United States international trading patterns before and after the implementation of free trade; and second, to provide a national analysis of Canada – United States international trading patterns to act as a baseline for explicitly geographical analyses in future chapters. The first task is undertaken using detailed commodity data for the two periods 1979 – 1988 and 1989 – 2003, allowing for differences in trading patterns before and after free trade agreements to be analysed. The second task is implicit in the first. The 1989 – 2003 analysis provides the foundation for showing the benefits of a geographical approach to international trade flows between Canada and the United States. The national level statistics presented here represent the national averages of the individual Canadian provinces. Therefore, the geographical approach taken in later chapters will show the regional differences of the impact of free trade on Canada.

Unfortunately, geographically disaggregated trade data at the provincial level are not available prior to the implementation of free trade between Canada and the United States. Canadian trade data measured at the provincial and U.S. state levels became available for the first year only in 1988, with the first analysis using these data being published seven years later (see McCallum 1995). The primary limitation imposed by this lack of data is that no comparison of the geography of Canada – United States international trade before and after the establishment of the Canada – United States Free Trade Agreement can be undertaken.

This chapter is organized as follows. The data and measurement methodology to distinguish the different types of trade is presented in the following section. The 10 years of Canada's international trade prior to the Canada – United States Free Trade Agreement (CUFTA) is discussed in section 3. Section 4 presents Canada's trading patterns since the inception of the CUFTA. And section 5 concludes that an analysis of international trade flows that includes the changes in the different trade types based on quality enriches the analysis.

4.2. DATA AND METHODOLOGY

4.2.1. Data

The data used in the analysis of 1980 – 1988 international trade patterns for Canada with the world's countries are provided by Statistics Canada (2004a). These data measure Canadian international trade flows using the Standard International Trade Classification (SITC), containing yearly trade values at the four-digit level of aggregation for both imports and exports, indicating the origin and destination at the country level.

The data used in the analysis of 1979 – 1988 international trade patterns for Canada with United States are detailed commodity-based international trade flow data provided by The Center for International Data at the University of California-Davis (see Feenstra 1996, 1997 for a detailed account of these data). These data are also provided using the Standard Industrial Trade Classification (SITC), an old classification system for international trade data. For comparability with the 1989 – 2003 time period, the SITC classifications are converted into their equivalent Harmonized Tariff Schedule classification. These data contain the yearly dollar value and quantity of products traded, allowing for the international trade flows to be decomposed into their component parts (discussed below) in order to obtain a better picture of the dynamics of Canada's and the United States' changing international trade relations.

The data used in the analysis of 1989 –2003 international trade patterns for Canada with the United States and the world are also detailed commodity-based international trade flow data, but provided by Statistics Canada (2004b). These data are measured using the Harmonized Tariff Schedule with yearly dollar values and quantities for products traded at the 10-digit (imports) and the 8-digit (exports) levels of aggregation. In order to facilitate comparisons with exports and imports, the 10-digit import classifications were recoded to match the 8-digit export classifications. All data are converted into constant 1997 Canadian dollars.

4.2.2. The Measurement of Trade Types

The analysis below uses the common measures of export, import, and total trade constant dollar values as well as international trade shares to analyze the changing trading patterns for Canada from 1979 to 2003. Though these aggregate measures of international trade flows are instructive for the investigation of international trade in general, and trade policy changes such as free trade agreements, in particular, they may still hide changes in international trade patterns. The first measure used to uncover changes in the pattern of international trade is the often-used Grubel and Lloyd (1975) index. Secondly, the Canada – United States aggregate international trade flows are disentangled into their component parts: one-way trade (inter-industry), two-way trade (intra-industry), and the specialization in the quality of that two-way trade, vertically differentiated and horizontally differentiated intra-industry trade.

Within vertically differentiated trade, both high- and low- quality goods can be identified, using the methodology below, identifying Canada's role respectively in high-quality and low-quality market trade, respectively. Horizontally differentiated intra-industry trade is referred to as medium-quality trade as neither Canada nor the United States imports or exports goods with distinctive quality differences. This terminology of medium-quality trade, however, is more of a convenience in reference to high- and low-quality market trade because both countries may be importing high-, medium-, or low-quality goods. Due to data limitations, no absolute measures of quality can be ascertained within horizontally differentiated intra-industry trade.

Though these trade measures are being used in a national analysis of international trade flows in North America (see Fontagné et al. 1997 for a study on the European Union), they are particularly instructive for a geographical approach to studying that same trade. Though not undertaken in the present chapter, there is no reason to believe that subnational regions have the same spatial distribution of trade in low-quality goods as they do for high-quality or medium-quality goods. Additionally, and arguably more interesting, by separating the various classifications of trade into high-, medium-, and low-quality goods, one can uncover the role of a subnational region within an international production system.

As discussed in Chapter 3, the removal in the automotive industry in central Canada of trade barriers led to the rationalization of production. In the case of the automobile industry, Canadian firms assumed their new role in labour intensive production due to the relative cost advantage in labour over the United States. Similar changes have likely occurred across the country. Therefore, the removal of tariff barriers may not only alter the destinations and origins of a province's exports and imports, but alter the very nature of that trade as well. In the present chapter, these measures of trade are used to provide an assessment of the effects of free trade agreements on the international trading patterns of Canada and the United States.

The first distinction in the type of trade that needs to be made is that between inter-industry and intra-industry trade. The Grubel and Lloyd (1975) Index is the most widely accepted measure of intra- versus inter-industry trade. The Grubel-Lloyd Index[22] captures the degree of overlap in trade between two countries. In the present study, trade overlap is measured at the commodity level. If the Grubel-Lloyd Index has a value of zero, there is no trade overlap and all trade is then classified as one-way trade. In this situation, each country may import and export goods to each other, but there are no overlaps between the type of goods exported and the type of goods imported. If the value of the Grubel-Lloyd Index has a value of one, then there is perfect overlap in trade between the two countries. Although the Grubel-Lloyd Index measures the degree of trade overlap between two countries, it does not indicate when trade becomes two-way trade. If the definition of two-way trade is taken literally, the simultaneous import and export of the same commodity classification, any commodity that has a Grubel-Lloyd Index greater than zero is two-way trade. More generally, we can consider trade within a commodity classification to be two-way trade when there is significant overlap[23] for

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[22] $GL_j = \frac{(X_j + M_j) - |X_j - M_j|}{(X_j + M_j)} = 1 - \frac{|X_j - M_j|}{(X_j + M_j)}$, where *j* is the industry studied, *X* represents exports, and *M* represents imports.

[23] $\text{Two-way trade if}: \frac{Min(X_{p,t}, M_{p,t})}{Max(X_{p,t}, M_{p,t})} > 20\%$, where *p* represents the product and *t* represents the year.

exports and imports in the same commodity classification. In the present analysis, significant overlap is 20 percent, but previous applications have considered 0 and 10 percent significant overlap in exports and imports. The choice in these previous applications has been arbitrary, so a statistical justification of the 20 percent overlap is presented in the technical appendix to this dissertation. Below this level, the overlap is not considered significant and, therefore, does not represent the structural feature of trade (Abd-el-Rahman 1991).

Using this criterion, an index of two-way trade can be calculated.[24] This index represents the share of trade that is classified as two-way trade and was proposed by Fontagné and Freudenberg (1997). As with the share of trade volumes, this index varies from zero to one, with one representing perfect two-way trade. It should be noted that despite the similarity in interpretation with the Grubel-Lloyd Index, the two-way trade index (TW) is fundamentally different from the Grubel-Lloyd Index; rather than measuring the degree of trade overlap between two countries, the TW index considers all trade over the 20 percent threshold to be two-way trade. However, when these two indices are compared, they are quite similar (Fontagné and Freudenberg 1997). The difference between the two indices is that TW is a measure of all trade flows that are considered to be two-way trade, whereas the Grubel-Lloyd Index only measures the degree of trade overlap with no indication of when trade becomes two-way trade. Both indices are presented below for comparative purposes.

Thus far, only one- and two-way trade have been differentiated from each other. Two-way trade, however, can be separated into three further classifications based on the

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[24] $\text{Share of Two - Way Trade} = \frac{\sum_i (X_i + M_i)}{\sum_j (X_j + M_j)}$.

quality of exports and imports. As discussed above, these quality classifications are horizontal product differentiation (characterized by products with similar quality levels with different attributes), and vertical product differentiation that is characterized by products with significantly different quality levels (high and low quality). Following Stiglitz (1987), prices are assumed to represent quality differences. Consequently, differences in the unit values (UV) or prices of these commodities are always assumed to represent quality differences. Unit values are defined for each commodity classification as the value of trade divided by the quantity traded, giving an average price of the goods traded in this category. Clearly, the more disaggregated the classification system the better this method represents the price of the commodities—a classification system such as the 8-digit Harmonized Tariff Schedule with approximately 10 000 commodity classifications captures this well.[25]

Horizontal product differentiation can then be thought of as the unit value of exports in a commodity classification being similar to the unit value of imports in that same commodity classification. However, there must be some allowance for similar quality goods to have some price variation. Therefore, a threshold of similarity needs to be established. At what point is the price difference between exports and imports considered to represent quality differences? If the ratio of the export and import unit values is within a certain threshold[26] they are considered of equal quality. As with the

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[25] The categories in the Harmonized Tariff Schedule are so specific that different commodities have different quantity measures: litres, kilograms, number, etc. while the SITC classification system is more general and uses tonnes as its quantity variable for all commodity categories.

[26] $\frac{1}{1.15} \leq \frac{UV^X}{UV^M} \leq 1.15$

degree of overlap, some justification for the quality threshold needs to be undertaken. Past research has used 15 and 25 percent quality thresholds, but the threshold in the present analysis is 15 percent.[27] This trade is considered horizontally differentiated (HD). If the ratio of the export and import unit values is greater than the threshold, there are quality differences between the goods exported and the goods imported.[28] If Canada's export unit value is greater than its import unit value for a commodity classification, Canada trades a relatively high-quality product, and if Canada's export unit value is less than its import unit value for a commodity classification Canada trades in a relatively low-quality product: vertically differentiated high-quality trade (VDHQ) and vertically differentiated low-quality trade (VDLQ), respectively. These three classifications can be used to create indices representing their shares in overall trade flows. The sum of HD, VDHQ, and VDLQ equal the total value of two-way trade (TW).[29]

The primary limitation of the data used in this study is the non-existence of quantities for every product category. Sometimes this non-existence of quantities is due to confidentiality when particular products are produced by only a few firms. However, quantity information is also missing when the same product category is recorded with multiple quantity units—different exporters and importers measure their trade using

[27] This threshold value has also been determined in the statistical analysis presented in the technical appendix to this dissertation.

[28] $\frac{UV^X}{UV^M} > 1.15 \quad or \quad \frac{UV^X}{UV^M} < \frac{1}{1.15}$

[29] $TWHD_j = \frac{\sum_{p_i \in j} \sum_{HD} \left(X_{p,t} + M_{p,t} \right)}{\sum_{p_i \in j} \sum_{Z} \left(X_{p,t} + M_{p,t} \right)}$, where *HD* represents horizontally differentiated trade, *Z* represents all trade types, $p_i \in j$ represents product *i* in industry *j*, and *t* represents the year. A similar formula is used in the calculation of the shares of two-way trade in vertically differentiated products (VDHQ and VDLQ).

different units. Despite the low degree of aggregation in these data, many products are reported using multiple quantity units, with no standardization imposed. As a result, the percentage of horizontally- and vertically-differentiated trade is often not equal to two-way trade. Therefore, the proportions of trade based on quality must be viewed as a sample of all two-way trade in most industrial sectors. To aid in interpretation, the two-way trade index (TW) is supplemented with a restricted two-way trade index (TWR) that only includes two-way trade for those quantities reported for both the import and export value—both indices are reported in Table 4.13, below. This limitation in the data does not decrease the value of implementing the above measurement methodology. In order to assess the effects of free trade agreements it is necessary to decompose trade into its component parts. This type of analysis allows for a better insight into the integration of the Canadian and U.S. economies.

This insight is gained through not only identifying the changes in the volume of international trade flows either at the national of industry level of analysis, but identifying what types of trade have increased and/or decreased. Has Canada's increases in international trade flows been from increases in low-quality trade at the expense of high-quality trade, or vice versa? If Canada's low-quality trade has increased, Canada's role in the international division of labour would be to provide cheap, labour-intensive goods originating from relatively low-paying jobs. This type of increase in international trade volumes may lead to decreases in welfare for many people due to lost wages. On the other hand, increases in high-quality trade at the expense of low-quality trade would have the opposite effect. Before turning to the changes in these indices since the inception of the free trade agreements, the preceding 10 years of Canada's international trade flows are presented to provide a context.

4.3. THE INTERVENING YEARS

Almost twenty-five years separate the implementation of the Auto Pact and the CUFTA, but the intervening years were not without change. Despite the efforts to diversify the international trading portfolio of Canada by the Trudeau Liberal government in Canada, Canadian exporters became increasingly more reliant on U.S. markets (Hufbauer and Schott 1998), tying the Canadian economy to U.S. economic performance. In the ten years preceding the implementation of the CUFTA, Canadian real GDP grew by a factor of 1.3 and international trade with the United States grew slightly faster, by a factor of 1.33, with exports (1.35) growing faster than imports (1.30).

By way of comparison, Canada's trading patterns with the world (1980 – 1988) and with the United States (1979 – 1988) before free trade are presented. Additionally, a detailed industrial sector analysis of Canada – United States international trading patterns at the industrial sector level is presented. Both are instructive because knowing the spatial distribution of international trade flows before the free trade agreements allows an interpretation of the post-free trade spatial distribution.

4.3.1. Canada's Trading Pattern with the world, 1980 – 1988

Regionally, Canadian export volumes exhibited decreases to East Asia (EA-ANZ)[30] and the European Union (EU15)[31] during the early 1980s, but exhibited strong increases to both regions in the late 1980s just before the CUFTA entered into force (see Table 4.1). The United States showed little change in exports from Canada in the early 1980s, but did increase in the late 1980s. Mexico and the Rest of the World (ROW), however, remained constant with their exports from Canada with a low degree of exports that decreased a small degree over the 1980s.

<See Table 4.1, page 245>

Both Mexico and the ROW show similar declining patterns for the levels of exports and total international trade flows. The decreases for the ROW are substantial, falling by 50 percent in most cases. However, both the EU15 and EA-ANZ essentially doubled their volumes of Canadian imports from 1980 – 1988. Overall, international trade flows for 1980 – 1988 with the European Union increased by a factor of 1.15, slower than Canadian real GDP growth. In contrast, total international trade flows with East Asia increased by a factor of 1.7, significantly higher than GDP.

With respect to international trade shares (Table 4.2) both Mexico and the ROW exhibit the same patterns as the levels of international trade flows remaining respectively constant and decreasing. East Asia remained relatively constant in its Canadian export

[30] East Asia is defined as the ASEAN 10: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, plus China, Hong Kong, Taiwan, South Korea, and Japan plus Australia and New Zealand.

[31] European Union-15: Austria, Belgium-Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.

share until the late 1980s. However, after this point it started to increase. The European Union, though regaining some of its Canadian export share lost in the mid-1980s, lost significant ground in Canadian exports over the entire study period. With regard to Canadian imports, East Asia and the European Union had steady increases. As a consequence of large increases in imports, their total shares in Canadian trade increased overall. The United States, maintaining its dominance in Canadian international trade relations, increased its Canadian export and total trade shares from 1980 – 1988 and its Canadian import share remain relatively constant.

<See Table 4.2, page 246>

Therefore, at a national level from 1980 to 1988, Canada was significantly adjusting the spatial distribution of its international trade. Both the destinations of Canada's exports and the origins of Canada's imports changed significantly in the years before the CUFTA. This changing spatial division of international trade with respect to both the world, and specifically the United States, is most likely due to the successive rounds of GATT negotiations (Kennedy Round, 1964 – 1967; Tokyo Round, 1973 – 1979; and the last and most comprehensive, Uruguay Round, 1986 – 1994) (World Trade Organisation 2006).

4.3.2. Canada – United States Trading Patterns, 1979 - 1988

Let me now turn to Canada – United States international trade flows, 1979 – 1988. The industrial sectors (see appendix for the definitions of the industrial sectors) that exhibited above average export growth were Beverages and Tobacco, Plastics and Rubber Products, Printing and Publishing, Primary and Fabricated Metals, Electrical Machinery, Motor Vehicles and Parts, Other Transport, and Other Industries (Tables 4.3 and 4.4).

All of these industrial sectors except Other Industries had export growth far outstripping import growth over this period. In fact, aside from Beverages and Tobacco (1.35), only Other Industries (8.01) had above average (1.30) growth in imports. Unfortunately due to the aggregate nature of the data in this time period (Standard International Trade Classification, Revision 2), little can be done to uncover which industrial sectors within Other Industries had such phenomenal import growth.

<See Tables 4.3 and 4.4, pages 247 – 250>

With regard to relative trade shares for Canada – United States international trade flows for 1979 - 1988, there was also significant adjustment (see Table 4.5). Animal Agriculture, Vegetable Agriculture, and Mining Quarrying Petroleum all decreased their shares in Canadian exports. However, Printing and Publishing, Leather, Textiles, Clothing, Electrical Machinery, and Motor Vehicles and Parts all increased their Canadian export shares to the United States—Motor Vehicles and Parts almost doubled its Canadian export share. Almost the opposite occurred within Canadian import shares: Textiles, Wood Products, Printing and Publishing, Leather, Clothing, Primary and Fabricated Metals, Non-metallic Mineral Products, and Mining Quarrying Petroleum all lost Canadian import shares. Only Electrical Machinery and Other Industries increased their Canadian import shares, and Electrical Machinery's growth was moderate. Overall, Vegetable Agriculture, Chemicals, Wood Products, Non-metallic Mineral Products, and Mining Quarrying Petroleum showed significant decreases in their total trade shares over the time period, with Motor Vehicles and Parts and Other Industries showing the only impressive growth.

<See Table 4.5, page 251 - 253>

Turning to the indices for the decomposed trade types, Table 4.6 shows that two-way trade has increased its share steadily in the ten years prior to the free trade agreements. The level of low-quality market trade has remained relatively constant, whereas medium- and high-quality market trade have both increased their shares. Prior to 1984, high-quality goods exhibited significant increases in their share (7 – 31 percent of trade, 1979 – 1984), but that share subsequently dropped to just below 20 percent with medium-quality market trade taking its place. Given that low-quality market trade has remained relatively constant (a slight decrease over the entire study period), the increases in two-way trade are attributed to increases in both medium- and high-quality market trade.

What this means for Canada is that in the years preceding the CUFTA, higher quality goods dominated Canada – United States international trade flows. At this same time, one-way trade also decreased. As discussed above, this has implication for labour in Canada. The movement toward higher quality goods in trade, and therefore production, is a shift toward the increased need for skilled labour to produce the higher quality products and the corresponding wage increases.

At the industrial sector level, two-way trade increased or remained relatively constant in all industrial sectors except Animal Agriculture, Mining Quarrying and Petroleum, and Leather. Incidentally, these three industrial sectors also decreased their levels of international trade flows, decreased their trade shares, and increased their shares of low-quality market trade over the study period. Animal Agriculture and Leather also exhibit sharp decreases in their shares of high-quality market trade.

<See Table 4.6, pages 254 – 258>

The overall trend for the industrial sectors is an increase in the low-quality market trade. The most notable increases are in Food (17 – 44 percent), Beverages an Tobacco (2 – 25 percent), Plastics and Rubber Products (3 – 45 percent), and Textiles (9 – 30 percent). Needless to say, this common trend in so many industrial sectors does not manifest itself in the national aggregate indices. Therefore, the effects of a small number of industrial sectors are dominating the national aggregated results. These industrial sectors are Primary and Fabricated Metals, Non-electrical Machinery, Electrical Machinery and Motor Vehicles and Parts, consisting of 25 – 35 percent of all Canada-U.S. international trade flows depending on the year of measurement.

Of these four industrial sectors, Primary and Fabricated Metals is the only industrial sector to decrease its share of two-way trade, 46 – 35 percent. Though a substantial drop, the low-quality trade share dropped an even greater amount, 30 – 9 percent. Making up this difference are increases in both medium- and high-quality trade. Therefore, this industrial sector was undergoing a substantial change in its export and import structures long before tariff and non-tariff barriers to international trade began to fall in 1989.

Non-electrical machinery exhibits a marked increase in its two-way share of trade (54 – 84 percent), with an increase in medium-quality trade but significant volatility in both high- and low-quality trade. Overall, the trend in high-quality trade appears to be relatively constant, whereas the trend in low-quality trade is negative, but moderate. A difficulty with these interpretations in this industrial sector is its low TWR values, relative to its TW values. Consequently, much of the change in the product quality component of trade within this industrial sector is likely being lost due to a lack of appropriate data.

Electrical Machinery, however, shows a significant drop in low-quality market trade (34 – 17 percent), while high-quality market trade increases significantly (19 – 44 percent)—medium-quality market trade remained relatively constant. Therefore, not only do the increases in high-quality market trade account for the moderate growth in two-way trade (68 – 80 percent) in this industrial sector, but it also displaced a large portion of low-quality market trade.

Motor Vehicles and Parts low-quality market trade decreased from 16 – 0 percent over the study period with high-quality market trade increasing significantly from 6 to almost 40 percent—medium-quality market trade also increased, but more moderately (51 – 61 percent). These changes in the nature of Motor Vehicles and Parts trade occurred while two-way trade increased substantially from an already high level (78 – 99 percent). Though all four industrial sectors had similar trade in their respective indices, the changes in the Motor Vehicles and Parts and Electrical Machinery industrial sectors are clearly the driving force behind the patterns at the national aggregated level.

Herein lays the utility of the use of high-, medium-, and low-quality trade classifications in analyzing international trade flows. For all practical purposes, two industrial sectors are behind the nationally measured changes in trade patterns. Most notable is the disconnect between the changes in the quality composition of international trade flows at the national level and most Canadian industrial sectors. In all industrial sectors aside from Primary and Fabricated Metals, Non-Electrical Machinery, Electrical Machinery, and Motor Vehicles and Parts, low-quality trade exhibited substantial increases. Only in the four industrial sectors mentioned here did low-quality trade exhibit substantial decreases. Therefore, the vast majority of industrial sectors have likely experienced increases in lesser-skilled employment with corresponding lower wages. Only a handful of industrial sectors (that consist of a large number of manufacturing jobs, however) have moved into the need for greater skilled workers. And given the nature of the Canadian economy being a patchwork quilt of industrial sectors (Britton 1996), the industrial sectors with these positive impacts are in particular places, namely Ontario.

Needless to say, Canada's place in the international economy was far from constant before free trade agreement negotiations began with the United States in the mid-1980s. The anticipation of free trade with the United States and Canada's involvement in the successive rounds of GATT negotiations have had a significant impact on not only with which countries Canada trades, but the nature of that trade. Both the United States and automotive trade dominate Canada's international trading relations. However, natural resource and machinery industries are beginning to become more active in both imports and exports. And trading relations with East Asia are increasing significantly at the expense of the Rest of the World—the trading relationship with the EU15 has remained constant.

4.4. CANADA – UNITED STATES TRADE PATTERNS, 1989 – 2003

The results for Canada – United States international trade patterns, 1989 – 2003 are presented below. I begin with an overview of the reductions in tariff rates at the national and industrial sector levels between Canada and the United States following the free trade agreements. This is followed by an analysis of Canada's changing trade relations with the world and a detailed analysis of Canada – United States international trade at the industrial level.

4.4.1. Tariff Reductions

The tariff reductions shown in Table 4.7 are simple averages of commodity-based (Harmonized Tariff Schedule) tariff rates calculated at the national and industrial sector levels. The majority of the tariff rates are ad valorem (value-based), but approximately 5 percent of the commodity categories are partially or wholly quantity-based (dollars per kilogram, etc.). As such, ad valorem equivalent rates are calculated for these tariff categories using the duty collected and the total value exported to obtain an ad valorem equivalent tariff rate (Department of Finance Canada 2004, External Affairs Canada 1987, Feenstra et al. 2002, and United States International Trade Commission (USITC) 2004). The value- and quantity-based rates are generally in the same magnitude; however, the highest tariff rates are quantity-based, by a factor of eight over the highest value-based tariff rates, and found in the traditionally protected industrial sectors such as Clothing, Textiles, and Agriculture.

There are a number of limitations of these tariff databases. The primary limitation is that information on quotas, such as quotas under the Multi-Fibre Agreement or special quotas under NAFTA, are not included. These databases also do not include anti-dump, countervail, or other special duties such as those imposed on the softwood lumber industry. And importantly with respect to the automotive and textiles and clothing industrial sectors, the eligibility of commodities for the preferential CUFTA and NAFTA tariff rates based on the rules of origin is not included in these calculations (Feenstra et al.

2002). Despite these limitations, these tariff databases provide a good indication of the level of protection for Canada, the United States, and their respective industrial sectors.

The Canadian and U.S. average tariff rates are shown in Table 4.7. In the base year, 1988, the ad valorem equivalent tariff rate for Canada (8.91 percent) is almost one and one-half times that of the United States' ad valorem equivalent tariff rate (6.1 percent). This shows that Canada's degree of protection was significantly higher than the United States before the establishment of the CUFTA. The tariff rates of the two countries do converge by 1995 and are now approximately 0.5 percent. A curiosity to notice is that both the United States and Canada have positive, though small in magnitude, tariff rates after 1998 when tariff rates were to be zero according to the CUFTA negotiations. The dominant source of these positive post-1998 tariff rates is quantity-based tariffs in the Animal Agriculture, Food, and Beverage and Tobacco industrial sectors—traditionally, highly protected industries.

<See Table 4.7, pages 259 - 260>

The industrial sector tariff rates for Canada and the United States are also shown in Table 4.7. All industrial sectors exhibit the same basic pattern of tariff rate reductions, with the Beverages and Tobacco, Textiles, and Clothing industrial sectors having the greatest decreases in tariff rates for both countries—the Animal Agriculture industrial sector in the United States also exhibited significant tariff rate reductions. The most important aspect of the industrial sector tariff rate reductions to notice is the increase in tariff rates for Canada's Animal Agriculture and Beverage and Tobacco and for the United States' Animal Agriculture and Food industrial sectors. This initially counter intuitive result—present in many industrial sectors, but quite apparent in the industrial sectors mentioned above—is present in the industrial sectors that have many quantity-based tariff rates. In these industrial sectors, international trade flows are growing at a faster rate than the tariff rate reductions. As a result, even though the quantity-based tariff rate is decreasing, causing increases in the trading flow volumes, the ad valorem equivalent tariff rate is actually rising. Therefore, these tariff rate increases are actually a consequence of decreased protection.

4.4.2. International Trade at the National Level

The levels of Canadian international trade flows to the United States, Mexico, the European Union, East Asia (hereafter referred to as EA-ANZ), and the Rest of the World (ROW) are shown in Table 4.8. Canada’s international trade with the United States has grown steadily throughout the study period, with exports growing at a rate slightly higher than imports. Concerning the possibility of trade diversion resulting from the free trade agreements, total international trade flows to all other regions of the world, including Mexico, have increased at a faster rate than the Canadian economy. This means that all regions of the world have become more important to the Canadian economy over this time period. In comparison with the 1980 – 1988 period, international trade flows with the United States grew substantially post-1991, after almost 10 years of very little growth. Also the trend of Canada's international trade flows with Mexico and the ROW have reversed, with the ROW gaining substantial ground lost in the previous decade and Mexico exhibiting substantial growth (\$9 – \$33 billion). EA-ANZ continues to be Canada's largest trading partner after the United States.

Considering imports separately, the pattern is similar to the larger trends just discussed with exceptional growth in Canada’s imports from Mexico. Exports exhibit a slightly different pattern, growing significantly faster than the Canadian economy for the United States and Mexico, but slower, though positive, for the EU15, EA-ANZ, and ROW. Therefore, any concerns regarding trade diverting effects of the free trade agreements are unfounded, and consistent with previous research. As with the levels of total trade, Mexico and the ROW have regained lost growth in both imports and exports.

<See Table 4.8, page 261>

The relative shares of Canadian international trade flows to the same countries/regions are shown in Table 4.9. Canada is clearly adjusting its trading relationships with the rest of the world as a result of the free trade agreements. The EU15, EA-ANZ, and the ROW are all losing shares in Canadian international trade flows, particularly with respect to exports, despite gains in the value of international trade flows. This is a continuing trend from 1980 – 1988 for Mexico and the ROW, but the EU15 and EA-ANZ had increased their shares of Canadian exports in the four to five years prior to the CUFTA entering into force. Essentially Canadian exports have been shifting their destinations from Mexico, the EU15, EA-ANZ, and ROW to the United States over the past 15 years: 74 percent (1989) to 85 percent (2003). Mexico has only increased its share of Canadian exports marginally. EA-ANZ began to lose some of its import share after the implementation of the NAFTA, but has since regained its losses; both the EU15 and the ROW show consistent moderate gains in their import shares, also exhibiting slight decreases around the time the NAFTA was implemented. Prior to the CUFTA, both the EU15 and EA-ANZ exhibited strong gains in Canadian import shares. The United States, however, has decreased its share in Canadian imports by 3 percent, with Mexico absorbing most of the U.S. losses.

<See Table 4.9, page 262>

The overall result of the free trade agreements is Canada reorganizing its international trading relationships both within and outside of North America. Additionally, this reorganization may have occurred without any losses in global welfare because Canada's international trade flows outside of North America have increased in real terms—this hypothesis, however, is not tested. In many cases, that growth in international trade flows has outstripped the growth of the Canadian economy.

4.4.3. International Trade Growth at the Industrial Sector Level

As shown in Table 4.10, almost all industrial sectors have experienced significant growth in the volume of international trade flows in real terms—all values are in constant 1997 Canadian dollars for exports, imports, and total trade. The only exception to this pattern is the Leather industrial sector that exhibited almost zero growth—the norm in the 1979 – 1988 period. The Food Products and Clothing industrial sectors exhibited the strongest growth, with trading volumes five times the 1989 value, or more, in 2003. Generally speaking, all industrial sectors in the Canadian economy expanded their levels of international trade flows with the United States after the CUFTA was signed.

<See Table 4.10, pages 263 - 265>

Separating international trade flows into exports and imports, export growth outstripped import growth in all but four industrial sectors. With increase factors—see Table 4.11—as high as 5.18 (Textiles), 6.60 (Food), and 9.40 (Clothing), and overall exports (2.55) and imports (1.97), Canada's trade balance with the United States improved. This outcome satisfies one of the goals set out by Canadian negotiators of the CUFTA. From 1979 – 1988, export growth also tended to be stronger than import growth, but the magnitude of growth for exports, imports, and total trade after 1989 dwarf the corresponding values before free trade.

<See Table 4.11, page 266>

Regarding the timing of the expansion in international trade flows, most industrial sectors show smooth expansion over the study period. However, Vegetable Agriculture, Mining Quarrying and Petroleum, Wood Products, Primary and Fabricated Metals Products, Other Transport, Professional Goods, and Other all appear to have accelerated their growth at times coinciding with the implementation of the NAFTA. Despite this appearance, caution should be exercised with any interpretations given that only five years separate the CUFTA and the NAFTA and no inferential testing is done to confirm or deny this appearance in the data. Lastly, as shown in the national levels of imports and exports, as well as most of the industrial sectors, the levels of post-2000 international trade flows have fallen slightly, likely due to the changing political climate in the United States resulting from the 11 September 2001 terrorist attacks (9/11). Since 9/11 the United States government has increased security at its borders, increasing the costs of international trade.

<See Table 4.12, pages 267 - 269>

Turning to Table 4.12, the relative industrial sector shares in Canada – United States' trade, the changes over the study period are much more varied indicating changes in the industrial structure of international trade flows. Paper Products, Printing and Publishing, Primary and Fabricated Metals, Non-electrical Machinery, and Motor Vehicles and Parts all exhibit declines in their shares of international trade flows, despite strong growth in the levels of that trade. The decrease in the share of Motor Vehicles and

Parts from 28.6 percent (1989) to a low of 23.3 percent (2001) is indicative of the Canadian economy's move toward a more diversified international trade portfolio now that free trade is established in more than this one industrial sector of the economy. The most recent decrease in the share of Wood Products, particularly after 1999, is likely due to the softwood lumber dispute that escalated in recent years—the industrial sector's share had been increasing, albeit slowly, until that time. Notable expansions include Electrical Machinery (prior to 2001), Mining Quarrying and Petroleum and Plastics and Rubber Products industrial sectors, with Food, Chemicals, and Other exhibiting moderate relative expansion.

Referring back to Tables 4.10 and 4.11, the industrial sectors that experienced above average increases in international trade flow volumes also generally experienced above average tariff rate reductions. For both Canada and the United States, the Beverages and Tobacco, Plastics and Rubber Products, Textiles, and Clothing industrial sectors all had above average increases in trade flows and average tariff rate reductions—this is particularly true for Canadian exports from the Clothing and Textiles industrial sectors. A simple correlation analysis confirms this supposition to be correct. Those Canadian industrial sectors facing the highest initial tariff barriers to the United States' market has the highest increases in export volumes ($r = 0.46$, p-value = 0.037), whereas those industrial sectors that received the most protection from Canadian tariff rates had the greatest increases in import volumes, though the result is statistically insignificant ($r = 0.218$, p-value = 0.355). This result indirectly shows the greater importance of the U.S. market to Canada than the Canadian market to the United States, particularly because Canadian tariffs were on average greater than those of their U.S. counterparts.

4.4.4. Canada-United States International Trade by Trade Types

At the aggregate country level, the Grubel-Lloyd (GL) and Two-Way Trade (TW) indices indicate gradual increases over time. However, at the individual sector level, changes in two-way trade are, in some cases, large in magnitude (see Table 4.13). Only the industrial sectors of Mining Quarrying and Petroleum, Clothing, Non-metallic Mineral Products, Motor Vehicles and Parts, and Other Industries exhibit declines in the level of two-way trade, with significant declines only in Clothing and Non-metallic Mineral Products. The significant difference in the share of two-way trade in Motor Vehicles and Parts between the two study periods is due to the significantly greater level of disaggregation in the latter time period—fewer commodities are grouped together using the Harmonized Tariff System. Industrial sectors that expanded their two-way trade significantly include Animal Agriculture, Chemicals, Plastics and Rubber Products, Paper Products, Printing and Publishing, Textiles, and Professional Goods. As shown in Table 4.11, the general expansion of two-way trade comes from Canada's increased exports to the United States in almost every industrial sector. Aside from Plastics and Rubber Products and Paper Products, none of these industrial sectors exhibited significant change in their relative international trade flow shares or exceptional growth in the levels of international trade flows. Therefore, merely separating international trade flows into one-way and two-way trade provides significant insight into the changes in the level of industrial sector cross-border integration.

Separating two-way trade into low-, medium-, and high-end markets provides further insights into the changing relationship of the Canadian and U.S. economies. At the aggregate national level, despite little change in two-way trade as a whole, Canada continues to move into the middle- and high-end market trade in international trade after the implementation of the CUFTA. The medium-quality market trade (HD), though volatile, shows an upward trend over the study period (0.133 to 0.157), with a similar trend, somewhat less volatile, in the high-end market (VDHQ) over the study period (0.079 to 0.112). Also worth noting is the timing of these changes. Both increases only occur after the implementation of the NAFTA, indicating (though not proving) that the NAFTA has an independent affect on the Canada – United States trading relationship, over and above that of the CUFTA. This point is discussed further, below.[32]

<See Table 4.13, pages 270 – 274>

At the industrial sector level, sectors that show increases in two-way trade generally exhibit increases in high-end markets at the expense of low- and/or middle-end markets, though middle-end markets do commonly rise. This result is the opposite of that in the preceding period. Industrial sectors that exhibit notable changes in the composition of international trade flows are Animal Agriculture and Leather. Animal Agriculture has since increased its share of two-way trade, whereas Leather has continued to decrease two-way trade, but only moderately. In the previous period, Animal Agriculture increased its share of low-quality market trade at the expense of medium- and high-quality market trade, and similarly for Leather. However, the opposite is true in this latter study period. In the case of Animal Agriculture, both medium- and high-quality market trade have increased at the expense of low-quality market trade; for Leather, high-

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[32] In order to properly asses the effect of the NAFTA, many factors that have coincided with the NAFTA's timing must be controlled for in an inferential analysis. Such factors include, but are not limited to: the economic performance of the U.S. economy, financial markets, and the value of the Canadian dollar.

quality market trade has increased at the expense of low- and medium-quality market trade.

This pattern of substituting into high- and medium-quality market trade at the expense of low-quality market trade is also present in those industrial sectors that exhibit growth in two-way trade, 1979 – 1988. Vegetable Agriculture, Food, Plastics and Rubber Products, Textiles, and Non-electrical Machinery all exhibit this trade pattern in the latter study period. This movement into high- and medium-quality market trade in the majority of industrial sectors under free trade, rather than only a few, shows promise for Canada's integration into the North American economy. Though similar data are not available for U.S.-Mexico international trade flows, it can be confidently assumed, due to the levels of skilled labour and capital, that the United States trades relatively high-quality goods for relatively low-quality goods with Mexico, if that trade can be classified as two-way trade—this is the general finding of Schott (2004), with respect to product quality and the wealth of nations. Given that Canada trades high-quality goods for low-quality goods on average with the United States and the majority of that trade is classified as two-way trade, the ranking of high-, medium-, and low-quality market trade appears to follow a north-to-south relationship. That is, it appears that Canada is specializing in the export of high-quality market goods, the United States is specialising in the export of medium-quality market goods, and Mexico is specialising in the export of low-quality market goods. As indicated at the national level, changes in the low-, medium- and high-end portions of the market dominantly occur at or after the time of the NAFTA entering into force, once again indicating that the NAFTA may have had an independent affect on the Canada – United States trading relationship.

Consequently, there appears to be a new spatial division of labour in international trade patterns occurring in North America. Usually, it is thought that Canada specializes and trades in the low value-added goods with the United States, along the lines of the arguments made in the staples thesis (see Barnes et al. 2001). However, this result undermines that assertion. Most industrial sectors are moving away from inter-industry trade (the dominant form of trade that operates under the staples thesis) and into intra-industry trade in high- and medium-quality goods. The inclusion of Mexico into the North American free trade area, and/or the corresponding trade policies to deal with Mexico's inclusion, has more favourably placed Canada with regard to its most significant trading partner, the United States. Though this point is not discussed by Trefler (2004), this finding is consistent with Trefler's (2004) effect of the CUFTA. Resulting from the CUFTA, skill levels, wages, and productivity have all increased in Canada, providing the necessary conditions for increased quality production: a higher-paid, higher-skilled Canadian workforce. Though it may be premature to claim that Canada is now beginning to work its way out of the staples trap (and which is beyond the scope of this dissertation) it certainly appears as though this may be the case.

However, caution should be taken in any interpretation of changes in the Printing and Publishing, Other Transport, Professional Goods, and Other industrial sectors due to their small (non-existent for Printing and Publishing) samples of two-way trade commodity categories that have quantities reported for both imports and exports. As shown in Table 4.13, these industrial classifications have very low TWR values, relative to their respective TW values. As indicated above in the section on data and methodology, this occurs when quantities are not available for all of the commodity categories. Consequently, product quality can only be calculated for very few of the commodities in these industrial classifications making any inferences on the level of product quality in trade suspect.

4.5. SUMMARY AND CONCLUSIONS

The Canada – United States Free Trade Agreement and the North American Free Trade Agreement have undoubtedly changed Canada's international trading relationship with the United States and the world in a far more comprehensive manner than previous trading agreements between these two countries. Both Agreements set the standard for the integration of regional trading partners not only on trade and goods, but services, investment, dispute resolution, and trade in agricultural industries. The NAFTA is also the first free trade agreement negotiated and implemented between industrialized and developing economies.

There has been a definite reorganization of Canada's trading relationships with regions of the world, but this reorganization does not come at the price of trade diversion. Not only has Canada's trade within North America increased, but so has its trade with the rest of the world. Canada – United States international trade flows have grown in all but a few industrial sectors in the Canadian economy, and there has been some significant restructuring in the relative shares of these industrial sectors pertaining particularly to United States' international trade flows. However, these more traditional measures of change in international trade relations tell part of the story resulting from the CUFTA and, in particular, the NAFTA.

Separating international trade flows into one-way and two-way trade shows the changes in the level of industrial sector cross-border integration. Two-way trade has increased within most industrial sectors, indicating stronger linkages between Canadian and U.S. industries. And within the two-way trade category, Canada is moving into the higher-end product markets. On the whole, the free trade agreements appear to have impacted the Canadian economy positively. Though significant trade-induced industrial adjustment is likely present, the overall effect of free trade in North America has been an increase in trade that may allow the Canadian economy to better place itself in the North American and global economies for the benefit of all Canadians in the long run. Through international trade with the United States and Mexico, the Canadian economy is moving away from lower quality markets into higher quality markets, likely increasing the demand for skilled labour, providing better wages and working conditions. And, though this is speculation at this point, as a result Canada appears to be breaking free of the staples trap, potentially releasing Canada from the inherent instabilities of staples production.

Future chapters investigate the local effects associated with these apparently positive outcomes at the national aggregate level. As indicated in Britton (1996), the various industrial sectors of the Canadian economy are largely associated with particular provinces: forestry in British Columbia, oil and gas in Alberta, and automobiles in Ontario. Therefore, the changes occurring in the industrial sectors are likely representing changes occurring at a provincial scale of analysis. As such, after discussing issues regarding the integration of Canada and the United States involving the political geography of Canada – United States interregional trade and the effects of the NAFTA in the following chapter, the analysis proceeds to the provincial scale.

Chapter 5[33]

Canada – United States integration: the effects of the national border and the NAFTA

5.1. INTRODUCTION

Before I turn to my own geographical analysis of Canada's international trade flows with the United States, I will examine two related issues that have emerged from the existing literature on Canada – United States economic integration, and which have been touched upon at least implicitly above. These are the border effect and the North American Free Trade Agreement (NAFTA) effect. The border effect refers to the impact that the Canada – United States border has on international trade flows, and the NAFTA effect

[33] Portions of this chapter have been published in the following:

Andresen, M.A. (2009). The border puzzle is solved. *Applied Economics Letters* 16(16): 1617 - 1620.

Andresen, M.A. (2009). The geographical effects of the NAFTA on Canadian provinces. *Annals of Regional Science* 43(1): 251 - 265.

Andresen, M.A. (2010). The geography of the Canada - United States border effect. *Regional Studies* 44(5): 579 - 594.

Andresen, M.A. (2013). A robust solution for the Canada – United States border puzzle. *International Trade Journal*, in press.

refers to the inability of previous research to uncover the impact the NAFTA has had on Canada – United States international trade flows.

Over the last 40 years, as I have shown, the level of integration between Canada and the United States has increased substantially. Today, as a result of that integration, approximately $2 billion of goods and services crosses the Canada – United States border every single day (Sydor 2003). Since 1989, the year the Canada – United States Free Trade Agreement (CUFTA) entered into force, Canada's exports of merchandise to the United States has almost tripled and imports of merchandise from the United States have almost doubled in real terms—almost an increase factor of 2.5 for total merchandise trade. Not surprisingly, Canada's share of international trade with the United States has risen from 69 to 73 percent. This increase is all due to exports (74 to 85 percent), however. In fact, the import share from the United States has fallen since the inception of the CUFTA (65 to 60 percent). At the provincial level, all provinces except Newfoundland have more than doubled their international trade with the United States (Newfoundland increased its international trade with the United States by a factor of 1.5). And separating provincial trade into exports and imports, all provinces except Prince Edward Island's imports increased substantially in real terms, 1989 – 2003 (Statistics Canada 2004b).

Regardless of these increases, research undertaken by economic geographers and economists has found that the Canada – United States border remains a significant barrier to international trade. For example, McCallum (1995) estimated that in 1988 Canadian provinces traded 22 times more with other Canadian provinces than with U.S. states of similar size and distance away. Given that trade tariffs between the two countries are now zero, and were low (approximately 4 percent on average) in 1988, McCallum's (1995) result and others like it is viewed as a border puzzle: the "border effect." The second related issue is that a number of empirical studies have concluded that the implementation of the NAFTA seems to have had no effect on international trade between Canada and the United States: the NAFTA effect. In fact, the American economist Paul Krugman has said that the impact of the NAFTA on Canada is zero (cited in Contenta 1996). I will argue in this chapter that neither the border nor the NAFTA effects are real. That they are thought to be real is a consequence in both cases of improper geographical, economic, and statistical specification. Once proper specification is undertaken both effects disappear. I first discuss geographical misspecification, which applies mainly to the NAFTA effect, and then economic and statistical misspecification which applies to both effects.

Most past research has investigated NAFTA at the national scale, and at that scale finds almost no effect. The problem, though, is that the appropriate scale to examine the effects of Canada – United States free trade agreements is not at the level of the nation state, but at the provincial/state level. The provincial/state level is the appropriate level of geographical specification because of North America's highly variegated economic geographical landscape. This varied economic landscape means that the Canada – United States border represents a different barrier to trade for the different provinces and states. The automobile industry, for example, has had low or zero tariffs since the mid-1960s and comprises of a significantly large portion of Ontario's international trade with the United States, over 35 percent. Consequently, tariff and non-tariff reductions through the CUFTA and/or the NAFTA did not affect the significance of Ontario's barrier to trade with the United States. On the other hand, British Columbia (trade in forestry products) and Quebec (trade in clothing and apparel) faced much larger barriers to trade before either of the free trade agreements, and so their removal had significant trade effects. Therefore, the appropriate spatial scale of analysis to examine the effect of the NAFTA is the Canadian province and U.S. state. As I will show below, once analysis of NAFTA is specified at the appropriate geographical scale the effect of NAFTA is significantly positive, and certainly not zero.

Let me now turn to the economic and statistical misspecification, that is common to both the border and NAFTA effect. By economic specification I mean the choice of variables used in the statistical analysis. International and interregional trade are complex phenomena and cannot be explained using only a handful of economic variables. But in many studies of both the border and NAFTA effects only two variables are employed: economic size and distance between trading partners. Two variables are simply not enough, however. Other variables must also be included such as the wealth of the trading partners, their endowment of capital and labour, tariffs, and currency volatility. Only if all of these variables are included will the border and NAFTA effects be isolated. If they are not included, and in most studies they are not because only size and distance are variables, there is misspecification, and as a result there is statistical bias and incorrect inference.

Finally, the appropriate statistical specification (estimation procedure) is just as critical (perhaps more critical) than the appropriate economic specification. The research investigating the border and NAFTA effects use data that vary across both space and time, panel data. These type of data must be analyzed using the appropriate statistical estimation procedure (panel data estimation), otherwise statistical bias becomes an issue here as well. As should always be the case, the context of data analysis matters and dictates what must be done in order to avoid incorrect inference.

My intention in this chapter, then, is to show that once Canada – United States interregional trade is correctly analyzed with respect to the scale of analysis, the set of economic variables, and the correct statistical estimation procedure, neither the border nor NAFTA effects are real. They are artefacts of geographical, economic, and statistical misspecification. The result is that first, the Canada – United States international border does not now, or in its recent history, impede international trade flows between Canada and the United States, and second, that the NAFTA has a positive impact on Canada – United States international trade flows, but the effect varies across the Canadian provinces.

The chapter is organized as follows. The literature regarding the border effect and its difficulties are reviewed in the next section. Section 3 presents the data used to investigate the border effect and the NAFTA, as well as the different methodologies that correspond to their respective literatures. The statistical results from the border effect investigation are discussed in section 4. The effect of the NAFTA is presented in section 5. Section 6, using all of Canada's international trading partners, discusses the appropriate direction of future research on Canadian trade. And section 7 concludes that Canada and the United States are indeed two integrated economies that have benefited (in terms of trade volumes) from their recent international trading agreements.

5.2. THE BORDER EFFECT

The border effect entered the vocabulary of most economists and economic geographers who investigated Canada – United States international trade flows in 1995 when McCallum (1995) investigated the degree of integration between these two countries using a new international trade data set that measured international trade flows at the Canadian province and U.S. state levels in 1988. Combining these data with interprovincial trade data, McCallum (1995) was able to investigate whether Canada traded more with itself or with the United States after controlling for the economic sizes of the provinces and states as well as the distances between them using a gravity model of international trade flows. The gravity model of international trade flows states that trade flows between larger economies will be larger than between smaller economies and that the greater the distance between the two economies the less they will trade. The intuition for these two prior expectations is straightforward: larger economies have the potential for more interaction because their economies produce greater volumes of more goods, and distance decreases interaction because the greater the distance travelled, the greater the transportation costs. Therefore, in a statistical framework, the estimated parameters on the economic sizes of the trading economies (usually gross domestic product) are expected to be positive, and the estimated parameter on distance is expected to be negative.

The gravity equation McCallum (1995) estimated is as follows:

$$\ln x_{ij} = \beta_1 + \beta_2 \ln y_i + \beta_3 \ln y_j + \beta_4 Dist + \beta_5 BE\,, \qquad (5.1)$$

where x_{ij} is the natural logarithm of trade between region i and region j, y_i is the gross domestic product of region i, y_j is the gross domestic product of region j, $Dist$ is the distance between region *i* and region *j*, and *BE* represents the effect of the Canada – United States border on international trade flows. The border effect variable is a dummy variable equal to one if the trade flows cross the Canada – United States border and zero if the trade flows are interprovincial. If Canada is more integrated with the United States than itself, the estimated parameter for the border effect will be positive. The interpretation of this border effect would then be that Canadian provinces trade more with the United States than other Canadian provinces after controlling for economic size and distance. However, if the estimated parameter is negative, then Canadian provinces are more integrated with other Canadian provinces than the United States after controlling for economic size and distance. The expectation of the parameter was positive given the high degree of integration between Canada and the United States.[34] However, this was not the case.

Rather than Canada having a positive estimated parameter indicating a high degree of integration with the Untied States' economy, the estimated parameter was negative, statistically significant, and large in magnitude. McCallum's (1995) border effect stated that Canadian provinces are more inclined to trade with themselves than they are with the U.S. states by 2100 percent, a factor of 21.[35] Therefore, despite the large volumes of international trade flowing between Canada and the United States and their

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[34] In later research, Helliwell (1998) conducted a survey of economists and their students, finding that this view was dominantly held.

[35] McCallum (1995) actually made the statement that it was a factor of 22, $\exp(\beta_5) = 22$, but that is the result of incorrect statistical inference in a semilogarithmic equation. As shown by Halvorsen and Palmquist (1980) and Kennedy (1981), the correct interpretation of a dummy variable in a semilogarithmic specification is $\exp(\beta_5) - 1 = 21$.

trading agreements either in force or about to enter into force, Canada in 1988 does not appear to be at all integrated with the United States. Further work by Helliwell (1996, 1998) confirmed McCallum's (1995) original finding, but had also showed that the magnitude of the border effect decreased to a factor of 12 by 1996, likely due to the further integration between Canada and the United States. This decreased negative magnitude itself is still unexpectedly high because of free trade between Canada and the United States was established seven years before. The explanation provided by Helliwell (1998) is grounded in the relative integration between Canada's provinces and between Canada and the United States.

Helliwell (1998) argues that there is a greater ease of economic operations within one country than between two or more countries because of factors such as a single nation having common institutions, a common currency, cultures, and information networks. And it is because of these commonalities that Canada is more integrated with itself than with the United States, leading to a negative estimated parameter for the border effect. However, a nation such as Canada is not without its own internal barriers (Doern and MacDonald 1999). In fact, the barriers to trade within Canada were so great that the federal and provincial governments of Canada negotiated an Agreement on Internal Trade that entered into force 01 July 1995. How could internal integration explain the Canada – United States border effect if Canada needed to negotiate a free trade agreement with itself? Additionally, aside from the non-existence of tariff barriers between the Canadian provinces, the types of barriers to trade within Canada are quite similar to those between Canada and the United States.

The division of responsibilities between federal, provincial, and local governments as well as preferences based on provincial residency and different product/safety/shipping standards have created interprovincial trade barriers within Canada (Leidy 1998; Schwanen 1992).[36] These barriers, and their deleterious effects, have long been recognized by the different levels of Canadian government, but the push for policies to deal with these barriers did not begin until the mid-1980s. These policies took many years to come to fruition because of governmental focus on international free trade agreements over that same time period (Statistics Canada 1996). In 1994, the estimated cost of these barriers was $6.5 billion per year, enough to raise average income in Canada by 1.5 – 6.5 percent depending upon province of residence (Palda 1994). Needless to say, any statements claiming a high degree of integration within Canada to explain the border effect must be made with caution. In fact, the barriers to interprovincial trade may actually exceed the barriers between Canada and the rest of the world. This is specifically the case for the United States due to the decreased trade barriers resulting from the establishment of two international free trade agreements (Loizides and Grant 1992).

As a result of expectations regarding Canada – United States integration, the statistical evidence to the contrary, and a lack of adequate explanation for the border effect, those studying Canada – United States international trade flows have been puzzled. Consequently, a significant body of research has emerged investigating the border effect without any resolution, leading Obstfeld and Rogoff (2001) to call the border effect one of the six major puzzles of international economics. The work on

[36] These authors do list other barriers, but these are the ones that are common for most goods and services.

border effects immediately following McCallum (1995) was dominated by extending the time frame of analysis to see if the border effect has reduced over time and using different data sets to see if the border effect is an artefact of Canadian trade data. More recent research on the border effects has focussed on the proper interpretation of the border effect coefficient, and the proper specification of the gravity equation in terms of economics, statistics, and geography.

5.2.1. Interpretation of the Gravity Equation

Proper interpretation of the border effect has been somewhat problematic in a portion of the research using the gravity equation. Consequently, part of the puzzle of the border effect revolves around the misinterpretation of the border effect itself.

The first misinterpretation comes from incorrect statistical inference. As pointed out by Anderson and van Wincoop (2003), the gravity equation modelled by McCallum (1995), and those that followed, does not lend itself to standard statistical inference. For example, Brown and Anderson (1999) have claimed that Canada would have to export its entire gross domestic product to the United States if the border effect were to be removed because export volumes to the United States would have to increase by a factor of 21. Rather, the magnitude of the border effect, as modelled, is better interpreted as the magnitude of change in the spatial distribution of existing trade flows favouring U.S. states (as opposed to Canadian provinces) if the border effect were removed: interprovincial trade would fall and international trade to the United States would rise. Total provincial exports (interprovincial plus international) would not have to rise if the border effect disappeared, though they likely would—Anderson and van Wincoop (2003) estimate that international trade flows would increase by 44 percent.

The second misinterpretation of the border effect also results from a misunderstanding of the border effect in the context of an economically large and an economically small country. Suppose that the 10 Canadian provinces and 48 continental U.S. states all have the same economic size, and are trading with each other freely. Now, suppose a border separates the Canadian provinces and U.S. states using a policy instrument such as a tariff. The Canadian provinces now have a barrier to 83 percent of their potential trading partners, whereas the U.S. states only have a barrier to 17 percent of their potential trading partners—if actual economic sizes are used, the relative loss of potential markets for Canada is even larger. With such a large difference in potential market loss, we should expect that the border effect variable is significantly larger for Canada (Anderson and van Wincoop 2003; Feenstra 2002). Therefore, the border plays the same role for U.S. states as it does for Canadian provinces, but it affects a larger proportion of the Canadian provinces' market, explaining why the border effect appears stronger simply because of which side of the border you are on.

5.2.2. Economic Specification of the Gravity Equation

In addition to the improper interpretation of the border effect variable within the gravity equation, it is quite clear that the original border effect estimates suffer from specification error within the gravity equation itself—important variables are missing from McCallum's (1995) analysis as well as many researchers who followed in his stead. Anderson and van Wincoop (2003), as part of their solution to the border puzzle, state that in the border effect ``estimation results are biased due to omitted variables'' (Anderson and van Wincoop 2003, 170). They resolve the omitted variable bias through the inclusion of three variables measuring trade resistance derived through a theoretical framework. Their estimation procedure is far more difficult to implement than McCallum's (1995) specification, and Feenstra (2002) finds that fixed effects (dummy variables representing each bilateral trading pair) can account for these trade resistance variables while maintaining the ease of implementation used by McCallum (1995). However, there is a greater difficulty with their solution to the border puzzle.

The theoretical framework used by Anderson and van Wincoop (2003) is based on the trade diversion hypothesis in its purest sense: any increase in cross-border trade flows implies a one-for-one decrease in Canadian interprovincial trade flows. Both Helliwell et al. (1999) and Coulombe (2003; 2004) strongly reject this assertion, finding that interprovincial trade and cross-border trade are complements.[37] The reason is clear: a dynamic efficiency argument. Once a province trades in those goods in which it possesses a comparative advantage with U.S. states, it will likely become more efficient thus fostering interprovincial trade (Trefler 2004). Regardless of this aspect of Anderson and van Wincoop's (2003) theoretical framework, or how one wishes to interpret the complementarity of interprovincial and international trade flows, Anderson and van Wincoop (2003) are on the right track with omitted variable bias and the border effect. Anderson and Smith (1999) added gross domestic product per capita and contiguity variables to the original McCallum (1995) gravity equation reducing the border effect from 22 to 15, a 31 percent decrease. This quite clearly shows the amount of bias an omitted variable can cause. Additionally, both of these variables are commonly

[37] The data used in this paper also show that interprovincial and cross-border Canada – United States trade are complements. See Table 5.4 below.

employed in gravity models of international trade flows, and their inclusion theoretically justified in the intra-industry trade literature (Frankel et al. 1995).

The effect of omitted variable bias found by Anderson and Smith (1999) demonstrates the importance of proper economic specification in the gravity equation. The two broad classifications of international trade flows (inter-industry and intra-industry trade)[38] each have factors that determine (at least partially) the quantity of trade that flows between two regions. One of the common criticisms of the gravity equation is that it cannot differentiate between inter-industry and intra-industry trade—see Feenstra et al. (2001) that offers a method to differentiate between these trade types within the gravity equation—but this weakness in the gravity equation is likely the reason for its continued success in explaining trade flows. And because the gravity equation can be theoretically derived for both trade types (see Anderson 1979; Anderson and van Wincoop 2003; Bergstrand 1985; Bergstrand 1989; Deardorff 1998; and Helpman and Krugman 1985), the determinants of both types of trade must be included in any proper specification. This includes the economic sizes of the trading economies (GDP), the geographic distance between them, the level of economic development of the trading economies (GDP per capita), the differences in both the economic sizes and development of the trading economies if these variables are not entered separately, contiguity, trade barriers (tariffs and non-tariff barriers), relative factor endowments (capital-labour and land-labour ratios and their differences if these variables are not entered separately), currency volatility if a time series or panel data are used in estimation, and variables capturing the presence of any free trade agreements.

[38] See chapter 4 for a discussion of the differences between these two types of trade.

The economic sizes and geographic distances between trading partners have been part of the gravity equation for over 40 years (see Tinbergen 1962, Pöyhönen 1963, and Linneman 1966) and require no further discussion; economic development captures the degree of industrialization and the tendency toward intra-industry trade (Frankel et al. 1995; Greenaway and Milner 1986); the differences in economic size and economic development are also related to intra-industry trade, as similar countries have high degrees of intra-industry trade (Helpman 1987; Hummels and Levinsohn 1995); and relative factor endowments are another measure of differences between trading partners with increases in relative factor endowment differences decreasing intra-industry trade in favour of inter-industry trade (Hummels and Levinsohn 1995).

Trade barriers, particularly tariffs in the context of recent free trade agreements between Canada and the United States, are critical in any study of international trade flows over time. Feenstra (2002) finds that in OECD countries the reduction in tariffs accounts for 38 percent of the increases in international trade flows. Tariff are clearly important in the explanation of the border effect because decreases in Canada – United States tariffs over the past 20 years have been significant. However, their inclusion along with the border effect variable can take place only within a particular estimation procedure because of perfect collinearity. Tariffs are implicated in the research using sectoral trade data (see Brown 1998; Brown 2003; Brown and Anderson 2002; Hillberry 2002) to investigate the border effect of various industries in the Canadian economy, but are never employed in estimation despite their importance in analyzing trade flows.

Finally, currency volatility should be included in any temporal context, particularly in a North American context because of the perceived loss of trade from currency value uncertainty (Grubel 1999). Exporters, facing uncertainty from currency volatility or profit-squeeze from the currency value, may substitute international trade for interprovincial trade. Given the recent volatility of the Canadian and U.S. dollar exchange rate, such effects cannot be ignored. However, as with tariffs measured at the national level, currency variables cannot be used in conjunction with the border effect in statistical estimation due to collinearity issues. The inclusion of variables representing free trade agreements capture the reduction of non-tariff barriers contained within the agreements.

5.2.3. Geographic Specification of the Gravity Equation

Recent research by economists, regional economists, and geographers has also revealed that there is a geography to the border effect itself. Anderson and Smith (1999) and Helliwell (1998), among other questions, ask whether or not the border effect is uniform across Canadian provinces. Though Helliwell's (1998) analysis includes a temporal component—estimating the provincial border effects, 1988 – 1996—their results are qualitatively similar. Overall, the lowest border effects are found in western Canada, becoming moderate in eastern Canada, with the highest provincial border effects in the Maritime provinces and Newfoundland. To illustrate the magnitude of provincial variation, using the same data and estimation model as McCallum (1995), Anderson and Smith (1999) find that there is substantial differentiation: British Columbia has the lowest border effect, ``only'' being biased towards interprovincial trade by a factor of 10, whereas Prince Edward Island has the largest in magnitude border effect with a factor of 49. The time trend of the provincial border effects are negative for most provinces, indicating a decrease in the bias toward interprovincial trade. Only Newfoundland and

Prince Edward Island have increased the magnitudes of bias toward interprovincial trade over Helliwell's (1998) time period, with Nova Scotia and New Brunswick exhibiting small decreases in their bias.

Though this high degree of bias toward interprovincial trade by the Maritime provinces and Newfoundland is not surprising given their strong economic ties to central Canada, the relative rankings of western and central Canada is curious. Central Canada has historically maintained strong economic ties to the United States through international trade, particularly Ontario, whereas western Canada has not had its economic ties to the United States as strong. The western provinces do, however, have significant trade volumes with the United States (oil and lumber), just not to the same degree as Ontario. To explain this unexpected result, Helliwell (1998) argues that the border effect for manufacturing-based provinces (central Canada) should be higher than for resource-based provinces (western Canada). Curiously, no justification is given for this claim and it does not appear to be related to tariff rates as the tariff rates in the resource industries are substantially higher than those for manufacturing industries. This is particularly true for automotive products, implying a lesser friction for manufacturing trade movements across the Canada – United States border.

Anderson and Smith (1999) and Helliwell (1998) further investigate provincial border effects to find if exports and imports have the same border effect—the spatial distribution of import origins will not necessarily be the same for export destinations. With this separation, in 1988, British Columbia's propensity to export to Canadian provinces drops significantly to a factor of 5, with its propensity to import from Canadian provinces increasing to a factor of 20. This phenomenon leads Anderson and Smith

(1999) to refer to British Columbia as an export platform, importing from Canadian provinces and exporting to U.S. states. But there is no way to know if there is any overlap in the goods that are imported and then exported. Because of British Columbia's relative lack of manufacturing (Barnes et al. 2001), it is rather doubtful that Anderson and Smith's (1999) reference to British Columbia is correct. The re-export of imports from other Canadian provinces is not likely occurring after any value-added production.

Ontario, curiously because of the high degree of trade flows in automotive products with the United States, has the second highest border effect for exports making it appear to be more of an import platform—in 1996 Ontario's border effect for exports was 18, whereas its border effect for imports was only 8. Though there has been significant restructuring in the automotive industry over the past 20 years (Holmes 1996), the close proximity of Ontario to the automotive industry's core in the United States makes the import platform argument for Ontario much more viable then the export platform argument for British Columbia. Though British Columbia, and the other western provinces, export many raw materials and manufactured goods imported from other Canadian provinces, relatively speaking Ontario better exemplifies itself as an export platform according to Helliwell's (1998) findings. Overall, the rank of the provinces with respect to their export and import provincial border effects is similar to the total trade provincial border effects that increase moving east across the country—Helliwell's (1998) temporal analysis essentially finds the same results. Therefore, for brevity's sake, in the analysis that follows, only the total trade provincial border effects are investigated.

5.2.4. Statistical Specification of the Gravity Equation

Finally, there is the proper statistical specification. Mátyás (1997; 1998) shows that the majority of research employing the gravity equation, including research investigating the border effect, is improperly specified. With this misspecification comes biased statistical estimates and, therefore, potentially improper inference. Specifically, Mátyás (1997; 1998) calls for the use of as many as three fixed effect variables depending on the type of data used (cross-section, temporal, or panel): an origin country effect, a destination country effect, and a business cycle effect.

Although they believe that heterogeneity (origin and destination country effects) must be modelled in a correct gravity equation specification, Cheng and Wall (2003) and Wall (2000) show that the Mátyás (1997; 1998) specification leads to difficulties with residuals and in-sample predictions. Cheng and Wall (2003) and Wall (2000) propose trading-partner-pair specific effects to account for the heterogeneity. This specification has the advantage of not imposing the restriction that the intercept for the United States, for example, must be the same for all of its trading partners. With these fixed effects being specific to each bilateral trading relationship, this form of fixed effect controls for political, social, historical, and cultural factors that are all too difficult to measure. Also, because these fixed effects do not change over time, the problematic measurement of geographic distance does not need to be incorporated into the model because of perfect linear collinearity (Cheng and Wall 2003) (see Head and Mayer (2002) for a discussion of the difficulties with distance measurements). Therefore, coupled with the business cycle measurement proposed by Mátyás (1997; 1998), the fixed effects of Cheng and Wall (2003) and Wall (2000) can easily be accommodated within most statistical and econometric software programs without their explicit inclusion in the data set (see Kennedy (2003) for a good discussion of issues with panel data estimation).[39]

5.3. DATA AND ESTIMATION METHODOLOGY

The data on Canada – United States trade flows are obtained from Statistics Canada (2004b) *Canadian International Trade, 1988 – 2003*. These data measure trade flows at the 8- and 10-digit Harmonized Tariff Schedule (HTS) level of aggregation for exports and imports, with Canadian provinces and U.S. states the smallest geographic units.[40] All HTS classifications are aggregated based on their origin and destination. Interprovincial trade flow data has three sources: Statistics Canada (1998) *Interprovincial Trade in Canada, 1984 – 1996*, Statistics Canada (2000) *Interprovincial and International Trade in Canada, 1992 – 1998*, and Statistics Canada's (2005a) *Canadian Socio-Economic Information Management System* (CANSIM) for the most recent interprovincial trade data.

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[39] There is the additional complication of the presence of spatial autocorrelation within border effect studies. Spatial autocorrelation does not bias statistical estimates, but it does artificially reduce variance when the spatial autocorrelation is positive. However, controlling for spatial autocorrelation with panel data is not possible within current standard statistical or econometric software and must be undertaken within programs that require user programming and is beyond the scope of my thesis.

[40] One potential problem with using provincial level data for measuring trade origins and destinations is locational bias: a good may leave Canada from British Columbia and be recorded as such, but originated from Alberta. Statistics Canada has mitigated this potential for error by recording the actual province/state of origin.

Provincial GDP, GDP per capita, and labour forces are also obtained through CANSIM. Provincial tariff rates are calculated using the duty collected variables within the Statistics Canada (2004b) *Canadian International Trade, 1988 – 2003* publication. Provincial capital stocks are obtained through the Centre for the Study of Living Standards (2005) *NAICS based Capital, Labour and Total Factor Productivity Tables by Province for Canada*, available from the CSLS on-line. Arable land is obtained from Statistics Canada's (1986, 1992, 1999a, 2002, 2005b) censuses of agriculture. These data are available at the provincial level, but only at 5-year intervals—intervening years are obtained using linear interpolation.

U.S. state GDP and GDP per capita are obtained from the Bureau of Economic Analysis and U.S. state labour forces are obtained from the Bureau of Labor Statistics, all available on-line. Arable land estimates for the U.S. states are obtained from the United States Department of Agriculture (2000) *Summary Report: 1997 Natural Resources Inventory (revised December 2000).* As with the Canadian data, arable land for the United States is only available at 5-year intervals, with the intervening years obtained through linear interpolation.

U.S. state capital stock estimates are not available, nor are U.S. state total factor productivity estimates which can be used to calculate state-level capital stocks. In order to calculate the capital stocks for each U.S. states, the annual United States capital stock is distributed based on each state's share of U.S. GDP. This same technique was used to calculate capital stocks for Canadian provinces to test the similarity of this estimation to actual data. For the Canadian data, the two measures of provincial capital stock have an extremely high and statistically significant correlation coefficient, $r = 0.969$. Therefore, the estimates for U.S. state capital stock cause little concern for bias in any estimation.

The geographic distances between trading regions are measured in the number of kilometres between the principal centres in each region using Google Earth and Microsoft MapPoint.

5.3.1. The Border Effect Specification

The variables listed above are estimated in the following gravity equation specification to estimate the border effect:

$$\begin{aligned}\ln x_{ij} &= \beta_1 + \beta_2 \ln y_i + \beta_3 \ln y_j + \beta_4 \ln D_{ij} + \beta_5 \ln yc_i + \beta_6 \ln yc_j + \beta_7 \ln KL_i \\ &\quad + \beta_8 \ln KL_j + \beta_9 TL_i + \beta_{10} TL_j + \beta_{11} Tariff + \beta_{12} NAFTA + \sum_{k=1989}^{2001} \alpha_k BE_k\end{aligned}, \qquad (5.2)$$

where x_{ij} is the bilateral trade flow between region i and region j, y_i and y_j are the GDP of regions i and j, D_{ij} is the geographic distance between regions i and j (used only in the sensitivity analysis, below), yc_i and yc_j are the GDP per capita of regions i and j, KL_i and KL_j are the capital-labour ratios of regions i and j, TL_i and TL_j are the land-labour ratios of regions i and j, *Tariff* is the provincial level tariff measuring the level of protection for each province, *NAFTA* is a dummy variable that is one after 1993 and zero otherwise, and BE_k is the border effect for the years 1989 – 2001. The border effect is not modelled for 1989 in the panel estimations and the currency volatility and contiguity variables are not in any of the models due to collinearity issues.

5.3.2. The NAFTA Effect Specification

The primary difference between the border effect specification and the NAFTA effect specification is in regard to the way the independent variables are measured. This difference is an attempt to remain as consistent as possible with the past literatures within each topic, while correcting for their limitations.

In the border effect specification, the variables representing each trading economy are measured as consistently representing the same country. For example, in the context of trade between British Columbia and Washington, if British Columbia was region *i* for the GDP variable, then British Columbia was also region *i* for GDP per capita. This is not necessarily the case for the NAFTA effect. Rather, to be consistent with Hummels and Levinsohn (1995), for example, the two GDP variables will represent their economies depending on their relative sizes, large versus small, GDP_{Large} and GDP_{Small}. For example, suppose that Washington has a larger GDP than British Columbia, but British Columbia has a larger GDP per capita than Washington.[41] In this example, Washington would be represented by GDP_{Large} and GDP per $capita_{Small}$, whereas British Columbia was be represented by GDP_{Small} and GDP per $capita_{Large}$.

Regarding statistical interpretations, differences in GDP decreases intra-industry trade, so GDP_{Large} is expected to have a negative coefficient because it represents an increasing difference between the two trading economies; consequently, GDP_{Small} is expected to have a positive coefficient because, holding GDP_{Large} constant, increasing GDP_{Small} decreases the difference in economic size between the two trading economies. In this context, Ontario's GDP will always be measured as GDP_{Large} for interprovincial trade flows, but will be GDP_{Small} for some trading relationships with the United States. The same representation is used for GDP per capita and the relative factor endowment variables.

This leads to the following gravity equation specification:

[41] Washington's GDP and GDP per capita are in fact both larger than for British Columbia.

$$\begin{aligned}\ln x_{ijt} = &\beta_1 + \beta_2 \ln y_{LARGE\,t} + \beta_3 \ln y_{SMALL\,t} + \beta_4 \ln yc_{LARGE\,t} + \beta_5 \ln yc_{SMALL\,t} \\ &+ \beta_6 \ln KL_{LARGE\,t} + \beta_7 \ln KL_{SMALL\,t} + \beta_8 \ln TL_{LARGE\,t} + \beta_9 \ln TL_{SMALL\,t} \quad , \\ &+ \beta_{10} \ln ER_t + \beta_{11} Tariff_t + \beta_{12} t + \beta_{13} NAFTA\end{aligned} \tag{5.3}$$

where x_{ijt} is the bilateral trade flow between trading economies i and j at time t, y_{LARGEt} and y_{SMALLt} are the GDPs of the large and small trading economies at time t, yc_{LARGEt} and yc_{SMALLt} are the GDP per capita measures of the large and small trading economies at time t, KL_{LARGEt} and KL_{SMALLt} are the capital-labour ratios for the large and small trading economies at time t, TL_{LARGEt} and TL_{SMALLt} are the land-labour ratios for the large and small trading economies at time t, ER_t is the exchange rate between Canada and the United States at time t with interprovincial trade given an exchange rate value of one, $Tariff_t$ is the average Canada – United States tariff rate at time t, t is the linear trend, and *NAFTA* is a dummy variable that is one after 1993 and zero otherwise.

The NAFTA variable takes on a number of forms in the analysis below depending on the regression context. Four regression models are undertaken in this analysis, two using Canada – United States international trade flows and two using both interprovincial and international trade flows. In the former analysis, the NAFTA's effects are investigated only for changes in the Canadian trading patterns with the United States. This is similar to most previous analyses, less non-NAFTA member countries. In the latter analysis the NAFTA's effects are investigated both on changes in the Canadian patterns with the United States and with other Canadian provinces. Any significant change in the trading patterns, positive or negative, with the United States may impact interprovincial trade flows. The first analysis is to have a baseline investigation similar to that of past research in the effects of the NAFTA and the second analysis is to extend that investigation to uncover whether or not the NAFTA has impacted interprovincial trade flows. The effects of the NAFTA are measured at the national level and at the provincial level to investigate the geography of the effects of the NAFTA in both analyses.

Equations 5.2 and 5.3 are estimated using a fixed effect panel procedure. All Canadian provinces (no Territories due to a lack of explanatory variables) and all U.S. continental states are included in the data set—the District of Columbia is treated as a separate spatial unit of analysis and is therefore considered a U.S. state in the analysis similar to that of Coughlin and Wall (2003). All zero values of bilateral trade are replaced with one dollar to facilitate the natural logarithm. This allows for all possible trading relationships to be modelled without any serious concerns for bias (Eichengreen and Irwin 1995, Greene 2000). All variables except the average tariff rate, linear trend, and NAFTA variables are measured in natural logarithms to ease interpretations: all of the coefficients on these variables are then elasticities, representing the percentage change in the dependent variable given a one percentage change in the independent variable. All estimation is performed using NLogit 3.0.

5.4. BORDER EFFECT RESULTS

5.4.1. Standard Gravity Equation Results

The results of estimation are shown in Table 5.1 (standard gravity equation variables) and Table 5.2 (border effect variables). The adjusted R^2 for the OLS and random effects models are on par with previous research on the border effect, with a large jump in the adjusted R^2 for the fixed effects model. The estimated parameters for GDP, GDP per capita, and the factor endowment variables, when significant, are generally similar in sign and magnitude across the different models, and the NAFTA dummy variable is significant and positive in the fixed and random effects models but negative and significant in the OLS model. The provincial tariff parameters are always positive and significant, which is a curious result because tariffs typically have a strong negative impact on trade flows.

<See Table 5.1, page 275>

With regard to expectations, the signs and magnitudes of the estimated GDP parameters are consistent with previous border effect results. GDP per capita, however, is not consistent across the three models. In the panel regressions, GDP per capita is similar to that found by Anderson and Smith (1999) with one region's GDP per capita having a positive effect and the other region's GDP per capita having a negative effect on the level of trade. In the OLS regression, the estimated parameters for both region *i* and *j* are positive and significant. The negative estimated parameters for the capital-labour ratios are consistent with intra-industry trade expectations given that differences in relative factor endowments decrease intra-industry trade, and the positive estimated parameters for the land-labour ratios are consistent with inter-industry trade expectations because those differences in relative factor endowments increase inter-industry trade. The coefficients for the capital-labour and land-labour relative factor endowment variables are expected to be consistent with each other, capturing the dominant form of trade. In the case of Canada and the United States, all of the coefficients are expected to be negative given that intra-industry trade dominates Canada – United States trade flows at the national level. However, the degree of intra-industry trade varies substantially across the Canadian provinces. Therefore, the inconsistency is likely the result of intra-industry trade dominating in central Canada and inter-industry trade dominating in other areas of the country. Capital-labour ratios are capturing the intra-industry trade in central Canada and the land-labour ratios are capturing the inter-industry trade elsewhere in Canada. With regard to the NAFTA variable, its negative coefficient within the OLS framework is not expected. However, the positive and significant NAFTA coefficients in the panel data models do conform to expectations: only a moderate positive impact on Canada – United States international trade, because the decreases in trade barriers between the two countries were implemented through the Canada – United States Free Trade Agreement in 1989.

Though these structural variables are not the primary concern of this paper, overall the fixed and random effects models fare better than the classical OLS model with respect to the expectations on the estimated parameters. The F-test for a panel regression strongly rejecting (p-value < 0.001) the classical OLS model in addition to the better fit with expectations only strengthens the case for panel estimation made by Cheng and Wall (2003) and Wall (2000).

5.4.2. Border Effect Results

The border effects for the three estimated models are reported in Table 5.2. For ease of explanation, the notation of the border effect is presented differently than previous research. When the border effect reduces Canada – United States trade it is represented as negative (the same sign as its estimated parameter) and if the border effect increases Canada – United States trade it is represented as positive. This notation has not been necessary in previous research because the border effect had always reduced Canada – United States trade.

The results from the OLS model are qualitatively similar to the findings of Helliwell (1998), with the border effect decreasing over time. The border effect reaches a high of 99 in 1991 and falls to 13 by 2001. Though in line with previously estimated border effects by 2001, the 1991 magnitude is incredibly high after controlling for GDP, economic development, factor endowments, tariffs, and the NAFTA. However, the border effects in the OLS model may be higher than past research due to the inclusion of all bilateral trading partners between Canada and the United States, rather than only the economically large U.S. states and the U.S. border states. Nevertheless, the OLS results presented here are qualitatively similar to that of past border effect research, favouring interprovincial trade and decreasing over time, showing that the following results are not an artefact of particular data.

<See Table 5.2, page 276>

Turning to the fixed and random effects models, the results are radically different. In the fixed effects model, all of the estimated parameters are positive implying that after controlling for the standard gravity equation variables Canadian provinces trade more with U.S. states than other Canadian provinces. The magnitude of this positive border effect steadily increases over the study period, becoming statistically significant in 1992 and reaching a maximum value of 1.94 in 2001. Therefore, both at and shortly after the establishment of the Canada – United States Free Trade Agreement (CUFTA) in 1989, there was no positive or deleterious effect of the Canada – United States border on trade flows relative to Canadian interprovincial trade. Only in 1992 after tariff reductions and institutional changes had taken place did the CUFTA have a positive impact on Canadian trade flows to the United States. By 2001, Canadian provinces traded approximately 194 percent more with U.S. states than other Canadian provinces after controlling for other structural variables. Not only are these results in magnitudes that are reasonable, but they are consistent with expectations regarding the establishment of free trade agreements.

The random effects model has slightly different results than the fixed effects model. In 1990, the border effect does start out negative implying that Canadian provinces trade 43 percent less with U.S. states than other Canadian provinces, a number comparable to that found by Anderson and van Wincoop (2003). The border effect becomes statistically insignificant in 1992, and positive in the following years reaching a maximum of 0.871 in 2001 implying that Canadian provinces trade 87.1 percent more with U.S. states than other Canadian provinces after controlling for other structural variables. The interpretation of these results is similar to that of the fixed effects model. Before and shortly after the establishment of the CUFTA, the trade barriers between Canada and the United States posed a modest resistance to Canada – United States trade flows. Once those trade barriers were reduced during the first few years of the CUFTA that resistance became insignificant. Eventually, the tariff barriers became low enough to increase provincial trade with U.S. states relative to other Canadian provinces.

5.4.3. Sensitivity Analysis

The incorporation of panel estimation techniques have not eliminated a border effect for Canada – United States international trade flows, but reduced its magnitude to a reasonable level and changed the sign of the estimated parameter to what would be expected for Canada and the United States with their long trading history. Clearly, the existence of a large and negative border effect in other studies for Canadian province and U.S. state trade is a result of some sort of statistical bias. However, the source of this statistical bias, as yet, is unknown. Is the initial specification of McCallum (1995) the source of statistical bias through omitted variables? Or is it the estimation procedure itself? As shown below, the answer to both of these questions is yes.

<See Table 5.3, page 277>

McCallum's (1995) estimate of the border effect, and those that followed his lead, does suffer from omitted variable bias, but that bias is not the primary source of the error. In fact, the bias induced from the omitted variables reduced the negative magnitude of these border effect parameters. This is shown in Table 5.3: the McCallum specification is y_i, y_j, and D_{ij}, whereas the full specification is the set of variables in Table 5.1 plus D_{ij}. The estimated border effects in the OLS McCallum specification are similar to those found in previous research with a border effect of 30 in 1989 falling to 14 by 2001, somewhat higher than those found by McCallum (1995) and Helliwell (1998) due to the inclusion of all U.S. states in the present specification. However, in the OLS full specification, the border effect jumps to over 200 in 1989 falling only to 26 by 2001. The inclusion of theoretically-informed variables to explain the pattern of trade between Canada and the United States has not only changed the value of the estimated border effects, but made their magnitudes ridiculous. Surely if these values of the estimated border effect had been reported the issue would not have garnered such a high degree of attention. Instead, the border effect would have been dismissed as problematic specification. That specification problem, moreover, is statistical not economic.

In a panel data set, if any cross-section heterogeneity is not accounted for, the remaining estimated parameters suffer from omitted variable bias (Kennedy 2003). Consequently, in the presence of cross-section heterogeneity, the appropriate statistical specification must be used to avoid potentially misleading estimation results. This is the primary source of the bias in previously estimated border effect parameters. As shown in Table 5.3, the fixed effect models for both the McCallum and full specifications have estimated border effect parameters that are insignificantly different from zero until 1991, then positive and significantly greater than zero afterward (the random effects model results are qualitatively similar, but lower in magnitude as in Table 5.2, so they are not presented here for the sensitivity analysis). Therefore, though proper economic specification is an issue with the border effect, the primary difficulty with past estimates is the statistical specification.

To be fair, McCallum (1995) did not have the ability to control for cross-section heterogeneity because he had only one year of trade data. Subsequent work did not suffer from this limitation, however. As a result, all of the cross-section heterogeneity was forced into the estimated border effect parameter, causing it to be large in magnitude and negative.

5.4.4. The Geography of the Border Effect

The results for the provincial level border effects are qualitatively similar to that of the national border effects (see Table 5.4). Prior to 1992 for most provinces the border effects are negative, significant, or both. They become positive and significant by 1993, except in Newfoundland.

As stated above, in past research the western provinces exhibited significantly less bias toward interprovincial trade than the provinces in central Canada. This pattern is similar in the present analysis with the western provinces now exhibiting a stronger bias toward interregional trade with the United States than central Canada. The Maritime provinces, however, exhibit a stronger bias toward interregional trade than do both Ontario and Quebec. This result for the Maritime provinces is qualitatively different (aside from the positive provincial border effect that is already qualitatively different) from past research. For Helliwell (1998), the bias toward interprovincial trade increased eastward across Canada. My figures show, in contrast, that the ``bias'' moves from the western provinces to the Maritime provinces and then back to central Canada.

<See Table 5.4, pages 278 – 279>

Newfoundland and Prince Edward Island are the anomalies in the present analysis. Newfoundland's provincial border effect, aside from 1991 and 1992, is always insignificant and is dominantly negative. Therefore, neither the Canada – United States Free Trade Agreement nor the North American Free Trade Agreement have significantly altered Newfoundland's bias toward interprovincial trade.

Prince Edward Island's results are opposite to that of Newfoundland. It now has the strongest bias toward interregional trade with the United States. This is the complete opposite to past research that found Prince Edward Island exhibited the strongest bias toward interprovincial trade. Though Prince Edward Island's provincial border effect was of similar magnitude with the other provinces until 1994 and 1995, the magnitude of its provincial border effect has since more than tripled indicating that Prince Edward Island now trades with the U.S. states 367 percent more than the average for other Canadian provinces after controlling for economic size, economic development, relative factor endowments, tariff rate changes, and distance. However, given the nature of Prince Edward Island's international trade flows with the U.S. states (relatively low trade volumes compared to other Canadian provinces) this change should be interpreted with caution.

5.5. NAFTA EFFECT RESULTS

5.5.1. Canada – United States International Trade and the NAFTA

Turning to the effects of the NAFTA, the statistical results from the four regression models are presented in Tables 5.5 – 5.8. Table 5.5 shows the results from the Canada – United States international trade flow data only measuring the effect of the NAFTA at the national level for a more direct comparison to past research. The estimated elasticities for GDP, GDP per capita, and the relative factor endowment variables are generally consistent with expectations. When the ``large'' and ``small'' variables are significant the large variable is negative and the small variable is positive (except the land-labour ratio for the small trading economy), generally being consistent with the dominant portion of intra-industry trade for Canada. None of these elasticities are particularly high or low in magnitude. The exchange rate and linear trend coefficients have their expected positive signs with the exchange rate elasticity being particularly high in magnitude indicating the gains in trade from a weaker Canadian dollar. The average tariff rate, however, has a positive and significant coefficient, a curious result similar to that found above with regard to the border effect.

<See Table 5.5, page 280>

The national effect of the NAFTA is positive and statistically significant, contrary to most of the past research. However, it should be noted that the key difference between this national effect and most of the past research on the effects of the NAFTA is that the current result is based on province-state trade flows rather than Canada – United States aggregate national trade flows. Nevertheless, the impact of the NAFTA on Canada United States international trade flows has been a 16.32 percent increase over and above any increases from the CUFTA. This result is more modest than that found by Wall (2003), but his analysis separates exports and imports for Canadian and U.S. regions rather than dealing with total trade flows between provinces and states—neither type of analysis is superior to the other, they merely address different questions.

Turning to the geography of the effects of the NAFTA on Canada's trade flows to the United States, Table 5.6 exhibits significantly different results from Wall (2003)—the NAFTA variable in this regression model measures the impact of the NAFTA on each provinces' trade flows with the United States as a whole. The GDP, GDP per capita, relative factor endowment, exchange rate, average tariff rate, and linear trend variable coefficients are all similar to that shown in Table 1, but the effect of the NAFTA varies significantly across the Canadian economic landscape.

<See Table 5.6, page 281>

Except for British Columbia, all of the provincial NAFTA effects are positive, contrary to that found by Wall (2003). Even the Maritime provinces and Newfoundland, all exhibiting negative effects from the NAFTA in Wall's (2003) analysis, have positive coefficients with Prince Edward Island's coefficient being statistically significant and high in magnitude. As a result of the NAFTA, Prince Edward Island's international trade flows with the United States have increased by more than 76 percent. Though Prince Edward Island's international trade flows with the United States are a small share of Canada's total trade flows with the United States, this result exemplifies the impact on results from changing the spatial scale of analysis. Turning to central Canada, the overall results presented in this analysis are qualitatively similar to that found by Wall (2003), but only Ontario has experienced a positive effect from the NAFTA, an increase of trade flows of almost 16 percent, whereas Quebec's positive effect from the NAFTA is highly insignificant. The effect of the NAFTA for Ontario is also significantly more modest than that found by Wall (2003). The 16 percent effect found here is less than both of the effects found by Wall (2003) for exports and imports, 43 and 18 percent, respectively. The national effect of the NAFTA found in this analysis is expected to be within Wall's (2003) export and import effects given that aggregate trade effects should be a weighted average of the independent effects on imports and exports. Western Canada also differs significantly from Wall (2003) in that the overall impact of the NAFTA on western provinces is positive. British Columbia and Alberta exhibit insignificant effects from the NAFTA, but both Saskatchewan and Manitoba exhibit significant positive effects on international trade flows to the United States, 39.34 and 14.46 percent, respectively.

The overall result presented here is that the NAFTA has had a positive impact on trade for the individual Canadian provinces. British Columbia's NAFTA effect is negative but in such a low magnitude that it is inconsequential. Not all of the provinces with significant and positive NAFTA effects are significantly impacted by the non-tariff changes in the NAFTA. Ontario, for example, has been affected because of changes in the rules of origin in the automotive sector. A natural question to ask then, is what is the driving force behind these changes? As discussed above (chapter 3) in the context of trade creation and diversion, the new economic geography literature provides insight here. The NAFTA altered the mean centre of the consumer market for Canada and the

United States moving it further south through the inclusion of Mexico in the NAFTA. Because of the change in the mean centre and the corresponding possibility of firms changing locations within the same country or to another country in response to this new mean centre, post-NAFTA trade flows are altered. Rather than a province trading with another province, that province now trades with the United States because of firms moving closer to the mean centre of their market. In order to better understand this positive effect of the NAFTA on the provinces' trade flows, the incorporation of interprovincial trade flows is needed to investigate whether or not the NAFTA has negatively impacted Canada's interprovincial trade.

In general, the present analysis again exemplifies the impact of aggregating provinces and states into larger sub-national regions to assess the NAFTA, or any other policy change. As found by Coughlin and Wall (2003) regarding the effects of the NAFTA on U.S. states, aggregating U.S. states to larger sub-national regions conceals the distinctive effects of the NAFTA on the spatial units within each of those sub-regions.

5.4.2. International and Interprovincial Trade and the NAFTA

Turning to the international-interprovincial results, presented in Tables 5.7 and 5.8, all of the non-NAFTA variables in both regression results are quite similar to the two regression models discussed above, so they will not be discussed. The results for the effects of the NAFTA on interprovincial and international trade flows to the United States, however, are worthy of independent comment. The effects of the NAFTA on international trade flows to the United States are positive, statistically significant, and very close in magnitude to the effect of the NAFTA shown in Table 5.5—the effect is now a 14.65 percent increase in international trade flows to the United States in addition to the effects from the CUFTA. The effect of the NAFTA on interprovincial trade is negative but not statistically significant. Therefore, at the national level, the effect of the NAFTA has been to increase international trade flows to the United States without significantly decreasing the interprovincial trade flows.

<See Table 5.7, page 282>

The geography of the effects of the NAFTA on international trade flows to the United States and Canadian interprovincial trade flows are shown in Table 5.8. There are both similarities and differences between the results using only international trade flow data and using international and interprovincial trade flow data (comparing Tables 5.6 and 5.8), but where the variables in each of the models overlap the results are strikingly similar. The primary difference is that now the effect of the NAFTA on Manitoba's international trade flows with the United States, though still positive, is statistically insignificant. The interesting result that emerges out of the use of both international and interprovincial trade data is the effect of the NAFTA on interprovincial trade.

<See Table 5.8, page 283>

Of the ten effects of the NAFTA on interprovincial trade flows, nine of them are statistically insignificant, some positive and some negative, generally confirming the national statistically insignificant result. British Columbia, however, is negative, statistically significant, and high in absolute magnitude. The effect of the NAFTA has been to decrease British Columbia's interprovincial trade flows by almost 28 percent. This is a curious result because British Columbia has increased its interprovincial trade over this study period by 27 percent, significantly more than Ontario's and Quebec's meagre increases of 7 and 8 percent, respectively—it should be noted that Ontario and

Quebec do have quantitatively large estimated decreases in interprovincial trade flows resulting from the NAFTA, but those decreases are not statistically significant. British Columbia has also decreased its share of total trade to and from other Canadian provinces, but those decreases are common for all Canadian provinces and British Columbia's decreases are not exceptionally high: Alberta, Saskatchewan, Ontario, Quebec, and Nova Scotia all have greater relative decreases in their shares of interprovincial trade flows (Statistics Canada 1998; 2000; 2005a)—and the changing pattern of British Columbia's interprovincial trade flows now focusing more on geographically closer provinces found in previous chapters is no different than any of the other Canadian provinces. Once again, the utility of using individual provinces and states is manifest, rather than using aggregated sub-national regions for the analysis. Overall, the effects of the NAFTA are positive for the Canadian provinces with regard to international trade flows to the United States, without any significant loss of interprovincial trade aside from the loss for British Columbia.

Though the geographical pattern of the effects of the NAFTA on both international trade flows to the United States and interprovincial trade flows is interesting in itself, the causes of this geographical effect is also of particular interest. However, the causes behind the geographical effects are more difficult to ascertain than the effects themselves. However, with the majority of provinces decreasing their interregional trade and increasing their international trade (most of which are statistically insignificant, however) the possible explanation of firms changing locations due to the new mean centre of the consumer market for Canada and the United States has gained merit. If large Canadian firms locate further south (even only just across the Canada – United

States border), former interprovincial trade becomes international trade. It is certainly the case that the mean centre of the consumer market shifted further south with the CUFTA, but the NAFTA has shifted the mean centre even further south, providing more incentive (and likely more firms) to move into the United States, if not Mexico. Most of the statistical results are not statistically significant, so this spatial shift is not likely incredibly strong, but appears to be present nonetheless. Unfortunately, in order to authentically test this hypothesis, firm-level data that includes their (changing) locations over time are required but not available. However, some other hypotheses can be investigated with the available data.

<See Table 5.9, page 284>

As shown in Table 5.9, most of the correlations between the provincial effects of the NAFTA on international and interprovincial trade flows and the economic relationships between Canada's provinces and their trading partners are statistically insignificant. Despite this insignificance, the signs of the correlation coefficients are instructive. Those provinces with the lowest export shares, import shares, and export-GDP ratios in 1989 had the largest impact from the NAFTA on trade, as well as those provinces that had the highest export shares, import shares, and export-GDP ratios in 2001 had the largest impact from the NAFTA on trade. Similarly, those provinces with the highest 1989 tariff rates had the greatest positive impacts from the NAFTA on trade. Therefore, those provinces with the least amount of economic ties in 1989 and the most protection through tariffs gained the most in trade flows once barriers to trade were reduced, and those provinces that had the highest amount of economic ties in 2001 gained the most in trade flows. These relationships, though insignificant, do make sense because the provinces that were able to increase their trade (1989 correlations) and did increase their trade (2001 correlations) with the United States experienced the greatest gains in trade from the NAFTA. The difficulty in this interpretation is that many of the changes in export shares, import shares, export-GDP ratios, and tariff rates are due to the CUFTA—there is no control group for this analysis to investigate independently the effect of the NAFTA. Consequently, with the limitations of available data, the most conclusive evidence for the effect of the NAFTA is that it has had a strong geographical impact on the Canadian economic landscape. Though circumstantial, those geographical effects appear to be related to the degree of the province's economic ties with the United States and the rest of Canada before and after the NAFTA entered into force.

5.6. THE DIRECTION OF FUTURE RESEARCH ON CANADIAN TRADE

The natural question to ask at this point is: what is the appropriate direction for future research on Canada – United States international trading relations? As shown in Table 5.10 using an increase factor,[42] total international trade flows have increased in real terms to all regions of the world for most provinces—the increase factors for imports and exports are also provided. Aside from the Territories that have seen substantial decreases in international trade flows to Mexico, East Asia plus Australia and New Zealand (EA-ANZ) ,[43] and the rest of the world (ROW), decreases in aggregate international trade

[42] The increase factor is measured as the ratio of 2001 and 1989 trade levels in constant dollars.

[43] East Asia is defined as the ASEAN 10: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, plus China, Hong Kong, Taiwan, South Korea, and Japan plus Australia and New Zealand.

flows are few and of low magnitude: British Columbia and Prince Edward Island have decreased their total international trade flows with the European Union (EU15),[44] with those decreases both being from a decrease in exports—imports from the European Union to both British Columbia and Prince Edward Island have increased over the study period. New Brunswick has decreased its total international trade flows with East Asia, also from a decrease in exports to that region. And Nova Scotia has decreased its international trade flows with Mexico and East Asia, both from decreases in imports from those regions.

<See Table 5.10, pages 285 – 287>

Turning to international trade flows between and within Canada and the United States, all of the Canadian provinces have increased their interprovincial trade levels in real terms, by an unweighted average of 23 percent. There are some decreases in the level of interprovincial trade in some cases, but those decreases are small and aside from Ontario's small decrease in interprovincial exports are in the smaller east coast provinces and the Territories. In contrast, Canadian provinces have increased their levels of international trade with U.S. states by an unweighted average of 153 percent, with all of the provinces except Newfoundland and the Territories more than doubling (in some cases almost quadrupling) their international trade flows with the United States. Thus far, it appears as though the most fruitful analyses of Canadian international trade flows are with the United States.

<See Table 5.11, pages 288 - 289>

[44] European Union-15: Austria, Belgium-Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Analysing the shares of international and interprovincial trade flows only supports the above statement (see Table 5.11). The shares of international trade to East Asia fell for all provinces except Manitoba, Ontario, and Newfoundland.[45] These three provinces did exhibit increases in their trade share to these regions, but those increases are all very modest. This is somewhat of a curious result given the attention East Asia has garnered as a force in the international economy. Even British Columbia has decreased its share of international trade flows with East Asia. Only having international trade flows with the United States have risen. British Columbia has increased its share of imports from East Asia, but its share and level of exports have fallen. On the international front, the rest of the world has lost total trade shares with all provinces except Quebec, Nova Scotia, and Newfoundland, and the European Union has lost total trade shares from British Columbia, Ontario, the Maritimes, and Newfoundland.

At a more local level, there is a clear winner and loser when it comes to interprovincial and international trade shares. For all of the provinces, total interprovincial trade shares have fallen. On the import side, Prince Edward Island very modestly increased its share of interprovincial trade, and for exports only British Columbia and Newfoundland increased their interprovincial trade shares, with Newfoundland's increase in interprovincial trade shares being substantial, from 21 to 40 percent of all of its trade. Turning to the trade shares with the United States, all of the provinces have increased their total trade shares with the United States. Prince Edward Island slightly decreased its already low share of imports from the United States, and Newfoundland and the Territories both decreased their exports to the United States. Additionally, in 1989 only Ontario had a larger trade share with the United States than

[45] It should be noted that this time period includes the 1997 Asian Crisis.

with Canadian provinces, but by 2001 only Saskatchewan, Nova Scotia, Prince Edward Island, Newfoundland, and the Territories had a greater share of their trade with Canadian provinces, with almost all provinces having significant increases in their shares of trade with the United States.

Despite that increases in international trade outside of North America and interprovincial trade may lead to increases in the economic welfare of Canadian provinces, of increasing importance for possible provincial economic welfare gains is their trade flows with the United States. Accordingly, less attention should be focussed on the international trading patterns outside of North America with more attention being focussed on province-state trading patterns. The trading relationship for each Canadian province has its own unique geography with the United States. Only through a detailed analysis of each of those trading relationships will a complete understanding of the complex geographical trading relationship between Canada and the United States become manifest.

5.7. CONCLUSIONS

For over ten years now the finding of a border effect between Canada and the United States has been a major puzzle in international economics and the NAFTA has not been shown to definitely have had an impact on Canada – United States international trade flows. I've argued in this chapter that research showing both such effects was wrong. Because of improper geographic, economic, and statistical specification, previous estimates of the border effect and NAFTA effect were biased, and which produced incorrect inferences. In the case of the border effect, the solution does not stem from imposing a new theoretical framework. It involves taking the gravity equation and then modelling with theoretically-informed variables commonly used in most empirical international trade research along with an appropriate statistical procedure and proper statistical inference for a semilogarithmic equation. Using this approach I have uncovered two facts about the integration of Canada and the United States.

First, the border effect is insignificant or negative in low magnitude following the establishment of the CUFTA and then moderately positive at or after 1992. So, in 1990, interprovincial trade is favoured over province-state trade by approximately 7 – 43 percent. But by 2001 province-state trade is favoured over interprovincial trade by approximately 100 – 200 percent, depending on whether the fixed or random effects model is used. These results are in a direction and at a magnitude that are not surprising within the context of the free trade agreements between Canada and the United States.

And second, the NAFTA has indeed had a positive effect on Canada's international trade flows with the United States. Additionally, the NAFTA has been shown to have had a statistically insignificant impact on overall interprovincial trade flows and that the geographical effects of the NAFTA are best viewed at the provincial level. Using the Canadian provinces and U.S. states as the spatial units of analysis, it is found that the geographical effects of the NAFTA are overwhelmingly positive for international trade flows to the United States and that only British Columbia has experienced a negative change in interprovincial trade flows resulting from the NAFTA.

With these two issues regarding the integration of Canada and the United States and the appropriate direction of research regarding Canada – United States international trade flows clarified, my analysis now turns to the geographical dimensions of Canada's trade with the United States. This analysis begins with an account of the trading patterns of the Canadian provinces with other Canadian provinces and the United States. This is then followed with an investigation into the degree of spatial change in the Canadian provinces' trading patterns in the twelve years since the inception of free trade between Canada and the United States.

Chapter 6[46]

Canada – United States interregional trade flows, 1989 – 2001

6.1. INTRODUCTION

Now that the appropriate direction of research on Canadian trade has been established in the previous chapter, the analysis now moves into a regional account of the trade flows of Canadian provinces. This chapter presents and examines the trading patterns between Canadian provinces and other Canadian provinces as well as between Canadian provinces and U.S. states.[47] Using interregional trade volumes (measured in constant dollars), interregional trade shares, and economic dependence through interregional trade, the general trading patterns of the Canadian provinces are presented.

As stated in the introduction, most of the attention geographers have paid to international trade flows has been at the nation-nation scale (see Dicken 2003; Gaile and Grant 1989; Hanick 1987, 1988, 1989; Michalak and Gibb 1997; Nierop and De Vos 1988; and Poon et al. 2000), despite the fact that *regional* production systems are at the heart of economic geography (Walker 2000). Additionally, Hoare (1993) notes that ``a little-explored facet of the global economy is the way regions within nations and different parts of the international community interact through trade flows. ... Given the well-established tendency for any one country to trade more with some overseas nations than

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[46] Portions of this chapter have been published in the following: Andresen, M.A. (2009). Canada - United States interregional trade flows, 1989 - 2001. *Canadian Journal of Regional Science* 32(2): 187 - 202.

[47] For simplicity in explication, the District of Columbia is referred to as a U.S. state.

with others we should expect at least as much and probably more trading-partner specialization on the part of that country's constituent localities'' (Hoare 1993: 701).

This poses the question of why the nation is the unit of analysis in most North American studies of international trade flows. Canada and the United States undoubtedly have great variation in the destinations of their interregional exports, but each country is most often treated as a single unit of analysis. The 15 countries of the European Union (EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom) are each used as separate units of analysis when assessing the effects of the European Union on international trade flows (see Fontagné et al. 1997, for example).

<See Figure 6.1, page 337>

As shown in Table 6.1 and Figure 6.1, the EU-15 has a geographic area of 3.2 million kilometers squared. Therefore, the EU-15 fits inside the United States three times and Canada three times. Granted, though most of the United States can be considered economically active, the same cannot be said for Canada. However, if we only consider the area within 500 kilometers of the Canada – United States border, a conservative estimate of the dominant area of economic activity within Canada, Canada and United States would be equivalent to four times the area of the EU-15. From this perspective based on area, Canada and the United States consist of 60 spatial units of analysis, the number of continental U.S. states (50) plus the 10 Canadian provinces. The point here is that based on the arguments of Hoare (1993) and the large geographic size of both Canada and the United States, analyzing Canada – United States interregional trade flows must be undertaken at a sub-national scale.

<See Table 6.1, page 290>

A body of research has emerged that investigates the exports of U.S. states and/or their regional groupings—see Coughlin and Wall (2003), Erickson and Haywood (1991), Gazel and Schwen (1998), Hayward and Erickson (1995), Sawchuk and Sydor (2003), and Warf and Cox (1993) for representative studies. However, even these studies concerned with the sub-national regions of the United States tend to examine the trade flows of those regions with other countries and with the ``rest of the world'' rather than with other sub-national regions. There are also a small number of region-specific studies: Calzonetti (1991), Hayter and Holmes (1999), McConnell and MacPherson (1991), Melvin (1988), Warf and Cox (1990), but these articles only consider the effects of the CUFTA and/or the NAFTA on regions, cities, and/or specific industries within Canada and the United States rather than their relationship with the rest of the two countries. In short, within the geographical trade literature, the sub-national region is a relatively unexplored research area, particularly with respect to Canadian regional (provincial level) trade flows.

6.2. PAST RESEARCH ON CANADA – U.S. INTERREGIONAL TRADE

Not surprisingly, especially given the spatial distribution of U.S. states' international trade flows found by Erickson and Hayward (1991), Canada – United States trade is very regionally oriented. Breaking Canada – United States trade flows into only three regions (Atlantic Canada – New England, Ontario – Great Lakes, and Cascadia), Brown (1998) finds that the composition of Canada – United States trade varies geographically: Atlantic Canada is dominantly involved in natural resource-based trade flows; Ontario has a broad-based composition of trade flows dominated by manufacturing, particularly the automotive industry; and Cascadia's trade flows are in between with both manufactured goods and natural resources. Norcliffe (1996), though, measuring the destinations and origins of Canadian regions' exports and imports at the national level, finds that Ontario and the Prairies import the greatest proportions of trade from the United States (72.2 and 84.5 percent of imports in 1993, respectively), whereas Ontario exports the greatest proportion of trade to the United States (89.5 percent), largely due to the automotive industry (Quebec and the Prairies are also high at respectively 78.9 and 75.3 percent). Turning to Canadian regional trade flows outside of the United States, Quebec and the Atlantic provinces have the strongest ties to Europe, and British Columbia has the strongest ties to Japan (British Columbia and the Territories have the weakest ties to the United States).[48] Quite clearly, geographical proximity, colonial ties back to Europe, and the regional importance of the automotive industry play important roles in determining the spatial distribution of Canadian regional trade flows.

Brown and Anderson (1999) separate Canada into five regions and the United States into nine regions, finding similar regional ties as Brown (1998) and Norcliffe (1996). Building on this analysis, Brown and Anderson (1999) calculate the regional economic dependence of the Canadian and U.S. regions on each other. Due to the United States' greater diversification in international trade flows the economic dependence of U.S. regions on Canada is significantly lower than for Canadian regions on the United

[48] Though not explained by Norcliffe (1996), British Columbia's weak tie to the United States is from a low level of imports, relative to other provinces because British Columbia's export shares to the United States are high.

States. Only 1.32 percent of the United States' economy, in 1992, was tied to Canada, whereas 17.45 percent of the Canadian economy was tied to the United States in that same year. The greatest interregional ties are between the Great Lakes region in the United States (3.15 percent of GDP) and Ontario (23.91 percent of GDP). The remainder of the Canadian regions are below the Canadian average, with the prairies being the lowest—this result is curious given that the Prairies overwhelmingly import and export from the United States.

Using export trade flows as a percentage of GDP to measure economic dependence, Brown and Anderson (1999) reinforce the finding that geographically close regions are the most integrated. All Canadian regions exported more than 10 percent of their GDP to the United States in 1992. The largest proportions of that economic dependence is tied to their respective U.S. border regions—the automotive industry in Ontario and the Great Lakes, for example. More insightful, however, is their calculation of intra-industry trade using the Grubel and Lloyd (1975) Index.

Intra-industry trade is found to vary significantly across the Canadian regions. Ontario has the highest level of intra-industry trade, particularly with the Great Lakes region (automotive industry trade flows), followed by Quebec, Alberta/British Columbia, the Atlantic provinces, and the Prairies. Although Brown and Anderson (1999) mistakenly associate intra-industry trade as capturing similarity in industrial structure, their analysis is instructive in showing the geographical nature of Canada – United States in intra-industry trade. Those regions that have the greatest degrees of intra-industry trade also have the largest manufacturing bases. And because a greater degree of manufacturing leads to greater product differentiation (both horizontal and vertical) intra-industry trade is positively associated with the degree of the manufacturing base.

The primary limitation of the above studies is their lack of a temporal component to investigate whether or not the spatial distribution of Canada – United States trade flows have changed over time, in particular, as a result of the CUFTA or NAFTA. Polèse (2000) is the first paper to fill this gap in the literature using Canada – United States interregional trade flows. Asking whether or not Quebec is special with regard to North American integration, Polèse (2000) finds that Quebec is more integrated with the rest of Canada than Ontario. And Ontario is the least integrated with Canada, but the most integrated with the United States. Curiously, Ontario appears to be the most dedicated to the Canadian confederation and Quebec appears to be the least dedicated, at least at the political level, although it is Quebec that potentially stands to lose the most from separation from Canada. Furthermore, since 1993 the percentage of Canadian regional GDP exported to the United States essentially doubled by 1997, likely a result of the NAFTA. The addition of the temporal component by Polèse (2000) only exemplifies the importance of the U.S. economy to Canada found by Brown and Anderson (1999).

And finally, Acharya et al. (2003), using four U.S. and five Canadian regions, analyze Canada – United States interregional trade flows 1980 – 2000. Overall they find that Canadian exports to New England and the Midwest have fallen while the Northwest has remained constant; and imports for all of three regions have remained relatively constant in terms of the interregional distribution of trade flows. The most striking result is the large increases for both imports and exports with the U.S. South. This phenomenon is common across all five Canadian regions ranging from small increases (Ontario increased its share of exports to the South from 10 – 13 percent) to rather large increases (Ontario increased its share of imports from the South from 13 – 23 percent). Other Canadian regions also had increases in their share of trade flows as high as 10 percent, but the sheer volume of Ontario's trade flows makes any increases in Ontario's trade flows the most significant of all the provinces. Additionally, British Columbia, the Prairies, and Atlantic provinces dominated trade in natural resources, Quebec dominated trade in labour intensive products, and Ontario is more specialized in manufactured goods (Acharya et al. 2003).

This literature on Canada – United States interregional trade flows, though small, is particularly instructive. The static analyses of interregional trade flows show that there are definite spatial patterns relating to geography and history, and the panel studies show that these spatial patterns are changing over time, likely due to the establishment of free trade agreements. However, the current scope of analyses on Canada – United States interregional trade flows leaves much to be desired for an understanding of the geography of Canada – United States interregional trade. Therefore, in this and the following chapters an extensive analysis, both descriptive and inferential, is undertaken to fill this gap in the literature.

6.3. DATA AND METHODOLOGY

The data used for the interregional trade analysis of Canada and the United States mainly derives from Statistics Canada. Statistics Canada (1998; 2000; 2005a) provides both interprovincial and international trade flow data at the province[49] and state level, indicating both the origin and destination of trade flows. These are the same data used in Chapter 4 that presents a national analysis of Canada – United States international trade flows. But rather than being aggregated by industry to the national level, the data are aggregated to total exports and imports for Canadian provinces and U.S. states. There are no industrial classifications presented in the present analysis for all provinces and industrial sectors, but Ontario's international trade at the industrial sector level is presented for the automotive industrial sector to explicate the results found below. Data for provincial GDP is obtained through Statistics Canada (2005a), and data for U.S. state GSP (gross state product) is obtained through the website maintained by the U.S. Bureau of Economic Analysis <http://www.bea.doc.gov/>.

Using these data, this chapter presents a descriptive analysis of Canada – United States interregional trade. First, the volume of provincial exports and imports are calculated for each province with each of the Canadian provinces and U.S. states. This includes the use of increase factors (the ratio of 2001 trade levels to 1989 trade levels) that measure of the degree of increased or decreased interregional trade flows to summarize the changing patterns of province-state trade flows. Second, the shares of trade for exports and imports at the province-province and province-state levels are calculated. The purpose of this analysis is to show the changing provincial focus (if any) of interregional trade flows since the establishment of the CUFTA and the NAFTA. Third, the economic dependence of each province on each U.S. state and Canadian

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[49] The use of the term province is used in the present analysis to represent all Canadian regions, including the Territories. Though the Territories are not provinces, this terminology is used to simplify explication.

province is calculated to investigate whether or not economic dependence has changed after the establishment of the CUFTA and the NAFTA. And fourth, an analysis of the patterns found is undertaken using Ontario's international trade flows with the U.S. states in the automotive industrial sector. Essentially, the descriptive analyses presented in this chapter complements the descriptive analyses in Chapter 4 at the national level, but is not undertaken to the same degree because of the number of spatial units to analyze. Calculating these various indices at the regional level shows the geography of Canada – United States international trade flows in reference to the analyses at the national level. The regional descriptive analyses, therefore, provide a much richer and comprehensive account of the world's largest bilateral trade flow from an explicitly geographical perspective.

6.4. CANADA – U.S. INTERREGIONAL TRADE FLOWS, 1989 – 2001

6.4.1. The Volumes of Interregional Trade

The export and import trade volumes representing all exports and imports to Canada and the United States are shown in Tables 6.2 and 6.3. The interprovincial and international export trade flows for all provinces except the Territories increased faster than GDP from 1989 to 2001—the Territories increased their real levels of exports by 21 percent, but their economy grew by 61 percent. The interprovincial and international import trade flows, however, increased slower than GDP for all provinces except Alberta, Saskatchewan, Manitoba, and Ontario. None of Canada's provinces decreased their real levels of imports from 1989 to 2001, but the export orientation of Canadian provinces has increased since the establishment of the free trade agreements.

Export trade volumes for the Canadian provinces have the general pattern of increased trade with most U.S. states. For most provinces, the vast majority of U.S. states have undergone above average increases in exports from Canadian provinces, with the largest increases typically related to geographic proximity and the economic size of the export destination (the issue of trade volumes and economic size is dealt with in the following chapter). However, many of the increase factors for the United States must be interpreted with caution due to the small number effect. For example, British Columbia's greatest magnitude increase factor for exports is for South Dakota a result of an increase in export volumes from 3.96 to 33.77 million 1997 dollars, but British Columbia's export volumes to Washington increased by more than 4 billion 1997 dollars over the same time period (Washington also has a high increase factor). Therefore, export and import destinations that have relatively small 1989 export or import trade volumes must be interpreted with caution with regard to the increase factor. More interesting, however, is the changing export trade volumes to the Canadian provinces.

As shown in Chapter 5, interprovincial trade has increased since the establishment of a free trade agreement in 1989, but those increases have been much lower than the increases in trade between Canadian provinces and U.S. states during the same period. The geography of the increases in interprovincial trade varies significantly from province to province and is vastly different from the experience of U.S. states.

<See Tables 6.2 and 6.3, pages 291 – 302>

Aside from Alberta, British Columbia's export values to the Canadian provinces are less than average, with decreases to New Brunswick and the Territories. Alberta had no interprovincial exports increasing greater than average and also decreasing its export trade volumes to the Territories. Saskatchewan is far more Canadian focused, only decreasing its export values to Quebec, but increasing export values to Alberta, Nova Scotia, Prince Edward Island, and Newfoundland. Manitoba resembles Alberta, with below average increases for all provinces except Saskatchewan and New Brunswick, that both experienced decreases. Ontario decreased its export trade volumes to most other provinces, and Quebec reduced its export trade volumes to four provinces—neither Ontario nor Quebec had above average increases to any Canadian province. New Brunswick, Nova Scotia, and Prince Edward Island appear to be reorganizing their interprovincial export trade volumes, with some provinces having decreases in those volumes while others have above average increases. Newfoundland, however, exhibits significant growth in its interprovincial export trade volumes to all of central and eastern Canada—British Columbia, Alberta, Saskatchewan, and the Territories decreased their export trade volumes from Newfoundland. Incidentally, Newfoundland also has the largest number of decreases in export trade volumes to the United States. And the Territories, aside from British Columbia and Ontario, exhibit sharp decreases in its interprovincial export trade volumes. Therefore, with the exception of Manitoba and the spatial redistribution of interprovincial trade in the Maritimes and Newfoundland, interprovincial export trade volumes have suffered, particularly with respect to the economically largest provinces.

Import trade volumes have seen a somewhat different pattern of change. As with export trade volumes, most Canadian provinces increased their imports from the U.S. states, with the largest increases dominantly being related to geographic proximity and economic size. However, Quebec, the Maritime provinces, Newfoundland, and the

Territories all decreased their import trade volumes from many U.S. states, particularly those of Nova Scotia, Prince Edward Island, Newfoundland, and the Territories. Additionally, a large number of these decreases in import trade volumes do not appear to be motivated by geographical proximity.

Curiously, the opposite pattern manifests itself when considering interprovincial import trade volumes. Though there are some notable increases in interprovincial import trade volumes dominantly based on geographical proximity, the western provinces and Ontario undergo many significant decreases in interprovincial import trade volumes and relatively few above average increases. Conversely, Quebec, the Maritime provinces, Newfoundland, and the Territories have many above average increases in interprovincial import trade volumes and relatively few decreases in interprovincial trade volumes. Furthermore, the majority of those interprovincial import trade volume decreases are related to the western provinces and Ontario, the same provinces that are decreasing their import trade volumes to Quebec and the provinces to its east.

Overall, aside from Newfoundland, the export trade volumes of the Canadian provinces have shifted toward the U.S. states. Most provincial destinations of export trade volumes have experienced either decreases or below average increases. Import trade volumes, however, have undergone a change that is much more geographical than export trade volumes. The western provinces and Ontario are reorientating their import trade volumes away from other provinces and toward the U.S. states. In contrast, Quebec, the Maritime provinces, Newfoundland, and the Territories, though still increasing their import trade volumes from many U.S. states, appear to be reorientating the sourcing of their imports to originate from Canadian provinces.

Much of this finding is consistent with Wall (2003). Wall (2003) found that the NAFTA has had a negative impact on trade in eastern Canada, a positive impact on trade in central Canada, and an insignificant impact on trade in western Canada. The weaker spatial reorientation of eastern Canada's export trade volumes to the U.S. states and the spatial reorientation of eastern Canada's import trade volumes to Canadian provinces is consistent with Wall's (2003) findings with respect to the NAFTA. Additionally, if Ontario's spatial reorientation of import and export trade volumes dominate those of Quebec's due to their relative sizes, central Canada's effect on trade from the NAFTA found in the present analysis is also consistent with that found by Wall (2003). Western Canada, however, is more problematic. With the exceptions of Saskatchewan in terms of export trade volumes and Manitoba in terms of import trade volumes, the western provinces appear to be undergoing a spatial reorientation toward the U.S. states. That said, after Wall (2003), there may be enough variation within the western provinces to make one believe that the NAFTA has had an insignificant impact on trade—the conflicting effects of the NAFTA may be washing themselves out.

6.4.2. The Shares of Interregional Trade

The analysis of trade shares provides a much clearer representation of the changing spatial distribution of provincial exports and imports. Tables 6.4 and 6.5 present the export and import trade shares representing all exports and imports to Canada and the United States—just as the case of trade volumes, these shares are not to be confused with those presented in Chapter 5 that encompass provincial exports and imports with all countries in the world.

All of the Canadian provinces expect Newfoundland and the Territories increased their share of exports to the United States by approximately 50 percent from 1989 to 2001—provinces that already exported large shares of their trade to the U.S. states in 1989, such as British Columbia and Ontario, did not exhibit such high magnitudes of change. The Territories maintained their very low share (4 percent) of exports to the United States, whereas Newfoundland's export share fell by more than 30 percent, from 70 to 48 percent. Despite the fact that most Canadian provinces send 50 – 70 percent of their exports to the United States, these numbers are still disproportionately low. Of the 61 spatial units (Canadian provinces and U.S. states) in the present analysis, over 80 percent are in the United States. Even if one does not consider the economic size of the U.S. states Canadian provinces still export disproportionately less with the United States. The same relationship also holds for imports, aside from Ontario.

The import shares of the Canadian provinces from U.S. states is lower, on average, that that of exports (Ontario is the primary exception). However, the majority of provinces increased their shares of imports from the U.S. states by approximately 50 percent, similar to that of export shares. Prince Edward Island, not Newfoundland, was the exception, in this case importing a decreasing import share from the United States. However, Prince Edward Island, Newfoundland, and the Territories obtain a very small share of their imports from the United States.

<See Tables 6.4 and 6.5, pages 303 – 310>

Aside from these noted changes, most of which are not radical in magnitude, the majority of changes in export and import shares appear moderate. There may have been significant changes in export and import trade volumes to the United States, but the large increases in most of the provinces' export and import shares to the United States appear to be a result of the cumulative effect of small changes favouring that country. In other words, the relative spatial distribution of provincial exports and imports is changing in favour of the U.S. states, but that change is gradual.

Given that the United States has increased both its export and import shares to and from Canadian provinces, interprovincial export and import shares must have fallen—the shares presented in this chapter reflect the shares of exports and imports only within Canada and the United States. However, given the variation in the export and import trade volumes, it was expected that there be a similar variation in the export and import trade shares. If one ignores Newfoundland and the Territories, the overwhelming change in interprovincial export and import shares is negative. There are a few moderate increases, dominantly related to geographic proximity, and a number of export and import trade shares that have essentially remained the same, but the dominant direction of change is negative. Even Ontario, maintaining the largest export and import trade shares for almost all provinces, exhibits large magnitude changes in those shares in all provinces except Newfoundland and the Territories.

The direction of change is clear. Canadian provinces are decreasing their exports and imports with other Canadian provinces and increasing their imports and exports with U.S. states. In the case of changes for the U.S. states, exports and imports are generally changing gradually. But, much of the change in exports and imports involving other Canadian provinces is abrupt. Therefore, Canadian provinces are substituting their interprovincial trade for interregional trade with the U.S. states. This substitution involves sharp decreases for a small number of Canadian provinces coupled with moderate increases to many U.S. states. In other words, the sharp decreases in interprovincial trade did not correspond with sharp increases in international trade. Early in the study period, the Canada – United States border posed a barrier to trade flows except for those province-state combinations that were already significantly integrated. A consequence of this barrier is much lower export and import shares than would be expected given the geographic and economic size of the United States. However, as the tariff barriers decreased—all tariffs were ``officially'' zero by 1998—Canadian provinces began to export relatively more to the United States and relatively less to other Canadian provinces. At this point, it is likely that interprovincial barriers began to supersede national barriers fostering international trade at the expense of interprovincial trade. So by 2001, there had been dramatic increases in not only the export and import trade volumes between provinces and states but also in export and import trade shares. The trade shares of Canadian provinces with U.S. states are still not near what would be expected, particularly for imports, the eastern provinces, and the Territories. However, because of the decreases in trade barriers, those trade shares are now much closer to any *a priori* expectations given market size. As a result of increased volumes and increased shares of trade with U.S. states the economic dependence of Canadian provinces on U.S. states has increased.

6.4.3. Economic Dependence and Interregional Trade

Following Brown and Anderson (1999) and Polèse (2000), the economic dependence of a Canadian province either on another Canadian province or a U.S. state is measured using the export value to GDP ratio (see Table 6.6). Though not a perfect measure of economic dependence, the share of a province's GDP that is exported to another province or U.S.

states does provide a good indicator of the importance of that export destination to the local economy.

From 1989 to 2001 all Canadian provinces except the Territories increased their economic dependence on the United States. This result is expected given that exports are growing faster than GDP over this study period. In fact, increasing economic dependence is a well-established fact for most countries of the world (Dicken 2003; International Monetary Fund 2005a, 2005b). And similar to export and import trade shares, most Canadian provinces have increased their economic dependence on the United States through trade by approximately 50 percent.

It is because of the greater market access resulting from the establishment of free trade agreements, Canadian provinces have increased their economic dependence with the United States. Furthermore, the geography of this economic dependence is quite apparent. Most provinces, in 1989, have an economic dependence with the United States ranging from 10 – 15 percent—the Territories' economic dependence is notably low, and has markedly decreased with its closest U.S. neighbour, Alaska. Ontario is the exception in this year with over 20 percent of its GDP exported to the United States. Given the long established relationship between Ontario and Michigan of free trade in automotive products, this is expected. By 2001, most Canadian provinces doubled their economic dependence through trade with the United States. Some provinces more than doubled their economic dependence, with Prince Edward Island tripling its economic dependence. Consequently, most provinces now have more than 20 percent of their economy tied to the United States, with some close to 40 percent. Somewhat unexpectedly, Ontario no longer has the highest degree of economic dependence. Though Ontario's economic dependence is still high, 35.94 percent, Alberta tops the list at 38.43 percent, with New Brunswick following closely behind Ontario at 35.24 percent.

<See Table 6.6, pages 311 – 314>

Once again, the results for interprovincial trade are significantly different. In 1989, most provinces had a greater degree of economic dependence through trade with other Canadian provinces than with the U.S. states—British Columbia, Ontario, and Newfoundland were the exceptions. This pattern reversed by 2001 for all provinces except Saskatchewan, Prince Edward Island, Newfoundland, and the Territories (the case of the former three provinces, economic dependence on Canada and the United States through trade is approximately equal). In the western (except Saskatchewan) and Maritime provinces, national economic dependence has either increased or decreased marginally, exhibiting very little change over this 12 year study period. Ontario, Quebec, and the Territories, however, exhibit significant drops in their economic dependence on Canada through trade. Only Saskatchewan and Newfoundland have experienced notable increases in their economic dependence—Saskatchewan's economic dependence increased by 39 percent and Newfoundland's economic dependence more than tripled.

The overall pattern of change with regard to economic dependence through trade is that western and central Canada increased its economic dependence with the U.S. states at the expense of Canadian provinces. The Maritime provinces and Newfoundland increased their economic dependence with the U.S. states but also increased their economic dependence with geographically close Canadian provinces. And the Territories are decreasing their economic dependence with all regions in Canada and the United States except with British Columbia and Ontario. The analysis on the economic dependence is the most geographically related with the changes in economic dependence following much more of a geographical proximity relationship than the analysis of trade volumes in particular, but also trade shares. And similar to that of trade shares, the increases in provincial economic dependence on U.S. states, aside from the noted moderate increases, dominantly come from the cumulative effect of small changes across the entire study region. Therefore, economic dependence is a dimension that changes slowly as economies adjust to their new economic geographical environment with free trade agreements.

6.4.4. Proximity and Economic Size

In the previous sub-sections, I have alluded to proximity and economic size as the potential drivers of change in the provincial interregional trade patterns. With regard to proximity, I have stated that geographically close trading partners (particularly in the United States) have experienced greater increases in their trade flows to and from Canadian provinces than geographically distant trading partners, and that the large economic size of the United States has distributed the increases in interregional trade flows such that Canadian provinces have had sharp decreases in their trade with each other, but the U.S. states have generally had much more modest change over the study period because there are more U.S. states to absorb the corresponding decreases in interprovincial trade. However, at this point of the analysis, these claims have not been substantiated.

Table 6.7 shows the trading partners with each of the Canadian provinces that have undergone substantial increases in economic dependence. Economic dependence is used for this analysis because its geographical pattern is the most pronounced.

Substantial increases are considered those increases that are more than two standard deviations greater than the average increase in economic dependence, and bolded states and provinces are those trading partners that are geographically close. Two conclusions can be drawn from the information in this table: first, geographically close trading partners are highly represented in this set of substantial increases in economic dependence; and second, there are some trading partners that are not geographically close that have also undergone substantial increases in economic dependence. Therefore, proximity alone, though clearly an important factor in the process of change taking place within Canada and the United States, cannot be considered the driving force of change now that barriers to trade between Canada and the United States have been officially eliminated.

<See Table 6.7, page 315>

When considering the shares of interregional trade, access to the larger United States' market is important for understanding the degree of change in interregional trade: sharp decreases for interprovincial trade and moderate increases in U.S. interregional trade. However, the individual market sizes of the U.S. states also appear to be important in identifying those trading partners that experienced significant increases in economic dependence. The prime example shown in Table 6.7 is Texas. Though Texas is not geographically close to any Canadian province, Texas has had significant increases in economic dependence for all of the western and central provinces, as well as New Brunswick. A similar result is found with California.

In order to assess this possible relationship to explain the pattern of spatial change in Canada – United States interregional trade, a regression analysis is undertaken. Using the economic dependence of a Canadian province on each trading partner as the dependent variable, the natural logarithm of the geographic distance between trading partners and the natural logarithm of the economic size (gross domestic product) of trading partners are estimated to test the hypothesis of proximity and economic size in determining the pattern of change in economic dependence. If this hypothesis is correct, the estimated coefficient for geographic distance will be negative and the estimated coefficient for economic size will be positive. However, the Adjusted-R^2 values are of particular interest, not the signs of the estimated coefficients. The magnitudes of the Adjusted-R^2 values will show how much of the variation in economic dependence is explained by these two variables.[50] The results are presented in Table 6.8.

<See Table 6.8, page 316>

Almost all of the estimated coefficients correspond to their expectations, with all statistically significant coefficients corresponding to their expectations. Curiously, only the statistical models for British Columbia and Alberta exhibit the expected signs on the estimated parameters and have reasonably high Adjusted-R^2 values. Though the results for economic size do fare better than those for geographic distance, there is still much to be explained in understanding the changing spatial pattern of economic dependence. Even in the cases of British Columbia and Alberta, the Adjusted-R^2 is quite low, indicating that a more comprehensive analysis is necessary.

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[50] Only considering two independent variables most likely imposes bias on the estimated coefficients, as discussed in chapter 5, but this bias does not affect the Adjusted-R^2 values.

6.4.5. Regional Industrial Structure

At this point of the analysis the patterns of interregional trade have only been described, rather than being explained. Therefore, in order to understand what is driving these patterns a more detailed analysis is necessary. However, with the large number of province-state and province-province trading partners, not to mention the large number of industrial sectors involved in the trade for each of these trading partners, only a limited analysis can be undertaken. Fortunately, there has been a substantial volume of research on one industry that is extremely geographically concentrated within Canada: the automotive industry in Ontario. Therefore, the focus now turns to that province and industrial sector.

Because of the high degree of geographic concentration in the automotive industry, there is a regional industrial structure than can be inferred. A large portion of Ontario's international trade with the United States is within the automotive industry: 39 and 36 percent in 1989 and 2001, respectively. This large percentage of Ontario's international trade is enough to dominate Ontario's overall trading patterns—research for my Master's degree found that at the national level the automotive industry dominated international trade indices and was approximately 25 percent, significantly less than for the province of Ontario, more than 35 percent. Therefore, major changes in the spatial patterns of Ontario's international trade with the United States that do not follow geographic proximity and economic size may be explained through its regional industrial structure, focussed on the automotive industry.

As discussed in Dicken (2003) and Holmes (1996), the North American automotive industry has undergone substantial change due to increased competition from

Asian automotive manufacturers and internal productivity constraints. Consequently, both the internal operations and spatial distribution of automotive manufacturing plants has been altered significantly since the mid-1980s. It is the changed spatial distribution of these manufacturing plants that sheds some light on Ontario's changing pattern of interregional trade.

Because of the desire for changed internal operations of automotive manufacturing, automotive manufacturers have sought out labour markets that are outside of the traditional automotive manufacturing sites of Michigan, Ontario, and Ohio to mitigate any resistance to this change (Holmes 1996). Rather than the traditional sites, automotive manufacturing has recently emerged in what Dicken (2003: 392) calls the ``transplant corridor'' that (dominantly) extends to Kentucky and Tennessee, with some automotive assembly and parts manufacturing extending as far as Georgia, Louisiana, Oklahoma, and Texas. This is precisely where Ontario's interregional trade expansions have been taking place: Ontario's economic dependence increased significantly with Michigan, Ohio, and Indiana, the traditional automotive manufacturing sites. However, returning to the volumes of interregional exports and imports, Ontario has had some of its largest increases with Kentucky and Tennessee.

<See Table 6.9, page 317>

Using industry level data for Ontario's automotive industry international trade, this pattern is confirmed, and shown in Table 6.9. California has undergone an incredible expansion of automotive trade with Ontario (an increase of a factor of 19) likely tied back to the establishment of a Toyota – General Motors production plant in that state (Dicken 2003). Additionally, the primary transplant corridor states of Kentucky and Tennessee have increased their automotive trade with Ontario by factors of 4.65 and 4.39, respectively. Both increases are extremely large given that Ontario's growth in automotive trade flows with the Untied States as a whole was only 100 percent. Clearly, Ontario's interregional trade flows in the automotive industry are geographically focussed and that geography is not only based on proximity and economic size opportunities opened to Ontario as a result of the free trade agreements, but related to Ontario's regional industrial structure.

Confounding the understanding of Ontario's changing patterns of trade flows is the structural adjustment that the automotive industry has undertaken that began before the inception of the free trade agreements between Canada and the United States. Therefore, analyzing international or interregional trade flows only considering economic and/or social variables expected to be related to the establishment of free trade agreements may lead to curious, or incorrect, inference. Only through an understanding of the pre-existing geography of production (and its dynamics independent of the free trade agreements) can the understanding of the effects of free trade agreements be investigated. Otherwise, one may falsely attribute the changing patterns of international or interregional trade flows exclusively to the initiatives contained within the free trade agreements themselves.

This brings out one of the limitations of a purely numerical approach, only investigating the changing patterns of interregional (or international) trade flows. Though a statistical analysis was used to infer explanation of the observed changing patterns, not all of the relevant variables necessary in such an analysis are easily quantifiable. Of course, this lack of explanation is apparent with the low Adjusted-R^2

values, but the changing regional industrial structure of the North American automotive industry is not easily expressed numerically. Therefore, context is extremely important in a purely numerical approach. An understanding of the regional industrial structure of the North American automotive industry does not undermine the regression results above with regard to economic size and distance, but it does exemplify the limitations of such an approach. If all of the known explanatory variables are not available, or feasible, to be used within a numerical approach, then reference to those unquantifiable measures must be undertaken when interpreting numerical results to ensure that incorrect inference is not made.

6.5. CONCLUSION

This chapter has analyzed Canada – United States interregional trade flows at the province-province and province-state level of analysis. This present analysis builds on the current literature studying the regional impacts of the free trade agreements by use of a finer geographical scale of analysis (the province and state rather than aggregated regions) and by extending the temporal dimension of previous studies. This finer geographical scale of analysis has proven fruitful in describing the changing patterns of interregional trade flows and their affiliated consequence for Canadian provinces by showing that the patterns of provinces within previously aggregated regions show substantial internal variation.

The export and import trade volumes, export and import trade shares, and the economic dependence of Canadian provinces on all other Canadian provinces and U.S. states provides a deeper understanding of the changing pattern of Canada – United States interregional trade because it allows for the regional differences of the free trade agreements to become manifest. All three analyses exhibited clear geographical patterns in interregional trade. However, those geographical patterns became clearest when the analysis moved to economic dependence. Most Canadian provinces have reoriented their spatial distributions of both exports and imports to and from the United States, resulting from greater market access through reduced tariff and non-tariff barriers. Preceding the establishment of free trade agreements, interprovincial trade barriers, though present and significant, were less than the international barriers between Canada and the United States. As such, despite some exceptions, primarily Ontario, Canadian provinces pursued trade with other provinces, The trade volumes to the United States were still very large in magnitude, but disproportionately low when one considers both economic size and the number of potential trading partners in the United States.

With the establishment of free trade agreements and the corresponding decreases in both tariff and non-tariff barriers to trade, the international barriers between Canada and the United States likely became relatively less than the interprovincial barriers to trade within Canada. Subsequently, Canadian provinces have begun to change their spatial distribution of trade within Canada and the United States, favouring the United States.

This spatial distribution, however, is not toward all U.S. states equally. There are three dominant factors defining the new geography of interregional trade within Canada and the United States: economic size, geographical proximity, and regional industrial structure. With regard to economic size, the larger U.S. states have undergone large increases in interregional trade with Canadian provinces irrespective of their proximity to

Canada. California and Texas are prime examples, both having large increases in their trade volumes, trade shares, and economic dependence with Canadian provinces.

Geographical proximity now plays a stronger role in the geography of interregional trade in Canada and the United States, though is not an all determining factor. As the barriers to international trade fell with the establishment of the free trade agreements, more ``natural'' trading relationships were able to manifest themselves. Prior to any significant decreases in international trade barriers, most Canadian provinces dominantly used Ontario as both an export destination and import origin despite its great distance from most provinces. This has changed significantly over the study period. Aside from a few cases, Ontario has decreased its importance to all other Canadian provinces as is has decreased the importance of other Canadian provinces to itself.

Regional industrial structure has changed remarkably in North America over the same time period as the establishment of free trade agreements between Canada and the United States. This changed regional economic structure has had an impact on the geography of production that affects the trading patterns of Canadian provinces that are dominant in particular industries. Consequently, without knowledge of this changing industrial structure, the changing patterns of Ontario's interregional trade may be attributed to the free trade agreements. For example, though Ontario still has strong economic ties to Michigan through automotive products trade, the establishment of significant automotive manufacturing further to the U.S. south has significantly increased Ontario's trading relationships with those U.S. states. Therefore, the importance of understanding context is critical in any numerical analysis.

Though the analysis presented in this chapter is instructive for understanding the interregional trading patterns within Canada and the United States, it does have its limitations. Analysing trade volumes, trade shares, and economic dependence through trade without explicitly controlling for relative economic size limits the interpretability of the results in this chapter. As such, the next chapter uses a measure that does deal with relative economic size, a measure of trade specialization to capture yet another dimension of the change in interregional trading patterns within Canada and the United States. The following chapter also analyses the aggregation of Canadian provinces and U.S. states into regions, not only from a spatial perspective but a temporal perspective as well. This analysis will address the issue of regional aggregation alluded to in the present chapter.

Chapter 7[51]

Testing for change in the spatial pattern and identifying trading regions for Canada – United States interregional trade

7.1. INTRODUCTION

In this last analytical chapter of my dissertation, I investigate the changing pattern of Canada – United States interregional trade flows. This investigation is undertaken in two stages. First, I assess the degree of change in the spatial patterns of interregional trade for each Canadian province. And second, once the degree of change has been established, I investigate the impact of that spatial change on trading regions within Canada and the United States. The former stage develops a new methodology for assessing the degree of

[51] Portions of this chapter have been published in the following:

Andresen, M.A. (2009). Trade specialization and reciprocal trading relationships in Canada and the United States, 1989 and 2001. *Annals of the Association of American Geographers* 99(1): 163 - 183.

Andresen, M.A. (2009). Testing for similarity in area-based spatial patterns: a nonparametric Monte Carlo approach. *Applied Geography* 29(3): 333 - 345.

Andresen, M.A. (2010). Canada - United States interregional trade: quasi-points and spatial change. *Canadian Geographer* 54(2): 139 - 157.

spatial change in interregional trade, while the latter uses the methodology developed in chapter 2.

With regard to the trading regions within Canada and the United States, the appropriate regional scale of analysis needs to be identified. The effect of the scale of analysis is discussed briefly in the previous chapter, showing how changing the scale of analysis (from a national scale to a provincial scale) can drastically change the descriptive analysis of the dynamic pattern of trade between Canada and the United States. This issue was discussed more generally in chapter 5, it is the modifiable areal unit problem (MAUP).

Relatedly, the majority of past research on Canada – United States trading patterns that investigate the change in the spatial distribution of interregional trade flows does not consider the degree of change for the individual provinces. Rather, these studies investigate the overall change in interprovincial trade and international trade resulting from either the Canada – United States Free Trade Agreement and/or the North American Free Trade Agreement. Consequently, the results of their studies indicate the national average change rather than the change for each province (see Brox (2001) and Helliwell et al. (1999)).

The question then is: how do we measure changes in the spatial pattern of interregional trade flows at the Canadian province and U.S. state scale? As shown in chapter 6, most provinces have exhibited significant increases in their levels of interregional trade to both other Canadian provinces and U.S. states. However, only considering the absolute volume may be deceiving. If a province increases trade by $1 million with one of its trading partners and by $10 million with another trading partner, does that truly indicate that the latter trading partner has experienced the most change? Possibly not. The answer to this question depends on the initial volume of trade flowing to and from both trading partners. Alternatively, to address the issue of relative change one could use the percentage of trade exported or imported to or from origins and destinations. This analysis would control for the large increases in interregional trade for most Canadian provinces, but it introduces a different complication: is 15 percent of a province's exports to a particular region in 2001 significantly different from 12 percent of that province's exports to that same regions in 1989?

This chapter extends past research on the changing pattern of interregional trade in Canada and the United States in four ways. First, all provincial and U.S. states import and export origins and destinations are considered when identifying a change in the spatial pattern of those trade flows. Second, exports and imports are analysed independently because the changes in the spatial patterns of imports and exports are not *a priori* expected to be similar. Third, the methodology employed allows for the identification of statistically significant change for all province-province and province-state bilateral trading relationships using a nonparametric Monte Carlo simulation approach. And fourth, the degrees of spatial change found are used to motivate an investigation into the changing trading regions within Canada and the United States. This analysis both complements and quantifies changes in the spatial patterns of interregional trade flows found in previous chapters as well as providing some symmetry in this dissertation by ending the analysis where it began, investigating trading regions.

In order to perform this analysis a completely different view of trade data is introduced here along with the development of a new spatial pattern test and a corresponding index of spatial change. This new view of trade data is similar to a set of spatial points and the spatial pattern test is, in essence, a spatial point pattern test that is extended to spatial interaction (trade flow) data. Subsequently, the following section introduces this new view of trade data and briefly reviews the two basic forms of spatial point pattern test for discrete events as well as commentary on their limitations. Section 3 presents the new spatial point pattern test and an index of similarity. The results are discussed in section 4. Section 5 discusses the effect of this spatial change on trading regions within Canada and the United States. And section 6 concludes that the changes in the spatial patterns of interregional trade not only vary across space, but also between exports and imports, and that because of these changes in the spatial patterns of interregional trade the trading regions within Canada and the United States have changed since the inception of free trade agreements between these two countries.

7.2. QUASI-POINTS AND SPATIAL POINT PATTERN TESTS

7.2.1. Quasi-Points and Spatial Interaction Data

The use of a spatial point pattern test to measure change in spatial interaction data is admittedly a curious application. However, if one considers spatial interaction data in its essence, I hope to show that the application of a spatial point pattern test is useful. Spatial interaction data measure flows between two places such as interregional trade. Therefore, one of the two places may be chosen as a point of reference: trade flows from point A to point B (exports) and to point A from point B (imports), capturing both dimensions of the spatial interaction data and allowing from exports and imports to be viewed and tested separately from each other. With the point of reference in mind, point

A, the volume or value of the trade flows to and from point A may be interpreted as points in the following manner: British Columbia exported approximately $30 billion to other Canadian provinces and U.S. states in 2001, so each one of these dollars may be considered a ``point'' and plotted on a map with that quasi-point being placed at the destination of the export value. The data used in this analysis are measured in millions of dollars, so British Columbia would have approximately 30 000 points to be placed on a map of Canada and the United States.

Of course, such an interpretation of spatial interaction data has its limitations, of which two are particularly important. First, each Canadian province and U.S. state is a geographically large area and a point is typically a discrete location within an area—an address or street intersection, for example. However, the scale of the data used in this analysis is at the province and state level. Therefore, if British Columbia is to have multiple quasi-points placed within one of its export destinations, the placement of those points with the area of that destination is completely arbitrary: they may be placed on top of one another, randomly dispersed within the area of the destination, or clustered within that destination based on some criterion such as population or economic activity. But because the placement of these quasi-points is arbitrary, no inference may be performed at any scale cartographically larger than the Canadian province and U.S. state. This limitation only becomes problematic when inference is not based on the appropriate scale of analysis, committing the ecological fallacy (Robinson 1950).

The second limitation is a direct consequence of converting spatial interaction data to quasi-point data. Though the units of measurement for the interregional trade data are millions of dollars, the values of interregional trade do contain one decimal point.

Because the number of points is a discrete variable the decimal point must necessarily be removed. This is simply done by rounding-up or rounding-down based on the number after the decimal point. This action necessarily imposes error on the number of points used to measure the change in the spatial point pattern, but as shown in Table 7.1 that error is minimal.

<See Table 7.1, page 318>

In most cases, the error in the number of quasi-points is less than 0.01 percent, with the largest error being 0.5 percent in the case of Prince Edward Island's imports—almost one-third of the conversions have no error in the number of quasi-points. This extremely low magnitude of error itself causes no concerns for the analysis that follows. Due to the large volumes of trade flowing between most Canadian provinces and U.S. states the gain or loss of a fraction of $1 million in trade is inconsequential. Of course, this may not be the case with some of the economically smaller Canadian provinces and it is likely not a coincidence that Prince Edward Island has the greatest error. The economically smaller provinces have smaller interregional export and import values such that a quasi-point difference may represent a relatively large volume of trade in a particular bilateral relationship. Therefore, particularly with regard to the economically smaller provinces, the degree of change in the spatial point pattern of trade must be interpreted with caution.

Despite these two limitations, converting spatial interaction data into quasi-point data for the purpose of testing the change in the spatial patterns of interregional trade is believed to be sound. If all inference is maintained at the province and state levels of analysis the first limitation is not an issue; and if changes in the spatial patterns of interregional trade, particularly with the economically smaller provinces, are interpreted with caution the second limitation is minimized. In order to undertake an analysis of spatial point patterns, there is the basic choice between distance- and count-based spatial point pattern tests. Each is discussed, in turn.

7.2.2. Distance- Versus Count-Based Spatial Point Pattern Tests

The two basic forms of spatial point pattern tests used to investigate discrete point events are distance- and count-based tests. Distance-based tests use the cartographic distances between two points in the data set or the distance between randomly selected coordinates within the study space and points in the data set to determine a random, clustered, or uniform spatial pattern to the points (Bailey and Gatrell 1995). This first type of test is inappropriate with the use of quasi-points for two reasons. First, the placement of the quasi-points within each spatial area is arbitrary so any distance measurements do not have any intrinsic meaning. Secondly, simply based on economic size alone, it is expected that there will be a clustering of quasi-points in particular provinces and states. Though the economic size issue may be controlled by using a relative measure of quasi-points, the distance calculation in these methods make them inappropriate for this quasi-point application.

The second basic form of spatial point pattern tests is a count-based test. This test counts the number of point events within a defined spatial area, usually a square area called a quadrat. The primary limitation of this form of spatial point pattern test is its potential susceptibility to the modifiable areal unit problem (see Openshaw 1984). However, in the present analysis using quasi-points there are the ``natural'' spatial units of analysis of the Canadian provinces and U.S. states. The data employed in this analysis are measured at this scale and, therefore, greatly reduces the concern over the modifiable areal unit problem. This count-based method has a further advantage over the distance-based methods as well: there is no need to control for relative economic size because the distance calculation between points is not necessary.

However, both basic forms of spatial point pattern tests have a common limitation that is critical for the present analysis. Both tests are able to distinguish between random, uniform, and clustered sets of (quasi-) points but neither test allows for the comparison of two sets of (quasi-) points. For example, British Columbia's interregional trading pattern may be clustered to the same degree as Alberta's interregional trading pattern leading to identical spatial point pattern test statistics. However, the clustering of British Columbia's and Alberta's interregional trading patterns may be in completely different places. Herein lies the need for the development of a new spatial point pattern test that allows for the use of quasi-points and the comparison of two spatial (quasi-) point patterns.

7.3. THE SPATIAL (QUASI-) POINT PATTERN TEST AND ITS INDEX

The spatial point pattern test developed for this analysis is conceptually simple, though computationally intense. There are two issues at stake for testing the similarity of two spatial point patterns. The first issue is how to compare two spatial (quasi-) point patterns that have different numbers of points. This is exactly the case with the interregional trade quasi-points due to increased levels of trade for each Canadian province. Given that interregional trade volumes have increased from 1989 to 2001, the obvious approach becomes apparent when the question is re-phrased: how different would British Columbia's spatial quasi-point pattern be from its 1989 spatial quasi-point pattern if British Columbia exported exactly the same value of trade in each year? Let us say that British Columbia exported $30 billion in 2001 and $15 billion in 1989, then $15 billion of British Columbia' 2001 exports should be randomly sampled and mapped to be able to compare this spatial quasi-point pattern with the actual 1989 spatial quasi-point pattern.

The second issue stems from the first issue. One random sample does not provide a meaningful comparison of two spatial (quasi-) point patterns. In essence, this could have been done without any random sampling and compared the percentage of trade exported to and imported from each possible destination and origin. But again, this is problematic because we don't know if 15 percent is significantly different from 12 percent, or even 14 percent. Therefore, this sampling technique is done repeatedly such that outlying (quasi-) points can be identified in a statistical fashion. The question is how many repeated samples should be undertaken? This repeated sampling is the most computationally intense aspect of the test; the more repeated sampled done, the more reliable the result, but computational time is also increased. In the geographical information analysis literature, 50 repeated samples are commonly used (Davis and Keller 1997), but early experiments using the Monte Carlo approach in the statistical literature has achieved good results with as few as 20 repeated samples (Hope 1968). To err on the side of caution, 200 repeated samples are undertaken in the present analysis. Though 200 repeated samples may seem excessive given that 50 is commonly used, 200 repeated samples does provide easy cut-off values for the confidence interval, described below.

Once 200 repeated samples are obtained, the quasi-points are to be converted back to spatial interaction data by aggregating the number of points within each region, followed by having each spatial unit (province and state) having its 200 values ranked. The bottom five and top five values are to be removed, creating a nonparametric 95 percent confidence interval. If the 1989 value of interregional trade falls within this nonparametric 95 percent confidence interval for a particular province or state, then this portion of the interregional spatial patterns is to be considered similar.

To complete the test, an index of similarity, *S*, is calculated to give an indication of how similar the two spatial (quasi-) point patterns are:

$$S = \frac{\sum_{i=1}^{n} s_i}{n}, \tag{7.1}$$

where s_i is spatial unit *i* that is considered to have a similar spatial (quasi-) point pattern in both 1989 and 2001, and *n* is the total number of export and import destinations and origins. Therefore, *S* simply represents the percentage of spatial units that have a similar spatial pattern of trade flows in each year.

The entire methodology is outlined in the following 10 steps:

Step 1: convert spatial interaction data to prepare for quasi-points by rounding data values to the nearest whole number.

Step 2: create quasi-point data set by taking one observation, for example, of $100 million and convert into 100 $1 million observations, each with a spatial reference so quasi-point to spatial interaction data conversion can occur later.

Step 3: randomly select a subset of the 2001 data quasi-points based on the total value of 1989 interregional trade

Step 4: aggregate the trade values, by region, in the subset of data to re-create spatial interaction data

Step 5: repeat steps 3 and 4 200 times.

Step 6: Collect all data subsets into one spreadsheet and rank the aggregated values for each region from lowest to highest.

Step 7: obtain a nonparametric 95 percent confidence interval for each region by deleting the bottom five and top five observations.

Step 8: consider a region to be similar if the 1989 value falls within the nonparametric 95 percent confidence interval

Step 9: calculate *S* to provide a measure of the similarity between the two spatial (quasi-) point patterns.

Step 10: repeat steps 1 to 9 for all provinces, exports, and imports.

The interregional trade data used for the application of this test are provided by Statistics Canada (1998, 2000, 2004b, and 2005a). These data measure the exports and imports to and from Canadian provinces to other Canadian provinces and U.S. states. These are the same data used in previous chapters, discussed earlier.

7.4. RESULTS

The output from the spatial pattern test is shown in Table 7.2 and Figure 7.1. Overall, the spatial patterns of interregional trade are significantly different in 2001 compared to 1989. Aside from Prince Edward Island and the Territories, with respect to exports, the Canadian provinces only imported and exported in a similar spatial pattern in less than one-third of their trading partners. And as with previous analyses, there is substantial variation across the different provinces in the case of exports, but much less variation for imports.

With regard to the index of similarity for exports, S_x, the economically largest provinces exhibit the greatest change in their spatial patterns. Ontario, Quebec, British Columbia, and Alberta all have values of S_x less than 15 percent. At the other end of the scale, the Territories and Prince Edward Island exhibit the least change in their spatial patterns, 55 and 53 percent, respectively, though still a substantial degree of change from 1989 to 2001. The remaining provinces of Saskatchewan, Manitoba, Nova Scotia, and Newfoundland all exhibit intermediate level of change in their spatial patterns of interregional trade.

<See Table 7.2 and Figure 7.1, pages 319 and 338, respectively>

The most obvious source of this provincial variation in S_x is the effective provincial tariff rates. All tariffs are measured at the national level, but because of Canada's geography of economic activities (see Britton 1996) each province effectively faces different tariff rates with the Untied States. Though this discussion is concerned with negotiated tariff rates and their reductions within free trade agreements, the same idea applies in the trading sanctions recently placed upon Canada such as the softwood lumber duty—British Columbia, in particular, and Quebec have experienced the greatest impacts from a nationally imposed duty. The ideal calculation of the effective provincial tariff rate would use the national tariff rates at the industry level and the industry shares of the provincial gross domestic products. This calculation, for example, would favour the forestry industry in British Columbia and the automotive industry in Ontario for the effective provincial tariff rate calculations, indicating that British Columbia's economy has a greater barrier to the United States' market than the Ontario economy due to the low tariffs in the automotive industry established in the Canada – United States Automotive Products Agreement of 1965. Unfortunately, though at the industrial level provincial gross domestic product data are available through Statistics Canada, large portions of these data are missing due to issues of industrial confidentiality. This is particularly true for the economically smaller provinces in Canada.

Therefore, an alternative measure of the effective provincial tariff rate is calculated. Statistics Canada (2004b), the source for data on Canada's international trade at the provincial level, contains a variable measuring the value of tariff duty collected for each product category. The total values of tariff duty and trade are summed at the provincial level to calculate the effective provincial tariff rate for each year in the study period, 1989 – 2001. This variable is a good proxy for the effective provincial tariff rate because it is based on the actual Canadian tariffs. There are two primary limitations, however. First is that the calculations only involve merchandise actually traded. Therefore, if there are high tariff rates that prohibit trade, these tariff rates are not included in the effective provincial tariff rate. Unfortunately there is nothing that can be done to offset this limitation and the effective provincial tariff rate must be considered an underestimate of the true provincial tariff rate if industrial level provincial gross domestic product was used in the calculation. The second limitation is that this effective provincial tariff rate only captures the Canadian tariff rates. As such, only the level of Canadian protection is measured, not necessarily the degree of the barrier to the U.S. markets. However, though U.S. tariffs are on average lower than Canadian tariffs, the correlation of Canadian and U.S. tariff rates measured at the industry level is high, $r = 0.812$ (p-value

< 0.001). Therefore, the U.S. commodity tariff rates are on average similar to that of the Canadian tariff rates so the effective provincial tariff rate is interpreted as capturing both the protection of provincial industries and the barrier to the U.S. markets for each province. These effective provincial tariff rates are shown in Table 7.3.

<See Table 7.3, page 320>

With all of these caveats regarding the measure of the effective provincial tariff rates, the correlation between S_x and the tariff rates in 1989 is negative and significant, $r = -0.47$, as would be expected. The provinces that had the highest barriers to trade at the time of the establishment of free trade agreements exhibit the greatest change in their spatial pattern in interregional trade because the U.S. markets are now relatively open to these provinces. This relationship can be seen by referring to both Tables 7.2 and 7.3. British Columbia and Alberta, for example, had the highest effective provincial tariff rates in 1989 and two of the lowest S_x values. However, as indicated above with regard to the limitations of this tariff calculation, there are some curiosities. The Maritime provinces and Newfoundland have lower effective provincial tariff rates than Ontario that has had its largest industry (automotive) involved in a free trade agreement with the United States for over 40 years. Therefore, interpretations regarding this albeit expected correlation should be made with caution.

Another potential source of the provincial variation in S_x is the degree of dependence a Canadian province has on the U.S. market through trade. This degree of dependence may be captured in two ways: the share of provincial trade with the United States, and the export – provincial gross domestic product ratio.

As shown in Table 7.4, the provincial trade shares with the United States increased for all provinces, with substantial increases in all cases except Newfoundland and the Territories. It is expected that those provinces that already have a large portion of their trade with the United States will have the greatest magnitude changes in their spatial pattern of interregional trade, a low S_x value. This expectation is held because provinces that already send large proportions of their trade to the U.S. states have established trading networks in those regions such that new avenues of interregional trade opened through the reduction of tariff barriers can be seized within a relatively shorter time frame than those provinces without such existing trading networks (see Dicken 2003 for a discussion of trading networks at the international level). Those provinces with lesser ties to the United States are not expected to be able to act on these new avenues of interregional trade opened through the reduction of tariff barriers as quickly given that these networks cannot develop quickly. In fact, these provinces may not even have a outward looking culture, essentially preventing any rapid establishment of such trading networks.

<See Table 7.4, page 321>

Strong and significant correlations are found to support these prior expectations—all correlations reported are significant at the 5 percent level. The correlations between S_x and the trade shares in 1989 and 2001 are r = -0.724 and r = -0.748, respectively, indicating that provinces with greater shares of their trade flowing to and from the United States have undergone more change in their spatial patterns of interregional trade. The results for the export – provincial gross domestic product are similar but not at the same magnitude. The correlations between S_x and the export – provincial gross domestic product ratios in 1989 and 2001 are r = -0.641 and r = -0.628, respectively, once again indicating that provinces with greater existing ties to the United States at the time free trade agreements were established have had greater changes in their spatial patterns of interregional trade. Overall, the analysis of S_x has conformed to prior expectations, but the same cannot be said for S_m.

As shown in Figure 7.1b, the index of similarity for imports, S_m, does not vary significantly across the Canadian provinces. All values of S_m are low in magnitude indicating that significant change has occurred in the Canadian provinces' spatial patterns of interregional trade. Ontario and the Territories do stand out with lower values of S_m, 0.117 and 0.150 respectively, but the remaining Canadian provinces all exhibit values of S_m very close to 0.20. Not surprisingly, the empirical findings for S_m are not as strong as those for S_x given the lack of variation in S_m.

The correlations between S_m and the 1989 effective provincial tariff rate, r = 0.48, is opposite of expectations. Because the effective provincial tariff rate best captures the degree of protection a province receives from international competition, a negative correlation is expected. Once that protection has eroded through tariff reductions, imports may be sourced from those regions that previously had prohibitive barriers to trade. One explanation for this positive, though statistically insignificant, correlation is similar to the explanation above relating to S_x: previously protected provinces do not have the trading networks established to source imports from the United States once tariff barriers have decreased. However, if this proposition were the case, significant positive correlations would be expected between S_m and the two measures of economic dependence with the United States: trade share and the export – provincial gross domestic product ratio. However, this is not the case. Positive correlations are found with all of the correlations except S_m and the 1989 trade shares, but all of the correlations are highly insignificant—the correlations range from $r = -0.05$ to $r = 0.16$. Therefore, it must be the case that the changing pattern of interregional imports are governed by processes independent of the changing pattern of interregional exports, And those processes are not typically associated with the establishment of free trade agreements.

One possible explanation lays in the relative importance of U.S. markets to Canadian provinces and Canadian markets to U.S. states. Because of the large size of the United States, the U.S. market is more important to Canadian provinces than the Canadian market is to the U.S. states. Therefore, changes in the tariff rates mean less to the U.S. states, as does the degree of economic dependence, because it is so low. Consequently, the variation in the degree of change for imports is more similar than that of exports because it is the U.S. states accessing the Canadian market in terms of imports. In the case of exports, it is the Canadian provinces that are accessing the U.S. market that matters more to them and each province has a different effective provincial tariff rate. This speculation also accounts for the insignificant correlation with respect to S_m. It should be noted, however, that just because the degree of change in imports is relatively similar across the Canadian provinces does not mean that each province has undergone the same spatial change.

7.5. RECIPROCAL TRADING REGIONS IN CANADA AND THE UNITED STATES

7.5.1. The Trade Location Quotient for Provincial Imports and Exports

Turning now to the changing trading regions within Canada and the United States, the different degrees of spatial change indicate that not all provinces will have altered their trading relationships equally. To investigate this changing nature of these trading relationships themselves, the methodology employed in chapter 2 at the international scale is applied to the Canadian provinces and the U.S. States with the difference that the measurements used now capture interregional trade specialization rather than international trade specialization. Using Statistics Canada (1998, 2000, 2004b, 2005a) international and interprovincial trade flow data, this metric is the trade location quotient, LQT_i, calculated as follows:

$$\mathrm{LQT}_i = \left({x_i}/{X_w} \right) \Big/ \left({GDP_i}/{GDP_w} \right), \tag{7.2}$$

where x_i is the value of exports (or imports) from region i, X_w is total regional exports (or imports), GDP_i is the gross domestic product of region i, and GDP_w is the total gross domestic product of all provinces and states in Canada and the United States (see also Anderson and Norheim (1993a; 1993b), O'Loughlin and Anselin (1996), Poon (1997), and Poon et al. (2000)).

The LQT indices for all of the Canadian provinces trading with all other Canadian provinces and U.S. states are presented in Tables 7.5 – 7.6 and Figures 7.2. Notable for both exports and imports across all provinces is the high degree of trade specialization with other Canadian provinces for both years reported in Tables 7.5 and 7.6. However, this high degree of trade specialization within Canada is undergoing substantial change.

Overall, the trade specialization of exports from Canadian provinces to other Canadian provinces is decreasing, particularly in western and central Canada. The Maritime provinces, Newfoundland, and the Territories are also largely decreasing their trade specialization in exports with other Canadian provinces. With regard to the trade specialization in imports, there is far greater provincial variation, with some provinces exhibiting notable increases in the trade specialization of imports from the other Canadian provinces, generally related to geographical proximity. It should be noted, however, that by 2001 a high degree of trade specialization in both exports and imports still exists between most provinces.

<See Table 7.5, pages 322 – 325>

Overall, the general trend is a decrease in the trade specialization with Canadian provinces except for an increase in that trade specialization for most of the Maritime provinces and Newfoundland with each other. Though it is not present in most of the maps, aside from the sharp decreases in trade specialization for the eastern provinces with the western provinces, provincial trade specialization has been quite dynamic from 1989 to 2001. There are similarities between the provinces usually aggregated together in other analyses, but distinct differences have been shown within these aggregations using the province as the spatial unit of analysis.

<See Table 7.6, pages 326 – 329>

Unlike the provincial trade specialization with other Canadian provinces, the provincial trade specialization with U.S. states is far more visible in Figures 7.2a – 7.2k. This is due to the levels of trade specialization in exports and imports being generally not as high in province-state relationships compared to the province-province relationships despite the sometimes radical changes documented above. Overall, the Canadian provinces, with regard to the U.S. states, are increasing their trade specialization in both exports and imports with their geographically close neighbours, at the expense of their geographically distant neighbours. As with the provincial trade specialization with other Canadian provinces, the provincial specialization with U.S. states has explicitly shown the utility of not aggregating provinces or states to form larger spatial units of analysis. The general trend for provincial trade specialization with U.S. states across all provinces has been an increase in trade specialization for both exports and imports with those U.S. states in close geographical proximity. Not only have geographically close U.S. states increased their trade specialization with many of the Canadian provinces, but the clustering of those U.S. states close to the Canada – United States border has become tighter. This increased clustering and significant changes in the trade specialization of exports and imports over the study period is a definite indication of a changed spatial configuration of Canada – United States interregional trade. The natural question to ask now is what effect free trade agreements established in this study period have had on trading regions involving these two countries.

<See Figure 7.2, pages 339 – 349>

7.5.2. Determining the Reciprocal Trading Regions

In order to determine the reciprocal trading regions in Canada and the United States, the LQT index, introduced in chapter 2, is calculated for each of the 61 provinces and states and all of their bilateral trading partners for both exports and imports producing a 61 *x* 61 matrix of LQT indices for imports and exports. These index values are then used to calculate the trade intensity of each province with every other Canadian province and

U.S. state. If bilateral trade flows are overrepresented for a province-province or province-state pair in both directions of flow, those two regions are considered to be involved in a reciprocal bilateral trading relationship. Once all of the reciprocal bilateral trading relationships are established, common relationships are investigated to assess whether there have been changing regional trade relations as a result of the free trade agreements between Canada and the United States. The methodology to form trading regions in this study is endogenous—there is no *a priori* assignment of a province or state to a region.

Following the methodology outlined in Chapter 2, the regional assignment algorithm employed is as follows: using the LQT index, identify all reciprocal bilateral trading relationships; aggregate the trade flows of each reciprocal bilateral trading relationship and rank them by the magnitude of their aggregate trade flows; classify the largest magnitude aggregate trade flow as a region; recalculate the LQT index considering the region as one spatial unit; repeat until there are no reciprocal bilateral trading relationships. Similar to the methodology employed in Chapter 2, the primary critical threshold value of the LQT index is 1.30 to capture the Miller et al. (1991) category of overrepresentation. However, for the purpose of a sensitivity analysis, the critical threshold values of 1.20 and 1.10 are used to capture moderate overrepresentation.

7.5.3. Reciprocal Trading Regions, 1989 and 2001

Given the significant changes in the trade specializations in exports and imports for Canadian provinces with other Canadian provinces and U.S. states, it should come as no surprise that the reciprocal trading regions for Canadian provinces have also undergone significant change between 1989 and 2001. Though the above analysis has interpreted the results for exports and imports separately and trading regions are determined based on reciprocal trading relationships, changes in the trade specialization of exports and imports tends to be consistent across most of the provinces—if British Columbia decreases its trade specialization in exports with Alberta, Alberta does the same with British Columbia. First, the results using the critical threshold value of 1.30 are presented, and then second, the sensitivity analysis using the critical threshold values of 1.20 and 1.10.

In 1989 there were three reciprocal trading regions, each conforming to the dominant views of the divisions in Canada: western Canada, central Canada, and eastern Canada (see Table 7.7 and Figures 7.3 – 7.5 for a list and maps of all the reciprocal trading regions in both 1989 and 2001). The reciprocal trading region in central Canada, centred on Ontario, includes Quebec, Michigan, and Vermont. Given the high degree of trade specialization between Ontario – Quebec, Ontario – Michigan, and Quebec – Vermont, the establishment of this reciprocal trading region is no surprise. The New Brunswick reciprocal trading region encompasses all of the Maritime provinces and Newfoundland with the U.S. states of Massachusetts, Maine, and, curiously, South Carolina. The high degree of trade specialization that existed in 1989 between all of the Maritime provinces and Newfoundland for both exports and imports along with the contiguity of Maine and the Atlantic orientation and proximity of Massachusetts is not an unexpected result, particularly due to the high degree of trade specialization in exports from the Maritime provinces and Newfoundland to these two U.S. states—the inclusion of South Carolina is, however, a curiosity. And lastly, the British Columbia reciprocal trading region includes all of the western provinces and the Territories plus Washington and Montana. All of the western provinces had high degrees of trade specialization in exports to Montana, and British Columbia and Alberta had high degrees of trading specialization in exports to Washington. Once again, particularly given the propensity of many researchers to group all of western Canada together, this reciprocal trading region is no surprise. Overall, the findings for the 1989 reciprocal trading regions are far from novel, mainly including Canadian provinces (none were left out of a reciprocal trading region) and only including a select few U.S. states.

<See Table 7.7, pages 330 – 331>

The same cannot be said for the reciprocal trading regions in 2001. The Ontario reciprocal trading region remains intact. Though Ontario and Quebec have decreased their trade specializations in both exports and imports since 1989, there is still a high degree of trade specialization between them. The same can be said with regard to Ontario – Michigan and Quebec – Vermont for the trade specialization in imports, but these two province-state combinations have increased their trade specialization in terms of exports.

The New Brunswick reciprocal trading region maintains all of its 1989 members, less South Carolina. Most of these remaining provinces and states increased their respective trade specializations in both exports and imports in 2001. Nova Scotia maintains its high degree of trade specialization in exports to South Carolina, but that specialization is not strong enough to maintain South Carolina in the New Brunswick reciprocal trading region in 2001. As with the Ontario reciprocal trading region, any significant changes here would have to have been viewed with caution.

Western Canada, however, has undergone significant change with regard to its reciprocal trading region in 2001. The once unified British Columbia reciprocal trading region, with only two U.S. states, has broken into three reciprocal trading regions by 2001, with the addition of eight U.S. states, totalling ten. The Territories have been separated from the rest of Canada, forming a reciprocal trading region with Alaska. British Columbia, Alberta, and Saskatchewan have formed a reciprocal trading region with Washington, Montana, Wyoming, and North Dakota. And Manitoba has also separated itself from Canada, forming a reciprocal trading region with Minnesota, Wisconsin, Iowa, Nebraska, and South Dakota. These three reciprocal trading regions are all in line with expectations regarding geographic proximity, and are easily understood when one considers market access.

<See Figure 7.3, page 350>

In 1989, the tariff barriers between Canada and the United States were significant enough to limit the formation of reciprocal trading regions to only those U.S. states that had high degrees of integration with Canadian provinces before the establishment of any free trade agreements. Ontario and Michigan are a prime example with their high degree of integration in the automotive industry (and the accompanying low, or non-existent, tariff rates) dating back to the 1960s through the Canada – United States Automotive Products Agreement of 1965. Due to higher tariffs being faced by most provinces when trading with most of the U.S. states, Canadian provinces traded amongst themselves dealing with smaller, though significant, interprovincial trade barriers (Doern and MacDonald 1999; Leidy 1998; Loizides and Grant 1992; Palda 1994; Schwanen 1992). However, once those tariff barriers were reduced to levels lower than those impeding interprovincial trade, Canadian provinces that would have traded differently in 1989 do trade differently in 2001.

Despite the fact that the reciprocal trading regions outlined above are intuitive from geographical, economic, and historical expectations, they may in fact be artefacts of the particular critical threshold value of 1.30 to identify all reciprocal bilateral trading relationships. The critical threshold value of 1.30 is not considered too low—a 30 percent overrepresentation in bilateral trade relations definitely constitutes an intense trading relationship—but this value may be considered too high. According to the classification scheme set out by Miller et al. (1991), a LQT index value greater than 1.10 is considered moderately overrepresented. As such, as undertaken in Chapter 2, the lower critical threshold values of 1.20 and 1.10 are used to investigate the sensitivity of the regional assignments in the present analysis. All of these thresholds are admittedly arbitrary, but no value less than 1.10 should be considered an intense trading relationship.

<See Figure 7.4, page 351>

Relaxing the critical threshold value to 1.20 does alter the reciprocal trading regions in both 1989 and 2001. However, the interpretation of change is essentially the same. In 1989, Manitoba belongs to the British Columbia region when the critical threshold value is 1.30, but to the Ontario region when the critical threshold value is 1.20. Geographically speaking, this change is of little consequence because Manitoba is indeed geographically close to Ontario, the largest provincial economy in Canada. And although Manitoba’s LQT index values for exports and imports are high with Alberta and Saskatchewan, the volume of trade between Manitoba and Ontario dominates that of the other western provinces. In 2001, it is also Manitoba that represents the difference between the use of the 1.30 and 1.20 critical threshold values.

With a lower critical threshold value of 1.20, Manitoba forms a region with the other western provinces in 2001. This change, though representing some sensitivity in the various critical threshold values, is instructive in understanding the dynamics of interregional trading patterns within Canada and the United States. Only with the lower critical threshold value does Manitoba join other Canadian provinces in a reciprocal trading region. When the critical threshold value is increased, Manitoba separates itself from all other provinces and forms its own reciprocal trading region with geographically close U.S. states. Therefore, the volume of trade between Manitoba and other Canadian provinces is larger than its volume of trade with the U.S. states—this is particularly true for Manitoba imports, as shown in Chapter 6. However, the intensity of Manitoba's trade is now greater with the geographically close U.S. states. With time, as Manitoba presumably increases its trading volumes with the U.S. states while simultaneously maintaining or increasing its trade intensity, the lower critical threshold value will not alter the formation of reciprocal trading regions involving Manitoba.

<See Figure 7.5, page 352>

Further relaxing the critical threshold value to 1.10 alters the reciprocal trading regions in 1989, with no significant changes in 2001. In 1989, the British Columbia region gains the U.S. states of Oregon and Wisconsin, but loses Alberta to the Ontario region. This loss of Alberta to the Ontario region is a similar result to that of Manitoba, above. Though Alberta trades far more intensely with British Columbia than Ontario, the sheer volume of trade with Ontario dominates once the reciprocal trading relationships are established. Though the decrease of the critical threshold value from 1.30 to 1.20 is instructive, providing insight into Manitoba's dynamic trading relationships within Canada and the United States, this further reduction in the critical threshold value appears to be too low. This point is further shown in the case of Saskatchewan.

Saskatchewan now forms a reciprocal trading region of its own with five U.S. states. Though Saskatchewan does have a high degree of trade intensity with North Dakota, in particular, and Minnesota, the other U.S. states in Saskatchewan's reciprocal trading region have low or average trade intensity with Saskatchewan—Illinois does have large trade volumes. This is a clear case of a critical threshold value that is too low. Once Saskatchewan is aggregated with other U.S. states, other U.S. states are able to join Saskatchewan's region because of the low critical threshold value. The volume of trade between Saskatchewan and some U.S. states is high enough to dominate in regional assignment. For example, Saskatchewan has trading volumes with Illinois and Minnesota that are greater than all Canadian trading volumes except with Alberta and Ontario. However, these latter economies are assigned to economically large regions in Canada and the United States that Saskatchewan has interaction with through trade. And because the trade volumes of Alberta and Ontario are so large, their regional assignments occur before Saskatchewan's regional assignment. Consequently, Saskatchewan's trade intensity with those other Canadian provinces is significantly decreased when they are aggregated with the U.S. states in their reciprocal trading regions. As a result, Saskatchewan is ``forced'' to form regions with U.S. states that it has moderately intense bilateral trading relationships with, that contain large volumes.

This outcome very clearly indicates the need to consider both the relative measures (trade intensity) and absolute measures (trade volumes) when undertaking regional assignment. If the relative measure is too low of a threshold the absolute measure will dominate, generating curious results. And if the relative measure is too high of a threshold, no regional assignment will take place. The critical threshold value of 1.10 definitely appears to be too low.

Fortunately this issue is resolved by 2001. Aside from the addition of New Hampshire to the New Brunswick region, the regional assignment using the 1.10 critical threshold value is identical to the regional assignment using the 1.20 critical threshold value. Therefore, by 2001 Saskatchewan's trade volumes have adjusted to favour its geographically close U.S. states that are also trading intensely with the other western provinces.

Overall, there is more consistency across the sets of reciprocal trading regions than not. The general pattern is an increase in the number of reciprocal trading regions with those regions including more U.S. states that are geographically close. Rather than Canada consisting of three reciprocal trading regions in 1989, the country is now definitely composed of four reciprocal trading regions with the fifth (involving Manitoba) at least beginning to become well-defined by 2001.

7.6. CONCLUSION

This chapter has investigated the changing spatial pattern of interregional imports and exports for Canadian provinces 1989 – 2001 and the corresponding changes in their trading regions. Past research on the spatial pattern of Canada – United States trade flows have aggregated provinces and states to form larger trading regions and based the differing spatial structure of trade only for one year. Breaking from this perspective, this chapter uses the Canadian provinces and U.S. states as the spatial units of analysis and searches for changes in the spatial patterns of interregional trade for the individual provinces over time. Given that such an analysis has not been undertaken before, a new spatial pattern test is developed that is nonparametric and involves a Monte Carlo simulation.

All of the Canadian provinces experienced substantial change in their spatial patterns of interregional trade for both exports and imports. The spatial patterns of exports varied geographically, and relating to the initial level of tariff protection and economic ties to the United States through trade that existed prior to the establishment of free trade agreements between Canada and the United States. The changing spatial patterns of interregional imports, however, do not follow this pattern. Rather, there is very little spatial variation in the index of similarity for imports, indicating that the changing spatial pattern of interregional imports does not relate to the differential effects of the free trade agreements on the Canadian provinces.

As a result of these spatial patterns of interregional trade for both exports and imports, the spatial configuration of reciprocal trading relationships has undergone significant change as well. Decreased tariffs between Canadian provinces and U.S. states have increased the market access for Canadian provinces. Once facing lower barriers to trade at an interprovincial level, those barriers are now lower at an international level. Consequently, the reciprocal trading regions involving Canadian provinces have reoriented themselves toward the United States. In western Canada, this has led to more reciprocal trading regions, each with fewer Canadian provinces and more U.S. states.

CHAPTER 8

Conclusion

8.1. INTRODUCTION

I began this study of the geography of Canada – United States international trade flows by stating that only through a geographical approach can this trading relationship be properly understood. This statement is in part a result of reading works by economic geographers and economists that clearly shows the national scale of analysis is inappropriate (or even dysfunctional to loosely quote Kenichi Ohmae) in the study of Canadian international trade. Partly it is also because I have become an economic geographer. At both an empirical and a philosophical level I felt the need to undertake a geographical study of the phenomenon of Canada – United States international trade flows to complement and extend the national level study I undertook as a graduate student in economics at Simon Fraser University. I believe I have satisfied both of these needs.

My analysis moved through three scales. The first was at a global/international scale that investigated the geography of trade for nations. This was followed by a more detailed study of the Canada – United States trading relationship at the national scale. And lastly, there was an analysis of the Canada – United States trading relationship at the sub-national, regional scale. This multi-scale analysis, though grounded by a desire to uncover the actual regional trading patterns between Canada and the United States led to four questions.

First, how important is geography to international trade, in general? The answer to this question, and what was undertaken in chapter 2, is quite simply: a lot. To answer this question I needed to identify both the appropriate measurement for the geography of international trade, and the appropriate algorithm to generate the assignment of countries into regions to find evidence for the existence of the global triad. The appropriate measure for the geography of international trade involved significantly modifying existing measures. This new measurement allowed me to separate the geography of international trade from the geography of production. This is a critical distinction to make for reasons given in chapter 2. Once this new measurement was developed, an algorithm for assigning countries to regions was developed (and again extending the algorithms using is past research) allowing the generation of economically meaningful trading regions.

At the outset, I did not expect to find the results that I did. I expected to merely extend the results of Poon et al. (2000), perhaps showing that the global triad had been reached by 2001 (Poon et al. (2000) though finding clear evidence of regionalization in the global economy and the movement toward the global triad did not find evidence of the global triad itself). Rather, I found no evidence of the movement toward a global triad, although international trade flows were incredibly regionally focussed.

Not only were some countries excluded from a trading region all together (one of the fears held by Bhagwati 1999), but most trading regions were either tightly clustered in space, or were related to past colonial ties (until very recently some of those colonial ties were over a hundred years old). That is, geographic distance and history were evident in most trading regions. It was curious also that the nature of those trading regions had not changed over a period of twenty years. Approximately the same number of countries was involved in trading regions, and the average number of countries in each trading region (five), was essentially constant. I used a stricter version of regional assignment, distinguishing between economic dependence and economic integration, but still a movement toward the global triad did not materialize. Clearly, geography matters in international trade flows, as much now as it ever did.

The second question is: what is the current state of knowledge regarding the trading relationship between Canada and the United States? The analysis undertaken to answer this question occurred in chapters: 3, 4, and 5. Chapter 3 outlined the history of Canada's trading relationship with the United States, dating back before Canada's confederation through to the Canada – United States Free Trade Agreement (CUFTA) and the North American Free Trade Agreement (NAFTA). Additionally, chapter 3 outlined the effects of both the CUFTA and the NAFTA found in previous research.

Chapter 4 provided a detailed industrial level analysis of Canada – United States international trade flows the ten years before and fifteen years after the establishment of free trade. Of interest in the pre-free trade agreement time period is that the Canada – United States trading relationship was undergoing significant change before the CUFTA was even being negotiated. Therefore, any inferred effects of the free trade agreement must be made with caution. However, the most striking finding was Canada's relative place in North America's quality-based division of labour. The common belief is that Canada is in the middle between the United States and Mexico with respect to the quality of production, and that Canada is dependent on staples production, and export to the United States. As found in chapter 4, this view of Canada may now be wrong. Though United States – Mexico quality-based international trade data are not available to me, it was assumed that the United States engaged in higher quality production than that of Mexico. Combining that with the finding that Canada is increasingly moving into higher quality international trade with the United States at the expense of lower and medium quality international trade, Canada now appears to be at the top of the quality pyramid in North America.

And lastly, chapter 5 resolved two issues regarding the level of integration between Canada and the United States. First, the border effect, a puzzle in international economics for over ten years, was resolved using appropriate geographical, economic, and statistical specification. Rather than the border being a major hindrance to Canada's international trade with the United States, I found that the border had an insignificant or slightly negative effect the year after the inception of the CUFTA (what would be expected given the existence of tariff barriers) and a positive effect shortly thereafter. Second, past research has not been able to identify positively an impact of the NAFTA on Canada, either a positive or negative effect. Again, using the appropriate geographical, economic, and statistical specification I find that the NAFTA has had an overall positive impact on Canada, but that impact varies geographically. Saskatchewan, Ontario, and Prince Edward Island all experienced positive effects from the NAFTA on their trade with the United States, with all other Canadian provinces exhibiting insignificant effects. Additionally, aside from British Columbia, the NAFTA has not had a significant negative effect on Canada's interprovincial trade.

The third question is: what is the geography of trading patterns between Canada and the United States? The geographical analysis of Canada – United States international trade begins with chapter 6, that examines the trade volumes, trade shares, and economic dependence through trade of the Canadian provinces on other Canadian provinces and the U.S. states. Overall, it is found that Canadian provinces, though still strongly tied to other Canadian provinces, are beginning to shift their trading relationships south of the border. Likely as a result of decreased barriers to trade and close proximity, Canadian provinces are now trading significantly more with their geographically close U.S. neighbouring states.

However, it is also shown that understanding this changing spatial pattern of interregional trade is not limited to an analysis of the international trade statistics. Using Ontario's automotive industry as an example it is shown that the changing spatial pattern of Ontario's international trade with the United States is largely a result of industrial level restructuring that was in place before the establishment of the two most recent free trade agreements. Therefore, as with all analyses, the context of change is critical for understanding the changing spatial pattern of Canada's interregional trade with the United States.

The final question is: how has the changing geography of Canada – United States international trade flows impacted the trading relationships within these two countries? The changing geography of Canada – United States international trade flows is analyzed in chapter 7. This analysis proceeds in two stages: the establishment of how much change has occurred in the spatial patterns of the Canadian provinces' interregional trade, and how have those changed spatial patterns manifested themselves in the trading regions emerging within Canada and the United States.

The establishment of how much change in the spatial patterns of interregional trade has occurred since the inception of free trade between Canada and the United States involves the development of a new spatial pattern change test. The application of this spatial pattern change test is undertaken through a different view of spatial interaction data. The test itself is actually a spatial point pattern test. The concept of the quasi-point is introduced here to adapt the test to study interregional trade flows. Through this test, it is found that the exports of Canadian provinces have not changed uniformly. Rather, certain provinces have exhibited more spatial change in their exports than others. Curiously, the same is not true for imports. The relative change in the spatial pattern of exports is found to be negatively related to the tariff barrier an individual province experienced before the free trade agreements, the province's trade share with the United States, and the economic dependence on the United States. All of these negative correlations were expected. This led to the explanation that those provinces that has the greatest barriers to trade with the United States, and had the greatest original ties to the United States, changed their spatial patterns more than other Canadian provinces. Similar explanation of the changing patterns of the Canadian provinces' imports was not found, leading me to conclude that the Canadian market is not as important to the U.S. states as the U.S. market is to the Canadian provinces.

This differentiation of spatial change is then used as a stepping stone to investigate the changing trading regions within Canada and the United States. Because the provinces all exhibited significant degrees of spatial change in their interregional exports, I expected that the trading regions would also change significantly over the same time period. Using the same methodology employed in chapter 2 to identify a geography of international trade distinct from the geography of production, and then identify trading regions, I found that indeed the trading regions involving Canadian provinces have undergone substantial change. In the year the CUFTA entered into force, the Canadian trading regions were dominantly composed of Canadian provinces, with the addition of a few U.S. states, all very close to the Canada – United States border. By 2001, it was found that the Canadian provinces were decreasing their ties to other Canadian provinces while increasing their ties with the United States. Provincial ties to other Canadian provinces are still evident, but are decreasing nonetheless. This was particularly seen when altering the threshold for regional assignment with respect to Saskatchewan: trade intensity for Saskatchewan with the U.S. states is not as high as it is with other Canadian provinces, but the volume of Saskatchewan's interregional trade is now favouring the United States.

8.2. DIRECTIONS FOR FURTHER RESEARCH

In many ways, the sixty thousand or so words written above have only scratched the surface in understanding the geographical dimension of Canada – United States international trade flows. Though I believe I have shown the importance of undertaking more research in this area, I have only alluded to the avenues of potential research. There are three ways in which the understanding of the geographical dimension of Canada – United States international trade flows can and should be extended, and all of these extensions are geographical.

First, all of the statistical analysis performed above has used classical statistical techniques, with the exception of the development of the spatial pattern change test in chapter 7. As shown time and time again, the assumptions of classical statistical methods are not appropriate in the presence of (positive) spatial autocorrelation that is likely present in most of the Canadian provinces' trading relationships. From a theoretical standpoint, the presence of positive spatial autocorrelation, common in economic phenomena, artificially deflates variance that in turn inflates statistical significance proportional to the degree of positive spatial autocorrelation, possibly leading to false inference (see Anselin (1988) and Cressie (1993) for a more complete discussion of the role of spatial autocorrelation in statistical modelling). The key point is that modelling the spatial autocorrelation may significantly alter results. Therefore, there is a need to incorporate specifically spatial statistical methods to verify the results found in my dissertation. The difficulty is that no statistical software has the capabilities of performing such a feat at this time. There are spatial statistical software programs that allow for the control of spatial autocorrelation in a spatial statistical analysis, but no temporal component can be incorporated as well. Consequently, there is a need for the development of spatial statistical methods that are operational within a time-series – spatial-cross-section context.

Second, though explanation is undertaken in the above analysis, because of the vast scope of my study (all Canadian provinces and their trading partners in both Canada and the United States), there is a need for further research to investigate the causes of the changes in Canada's provincial trading patterns. Each Canadian province has many trading partners and many industries, which opens the door for a large number of studies to investigate the various trading relationships in each of the industries. I stated in chapter 6 that there has been no comprehensive study of the effects of Canada's free trade agreements with the United States and only a handful of studies that investigate local effects of these free trade agreements. My dissertation is the first attempt at a comprehensive study of Canada – United States international trade flows and has pointed to the need for more local studies: Ontario's automotive products industry, Alberta's oil industry, and British Columbia's forestry industry. To put it within the context of the economic geographer Andrew Sayer's well known distinction, I have provided an extensive analysis, but there is much work to be completed on intensive analyses of specific cases.

Lastly, there is a need for qualitative work in the study of the effects of Canada's free trade agreements with the United States. The number of questions that can be posed to the data used in my dissertation are almost endless due to their degree of disaggregation, both spatially and at the product level. However, any quantitative assessment of any free trade agreement is limited in that it can only represent the effects of free trade agreements that can be measured with standardized international trade and other economic data. Some of the potential qualitative studies that could be undertaken are to interview government officials involved in international relations, special-interest groups, labour unions, as well as individuals affected by the free trade agreements to uncover: how they viewed the free trade agreements at the time, how they perceive the changes due to the free trade agreements, and how they view the free trade agreements today. These qualitative studies could then be tied back to the data to see if there is any correspondence between peoples' perceptions of the effects of the free trade agreements and the measured effects of the free trade agreements. Additionally, this qualitative work could involve the political economic effects of the free trade agreements, something not investigated in my dissertation.

8.3. THE CONCLUSION OF THE CONCLUSIONS

In short, geography matters for the study of international and interregional trade flows. I have shown that geographical considerations are as strong today as they have ever been, and that the only way truly to understand the effects of an international trading agreement is to study those effects at a sub-national regional scale.

Table 1.1. U.S. Regions and their International Trade Destinations, 1987.

	North America	Central America	Europe	Asia
Great Lakes	52.6	5.1	20.1	15.3
Mid-Atlantic	25.7	5.5	31.4	25.5
New England	23.7	2.9	39.6	25.6
Plains	38.8	3.8	25.9	24.2
Rocky Mountains	22.1	4.0	32.3	36.2
South Atlantic	15.1	13.8	30.7	23.7
South Central	23.2	9.7	31.8	22.2
Southwest	11.8	24.3	23.4	27.1
West	11.3	5.5	30.3	44.1
United States	27.3	8.0	28.0	26.5

Source. Erickson and Hayward (1991).

Table 2.1. Share of World Exports and Imports

	Share of World Exports	Share of World Imports
2001	97.6	96.3
1991	97.6	96.8
1981	98.7	96.3

Source. Statistics Canada (2004a), calculations by the author.

Table 2.2. GDP, Export, and Import Shares

	North America	EU-15	EA-ANZ	Total
		GDP Share		
2001	31.1	29.5	21.6	82.2
1991	28.9	30.6	20.5	80.0
1981	29.3	31.9	17.1	78.2
		Export Share		
2001	19.1	37.6	24.0	80.7
1991	17.5	44.3	23.0	84.8
1981	17.9	36.7	17.1	71.7
		Import Share		
2001	24.8	35.0	20.7	80.5
1991	19.5	45.2	19.3	84.0
1981	19.2	39.3	15.9	74.4

Source. Statistics Canada (2004a) and International Monetary Fund (2004b), calculations by the author.

Table 2.3. Percentages of Bilateral Trading Relationships Relating to the Global Triad

	1981	1991	2001
Number of initial reciprocal bilateral trading relationships before regional assignment	1152 (10.0 %)	1175 (10.2 %)	1287 (11.2 %)
Within the regions of the triad	49.2	67.5	67.4
Between the regions of the triad	4.8	7.4	6.0
Within and between triad	54.0	74.9	73.4
Triad trade with the rest of the world	37.9	22.1	22.0
Trade not involving the triad	7.9	3.1	4.4

Source. Statistics Canada (2004a), calculations by the author.

Table 2.4. Summary of Trading Relationships, 1.30 Threshold

	1981	1991	2001
Number of reciprocal trading regions	24	24	26
Number of countries in trading regions (maximum = 152)	120	114	132
Average number of countries per region	5	4.75	5.08
Number of reciprocal bilateral trading relationships outside of the trading regions	3	7	3

Source. Statistics Canada (2004a), calculations by the author.

Table 2.5. Regional Assignments, 1981, 1.30 Threshold

United States	Germany	United Kingdom	Norway	Italy
Canada	France	Belgium-Luxembourg	Sweden	Libya
	Netherlands	Ireland	Denmark	Iraq
	Reunion	Cyprus	Finland	Turkey
		Saint Kitts and Nevis		Syria
		Sierra Leone		Jordan
Portugal	Greece	Spain	Japan	South Korea
Angola	Tunisia	Mexico	Indonesia	Philippines
Iran	Bulgaria	Cuba	Saudi Arabia	Kuwait
Iceland		Mauritania	Oman	Ecuador
Guinea-Bissau		Equatorial Guinea		
Singapore	Australia	Brazil	Bolivia	Guadeloupe
Malaysia	New Zealand	Venezuela	Argentina	Suriname
China	Papua New Guinea	Colombia	Chile	French Guiana
Thailand	Fiji	Uruguay	Peru	
Brunei	Kiribati	Paraguay		
Laos		Nigeria		
Bhutan				
Maldives				
El Salvador, Guatemala, Costa Rica, Nicaragua, Honduras, Trinidad and Tobago, Jamaica, Netherlands Antilles, Panama, Guyana, Barbados, Bermuda, Belize		India	Yemen	Ghana
		United Arab Emirates	Sudan	Gambia
		Pakistan	Lebanon	Liberia
		Sri Lanka		
		Seychelles		
Kenya	Ivory Coast	Mauritius	Israel	Soviet Union
Uganda	Burkina Faso	Comoros	Egypt	Poland
Rwanda	Mali	Madagascar	Romania	Czechoslovakia
Mozambique	Senegal			Yugoslavia
Bangladesh	Morocco			Hungary
Burundi	Togo			
Somalia	Benin			
Djibouti				

Reciprocal bilateral relationships: Austria-Switzerland, South Africa-Malawi, Haiti-Dominican Republic

Table 2.6. Regional Assignments, 1991, 1.30 Threshold

United States Canada Mexico	Germany France Belgium-Luxembourg Guadeloupe Reunion Gambia	United Kingdom Netherlands Ireland Cyprus Saint Kitts and Nevis	Norway Sweden Denmark Finland Liberia	Spain Italy Libya Malta Equatorial Guinea
Austria Switzerland Hungary Czechoslovakia Lebanon	Portugal Angola Guinea-Bissau Iceland Mozambique	Greece Bulgaria Yugoslavia Albania Somalia	Australia Japan Oman Solomon Is.	Singapore Malaysia China Thailand Brunei Maldives
South Korea Indonesia Saudi Arabia Kuwait Bhutan	New Zealand Fiji Papua New Guinea Kiribati	Venezuela Netherlands Antilles Colombia Peru Trinidad and Tobago Ecuador Panama	Brazil Argentina Chile Uruguay Paraguay Bolivia	El Salvador Guatemala Costa Rica Nicaragua Honduras
Jamaica Guyana Belize Cayman Is. Turks and Caicos Is.	Soviet Union Poland Romania	South Africa Zimbabwe Malawi	Nigeria Ghana Cameroon Ivory Coast Senegal Guinea Togo	Kenya Uganda Israel
Algeria Tunisia Morocco	Madagascar Mauritius Seychelles Comoros	Pakistan Bahrain United Arab Emirates Qatar Sri Lanka Yemen Djibouti	India Iran Nepal	

Reciprocal bilateral relationships: Iran-Jordan, Turkey-Syria, Philippines-Vietnam, Egypt-Sudan, Bahamas-Bermuda, North Korea-Bangladesh, Suriname-French Guinea

Table 2.7. Regional Assignments, 2001, 1.30 Threshold

United States Canada Mexico	Germany France Belgium-Luxembourg	Spain Italy Portugal Albania Cayman Islands	Norway Sweden Denmark Finland	Austria Switzerland Czechoslovakia Hungary Yugoslavia
Greece Cyprus Syria Liberia	Turkey Algeria Israel Romania Bulgaria	United Kingdom Netherlands Ireland Gambia	Australia New Zealand Fiji Papua New Guinea Kiribati	Singapore Malaysia Thailand Philippines Vietnam Brunei Laos Maldives Solomon Islands
China South Korea Mongolia	Venezuela Colombia Ecuador Peru Panama Netherlands Antilles	Brazil Argentina Chile Uruguay Paraguay Bolivia	El Salvador, Guatemala, Honduras, Costa Rica, Nicaragua, Barbados, Saint Kitts and Nevis, Dominican Republic, Guyana, Suriname, Belize, Jamaica, Trinidad and Tobago	
Bahamas Bermuda Turks & Caicos Is.	South Africa Zambia Zimbabwe Mozambique Malawi Seychelles Sierra Leone	Nigeria Ghana Cameroon Senegal Togo Niger Benin Mauritania	Kenya Uganda Rwanda Sudan Burundi	Ivory Coast Burkina Faso Mali Guinea
Ethiopia Yemen Djibouti	Iraq Jordan Morocco Equatorial Guinea	India Egypt Nepal Bhutan Guinea-Bissau	Libya Tunisia Malta Cuba	Madagascar Mauritius Comoros
Saudi Arabia Bahrain Lebanon North Korea	United Arab Emirates Oman Iran Pakistan Kuwait Afghanistan Somalia			

Reciprocal bilateral relationships: Japan-Indonesia, Soviet Union-Poland, Congo-Central African Republic

Table 2.8. Regional Assignments, 1981, 1.20 Threshold

United States	Germany	United Kingdom	Norway	Italy
Canada	France	Belgium-Luxembourg	Sweden	Libya
Bahamas	Netherlands	Ireland	Denmark	Iraq
	Reunion	Cyprus	Finland	Turkey
	Guadeloupe	Saint Kitts and Nevis		Syria
		Malta		Jordan
Portugal	Greece	Spain	Japan	South Korea
Angola	Tunisia	Mexico	Indonesia	Kuwait
Iran	Bulgaria	Cuba	Saudi Arabia	Ecuador
Iceland		Mauritania	Oman	
Guinea-Bissau		Equatorial Guinea		
Singapore	Australia	Brazil	Venezuela	El Salvador
Malaysia	New Zealand	Argentina	Colombia	Guatemala
China	Papua New Guinea	Chile	Jamaica	Costa Rica
Thailand	Fiji	Uruguay	Bermuda	Nicaragua
Philippines	Kiribati	Paraguay	Panama	Honduras
Brunei		Bolivia	Dominican	Trinidad/Tobago
Laos		Nigeria	Republic	Guyana
Bhutan		Niger	Haiti	Barbados
Maldives				Belize
South Africa	Somalia	India	Yemen	Ghana
Malawi	Djibouti	United Arab Emirates	Sudan	Gambia
Mauritius	Ethiopia	Pakistan	Lebanon	Liberia
Seychelles		Sri Lanka		Sierra Leone
		Morocco		
Kenya	Ivory Coast	Nepal	Israel	Soviet Union
Uganda	Burkina Faso	Comoros	Egypt	Poland
Rwanda	Mali	Madagascar	Romania	Czechoslovakia
Mozambique	Senegal			Yugoslavia
Bangladesh	Algeria			Hungary
	Togo			
	Benin			

Reciprocal bilateral relationships: Austria-Switzerland, Suriname-French Guiana

Table 2.9. Regional Assignments, 1991, 1.20 Threshold

United States	Germany	United Kingdom	Norway	Spain
Canada	France	Netherlands	Sweden	Italy
Mexico	Belgium-Luxembourg	Ireland	Denmark	Portugal
	Guadeloupe	Cyprus	Finland	Libya
	Reunion	Saint Kitts and Nevis	Liberia	Malta
	Gambia			Equatorial Guinea
Austria	Greece	Australia	Japan	Turkey
Switzerland	Bulgaria	New Zealand	South Korea	Saudi Arabia
Hungary	Yugoslavia	Papau New Guinea	Indonesia	Kuwait
Czechoslovakia	Albania	Fiji		Pakistan
Lebanon		Kiribati		
Singapore	Philippines	Venezuela	Brazil	El Salvador
Malaysia	Vietnam	Netherlands Antilles	Argentina	Guatemala
China	Mozambique	Colombia	Chile	Costa Rica
Thailand		Peru	Uruguay	Nicaragua
Brunei		Trinidad and Tobago	Paraguay	Honduras
Maldives		Ecuador	Bolivia	
		Panama		
		Barbados		
Jamaica	Bahamas	South Africa	Kenya	Nigeria
Guyana	Haiti	Zimbabwe	Uganda	Ghana
Belize	Bermuda	Malawi	Israel	Cameroon
Cayman Is.				Ivory Coast
Turks and Caicos Is.				Senegal
				Guinea
				Togo
				Guinea-Bissau
Algeria	Madagascar	Bahrain	India	Egypt
Tunisia	Mauritius	United Arab Emirates	Iran	Sri Lanka
Morocco	Seychelles	Qatar	Nepal	Yemen
	Comoros	Somalia		
Iraq	Bangladesh	Soviet Union		
Jordon	Sudan	Poland		
Syria	Bhutan	Romania		

Reciprocal bilateral relationships: Suriname-French Guinea, Djibouti-Ethiopia

Table 2.10. Regional Assignments, 2001, 1.20 Threshold

United States Canada Mexico	Germany France Belgium- Luxembourg Tunisia	Spain Italy Portugal Romania Albania Cayman Islands	Norway Sweden Denmark Finland	Austria Switzerland Czechoslovakia Hungary Yugoslavia
Greece Cyprus Bulgaria Liberia	Turkey Algeria Israel Syria Lebanon	United Kingdom Netherlands Ireland Gambia	Australia New Zealand Fiji Papua New Guinea Kiribati	Singapore Malaysia Thailand Philippines Vietnam Brunei Laos Malta Maldives Solomon Islands
China South Korea Mongolia	Venezuela Colombia Ecuador Peru Panama Netherlands Antilles	Brazil Argentina Chile Uruguay Paraguay Bolivia	El Salvador, Guatemala, Honduras, Costa Rica, Nicaragua, Barbados, Saint Kitts and Nevis, Dominican Republic, Guyana, Suriname, Belize, Jamaica, Trinidad and Tobago	
Bahamas Bermuda Turks & Caicos Is.	South Africa Zambia Zimbabwe Mozambique Malawi Seychelles Sierra Leone	Nigeria Ghana Cameroon Senegal Togo Niger Benin Mauritania	Kenya Uganda Rwanda Sudan Burundi	Ivory Coast Burkina Faso Mali Guinea
Iraq Jordan Morocco Libya	United Arab Emirates Oman Iran Pakistan Kuwait Afghanistan Somalia	India Egypt Nepal Bhutan Guinea-Bissau	Saudi Arabia Bahrain Qatar Ethiopia Djibouti	Madagascar Mauritius Comoros

Reciprocal bilateral relationships: Japan-Indonesia, Soviet Union-Poland, Congo-Central African Republic, Cuba-North Korea, Jamaica-Trinidad and Tobago

Table 2.11. Regional Assignments, 1981, 1.10 Threshold

United States Canada Bahamas Turks and Caicos	Germany France Netherlands Reunion Belgium- Luxembourg	United Kingdom Ireland Norway Sweden Denmark Saint Kitts and Nevis	Greece Tunisia Bulgaria Cyprus	Italy Libya Iraq Turkey Syria Jordan
Portugal Angola Iceland Guinea-Bissau Mozambique	Spain Mexico Morocco Cuba Mauritania Equatorial Guinea	Japan Indonesia Saudi Arabia Oman	South Korea Kuwait Ecuador	Singapore Malaysia China Thailand Philippines Brunei Laos Bhutan Maldives
Australia New Zealand Papua New Guinea Fiji Kiribati	Venezuela Colombia Dominican Republic Netherlands Antilles Jamaica Panama Trinidad and Tobago Guyana Barbados Bermuda	El Salvador Guatemala Costa Rica Nicaragua Honduras Belize	Brazil Argentina Chile Bolivia Uruguay Paraguay Nigeria Niger	Guadeloupe Suriname French Guiana
South Africa Malawi Mauritius Seychelles	India United Arab Emirates Pakistan Sri Lanka Bangladesh	Israel Egypt Romania Nepal	Yemen Sudan Lebanon	Ghana Gambia Liberia Sierra Leone
Kenya Uganda Rwanda Burundi Somalia Djibouti Ethiopia	Ivory Coast Burkina Faso Mali Senegal Algeria Togo Benin	Soviet Union Poland Czechoslovakia Yugoslavia Hungary Albania		

Reciprocal bilateral relationships: Finland-Iran, Austria-Switzerland, Comoros-Madagascar

Table 2.12. Regional Assignments, 1991, 1.10 Threshold

United States Canada Mexico	Germany France Belgium-Luxembourg Netherlands Reunion	United Kingdom Italy Ireland Libya Malta Saint Kitts and Nevis	Norway Sweden Denmark Finland Liberia	Spain Portugal Algeria Morocco Mozambique Guinea-Bissau Equatorial Guinea
Austria Switzerland Hungary Czechoslovakia	Turkey Saudi Arabia Pakistan Kuwait	Greece Cyprus Bulgaria Yugoslavia Albania Lebanon	Japan South Korea Indonesia Solomon Islands	Singapore Malaysia China Thailand Brunei Maldives
Australia New Zealand Fiji Papua New Guinea Kiribati	Venezuela Netherlands Antilles Colombia Peru Trinidad and Tobago Ecuador Panama Barbados Guyana	Brazil Argentina Chile Uruguay Paraguay Bolivia	El Salvador Guatemala Costa Rica Nicaragua Honduras	Bahamas Haiti Bermuda
Jamaica Belize Dominican Republic Cayman Is. Turks and Caicos Is.	Soviet Union Poland Romania	South Africa Zimbabwe Malawi	Nigeria Ghana Cameroon Ivory Coast Senegal Guinea Togo	Kenya Uganda Israel
Suriname French Guinea Guadeloupe	Madagascar Mauritius Seychelles Comoros	Bahrain Iraq United Arab Emirates Ethiopia Qatar Yemen Djibouti	India Iran Nepal Sri Lanka	North Korea Bangladesh Bhutan

Reciprocal bilateral relationships: Iran-Jordan, Philippines-Vietnam, Egypt-Sudan, Syria-Tunisia

Table 2.13. Regional Assignments, 2001, 1.10 Threshold

United States Canada Mexico	Germany France Belgium-Luxembourg Netherlands Sierra Leone	Spain Italy Portugal Libya Albania Cayman Islands	United Kingdom Ireland Cyprus Gambia	Austria Switzerland Czechoslovakia Hungary Yugoslavia
Turkey Algeria Israel Romania Syria Lebanon	Norway Sweden Denmark Finland	Japan Thailand United Arab Emirates Somalia	Australia New Zealand Fiji Papua New Guinea Kiribati	Singapore Malaysia Philippines Brunei Malta Cambodia Maldives Solomon Islands
China South Korea Vietnam Laos	Venezuela Colombia Ecuador Peru Panama Netherlands Antilles Costa Rica	Brazil Argentina Chile Uruguay Paraguay Bolivia Guinea-Bissau	El Salvador, Guatemala, Honduras, Nicaragua, Jamaica, Trinidad and Tobago, Barbados, Saint Kitts and Nevis, Dominican Republic, Guyana, Suriname, Belize	
Bahamas Cuba Turks & Caicos Is.	South Africa Zambia Zimbabwe Mozambique Malawi Seychelles	Indonesia Nigeria Ghana Togo Niger Benin	Kenya Uganda Rwanda Sudan Burundi	Ivory Coast Burkina Faso Mali Guinea Senegal Mauritania Cameroon
Pakistan Kuwait Afghanistan	Iraq Jordan Morocco Tunisia	India Egypt Nepal Bhutan	Soviet Union Poland Bulgaria	Madagascar Mauritius Comoros
Saudi Arabia Bahrain Qatar North Korea Ethiopia Djibouti				

Reciprocal bilateral relationships: Iran-Oman, Greece-Liberia, Chad-Central African Republic

Table 2.14. Summary of Trading Relationships, 1.20 and 1.10 Thresholds

	1981	1991	2001
		1.20 Threshold	
Number of reciprocal trading regions	25	28	24
Number of countries in trading regions (maximum = 152)	124	122	129
Average number of countries per region	4.96	4.36	5.38
Number of reciprocal bilateral trading relationships outside of the trading regions	2	2	5
		1.10 Threshold	
Number of reciprocal trading regions	23	25	25
Number of countries in trading regions (maximum = 152)	124	121	130
Average number of countries per region	5.39	4.84	5.2
Number of reciprocal bilateral trading relationships outside of the trading regions	3	4	3

Source. Statistics Canada (2004a), calculations by the author.

Table 4.1. Canadian International Trade Flows, Billions of Constant 1997 Canadian Dollars, 1980 - 1988

Exports	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	94.75	97.71	95.62	103.16	128.75	137.89	136.46	129.02	130.84
Mexico	0.95	1.24	0.84	0.61	0.56	0.62	0.55	0.67	0.67
EU15	20.85	17.36	13.86	11.52	11.76	10.99	12.38	13.82	15.39
EA-ANZ	15.39	14.37	14.02	13.68	15.04	15.21	15.48	17.49	21.97
ROW	17.94	18.06	16.76	13.32	14.40	12.13	11.21	9.80	10.31
Total	149.88	148.74	141.10	142.29	170.50	176.85	176.08	170.79	179.17

Imports	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	87.72	88.66	73.07	76.75	96.58	101.88	102.09	117.07	119.21
Mexico	0.54	1.61	1.24	1.18	1.24	1.24	0.49	0.92	0.90
EU15	11.65	11.89	9.73	9.93	12.69	16.20	18.35	19.34	22.12
EA-ANZ	10.36	12.39	10.34	12.31	14.89	16.00	19.36	19.35	21.75
ROW	14.17	13.05	7.26	6.47	7.09	6.59	6.65	5.95	7.38
Total	124.45	127.60	101.65	106.65	132.49	141.91	146.95	162.64	171.36

Total Trade	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	182.47	186.37	168.68	179.92	225.32	239.78	238.55	246.09	250.05
Mexico	1.49	2.85	2.08	1.79	1.80	1.85	1.05	1.60	1.57
EU15	32.51	29.25	23.59	21.45	24.44	27.19	30.73	33.16	37.51
EA-ANZ	25.75	26.76	24.37	25.99	29.93	31.21	34.84	36.84	43.72
ROW	32.12	31.11	24.02	19.79	21.49	18.72	17.86	15.74	17.69
Total	274.34	276.34	242.75	248.94	302.98	318.76	323.03	333.43	350.53

Source. Statistics Canada (2004a).

Table 4.2. Canadian International Trade Shares

Exports	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	0.632	0.657	0.678	0.725	0.755	0.780	0.775	0.755	0.730
Mexico	0.006	0.008	0.006	0.004	0.003	0.004	0.003	0.004	0.004
EU15	0.139	0.117	0.098	0.081	0.069	0.062	0.070	0.081	0.086
EA-ANZ	0.103	0.097	0.099	0.096	0.088	0.086	0.088	0.102	0.123
ROW	0.120	0.121	0.119	0.094	0.084	0.069	0.064	0.057	0.058
Imports	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	0.705	0.695	0.719	0.720	0.729	0.718	0.695	0.720	0.696
Mexico	0.004	0.013	0.012	0.011	0.009	0.009	0.003	0.006	0.005
EU15	0.094	0.093	0.096	0.093	0.096	0.114	0.125	0.119	0.129
EA-ANZ	0.083	0.097	0.102	0.115	0.112	0.113	0.132	0.119	0.127
ROW	0.114	0.102	0.071	0.061	0.054	0.046	0.045	0.037	0.043
Total Trade	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
USA	0.665	0.674	0.695	0.723	0.744	0.752	0.738	0.738	0.713
Mexico	0.005	0.010	0.009	0.007	0.006	0.006	0.003	0.005	0.004
EU15	0.118	0.106	0.097	0.086	0.081	0.085	0.095	0.099	0.107
EA-ANZ	0.094	0.097	0.100	0.104	0.099	0.098	0.108	0.110	0.125
ROW	0.117	0.113	0.099	0.079	0.071	0.059	0.055	0.047	0.050

Source. Statistics Canada (2004a).

Table 4.3a. Total and Industrial Sector Export Levels, Billions of Constant 1997 Canadian Dollars

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total Trade	88.910	87.471	90.547	87.536	93.065	120.703	127.974	124.731	118.683	120.433
Animal Agriculture	3.348	2.511	2.377	2.627	2.576	3.006	3.173	3.404	3.654	3.314
Vegetable Agriculture	8.419	1.488	1.849	1.659	1.760	2.477	2.796	3.194	2.871	2.920
Food	0.433	0.403	0.416	0.468	0.526	0.638	0.732	0.958	0.921	0.838
Beverages and Tobacco	0.365	0.868	0.996	0.975	1.049	1.150	1.050	1.006	0.990	0.995
Mining, Quarrying, Petroleum	15.408	17.094	17.212	16.380	15.905	18.195	19.973	13.186	12.345	11.199
Chemicals	4.821	4.854	5.439	4.942	4.240	5.442	4.941	4.474	4.463	4.818
Plastics and Rubber Products	1.244	1.200	1.342	1.520	1.679	2.241	2.439	2.766	2.884	2.978
Wood Products	7.163	4.927	4.448	3.908	5.620	6.114	6.602	6.650	6.367	5.522
Paper Products	9.914	9.998	9.858	8.866	8.528	10.485	10.639	10.859	11.756	12.020
Printing and Publishing	0.213	0.288	0.279	0.315	0.408	0.510	0.595	0.712	0.713	0.605
Leather	0.288	0.259	0.257	0.246	0.249	0.341	0.399	0.398	0.429	0.359
Textiles	0.123	0.150	0.187	0.183	0.226	0.343	0.342	0.421	0.477	0.494
Clothing	0.164	0.157	0.166	0.182	0.211	0.262	0.305	0.332	0.387	0.399
Non-metallic Mineral Product	2.712	5.568	4.465	3.678	3.560	4.915	4.871	6.367	2.903	2.525
Primary & Fabricated Metals	7.029	7.497	7.760	5.392	6.199	8.500	8.022	9.006	9.932	11.255
Non-Electrical machinery	5.685	6.442	7.554	6.562	6.792	10.000	9.681	9.344	9.984	10.014
Electrical Machinery	1.886	2.045	2.261	2.176	2.247	3.772	3.925	4.113	4.260	4.567
Motor Vehicles and Parts	15.027	16.438	17.958	21.653	25.674	35.443	38.961	38.472	34.692	37.408
Other Transport	1.330	1.754	1.720	1.753	1.324	1.685	2.118	2.624	2.376	2.269
Professional Goods	0.425	0.407	0.468	0.435	0.469	0.650	0.849	0.862	0.854	0.724
Other	2.919	3.120	3.527	3.608	3.827	4.540	5.565	5.571	5.430	5.212

Source. Feenstra (1996; 1997).

Table 4.3b. Total and Industrial Sector Import Levels, Billions of Constant 1997 Canadian Dollars

	1979	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
Total Trade	75.777	72.703	75.499	61.254	65.421	81.003	83.662	78.682	91.361	98.385
Animal Agriculture	0.566	0.538	0.607	0.486	0.473	0.535	0.443	0.491	0.583	0.569
Vegetable Agriculture	2.368	2.556	2.645	2.335	2.114	2.228	1.911	1.804	1.804	1.845
Food	0.816	0.859	0.806	0.676	0.647	0.687	0.585	0.488	0.568	0.553
Beverages and Tobacco	0.374	0.434	0.349	0.353	0.378	0.390	0.372	0.443	0.471	0.503
Mining, Quarrying, Petroleum	4.667	5.185	4.981	4.455	3.897	4.513	3.900	3.309	3.063	2.781
Chemicals	3.874	3.938	4.097	3.462	3.694	4.117	4.148	4.057	4.414	4.568
Plastics and Rubber Products	2.355	2.176	2.452	2.026	2.323	2.624	2.382	2.251	2.915	2.998
Wood Products	1.039	0.828	0.884	0.544	0.725	0.696	0.641	0.717	0.793	0.820
Paper Products	1.104	1.083	1.248	1.049	1.080	1.236	1.155	1.100	1.253	1.412
Printing and Publishing	1.020	0.991	1.056	1.083	1.045	1.130	1.071	1.022	1.213	1.261
Leather	0.489	0.340	0.347	0.288	0.325	0.344	0.339	0.312	0.393	0.332
Textiles	1.680	1.536	1.533	1.092	1.209	1.159	1.056	0.902	1.040	1.053
Clothing	0.285	0.283	0.298	0.209	0.218	0.185	0.158	0.185	0.175	0.180
Non-metallic Mineral Product	3.396	4.585	3.282	2.343	2.809	3.304	3.056	3.304	2.434	2.290
Primary & Fabricated Metals	4.536	4.154	4.603	3.101	3.172	3.746	3.465	3.044	3.721	4.347
Non-Electrical machinery	14.392	14.776	15.844	12.724	12.383	15.363	15.843	13.997	15.871	15.256
Electrical Machinery	4.008	4.039	4.555	3.946	4.220	5.245	4.941	5.024	5.781	6.415
Motor Vehicles and Parts	22.293	17.776	18.449	15.175	18.960	24.363	27.776	26.044	25.696	25.197
Other Transport	1.867	1.754	2.119	1.349	1.330	1.541	1.347	1.464	1.420	2.196
Professional Goods	1.964	2.241	2.458	2.341	2.189	2.409	2.457	2.298	2.454	2.403
Other	2.673	2.629	2.890	2.209	2.238	5.185	6.622	6.426	15.304	21.406

Source. Feenstra (1996; 1997).

Table 4.3c. Total and Industrial Sector Total Trade Levels, Billions of Constant 1997 Canadian Dollars

	1979	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
Total Trade	164.687	160.174	166.046	148.771	158.503	201.779	211.617	203.340	210.061	218.833
Animal Agriculture	3.913	3.049	2.984	3.113	3.050	3.541	3.616	3.895	4.237	3.883
Vegetable Agriculture	10.787	4.044	4.494	3.993	3.874	4.705	4.707	4.998	4.676	4.765
Food	1.250	1.262	1.222	1.144	1.173	1.325	1.317	1.446	1.488	1.390
Beverages and Tobacco	0.739	1.302	1.345	1.328	1.427	1.539	1.423	1.449	1.461	1.499
Mining, Quarrying, Petroleum	20.076	22.280	22.196	20.840	19.802	22.707	23.874	16.496	15.408	13.980
Chemicals	8.695	8.792	9.536	8.404	7.934	9.559	9.089	8.531	8.877	9.386
Plastics and Rubber Products	3.599	3.376	3.794	3.546	4.002	4.865	4.821	5.017	5.800	5.976
Wood Products	8.202	5.755	5.332	4.452	6.345	6.810	7.243	7.368	7.160	6.342
Paper Products	11.018	11.081	11.106	9.915	9.608	11.721	11.794	11.959	13.009	13.431
Printing and Publishing	1.232	1.279	1.335	1.398	1.453	1.640	1.667	1.733	1.926	1.866
Leather	0.777	0.599	0.605	0.534	0.574	0.686	0.738	0.710	0.822	0.691
Textiles	1.804	1.686	1.720	1.275	1.436	1.502	1.398	1.322	1.517	1.547
Clothing	0.449	0.440	0.464	0.391	0.429	0.447	0.463	0.517	0.562	0.579
Non-metallic Mineral Product	6.108	10.153	7.747	6.021	6.370	8.219	7.927	9.671	5.337	4.815
Primary & Fabricated Metals	11.566	11.652	12.364	8.493	9.371	12.246	11.487	12.050	13.653	15.599
Non-Electrical machinery	20.077	21.218	23.404	19.291	19.175	25.363	25.528	23.336	25.864	25.272
Electrical Machinery	5.894	6.084	6.816	6.121	6.467	9.017	8.866	9.136	10.041	10.982
Motor Vehicles and Parts	37.323	34.222	36.413	36.824	44.634	59.788	66.737	64.516	60.388	62.605
Other Transport	3.197	3.507	3.838	3.102	2.654	3.226	3.465	4.088	3.795	4.465
Professional Goods	2.389	2.648	2.926	2.776	2.658	3.059	3.306	3.161	3.308	3.127
Other	5.592	5.749	6.417	5.817	6.065	9.725	12.187	11.997	20.738	26.615

Source. Feenstra (1996; 1997).

Table 4.4. Canada-U.S. International Trade Flows, Increase Factors, 1979 - 1988

	Exports	Imports	Total
Total Trade	1.35	1.30	1.33
Animal Agriculture	0.99	1.01	0.99
Vegetable Agriculture	0.35	0.78	0.44
Food	1.93	0.68	1.11
Beverages and Tobacco	2.72	1.35	2.03
Mining, Quarrying, Petroleum	0.73	0.60	0.70
Chemicals	1.00	1.18	1.08
Plastics and Rubber Products	2.39	1.27	1.66
Wood Products	0.77	0.79	0.77
Paper Products	1.21	1.28	1.22
Printing and Publishing	2.84	1.24	1.51
Leather	1.25	0.68	0.89
Textiles	4.01	0.63	0.86
Clothing	2.44	0.63	1.29
Non-metallic Mineral Product	0.93	0.67	0.79
Primary & Fabricated Metals	1.60	0.96	1.35
Non-Electrical machinery	1.76	1.06	1.26
Electrical Machinery	2.42	1.60	1.86
Motor Vehicles and Parts	2.49	1.13	1.68
Other Transport	1.71	1.18	1.40
Professional Goods	1.71	1.22	1.31
Other	1.79	8.01	4.76

Source. Feenstra (1996; 1997).

Table 4.5a. Industrial Sector International Export Trade Shares

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Animal Agriculture	0.038	0.029	0.026	0.030	0.028	0.025	0.025	0.027	0.031	0.028
Vegetable Agriculture	0.095	0.017	0.020	0.019	0.019	0.021	0.022	0.026	0.024	0.024
Food	0.005	0.005	0.005	0.005	0.006	0.005	0.006	0.008	0.008	0.007
Beverages and Tobacco	0.004	0.010	0.011	0.011	0.011	0.010	0.008	0.008	0.008	0.008
Mining, Quarrying, Petroleum	0.173	0.195	0.190	0.187	0.171	0.151	0.156	0.106	0.104	0.093
Chemicals	0.054	0.055	0.060	0.056	0.046	0.045	0.039	0.036	0.038	0.040
Plastics and Rubber Products	0.014	0.014	0.015	0.017	0.018	0.019	0.019	0.022	0.024	0.025
Wood Products	0.081	0.056	0.049	0.045	0.060	0.051	0.052	0.053	0.054	0.046
Paper Products	0.112	0.114	0.109	0.101	0.092	0.087	0.083	0.087	0.099	0.100
Printing and Publishing	0.002	0.003	0.003	0.004	0.004	0.004	0.005	0.006	0.006	0.005
Leather	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003
Textiles	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.004
Clothing	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003
Non-metallic Mineral Product	0.031	0.064	0.049	0.042	0.038	0.041	0.038	0.051	0.024	0.021
Primary & Fabricated Metals	0.079	0.086	0.086	0.062	0.067	0.070	0.063	0.072	0.084	0.093
Non-Electrical machinery	0.064	0.074	0.083	0.075	0.073	0.083	0.076	0.075	0.084	0.083
Electrical Machinery	0.021	0.023	0.025	0.025	0.024	0.031	0.031	0.033	0.036	0.038
Motor Vehicles and Parts	0.169	0.188	0.198	0.247	0.276	0.294	0.304	0.308	0.292	0.311
Other Transport	0.015	0.020	0.019	0.020	0.014	0.014	0.017	0.021	0.020	0.019
Professional Goods	0.005	0.005	0.005	0.005	0.005	0.005	0.007	0.007	0.007	0.006
Other	0.033	0.036	0.039	0.041	0.041	0.038	0.043	0.045	0.046	0.043

Source. Feenstra (1996; 1997).

Table 4.5b. Industrial Sector International Import Trade Shares

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Animal Agriculture	0.007	0.007	0.008	0.008	0.007	0.007	0.005	0.006	0.006	0.006
Vegetable Agriculture	0.031	0.035	0.035	0.038	0.032	0.028	0.023	0.023	0.020	0.019
Food	0.011	0.012	0.011	0.011	0.010	0.008	0.007	0.006	0.006	0.006
Beverages and Tobacco	0.005	0.006	0.005	0.006	0.006	0.005	0.004	0.006	0.005	0.005
Mining, Quarrying, Petroleum	0.062	0.071	0.066	0.073	0.060	0.056	0.047	0.042	0.034	0.028
Chemicals	0.051	0.054	0.054	0.057	0.056	0.051	0.050	0.052	0.048	0.046
Plastics and Rubber Products	0.031	0.030	0.032	0.033	0.036	0.032	0.028	0.029	0.032	0.030
Wood Products	0.014	0.011	0.012	0.009	0.011	0.009	0.008	0.009	0.009	0.008
Paper Products	0.015	0.015	0.017	0.017	0.017	0.015	0.014	0.014	0.014	0.014
Printing and Publishing	0.013	0.014	0.014	0.018	0.016	0.014	0.013	0.013	0.013	0.013
Leather	0.006	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.003
Textiles	0.022	0.021	0.020	0.018	0.018	0.014	0.013	0.011	0.011	0.011
Clothing	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.002
Non-metallic Mineral Product	0.045	0.063	0.043	0.038	0.043	0.041	0.037	0.042	0.027	0.023
Primary & Fabricated Metals	0.060	0.057	0.061	0.051	0.048	0.046	0.041	0.039	0.041	0.044
Non-Electrical machinery	0.190	0.203	0.210	0.208	0.189	0.190	0.189	0.178	0.174	0.155
Electrical Machinery	0.053	0.056	0.060	0.064	0.065	0.065	0.059	0.064	0.063	0.065
Motor Vehicles and Parts	0.294	0.244	0.244	0.248	0.290	0.301	0.332	0.331	0.281	0.256
Other Transport	0.025	0.024	0.028	0.022	0.020	0.019	0.016	0.019	0.016	0.022
Professional Goods	0.026	0.031	0.033	0.038	0.033	0.030	0.029	0.029	0.027	0.024
Other	0.035	0.036	0.038	0.036	0.034	0.064	0.079	0.082	0.168	0.218

Source. Feenstra (1996; 1997).

Table 4.5c. Industrial Sector International Total Trade Shares

	1979	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
Animal Agriculture	0.024	0.019	0.018	0.021	0.019	0.018	0.017	0.019	0.020	0.018
Vegetable Agriculture	0.065	0.025	0.027	0.027	0.024	0.023	0.022	0.025	0.022	0.022
Food	0.008	0.008	0.007	0.008	0.007	0.007	0.006	0.007	0.007	0.006
Beverages and Tobacco	0.004	0.008	0.008	0.009	0.009	0.008	0.007	0.007	0.007	0.007
Mining, Quarrying, Petroleum	0.122	0.139	0.134	0.140	0.125	0.113	0.113	0.081	0.073	0.064
Chemicals	0.053	0.055	0.057	0.056	0.050	0.047	0.043	0.042	0.042	0.043
Plastics and Rubber Products	0.022	0.021	0.023	0.024	0.025	0.024	0.023	0.025	0.028	0.027
Wood Products	0.050	0.036	0.032	0.030	0.040	0.034	0.034	0.036	0.034	0.029
Paper Products	0.067	0.069	0.067	0.067	0.061	0.058	0.056	0.059	0.062	0.061
Printing and Publishing	0.007	0.008	0.008	0.009	0.009	0.008	0.008	0.009	0.009	0.009
Leather	0.005	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.004	0.003
Textiles	0.011	0.011	0.010	0.009	0.009	0.007	0.007	0.007	0.007	0.007
Clothing	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.003
Non-metallic Mineral Product	0.037	0.063	0.047	0.040	0.040	0.041	0.037	0.048	0.025	0.022
Primary & Fabricated Metals	0.070	0.073	0.074	0.057	0.059	0.061	0.054	0.059	0.065	0.071
Non-Electrical machinery	0.122	0.132	0.141	0.130	0.121	0.126	0.121	0.115	0.123	0.115
Electrical Machinery	0.036	0.038	0.041	0.041	0.041	0.045	0.042	0.045	0.048	0.050
Motor Vehicles and Parts	0.227	0.214	0.219	0.248	0.282	0.296	0.315	0.317	0.287	0.286
Other Transport	0.019	0.022	0.023	0.021	0.017	0.016	0.016	0.020	0.018	0.020
Professional Goods	0.015	0.017	0.018	0.019	0.017	0.015	0.016	0.016	0.016	0.014
Other	0.034	0.036	0.039	0.039	0.038	0.048	0.058	0.059	0.099	0.122

Source. Feenstra (1996; 1997).

Table 4.6a. Industrial Sectors, by Trade Type

		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total Trade	GL	0.367	0.431	0.423	0.404	0.449	0.471	0.497	0.525	0.502	0.476
	TW	0.472	0.567	0.588	0.564	0.612	0.644	0.656	0.671	0.685	0.688
	TWR	0.314	0.374	0.395	0.375	0.453	0.475	0.484	0.488	0.473	0.473
	HD	0.136	0.121	0.111	0.039	0.089	0.028	0.231	0.220	0.192	0.217
	VDHQ	0.067	0.142	0.165	0.262	0.277	0.306	0.181	0.181	0.185	0.176
	VDLQ	0.110	0.111	0.119	0.074	0.087	0.141	0.072	0.087	0.096	0.079
Animal Agriculture	GL	0.220	0.272	0.293	0.229	0.238	0.220	0.182	0.180	0.187	0.208
	TW	0.287	0.277	0.432	0.273	0.329	0.284	0.147	0.157	0.202	0.189
	TWR	0.286	0.264	0.421	0.264	0.320	0.273	0.136	0.147	0.193	0.180
	HD	0.177	0.057	0.215	0.137	0.182	0.145	0.009	0.002	0.002	0.010
	VDHQ	0.033	0.179	0.066	0.049	0.060	0.046	0.037	0.034	0.045	0.037
	VDLQ	0.076	0.028	0.140	0.078	0.077	0.082	0.090	0.111	0.147	0.133
Vegetable Agriculture	GL	0.096	0.281	0.305	0.291	0.320	0.309	0.278	0.286	0.319	0.316
	TW	0.138	0.432	0.385	0.402	0.620	0.297	0.294	0.274	0.267	0.280
	TWR	0.031	0.160	0.125	0.126	0.241	0.229	0.228	0.219	0.206	0.218
	HD	0.004	0.087	0.017	0.042	0.082	0.008	0.000	0.048	0.045	0.003
	VDHQ	0.015	0.027	0.057	0.033	0.033	0.046	0.049	0.061	0.043	0.028
	VDLQ	0.012	0.046	0.052	0.051	0.125	0.174	0.179	0.110	0.118	0.188
Food	GL	0.264	0.238	0.272	0.303	0.385	0.345	0.396	0.380	0.399	0.422
	TW	0.307	0.312	0.340	0.305	0.494	0.463	0.540	0.542	0.521	0.573
	TWR	0.298	0.302	0.329	0.290	0.481	0.448	0.523	0.509	0.490	0.541
	HD	0.011	0.011	0.015	0.017	0.089	0.025	0.142	0.025	0.039	0.056
	VDHQ	0.115	0.126	0.140	0.089	0.076	0.048	0.081	0.075	0.056	0.046
	VDLQ	0.173	0.165	0.174	0.184	0.316	0.375	0.301	0.408	0.395	0.439
Beverages & Tobacco	GL	0.184	0.242	0.210	0.198	0.224	0.209	0.265	0.241	0.294	0.337
	TW	0.190	0.316	0.132	0.160	0.209	0.145	0.150	0.169	0.182	0.437
	TWR	0.176	0.102	0.112	0.130	0.168	0.135	0.124	0.146	0.154	0.387
	HD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	VDHQ	0.156	0.079	0.097	0.100	0.104	0.103	0.094	0.108	0.126	0.140
	VDLQ	0.020	0.023	0.015	0.030	0.064	0.032	0.030	0.038	0.027	0.246

Source. Feenstra (1996; 1997).

Table 4.6b. Industrial Sectors, by Trade Type

		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Mining, Quarrying, Petroleum	GL	0.170	0.226	0.209	0.191	0.170	0.171	0.159	0.190	0.176	0.164
	TW	0.392	0.393	0.361	0.373	0.170	0.208	0.171	0.205	0.223	0.110
	TWR	0.012	0.024	0.039	0.031	0.026	0.027	0.024	0.034	0.039	0.036
	HD	0.002	0.005	0.000	0.006	0.002	0.000	0.002	0.004	0.001	0.000
	VDHQ	0.009	0.009	0.026	0.019	0.011	0.012	0.015	0.017	0.024	0.020
	VDLQ	0.002	0.010	0.013	0.006	0.013	0.015	0.007	0.013	0.015	0.016
Chemicals	GL	0.188	0.223	0.227	0.212	0.261	0.236	0.251	0.259	0.283	0.286
	TW	0.199	0.255	0.276	0.239	0.306	0.248	0.290	0.312	0.340	0.351
	TWR	0.159	0.206	0.206	0.194	0.259	0.206	0.257	0.296	0.306	0.326
	HD	0.013	0.035	0.005	0.053	0.019	0.019	0.061	0.038	0.075	0.076
	VDHQ	0.029	0.021	0.044	0.014	0.030	0.026	0.036	0.060	0.055	0.064
	VDLQ	0.117	0.151	0.157	0.127	0.210	0.161	0.160	0.197	0.177	0.186
Plastics and Rubber Products	GL	0.403	0.408	0.422	0.373	0.391	0.426	0.425	0.396	0.407	0.498
	TW	0.379	0.458	0.485	0.376	0.508	0.809	0.808	0.616	0.826	0.829
	TWR	0.360	0.428	0.446	0.345	0.479	0.782	0.782	0.590	0.802	0.803
	HD	0.069	0.060	0.200	0.020	0.163	0.164	0.153	0.020	0.114	0.102
	VDHQ	0.258	0.278	0.186	0.216	0.201	0.228	0.232	0.182	0.268	0.248
	VDLQ	0.033	0.091	0.060	0.109	0.115	0.390	0.397	0.388	0.419	0.453
Wood Products	GL	0.179	0.201	0.239	0.186	0.163	0.144	0.127	0.140	0.167	0.192
	TW	0.198	0.220	0.267	0.192	0.161	0.140	0.135	0.181	0.222	0.223
	TWR	0.046	0.038	0.045	0.039	0.030	0.034	0.041	0.047	0.056	0.049
	HD	0.000	0.000	0.000	0.012	0.007	0.000	0.000	0.000	0.022	0.002
	VDHQ	0.016	0.021	0.028	0.011	0.000	0.007	0.008	0.011	0.019	0.018
	VDLQ	0.030	0.017	0.017	0.017	0.023	0.027	0.033	0.036	0.015	0.030
Paper Products	GL	0.112	0.109	0.109	0.110	0.132	0.138	0.139	0.129	0.133	0.143
	TW	0.120	0.090	0.140	0.077	0.121	0.127	0.129	0.136	0.142	0.141
	TWR	0.095	0.078	0.131	0.070	0.111	0.112	0.112	0.119	0.125	0.131
	HD	0.032	0.018	0.024	0.012	0.021	0.050	0.015	0.020	0.028	0.031
	VDHQ	0.015	0.012	0.020	0.010	0.022	0.019	0.040	0.087	0.067	0.069
	VDLQ	0.047	0.048	0.087	0.048	0.069	0.042	0.056	0.012	0.030	0.031

Source. Feenstra (1996; 1997).

Table 4.6c. Industrial Sectors, by Trade Type

		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Printing and Publishing	GL	0.340	0.440	0.413	0.447	0.552	0.542	0.578	0.659	0.602	0.544
	TW	0.507	0.524	0.526	0.542	0.988	0.988	0.993	0.982	0.997	0.644
	TWR	0.383	0.382	0.367	0.434	0.876	0.890	0.868	0.845	0.843	0.509
	HD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	VDHQ	0.004	0.004	0.004	0.003	0.008	0.006	0.010	0.010	0.013	0.015
	VDLQ	0.380	0.377	0.363	0.431	0.868	0.884	0.858	0.835	0.830	0.494
Leather	GL	0.558	0.593	0.581	0.594	0.545	0.467	0.510	0.480	0.435	0.470
	TW	0.822	0.892	0.795	0.768	0.761	0.711	0.676	0.625	0.653	0.646
	TWR	0.737	0.798	0.778	0.753	0.734	0.672	0.643	0.605	0.619	0.610
	HD	0.084	0.099	0.086	0.008	0.087	0.078	0.092	0.071	0.104	0.044
	VDHQ	0.531	0.512	0.508	0.524	0.406	0.378	0.347	0.335	0.341	0.350
	VDLQ	0.122	0.187	0.185	0.221	0.241	0.217	0.204	0.200	0.173	0.216
Textiles	GL	0.111	0.140	0.163	0.205	0.228	0.321	0.307	0.355	0.381	0.366
	TW	0.125	0.181	0.191	0.192	0.278	0.422	0.371	0.511	0.489	0.479
	TWR	0.110	0.162	0.165	0.163	0.196	0.307	0.301	0.408	0.387	0.374
	HD	0.000	0.005	0.006	0.007	0.000	0.001	0.003	0.019	0.061	0.057
	VDHQ	0.022	0.023	0.036	0.020	0.012	0.011	0.015	0.048	0.026	0.027
	VDLQ	0.088	0.133	0.124	0.136	0.184	0.296	0.283	0.341	0.299	0.290
Clothing	GL	0.292	0.329	0.492	0.534	0.455	0.381	0.325	0.355	0.380	0.364
	TW	0.318	0.426	0.667	0.681	0.622	0.492	0.349	0.535	0.514	0.475
	TWR	0.063	0.044	0.234	0.264	0.186	0.070	0.205	0.367	0.311	0.274
	HD	0.000	0.000	0.000	0.022	0.000	0.009	0.000	0.000	0.160	0.012
	VDHQ	0.008	0.030	0.018	0.020	0.013	0.001	0.158	0.196	0.000	0.114
	VDLQ	0.055	0.014	0.215	0.223	0.174	0.060	0.046	0.171	0.151	0.149
Non-metallic Mineral Products	GL	0.564	0.528	0.454	0.425	0.566	0.498	0.500	0.513	0.566	0.520
	TW	0.706	0.537	0.705	0.626	0.745	0.675	0.704	0.788	0.745	0.646
	TWR	0.039	0.024	0.036	0.057	0.051	0.050	0.050	0.043	0.097	0.106
	HD	0.000	0.000	0.000	0.002	0.000	0.001	0.004	0.000	0.000	0.003
	VDHQ	0.007	0.002	0.009	0.006	0.010	0.009	0.013	0.014	0.034	0.020
	VDLQ	0.032	0.022	0.027	0.049	0.041	0.040	0.034	0.029	0.064	0.083

Source. Feenstra (1996; 1997).

Table 4.6d. Industrial Sectors, by Trade Type

		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Primary and Fabricated Metals	GL	0.380	0.268	0.268	0.292	0.281	0.279	0.268	0.253	0.260	0.266
	TW	0.460	0.338	0.370	0.384	0.365	0.414	0.416	0.293	0.325	0.353
	TWR	0.407	0.276	0.309	0.311	0.283	0.331	0.323	0.235	0.266	0.294
	HD	0.025	0.031	0.068	0.069	0.096	0.093	0.064	0.062	0.008	0.094
	VDHQ	0.080	0.105	0.077	0.078	0.072	0.102	0.098	0.086	0.080	0.109
	VDLQ	0.302	0.139	0.164	0.164	0.115	0.137	0.161	0.087	0.179	0.091
Non-Electrical machinery	GL	0.408	0.498	0.545	0.609	0.620	0.600	0.630	0.669	0.645	0.636
	TW	0.539	0.690	0.717	0.797	0.773	0.814	0.819	0.837	0.845	0.830
	TWR	0.374	0.421	0.406	0.442	0.451	0.444	0.456	0.471	0.441	0.432
	HD	0.046	0.001	0.007	0.157	0.188	0.008	0.183	0.025	0.033	0.176
	VDHQ	0.197	0.111	0.150	0.125	0.110	0.213	0.189	0.176	0.181	0.183
	VDLQ	0.130	0.309	0.249	0.160	0.153	0.223	0.084	0.270	0.227	0.074
Electrical Machinery	GL	0.510	0.514	0.472	0.525	0.526	0.554	0.594	0.650	0.622	0.633
	TW	0.680	0.722	0.668	0.771	0.717	0.758	0.797	0.829	0.809	0.792
	TWR	0.611	0.655	0.603	0.683	0.639	0.680	0.714	0.702	0.689	0.693
	HD	0.085	0.169	0.065	0.113	0.000	0.013	0.021	0.083	0.087	0.116
	VDHQ	0.187	0.273	0.310	0.279	0.376	0.390	0.427	0.439	0.443	0.407
	VDLQ	0.339	0.213	0.228	0.290	0.263	0.277	0.267	0.180	0.159	0.170
Motor Vehicles and Parts	GL	0.597	0.722	0.670	0.559	0.664	0.660	0.711	0.744	0.759	0.697
	TW	0.737	0.974	0.972	0.829	0.982	0.984	0.984	0.987	0.983	0.985
	TWR	0.734	0.968	0.967	0.826	0.980	0.982	0.982	0.984	0.980	0.982
	HD	0.512	0.484	0.417	0.000	0.167	0.032	0.620	0.643	0.597	0.612
	VDHQ	0.058	0.375	0.423	0.820	0.809	0.807	0.362	0.342	0.383	0.370
	VDLQ	0.164	0.109	0.127	0.006	0.003	0.143	0.000	0.000	0.000	0.000
Other Transport	GL	0.430	0.702	0.640	0.799	0.753	0.814	0.719	0.651	0.706	0.753
	TW	0.424	0.903	0.975	0.968	0.976	0.973	0.947	0.951	0.974	0.954
	TWR	0.101	0.518	0.620	0.561	0.479	0.419	0.282	0.321	0.346	0.418
	HD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	VDHQ	0.041	0.412	0.519	0.489	0.000	0.006	0.195	0.280	0.151	0.000
	VDLQ	0.060	0.106	0.101	0.072	0.479	0.413	0.087	0.041	0.195	0.418

Source. Feenstra (1996; 1997).

Table 4.6e. Industrial Sectors, by Trade Type

		1979	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**
Professional Goods	GL	0.187	0.193	0.166	0.158	0.180	0.184	0.169	0.187	0.201	0.201
	TW	0.189	0.207	0.138	0.141	0.124	0.222	0.185	0.214	0.189	0.194
	TWR	0.030	0.076	0.026	0.057	0.096	0.078	0.066	0.073	0.077	0.072
	HD	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.009
	VDHQ	0.030	0.066	0.024	0.055	0.071	0.073	0.062	0.062	0.056	0.052
	VDLQ	0.000	0.010	0.002	0.002	0.025	0.004	0.005	0.008	0.021	0.012
Other	GL	0.822	0.785	0.760	0.640	0.622	0.913	0.894	0.907	0.512	0.381
	TW	0.928	0.943	0.917	0.934	0.957	0.985	0.987	0.986	0.990	0.992
	TWR	0.036	0.053	0.034	0.042	0.055	0.055	0.036	0.038	0.025	0.022
	HD	0.000	0.000	0.001	0.000	0.003	0.019	0.002	0.007	0.000	0.000
	VDHQ	0.006	0.025	0.001	0.007	0.013	0.015	0.014	0.009	0.007	0.002
	VDLQ	0.030	0.027	0.032	0.035	0.039	0.021	0.021	0.022	0.018	0.020

Source. Feenstra (1996; 1997).

Table 4.7a. Canadian Average Tariff Rates, Estimated Ad Valorem Equivalent

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	8.91	7.60	6.48	5.40	4.27	3.12	2.28	1.74	1.14	0.65	0.51	0.66	0.41	0.39	0.57	0.52
Animal Agriculture	2.81	2.26	1.99	1.64	1.36	1.15	0.91	1.43	0.71	2.54	3.28	3.22	1.03	0.90	2.65	2.63
Vegetable Agriculture	4.62	4.06	3.63	3.19	2.76	2.29	1.73	1.30	0.93	0.43	0.05	0.04	0.03	0.04	0.10	0.05
Food	8.84	7.58	6.65	5.66	4.78	3.89	2.92	2.24	1.48	0.76	0.22	0.23	0.17	0.37	1.38	0.36
Beverages and Tobacco	17.3	17.9	15.5	16.6	14.1	9.8	5.50	5.05	2.85	2.34	9.69	17.8	7.07	5.80	7.50	7.74
Mining, Quarrying, Petroleum	3.11	1.27	1.06	0.85	0.64	0.43	0.33	0.25	0.16	0.08	0.02	0.02	0.03	0.02	0.06	0.08
Chemicals	8.12	6.59	5.12	3.62	2.12	0.63	0.45	0.34	0.23	0.11	0.11	0.11	0.16	0.14	0.15	0.23
Plastics and Rubber Products	10.6	9.27	7.93	6.59	5.25	3.91	3.01	2.26	1.54	0.76	0.17	0.19	0.18	0.20	0.31	0.21
Wood Products	5.52	4.70	3.87	3.02	2.23	1.40	1.12	0.84	0.56	0.28	0.29	0.25	0.29	0.32	0.37	0.09
Paper Products	6.39	5.11	3.83	2.56	1.28	0.00	0.00	0.00	0.00	0.00	0.06	0.05	0.05	0.04	0.03	0.00
Printing and Publishing	3.67	2.77	2.08	1.38	0.69	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.07	0.07	0.08	0.00
Leather	8.25	4.39	3.66	2.93	2.20	1.48	1.34	0.98	0.65	0.32	0.29	0.40	0.37	0.33	0.40	0.69
Textiles	16.3	14.7	13.1	11.5	9.79	8.14	6.10	4.58	3.00	1.51	0.25	0.29	0.36	0.33	0.44	0.47
Clothing	22.1	19.8	17.5	15.3	13.1	10.8	8.56	6.42	4.26	2.13	1.81	1.78	1.73	1.80	1.62	1.62
Non-metallic Mineral Product	7.70	6.41	5.35	4.29	3.23	2.17	1.43	1.07	0.75	0.37	0.18	0.17	0.20	0.18	0.29	0.21
Primary & Fabricated Metals	7.74	6.70	5.79	4.88	3.97	3.07	2.16	1.62	1.08	0.53	0.10	0.12	0.13	0.14	0.17	0.14
Non-Electrical machinery	5.93	4.55	3.55	2.54	1.54	0.53	0.37	0.27	0.17	0.09	0.04	0.04	0.04	0.04	0.12	0.06
Electrical Machinery	8.48	7.12	5.96	4.80	3.64	2.48	1.49	1.08	0.70	0.35	0.22	0.19	0.18	0.20	0.24	0.23
Motor Vehicles and Parts	7.93	6.25	5.54	4.83	4.12	3.41	2.59	1.95	1.29	0.65	0.13	0.14	0.16	0.19	0.25	0.42
Other Transport	12.6	10.3	8.73	7.17	5.61	4.05	2.97	2.23	1.45	0.72	0.11	0.08	0.08	0.07	0.19	0.17
Professional Goods	6.25	5.61	4.97	4.33	3.69	3.05	1.99	1.47	0.95	0.46	0.26	0.29	0.34	0.31	0.29	0.36
Other	10.7	9.03	7.76	6.51	5.24	3.97	2.97	2.09	1.38	0.68	0.23	0.34	0.38	0.26	0.30	0.36

Source. Department of Finance Canada (2004) and External Affairs Canada (1987).

Table 4.7b. U.S. Average Tariff Rates, Estimated Ad Valorem Equivalent

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
United States	6.1	4.9	4.1	3.2	2.5	1.9	1.4	1.6	0.9	0.7	0.5	0.5	0.7	0.5	0.6	0.0
Animal Agriculture	10.4	3.3	2.9	2.4	1.8	1.5	1.2	6.1	4.1	3.7	4.5	4.5	4.6	4.7	6.4	0.0
Vegetable Agriculture	5.1	4.5	3.9	3.1	2.4	1.9	1.5	1.8	1.3	0.9	0.6	0.6	0.6	0.6	0.5	0.0
Food	5.5	6.1	5.3	4.3	3.5	2.9	2.3	4.9	3.5	3.8	3.8	3.7	3.3	4.3	4.7	0.0
Beverages and Tobacco	8.6	13.5	6.8	5.9	4.2	3.2	2.7	1.8	0.8	0.7	1.3	0.9	1.1	0.5	1.2	0.0
Mining, Quarrying, Petroleum	1.2	0.3	0.3	0.2	0.1	0.1	0	0	0	0	0	0	0	0	0	0.0
Chemicals	5.5	4.5	3.4	2	1	0.1	0.1	0	0	0	0	0	0	0	0	0.0
Plastics and Rubber Products	4.7	2.9	2.5	2	1.6	1.2	0.9	0.6	0.4	0.2	0	0	0	0	0	0.0
Wood Products	3.5	3.2	2.7	2	1.5	1	0.7	0.5	0.3	0.1	0	0	0	0	0	0.0
Paper Products	1.9	1.7	1.3	0.8	0.4	0	0	0	0	0	0	0	0	0	0	0.0
Printing and Publishing	1.6	0.6	0.5	0.3	0.2	0	0	0	0	0	0	0	0	0	0	0.0
Leather	5.3	4.2	3.6	2.9	2.3	1.8	1.5	1.1	0.7	0.3	0	0	0	0	0	0.0
Textiles	9.4	9.2	7.9	6.7	5.7	4.9	3.7	2.8	1.7	1	0.1	0.1	0.1	0.2	0.1	0.0
Clothing	13.2	11.5	10.3	8.8	7.5	6.2	5	3.7	1.9	1.1	0	0	0	0	0	0.0
Non-metallic Mineral Product	6.5	5.3	4.4	3.4	2.4	1.6	1	0.7	0.4	0.2	0	0	0	0	0	0.0
Primary & Fabricated Metals	4	3.4	2.9	2.4	2	1.6	1.2	0.9	0.5	0.3	0	0	0	0	0	0.0
Non-Electrical machinery	3.1	2	1.5	1	0.5	0.1	0.1	0.1	0	0	0	0	0	0	0	0.0
Electrical Machinery	3.8	1.6	1.3	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0	0	0	0	0	0.0
Motor Vehicles and Parts	2.7	2	1.8	1.6	1.3	1.1	0.9	0.4	0.2	0.2	0	0	0	0	0	0.0
Other Transport	2.4	3	2.5	2	1.4	1	0.8	0.6	0.4	0.2	0	0	0	0	0	0.0
Professional Goods	4.7	3.9	3.3	2.8	2.2	1.9	1.4	1.1	0.4	0.3	0	0	0	0	0	0.0
Other	5.8	4.4	3.6	2.9	2.3	1.7	1.4	0.7	0.5	0.3	0	0	2.1	0	0	0.0

Source. Feenstra et al. (2002) and USITC (2004).

Table 4.8. Canadian International Trade Flows, Billions of Constant 1997 Canadian Dollars

Exports	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
USA	117.0	117.4	112.7	128.4	152.2	182.4	202.1	213.5	230.2	253.6	283.0	318.6	307.2	298.4	306.5
Mexico	0.7	0.7	0.6	0.9	0.9	1.1	1.2	1.3	1.2	1.5	1.6	1.9	2.5	2.2	2.2
EU15	13.7	13.8	12.8	12.8	11.9	12.9	16.7	15.5	14.8	15.4	15.5	17.6	16.7	15.3	18.8
EA-ANZ	18.3	17.2	16.3	16.4	17.1	20.4	26.5	24.1	23.8	18.5	18.1	20.3	18.7	18.5	21.2
ROW	8.5	8.9	8.8	9.3	8.6	9.5	11.0	11.6	12.9	11.6	9.9	10.2	9.9	9.1	10.8
Total	158.2	158.0	151.1	167.7	190.7	226.3	257.4	266.0	282.9	300.5	328.1	368.5	355.0	343.5	359.5
Imports	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
USA	99.7	95.8	81.8	95.9	116.9	139.7	150.6	153.2	178.7	198.8	206.9	211.3	196.9	196.2	196.5
Mexico	2.0	2.0	2.8	3.0	3.9	4.7	5.5	6.1	7.0	7.7	9.4	11.4	11.4	11.8	12.2
EU15	19.0	19.1	17.2	16.7	16.9	20.2	22.8	22.5	26.4	27.9	31.0	34.6	35.7	35.8	38.5
EA-ANZ	22.0	21.2	21.9	23.9	25.9	28.7	31.4	28.9	33.9	38.5	41.4	47.0	43.7	47.2	51.8
ROW	10.1	10.5	9.9	10.1	11.0	12.8	14.7	15.7	17.6	17.7	18.8	24.7	23.2	23.9	27.7
Total	152.7	148.6	133.7	149.6	174.6	206.2	224.9	226.4	263.7	290.7	307.5	329.0	310.9	314.8	326.6
Total Trade	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
USA	216.7	213.2	194.5	224.4	269.1	322.0	352.7	366.7	408.8	452.4	489.9	529.9	504.1	494.6	503.0
Mexico	2.7	2.7	3.4	3.9	4.8	5.9	6.7	7.4	8.2	9.2	11.0	13.3	13.9	14.0	14.3
EU15	32.6	33.0	29.9	29.5	28.8	33.1	39.5	38.0	41.2	43.3	46.5	52.1	52.4	51.1	57.3
EA-ANZ	40.3	38.4	38.2	40.3	42.9	49.1	57.8	53.0	57.8	57.0	59.5	67.3	62.4	65.7	72.9
ROW	18.6	19.5	18.7	19.4	19.6	22.3	25.7	27.4	30.5	29.4	28.7	34.9	33.1	33.0	38.5
Total	310.8	306.7	284.8	317.4	365.2	432.3	482.4	492.4	546.5	591.2	635.6	697.5	665.9	658.3	686.1

Source. Statistics Canada (2004b).

Table 4.9. Canadian International Trade Shares

Exports	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
USA	0.740	0.743	0.746	0.766	0.798	0.806	0.785	0.803	0.814	0.844	0.863	0.864	0.865	0.869	0.853
Mexico	0.005	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.005	0.007	0.006	0.006
EU15	0.086	0.087	0.084	0.076	0.062	0.057	0.065	0.058	0.052	0.051	0.047	0.048	0.047	0.045	0.052
EA-ANZ	0.115	0.109	0.108	0.098	0.090	0.090	0.103	0.091	0.084	0.061	0.055	0.055	0.053	0.054	0.059
ROW	0.054	0.057	0.058	0.055	0.045	0.042	0.043	0.044	0.045	0.039	0.030	0.028	0.028	0.027	0.030
Imports	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
USA	0.653	0.644	0.612	0.641	0.670	0.678	0.670	0.677	0.678	0.684	0.673	0.642	0.633	0.623	0.602
Mexico	0.013	0.013	0.021	0.020	0.023	0.023	0.024	0.027	0.027	0.027	0.031	0.035	0.037	0.037	0.037
EU15	0.124	0.129	0.129	0.112	0.097	0.098	0.101	0.099	0.100	0.096	0.101	0.105	0.115	0.114	0.118
EA-ANZ	0.144	0.143	0.164	0.160	0.148	0.139	0.139	0.128	0.129	0.133	0.135	0.143	0.141	0.150	0.158
ROW	0.066	0.071	0.074	0.068	0.063	0.062	0.065	0.069	0.067	0.061	0.061	0.075	0.075	0.076	0.085
Total Trade	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
USA	0.697	0.695	0.683	0.707	0.737	0.745	0.731	0.745	0.748	0.765	0.771	0.760	0.757	0.751	0.733
Mexico	0.009	0.009	0.012	0.012	0.013	0.014	0.014	0.015	0.015	0.015	0.017	0.019	0.021	0.021	0.021
EU15	0.105	0.107	0.105	0.093	0.079	0.077	0.082	0.077	0.075	0.073	0.073	0.075	0.079	0.078	0.084
EA-ANZ	0.130	0.125	0.134	0.127	0.118	0.113	0.120	0.108	0.106	0.096	0.094	0.096	0.094	0.100	0.106
ROW	0.060	0.064	0.066	0.061	0.054	0.052	0.053	0.056	0.056	0.050	0.045	0.050	0.050	0.050	0.056

Source. Statistics Canada (2004b).

Table 4.10a. Total and Industrial Sector Export Levels, Billions of Constant 1997 Canadian Dollars

	1989	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Total Trade	117.0	117.4	112.7	128.4	152.2	182.4	202.1	213.5	230.2	253.6	283.0	318.6	307.2	298.4	306.5
Animal Agriculture	2.8	3.1	3.0	3.6	4.0	4.1	4.2	4.8	5.2	5.8	6.2	6.6	7.8	8.0	6.6
Vegetable Agriculture	0.9	0.9	0.8	1.1	1.4	2.1	2.0	2.3	2.6	2.8	2.7	2.7	3.1	3.2	3.2
Food	0.9	0.9	1.2	1.6	1.9	2.4	2.7	3.0	3.4	4.3	4.6	4.8	5.5	6.0	6.8
Beverages and Tobacco	0.9	1.0	1.2	1.5	2.0	1.5	1.5	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0
Mining, Quarrying, Petroleum	13.3	15.5	15.6	17.2	19.6	21.7	23.4	27.8	29.0	25.3	29.2	51.4	53.7	46.7	61.2
Chemicals	4.7	4.7	4.6	5.4	6.2	7.4	8.4	8.7	9.5	10.1	10.3	11.3	12.1	12.3	13.1
Plastics and Rubber Products	3.3	3.5	3.4	4.2	5.2	6.8	8.0	8.4	9.7	10.9	11.9	13.2	13.8	14.2	14.9
Wood Products	5.3	4.9	4.5	6.2	9.0	11.2	10.4	12.3	13.5	14.8	17.7	15.7	15.3	15.1	15.1
Paper Products	11.7	11.9	10.3	10.5	11.1	12.5	17.6	15.2	15.0	16.4	16.8	18.6	18.0	16.9	15.9
Printing and Publishing	0.5	0.4	0.4	0.5	0.7	0.7	0.9	0.9	1.1	1.4	1.5	1.6	1.7	1.8	1.8
Leather	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
Textiles	0.5	0.6	0.7	0.9	1.1	1.4	1.6	1.8	2.0	2.4	2.5	2.6	2.6	2.6	2.5
Clothing	0.3	0.4	0.5	0.7	0.9	1.2	1.4	1.7	2.1	2.6	2.9	3.1	3.0	3.1	2.9
Non-metallic Mineral Product	2.4	1.8	2.5	2.8	3.7	4.0	3.9	4.6	5.0	5.6	6.0	6.5	5.1	5.6	5.1
Primary and Fabricated Metals	11.0	9.6	8.7	9.8	11.3	14.3	17.1	16.9	18.4	19.7	19.5	20.9	19.8	20.7	20.3
Non-Electrical machinery	11.1	10.6	9.9	11.1	13.3	17.2	20.0	21.2	22.5	26.6	27.5	28.9	27.2	25.9	24.6
Electrical Machinery	5.0	6.4	6.5	7.0	7.4	9.0	10.8	12.7	14.3	15.8	18.3	25.9	17.7	14.7	13.2
Motor Vehicles and Parts	36.0	34.6	32.6	37.6	46.3	54.9	56.9	55.9	59.6	68.3	82.8	80.2	75.0	77.7	74.6
Other Transport	2.7	3.1	3.2	2.9	2.7	3.8	4.3	5.4	5.8	8.1	8.5	8.4	10.7	9.1	10.1
Professional Goods	1.2	0.9	1.0	1.3	1.4	1.8	1.9	2.1	2.4	2.8	3.0	4.4	3.6	3.3	3.0
Other	2.2	2.1	1.8	2.3	2.9	4.0	4.8	5.5	6.5	7.3	8.6	9.4	9.1	9.3	9.2

Source. Statistics Canada (2004b).

Table 4.10b. Total and Industrial Sector Import Levels, Billions of Constant 1997 Canadian Dollars

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total Trade	99.7	95.8	81.8	95.9	116.9	139.7	150.6	153.2	178.7	198.8	206.9	211.3	196.9	196.2	196.5
Animal Agriculture	1.0	1.0	1.1	1.1	1.2	1.4	1.4	1.4	1.5	1.6	1.8	1.9	2.0	1.9	1.8
Vegetable Agriculture	2.4	2.3	2.2	2.4	2.7	2.7	2.9	2.9	3.2	3.4	3.4	3.6	4.0	4.5	4.5
Food	1.2	1.4	1.5	1.9	2.2	2.5	2.7	2.8	3.3	3.8	3.8	3.8	4.2	4.5	4.8
Beverages and Tobacco	0.6	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.2	1.3	1.3	1.3	1.5	1.5	1.6
Mining, Quarrying, Petroleum	2.9	3.0	2.3	2.5	2.4	2.8	3.1	3.2	3.7	4.3	4.0	4.3	4.4	4.4	6.0
Chemicals	5.4	5.6	5.9	6.6	7.7	9.0	9.8	10.4	11.9	13.4	14.1	14.3	14.7	14.9	15.6
Plastics and Rubber Products	4.8	4.8	4.7	5.5	6.4	7.8	8.5	9.0	10.5	11.9	12.8	13.3	13.0	13.4	13.6
Wood Products	1.3	1.2	1.1	1.2	1.4	1.7	1.8	1.7	2.1	2.2	2.4	2.5	2.3	2.4	2.4
Paper Products	1.9	2.1	2.1	2.4	2.7	3.3	4.2	3.9	4.3	4.9	5.2	5.6	5.6	5.6	5.6
Printing and Publishing	1.7	1.8	1.9	2.0	2.1	2.4	2.5	2.4	2.7	2.8	2.7	2.6	2.6	2.6	2.8
Leather	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2
Textiles	1.6	1.6	1.6	1.8	2.1	2.5	2.8	3.0	3.4	3.8	3.6	3.6	3.4	3.2	3.0
Clothing	0.4	0.4	0.5	0.6	0.8	0.9	1.0	1.0	1.3	1.4	1.3	1.2	1.2	1.1	1.0
Non-metallic Mineral Product	2.4	2.3	2.1	2.3	3.0	2.9	2.8	3.0	3.5	4.0	3.8	3.9	3.7	3.8	3.9
Primary and Fabricated Metals	7.0	6.7	6.1	6.7	7.8	9.7	11.0	10.7	13.3	14.5	14.9	16.8	14.4	14.5	14.1
Non-Electrical machinery	21.0	19.3	18.0	19.7	23.1	27.9	29.9	30.7	36.2	41.0	42.0	42.7	39.1	37.1	35.8
Electrical Machinery	10.0	10.9	10.1	11.3	13.0	15.7	17.5	18.1	20.3	22.4	23.7	25.1	20.4	17.6	16.2
Motor Vehicles and Parts	26.1	22.7	12.1	18.5	28.1	34.7	35.6	35.6	42.3	45.1	48.5	46.4	42.6	48.1	49.0
Other Transport	2.5	2.3	2.2	2.3	1.9	2.2	2.9	3.0	3.4	4.7	4.4	4.5	5.4	3.7	3.6
Professional Goods	3.4	3.3	3.2	3.4	4.0	5.0	5.1	5.2	6.1	7.1	7.9	8.3	7.5	6.9	6.7
Other	1.9	2.1	2.2	2.8	3.1	3.6	3.7	3.8	4.2	4.8	5.1	5.1	4.7	4.5	4.3

Source. Statistics Canada (2004b).

Table 4.10c. Total and Industrial Sector Total Trade Levels, Billions of Constant 1997 Canadian Dollars

	1989	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Total Trade	216.7	213.2	194.5	224.3	269.1	322.1	352.7	366.7	408.9	452.4	489.9	529.9	504.1	494.6	503.0
Animal Agriculture	3.8	4.1	4.1	4.7	5.2	5.5	5.6	6.2	6.7	7.5	8.0	8.5	9.8	9.8	8.4
Vegetable Agriculture	3.4	3.3	3.0	3.5	4.1	4.7	4.9	5.2	5.8	6.2	6.1	6.3	7.1	7.7	7.7
Food	2.1	2.3	2.7	3.5	4.2	4.9	5.4	5.8	6.7	8.1	8.4	8.7	9.7	10.5	11.6
Beverages and Tobacco	1.5	1.6	1.8	2.2	2.8	2.4	2.4	2.8	3.1	3.3	3.3	3.3	3.5	3.4	3.6
Mining, Quarrying, Petroleum	16.2	18.5	17.9	19.7	22.0	24.5	26.4	31.0	32.7	29.6	33.2	55.7	58.1	51.0	67.2
Chemicals	10.1	10.4	10.5	12.0	13.9	16.4	18.2	19.1	21.4	23.5	24.4	25.6	26.8	27.2	28.7
Plastics and Rubber Products	8.1	8.2	8.1	9.7	11.6	14.5	16.5	17.4	20.2	22.8	24.7	26.5	26.8	27.6	28.5
Wood Products	6.6	6.1	5.7	7.5	10.4	12.8	12.1	14.0	15.6	17.1	20.1	18.2	17.6	17.5	17.5
Paper Products	13.6	13.9	12.4	12.8	13.8	15.8	21.8	19.1	19.3	21.3	22.0	24.2	23.6	22.5	21.5
Printing and Publishing	2.3	2.2	2.3	2.5	2.8	3.1	3.4	3.4	3.8	4.1	4.2	4.2	4.3	4.4	4.6
Leather	0.6	0.6	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.8	0.7	0.8	0.8	0.7	0.6
Textiles	2.1	2.2	2.3	2.7	3.2	3.9	4.4	4.8	5.4	6.2	6.1	6.2	5.9	5.8	5.5
Clothing	0.7	0.8	1.0	1.3	1.7	2.1	2.5	2.7	3.4	4.1	4.2	4.3	4.1	4.1	3.9
Non-metallic Mineral Product	4.7	4.1	4.6	5.1	6.7	6.9	6.7	7.7	8.6	9.6	9.8	10.4	8.8	9.4	8.9
Primary and Fabricated Metals	17.9	16.3	14.8	16.5	19.1	24.0	28.0	27.7	31.8	34.2	34.4	37.7	34.1	35.2	34.4
Non-Electrical machinery	32.1	30.0	27.9	30.7	36.4	45.0	49.9	51.9	58.7	67.6	69.5	71.6	66.3	62.9	60.4
Electrical Machinery	15.0	17.3	16.6	18.4	20.4	24.7	28.3	30.8	34.6	38.2	42.0	51.0	38.2	32.3	29.4
Motor Vehicles and Parts	62.0	57.3	44.7	56.1	74.4	89.6	92.6	91.6	101.8	113.4	131.3	126.6	117.6	125.7	123.7
Other Transport	5.3	5.4	5.4	5.2	4.7	6.0	7.2	8.3	9.2	12.8	12.9	12.9	16.0	12.8	13.8
Professional Goods	4.6	4.3	4.2	4.7	5.4	6.8	7.1	7.3	8.5	9.9	10.9	12.7	11.1	10.2	9.8
Other	4.1	4.2	4.1	5.1	6.0	7.6	8.5	9.2	10.6	12.1	13.7	14.5	13.8	13.7	13.5

Source. Statistics Canada (2004b).

Table 4.11. Canada-U.S. International Trade Flows, Increase Factors, 1989 - 2003

	Exports	Imports	Total
Total Trade	2.62	1.97	2.32
Animal Agriculture	2.36	1.80	2.21
Vegetable Agriculture	3.56	1.88	2.26
Food	7.56	4.00	5.52
Beverages and Tobacco	2.22	2.67	2.40
Mining, Quarrying, Petroleum	4.60	2.07	4.15
Chemicals	2.79	2.89	2.84
Plastics and Rubber Products	4.52	2.83	3.52
Wood Products	2.85	1.85	2.65
Paper Products	1.36	2.95	1.58
Printing and Publishing	3.60	1.65	2.00
Leather	1.33	0.67	1.00
Textiles	5.00	1.88	2.62
Clothing	9.67	2.50	5.57
Non-metallic Mineral Product	2.13	1.63	1.89
Primary and Fabricated Metals	1.85	2.01	1.92
Non-Electrical machinery	2.22	1.70	1.88
Electrical Machinery	2.64	1.62	1.96
Motor Vehicles and Parts	2.07	1.88	2.00
Other Transport	3.74	1.44	2.60
Professional Goods	2.50	1.97	2.13
Other	4.18	2.26	3.29

Source. Statistics Canada (2004b).

Table 4.12a. Industrial Sector International Export Trade Shares

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Animal Agriculture	2.4	2.7	2.7	2.8	2.6	2.3	2.1	2.3	2.3	2.3	2.2	2.1	2.5	2.7	2.1
Vegetable Agriculture	0.8	0.8	0.7	0.8	0.9	1.1	1.0	1.1	1.1	1.1	1.0	0.9	1.0	1.1	1.0
Food	0.8	0.8	1.0	1.2	1.3	1.3	1.3	1.4	1.5	1.7	1.6	1.5	1.8	2.0	2.2
Beverages and Tobacco	0.8	0.9	1.1	1.2	1.3	0.8	0.7	0.8	0.8	0.8	0.7	0.6	0.7	0.7	0.6
Mining, Quarrying, Petroleum	11.4	13.2	13.9	13.4	12.9	11.9	11.6	13.0	12.6	10.0	10.3	16.1	17.5	15.6	20.0
Chemicals	4.0	4.0	4.1	4.2	4.1	4.1	4.2	4.1	4.1	4.0	3.7	3.5	3.9	4.1	4.3
Plastics and Rubber Products	2.8	2.9	3.0	3.3	3.4	3.7	4.0	3.9	4.2	4.3	4.2	4.1	4.5	4.8	4.9
Wood Products	4.6	4.2	4.0	4.8	5.9	6.1	5.1	5.8	5.9	5.8	6.3	4.9	5.0	5.1	4.9
Paper Products	10.0	10.1	9.1	8.1	7.3	6.9	8.7	7.1	6.5	6.5	5.9	5.8	5.9	5.6	5.2
Printing and Publishing	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6
Leather	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
Textiles	0.4	0.5	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.9	0.8
Clothing	0.3	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.0	0.9
Non-metallic Mineral Products	2.0	1.6	2.2	2.2	2.4	2.2	2.0	2.2	2.2	2.2	2.1	2.0	1.6	1.9	1.7
Primary & Fabricated Metals	9.4	8.2	7.7	7.7	7.4	7.8	8.5	7.9	8.0	7.8	6.9	6.6	6.4	6.9	6.6
Non-Electrical machinery	9.5	9.1	8.8	8.6	8.8	9.4	9.9	9.9	9.8	10.5	9.7	9.1	8.9	8.7	8.0
Electrical Machinery	4.2	5.4	5.8	5.5	4.8	5.0	5.3	6.0	6.2	6.2	6.5	8.1	5.8	4.9	4.3
Motor Vehicles and Parts	30.7	29.5	28.9	29.2	30.4	30.1	28.2	26.2	25.9	26.9	29.2	25.2	24.4	26.0	24.3
Other Transport	2.3	2.7	2.8	2.3	1.8	2.1	2.1	2.5	2.5	3.2	3.0	2.7	3.5	3.1	3.3
Professional Goods	1.0	0.8	0.9	1.0	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.4	1.2	1.1	1.0
Other	1.9	1.8	1.6	1.8	1.9	2.2	2.4	2.6	2.8	2.9	3.1	2.9	3.0	3.1	3.0

Source. Statistics Canada (2004b).

Table 4.12b. Industrial Sector International Import Trade Shares

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Animal Agriculture	1.0	1.1	1.4	1.2	1.0	1.0	1.0	0.9	0.8	0.8	0.9	0.9	1.0	0.9	0.9
Vegetable Agriculture	2.5	2.4	2.7	2.5	2.3	1.9	1.9	1.9	1.8	1.7	1.6	1.7	2.0	2.3	2.3
Food	1.2	1.5	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.8	2.1	2.3	2.4
Beverages and Tobacco	0.6	0.6	0.8	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.7	0.8	0.8
Mining, Quarrying, Petroleum	2.9	3.1	2.8	2.6	2.0	2.0	2.0	2.1	2.1	2.2	1.9	2.0	2.2	2.2	3.0
Chemicals	5.4	5.9	7.2	6.8	6.6	6.4	6.5	6.8	6.6	6.7	6.8	6.8	7.5	7.6	7.9
Plastics and Rubber Products	4.8	5.0	5.8	5.7	5.5	5.6	5.6	5.9	5.9	6.0	6.2	6.3	6.6	6.9	6.9
Wood Products	1.3	1.3	1.4	1.3	1.2	1.2	1.2	1.1	1.2	1.1	1.1	1.2	1.2	1.2	1.2
Paper Products	1.9	2.2	2.6	2.5	2.3	2.3	2.8	2.6	2.4	2.4	2.5	2.7	2.8	2.9	2.9
Printing and Publishing	1.7	1.9	2.3	2.1	1.8	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.3	1.3	1.4
Leather	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Textiles	1.6	1.6	2.0	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.7	1.7	1.6	1.5
Clothing	0.4	0.5	0.6	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5
Non-metallic Mineral Products	2.4	2.4	2.5	2.4	2.6	2.1	1.8	2.0	2.0	2.0	1.8	1.9	1.9	1.9	2.0
Primary & Fabricated Metals	7.0	7.0	7.5	7.0	6.7	6.9	7.3	7.0	7.5	7.3	7.2	7.9	7.3	7.4	7.2
Non-Electrical machinery	21.0	20.2	22.0	20.5	19.8	19.9	19.9	20.1	20.3	20.6	20.3	20.2	19.9	18.9	18.2
Electrical Machinery	10.0	11.4	12.3	11.8	11.1	11.2	11.6	11.8	11.4	11.3	11.4	11.9	10.4	9.0	8.2
Motor Vehicles and Parts	26.1	23.7	14.8	19.3	24.0	24.9	23.7	23.3	23.6	22.7	23.4	22.0	21.6	24.5	25.0
Other Transport	2.5	2.4	2.7	2.4	1.6	1.6	2.0	1.9	1.9	2.4	2.1	2.1	2.7	1.9	1.8
Professional Goods	3.4	3.5	3.9	3.6	3.4	3.6	3.4	3.4	3.4	3.6	3.8	3.9	3.8	3.5	3.4
Other	1.9	2.2	2.7	2.9	2.7	2.6	2.5	2.5	2.3	2.4	2.4	2.4	2.4	2.3	2.2

Source. Statistics Canada (2004b).

Table 4.12c. Industrial Sector International Total Trade Shares

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Animal Agriculture	1.7	1.9	2.1	2.1	1.9	1.7	1.6	1.7	1.6	1.6	1.6	1.6	1.9	2.0	1.7
Vegetable Agriculture	1.6	1.5	1.5	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.2	1.4	1.5	1.5
Food	1.0	1.1	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.8	1.7	1.6	1.9	2.1	2.3
Beverages and Tobacco	0.7	0.8	0.9	1.0	1.0	0.8	0.7	0.8	0.8	0.7	0.7	0.6	0.7	0.7	0.7
Mining, Quarrying, Petroleum	7.5	8.7	9.2	8.8	8.2	7.6	7.5	8.4	8.0	6.5	6.8	10.5	11.5	10.3	13.4
Chemicals	4.6	4.9	5.4	5.4	5.2	5.1	5.2	5.2	5.2	5.2	5.0	4.8	5.3	5.5	5.7
Plastics and Rubber Products	3.7	3.9	4.2	4.3	4.3	4.5	4.7	4.7	4.9	5.0	5.0	5.0	5.3	5.6	5.7
Wood Products	3.1	2.9	2.9	3.3	3.9	4.0	3.4	3.8	3.8	3.8	4.1	3.4	3.5	3.5	3.5
Paper Products	6.3	6.5	6.4	5.7	5.1	4.9	6.2	5.2	4.7	4.7	4.5	4.6	4.7	4.5	4.3
Printing and Publishing	1.0	1.1	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.9
Leather	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1
Textiles	1.0	1.0	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.4	1.2	1.2	1.2	1.2	1.1
Clothing	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.8
Non-metallic Mineral Products	2.2	1.9	2.3	2.3	2.5	2.2	1.9	2.1	2.1	2.1	2.0	2.0	1.7	1.9	1.8
Primary & Fabricated Metals	8.3	7.7	7.6	7.4	7.1	7.4	7.9	7.5	7.8	7.6	7.0	7.1	6.8	7.1	6.8
Non-Electrical machinery	14.8	14.1	14.4	13.7	13.5	14.0	14.1	14.2	14.4	14.9	14.2	13.5	13.2	12.7	12.0
Electrical Machinery	6.9	8.1	8.5	8.2	7.6	7.7	8.0	8.4	8.5	8.4	8.6	9.6	7.6	6.5	5.8
Motor Vehicles and Parts	28.6	26.9	23.0	25.0	27.6	27.8	26.2	25.0	24.9	25.1	26.8	23.9	23.3	25.4	24.6
Other Transport	2.4	2.5	2.8	2.3	1.7	1.8	2.1	2.3	2.3	2.8	2.6	2.4	3.2	2.6	2.7
Professional Goods	2.1	2.0	2.2	2.1	2.0	2.1	2.0	2.0	2.1	2.2	2.2	2.4	2.2	2.1	1.9
Other	1.9	2.0	2.1	2.3	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.7	2.7	2.8	2.7

Source. Statistics Canada (2004b).

Table 4.13a. Industrial Sectors, by Trade Type

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total Trade	GL	0.41	0.43	0.36	0.39	0.41	0.40	0.42	0.43	0.44	0.46	0.44	0.43	0.42	0.43	0.42
	TW	0.58	0.59	0.45	0.51	0.53	0.58	0.60	0.61	0.60	0.62	0.64	0.61	0.54	0.60	0.58
	TWR	0.31	0.34	0.19	0.26	0.27	0.33	0.32	0.33	0.33	0.34	0.35	0.33	0.27	0.34	0.33
	HD	0.13	0.18	0.06	0.13	0.12	0.15	0.17	0.10	0.16	0.19	0.15	0.14	0.10	0.16	0.12
	VDHQ	0.08	0.08	0.07	0.06	0.07	0.08	0.09	0.11	0.10	0.09	0.12	0.12	0.11	0.11	0.09
	VDLQ	0.10	0.07	0.07	0.07	0.08	0.09	0.07	0.12	0.07	0.07	0.08	0.06	0.07	0.07	0.13
Animal Agriculture	GL	0.27	0.19	0.21	0.24	0.27	0.29	0.26	0.27	0.30	0.28	0.30	0.32	0.28	0.25	0.29
	TW	0.26	0.18	0.27	0.28	0.29	0.30	0.30	0.28	0.35	0.36	0.35	0.48	0.35	0.35	0.39
	TWR	0.25	0.18	0.26	0.27	0.29	0.29	0.29	0.27	0.34	0.35	0.35	0.48	0.35	0.35	0.38
	HD	0.03	0.01	0.01	0.03	0.03	0.01	0.03	0.03	0.02	0.19	0.18	0.17	0.19	0.20	0.18
	VDHQ	0.05	0.06	0.04	0.04	0.04	0.09	0.09	0.08	0.13	0.09	0.12	0.26	0.12	0.11	0.14
	VDLQ	0.17	0.11	0.21	0.21	0.22	0.19	0.17	0.17	0.19	0.07	0.06	0.05	0.04	0.04	0.05
Vegetable Agriculture	GL	0.20	0.21	0.22	0.21	0.23	0.22	0.22	0.26	0.24	0.26	0.27	0.26	0.25	0.25	0.28
	TW	0.24	0.26	0.28	0.30	0.28	0.25	0.28	0.32	0.30	0.33	0.36	0.33	0.34	0.31	0.34
	TWR	0.20	0.21	0.23	0.25	0.24	0.20	0.23	0.27	0.24	0.26	0.30	0.26	0.27	0.25	0.28
	HD	0.05	0.04	0.04	0.03	0.04	0.05	0.03	0.04	0.02	0.13	0.10	0.05	0.09	0.06	0.10
	VDHQ	0.01	0.03	0.02	0.03	0.02	0.02	0.03	0.07	0.07	0.05	0.07	0.13	0.06	0.08	0.08
	VDLQ	0.13	0.14	0.17	0.19	0.17	0.13	0.17	0.17	0.16	0.09	0.13	0.09	0.11	0.11	0.10
Food	GL	0.38	0.39	0.40	0.42	0.45	0.46	0.47	0.48	0.49	0.45	0.47	0.49	0.50	0.49	0.48
	TW	0.50	0.50	0.51	0.57	0.58	0.60	0.57	0.62	0.60	0.57	0.62	0.64	0.58	0.64	0.63
	TWR	0.50	0.50	0.51	0.57	0.58	0.60	0.57	0.62	0.60	0.57	0.62	0.64	0.58	0.64	0.63
	HD	0.12	0.21	0.20	0.24	0.10	0.23	0.28	0.31	0.30	0.32	0.26	0.29	0.35	0.34	0.31
	VDHQ	0.18	0.13	0.14	0.10	0.24	0.11	0.09	0.12	0.09	0.13	0.13	0.13	0.13	0.12	0.15
	VDLQ	0.20	0.17	0.17	0.23	0.24	0.25	0.20	0.19	0.22	0.12	0.23	0.21	0.11	0.18	0.17
Beverages and Tobacco	GL	0.22	0.24	0.22	0.18	0.16	0.22	0.24	0.23	0.25	0.26	0.30	0.28	0.30	0.33	0.30
	TW	0.20	0.23	0.23	0.21	0.25	0.20	0.25	0.23	0.33	0.33	0.35	0.34	0.34	0.30	0.31
	TWR	0.20	0.22	0.22	0.21	0.25	0.20	0.25	0.23	0.33	0.33	0.35	0.34	0.34	0.30	0.31
	HD	0.06	0.01	0.04	0.09	0.07	0.08	0.04	0.04	0.15	0.09	0.08	0.10	0.08	0.08	0.19
	VDHQ	0.01	0.01	0.01	0.00	0.03	0.01	0.08	0.10	0.02	0.02	0.01	0.08	0.09	0.06	0.05
	VDLQ	0.13	0.20	0.18	0.12	0.15	0.11	0.13	0.09	0.17	0.23	0.25	0.16	0.17	0.17	0.07

Source. Statistics Canada (2004b).

Table 4.13b. Industrial Sectors, by Trade Type

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Mining, Quarrying, Petroleum	GL	0.13	0.12	0.09	0.08	0.08	0.08	0.08	0.08	0.09	0.13	0.10	0.08	0.09	0.09	0.12
	TW	0.11	0.10	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.14	0.08	0.06	0.06	0.07	0.06
	TWR	0.11	0.10	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.14	0.08	0.06	0.06	0.07	0.06
	HD	0.06	0.03	0.04	0.03	0.01	0.02	0.03	0.03	0.02	0.07	0.01	0.02	0.01	0.02	0.03
	VDHQ	0.01	0.03	0.02	0.01	0.04	0.03	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.02	0.02
	VDLQ	0.04	0.04	0.03	0.04	0.04	0.03	0.05	0.03	0.05	0.04	0.04	0.02	0.04	0.03	0.01
Chemicals	GL	0.24	0.25	0.26	0.27	0.27	0.30	0.31	0.33	0.33	0.34	0.34	0.35	0.35	0.35	0.35
	TW	0.28	0.32	0.29	0.32	0.36	0.37	0.41	0.44	0.42	0.43	0.46	0.46	0.48	0.49	0.48
	TWR	0.20	0.23	0.21	0.22	0.25	0.26	0.28	0.31	0.29	0.29	0.31	0.31	0.32	0.32	0.32
	HD	0.06	0.06	0.07	0.06	0.07	0.05	0.05	0.07	0.07	0.09	0.09	0.09	0.07	0.07	0.07
	VDHQ	0.07	0.08	0.04	0.08	0.08	0.08	0.07	0.09	0.08	0.08	0.08	0.09	0.11	0.12	0.12
	VDLQ	0.07	0.10	0.09	0.08	0.11	0.13	0.16	0.15	0.14	0.13	0.14	0.14	0.14	0.13	0.13
Plastics and Rubber Products	GL	0.54	0.56	0.57	0.59	0.60	0.62	0.64	0.65	0.67	0.67	0.68	0.68	0.67	0.68	0.66
	TW	0.70	0.71	0.79	0.83	0.83	0.83	0.84	0.87	0.89	0.91	0.91	0.91	0.91	0.89	0.87
	TWR	0.44	0.45	0.54	0.57	0.58	0.57	0.60	0.63	0.63	0.62	0.63	0.64	0.64	0.63	0.61
	HD	0.18	0.19	0.20	0.19	0.11	0.24	0.38	0.29	0.42	0.30	0.30	0.36	0.32	0.29	0.27
	VDHQ	0.08	0.10	0.09	0.12	0.21	0.11	0.06	0.07	0.07	0.11	0.10	0.11	0.11	0.06	0.05
	VDLQ	0.18	0.16	0.25	0.27	0.26	0.22	0.16	0.26	0.13	0.21	0.23	0.17	0.21	0.28	0.29
Wood Products	GL	0.16	0.17	0.16	0.14	0.12	0.13	0.13	0.13	0.15	0.16	0.15	0.17	0.15	0.16	0.16
	TW	0.17	0.20	0.20	0.18	0.15	0.16	0.18	0.17	0.19	0.21	0.17	0.21	0.18	0.16	0.19
	TWR	0.13	0.16	0.15	0.14	0.12	0.13	0.14	0.13	0.14	0.16	0.14	0.17	0.12	0.13	0.14
	HD	0.01	0.03	0.00	0.00	0.02	0.04	0.02	0.03	0.04	0.04	0.03	0.03	0.01	0.03	0.04
	VDHQ	0.03	0.05	0.05	0.04	0.05	0.05	0.06	0.08	0.07	0.08	0.07	0.10	0.09	0.06	0.06
	VDLQ	0.10	0.08	0.10	0.10	0.05	0.04	0.05	0.02	0.03	0.03	0.03	0.04	0.02	0.04	0.05
Paper Products	GL	0.14	0.16	0.18	0.21	0.22	0.24	0.24	0.26	0.28	0.29	0.30	0.31	0.32	0.33	0.34
	TW	0.18	0.18	0.20	0.24	0.22	0.29	0.24	0.34	0.36	0.37	0.39	0.39	0.41	0.39	0.40
	TWR	0.16	0.15	0.17	0.19	0.15	0.21	0.16	0.24	0.26	0.26	0.27	0.27	0.28	0.24	0.27
	HD	0.04	0.08	0.05	0.05	0.05	0.07	0.09	0.10	0.13	0.10	0.08	0.10	0.14	0.11	0.15
	VDHQ	0.01	0.01	0.02	0.04	0.05	0.04	0.04	0.04	0.03	0.06	0.07	0.10	0.08	0.08	0.09
	VDLQ	0.12	0.06	0.10	0.10	0.06	0.10	0.04	0.10	0.10	0.10	0.11	0.07	0.06	0.05	0.03

Source. Statistics Canada (2004b).

Table 4.13c. Industrial Sectors, by Trade Type

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Printing and Publishing	GL	0.47	0.37	0.36	0.38	0.45	0.47	0.47	0.50	0.51	0.53	0.53	0.53	0.55	0.55	0.54
	TW	0.60	0.58	0.60	0.57	0.60	0.61	0.63	0.98	0.70	0.99	0.98	0.99	0.99	0.99	0.99
	TWR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VDHQ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VDLQ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leather	GL	0.54	0.56	0.55	0.57	0.57	0.58	0.61	0.58	0.64	0.56	0.57	0.58	0.52	0.49	0.50
	TW	0.65	0.69	0.69	0.72	0.74	0.75	0.77	0.71	0.76	0.75	0.77	0.75	0.73	0.64	0.64
	TWR	0.50	0.58	0.54	0.57	0.58	0.62	0.58	0.52	0.57	0.52	0.51	0.48	0.46	0.42	0.40
	HD	0.27	0.20	0.03	0.29	0.33	0.32	0.32	0.26	0.26	0.03	0.03	0.00	0.03	0.01	0.03
	VDHQ	0.09	0.17	0.28	0.26	0.23	0.24	0.23	0.23	0.26	0.43	0.42	0.44	0.40	0.37	0.34
	VDLQ	0.14	0.20	0.23	0.03	0.03	0.06	0.04	0.04	0.05	0.06	0.06	0.04	0.03	0.04	0.04
Textile	GL	0.29	0.35	0.37	0.41	0.41	0.38	0.41	0.42	0.42	0.44	0.47	0.47	0.46	0.46	0.47
	TW	0.38	0.38	0.40	0.60	0.57	0.45	0.61	0.59	0.59	0.61	0.61	0.68	0.63	0.65	0.68
	TWR	0.38	0.36	0.38	0.58	0.55	0.44	0.60	0.57	0.59	0.60	0.59	0.65	0.61	0.62	0.66
	HD	0.04	0.07	0.11	0.26	0.28	0.17	0.21	0.09	0.19	0.31	0.33	0.28	0.25	0.32	0.23
	VDHQ	0.16	0.11	0.12	0.13	0.14	0.19	0.22	0.28	0.23	0.14	0.12	0.18	0.17	0.12	0.09
	VDLQ	0.18	0.18	0.15	0.18	0.12	0.08	0.17	0.20	0.16	0.15	0.14	0.19	0.19	0.18	0.34
Clothing	GL	0.45	0.44	0.42	0.42	0.45	0.46	0.49	0.49	0.50	0.49	0.45	0.41	0.41	0.39	0.39
	TW	0.64	0.63	0.53	0.56	0.60	0.61	0.63	0.64	0.62	0.67	0.52	0.54	0.53	0.52	0.50
	TWR	0.51	0.49	0.40	0.47	0.51	0.51	0.53	0.55	0.54	0.58	0.42	0.40	0.37	0.35	0.35
	HD	0.05	0.10	0.12	0.18	0.14	0.13	0.14	0.08	0.17	0.20	0.08	0.07	0.06	0.09	0.13
	VDHQ	0.36	0.20	0.11	0.19	0.17	0.22	0.25	0.31	0.22	0.22	0.19	0.19	0.17	0.17	0.09
	VDLQ	0.09	0.19	0.18	0.11	0.20	0.15	0.14	0.16	0.16	0.15	0.15	0.14	0.13	0.09	0.13
Non-metallic Mineral Product	GL	0.40	0.55	0.40	0.44	0.42	0.38	0.38	0.37	0.44	0.46	0.38	0.35	0.37	0.35	0.36
	TW	0.64	0.63	0.60	0.74	0.49	0.49	0.50	0.48	0.70	0.65	0.40	0.41	0.45	0.43	0.42
	TWR	0.38	0.33	0.31	0.46	0.23	0.19	0.17	0.17	0.44	0.40	0.14	0.15	0.15	0.14	0.13
	HD	0.28	0.15	0.02	0.20	0.02	0.01	0.02	0.11	0.39	0.30	0.05	0.03	0.05	0.03	0.02
	VDHQ	0.04	0.16	0.26	0.24	0.20	0.14	0.13	0.05	0.05	0.10	0.09	0.10	0.09	0.09	0.09
	VDLQ	0.06	0.01	0.03	0.01	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.02	0.01	0.02	0.02

Source. Statistics Canada (2004b).

Table 4.13d. Industrial Sectors, by Trade Type

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Primary & Fabricated Metals	GL	0.38	0.41	0.41	0.41	0.43	0.43	0.43	0.44	0.46	0.48	0.48	0.47	0.48	0.49	0.49
	TW	0.48	0.51	0.50	0.54	0.54	0.54	0.53	0.55	0.58	0.63	0.62	0.59	0.61	0.63	0.64
	TWR	0.29	0.32	0.32	0.32	0.31	0.33	0.32	0.31	0.34	0.35	0.33	0.32	0.33	0.35	0.35
	HD	0.10	0.17	0.14	0.15	0.15	0.14	0.16	0.14	0.15	0.15	0.15	0.14	0.16	0.19	0.19
	VDHQ	0.09	0.06	0.07	0.05	0.05	0.08	0.07	0.08	0.09	0.08	0.07	0.06	0.06	0.07	0.05
	VDLQ	0.09	0.10	0.12	0.13	0.11	0.11	0.09	0.10	0.10	0.13	0.11	0.11	0.11	0.10	0.11
Non-Electrical machinery	GL	0.58	0.57	0.57	0.58	0.57	0.56	0.56	0.60	0.58	0.59	0.60	0.61	0.61	0.62	0.64
	TW	0.78	0.75	0.79	0.79	0.79	0.80	0.83	0.84	0.83	0.82	0.82	0.80	0.81	0.81	0.84
	TWR	0.27	0.27	0.27	0.27	0.27	0.25	0.25	0.27	0.28	0.30	0.32	0.32	0.32	0.33	0.34
	HD	0.01	0.02	0.11	0.15	0.16	0.12	0.11	0.13	0.13	0.15	0.16	0.15	0.15	0.16	0.01
	VDHQ	0.21	0.18	0.09	0.05	0.04	0.03	0.04	0.06	0.07	0.08	0.07	0.07	0.07	0.06	0.23
	VDLQ	0.05	0.07	0.07	0.08	0.07	0.09	0.09	0.09	0.08	0.07	0.09	0.09	0.10	0.11	0.09
Electrical Machinery	GL	0.59	0.67	0.63	0.61	0.60	0.61	0.65	0.67	0.65	0.66	0.62	0.56	0.58	0.59	0.60
	TW	0.75	0.77	0.72	0.77	0.74	0.78	0.80	0.80	0.81	0.78	0.80	0.81	0.79	0.78	0.81
	TWR	0.31	0.25	0.28	0.30	0.29	0.28	0.30	0.33	0.33	0.30	0.26	0.23	0.23	0.21	0.22
	HD	0.02	0.00	0.02	0.03	0.02	0.02	0.19	0.03	0.02	0.02	0.01	0.02	0.01	0.02	0.01
	VDHQ	0.25	0.20	0.23	0.25	0.23	0.06	0.07	0.25	0.25	0.23	0.20	0.17	0.17	0.14	0.14
	VDLQ	0.03	0.05	0.03	0.02	0.03	0.20	0.04	0.04	0.07	0.05	0.06	0.04	0.05	0.05	0.07
Motor Vehicles and Parts	GL	0.48	0.52	0.26	0.38	0.45	0.39	0.42	0.41	0.44	0.45	0.42	0.42	0.40	0.44	0.44
	TW	0.81	0.84	0.29	0.50	0.57	0.71	0.72	0.76	0.68	0.69	0.78	0.75	0.52	0.74	0.73
	TWR	0.50	0.63	0.05	0.28	0.35	0.55	0.49	0.54	0.47	0.49	0.54	0.52	0.28	0.54	0.53
	HD	0.33	0.52	0.01	0.24	0.25	0.34	0.31	0.14	0.30	0.39	0.28	0.28	0.05	0.30	0.24
	VDHQ	0.02	0.03	0.02	0.02	0.04	0.15	0.15	0.17	0.16	0.08	0.21	0.21	0.21	0.22	0.03
	VDLQ	0.15	0.08	0.03	0.02	0.06	0.06	0.03	0.23	0.02	0.02	0.05	0.03	0.02	0.03	0.26
Other Transport	GL	0.50	0.56	0.51	0.43	0.50	0.47	0.49	0.46	0.55	0.52	0.57	0.57	0.50	0.46	0.39
	TW	0.55	0.74	0.58	0.47	0.48	0.47	0.67	0.42	0.54	0.56	0.58	0.63	0.56	0.53	0.58
	TWR	0.05	0.18	0.05	0.01	0.02	0.02	0.28	0.03	0.11	0.11	0.15	0.22	0.26	0.24	0.33
	HD	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.09	0.08	0.01	0.00	0.21	0.00	0.02
	VDHQ	0.04	0.17	0.04	0.01	0.01	0.01	0.27	0.02	0.01	0.02	0.12	0.20	0.03	0.22	0.31
	VDLQ	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01

Source. Statistics Canada (2004b).

Table 4.13e. Industrial Sectors, by Trade Type

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Professional Goods	GL	0.41	0.40	0.44	0.48	0.46	0.49	0.50	0.51	0.48	0.48	0.43	0.47	0.47	0.49	0.46
	TW	0.53	0.49	0.55	0.62	0.63	0.68	0.69	0.71	0.72	0.71	0.63	0.66	0.73	0.75	0.54
	TWR	0.02	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.04	0.05	0.04
	HD	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
	VDHQ	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
	VDLQ	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03
Other	GL	0.49	0.56	0.58	0.61	0.60	0.61	0.63	0.60	0.60	0.55	0.54	0.52	0.52	0.53	0.51
	TW	0.70	0.85	0.79	0.80	0.80	0.74	0.81	0.72	0.73	0.70	0.74	0.73	0.71	0.64	0.64
	TWR	0.05	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.01
	HD	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VDHQ	0.03	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VDLQ	0.02	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00

Source. Statistics Canada (2004b).

Table 5.1. Standard Gravity Equation Variables

	OLS	Fixed Effects	Random Effects
GDP *i*	1.309	1.317	1.305
	(< 0.001)	(0.002)	(< 0.001)
GDP *j*	1.099	0.103	1.108
	(< 0.001)	(0.780)	(< 0.001)
GDP per Capita *i*	1.473	1.039	0.912
	(< 0.001)	(0.035)	(0.004)
GDP per Capita *j*	1.057	-2.352	-1.244
	(< 0.001)	(< 0.001)	(< 0.001)
Capital-Labor Ratio *i*	-0.994	-0.899	-0.628
	(< 0.001)	(0.002)	(< 0.001)
Capital-Labor Ratio *j*	-1.153	0.169	-0.365
	(< 0.001)	(0.135)	(< 0.001)
Land-Labor Ratio *i*	0.014	0.033	0.012
	(< 0.001)	(0.002)	(< 0.001)
Land-Labor Ratio *j*	-0.005	0.020	0.009
	(0.002)	(0.122)	(0.0550
Provincial Tariff	0.393	0.178	0.066
	(< 0.001)	(< 0.001)	(0.011)
NAFTA	-0.245	0.224	0.142
	(0.070)	(0.017)	(0.065)
$\overline{R}^2$	0.731	0.935	0.727

F-Test for standard regression: 836.34, p-value < 0.0001

F-Test for panel regression: 47.03, p-value < 0.0001

Notes. P-values are reported in parentheses.

Table 5.2. Border Effects

	OLS	Fixed Effects	Random Effects
Border Effect 1989	-4.469 [-86.27] (< 0.001)		
Border Effect 1990	-4.473 [-86.62] (< 0.001)	0.066 [0.07] (0.195)	-0.134 [-0.14] (0.007)
Border Effect 1991	-4.610 [-99.48] (< 0.001)	0.090 [0.09] (0.117)	-0.179 [-0.20] (0.001)
Border Effect 1992	-4.287 [-71.75] (< 0.001)	0.359 [0.43] (< 0.001)	-0.004 [-0.01] (0.950)
Border Effect 1993	-3.922 [-49.50] (< 0.001)	0.639 [0.89] (< 0.001)	0.183 [0.20] (0.004)
Border Effect 1994	-3.419 [-29.54] (< 0.001)	0.633 [0.88] (< 0.001)	0.216 [0.24] (0.014)
Border Effect 1995	-3.254 [-24.89] (< 0.001)	0.772 [1.16] (< 0.001)	0.311 [0.36] (0.001)
Border Effect 1996	-3.166 [-22.71] (< 0.001)	0.830 [1.29] (< 0.001)	0.342 [0.41] (< 0.001)
Border Effect 1997	-2.976 [-18.61] (< 0.001)	0.886 [1.43] (< 0.001)	0.418 [0.52] (< 0.001)
Border Effect 1998	-2.797 [-15.40] (< 0.001)	0.981 [1.67] (< 0.001)	0.522 [0.69] (< 0.001)
Border Effect 1999	-2.762 [-14.83] (< 0.001)	0.979 [1.66] (< 0.001)	0.534 [0.71] (< 0.001)
Border Effect 2000	-2.631 [-12.89] (< 0.001)	1.081 [1.95] (< 0.001)	0.626 [0.87] (< 0.001)
Border Effect 2001	-2.661 [-13.31] (< 0.001)	1.080 [1.94] (< 0.001)	0.626 [0.87] (< 0.001)

Notes. Border effects are reported in brackets and p-values are reported in parentheses. The inclusion of the distance variable does not alter the qualitative results of the OLS regression.

Table 5.3. Border Effects, Sensitivity Analysis

	OLS: McCallum Specification	**OLS: Full Specification**	**Fixed Effects: McCallum Specification**	**Fixed Effects: Full Specification**
Border Effect	-3.439 [-30.16]	-5.437 [-228.75]		
1989	(< 0.001)	(< 0.001)		
Border Effect	-3.522 [-32.85]	-5.233 [-186.35]	-0.032 [-0.03]	0.066 [0.07]
1990	(< 0.001)	(< 0.001)	(0.512)	(0.195)
Border Effect	-3.584 [-35.02]	-5.324 [-204.20]	-0.029 [-0.03]	0.090 [0.09]
1991	(< 0.001)	(< 0.001)	(0.563)	(0.117)
Border Effect	-3.451 [-30.53]	-4.866 [-128.80]	0.137 [0.15]	0.359 [0.43]
1992	(< 0.001)	(< 0.001)	(0.010)	(< 0.001)
Border Effect	-3.296 [-26.00]	-4.329 [-74.87]	0.309 [0.36]	0.639 [0.89]
1993	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-3.117 [-21.58]	-4.046 [-56.17]	0.487 [0.63]	0.633 [0.88]
1994	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-3.032 [-19.74]	-3.821 [-44.65]	0.581 [0.79]	0.772 [1.16]
1995	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-3.019 [-19.47]	-3.725 [-40.47]	0.614 [0.85]	0.830 [1.29]
1996	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-2.923 [-17.59]	-3.558 [-34.09]	0.667 [0.95]	0.886 [1.43]
1997	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-2.804 [-15.51]	-3.382 [-28.43]	0.760 [1.14]	0.981 [1.67]
1998	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-2.776 [-15.05]	-3.374 [-28.20]	0.775 [1.17]	0.979 [1.66]
1999	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-2.688 [-13.70]	-3.233 [-24.36]	0.867 [1.38]	1.081 [1.95]
2000	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
Border Effect	-2.705 [-13.95]	-3.321 [-26.69]	0.882 [1.42]	1.080 [1.94]
2001	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)

Notes. Border effects are reported in brackets and p-values are reported in parentheses.

Table 5.4a. Provincial Border Effects

	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario
B.E.	-0.047 [-0.05]	0.145 [0.16]	-0.083 [-0.08]	-0.059 [-0.06]	0.009 [0.01]
1990	(0.757)	(0.339)	(0.599)	(0.698)	(0.954)
B.E.	0.043 [0.04]	0.288 [0.33]	-0.093 [-0.09]	0.106 [0.11]	0.188 [0.21]
1991	(0.784)	(0.064)	(0.561)	(0.505)	(0.282)
B.E.	0.331 [0.39]	0.469 [0.60]	0.325 [0.38]	0.168 [0.18]	0.432 [0.54]
1992	(0.040)	(0.003)	(0.045)	(0.296)	(0.019)
B.E.	0.498 [0.65]	0.451 [0.57]	0.413 [0.51]	0.422 [0.53]	0.638 [0.89]
1993	(0.002)	(0.004)	(0.014)	(0.010)	(< 0.001)
B.E.	0.687 [0.99]	0.356 [0.43]	0.400 [0.49]	0.452 [0.57]	0.611 [0.84]
1994	(< 0.001)	(0.049)	(0.017)	(0.010)	(0.002)
B.E.	0.729 [1.07]	0.449 [0.57]	0.421 [0.52]	0.614 [0.85]	0.693 [1.00]
1995	(< 0.001)	(0.011)	(0.012)	(< 0.001)	(< 0.001)
B.E.	0.752 [1.12]	0.612 [0.84]	0.606 [0.83]	0.618 [0.86]	0.797 [1.22]
1996	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
B.E.	0.765 [1.15]	0.505 [0.66]	0.662 [0.94]	0.672 [0.96]	0.756 [1.13]
1997	(< 0.001)	(0.006)	(< 0.001)	(< 0.001)	(< 0.001)
B.E.	0.809 [1.24]	0.482 [0.62]	0.652 [0.92]	0.673 [0.96]	0.783 [1.19]
1998	(< 0.001)	(0.008)	(< 0.001)	(< 0.001)	(< 0.001)
B.E.	0.835 [1.30]	0.539 [0.71]	0.585 [0.79]	0.646 [0.91]	0.683 [0.98]
1999	(< 0.001)	(0.003)	(0.003)	(< 0.001)	(< 0.001)
B.E.	0.735 [1.09]	0.726 [1.07]	0.573 [0.77]	0.703 [1.02]	0.605 [0.83]
2000	(< 0.001)	(< 0.001)	(0.006)	(< 0.001)	(< 0.001)
B.E.	0.716 [1.05]	0.866 [1.38]	0.620 [0.86]	0.699 [1.01]	0.580 [0.79]
2001	(< 0.001)	(< 0.001)	(0.005)	(< 0.001)	(< 0.001)

Notes. Border effects are reported in brackets and p-values are reported in parentheses.

Table 5.4b. Provincial Border Effects

	Quebec	New Brunswick	Nova Scotia	Prince Edward Is.	Newfoundland
B.E.	-0.015 [-0.02]	0.249 [0.28]	-0.032 [-0.03]	0.060 [0.06]	-0.048 [-0.05]
1990	(0.921)	(0.103)	(0.835)	(0.693)	(0.752)
B.E.	0.099 [0.11]	0.406 [0.50]	0.229 [0.26]	0.001 [0.00]	-0.477 [-0.38]
1991	(0.542)	(0.011)	(0.144)	(0.996)	(0.002)
B.E.	0.315 [0.37]	0.382 [0.47]	0.331 [0.39]	0.434 [0.54]	-0.504 [-0.40]
1992	(0.064)	(0.019)	(0.038)	(0.006)	(0.004)
B.E.	0.534 [0.71]	0.465 [0.59]	0.594 [0.81]	0.488 [0.63]	-0.108 [-0.10]
1993	(0.002)	(0.004)	(< 0.001)	(0.002)	(0.564)
B.E.	0.502 [0.65]	0.553 [0.74]	0.631 [0.89]	0.510 [0.67]	0.071 [0.07]
1994	(< 0.001)	(0.001)	(< 0.001)	(0.003)	(0.708)
B.E.	0.600 [0.82]	0.569 [0.77]	0.675 [0.96]	0.709 [1.03]	0.161 [0.17]
1995	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(0.450)
B.E.	0.642 [0.90]	0.532 [0.70]	0.636 [0.89]	0.847 [1.33]	-0.077 [-0.07]
1996	(< 0.001)	(0.002)	(< 0.001)	(< 0.001)	(0.747)
B.E.	0.583 [0.79]	0.585 [0.79]	0.612 [0.84]	0.652 [0.92]	0.115 [0.12]
1997	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(0.636)
B.E.	0.594 [0.81]	0.642 [0.90]	0.582 [0.79]	0.974 [1.65]	0.094 [0.10]
1998	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(0.679)
B.E.	0.514 [0.67]	0.537 [0.71]	0.718 [1.05]	1.179 [2.25]	-0.261 [-0.23]
1999	(0.002)	(0.002)	(< 0.001)	(< 0.001)	(0.234)
B.E.	0.551 [0.74]	0.641 [0.90]	0.722 [1.06]	1.387 [3.00]	-0.074 [-0.07]
2000	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(0.758)
B.E.	0.555 [0.74]	0.604 [0.83]	0.631 [0.88]	1.542 [3.67]	-0.040 [-0.05]
2001	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)	(0.865)

Notes. Border effects are reported in brackets and p-values are reported in parentheses.

Table 5.5. Canada - United States Trade

	Coefficient	Percent Impact	P-Value
GDP $_{Large}$	0.07		0.88
GDP $_{Small}$	0.33		0.47
GDP Per Capita $_{Large}$	-0.59		0.21
GDP Per Capita $_{Small}$	0.88		0.06
Capital-Labour Ratio $_{Large}$	-1.30		< 0.01
Capital-Labour Ratio $_{Small}$	1.06		0.01
Land-Labour Ratio $_{Large}$	-0.42		0.17
Land-Labour Ratio $_{Small}$	-0.87		< 0.01
Exchange Rate	2.16		< 0.01
Average Tariff Rate	0.09		< 0.01
Linear Trend	0.06		< 0.01
NAFTA	0.15	16.32	< 0.01
Adjusted R^2 = 0.930			
F = 168.83, p-value < 0.01			

Table 5.6. Canada - United States Trade, Provincial NAFTA Effects

	Coefficient	Percent Impact	P-Value
GDP $_{Large}$	-0.18		0.72
GDP $_{Small}$	-0.28		0.59
GDP Per Capita $_{Large}$	-0.58		0.27
GDP Per Capita $_{Small}$	0.76		0.12
Capital-Labour Ratio $_{Large}$	-1.09		0.01
Capital-Labour Ratio $_{Small}$	-0.05		0.93
Land-Labour Ratio $_{Large}$	-0.72		0.03
Land-Labour Ratio $_{Small}$	-0.73		0.01
Exchange Rate	2.18		< 0.01
Average Tariff Rate	0.09		< 0.01
Linear Trend	0.09		< 0.01
NAFTA $_{\text{British Columbia – U.S.}}$	-0.02	-2.20	0.83
NAFTA $_{\text{Alberta – U.S.}}$	0.13	13.73	0.17
NAFTA $_{\text{Saskatchewan – U.S.}}$	0.33	39.34	< 0.01
NAFTA $_{\text{Manitoba – U.S.}}$	0.14	14.46	0.09
NAFTA $_{\text{Ontario – U.S.}}$	0.15	15.86	0.07
NAFTA $_{\text{Quebec – U.S.}}$	0.06	6.16	0.45
NAFTA $_{\text{New Brunswick – U.S.}}$	0.04	3.73	0.65
NAFTA $_{\text{Nova Scotia – U.S.}}$	0.07	6.85	0.41
NAFTA $_{\text{Prince Edward Island – U.S.}}$	0.57	76.12	< 0.01
NAFTA $_{\text{Newfoundland – U.S.}}$	0.12	12.76	0.24
Adjusted R^2 = 0.930			
F = 166.83, p-value < 0.01			

Table 5.7. Canada - United States and Interprovincial Trade

	Coefficient	Percent Impact	P-Value
GDP $_{Large}$	-0.16		0.70
GDP $_{Small}$	0.10		0.81
GDP Per Capita $_{Large}$	-0.51		0.23
GDP Per Capita $_{Small}$	0.99		0.02
Capital-Labour Ratio $_{Large}$	-1.02		< 0.01
Capital-Labour Ratio $_{Small}$	1.08		< 0.01
Land-Labour Ratio $_{Large}$	-0.59		0.03
Land-Labour Ratio $_{Small}$	-0.97		< 0.01
Exchange Rate	2.53		< 0.01
Average Tariff Rate	0.07		< 0.01
Linear Trend	0.04		< 0.01
NAFTA $_{United\ States}$	0.14	14.65	< 0.01
NAFTA $_{Canada}$	-0.11	-10.07	0.26
Adjusted $R^2 = 0.935$			
$F = 183.69$, p-value < 0.01			

Table 5.8. Canada - United States and Interprovincial Trade, Provincial NAFTA Effects

	Coefficient	Percent Impact	P-Value
GDP $_{Large}$	-0.32		0.49
GDP $_{Small}$	-0.39		0.43
GDP Per Capita $_{Large}$	-0.47		0.31
GDP Per Capita $_{Small}$	0.90		0.04
Capital-Labour Ratio $_{Large}$	-0.95		< 0.01
Capital-Labour Ratio $_{Small}$	-0.05		0.92
Land-Labour Ratio $_{Large}$	-0.90		< 0.01
Land-Labour Ratio $_{Small}$	-0.86		< 0.01
Exchange Rate	2.55		< 0.01
Average Tariff Rate	0.08		< 0.01
Linear Trend	0.08		< 0.01
NAFTA $_{\text{British Columbia – U.S.}}$	-0.04	-4.23	0.65
NAFTA $_{\text{Alberta – U.S.}}$	0.11	11.65	0.20
NAFTA $_{\text{Saskatchewan – U.S.}}$	0.32	38.24	< 0.01
NAFTA $_{\text{Manitoba – U.S.}}$	0.11	11.99	0.14
NAFTA $_{\text{Ontario – U.S.}}$	0.13	14.40	0.08
NAFTA $_{\text{Quebec – U.S.}}$	0.04	4.30	0.57
NAFTA $_{\text{New Brunswick – U.S.}}$	0.02	2.16	0.78
NAFTA $_{\text{Nova Scotia – U.S.}}$	0.05	4.90	0.53
NAFTA $_{\text{Prince Edward Island – U.S.}}$	0.55	73.29	< 0.01
NAFTA $_{\text{Newfoundland – U.S.}}$	0.11	12.15	0.23
NAFTA $_{\text{British Columbia – Canada}}$	-0.33	-27.97	< 0.01
NAFTA $_{\text{Alberta – Canada}}$	-0.02	-2.38	0.88
NAFTA $_{\text{Saskatchewan – Canada}}$	0.14	15.01	0.37
NAFTA $_{\text{Manitoba – Canada}}$	0.03	2.63	0.86
NAFTA $_{\text{Ontario – Canada}}$	-0.22	-20.07	0.15
NAFTA $_{\text{Quebec – Canada}}$	-0.19	-16.96	0.22
NAFTA $_{\text{New Brunswick – Canada}}$	-0.12	-11.68	0.42
NAFTA $_{\text{Nova Scotia – Canada}}$	-0.07	-6.91	0.64
NAFTA $_{\text{Prince Edward Island – Canada}}$	0.12	12.88	0.44
NAFTA $_{\text{Newfoundland – Canada}}$	0.17	18.90	0.28

Adjusted $R^2 = 0.935$

$F = 179.03$, p-value < 0.01

Table 5.9. Factors Behind the NAFTA Effects

	Correlation Coefficient
1989 Tariff	0.260
Export Share, 1989	-0.281
Export Share, 2001	**0.378**
Export - GDP Ratio, 1989	-0.262
Export - GDP Ratio, 2001	0.253
Import Share, 1989	-0.348
Import Share, 2001	-0.265

Note. Bold Indicates significance at the 10 percent level.

Table 5.10a. Provincial Trade Flows, Billions of Constant 1997 Dollars, and Increase Factors

	BC			Alberta			Saskatchewan			Manitoba		
Exports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	5.12	9.20	1.80	14.55	22.02	1.51	3.80	6.96	1.83	4.49	5.41	1.21
USA	8.50	20.99	2.47	11.61	47.31	4.07	2.51	6.23	2.48	2.23	6.94	3.11
Mexico	0.04	0.08	2.08	0.08	0.45	5.53	0.04	0.25	6.83	0.02	0.18	8.59
EU15	3.25	2.02	0.62	0.29	0.88	3.06	0.26	0.68	2.67	0.25	0.35	1.41
EA-ANZ	8.35	6.35	0.76	2.49	3.18	1.28	1.36	1.93	1.42	0.42	0.97	2.30
ROW	0.63	0.73	1.15	1.24	1.42	1.15	1.06	1.68	1.58	0.34	0.44	1.31
Total	25.89	39.36	1.52	30.26	75.27	2.49	9.03	17.73	1.96	7.74	14.29	1.85
Imports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	13.37	14.23	1.06	13.01	18.75	1.44	5.60	6.43	1.15	5.14	6.92	1.34
USA	6.63	11.54	1.74	3.32	9.33	2.81	1.53	3.78	2.47	2.87	7.65	2.67
Mexico	0.06	0.49	8.32	0.03	0.45	15.34	0.01	0.15	26.81	0.02	0.16	9.89
EU15	1.02	1.30	1.27	0.37	1.19	3.25	0.11	0.21	1.89	0.15	0.95	6.28
EA-ANZ	7.40	13.43	1.81	0.30	0.93	3.10	0.02	0.13	5.59	0.23	0.52	2.32
ROW	0.47	0.85	1.80	0.07	0.27	4.18	0.02	0.03	1.79	0.04	0.17	4.39
Total	28.96	41.84	1.44	17.09	30.93	1.81	7.29	10.72	1.47	8.44	16.37	1.94
Total Trade	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	18.49	23.43	1.27	27.55	40.77	1.48	9.41	13.38	1.42	9.63	12.33	1.28
USA	15.14	32.53	2.15	14.93	56.65	3.79	4.04	10.01	2.48	5.10	14.60	2.86
Mexico	0.10	0.57	5.88	0.11	0.90	8.14	0.04	0.40	9.53	0.04	0.34	9.16
EU15	4.27	3.32	0.78	0.65	2.07	3.17	0.36	0.89	2.44	0.40	1.30	3.27
EA-ANZ	15.75	19.78	1.26	2.79	4.11	1.48	1.38	2.05	1.49	0.65	1.49	2.31
ROW	1.11	1.58	1.43	1.31	1.70	1.30	1.08	1.71	1.58	0.37	0.61	1.62
Total	54.86	81.21	1.48	47.34	106.20	2.24	16.32	28.45	1.74	16.18	30.66	1.89

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 5.10b. Provincial Trade Flows, Billions of Constant 1997 Dollars, and Increase Factors

	Ontario			Quebec			New Brunswick			Nova Scotia		
Exports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	39.70	37.81	0.95	26.52	27.40	1.03	3.09	4.12	1.34	2.28	3.11	1.37
USA	67.23	157.30	2.34	19.49	54.62	2.80	2.20	6.76	3.07	1.72	4.40	2.56
Mexico	0.38	1.28	3.37	0.13	0.27	2.08	0.00	0.01	3.55	0.02	0.03	1.23
EU15	3.84	5.06	1.32	4.09	5.42	1.32	0.71	0.31	0.44	0.36	0.35	0.95
EA-ANZ	3.34	3.31	0.99	1.58	2.17	1.37	0.30	0.26	0.86	0.16	0.25	1.60
ROW	2.91	3.05	1.05	1.55	1.82	1.17	0.29	0.25	0.86	0.22	0.26	1.17
Total	117.39	207.81	1.77	53.36	91.70	1.72	6.59	11.72	1.78	4.75	8.39	1.76
Imports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	28.63	35.36	1.23	21.86	24.84	1.14	3.97	4.23	1.07	4.70	4.26	0.91
USA	71.02	142.90	2.01	12.55	18.27	1.46	1.05	2.13	2.04	0.54	0.98	1.83
Mexico	1.65	9.10	5.50	0.15	0.94	6.18	0.00	0.02	6.08	0.03	0.02	0.58
EU15	7.79	14.65	1.88	7.00	13.87	1.98	0.34	0.74	2.18	1.88	2.59	1.38
EA-ANZ	9.39	21.49	2.29	4.27	6.93	1.62	0.07	0.08	1.27	0.31	0.19	0.61
ROW	2.68	5.42	2.02	3.39	7.41	2.18	1.26	2.21	1.76	0.63	1.42	2.25
Total	121.18	228.92	1.89	49.23	72.25	1.47	6.68	9.43	1.41	8.09	9.46	1.17
Total Trade	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	68.33	73.17	1.07	48.38	52.24	1.08	7.05	8.36	1.19	6.98	7.37	1.06
USA	138.30	300.30	2.17	32.04	72.88	2.27	3.25	8.89	2.74	2.25	5.38	2.39
Mexico	2.03	10.38	5.10	0.28	1.21	4.29	0.01	0.04	4.88	0.05	0.04	0.86
EU15	11.63	19.71	1.69	11.10	19.29	1.74	1.05	1.05	1.00	2.25	2.94	1.31
EA-ANZ	12.73	24.79	1.95	5.85	9.10	1.56	0.37	0.34	0.93	0.46	0.44	0.94
ROW	5.60	8.47	1.51	4.94	9.22	1.87	1.55	2.46	1.59	0.85	1.68	1.97
Total	238.62	436.81	1.83	102.60	163.94	1.60	13.27	21.14	1.59	12.85	17.85	1.39

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 5.10c. Provincial Trade Flows, Billions of Constant 1997 Dollars, and Increase Factors

	PEI			Newfoundland			Territories		
Exports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	0.34	0.50	1.45	0.57	2.19	3.86	0.54	0.65	1.21
USA	0.12	0.49	3.96	1.37	2.05	1.49	0.02	0.02	1.16
Mexico	0.00	0.00	3.37	0.00	0.00	1.46	0.00	0.00	0.00
EU15	0.03	0.03	0.89	0.40	0.73	1.83	0.19	0.90	4.84
EA-ANZ	0.01	0.01	1.19	0.12	0.23	1.97	0.14	0.00	0.00
ROW	0.03	0.03	1.19	0.25	0.21	0.86	0.02	0.02	0.93
Total	0.53	1.06	1.99	2.70	5.41	2.00	0.90	1.59	1.76
Imports	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	0.76	0.85	1.12	2.78	2.39	0.86	1.15	1.13	0.98
USA	0.02	0.01	0.46	0.15	0.23	1.46	0.01	0.05	3.49
Mexico	0.00	0.00	1.98	0.00	0.01	9.33	0.00	0.00	0.29
EU15	0.00	0.00	1.30	0.27	0.18	0.64	0.00	0.00	1.18
EA-ANZ	0.00	0.00	1.16	0.01	0.02	2.24	0.00	0.00	4.75
ROW	0.00	0.00	15.99	0.46	1.28	2.77	0.00	0.00	0.34
Total	0.78	0.87	1.10	3.68	4.10	1.11	1.17	1.18	1.01
Total Trade	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Canada	1.10	1.34	1.22	3.34	4.57	1.37	1.69	1.78	1.05
USA	0.15	0.50	3.41	1.53	2.28	1.49	0.03	0.07	2.10
Mexico	0.00	0.00	3.20	0.00	0.01	4.80	0.00	0.00	0.24
EU15	0.03	0.03	0.93	0.67	0.90	1.34	0.19	0.90	4.81
EA-ANZ	0.01	0.01	1.18	0.13	0.25	1.99	0.14	0.00	0.01
ROW	0.03	0.04	1.30	0.71	1.49	2.10	0.02	0.02	0.93
Total	1.32	1.92	1.46	6.38	9.51	1.49	2.07	2.77	1.34

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 5.11a. Shares of Provincial Trade Flows

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
Exports	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	19.77	23.37	48.08	29.26	42.14	39.25	57.95	37.86	33.82	18.19	49.70	29.88
USA	32.84	53.32	38.37	62.85	27.79	35.13	28.80	48.59	57.27	75.70	36.53	59.57
Mexico	0.15	0.20	0.27	0.60	0.40	1.40	0.27	1.24	0.32	0.62	0.25	0.30
EU15	12.56	5.13	0.95	1.17	2.84	3.85	3.17	2.42	3.27	2.44	7.67	5.91
EA-ANZ	32.24	16.13	8.23	4.23	15.03	10.87	5.45	6.80	2.84	1.59	2.96	2.36
ROW	2.44	1.85	4.11	1.89	11.79	9.49	4.35	3.08	2.48	1.47	2.90	1.98
Imports	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	46.16	34.01	76.12	60.62	76.88	59.93	60.93	42.25	23.63	15.45	44.41	34.37
USA	22.90	27.58	19.43	30.18	21.01	35.26	33.96	46.76	58.61	62.42	25.49	25.29
Mexico	0.20	1.18	0.17	1.46	0.08	1.43	0.19	0.97	1.36	3.98	0.31	1.31
EU15	3.53	3.10	2.14	3.84	1.49	1.92	1.79	5.81	6.43	6.40	14.23	19.20
EA-ANZ	25.56	32.09	1.76	3.01	0.31	1.18	2.67	3.19	7.75	9.39	8.67	9.59
ROW	1.64	2.03	0.38	0.88	0.24	0.29	0.45	1.02	2.22	2.37	6.89	10.25
Total Trade	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	33.70	28.85	58.20	38.39	57.66	47.04	59.51	40.20	28.63	16.75	47.16	31.86
USA	27.60	40.06	31.54	53.34	24.76	35.18	31.49	47.62	57.96	68.75	31.23	44.46
Mexico	0.18	0.70	0.23	0.85	0.26	1.41	0.23	1.09	0.85	2.38	0.28	0.74
EU15	7.79	4.08	1.38	1.95	2.23	3.12	2.45	4.23	4.87	4.51	10.82	11.77
EA-ANZ	28.71	24.36	5.89	3.87	8.45	7.22	4.00	4.87	5.33	5.68	5.70	5.55
ROW	2.02	1.95	2.77	1.60	6.63	6.02	2.32	1.98	2.34	1.94	4.82	5.62

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 5.11b. Shares of Provincial Trade Flows

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
Exports	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	46.81	35.21	47.87	37.09	64.39	46.91	20.95	40.40	59.60	41.01
USA	33.42	57.70	36.11	52.43	23.38	46.53	50.82	37.93	2.27	1.49
Mexico	0.05	0.11	0.46	0.32	0.04	0.07	0.04	0.03	0.00	0.00
EU15	10.75	2.66	7.68	4.12	5.31	2.38	14.65	13.39	20.53	56.31
EA-ANZ	4.60	2.22	3.27	2.97	1.84	1.10	4.39	4.33	15.42	0.03
ROW	4.36	2.11	4.62	3.06	5.04	3.02	9.15	3.92	2.18	1.15
Imports	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	59.38	44.90	58.12	45.02	96.57	97.84	75.52	58.26	98.69	95.72
USA	15.66	22.64	6.65	10.40	2.93	1.23	4.20	5.52	1.18	4.10
Mexico	0.06	0.25	0.35	0.18	0.00	0.01	0.02	0.20	0.00	0.00
EU15	5.08	7.85	23.25	27.41	0.42	0.49	7.45	4.30	0.11	0.12
EA-ANZ	0.99	0.89	3.82	1.99	0.05	0.05	0.24	0.49	0.01	0.06
ROW	18.83	23.48	7.81	15.00	0.03	0.37	12.57	31.23	0.00	0.00
Total Trade	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Canada	53.14	39.53	54.33	41.30	83.56	69.83	52.40	48.09	81.67	64.28
USA	24.48	42.06	17.55	30.15	11.20	26.15	23.95	23.97	1.66	2.60
Mexico	0.06	0.17	0.39	0.24	0.02	0.04	0.03	0.10	0.00	0.00
EU15	7.90	4.97	17.49	16.47	2.40	1.53	10.50	9.48	9.00	32.42
EA-ANZ	2.78	1.62	3.62	2.45	0.77	0.63	2.00	2.68	6.72	0.04
ROW	11.64	11.64	6.63	9.39	2.05	1.83	11.12	15.68	0.95	0.66

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.1. Spatial Units of Analysis.

	Area	Population, 2001	GDP, 2001, US$
Canada	10 million km^2	32 million	695 billion
United States	9.6 million km^2	278 million	10 065 billion
EU-15	3.2 million km^2	380 million	7870 billion
Canada-U.S. Border: 6400 kilometres.			

Source. International Monetary Fund (2005a).

Table 6.2a. Provincial Exports, Millions of Constant 1997 Dollars, and Increase Factors

	BC			Alberta			Saskatchewan			Manitoba		
	1989	2001	IF	1989	2001	IF	1989	2001	IF	1989	2001	IF
Alaska	59.38	101.00	1.70	30.76	106.00	3.45	0.27	9.53	35.56	1.07	7.37	6.89
Alabama	68.96	141.00	2.04	25.12	73.82	2.94	2.69	63.50	23.62	3.74	21.02	5.62
Arkansas	14.06	76.18	5.42	27.83	44.99	1.62	1.03	13.89	13.55	22.47	34.69	1.54
Arizona	89.21	264.00	2.96	56.88	126.00	2.22	1.53	39.21	25.70	8.04	31.36	3.90
California	1410.00	4120.00	2.92	390.00	1750.00	4.49	93.27	155.00	1.66	88.37	246.00	2.78
Colorado	70.21	304.00	4.33	54.02	396.00	7.33	4.54	86.93	19.13	23.20	131.00	5.65
Connecticut	54.91	158.00	2.88	66.25	402.00	6.07	1.74	3.10	1.78	8.98	14.40	1.60
Dist. of Columbia	1.17	3.80	3.24	0.24	10.20	42.23	0.04	2.88	72.94	0.01	2.13	196.89
Delaware	36.04	26.44	0.73	2.14	13.38	6.25	6.01	6.76	1.12	1.85	4.34	2.35
Florida	256.00	285.00	1.11	52.75	363.00	6.88	24.32	39.74	1.63	13.46	228.00	16.94
Georgia	187.00	311.00	1.66	151.00	286.00	1.89	17.83	30.06	1.69	40.44	66.61	1.65
Iowa	28.59	112.00	3.92	276.00	1330.00	4.82	50.63	118.00	2.33	46.23	188.00	4.07
Idaho	95.13	289.00	3.04	68.35	209.00	3.06	3.75	33.06	8.81	7.18	17.11	2.38
Illinois	221.00	1170.00	5.29	1170.00	7740.00	6.62	539.00	906.00	1.68	281.00	355.00	1.26
Indiana	108.00	273.00	2.53	715.00	179.00	0.25	139.00	40.54	0.29	63.52	58.79	0.93
Kansas	24.78	81.70	3.30	24.76	1060.00	42.82	9.89	274.00	27.69	31.48	118.00	3.75
Kentucky	72.03	114.00	1.58	88.44	128.00	1.45	13.24	24.31	1.84	59.70	43.48	0.73
Louisiana	20.34	80.53	3.96	15.52	136.00	8.76	5.87	34.67	5.91	14.10	24.40	1.73
Massachusetts	127.00	226.00	1.78	22.81	301.00	13.20	6.32	13.15	2.08	27.29	30.30	1.11
Maryland	60.07	116.00	1.93	11.34	73.97	6.52	2.65	10.65	4.02	7.81	23.29	2.98
Maine	77.29	113.00	1.46	19.74	53.17	2.69	0.89	2.98	3.36	3.48	37.84	10.87
Michigan	199.00	275.00	1.38	680.00	2330.00	3.43	34.85	38.65	1.11	79.83	446.00	5.59
Minnesota	278.00	320.00	1.15	1670.00	2800.00	1.68	607.00	489.00	0.81	285.00	1480.00	5.19
Missouri	93.75	202.00	2.15	30.88	172.00	5.57	23.89	72.57	3.04	29.93	83.98	2.81
Mississippi	34.91	38.14	1.09	10.38	19.73	1.90	18.25	16.20	0.89	5.03	9.82	1.95
Montana	92.44	191.00	2.07	816.00	1030.00	1.26	36.23	653.00	18.03	22.19	190.00	8.56
North Carolina	163.00	270.00	1.66	52.65	250.00	4.75	11.32	31.67	2.80	26.47	66.94	2.53
North Dakota	13.43	65.69	4.89	76.69	628.00	8.19	201.00	358.00	1.78	247.00	515.00	2.09
Nebraska	20.92	81.65	3.90	26.06	111.00	4.26	32.77	89.37	2.73	41.70	207.00	4.96
New Hampshire	56.29	96.97	1.72	3.57	30.50	8.55	1.01	5.53	5.50	0.85	6.65	7.79
New Jersey	146.00	253.00	1.73	77.37	304.00	3.93	15.69	15.34	0.98	40.58	92.08	2.27

New Mexico	8.47	45.54	5.38	2.46	23.58	9.58	0.12	5.36	44.12	5.26	7.16	1.36
Nevada	49.55	245.00	4.94	19.85	78.04	3.93	1.52	9.28	6.09	2.91	11.89	4.09
New York	325.00	378.00	1.16	1050.00	6140.00	5.85	102.00	60.27	0.59	78.04	136.00	1.74
Ohio	249.00	373.00	1.50	322.00	1900.00	5.90	77.68	179.00	2.30	57.68	126.00	2.18
Oklahoma	17.47	64.44	3.69	21.33	92.32	4.33	72.44	14.08	0.19	16.72	44.00	2.63
Oregon	600.00	1160.00	1.93	121.00	452.00	3.74	35.74	293.00	8.20	14.04	52.56	3.74
Pennsylvania	180.00	311.00	1.73	44.13	901.00	20.42	46.31	248.00	5.35	64.15	449.00	7.00
Rhode Island	16.97	11.68	0.69	2.43	3.79	1.56	0.29	0.46	1.58	14.34	3.03	0.21
South Carolina	60.27	72.99	1.21	13.27	93.45	7.04	0.91	20.81	22.93	4.60	21.56	4.69
South Dakota	3.96	33.77	8.52	13.83	99.01	7.16	14.70	58.80	4.00	42.78	143.00	3.34
Tennessee	127.00	205.00	1.61	329.00	3030.00	9.21	36.43	64.30	1.76	32.68	90.08	2.76
Texas	212.00	737.00	3.48	308.00	1640.00	5.32	13.89	221.00	15.91	52.14	214.00	4.10
Utah	32.15	123.00	3.83	109.00	436.00	4.00	2.53	33.91	13.42	3.96	53.73	13.58
Virginia	71.72	99.12	1.38	45.60	160.00	3.51	6.84	56.05	8.19	30.95	44.91	1.45
Vermont	53.57	82.30	1.54	52.88	313.00	5.92	0.96	3.79	3.97	2.52	2.91	1.16
Washington	1900.00	6300.00	3.32	2050.00	7470.00	3.64	26.36	190.00	7.21	127.00	362.00	2.85
Wisconsin	386.00	534.00	1.38	369.00	1110.00	3.01	159.00	412.00	2.59	70.87	308.00	4.35
West Virginia	25.14	33.90	1.35	1.53	44.38	28.94	3.90	1.29	0.33	73.79	15.24	0.21
Wyoming	3.83	21.04	5.50	18.46	867.00	46.97	0.97	678.00	696.21	2.17	74.15	34.20
British Columbia	n/a	n/a	n/a	3410.00	5370.00	1.57	303.00	616.00	2.03	456.00	562.00	1.23
Alberta	1850.00	4850.00	2.62	n/a	n/a	n/a	914.00	2320.00	2.54	903.00	1410.00	1.56
Saskatchewan	357.00	439.00	1.23	1650.00	2950.00	1.79	n/a	n/a	n/a	637.00	614.00	0.96
Manitoba	274.00	394.00	1.44	1060.00	2140.00	2.02	558.00	913.00	1.64	n/a	n/a	n/a
Ontario	1580.00	2210.00	1.40	5960.00	8490.00	1.42	1420.00	2490.00	1.75	1720.00	1940.00	1.13
Quebec	688.00	984.00	1.43	1900.00	2380.00	1.25	531.00	469.00	0.88	593.00	662.00	1.12
New Brunswick	77.75	49.11	0.63	80.87	93.53	1.16	22.16	24.46	1.10	54.11	51.64	0.95
Nova Scotia	85.34	103.00	1.21	91.38	181.00	1.98	26.12	64.76	2.48	66.60	78.26	1.18
Prince Edward Is.	9.96	16.40	1.65	14.56	21.46	1.47	3.96	10.31	2.61	6.24	11.06	1.77
Newfoundland	36.51	53.80	1.47	51.76	119.00	2.30	11.87	25.02	2.11	22.20	36.27	1.63
Territories	160.00	99.44	0.62	328.00	280.00	0.85	14.25	25.30	1.78	27.06	44.70	1.65
Total	13619.56	30188.62	2.22	26152.88	69335.32	2.65	6313.45	13184.54	2.09	6713.80	12349.75	1.84

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.2b. Provincial Exports, Millions of Constant 1997 Dollars, and Increase Factors

	Ontario			Quebec			New Brunswick			Nova Scotia		
	1989	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Alaska	19.34	51.17	2.65	9.71	34.22	3.53	1.30	0.53	0.41	0.13	0.99	7.55
Alabama	238.00	855.00	3.59	320.00	364.00	1.14	4.88	24.69	5.06	2.27	81.30	35.87
Arkansas	137.00	476.00	3.47	153.00	582.00	3.80	0.48	12.43	25.90	0.43	3.40	7.96
Arizona	169.00	974.00	5.76	55.30	1240.00	22.42	2.26	9.77	4.32	0.90	3.83	4.24
California	2100.00	16400.00	7.81	370.00	1890.00	5.11	23.72	75.93	3.20	17.66	65.65	3.72
Colorado	172.00	510.00	2.97	52.98	420.00	7.93	2.35	6.26	2.66	0.34	6.19	18.35
Connecticut	449.00	931.00	2.07	561.00	1100.00	1.96	70.20	168.00	2.39	19.14	291.00	15.21
Dist. of Columbia	33.17	58.47	1.76	20.83	49.70	2.39	0.39	0.50	1.29	0.21	1.09	5.16
Delaware	338.00	581.00	1.72	65.97	174.00	2.64	11.32	6.44	0.57	3.11	5.58	1.79
Florida	467.00	1800.00	3.85	452.00	1450.00	3.21	25.32	95.97	3.79	45.45	83.75	1.84
Georgia	793.00	2240.00	2.82	343.00	1670.00	4.87	18.09	95.93	5.30	18.94	37.13	1.96
Iowa	319.00	629.00	1.97	60.49	268.00	4.43	1.75	32.44	18.53	0.36	14.41	40.40
Idaho	24.02	80.33	3.34	14.59	40.29	2.76	0.32	2.57	8.09	0.47	6.50	13.95
Illinois	3250.00	6050.00	1.86	881.00	2690.00	3.05	16.78	138.00	8.23	7.59	67.54	8.90
Indiana	1150.00	3490.00	3.03	379.00	1210.00	3.19	5.09	69.65	13.68	28.06	22.64	0.81
Kansas	292.00	1090.00	3.73	238.00	272.00	1.14	0.70	15.64	22.38	0.67	3.36	5.04
Kentucky	891.00	2810.00	3.15	360.00	1280.00	3.56	0.73	48.58	66.37	1.57	19.02	12.15
Louisiana	239.00	527.00	2.21	54.38	146.00	2.68	20.03	13.10	0.65	17.84	10.25	0.57
Massachusetts	921.00	2550.00	2.77	944.00	2030.00	2.15	557.00	1130.00	2.03	386.00	1620.00	4.20
Maryland	611.00	1070.00	1.75	338.00	820.00	2.43	12.97	87.39	6.74	23.26	56.55	2.43
Maine	156.00	495.00	3.17	280.00	682.00	2.44	770.00	1980.00	2.57	109.00	188.00	1.72
Michigan	25500.00	58200.00	2.28	2540.00	3210.00	1.26	25.80	88.70	3.44	43.38	63.86	1.47
Minnesota	801.00	2090.00	2.61	105.00	1120.00	10.67	6.86	33.87	4.94	1.29	6.91	5.35
Missouri	973.00	2350.00	2.42	152.00	415.00	2.73	4.93	10.45	2.12	1.94	2.95	1.52
Mississippi	174.00	320.00	1.84	47.19	143.00	3.03	3.39	32.33	9.54	1.95	2.19	1.12
Montana	21.93	104.00	4.74	5.74	20.02	3.49	0.22	1.07	4.79	0.55	2.19	3.95
North Carolina	873.00	1970.00	2.26	284.00	1070.00	3.77	11.75	62.50	5.32	4.97	43.98	8.84
North Dakota	51.67	103.00	1.99	13.84	22.26	1.61	0.51	0.53	1.04	0.12	1.14	9.52
Nebraska	172.00	256.00	1.49	24.67	83.93	3.40	1.90	4.09	2.15	0.03	0.97	27.88
New Hampshire	94.07	474.00	5.04	205.00	719.00	3.51	57.80	311.00	5.38	32.79	61.56	1.88
New Jersey	1270.00	3980.00	3.13	891.00	2300.00	2.58	53.83	214.00	3.98	94.31	94.65	1.00

New Mexico	28.24	88.46	3.13	63.94	96.59	1.51	0.21	1.53	7.36	0.11	1.15	10.14
Nevada	59.72	329.00	5.51	26.71	120.00	4.49	4.21	8.37	1.99	0.17	5.46	31.95
New York	11900.00	12800.00	1.08	3400.00	8120.00	2.39	204.00	289.00	1.42	160.00	130.00	0.81
Ohio	3720.00	8940.00	2.40	791.00	2190.00	2.77	16.63	102.00	6.13	9.74	75.00	7.70
Oklahoma	326.00	469.00	1.44	47.21	553.00	11.71	0.54	45.15	83.26	0.10	34.34	346.03
Oregon	133.00	959.00	7.21	96.72	339.00	3.50	0.71	6.10	8.55	0.65	207.00	318.44
Pennsylvania	2210.00	5230.00	2.37	1170.00	3170.00	2.71	71.70	191.00	2.66	80.08	119.00	1.49
Rhode Island	100.00	403.00	4.03	107.00	226.00	2.11	16.47	36.14	2.19	12.10	27.55	2.28
South Carolina	370.00	1370.00	3.70	139.00	344.00	2.47	85.22	27.20	0.32	435.00	706.00	1.62
South Dakota	40.47	67.18	1.66	4.53	49.83	11.00	0.20	0.38	1.88	0.36	1.94	5.45
Tennessee	597.00	1860.00	3.12	239.00	1010.00	4.23	11.46	77.89	6.80	3.64	21.00	5.77
Texas	1390.00	4500.00	3.24	558.00	2950.00	5.29	14.35	477.00	33.24	32.92	105.00	3.19
Utah	54.60	380.00	6.96	31.72	721.00	22.73	0.38	5.76	15.07	0.30	4.31	14.43
Virginia	543.00	1700.00	3.13	530.00	1330.00	2.51	34.44	613.00	17.80	83.58	27.09	0.32
Vermont	385.00	419.00	1.09	1470.00	3730.00	2.54	8.47	14.26	1.68	1.15	6.15	5.34
Washington	1170.00	1080.00	0.92	201.00	582.00	2.90	5.39	13.77	2.55	11.65	18.21	1.56
Wisconsin	1260.00	2750.00	2.18	251.00	958.00	3.82	14.47	70.58	4.88	19.06	30.77	1.61
West Virginia	175.00	440.00	2.51	134.00	578.00	4.31	2.51	4.46	1.77	0.41	1.18	2.87
Wyoming	19.39	29.54	1.52	2.11	12.45	5.91	0.08	0.33	4.04	0.09	1.34	15.27
British Columbia	6100.00	5020.00	0.82	2590.00	2150.00	0.83	206.00	91.19	0.44	101.00	95.78	0.95
Alberta	6760.00	7330.00	1.08	2270.00	2540.00	1.12	69.09	66.64	0.96	95.11	185.00	1.95
Saskatchewan	2210.00	1560.00	0.71	681.00	781.00	1.15	27.96	20.90	0.75	23.10	51.55	2.23
Manitoba	2340.00	2400.00	1.03	837.00	903.00	1.08	27.96	63.92	2.29	31.93	72.82	2.28
Ontario	n/a	n/a	n/a	16300.00	17400.00	1.07	585.00	723.00	1.24	582.00	852.00	1.46
Quebec	16500.00	17200.00	1.04	n/a	n/a	n/a	910.00	1910.00	2.10	469.00	661.00	1.41
New Brunswick	1640.00	1250.00	0.76	1480.00	1430.00	0.97	n/a	n/a	n/a	488.00	665.00	1.36
Nova Scotia	2220.00	1630.00	0.73	1170.00	1120.00	0.96	901.00	715.00	0.79	n/a	n/a	n/a
Prince Edward Is.	303.00	221.00	0.73	157.00	181.00	1.15	132.00	200.00	1.52	125.00	164.00	1.31
Newfoundland	1220.00	857.00	0.70	835.00	644.00	0.77	224.00	303.00	1.35	346.00	310.00	0.90
Territories	402.00	338.00	0.84	201.00	254.00	1.26	4.11	30.83	7.50	14.27	53.14	3.72
Total	106875.62	195135.15	1.83	46005.62	81998.30	1.78	5291.25	10880.72	2.06	3991.24	7501.37	1.88

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.2c. Provincial Exports, Millions of Constant 1997 Dollars, and Increase Factors

	PEI			Newfoundland			Territories		
	1989	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Alaska	0.04	0.01	0.29	6.63	0.87	0.13	17.42	7.66	0.44
Alabama	0.27	0.74	2.76	57.00	1.25	0.02	0.23	0.02	0.07
Arkansas	0.12	1.78	15.34	0.07	0.35	4.84	0.00	0.00	
Arizona	0.03	1.18	37.06	0.00	9.63	2090.13	0.02	0.60	30.83
California	0.57	13.73	24.13	0.61	23.44	38.20	0.03	2.40	94.21
Colorado	0.01	1.87	240.24	0.02	0.38	17.67	0.00	0.14	56.65
Connecticut	2.98	15.07	5.06	9.50	103.00	10.84	0.00	0.10	
Dist. of Columbia	0.23	0.62	2.74	0.01	0.00	0.00	0.00	0.04	
Delaware	1.59	0.56	0.35	0.93	5.06	5.46	0.00	0.00	
Florida	2.31	25.24	10.91	23.22	133.00	5.73	0.01	0.70	49.84
Georgia	0.76	7.20	9.49	0.45	5.41	11.96	0.00	0.10	84.24
Iowa	0.00	1.39		0.00	2.15		0.00	0.01	
Idaho	0.07	1.82	25.90	0.00	1.31		0.00	0.11	
Illinois	1.61	3.02	1.88	6.12	19.36	3.16	0.00	0.06	
Indiana	0.45	5.24	11.63	0.56	23.54	41.87	0.00	0.04	
Kansas	0.13	0.44	3.34	0.11	1.52	13.90	0.00	0.02	
Kentucky	0.06	0.71	12.78	0.35	0.27	0.78	0.00	0.00	
Louisiana	0.21	1.54	7.19	8.38	1.37	0.16	0.00	0.00	0.00
Massachusetts	43.68	121.00	2.77	786.00	558.00	0.71	0.02	0.06	3.39
Maryland	1.69	11.34	6.72	78.11	11.95	0.15	0.00	0.06	
Maine	13.76	65.59	4.77	31.45	95.00	3.02	0.00	0.04	
Michigan	0.32	9.03	27.89	32.90	29.21	0.89	0.00	0.10	26.93
Minnesota	0.13	0.92	6.97	0.21	2.01	9.45	0.02	0.25	10.18
Missouri	0.13	1.63	12.27	0.03	0.58	20.22	0.00	0.07	20.67
Mississippi	0.07	0.21	3.09	0.70	0.72	1.04	0.00	0.00	
Montana	0.00	0.84		3.14	0.10	0.03	0.00	0.90	
North Carolina	0.92	15.59	16.95	1.81	7.53	4.17	0.00	0.01	
North Dakota	0.01	0.15	14.49	0.05	0.01	0.28	0.00	1.05	
Nebraska	0.01	0.07	5.09	0.01	0.51	74.07	0.00	0.04	
New Hampshire	1.39	8.37	6.01	16.74	18.67	1.11	0.00	0.00	1.14
New Jersey	13.20	54.92	4.16	17.10	392.00	22.92	0.00	0.01	

New Mexico	0.00	0.05		0.00	0.01		0.00	0.00	
Nevada	0.01	3.10	227.71	0.01	2.51	228.09	0.00	5.83	
New York	18.58	35.27	1.90	15.69	84.62	5.39	0.33	0.61	1.84
Ohio	1.64	28.91	17.65	1.71	25.98	15.19	0.01	0.05	7.81
Oklahoma	0.00	1.06		0.04	10.66	295.95	0.02	0.02	0.91
Oregon	0.01	2.84	240.46	0.09	0.33	3.81	0.36	0.08	0.21
Pennsylvania	8.81	20.05	2.27	162.00	88.18	0.54	0.00	0.52	
Rhode Island	2.97	2.68	0.90	1.24	10.01	8.04	0.00	0.00	
South Carolina	0.51	0.60	1.18	1.35	3.90	2.88	0.00	0.38	
South Dakota	0.00	0.15		0.00	0.01		0.00	0.00	
Tennessee	0.49	6.43	13.04	1.67	1.61	0.96	1.02	0.02	0.02
Texas	0.22	7.83	34.83	107.00	142.00	1.33	0.27	1.00	3.79
Utah	0.03	0.53	16.12	0.04	0.00	0.00	0.00	0.00	
Virginia	3.80	5.43	1.43	0.59	212.00	361.16	0.00	0.03	
Vermont	0.22	3.37	15.26	0.00	0.87		0.00	0.00	
Washington	0.25	0.26	1.06	0.85	13.37	15.70	0.33	0.40	1.23
Wisconsin	0.20	1.00	5.04	0.19	1.62	8.54	0.00	0.08	19.41
West Virginia	0.03	0.16	5.28	0.00	6.39	1836.29	0.00	0.07	
Wyoming	0.00	0.79	274.57	0.10	0.00	0.03	0.35	0.05	0.14
British Columbia	5.44	3.66	0.67	23.21	11.43	0.49	176.00	311.00	1.77
Alberta	6.64	11.15	1.68	21.95	21.84	0.99	116.00	12.28	0.11
Saskatchewan	2.42	1.97	0.81	12.54	8.34	0.66	3.96	0.37	0.09
Manitoba	1.81	16.03	8.85	6.90	10.59	1.54	7.16	2.34	0.33
Ontario	98.44	116.00	1.18	206.00	816.00	3.96	181.00	323.00	1.78
Quebec	64.62	87.16	1.35	163.00	480.00	2.94	43.70	2.62	0.06
New Brunswick	89.99	125.00	1.39	30.73	545.00	17.73	1.98	0.00	0.00
Nova Scotia	45.90	96.16	2.09	92.82	272.00	2.93	5.18	0.47	0.09
Prince Edward Is.	n/a	n/a	n/a	6.27	21.56	3.44	0.00	0.66	
Newfoundland	27.78	38.05	1.37	n/a	n/a	n/a	2.78	0.00	0.00
Territories	0.00	1.50		3.14	0.56	0.18	n/a	n/a	n/a
Total	467.59	989.00	2.12	1941.36	4239.60	2.18	558.21	676.49	1.21

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.3a. Provincial Imports, Millions of Constant 1997 Dollars, and Increase Factors

	BC			Alberta			Saskatchewan			Manitoba		
Exporter	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Alaska	37.09	164.00	4.42	2.40	4.27	1.77	0.14	0.06	0.45	0.41	0.85	2.07
Alabama	46.31	67.59	1.46	27.62	69.80	2.53	9.75	19.75	2.03	15.88	50.34	3.17
Arkansas	21.61	89.84	4.16	16.86	84.16	4.99	7.26	56.74	7.82	28.84	59.58	2.07
Arizona	62.04	173.00	2.79	47.41	203.00	4.28	4.16	7.41	1.78	11.95	77.39	6.48
California	1330.00	2450.00	1.84	448.00	1320.00	2.95	35.33	50.74	1.44	177.00	237.00	1.34
Colorado	48.14	87.72	1.82	63.47	127.00	2.00	6.34	22.15	3.49	11.41	60.77	5.32
Connecticut	64.53	88.73	1.38	23.31	43.03	1.85	3.63	17.28	4.76	32.53	46.37	1.43
Dist. of Columbia	0.69	3.61	5.23	0.05	0.35	7.09	0.02	0.91	39.75	2.25	3.50	1.55
Delaware	9.80	9.73	0.99	24.36	7.54	0.31	2.72	3.75	1.38	14.69	12.04	0.82
Florida	101.00	165.00	1.63	43.90	157.00	3.58	20.06	45.77	2.28	40.71	174.00	4.27
Georgia	55.73	153.00	2.75	50.48	130.00	2.58	22.21	78.10	3.52	32.75	276.00	8.43
Iowa	63.56	92.84	1.46	47.11	110.00	2.34	95.43	228.00	2.39	113.00	354.00	3.13
Idaho	70.25	125.00	1.78	33.72	121.00	3.59	1.07	6.20	5.77	8.51	28.46	3.34
Illinois	534.00	468.00	0.88	389.00	749.00	1.93	310.00	604.00	1.95	433.00	1100.00	2.54
Indiana	97.27	183.00	1.88	61.06	116.00	1.90	60.21	179.00	2.97	141.00	291.00	2.06
Kansas	45.32	63.37	1.40	61.04	131.00	2.15	33.37	89.83	2.69	31.23	104.00	3.33
Kentucky	80.95	113.00	1.40	41.39	97.66	2.36	20.73	25.29	1.22	61.43	133.00	2.17
Louisiana	22.21	34.41	1.55	30.88	126.00	4.08	5.17	40.25	7.78	17.52	61.76	3.53
Massachusetts	61.99	123.00	1.98	39.44	90.87	2.30	8.83	26.14	2.96	17.49	69.18	3.95
Maryland	22.95	36.23	1.58	6.83	17.19	2.52	97.51	13.94	0.14	34.69	32.34	0.93
Maine	2.58	6.25	2.42	1.56	9.63	6.18	0.44	1.69	3.89	1.82	3.36	1.85
Michigan	124.00	145.00	1.17	78.06	125.00	1.60	24.96	77.89	3.12	118.00	196.00	1.66
Minnesota	110.00	124.00	1.13	157.00	199.00	1.27	104.00	158.00	1.52	336.00	857.00	2.55
Missouri	134.00	135.00	1.01	131.00	77.70	0.59	61.24	159.00	2.60	106.00	171.00	1.61
Mississippi	14.81	27.59	1.86	17.02	20.89	1.23	4.93	17.33	3.52	13.10	32.96	2.52
Montana	67.51	83.96	1.24	43.10	221.00	5.13	16.71	58.06	3.47	14.48	7.62	0.53
North Carolina	77.28	126.00	1.63	47.58	115.00	2.42	17.26	67.08	3.89	34.83	160.00	4.59
North Dakota	7.36	35.89	4.87	7.02	38.01	5.41	60.17	128.00	2.13	168.00	269.00	1.60
Nebraska	17.38	39.85	2.29	27.96	66.36	2.37	19.64	51.71	2.63	34.09	83.40	2.45
New Hampshire	12.37	18.03	1.46	5.05	26.80	5.31	2.10	1.42	0.67	2.98	11.41	3.83
New Jersey	99.37	119.00	1.20	36.11	124.00	3.43	20.41	38.97	1.91	39.90	96.13	2.41

New Mexico	2.97	5.92	1.99	3.19	21.50	6.74	0.64	0.89	1.40	1.43	4.58	3.21
Nevada	28.16	207.00	7.35	26.56	62.20	2.34	0.55	3.24	5.92	5.54	15.64	2.82
New York	139.00	231.00	1.66	70.39	191.00	2.71	16.50	117.00	7.09	66.98	145.00	2.16
Ohio	238.00	339.00	1.42	135.00	374.00	2.77	127.00	193.00	1.52	153.00	440.00	2.88
Oklahoma	25.32	50.50	1.99	135.00	358.00	2.65	18.08	76.46	4.23	14.63	69.01	4.72
Oregon	504.00	945.00	1.88	38.64	81.29	2.10	6.12	30.42	4.97	24.56	27.75	1.13
Pennsylvania	127.00	239.00	1.88	89.72	310.00	3.46	39.29	204.00	5.19	74.61	340.00	4.56
Rhode Island	7.03	10.92	1.55	2.48	3.30	1.33	1.15	1.05	0.92	3.91	11.67	2.98
South Carolina	24.73	107.00	4.33	13.05	108.00	8.27	11.66	30.54	2.62	20.21	96.15	4.76
South Dakota	3.32	40.16	12.08	3.48	34.46	9.89	5.66	28.13	4.97	8.91	94.65	10.62
Tennessee	62.94	217.00	3.45	49.70	147.00	2.96	18.78	65.26	3.47	56.28	193.00	3.43
Texas	185.00	423.00	2.29	501.00	2310.00	4.61	64.56	372.00	5.76	104.00	491.00	4.72
Utah	55.49	103.00	1.86	38.08	123.00	3.23	2.28	14.49	6.37	3.79	18.74	4.95
Virginia	33.73	52.03	1.54	33.83	43.01	1.27	9.60	74.71	7.78	19.99	85.75	4.29
Vermont	2.67	5.27	1.98	1.26	3.91	3.10	0.17	1.31	7.61	1.03	5.10	4.95
Washington	1600.00	2850.00	1.78	57.36	279.00	4.86	7.09	14.84	2.09	29.69	51.35	1.73
Wisconsin	103.00	135.00	1.31	63.89	105.00	1.64	118.00	251.00	2.13	171.00	479.00	2.80
West Virginia	4.92	11.25	2.29	9.30	11.48	1.23	3.16	21.38	6.77	3.36	20.09	5.97
Wyoming	13.62	9.48	0.70	11.97	39.43	3.29	4.96	9.57	1.93	2.08	2.06	0.99
British Columbia	n/a	n/a	n/a	1850.00	4850.00	2.62	357.00	439.00	1.23	274.00	394.00	1.44
Alberta	3410.00	5370.00	1.57	n/a	n/a	n/a	1650.00	2950.00	1.79	1060.00	2140.00	2.02
Saskatchewan	303.00	616.00	2.03	914.00	2320.00	2.54	n/a	n/a	n/a	558.00	913.00	1.64
Manitoba	456.00	562.00	1.23	903.00	1410.00	1.56	637.00	614.00	0.96	n/a	n/a	n/a
Ontario	6100.00	5020.00	0.82	6760.00	7330.00	1.08	2210.00	1560.00	0.71	2340.00	2400.00	1.03
Quebec	2590.00	2150.00	0.83	2270.00	2540.00	1.12	681.00	781.00	1.15	837.00	903.00	1.08
New Brunswick	206.00	91.19	0.44	69.09	66.64	0.96	27.96	20.90	0.75	27.96	63.92	2.29
Nova Scotia	101.00	95.78	0.95	95.11	185.00	1.95	23.10	51.55	2.23	31.93	72.82	2.28
Prince Edward Is.	5.44	3.66	0.67	6.64	11.15	1.68	2.42	1.97	0.81	1.81	16.03	8.85
Newfoundland	23.21	11.43	0.49	21.95	21.84	0.99	12.54	8.34	0.66	6.90	10.59	1.54
Territories	176.00	311.00	1.77	116.00	12.28	0.11	3.96	0.37	0.09	7.16	2.34	0.33
Total	19973.66	25764.24	1.29	16299.48	28080.71	1.72	7136.02	10210.89	1.43	8005.25	14565.68	1.82

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.3b. Provincial Imports, Millions of Constant 1997 Dollars, and Increase Factors

	Ontario			Quebec			New Brunswick			Nova Scotia		
	1989	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**	**1989**	**2001**	**IF**
Alaska	37.12	4.80	0.13	5.68	9.10	1.60	0.00	4.33		0.00	7.58	2413.48
Alabama	635.00	1900.00	2.99	82.99	153.00	1.84	6.51	19.46	2.99	2.64	5.73	2.17
Arkansas	287.00	851.00	2.97	31.83	80.58	2.53	1.65	10.08	6.12	0.59	1.03	1.74
Arizona	371.00	758.00	2.04	76.72	324.00	4.22	0.92	14.79	16.15	1.32	6.74	5.09
California	3510.00	7580.00	2.16	703.00	1580.00	2.25	73.96	36.63	0.50	26.73	36.05	1.35
Colorado	323.00	541.00	1.67	45.01	69.13	1.54	2.59	9.64	3.73	1.29	0.81	0.63
Connecticut	779.00	1250.00	1.60	412.00	651.00	1.58	26.25	25.16	0.96	19.22	41.35	2.15
Dist. of Columbia	14.96	6.63	0.44	2.40	3.88	1.61	0.00	0.59	303.61	0.10	0.00	0.00
Delaware	421.00	610.00	1.45	655.00	139.00	0.21	4.71	7.48	1.59	0.36	0.26	0.72
Florida	979.00	2060.00	2.10	375.00	697.00	1.86	44.26	40.65	0.92	12.35	14.44	1.17
Georgia	1130.00	3940.00	3.49	246.00	408.00	1.66	18.52	70.59	3.81	7.47	6.06	0.81
Iowa	632.00	1530.00	2.42	91.43	107.00	1.17	8.98	9.45	1.05	6.07	2.45	0.40
Idaho	50.57	193.00	3.82	27.14	30.91	1.14	1.62	3.62	2.24	0.09	0.31	3.66
Illinois	5130.00	8220.00	1.60	752.00	690.00	0.92	57.37	89.15	1.55	49.97	9.21	0.18
Indiana	2870.00	7810.00	2.72	160.00	319.00	1.99	17.64	24.46	1.39	5.11	6.85	1.34
Kansas	333.00	1120.00	3.36	78.26	94.52	1.21	3.71	15.75	4.25	1.86	3.16	1.70
Kentucky	1000.00	4230.00	4.23	146.00	239.00	1.64	26.82	70.19	2.62	28.63	3.10	0.11
Louisiana	267.00	852.00	3.19	153.00	204.00	1.33	1.55	29.38	19.00	15.27	8.32	0.54
Massachusetts	1770.00	2170.00	1.23	630.00	1100.00	1.75	85.18	85.96	1.01	32.67	13.27	0.41
Maryland	749.00	794.00	1.06	444.00	170.00	0.38	4.61	13.29	2.88	3.97	24.16	6.09
Maine	102.00	152.00	1.49	184.00	443.00	2.41	121.00	479.00	3.96	6.23	1.50	0.24
Michigan	17800.00	26100.00	1.47	250.00	327.00	1.31	20.59	28.37	1.38	15.50	7.32	0.47
Minnesota	1080.00	2090.00	1.94	177.00	152.00	0.86	21.04	21.97	1.04	10.27	3.31	0.32
Missouri	1360.00	3960.00	2.91	310.00	121.00	0.39	28.74	7.70	0.27	27.22	12.35	0.45
Mississippi	300.00	540.00	1.80	26.05	50.67	1.95	5.63	11.79	2.09	1.44	560.00	389.97
Montana	8.46	29.88	3.53	8.85	2.67	0.30	0.28	3.18	11.43	0.04	0.00	0.00
North Carolina	1560.00	4050.00	2.60	361.00	659.00	1.83	18.04	64.33	3.57	5.17	9.17	1.77
North Dakota	26.07	103.00	3.95	2.11	6.59	3.12	0.76	1.05	1.38	0.05	0.03	0.61
Nebraska	144.00	465.00	3.23	8.09	18.71	2.31	2.27	2.47	1.09	0.57	0.19	0.34
New Hampshire	193.00	416.00	2.16	125.00	291.00	2.33	9.43	22.52	2.39	2.82	2.68	0.95
New Jersey	1870.00	3100.00	1.66	668.00	1130.00	1.69	24.77	55.87	2.26	14.32	8.25	0.58
New Mexico	12.10	37.32	3.08	2.14	12.44	5.82	0.30	3.30	11.16	0.03	0.06	2.31

Nevada	151.00	162.00	1.07	7.08	52.14	7.36	0.08	5.39	65.88	0.14	1.15	8.00
New York	4890.00	8630.00	1.76	1150.00	1750.00	1.52	41.97	36.54	0.87	26.26	17.02	0.65
Ohio	8300.00	17500.00	2.11	405.00	1360.00	3.36	58.80	46.64	0.79	31.51	50.12	1.59
Oklahoma	388.00	650.00	1.68	35.96	49.87	1.39	3.90	8.31	2.13	71.94	1.16	0.02
Oregon	303.00	508.00	1.68	60.61	98.16	1.62	19.12	28.74	1.50	1.87	0.58	0.31
Pennsylvania	3000.00	5610.00	1.87	508.00	869.00	1.71	48.24	110.00	2.28	34.05	15.56	0.46
Rhode Island	121.00	273.00	2.26	94.96	129.00	1.36	7.83	10.90	1.39	1.84	1.12	0.61
South Carolina	612.00	2410.00	3.94	164.00	331.00	2.02	94.99	159.00	1.67	5.04	2.55	0.51
South Dakota	69.08	166.00	2.40	3.89	20.47	5.27	0.47	1.10	2.36	0.29	0.14	0.48
Tennessee	1280.00	3970.00	3.10	148.00	247.00	1.67	16.96	45.96	2.71	17.71	1.52	0.09
Texas	2010.00	6950.00	3.46	790.00	1030.00	1.30	39.82	307.00	7.71	19.89	74.61	3.75
Utah	301.00	420.00	1.40	23.41	93.32	3.99	1.15	1.14	0.99	0.71	0.67	0.94
Virginia	708.00	1920.00	2.71	167.00	350.00	2.10	17.99	49.31	2.74	5.92	8.73	1.47
Vermont	89.82	153.00	1.70	1120.00	1100.00	0.98	1.63	2.37	1.46	0.47	0.13	0.28
Washington	435.00	595.00	1.37	354.00	328.00	0.93	32.91	18.11	0.55	6.57	6.33	0.96
Wisconsin	1990.00	4400.00	2.21	146.00	148.00	1.01	16.97	15.39	0.91	7.94	6.62	0.83
West Virginia	424.00	978.00	2.31	23.35	24.80	1.06	1.37	6.30	4.60	0.26	0.20	0.75
Wyoming	26.62	87.13	3.27	3.04	8.06	2.65	0.12	0.18	1.53	0.04	0.17	4.58
British Columbia	1580.00	2210.00	1.40	688.00	984.00	1.43	77.75	49.11	0.63	85.34	103.00	1.21
Alberta	5960.00	8490.00	1.42	1900.00	2380.00	1.25	80.87	93.53	1.16	91.38	181.00	1.98
Saskatchewan	1420.00	2490.00	1.75	531.00	469.00	0.88	22.16	24.46	1.10	26.12	64.76	2.48
Manitoba	1720.00	1940.00	1.13	593.00	662.00	1.12	54.11	51.64	0.95	66.60	78.26	1.18
Ontario	n/a	n/a	n/a	16500.00	17200.00	1.04	1640.00	1250.00	0.76	2220.00	1630.00	0.73
Quebec	16300.00	17400.00	1.07	n/a	n/a	n/a	1480.00	1430.00	0.97	1170.00	1120.00	0.96
New Brunswick	585.00	723.00	1.24	910.00	1910.00	2.10	n/a	n/a	n/a	901.00	715.00	0.79
Nova Scotia	582.00	852.00	1.46	469.00	661.00	1.41	488.00	665.00	1.36	n/a	n/a	n/a
Prince Edward Is.	98.44	116.00	1.18	64.62	87.16	1.35	89.99	125.00	1.39	45.90	96.16	2.09
Newfoundland	206.00	816.00	3.96	163.00	480.00	2.94	30.73	545.00	17.73	92.82	272.00	2.93
Territories	181.00	323.00	1.78	43.70	2.62	0.06	1.98	0.00	0.00	5.18	0.47	0.09
Total	99475.24	178205.77	1.79	34306.34	43107.80	1.26	5009.58	6368.33	1.27	5236.14	5244.76	1.00

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.3c. Provincial Imports, Millions of Constant 1997 Dollars, and Increase Factors

	PEI			Newfoundland			Territories		
	1989	2001	IF	1989	2001	IF	1989	2001	IF
Alaska	0.00	0.00		0.00	0.12		6.41	41.65	6.50
Alabama	0.02	0.01	0.86	4.27	0.10	0.02	0.13	0.00	0.00
Arkansas	0.05	0.17	3.60	0.72	0.95	1.32	0.05	0.00	0.00
Arizona	0.01	0.05	9.73	0.23	0.19	0.84	0.24	0.01	0.04
California	0.48	0.58	1.22	4.28	23.84	5.57	1.26	0.06	0.05
Colorado	0.06	0.03	0.45	0.25	0.05	0.19	0.05	0.00	0.00
Connecticut	0.23	0.09	0.38	3.35	0.58	0.17	0.01	0.00	0.81
Dist. of Columbia	0.00	0.00		0.03	0.00	0.00	0.00	0.00	
Delaware	0.00	0.02	5.44	0.00	0.00	0.67	0.04	0.00	0.00
Florida	0.50	0.26	0.53	37.17	0.37	0.01	0.54	0.07	0.13
Georgia	0.04	0.13	3.40	0.78	0.26	0.34	0.17	0.00	0.00
Iowa	0.03	0.01	0.42	0.28	0.10	0.35	0.00	0.00	1.63
Idaho	0.14	0.17	1.15	0.01	0.05	6.85	0.07	0.00	0.06
Illinois	2.97	0.27	0.09	18.44	0.36	0.02	2.17	0.08	0.04
Indiana	0.14	0.03	0.20	1.38	0.31	0.23	0.01	0.00	0.73
Kansas	0.02	0.00	0.00	0.56	0.09	0.17	0.03	0.00	0.00
Kentucky	1.14	0.08	0.07	1.27	0.28	0.22	0.01	0.00	0.00
Louisiana	0.02	6.17	339.04	4.19	45.94	10.96	0.00	0.00	
Massachusetts	0.87	0.38	0.44	10.68	2.13	0.20	0.05	0.01	0.21
Maryland	0.40	0.04	0.11	0.49	0.10	0.21	0.02	0.00	0.00
Maine	0.21	0.12	0.55	0.21	2.79	13.20	0.00	0.00	
Michigan	1.75	0.16	0.09	6.29	0.30	0.05	0.06	0.00	0.00
Minnesota	1.31	0.03	0.02	5.51	0.19	0.04	0.24	0.03	0.13
Missouri	3.27	0.03	0.01	14.74	0.31	0.02	0.02	0.00	0.00
Mississippi	0.02	0.06	3.85	0.50	4.30	8.59	0.00	0.00	0.00
Montana	0.00	0.00		0.15	0.49	3.38	0.00	0.01	4.30
North Carolina	3.89	0.02	0.01	1.52	0.36	0.24	0.05	0.00	0.00
North Dakota	0.00	0.00	0.00	0.21	0.00	0.00	0.21	0.00	0.00
Nebraska	0.03	0.12	4.49	0.03	0.00	0.12	0.00	0.01	
New Hampshire	0.26	0.11	0.43	0.95	0.15	0.16	0.01	0.00	0.00
New Jersey	0.22	0.19	0.89	2.81	37.31	13.25	0.02	0.00	0.22

New Mexico	0.00	0.00		0.00	0.36	271.10	0.00	0.00	0.00
Nevada	0.06	0.00	0.00	0.06	0.00	0.08	0.04	0.00	0.00
New York	2.11	0.33	0.16	2.19	31.25	14.27	0.20	0.01	0.03
Ohio	1.23	0.21	0.17	11.79	0.38	0.03	0.14	0.08	0.58
Oklahoma	0.00	0.00	0.00	0.27	0.53	2.01	0.07	0.29	4.02
Oregon	0.06	0.01	0.24	0.68	0.94	1.39	0.07	0.03	0.44
Pennsylvania	0.30	0.11	0.38	4.34	1.85	0.43	0.05	1.63	31.10
Rhode Island	0.01	0.05	6.42	0.09	0.01	0.08	0.01	0.00	0.00
South Carolina	0.01	0.10	10.18	0.45	0.76	1.67	0.00	0.00	
South Dakota	0.07	0.00	0.00	0.31	0.09	0.31	0.20	0.00	0.00
Tennessee	0.03	0.02	0.83	1.57	0.82	0.52	0.03	0.00	0.00
Texas	0.25	0.15	0.60	2.95	61.29	20.80	0.18	0.27	1.55
Utah	0.00	0.00	1.45	0.23	0.02	0.08	0.02	0.00	0.06
Virginia	0.11	0.00	0.03	1.63	3.58	2.20	0.00	0.01	1.99
Vermont	0.01	0.01	0.62	0.05	0.05	0.94	0.00	0.00	
Washington	0.21	0.11	0.52	2.44	0.67	0.28	0.78	3.66	4.72
Wisconsin	0.47	0.21	0.44	2.77	1.36	0.49	0.13	0.31	2.47
West Virginia	0.00	0.00	0.00	0.00	0.03	8.13	0.00	0.00	0.00
Wyoming	0.00	0.00		0.01	0.00	0.00	0.00	0.00	
British Columbia	9.96	16.40	1.65	36.51	53.80	1.47	160.00	99.44	0.62
Alberta	14.56	21.46	1.47	51.76	119.00	2.30	328.00	280.00	0.85
Saskatchewan	3.96	10.31	2.61	11.87	25.02	2.11	14.25	25.30	1.78
Manitoba	6.24	11.06	1.77	22.20	36.27	1.63	27.06	44.70	1.65
Ontario	303.00	221.00	0.73	1220.00	857.00	0.70	402.00	338.00	0.84
Quebec	157.00	181.00	1.15	835.00	644.00	0.77	201.00	254.00	1.26
New Brunswick	132.00	200.00	1.52	224.00	303.00	1.35	4.11	30.83	7.50
Nova Scotia	125.00	164.00	1.31	346.00	310.00	0.90	14.27	53.14	3.72
Prince Edward Is.	n/a	n/a	n/a	27.78	38.05	1.37	0.00	1.50	
Newfoundland	6.27	21.56	3.44	n/a	n/a	n/a	3.14	0.56	0.18
Territories	0.00	0.66		2.78	0.00	0.00	n/a	n/a	n/a
Total	780.97	858.12	1.10	2931.03	2612.17	0.89	1167.59	1175.73	1.01

Note. Missing values for increase factors are due to zero trade in 1989.

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.4a. Provincial Export Shares

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
	1989	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Alaska	0.44	0.33	0.12	0.15	0.00	0.07	0.02	0.06	0.02	0.03	0.02	0.04
Alabama	0.51	0.47	0.10	0.11	0.04	0.48	0.06	0.17	0.22	0.44	0.70	0.44
Arkansas	0.10	0.25	0.11	0.06	0.02	0.11	0.33	0.28	0.13	0.24	0.33	0.71
Arizona	0.66	0.87	0.22	0.18	0.02	0.30	0.12	0.25	0.16	0.50	0.12	1.51
California	10.35	13.65	1.49	2.52	1.48	1.18	1.32	1.99	1.96	8.40	0.80	2.30
Colorado	0.52	1.01	0.21	0.57	0.07	0.66	0.35	1.06	0.16	0.26	0.12	0.51
Connecticut	0.40	0.52	0.25	0.58	0.03	0.02	0.13	0.12	0.42	0.48	1.22	1.34
Dist. of Columbia	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.03	0.03	0.05	0.06
Delaware	0.26	0.09	0.01	0.02	0.10	0.05	0.03	0.04	0.32	0.30	0.14	0.21
Florida	1.88	0.94	0.20	0.52	0.39	0.30	0.20	1.85	0.44	0.92	0.98	1.77
Georgia	1.37	1.03	0.58	0.41	0.28	0.23	0.60	0.54	0.74	1.15	0.75	2.04
Iowa	0.21	0.37	1.06	1.92	0.80	0.89	0.69	1.52	0.30	0.32	0.13	0.33
Idaho	0.70	0.96	0.26	0.30	0.06	0.25	0.11	0.14	0.02	0.04	0.03	0.05
Illinois	1.62	3.88	4.47	11.16	8.54	6.87	4.19	2.87	3.04	3.10	1.91	3.28
Indiana	0.79	0.90	2.73	0.26	2.20	0.31	0.95	0.48	1.08	1.79	0.82	1.48
Kansas	0.18	0.27	0.09	1.53	0.16	2.08	0.47	0.96	0.27	0.56	0.52	0.33
Kentucky	0.53	0.38	0.34	0.18	0.21	0.18	0.89	0.35	0.83	1.44	0.78	1.56
Louisiana	0.15	0.27	0.06	0.20	0.09	0.26	0.21	0.20	0.22	0.27	0.12	0.18
Massachusetts	0.93	0.75	0.09	0.43	0.10	0.10	0.41	0.25	0.86	1.31	2.05	2.48
Maryland	0.44	0.38	0.04	0.11	0.04	0.08	0.12	0.19	0.57	0.55	0.73	1.00
Maine	0.57	0.37	0.08	0.08	0.01	0.02	0.05	0.31	0.15	0.25	0.61	0.83
Michigan	1.46	0.91	2.60	3.36	0.55	0.29	1.19	3.61	23.86	29.83	5.52	3.91
Minnesota	2.04	1.06	6.39	4.04	9.61	3.71	4.24	11.98	0.75	1.07	0.23	1.37
Missouri	0.69	0.67	0.12	0.25	0.38	0.55	0.45	0.68	0.91	1.20	0.33	0.51
Mississippi	0.26	0.13	0.04	0.03	0.29	0.12	0.07	0.08	0.16	0.16	0.10	0.17
Montana	0.68	0.63	3.12	1.49	0.57	4.95	0.33	1.54	0.02	0.05	0.01	0.02
North Carolina	1.20	0.89	0.20	0.36	0.18	0.24	0.39	0.54	0.82	1.01	0.62	1.30
North Dakota	0.10	0.22	0.29	0.91	3.18	2.72	3.68	4.17	0.05	0.05	0.03	0.03
Nebraska	0.15	0.27	0.10	0.16	0.52	0.68	0.62	1.68	0.16	0.13	0.05	0.10
New Hampshire	0.41	0.32	0.01	0.04	0.02	0.04	0.01	0.05	0.09	0.24	0.45	0.88
New Jersey	1.07	0.84	0.30	0.44	0.25	0.12	0.60	0.75	1.19	2.04	1.94	2.80

New Mexico	0.06	0.15	0.01	0.03	0.00	0.04	0.08	0.06	0.03	0.05	0.14	0.12
Nevada	0.36	0.81	0.08	0.11	0.02	0.07	0.04	0.10	0.06	0.17	0.06	0.15
New York	2.39	1.25	4.01	8.86	1.62	0.46	1.16	1.10	11.13	6.56	7.39	9.90
Ohio	1.83	1.24	1.23	2.74	1.23	1.36	0.86	1.02	3.48	4.58	1.72	2.67
Oklahoma	0.13	0.21	0.08	0.13	1.15	0.11	0.25	0.36	0.31	0.24	0.10	0.67
Oregon	4.41	3.84	0.46	0.65	0.57	2.22	0.21	0.43	0.12	0.49	0.21	0.41
Pennsylvania	1.32	1.03	0.17	1.30	0.73	1.88	0.96	3.64	2.07	2.68	2.54	3.87
Rhode Island	0.12	0.04	0.01	0.01	0.00	0.00	0.21	0.02	0.09	0.21	0.23	0.28
South Carolina	0.44	0.24	0.05	0.13	0.01	0.16	0.07	0.17	0.35	0.70	0.30	0.42
South Dakota	0.03	0.11	0.05	0.14	0.23	0.45	0.64	1.16	0.04	0.03	0.01	0.06
Tennessee	0.93	0.68	1.26	4.37	0.58	0.49	0.49	0.73	0.56	0.95	0.52	1.23
Texas	1.56	2.44	1.18	2.37	0.22	1.68	0.78	1.73	1.30	2.31	1.21	3.60
Utah	0.24	0.41	0.42	0.63	0.04	0.26	0.06	0.44	0.05	0.19	0.07	0.88
Virginia	0.53	0.33	0.17	0.23	0.11	0.43	0.46	0.36	0.51	0.87	1.15	1.62
Vermont	0.39	0.27	0.20	0.45	0.02	0.03	0.04	0.02	0.36	0.21	3.20	4.55
Washington	13.95	20.87	7.84	10.77	0.42	1.44	1.89	2.93	1.09	0.55	0.44	0.71
Wisconsin	2.83	1.77	1.41	1.60	2.52	3.12	1.06	2.49	1.18	1.41	0.55	1.17
West Virginia	0.18	0.11	0.01	0.06	0.06	0.01	1.10	0.12	0.16	0.23	0.29	0.70
Wyoming	0.03	0.07	0.07	1.25	0.02	5.14	0.03	0.60	0.02	0.02	0.00	0.02
British Columbia	n/a	n/a	13.04	7.74	4.80	4.67	6.79	4.55	5.71	2.57	5.63	2.62
Alberta	13.58	16.07	n/a	n/a	14.48	17.60	13.45	11.42	6.33	3.76	4.93	3.10
Saskatchewan	2.62	1.45	6.31	4.25	n/a	n/a	9.49	4.97	2.07	0.80	1.48	0.95
Manitoba	2.01	1.31	4.05	3.09	8.84	6.92	n/a	n/a	2.19	1.23	1.82	1.10
Ontario	11.60	7.32	22.79	12.24	22.49	18.89	25.62	15.71	n/a	n/a	35.43	21.22
Quebec	5.05	3.26	7.26	3.43	8.41	3.56	8.83	5.36	15.44	8.81	n/a	n/a
New Brunswick	0.57	0.16	0.31	0.13	0.35	0.19	0.81	0.42	1.53	0.64	3.22	1.74
Nova Scotia	0.63	0.34	0.35	0.26	0.41	0.49	0.99	0.63	2.08	0.84	2.54	1.37
Prince Edward Is.	0.07	0.05	0.06	0.03	0.06	0.08	0.09	0.09	0.28	0.11	0.34	0.22
Newfoundland	0.27	0.18	0.20	0.17	0.19	0.19	0.33	0.29	1.14	0.44	1.81	0.79
Territories	1.17	0.33	1.25	0.40	0.23	0.19	0.40	0.36	0.38	0.17	0.44	0.31

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.4b. Provincial Export Shares

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
	1989	2001	1989	2001	1989	2001	1989	2001	1989	2001
Alaska	0.02	0.00	0.00	0.01	0.01	0.00	0.34	0.02	3.12	1.13
Alabama	0.09	0.23	0.06	1.08	0.06	0.08	2.94	0.03	0.04	0.00
Arkansas	0.01	0.11	0.01	0.05	0.02	0.18	0.00	0.01	0.00	0.00
Arizona	0.04	0.09	0.02	0.05	0.01	0.12	0.00	0.23	0.00	0.09
California	0.45	0.70	0.44	0.88	0.12	1.39	0.03	0.55	0.00	0.35
Colorado	0.04	0.06	0.01	0.08	0.00	0.19	0.00	0.01	0.00	0.02
Connecticut	1.33	1.54	0.48	3.88	0.64	1.52	0.49	2.43	0.00	0.01
Dist. of Columbia	0.01	0.00	0.01	0.01	0.05	0.06	0.00	0.00	0.00	0.01
Delaware	0.21	0.06	0.08	0.07	0.34	0.06	0.05	0.12	0.00	0.00
Florida	0.48	0.88	1.14	1.12	0.49	2.55	1.20	3.14	0.00	0.10
Georgia	0.34	0.88	0.47	0.49	0.16	0.73	0.02	0.13	0.00	0.01
Iowa	0.03	0.30	0.01	0.19	0.00	0.14	0.00	0.05	0.00	0.00
Idaho	0.01	0.02	0.01	0.09	0.01	0.18	0.00	0.03	0.00	0.02
Illinois	0.32	1.27	0.19	0.90	0.34	0.31	0.32	0.46	0.00	0.01
Indiana	0.10	0.64	0.70	0.30	0.10	0.53	0.03	0.56	0.00	0.01
Kansas	0.01	0.14	0.02	0.04	0.03	0.04	0.01	0.04	0.00	0.00
Kentucky	0.01	0.45	0.04	0.25	0.01	0.07	0.02	0.01	0.00	0.00
Louisiana	0.38	0.12	0.45	0.14	0.05	0.16	0.43	0.03	0.00	0.00
Massachusetts	10.53	10.39	9.67	21.60	9.34	12.23	40.49	13.16	0.00	0.01
Maryland	0.25	0.80	0.58	0.75	0.36	1.15	4.02	0.28	0.00	0.01
Maine	14.55	18.20	2.73	2.51	2.94	6.63	1.62	2.24	0.00	0.01
Michigan	0.49	0.82	1.09	0.85	0.07	0.91	1.69	0.69	0.00	0.02
Minnesota	0.13	0.31	0.03	0.09	0.03	0.09	0.01	0.05	0.00	0.04
Missouri	0.09	0.10	0.05	0.04	0.03	0.16	0.00	0.01	0.00	0.01
Mississippi	0.06	0.30	0.05	0.03	0.01	0.02	0.04	0.02	0.00	0.00
Montana	0.00	0.01	0.01	0.03	0.00	0.09	0.16	0.00	0.00	0.13
North Carolina	0.22	0.57	0.12	0.59	0.20	1.58	0.09	0.18	0.00	0.00
North Dakota	0.01	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.16
Nebraska	0.04	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
New Hampshire	1.09	2.86	0.82	0.82	0.30	0.85	0.86	0.44	0.00	0.00
New Jersey	1.02	1.97	2.36	1.26	2.82	5.55	0.88	9.25	0.00	0.00

New Mexico	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Nevada	0.08	0.08	0.00	0.07	0.00	0.31	0.00	0.06	0.00	0.86
New York	3.86	2.66	4.01	1.73	3.97	3.57	0.81	2.00	0.06	0.09
Ohio	0.31	0.94	0.24	1.00	0.35	2.92	0.09	0.61	0.00	0.01
Oklahoma	0.01	0.41	0.00	0.46	0.00	0.11	0.00	0.25	0.00	0.00
Oregon	0.01	0.06	0.02	2.76	0.00	0.29	0.00	0.01	0.06	0.01
Pennsylvania	1.35	1.76	2.01	1.59	1.88	2.03	8.34	2.08	0.00	0.08
Rhode Island	0.31	0.33	0.30	0.37	0.63	0.27	0.06	0.24	0.00	0.00
South Carolina	1.61	0.25	10.90	9.41	0.11	0.06	0.07	0.09	0.00	0.06
South Dakota	0.00	0.00	0.01	0.03	0.00	0.02	0.00	0.00	0.00	0.00
Tennessee	0.22	0.72	0.09	0.28	0.11	0.65	0.09	0.04	0.18	0.00
Texas	0.27	4.38	0.82	1.40	0.05	0.79	5.51	3.35	0.05	0.15
Utah	0.01	0.05	0.01	0.06	0.01	0.05	0.00	0.00	0.00	0.00
Virginia	0.65	5.63	2.09	0.36	0.81	0.55	0.03	5.00	0.00	0.00
Vermont	0.16	0.13	0.03	0.08	0.05	0.34	0.00	0.02	0.00	0.00
Washington	0.10	0.13	0.29	0.24	0.05	0.03	0.04	0.32	0.06	0.06
Wisconsin	0.27	0.65	0.48	0.41	0.04	0.10	0.01	0.04	0.00	0.01
West Virginia	0.05	0.04	0.01	0.02	0.01	0.02	0.00	0.15	0.00	0.01
Wyoming	0.00	0.00	0.00	0.02	0.00	0.08	0.01	0.00	0.06	0.01
British Columbia	3.89	0.84	2.53	1.28	1.16	0.37	1.20	0.27	31.53	45.97
Alberta	1.31	0.61	2.38	2.47	1.42	1.13	1.13	0.52	20.78	1.81
Saskatchewan	0.53	0.19	0.58	0.69	0.52	0.20	0.65	0.20	0.71	0.06
Manitoba	0.53	0.59	0.80	0.97	0.39	1.62	0.36	0.25	1.28	0.35
Ontario	11.06	6.64	14.58	11.36	21.05	11.73	10.61	19.25	32.43	47.75
Quebec	17.20	17.55	11.75	8.81	13.82	8.81	8.40	11.32	7.83	0.39
New Brunswick	n/a	n/a	12.23	8.87	19.25	12.64	1.58	12.85	0.35	0.00
Nova Scotia	17.03	6.57	n/a	n/a	9.82	9.72	4.78	6.42	0.93	0.07
Prince Edward Is.	2.49	1.84	3.13	2.19	n/a	n/a	0.32	0.51	0.00	0.10
Newfoundland	4.23	2.78	8.67	4.13	5.94	3.85	n/a	n/a	0.50	0.00
Territories	0.08	0.28	0.36	0.71	0.00	0.15	0.16	0.01	n/a	n/a

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.5a. Provincial Import Shares

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
	1989	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Alaska	0.19	0.64	0.01	0.02	0.00	0.00	0.01	0.01	0.04	0.00	0.02	0.02
Alabama	0.23	0.26	0.17	0.25	0.14	0.19	0.20	0.35	0.64	1.07	0.24	0.35
Arkansas	0.11	0.35	0.10	0.30	0.10	0.56	0.36	0.41	0.29	0.48	0.09	0.19
Arizona	0.31	0.67	0.29	0.72	0.06	0.07	0.15	0.53	0.37	0.43	0.22	0.75
California	6.66	9.51	2.75	4.70	0.50	0.50	2.21	1.63	3.53	4.25	2.05	3.67
Colorado	0.24	0.34	0.39	0.45	0.09	0.22	0.14	0.42	0.32	0.30	0.13	0.16
Connecticut	0.32	0.34	0.14	0.15	0.05	0.17	0.41	0.32	0.78	0.70	1.20	1.51
Dist. of Columbia	0.00	0.01	0.00	0.00	0.00	0.01	0.03	0.02	0.02	0.00	0.01	0.01
Delaware	0.05	0.04	0.15	0.03	0.04	0.04	0.18	0.08	0.42	0.34	1.91	0.32
Florida	0.51	0.64	0.27	0.56	0.28	0.45	0.51	1.19	0.98	1.16	1.09	1.62
Georgia	0.28	0.59	0.31	0.46	0.31	0.76	0.41	1.89	1.14	2.21	0.72	0.95
Iowa	0.32	0.36	0.29	0.39	1.34	2.23	1.41	2.43	0.64	0.86	0.27	0.25
Idaho	0.35	0.49	0.21	0.43	0.02	0.06	0.11	0.20	0.05	0.11	0.08	0.07
Illinois	2.67	1.82	2.39	2.67	4.34	5.92	5.41	7.55	5.16	4.61	2.19	1.60
Indiana	0.49	0.71	0.37	0.41	0.84	1.75	1.76	2.00	2.89	4.38	0.47	0.74
Kansas	0.23	0.25	0.37	0.47	0.47	0.88	0.39	0.71	0.33	0.63	0.23	0.22
Kentucky	0.41	0.44	0.25	0.35	0.29	0.25	0.77	0.91	1.01	2.37	0.43	0.55
Louisiana	0.11	0.13	0.19	0.45	0.07	0.39	0.22	0.42	0.27	0.48	0.45	0.47
Massachusetts	0.31	0.48	0.24	0.32	0.12	0.26	0.22	0.47	1.78	1.22	1.84	2.55
Maryland	0.11	0.14	0.04	0.06	1.37	0.14	0.43	0.22	0.75	0.45	1.29	0.39
Maine	0.01	0.02	0.01	0.03	0.01	0.02	0.02	0.02	0.10	0.09	0.54	1.03
Michigan	0.62	0.56	0.48	0.45	0.35	0.76	1.47	1.35	17.89	14.65	0.73	0.76
Minnesota	0.55	0.48	0.96	0.71	1.46	1.55	4.20	5.88	1.09	1.17	0.52	0.35
Missouri	0.67	0.52	0.80	0.28	0.86	1.56	1.32	1.17	1.37	2.22	0.90	0.28
Mississippi	0.07	0.11	0.10	0.07	0.07	0.17	0.16	0.23	0.30	0.30	0.08	0.12
Montana	0.34	0.33	0.26	0.79	0.23	0.57	0.18	0.05	0.01	0.02	0.03	0.01
North Carolina	0.39	0.49	0.29	0.41	0.24	0.66	0.44	1.10	1.57	2.27	1.05	1.53
North Dakota	0.04	0.14	0.04	0.14	0.84	1.25	2.10	1.85	0.03	0.06	0.01	0.02
Nebraska	0.09	0.15	0.17	0.24	0.28	0.51	0.43	0.57	0.14	0.26	0.02	0.04
New Hampshire	0.06	0.07	0.03	0.10	0.03	0.01	0.04	0.08	0.19	0.23	0.36	0.68
New Jersey	0.50	0.46	0.22	0.44	0.29	0.38	0.50	0.66	1.88	1.74	1.95	2.62

New Mexico	0.01	0.02	0.02	0.08	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.03
Nevada	0.14	0.80	0.16	0.22	0.01	0.03	0.07	0.11	0.15	0.09	0.02	0.12
New York	0.70	0.90	0.43	0.68	0.23	1.15	0.84	1.00	4.92	4.84	3.35	4.06
Ohio	1.19	1.32	0.83	1.33	1.78	1.89	1.91	3.02	8.34	9.82	1.18	3.15
Oklahoma	0.13	0.20	0.83	1.27	0.25	0.75	0.18	0.47	0.39	0.36	0.10	0.12
Oregon	2.52	3.67	0.24	0.29	0.09	0.30	0.31	0.19	0.30	0.29	0.18	0.23
Pennsylvania	0.64	0.93	0.55	1.10	0.55	2.00	0.93	2.33	3.02	3.15	1.48	2.02
Rhode Island	0.04	0.04	0.02	0.01	0.02	0.01	0.05	0.08	0.12	0.15	0.28	0.30
South Carolina	0.12	0.42	0.08	0.38	0.16	0.30	0.25	0.66	0.62	1.35	0.48	0.77
South Dakota	0.02	0.16	0.02	0.12	0.08	0.28	0.11	0.65	0.07	0.09	0.01	0.05
Tennessee	0.32	0.84	0.30	0.52	0.26	0.64	0.70	1.33	1.29	2.23	0.43	0.57
Texas	0.93	1.64	3.07	8.23	0.90	3.64	1.30	3.37	2.02	3.90	2.30	2.39
Utah	0.28	0.40	0.23	0.44	0.03	0.14	0.05	0.13	0.30	0.24	0.07	0.22
Virginia	0.17	0.20	0.21	0.15	0.13	0.73	0.25	0.59	0.71	1.08	0.49	0.81
Vermont	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.04	0.09	0.09	3.26	2.55
Washington	8.01	11.06	0.35	0.99	0.10	0.15	0.37	0.35	0.44	0.33	1.03	0.76
Wisconsin	0.52	0.52	0.39	0.37	1.65	2.46	2.14	3.29	2.00	2.47	0.43	0.34
West Virginia	0.02	0.04	0.06	0.04	0.04	0.21	0.04	0.14	0.43	0.55	0.07	0.06
Wyoming	0.07	0.04	0.07	0.14	0.07	0.09	0.03	0.01	0.03	0.05	0.01	0.02
British Columbia	n/a	n/a	11.35	17.27	5.00	4.30	3.42	2.70	1.59	1.24	2.01	2.28
Alberta	17.07	20.84	n/a	n/a	23.12	28.89	13.24	14.69	5.99	4.76	5.54	5.52
Saskatchewan	1.52	2.39	5.61	8.26	n/a	n/a	6.97	6.27	1.43	1.40	1.55	1.09
Manitoba	2.28	2.18	5.54	5.02	8.93	6.01	n/a	n/a	1.73	1.09	1.73	1.54
Ontario	30.54	19.48	41.47	26.10	30.97	15.28	29.23	16.48	n/a	n/a	48.10	39.90
Quebec	12.97	8.34	13.93	9.05	9.54	7.65	10.46	6.20	16.39	9.76	n/a	n/a
New Brunswick	1.03	0.35	0.42	0.24	0.39	0.20	0.35	0.44	0.59	0.41	2.65	4.43
Nova Scotia	0.51	0.37	0.58	0.66	0.32	0.50	0.40	0.50	0.59	0.48	1.37	1.53
Prince Edward Is.	0.03	0.01	0.04	0.04	0.03	0.02	0.02	0.11	0.10	0.07	0.19	0.20
Newfoundland	0.12	0.04	0.13	0.08	0.18	0.08	0.09	0.07	0.21	0.46	0.48	1.11
Territories	0.88	1.21	0.71	0.04	0.06	0.00	0.09	0.02	0.18	0.18	0.13	0.01

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.5b. Provincial Import Shares

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
	1989	2001	1989	2001	1989	2001	1989	2001	1989	2001
Alaska	0.00	0.07	0.00	0.14	0.00	0.00	0.00	0.00	0.55	3.54
Alabama	0.13	0.31	0.05	0.11	0.00	0.00	0.15	0.00	0.01	0.00
Arkansas	0.03	0.16	0.01	0.02	0.01	0.02	0.02	0.04	0.00	0.00
Arizona	0.02	0.23	0.03	0.13	0.00	0.01	0.01	0.01	0.02	0.00
California	1.48	0.58	0.51	0.69	0.06	0.07	0.15	0.91	0.11	0.00
Colorado	0.05	0.15	0.02	0.02	0.01	0.00	0.01	0.00	0.00	0.00
Connecticut	0.52	0.40	0.37	0.79	0.03	0.01	0.11	0.02	0.00	0.00
Dist. of Columbia	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delaware	0.09	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Florida	0.88	0.64	0.24	0.28	0.06	0.03	1.27	0.01	0.05	0.01
Georgia	0.37	1.11	0.14	0.12	0.00	0.02	0.03	0.01	0.01	0.00
Iowa	0.18	0.15	0.12	0.05	0.00	0.00	0.01	0.00	0.00	0.00
Idaho	0.03	0.06	0.00	0.01	0.02	0.02	0.00	0.00	0.01	0.00
Illinois	1.15	1.40	0.95	0.18	0.38	0.03	0.63	0.01	0.19	0.01
Indiana	0.35	0.38	0.10	0.13	0.02	0.00	0.05	0.01	0.00	0.00
Kansas	0.07	0.25	0.04	0.06	0.00	0.00	0.02	0.00	0.00	0.00
Kentucky	0.54	1.10	0.55	0.06	0.15	0.01	0.04	0.01	0.00	0.00
Louisiana	0.03	0.46	0.29	0.16	0.00	0.72	0.14	1.76	0.00	0.00
Massachusetts	1.70	1.35	0.62	0.25	0.11	0.04	0.36	0.08	0.00	0.00
Maryland	0.09	0.21	0.08	0.46	0.05	0.01	0.02	0.00	0.00	0.00
Maine	2.42	7.52	0.12	0.03	0.03	0.01	0.01	0.11	0.00	0.00
Michigan	0.41	0.45	0.30	0.14	0.22	0.02	0.21	0.01	0.01	0.00
Minnesota	0.42	0.34	0.20	0.06	0.17	0.00	0.19	0.01	0.02	0.00
Missouri	0.57	0.12	0.52	0.24	0.42	0.00	0.50	0.01	0.00	0.00
Mississippi	0.11	0.19	0.03	10.68	0.00	0.01	0.02	0.16	0.00	0.00
Montana	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
North Carolina	0.36	1.01	0.10	0.17	0.50	0.00	0.05	0.01	0.00	0.00
North Dakota	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00
Nebraska	0.05	0.04	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
New Hampshire	0.19	0.35	0.05	0.05	0.03	0.01	0.03	0.01	0.00	0.00
New Jersey	0.49	0.88	0.27	0.16	0.03	0.02	0.10	1.43	0.00	0.00

New Mexico	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Nevada	0.00	0.08	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
New York	0.84	0.57	0.50	0.32	0.27	0.04	0.07	1.20	0.02	0.00
Ohio	1.17	0.73	0.60	0.96	0.16	0.03	0.40	0.01	0.01	0.01
Oklahoma	0.08	0.13	1.37	0.02	0.00	0.00	0.01	0.02	0.01	0.02
Oregon	0.38	0.45	0.04	0.01	0.01	0.00	0.02	0.04	0.01	0.00
Pennsylvania	0.96	1.73	0.65	0.30	0.04	0.01	0.15	0.07	0.00	0.14
Rhode Island	0.16	0.17	0.04	0.02	0.00	0.01	0.00	0.00	0.00	0.00
South Carolina	1.90	2.50	0.10	0.05	0.00	0.01	0.02	0.03	0.00	0.00
South Dakota	0.01	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00
Tennessee	0.34	0.72	0.34	0.03	0.00	0.00	0.05	0.03	0.00	0.00
Texas	0.79	4.82	0.38	1.42	0.03	0.02	0.10	2.35	0.01	0.02
Utah	0.02	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Virginia	0.36	0.77	0.11	0.17	0.01	0.00	0.06	0.14	0.00	0.00
Vermont	0.03	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Washington	0.66	0.28	0.13	0.12	0.03	0.01	0.08	0.03	0.07	0.31
Wisconsin	0.34	0.24	0.15	0.13	0.06	0.02	0.09	0.05	0.01	0.03
West Virginia	0.03	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wyoming	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
British Columbia	1.55	0.77	1.63	1.96	1.27	1.91	1.25	2.06	13.70	8.46
Alberta	1.61	1.47	1.75	3.45	1.86	2.50	1.77	4.56	28.09	23.81
Saskatchewan	0.44	0.38	0.50	1.23	0.51	1.20	0.41	0.96	1.22	2.15
Manitoba	1.08	0.81	1.27	1.49	0.80	1.29	0.76	1.39	2.32	3.80
Ontario	32.74	19.63	42.40	31.08	38.80	25.75	41.62	32.81	34.43	28.75
Quebec	29.54	22.45	22.34	21.35	20.10	21.09	28.49	24.65	17.21	21.60
New Brunswick	n/a	n/a	17.21	13.63	16.90	23.31	7.64	11.60	0.35	2.62
Nova Scotia	9.74	10.44	n/a	n/a	16.01	19.11	11.80	11.87	1.22	4.52
Prince Edward Is.	1.80	1.96	0.88	1.83	n/a	n/a	0.95	1.46	0.00	0.13
Newfoundland	0.61	8.56	1.77	5.19	0.80	2.51	n/a	n/a	0.27	0.05
Territories	0.04	0.00	0.10	0.01	0.00	0.08	0.09	0.00	n/a	n/a

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.6a. Export Share of Provincial GDP

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
	1989	2001	1989	2001	1989	2001	1989	2001	1989	2001	1989	2001
Alaska	0.06	0.08	0.04	0.09	0.00	0.03	0.00	0.02	0.01	0.01	0.01	0.02
Alabama	0.07	0.11	0.03	0.06	0.01	0.21	0.01	0.06	0.07	0.20	0.19	0.17
Arkansas	0.01	0.06	0.03	0.04	0.00	0.05	0.08	0.10	0.04	0.11	0.09	0.27
Arizona	0.09	0.21	0.07	0.10	0.01	0.13	0.03	0.09	0.05	0.22	0.03	0.57
California	1.49	3.26	0.48	1.42	0.40	0.51	0.33	0.74	0.65	3.75	0.22	0.87
Colorado	0.07	0.24	0.07	0.32	0.02	0.28	0.09	0.40	0.05	0.12	0.03	0.19
Connecticut	0.06	0.13	0.08	0.33	0.01	0.01	0.03	0.04	0.14	0.21	0.33	0.50
Dist. of Columbia	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02
Delaware	0.04	0.02	0.00	0.01	0.03	0.02	0.01	0.01	0.10	0.13	0.04	0.08
Florida	0.27	0.23	0.07	0.29	0.10	0.13	0.05	0.69	0.14	0.41	0.27	0.67
Georgia	0.20	0.25	0.19	0.23	0.08	0.10	0.15	0.20	0.25	0.51	0.20	0.77
Iowa	0.03	0.09	0.34	1.08	0.22	0.38	0.17	0.57	0.10	0.14	0.04	0.12
Idaho	0.10	0.23	0.08	0.17	0.02	0.11	0.03	0.05	0.01	0.02	0.01	0.02
Illinois	0.23	0.93	1.45	6.29	2.31	2.95	1.06	1.07	1.01	1.38	0.52	1.23
Indiana	0.11	0.22	0.89	0.15	0.60	0.13	0.24	0.18	0.36	0.80	0.22	0.56
Kansas	0.03	0.06	0.03	0.86	0.04	0.89	0.12	0.36	0.09	0.25	0.14	0.12
Kentucky	0.08	0.09	0.11	0.10	0.06	0.08	0.22	0.13	0.28	0.64	0.21	0.59
Louisiana	0.02	0.06	0.02	0.11	0.03	0.11	0.05	0.07	0.07	0.12	0.03	0.07
Massachusetts	0.13	0.18	0.03	0.24	0.03	0.04	0.10	0.09	0.29	0.58	0.55	0.93
Maryland	0.06	0.09	0.01	0.06	0.01	0.03	0.03	0.07	0.19	0.24	0.20	0.38
Maine	0.08	0.09	0.02	0.04	0.00	0.01	0.01	0.11	0.05	0.11	0.16	0.31
Michigan	0.21	0.22	0.84	1.89	0.15	0.13	0.30	1.35	7.90	13.30	1.49	1.47
Minnesota	0.29	0.25	2.07	2.27	2.60	1.59	1.07	4.47	0.25	0.48	0.06	0.51
Missouri	0.10	0.16	0.04	0.14	0.10	0.24	0.11	0.25	0.30	0.54	0.09	0.19
Mississippi	0.04	0.03	0.01	0.02	0.08	0.05	0.02	0.03	0.05	0.07	0.03	0.07
Montana	0.10	0.15	1.01	0.84	0.16	2.13	0.08	0.57	0.01	0.02	0.00	0.01
North Carolina	0.17	0.21	0.07	0.20	0.05	0.10	0.10	0.20	0.27	0.45	0.17	0.49
North Dakota	0.01	0.05	0.10	0.51	0.86	1.17	0.93	1.56	0.02	0.02	0.01	0.01
Nebraska	0.02	0.06	0.03	0.09	0.14	0.29	0.16	0.63	0.05	0.06	0.01	0.04
New Hampshire	0.06	0.08	0.00	0.02	0.00	0.02	0.00	0.02	0.03	0.11	0.12	0.33
New Jersey	0.15	0.20	0.10	0.25	0.07	0.05	0.15	0.28	0.39	0.91	0.52	1.06
New Mexico	0.01	0.04	0.00	0.02	0.00	0.02	0.02	0.02	0.01	0.02	0.04	0.04

Nevada	0.05	0.19	0.02	0.06	0.01	0.03	0.01	0.04	0.02	0.08	0.02	0.06
New York	0.34	0.30	1.30	4.99	0.44	0.20	0.29	0.41	3.69	2.92	2.00	3.73
Ohio	0.26	0.30	0.40	1.54	0.33	0.58	0.22	0.38	1.15	2.04	0.46	1.01
Oklahoma	0.02	0.05	0.03	0.07	0.31	0.05	0.06	0.13	0.10	0.11	0.03	0.25
Oregon	0.64	0.92	0.15	0.37	0.15	0.95	0.05	0.16	0.04	0.22	0.06	0.16
Pennsylvania	0.19	0.25	0.05	0.73	0.20	0.81	0.24	1.36	0.68	1.19	0.69	1.45
Rhode Island	0.02	0.01	0.00	0.00	0.00	0.00	0.05	0.01	0.03	0.09	0.06	0.10
South Carolina	0.06	0.06	0.02	0.08	0.00	0.07	0.02	0.07	0.11	0.31	0.08	0.16
South Dakota	0.00	0.03	0.02	0.08	0.06	0.19	0.16	0.43	0.01	0.02	0.00	0.02
Tennessee	0.13	0.16	0.41	2.46	0.16	0.21	0.12	0.27	0.19	0.42	0.14	0.46
Texas	0.22	0.58	0.38	1.33	0.06	0.72	0.20	0.65	0.43	1.03	0.33	1.35
Utah	0.03	0.10	0.14	0.35	0.01	0.11	0.01	0.16	0.02	0.09	0.02	0.33
Virginia	0.08	0.08	0.06	0.13	0.03	0.18	0.12	0.14	0.17	0.39	0.31	0.61
Vermont	0.06	0.07	0.07	0.25	0.00	0.01	0.01	0.01	0.12	0.10	0.86	1.71
Washington	2.01	4.99	2.54	6.07	0.11	0.62	0.48	1.09	0.36	0.25	0.12	0.27
Wisconsin	0.41	0.42	0.46	0.90	0.68	1.34	0.27	0.93	0.39	0.63	0.15	0.44
West Virginia	0.03	0.03	0.00	0.04	0.02	0.00	0.28	0.05	0.05	0.10	0.08	0.27
Wyoming	0.00	0.02	0.02	0.70	0.00	2.21	0.01	0.22	0.01	0.01	0.00	0.01
British Columbia	n/a	n/a	4.23	4.36	1.30	2.01	1.72	1.70	1.89	1.15	1.52	0.99
Alberta	1.96	3.84	n/a	n/a	3.92	7.56	3.40	4.26	2.09	1.67	1.33	1.17
Saskatchewan	0.38	0.35	2.04	2.40	n/a	n/a	2.40	1.85	0.68	0.36	0.40	0.36
Manitoba	0.29	0.31	1.31	1.74	2.39	2.97	n/a	n/a	0.73	0.55	0.49	0.41
Ontario	1.67	1.75	7.39	6.90	6.09	8.11	6.47	5.86	n/a	n/a	9.58	7.99
Quebec	0.73	0.78	2.35	1.93	2.28	1.53	2.23	2.00	5.11	3.93	n/a	n/a
New Brunswick	0.08	0.04	0.10	0.08	0.10	0.08	0.20	0.16	0.51	0.29	0.87	0.66
Nova Scotia	0.09	0.08	0.11	0.15	0.11	0.21	0.25	0.24	0.69	0.37	0.69	0.51
Prince Edward Is.	0.01	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.09	0.05	0.09	0.08
Newfoundland	0.04	0.04	0.06	0.10	0.05	0.08	0.08	0.11	0.38	0.20	0.49	0.30
Territories	0.17	0.08	0.41	0.23	0.06	0.08	0.10	0.14	0.12	0.08	0.12	0.12
Sum U.S.	9.01	16.63	14.38	38.43	10.76	20.29	8.38	20.96	20.82	35.94	11.45	25.06
Sum Canada	5.42	7.28	18.03	17.89	16.32	22.67	16.87	16.35	12.30	8.64	15.58	12.57
Total Sum	14.43	23.91	32.41	56.32	27.08	42.96	25.25	37.31	33.12	44.58	27.03	37.63

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.6b. Export Share of Provincial GDP

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
	1989	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**	**1989**	**2001**
Alaska	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.49	0.13
Alabama	0.03	0.13	0.01	0.34	0.01	0.02	0.56	0.01	0.01	0.00
Arkansas	0.00	0.06	0.00	0.01	0.00	0.06	0.00	0.00	0.00	0.00
Arizona	0.01	0.05	0.00	0.02	0.00	0.04	0.00	0.08	0.00	0.01
California	0.16	0.40	0.09	0.28	0.02	0.44	0.01	0.19	0.00	0.04
Colorado	0.02	0.03	0.00	0.03	0.00	0.06	0.00	0.00	0.00	0.00
Connecticut	0.47	0.88	0.10	1.23	0.13	0.49	0.09	0.83	0.00	0.00
Dist. of Columbia	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00
Delaware	0.08	0.03	0.02	0.02	0.07	0.02	0.01	0.04	0.00	0.00
Florida	0.17	0.50	0.24	0.35	0.10	0.81	0.23	1.07	0.00	0.01
Georgia	0.12	0.50	0.10	0.16	0.03	0.23	0.00	0.04	0.00	0.00
Iowa	0.01	0.17	0.00	0.06	0.00	0.04	0.00	0.02	0.00	0.00
Idaho	0.00	0.01	0.00	0.03	0.00	0.06	0.00	0.01	0.00	0.00
Illinois	0.11	0.72	0.04	0.29	0.07	0.10	0.06	0.16	0.00	0.00
Indiana	0.03	0.36	0.15	0.10	0.02	0.17	0.01	0.19	0.00	0.00
Kansas	0.00	0.08	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00
Kentucky	0.00	0.25	0.01	0.08	0.00	0.02	0.00	0.00	0.00	0.00
Louisiana	0.13	0.07	0.09	0.04	0.01	0.05	0.08	0.01	0.00	0.00
Massachusetts	3.69	5.89	2.05	6.85	1.88	3.90	7.67	4.47	0.00	0.00
Maryland	0.09	0.46	0.12	0.24	0.07	0.37	0.76	0.10	0.00	0.00
Maine	5.10	10.33	0.58	0.79	0.59	2.12	0.31	0.76	0.00	0.00
Michigan	0.17	0.46	0.23	0.27	0.01	0.29	0.32	0.23	0.00	0.00
Minnesota	0.05	0.18	0.01	0.03	0.01	0.03	0.00	0.02	0.00	0.00
Missouri	0.03	0.05	0.01	0.01	0.01	0.05	0.00	0.00	0.00	0.00
Mississippi	0.02	0.17	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00
Montana	0.00	0.01	0.00	0.01	0.00	0.03	0.03	0.00	0.00	0.02
North Carolina	0.08	0.33	0.03	0.19	0.04	0.50	0.02	0.06	0.00	0.00
North Dakota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Nebraska	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Hampshire	0.38	1.62	0.17	0.26	0.06	0.27	0.16	0.15	0.00	0.00
New Jersey	0.36	1.12	0.50	0.40	0.57	1.77	0.17	3.14	0.00	0.00
New Mexico	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nevada	0.03	0.04	0.00	0.02	0.00	0.10	0.00	0.02	0.00	0.10
New York	1.35	1.51	0.85	0.55	0.80	1.14	0.15	0.68	0.01	0.01
Ohio	0.11	0.53	0.05	0.32	0.07	0.93	0.02	0.21	0.00	0.00
Oklahoma	0.00	0.24	0.00	0.15	0.00	0.03	0.00	0.09	0.00	0.00
Oregon	0.00	0.03	0.00	0.88	0.00	0.09	0.00	0.00	0.01	0.00
Pennsylvania	0.48	1.00	0.43	0.50	0.38	0.65	1.58	0.71	0.00	0.01
Rhode Island	0.11	0.19	0.06	0.12	0.13	0.09	0.01	0.08	0.00	0.00
South Carolina	0.56	0.14	2.32	2.99	0.02	0.02	0.01	0.03	0.00	0.01
South Dakota	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Tennessee	0.08	0.41	0.02	0.09	0.02	0.21	0.02	0.01	0.03	0.00
Texas	0.10	2.49	0.18	0.44	0.01	0.25	1.04	1.14	0.01	0.02
Utah	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00
Virginia	0.23	3.20	0.44	0.11	0.16	0.18	0.01	1.70	0.00	0.00
Vermont	0.06	0.07	0.01	0.03	0.01	0.11	0.00	0.01	0.00	0.00
Washington	0.04	0.07	0.06	0.08	0.01	0.01	0.01	0.11	0.01	0.01
Wisconsin	0.10	0.37	0.10	0.13	0.01	0.03	0.00	0.01	0.00	0.00
West Virginia	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Wyoming	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.01	0.00
British Columbia	1.37	0.48	0.54	0.41	0.23	0.12	0.23	0.09	4.97	5.44
Alberta	0.46	0.35	0.51	0.78	0.29	0.36	0.21	0.18	3.27	0.21
Saskatchewan	0.19	0.11	0.12	0.22	0.10	0.06	0.12	0.07	0.11	0.01
Manitoba	0.19	0.33	0.17	0.31	0.08	0.52	0.07	0.08	0.20	0.04
Ontario	3.88	3.77	3.10	3.60	4.23	3.74	2.01	6.54	5.11	5.65
Quebec	6.03	9.96	2.50	2.80	2.78	2.81	1.59	3.85	1.23	0.05
New Brunswick	n/a	n/a	2.60	2.81	3.87	4.03	0.30	4.37	0.06	0.00
Nova Scotia	5.97	3.73	n/a	n/a	1.97	3.10	0.91	2.18	0.15	0.01
Prince Edward Is.	0.87	1.04	0.67	0.69	n/a	n/a	0.06	0.17	0.00	0.01
Newfoundland	1.48	1.58	1.84	1.31	1.19	1.23	n/a	n/a	0.08	0.00
Territories	0.03	0.16	0.08	0.22	0.00	0.05	0.03	0.00	n/a	n/a
Sum U.S.	14.61	35.24	9.13	18.57	5.35	15.88	13.42	16.45	0.58	0.42
Sum Canada	20.46	21.51	12.12	13.15	14.75	16.01	5.53	17.54	15.17	11.40
Total Sum	35.07	56.75	21.25	31.72	20.10	31.89	18.95	33.99	15.75	11.82

Source. Statistics Canada (1998, 2000, 2004b, 2005a).

Table 6.7. Changing Interregional Patterns

	Notable Increases
British Columbia	**California**, Illinois, **Oregon**, Texas, **Washington**, **Alberta**
Alberta	**California**, Iowa, Illinois, Kansas, Michigan, New York, Ohio, Pennsylvania, Tennessee, Texas, **Washington**, **Wyoming**
Saskatchewan	Illinois, Kansas, **Montana**, **Oregon**, Pennsylvania, Texas, **Washington**, Wisconsin, **Alberta**, **Manitoba**, **Ontario**
Manitoba	California, Florida, Iowa, Michigan, **Minnesota**, **Montana**, **Nebraska**, **North Dakota**, Pennsylvania, Texas, Washington, **Wisconsin**, **Alberta**
Ontario	California, **Indiana**, **Michigan**, New Jersey, **Ohio**, **Pennsylvania**, Texas
Quebec	Arizona, California, Florida, Georgia, **Illinois**, **Indiana**, Kentucky, **Massachusetts**, Minnesota, North Carolina, **New Jersey**, **New York**, **Ohio**, **Pennsylvania**, Tennessee, Texas, Utah, **Vermont**, Virginia
New Brunswick	**Massachusetts**, **Maine**, **New Hampshire**, **New Jersey**, Texas, Virginia, **Quebec**
Nova Scotia	**Connecticut**, **Massachusetts**, Oregon, South Carolina, **Ontario**
Prince Edward Island	California, **Connecticut**, Florida, **Massachusetts**, **Maine**, North Carolina, **New Jersey**, **New York**, Ohio, Manitoba
Newfoundland	**Connecticut**, Florida, **Maine**, **New Jersey**, **New York**, Virginia, Ontario, **Quebec**, **New Brunswick**, **Nova Scotia**
Territories	**British Columbia**, **Ontario**

Note. U.S. states and Canadian provinces considered geographically close are reported in bold.

Table 6.8. Proximity and Economic Sizes Regression Output

	Distance Coefficient	Economic Size Coefficient	Adjusted-R^2
British Columbia	**-0.815 (< 0.0001)**	**0.246 (0.006)**	0.447
Alberta	**-1.171 (0.008)**	**0.483 (0.008)**	0.217
Saskatchewan	-0.36 (0.15)	-0.021 (0.815)	0.004
Manitoba	-0.142 (0.583)	0.14 (0.161)	0.009
Ontario	0.048 (0.916)	**0.691 (0.011)**	0.096
Quebec	0.043 (0.710)	**0.273 (0.002)**	0.165
New Brunswick	-0.457 (0.231)	0.075 (0.758)	-0.01
Nova Scotia	-0.208 (0.403)	0.151 (0.312)	-0.007
Prince Edward Is.	**-0.15 (0.040)**	0.122 (0.204)	0.005
Newfoundland	-0.212 (0.413)	0.126 (0.275)	-0.004
Territories	0.001 (0.882)	**0.004 (0.069)**	0.30

Note. P-values are in parentheses, coefficients significant at the 5 percent level are reported in bold.

Table 6.9. Increase Factors for Ontario's Automotive Trade

18.84	California	1.93	Ohio
12.92	Utah	1.91	Delaware
7.19	Idaho	1.91	Louisiana
6.67	Kansas	1.77	Texas
6.24	Maine	1.76	Virginia
5.06	Montana	1.73	North Carolina
4.90	Dist. of Columbia	1.60	Connecticut
4.65	Kentucky	1.49	New Hampshire
4.62	South Carolina	1.42	New Jersey
4.39	Tennessee	1.41	Florida
3.79	Arizona	1.34	Minnesota
3.19	Indiana	1.31	Wisconsin
2.98	Arkansas	1.21	Colorado
2.89	Alabama	1.20	Illinois
2.74	Georgia	1.00	Nevada
2.65	North Dakota	0.89	Pennsylvania
2.49	Massachusetts	0.88	Oklahoma
2.35	Missouri	0.83	Wyoming
2.35	West Virginia	0.76	South Dakota
2.35	Iowa	0.69	New Mexico
2.31	Oregon	0.51	Maryland
2.20	Rhode Island	0.47	New York
2.11	Alaska	0.33	Mississippi
2.08	Michigan	0.25	Vermont
2.01	Nebraska	0.08	Washington

Table 7.1. Spatial Interaction Data and Quasi-Points

	Exports		Imports	
	Actual	Quasi-Points	Actual	Quasi-Points
British Columbia	30189	30189	25764	25765
Alberta	69335	69334	28081	28079
Saskatchewan	13185	13184	10211	10209
Manitoba	12350	12349	14566	14565
Ontario	195135	195134	178206	178206
Quebec	81998	81998	43108	43109
New Brunswick	10881	10881	6368	6365
Nova Scotia	7501	7501	5245	5242
Prince Edward Island	989	989	858	854
Newfoundland	4241	4240	2612	2608
Territories	676	675	1176	1175

Source. Statistics Canada (1998, 2000, 2004b), calculations by the author.

Table 7.2. Indices of Similarity, Exports and Imports

	Exports	Imports
British Columbia	0.117	0.183
Alberta	0.133	0.183
Saskatchewan	0.350	0.217
Manitoba	0.283	0.217
Ontario	0.133	0.117
Quebec	0.017	0.200
New Brunswick	0.300	0.217
Nova Scotia	0.233	0.200
Prince Edward Island	0.533	0.117
Newfoundland	0.333	0.167
Territories	0.550	0.150

Source. Statistics Canada (1998, 2000, 2004b), calculations by the author.

Table 7.3. Effective Provincial Tariff Rates

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
British Columbia	3.36	3.24	3.11	2.52	2.61	1.40	0.99	0.72	0.47	0.15	0.11	0.13	0.12
Alberta	3.58	3.25	3.02	2.40	1.43	1.17	0.84	0.68	0.54	0.75	0.24	0.26	0.26
Saskatchewan	2.49	2.32	2.59	2.01	1.34	1.01	0.79	0.51	0.29	0.06	0.08	0.07	0.09
Manitoba	2.85	2.66	2.68	2.09	1.41	1.19	0.89	0.63	0.34	0.08	0.09	0.10	0.14
Ontario	2.42	2.18	2.15	1.56	1.07	0.91	0.64	0.46	0.25	0.11	0.07	0.07	0.09
Quebec	2.72	2.13	2.73	2.08	1.31	1.02	0.71	0.66	0.30	0.13	0.48	0.11	0.14
New Brunswick	3.18	2.69	2.67	2.18	1.36	0.94	0.73	0.43	0.27	0.09	0.09	0.07	0.08
Nova Scotia	2.04	1.72	1.34	1.41	0.79	0.75	0.56	0.41	0.41	0.17	0.25	0.13	0.40
Prince Edward Island	1.07	1.11	1.08	0.89	0.40	0.58	0.62	0.77	0.58	0.65	0.75	0.74	1.27
Newfoundland	1.93	0.61	1.63	0.89	0.42	0.37	0.42	0.53	0.47	0.42	0.51	0.19	0.50
Territories	2.92	2.82	1.30	1.98	0.36	0.37	0.30	0.06	0.08	0.00	0.03	0.03	0.04

Source. Statistics Canada (2004b).

Table 7.4. Provincial Trade Shares and Export – GDP Ratios with the United States

	Trade Share		Export – GDP Ratio	
	1989	**2001**	**1989**	**2001**
British Columbia	27.60	40.06	9.01	16.63
Alberta	31.54	53.34	14.38	38.43
Saskatchewan	24.76	35.18	10.76	20.29
Manitoba	31.49	47.62	8.38	20.96
Ontario	57.96	68.75	20.82	35.94
Quebec	31.23	44.46	11.45	25.06
New Brunswick	24.48	42.06	14.61	35.24
Nova Scotia	17.55	30.15	9.13	18.57
Prince Edward Island	11.20	26.15	5.35	15.88
Newfoundland	23.95	23.97	13.42	16.45
Territories	1.66	2.60	0.58	0.42

Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

Table 7.5a. Trade Location Quotients, Exports, 1989 and 2001

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01
Alaska	1.57	1.13	0.42	0.52	0.02	0.24	0.06	0.20	0.07	0.09	0.08	0.14
Alabama	0.44	0.42	0.08	0.09	0.04	0.43	0.05	0.15	0.19	0.39	0.60	0.39
Arkansas	0.15	0.39	0.16	0.10	0.02	0.16	0.49	0.43	0.19	0.37	0.49	1.08
Arizona	0.48	0.67	0.16	0.14	0.02	0.23	0.09	0.19	0.12	0.38	0.09	1.15
California	0.93	1.26	0.13	0.23	0.13	0.11	0.12	0.18	0.18	0.78	0.07	0.21
Colorado	0.37	0.70	0.15	0.40	0.05	0.46	0.25	0.74	0.12	0.18	0.08	0.36
Connecticut	0.27	0.35	0.17	0.38	0.02	0.02	0.09	0.08	0.28	0.32	0.81	0.89
Dist. of Columbia	0.02	0.02	0.00	0.03	0.00	0.04	0.00	0.03	0.06	0.05	0.09	0.11
Delaware	0.85	0.22	0.03	0.05	0.30	0.13	0.09	0.09	1.01	0.74	0.46	0.53
Florida	0.45	0.22	0.05	0.12	0.09	0.07	0.05	0.43	0.10	0.21	0.23	0.41
Georgia	0.53	0.39	0.22	0.16	0.11	0.09	0.23	0.21	0.29	0.44	0.29	0.78
Iowa	0.22	0.41	1.11	2.14	0.85	1.00	0.73	1.69	0.31	0.36	0.14	0.36
Idaho	1.99	3.23	0.74	1.02	0.17	0.85	0.30	0.47	0.06	0.14	0.09	0.17
Illinois	0.36	0.87	1.00	2.51	1.91	1.55	0.94	0.65	0.68	0.70	0.43	0.74
Indiana	0.42	0.49	1.46	0.14	1.17	0.17	0.50	0.26	0.57	0.97	0.44	0.80
Kansas	0.23	0.34	0.12	1.91	0.20	2.60	0.59	1.20	0.34	0.70	0.65	0.42
Kentucky	0.43	0.32	0.27	0.16	0.17	0.16	0.72	0.30	0.68	1.23	0.64	1.34
Louisiana	0.12	0.20	0.05	0.14	0.07	0.19	0.16	0.14	0.17	0.20	0.09	0.13
Massachusetts	0.39	0.32	0.04	0.18	0.04	0.04	0.17	0.10	0.36	0.56	0.87	1.05
Maryland	0.27	0.23	0.03	0.06	0.03	0.05	0.07	0.11	0.35	0.32	0.45	0.59
Maine	1.66	1.07	0.22	0.22	0.04	0.06	0.15	0.88	0.43	0.73	1.78	2.38
Michigan	0.46	0.28	0.82	1.02	0.17	0.09	0.38	1.09	7.56	9.02	1.75	1.18
Minnesota	1.19	0.62	3.71	2.38	5.58	2.19	2.46	7.06	0.44	0.63	0.13	0.80
Missouri	0.40	0.38	0.07	0.14	0.22	0.31	0.26	0.39	0.53	0.68	0.19	0.29
Mississippi	0.38	0.19	0.06	0.04	0.43	0.19	0.11	0.12	0.24	0.25	0.15	0.27
Montana	3.19	2.98	14.65	7.00	2.69	23.33	1.55	7.25	0.10	0.25	0.06	0.11
North Carolina	0.50	0.36	0.08	0.14	0.07	0.10	0.16	0.22	0.34	0.40	0.26	0.52
North Dakota	0.53	1.21	1.58	5.05	17.12	15.14	19.79	23.25	0.26	0.29	0.16	0.15
Nebraska	0.27	0.49	0.18	0.29	0.91	1.22	1.09	3.03	0.28	0.24	0.09	0.18
New Hampshire	0.96	0.85	0.03	0.12	0.04	0.11	0.03	0.14	0.20	0.64	1.04	2.31
New Jersey	0.32	0.25	0.09	0.13	0.07	0.04	0.18	0.23	0.36	0.62	0.58	0.85

New Mexico	0.11	0.32	0.02	0.07	0.00	0.09	0.14	0.12	0.05	0.10	0.25	0.25
Nevada	0.57	1.20	0.12	0.17	0.04	0.10	0.07	0.14	0.09	0.25	0.09	0.22
New York	0.33	0.18	0.56	1.27	0.23	0.07	0.16	0.16	1.56	0.94	1.04	1.42
Ohio	0.49	0.34	0.33	0.75	0.33	0.37	0.23	0.28	0.94	1.25	0.46	0.73
Oklahoma	0.15	0.25	0.09	0.15	1.31	0.12	0.28	0.41	0.35	0.28	0.12	0.78
Oregon	3.68	3.93	0.39	0.67	0.47	2.27	0.17	0.44	0.10	0.50	0.18	0.42
Pennsylvania	0.35	0.27	0.04	0.34	0.19	0.49	0.25	0.96	0.55	0.70	0.67	1.02
Rhode Island	0.39	0.12	0.03	0.02	0.01	0.01	0.67	0.08	0.29	0.65	0.73	0.86
South Carolina	0.41	0.22	0.05	0.12	0.01	0.15	0.06	0.16	0.32	0.65	0.28	0.39
South Dakota	0.13	0.53	0.24	0.68	1.07	2.12	2.94	5.51	0.17	0.16	0.05	0.29
Tennessee	0.54	0.40	0.73	2.57	0.34	0.29	0.28	0.43	0.33	0.56	0.30	0.72
Texas	0.23	0.37	0.18	0.36	0.03	0.26	0.12	0.26	0.19	0.35	0.18	0.55
Utah	0.38	0.65	0.68	1.00	0.07	0.41	0.10	0.69	0.08	0.31	0.11	1.40
Virginia	0.24	0.14	0.08	0.10	0.05	0.18	0.21	0.15	0.23	0.37	0.52	0.69
Vermont	2.28	1.70	1.17	2.81	0.09	0.18	0.22	0.15	2.09	1.34	18.51	28.32
Washington	7.45	10.60	4.19	5.47	0.22	0.73	1.01	1.49	0.58	0.28	0.23	0.36
Wisconsin	1.66	1.06	0.83	0.96	1.48	1.87	0.62	1.49	0.69	0.84	0.32	0.70
West Virginia	0.42	0.26	0.01	0.15	0.14	0.02	2.50	0.29	0.37	0.53	0.66	1.65
Wyoming	0.15	0.41	0.38	7.38	0.08	30.34	0.17	3.54	0.10	0.09	0.02	0.09
British Columbia	n/a	n/a	10.53	6.02	3.88	3.63	5.49	3.54	4.61	2.00	4.55	2.04
Alberta	12.83	12.80	n/a	n/a	13.67	14.02	12.70	9.10	5.97	2.99	4.66	2.47
Saskatchewan	8.57	4.65	20.63	13.60	n/a	n/a	31.02	15.89	6.76	2.56	4.84	3.05
Manitoba	5.77	3.87	11.62	9.15	25.33	20.52	n/a	n/a	6.28	3.65	5.21	3.26
Ontario	2.74	1.64	5.38	2.74	5.31	4.23	6.05	3.52	n/a	n/a	8.37	4.76
Quebec	2.26	1.47	3.25	1.55	3.77	1.60	3.95	2.41	6.91	3.97	n/a	n/a
New Brunswick	2.88	0.83	1.56	0.69	1.77	0.95	4.07	2.14	7.75	3.28	16.25	8.92
Nova Scotia	2.54	1.42	1.42	1.08	1.68	2.04	4.02	2.63	8.43	3.47	10.32	5.67
Prince Edward Is.	2.39	1.72	1.82	0.98	2.05	2.47	3.05	2.83	9.29	3.58	11.18	6.98
Newfoundland	1.99	1.40	1.47	1.35	1.40	1.49	2.46	2.31	8.49	3.45	13.50	6.18
Territories	25.26	5.65	26.96	6.93	4.85	3.29	8.66	6.21	8.09	2.97	9.39	5.31

Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Table 7.5b. Trade Location Quotients, Exports, 1989 and 2001

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
	LQ89	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**
Alaska	0.09	0.02	0.01	0.04	0.03	0.00	1.23	0.07	11.26	3.82
Alabama	0.08	0.20	0.05	0.96	0.05	0.07	2.54	0.03	0.04	0.00
Arkansas	0.01	0.17	0.02	0.07	0.04	0.28	0.01	0.01	0.00	0.00
Arizona	0.03	0.07	0.02	0.04	0.01	0.09	0.00	0.17	0.00	0.07
California	0.04	0.06	0.04	0.08	0.01	0.13	0.00	0.05	0.00	0.03
Colorado	0.03	0.04	0.01	0.06	0.00	0.13	0.00	0.01	0.00	0.01
Connecticut	0.89	1.02	0.32	2.57	0.43	1.01	0.33	1.61	0.00	0.01
Dist. of Columbia	0.01	0.01	0.01	0.03	0.10	0.11	0.00	0.00	0.00	0.01
Delaware	0.69	0.15	0.25	0.19	1.09	0.14	0.15	0.30	0.00	0.00
Florida	0.11	0.20	0.27	0.26	0.12	0.59	0.29	0.72	0.00	0.02
Georgia	0.13	0.34	0.18	0.19	0.06	0.28	0.01	0.05	0.00	0.01
Iowa	0.03	0.33	0.01	0.21	0.00	0.16	0.00	0.06	0.00	0.00
Idaho	0.02	0.08	0.03	0.29	0.04	0.62	0.00	0.10	0.00	0.05
Illinois	0.07	0.29	0.04	0.20	0.08	0.07	0.07	0.10	0.00	0.00
Indiana	0.05	0.35	0.37	0.16	0.05	0.29	0.02	0.30	0.00	0.00
Kansas	0.02	0.18	0.02	0.06	0.04	0.06	0.01	0.04	0.00	0.00
Kentucky	0.01	0.38	0.03	0.22	0.01	0.06	0.01	0.01	0.00	0.00
Louisiana	0.29	0.09	0.35	0.10	0.04	0.11	0.33	0.02	0.00	0.00
Massachusetts	4.44	4.42	4.08	9.20	3.94	5.21	17.07	5.61	0.00	0.00
Maryland	0.15	0.47	0.35	0.44	0.22	0.67	2.44	0.17	0.00	0.01
Maine	42.59	52.15	7.99	7.18	8.61	19.01	4.74	6.42	0.00	0.02
Michigan	0.15	0.25	0.34	0.26	0.02	0.28	0.54	0.21	0.00	0.00
Minnesota	0.08	0.18	0.02	0.05	0.02	0.05	0.01	0.03	0.00	0.02
Missouri	0.05	0.05	0.03	0.02	0.02	0.09	0.00	0.01	0.00	0.01
Mississippi	0.10	0.46	0.07	0.05	0.02	0.03	0.05	0.03	0.00	0.00
Montana	0.02	0.05	0.07	0.14	0.00	0.40	0.76	0.01	0.00	0.62
North Carolina	0.09	0.23	0.05	0.23	0.08	0.63	0.04	0.07	0.00	0.00
North Dakota	0.05	0.03	0.02	0.08	0.01	0.08	0.01	0.00	0.00	0.87
Nebraska	0.06	0.07	0.00	0.02	0.01	0.01	0.00	0.02	0.00	0.01
New Hampshire	2.54	7.54	1.91	2.16	0.69	2.23	2.01	1.16	0.00	0.00
New Jersey	0.31	0.60	0.71	0.38	0.85	1.69	0.27	2.81	0.00	0.00

New Mexico	0.01	0.03	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.00
Nevada	0.12	0.11	0.01	0.11	0.00	0.46	0.00	0.09	0.00	1.28
New York	0.54	0.38	0.56	0.25	0.56	0.51	0.11	0.29	0.01	0.01
Ohio	0.08	0.26	0.07	0.27	0.09	0.80	0.02	0.17	0.00	0.00
Oklahoma	0.01	0.48	0.00	0.53	0.00	0.12	0.00	0.29	0.00	0.00
Oregon	0.01	0.06	0.01	2.82	0.00	0.29	0.00	0.01	0.05	0.01
Pennsylvania	0.36	0.46	0.53	0.42	0.50	0.53	2.21	0.55	0.00	0.02
Rhode Island	0.97	1.04	0.95	1.15	1.98	0.85	0.20	0.74	0.00	0.00
South Carolina	1.48	0.23	9.98	8.69	0.10	0.06	0.06	0.08	0.00	0.05
South Dakota	0.02	0.02	0.04	0.12	0.00	0.07	0.00	0.00	0.00	0.00
Tennessee	0.13	0.42	0.05	0.16	0.06	0.38	0.05	0.02	0.11	0.00
Texas	0.04	0.67	0.12	0.21	0.01	0.12	0.82	0.51	0.01	0.02
Utah	0.01	0.08	0.01	0.09	0.01	0.09	0.00	0.00	0.00	0.00
Virginia	0.29	2.38	0.95	0.15	0.37	0.23	0.01	2.11	0.00	0.00
Vermont	0.93	0.82	0.17	0.51	0.27	2.12	0.00	0.13	0.00	0.00
Washington	0.05	0.06	0.16	0.12	0.03	0.01	0.02	0.16	0.03	0.03
Wisconsin	0.16	0.39	0.28	0.25	0.02	0.06	0.01	0.02	0.00	0.01
West Virginia	0.11	0.10	0.02	0.04	0.01	0.04	0.00	0.35	0.00	0.02
Wyoming	0.01	0.02	0.01	0.11	0.00	0.47	0.03	0.00	0.34	0.04
British Columbia	3.14	0.65	2.04	0.99	0.94	0.29	0.97	0.21	25.46	35.73
Alberta	1.23	0.49	2.25	1.97	1.34	0.90	1.07	0.41	19.63	1.45
Saskatchewan	1.73	0.61	1.89	2.20	1.69	0.64	2.11	0.63	2.32	0.18
Manitoba	1.51	1.74	2.29	2.88	1.11	4.80	1.02	0.74	3.67	1.03
Ontario	2.61	1.49	3.44	2.55	4.97	2.63	2.51	4.31	7.66	10.70
Quebec	7.70	7.90	5.26	3.97	6.19	3.97	3.76	5.10	3.50	0.17
New Brunswick	n/a	n/a	61.75	45.36	97.19	64.67	7.99	65.78	1.79	0.00
Nova Scotia	69.07	27.26	n/a	n/a	39.82	40.34	19.40	26.62	3.76	0.29
Prince Edward Is.	81.71	58.16	102.58	69.17	n/a	n/a	10.58	16.09	0.00	3.07
Newfoundland	31.49	21.90	64.48	32.50	44.19	30.26	n/a	n/a	3.70	0.00
Territories	1.67	4.86	7.68	12.15	0.00	2.60	3.47	0.23	n/a	n/a

Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Table 7.6a. Trade Location Quotients, Imports, 1989 and 2001

	BC		Alberta		Saskatchewan		Manitoba		Ontario		Quebec	
	LQ89	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**	**LQ89**	**LQ01**
Alaska	0.67	2.15	0.05	0.05	0.01	0.00	0.02	0.02	0.13	0.01	0.06	0.07
Alabama	0.20	0.23	0.15	0.22	0.12	0.17	0.17	0.31	0.55	0.95	0.21	0.32
Arkansas	0.16	0.53	0.15	0.46	0.15	0.85	0.53	0.62	0.43	0.73	0.14	0.29
Arizona	0.23	0.51	0.21	0.55	0.04	0.06	0.11	0.40	0.27	0.32	0.16	0.57
California	0.60	0.88	0.25	0.44	0.04	0.05	0.20	0.15	0.32	0.39	0.18	0.34
Colorado	0.17	0.24	0.28	0.32	0.06	0.15	0.10	0.29	0.23	0.21	0.09	0.11
Connecticut	0.22	0.23	0.10	0.10	0.03	0.11	0.27	0.21	0.52	0.46	0.80	1.00
Dist. of Columbia	0.01	0.02	0.00	0.00	0.00	0.02	0.06	0.04	0.03	0.01	0.01	0.02
Delaware	0.16	0.09	0.48	0.07	0.12	0.09	0.59	0.21	1.36	0.85	6.11	0.80
Florida	0.12	0.15	0.06	0.13	0.07	0.10	0.12	0.28	0.23	0.27	0.26	0.37
Georgia	0.11	0.23	0.12	0.18	0.12	0.29	0.16	0.73	0.44	0.85	0.28	0.36
Iowa	0.34	0.40	0.30	0.44	1.41	2.49	1.49	2.71	0.67	0.96	0.28	0.28
Idaho	1.00	1.64	0.59	1.45	0.04	0.20	0.30	0.66	0.14	0.37	0.22	0.24
Illinois	0.60	0.41	0.53	0.60	0.97	1.33	1.21	1.70	1.16	1.04	0.49	0.36
Indiana	0.26	0.38	0.20	0.22	0.45	0.95	0.94	1.08	1.54	2.37	0.25	0.40
Kansas	0.28	0.31	0.47	0.58	0.58	1.10	0.49	0.89	0.42	0.79	0.28	0.27
Kentucky	0.33	0.38	0.21	0.30	0.24	0.21	0.62	0.78	0.82	2.03	0.35	0.47
Louisiana	0.09	0.10	0.15	0.33	0.06	0.29	0.17	0.31	0.21	0.35	0.35	0.35
Massachusetts	0.13	0.20	0.10	0.14	0.05	0.11	0.09	0.20	0.75	0.52	0.77	1.09
Maryland	0.07	0.08	0.03	0.04	0.83	0.08	0.26	0.13	0.46	0.26	0.78	0.23
Maine	0.04	0.07	0.03	0.10	0.02	0.05	0.07	0.07	0.30	0.24	1.57	2.94
Michigan	0.20	0.17	0.15	0.13	0.11	0.23	0.47	0.41	5.67	4.43	0.23	0.23
Minnesota	0.32	0.28	0.56	0.42	0.85	0.91	2.44	3.47	0.63	0.69	0.30	0.21
Missouri	0.39	0.30	0.46	0.16	0.49	0.89	0.76	0.67	0.79	1.26	0.52	0.16
Mississippi	0.11	0.17	0.16	0.11	0.10	0.26	0.25	0.35	0.45	0.47	0.11	0.18
Montana	1.59	1.53	1.24	3.71	1.10	2.68	0.85	0.25	0.04	0.08	0.12	0.03
North Carolina	0.16	0.20	0.12	0.16	0.10	0.26	0.18	0.44	0.65	0.91	0.44	0.61
North Dakota	0.20	0.78	0.23	0.75	4.53	6.99	11.29	10.30	0.14	0.32	0.03	0.09
Nebraska	0.15	0.28	0.30	0.43	0.48	0.92	0.75	1.03	0.25	0.47	0.04	0.08
New Hampshire	0.14	0.18	0.07	0.25	0.07	0.04	0.09	0.21	0.45	0.62	0.85	1.78
New Jersey	0.15	0.14	0.07	0.13	0.09	0.12	0.15	0.20	0.57	0.53	0.59	0.80
New Mexico	0.03	0.05	0.03	0.16	0.02	0.02	0.03	0.07	0.02	0.04	0.01	0.06

Nevada	0.22	1.19	0.25	0.33	0.01	0.05	0.11	0.16	0.24	0.13	0.03	0.18
New York	0.10	0.13	0.06	0.10	0.03	0.16	0.12	0.14	0.69	0.70	0.47	0.58
Ohio	0.32	0.36	0.22	0.36	0.48	0.52	0.52	0.83	2.25	2.68	0.32	0.86
Oklahoma	0.15	0.23	0.95	1.47	0.29	0.86	0.21	0.55	0.45	0.42	0.12	0.13
Oregon	2.11	3.75	0.20	0.30	0.07	0.30	0.26	0.19	0.25	0.29	0.15	0.23
Pennsylvania	0.17	0.24	0.15	0.29	0.15	0.53	0.25	0.61	0.80	0.83	0.39	0.53
Rhode Island	0.11	0.13	0.05	0.04	0.05	0.03	0.15	0.25	0.38	0.48	0.86	0.94
South Carolina	0.11	0.38	0.07	0.36	0.15	0.28	0.23	0.61	0.56	1.25	0.44	0.71
South Dakota	0.08	0.74	0.10	0.58	0.37	1.31	0.51	3.09	0.32	0.44	0.05	0.23
Tennessee	0.18	0.49	0.18	0.31	0.15	0.38	0.41	0.78	0.75	1.31	0.25	0.34
Texas	0.14	0.25	0.46	1.26	0.14	0.56	0.19	0.52	0.30	0.60	0.34	0.37
Utah	0.45	0.64	0.38	0.70	0.05	0.23	0.08	0.20	0.49	0.37	0.11	0.34
Virginia	0.08	0.09	0.09	0.06	0.06	0.31	0.11	0.25	0.32	0.46	0.22	0.34
Vermont	0.08	0.13	0.04	0.09	0.01	0.08	0.07	0.22	0.52	0.53	18.92	15.89
Washington	4.28	5.62	0.19	0.50	0.05	0.07	0.20	0.18	0.23	0.17	0.55	0.39
Wisconsin	0.30	0.31	0.23	0.22	0.97	1.47	1.25	1.96	1.18	1.47	0.25	0.21
West Virginia	0.06	0.10	0.13	0.10	0.10	0.49	0.10	0.32	0.97	1.28	0.15	0.13
Wyoming	0.36	0.22	0.39	0.83	0.37	0.55	0.14	0.08	0.14	0.29	0.05	0.11
British Columbia	n/a	n/a	9.17	13.42	4.04	3.34	2.76	2.10	1.28	0.96	1.62	1.77
Alberta	16.12	16.61	n/a	n/a	21.84	23.02	12.51	11.71	5.66	3.80	5.23	4.40
Saskatchewan	4.96	7.64	18.33	26.41	n/a	n/a	22.79	20.04	4.67	4.47	5.06	3.48
Manitoba	6.54	6.46	15.88	14.88	25.59	17.82	n/a	n/a	4.96	3.23	4.95	4.55
Ontario	7.21	4.37	9.79	5.85	7.31	3.42	6.90	3.69	n/a	n/a	11.36	8.94
Quebec	5.81	3.76	6.23	4.07	4.27	3.44	4.68	2.79	7.34	4.40	n/a	n/a
New Brunswick	5.21	1.81	2.14	1.21	1.98	1.05	1.76	2.25	2.97	2.08	13.40	22.67
Nova Scotia	2.05	1.54	2.37	2.73	1.31	2.09	1.62	2.07	2.37	1.98	5.55	6.36
Prince Edward Is.	0.89	0.45	1.34	1.26	1.11	0.61	0.74	3.48	3.24	2.06	6.17	6.40
Newfoundland	0.86	0.35	1.00	0.61	1.31	0.64	0.64	0.57	1.54	3.60	3.53	8.76
Territories	18.94	20.70	15.30	0.75	1.19	0.06	1.92	0.28	3.91	3.11	2.74	0.10

Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Table 7.6b. Trade Location Quotients, Imports, 1989 and 2001

	New Brunswick		Nova Scotia		PEI		Newfoundland		Territories	
	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01	LQ89	LQ01
Alaska	0.00	0.23	0.00	0.49	0.00	0.00	0.00	0.02	1.98	11.94
Alabama	0.11	0.27	0.04	0.10	0.00	0.00	0.13	0.00	0.01	0.00
Arkansas	0.05	0.24	0.02	0.03	0.01	0.03	0.04	0.06	0.01	0.00
Arizona	0.01	0.18	0.02	0.10	0.00	0.00	0.01	0.01	0.02	0.00
California	0.13	0.05	0.05	0.06	0.01	0.01	0.01	0.08	0.01	0.00
Colorado	0.04	0.11	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00
Connecticut	0.35	0.26	0.25	0.52	0.02	0.01	0.08	0.01	0.00	0.00
Dist. of Columbia	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delaware	0.30	0.29	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.00
Florida	0.21	0.15	0.06	0.06	0.02	0.01	0.30	0.00	0.01	0.00
Georgia	0.14	0.42	0.06	0.04	0.00	0.01	0.01	0.00	0.01	0.00
Iowa	0.19	0.17	0.12	0.05	0.00	0.00	0.01	0.00	0.00	0.00
Idaho	0.09	0.19	0.00	0.02	0.05	0.06	0.00	0.01	0.02	0.00
Illinois	0.26	0.32	0.21	0.04	0.09	0.01	0.14	0.00	0.04	0.00
Indiana	0.19	0.21	0.05	0.07	0.01	0.00	0.03	0.01	0.00	0.00
Kansas	0.09	0.31	0.04	0.08	0.00	0.00	0.02	0.00	0.00	0.00
Kentucky	0.43	0.94	0.44	0.05	0.12	0.01	0.04	0.01	0.00	0.00
Louisiana	0.02	0.34	0.23	0.12	0.00	0.53	0.11	1.29	0.00	0.00
Massachusetts	0.72	0.58	0.26	0.11	0.05	0.02	0.15	0.03	0.00	0.00
Maryland	0.06	0.12	0.05	0.27	0.03	0.00	0.01	0.00	0.00	0.00
Maine	7.07	21.55	0.35	0.08	0.08	0.04	0.02	0.31	0.00	0.00
Michigan	0.13	0.13	0.09	0.04	0.07	0.01	0.07	0.00	0.00	0.00
Minnesota	0.24	0.20	0.11	0.04	0.10	0.00	0.11	0.00	0.01	0.00
Missouri	0.33	0.07	0.30	0.13	0.24	0.00	0.29	0.01	0.00	0.00
Mississippi	0.17	0.29	0.04	16.48	0.00	0.01	0.03	0.25	0.00	0.00
Montana	0.03	0.23	0.00	0.00	0.00	0.00	0.02	0.09	0.00	0.01
North Carolina	0.15	0.40	0.04	0.07	0.21	0.00	0.02	0.01	0.00	0.00
North Dakota	0.08	0.09	0.01	0.00	0.00	0.00	0.04	0.00	0.10	0.00
Nebraska	0.08	0.07	0.02	0.01	0.01	0.03	0.00	0.00	0.00	0.00
New Hampshire	0.44	0.93	0.13	0.13	0.08	0.03	0.08	0.02	0.00	0.00
New Jersey	0.15	0.27	0.08	0.05	0.01	0.01	0.03	0.43	0.00	0.00

New Mexico	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Nevada	0.00	0.13	0.00	0.03	0.01	0.00	0.00	0.00	0.01	0.00
New York	0.12	0.08	0.07	0.05	0.04	0.01	0.01	0.17	0.00	0.00
Ohio	0.32	0.20	0.16	0.26	0.04	0.01	0.11	0.00	0.00	0.00
Oklahoma	0.09	0.15	1.57	0.03	0.00	0.00	0.01	0.02	0.01	0.03
Oregon	0.32	0.46	0.03	0.01	0.01	0.00	0.02	0.04	0.01	0.00
Pennsylvania	0.25	0.45	0.17	0.08	0.01	0.00	0.04	0.02	0.00	0.04
Rhode Island	0.49	0.54	0.11	0.07	0.00	0.02	0.01	0.00	0.00	0.00
South Carolina	1.74	2.31	0.09	0.04	0.00	0.01	0.01	0.03	0.00	0.00
South Dakota	0.04	0.08	0.03	0.01	0.04	0.00	0.05	0.02	0.08	0.00
Tennessee	0.20	0.42	0.20	0.02	0.00	0.00	0.03	0.02	0.00	0.00
Texas	0.12	0.74	0.06	0.22	0.00	0.00	0.02	0.36	0.00	0.00
Utah	0.04	0.03	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00
Virginia	0.16	0.33	0.05	0.07	0.01	0.00	0.03	0.06	0.00	0.00
Vermont	0.19	0.23	0.05	0.02	0.01	0.01	0.01	0.01	0.00	0.00
Washington	0.35	0.14	0.07	0.06	0.01	0.01	0.04	0.01	0.04	0.16
Wisconsin	0.20	0.14	0.09	0.08	0.04	0.01	0.06	0.03	0.01	0.02
West Virginia	0.06	0.23	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Wyoming	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
British Columbia	1.25	0.60	1.32	1.53	1.03	1.49	1.01	1.60	11.07	6.57
Alberta	1.52	1.17	1.65	2.75	1.76	1.99	1.67	3.63	26.53	18.98
Saskatchewan	1.45	1.23	1.63	3.95	1.66	3.84	1.32	3.06	3.99	6.88
Manitoba	3.10	2.40	3.65	4.42	2.29	3.82	2.17	4.12	6.64	11.27
Ontario	7.73	4.40	10.01	6.97	9.16	5.77	9.83	7.35	8.13	6.44
Quebec	13.23	10.11	10.00	9.62	9.00	9.50	12.75	11.10	7.71	9.73
New Brunswick	n/a	n/a	86.90	69.76	85.36	119.26	38.59	59.35	1.78	13.42
Nova Scotia	39.52	43.32	n/a	n/a	64.93	79.29	47.89	49.24	4.96	18.75
Prince Edward Is.	58.84	62.10	28.71	58.01	n/a	n/a	31.05	46.09	0.00	4.04
Newfoundland	4.56	67.31	13.19	40.79	5.97	19.76	n/a	n/a	2.00	0.38
Territories	0.85	0.00	2.13	0.15	0.00	1.31	2.04	0.00	n/a	n/a

Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

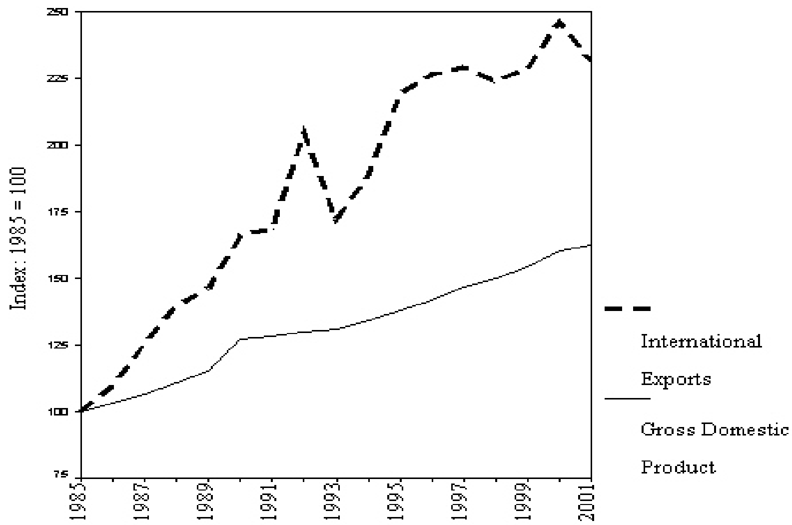
Table 7.7a. Provincial Reciprocal Trading Regions, 2001

		$LQT_{ij} > 1.30$		
Ontario	British Columbia	New Brunswick	Manitoba	Territories
Michigan	Alberta	Maine	Minnesota	Alaska
Quebec	Washington	Nova Scotia	Wisconsin	
Vermont	Saskatchewan	Massachusetts	Iowa	
	Montana	Newfoundland	Nebraska	
	Wyoming	Prince Edward Island	South Dakota	
	North Dakota			
		$LQT_{ij} > 1.20$		
Ontario	British Columbia	New Brunswick	Territories	
Michigan	Alberta	Maine	Alaska	
Quebec	Washington	Nova Scotia		
Vermont	Saskatchewan	Massachusetts		
	Manitoba	Newfoundland		
	Montana	Prince Edward Island		
	North Dakota			
	Wyoming			
		$LQT_{ij} > 1.10$		
Ontario	British Columbia	New Brunswick	Territories	
Michigan	Alberta	Maine	Alaska	
Quebec	Washington	Nova Scotia		
Vermont	Saskatchewan	Massachusetts		
	Manitoba	Newfoundland		
	Montana	Prince Edward Island		
	North Dakota	New Hampshire		
	Wyoming			

Table 7.7b. Provincial Reciprocal Trading Regions, 1989

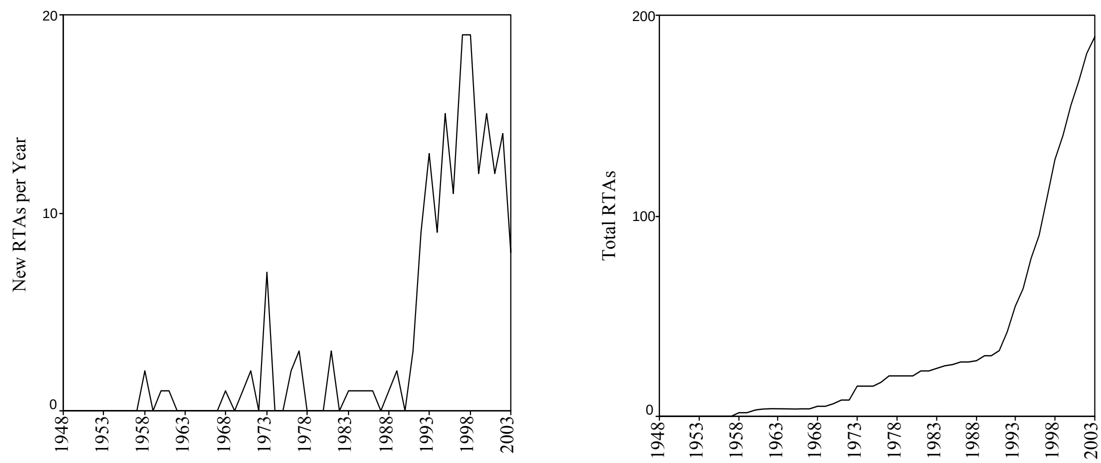
	$LQT_{ij} > 1.30$		
Ontario	British Columbia	New Brunswick	
Michigan	Alberta	Nova Scotia	
Quebec	Washington	Massachusetts	
Vermont	Saskatchewan	Newfoundland	
	Manitoba	Maine	
	Montana	South Carolina	
	Territories	Prince Edward Island	
	$LQT_{ij} > 1.20$		
Ontario	British Columbia	New Brunswick	
Michigan	Alberta	Nova Scotia	
Quebec	Washington	Massachusetts	
Manitoba	Saskatchewan	Newfoundland	
Vermont	Montana	Maine	
	Territories	South Carolina	
		Prince Edward Island	
	$LQT_{ij} > 1.10$		
Ontario	British Columbia	New Brunswick	Saskatchewan
Michigan	Washington	Nova Scotia	Illinois
Quebec	Oregon	Massachusetts	Minnesota
Alberta	Wisconsin	Newfoundland	North Dakota
Manitoba	Territories	Maine	Indiana
Vermont	Montana	South Carolina	Oklahoma
		Prince Edward Island	

Figure 1.1. Global International Trade Flows and Output.



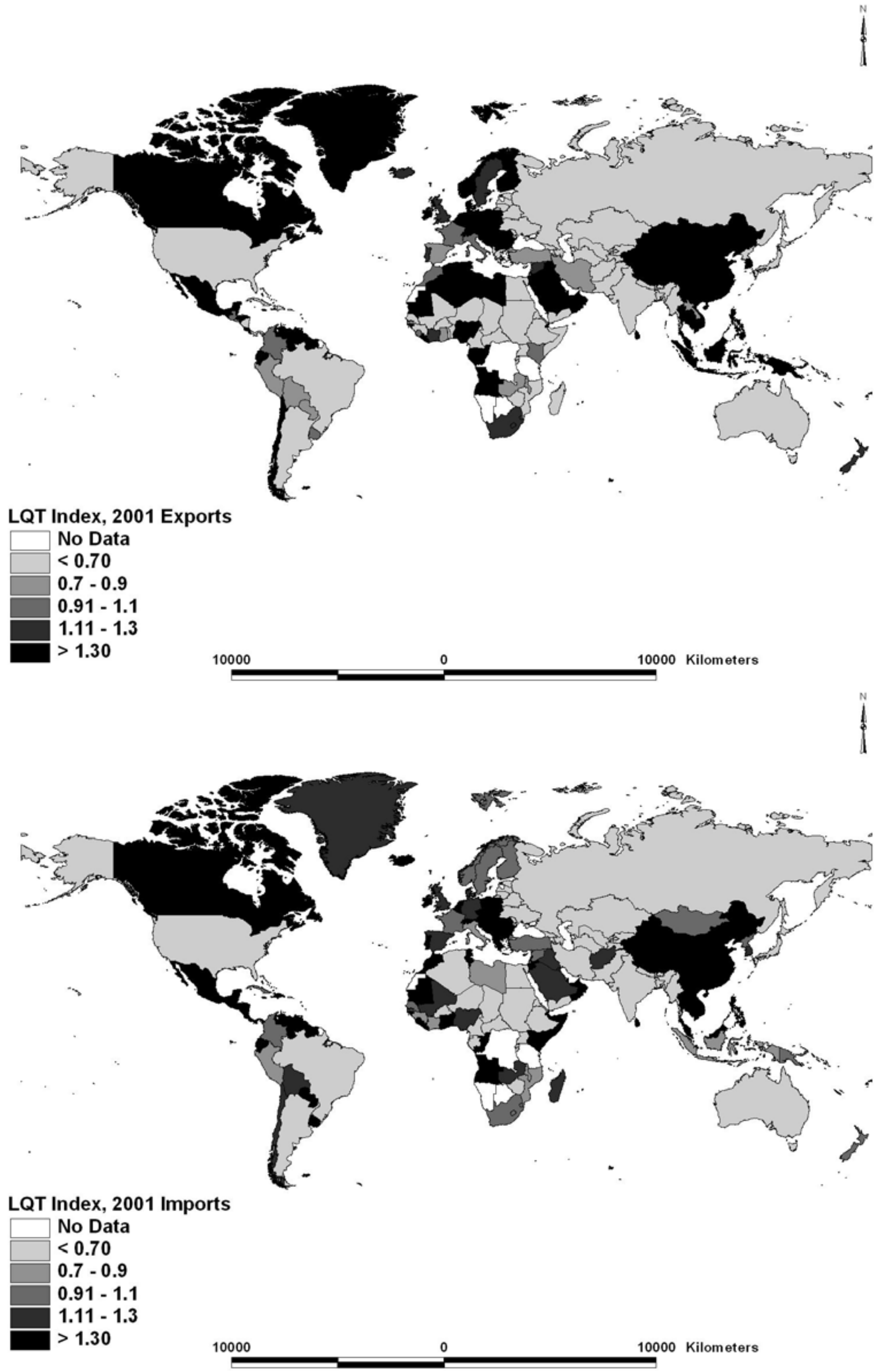
Source. International Monetary Fund (2005a, 2005b).

Figure 1.2. Regional Trade Agreements: Annual and Total.



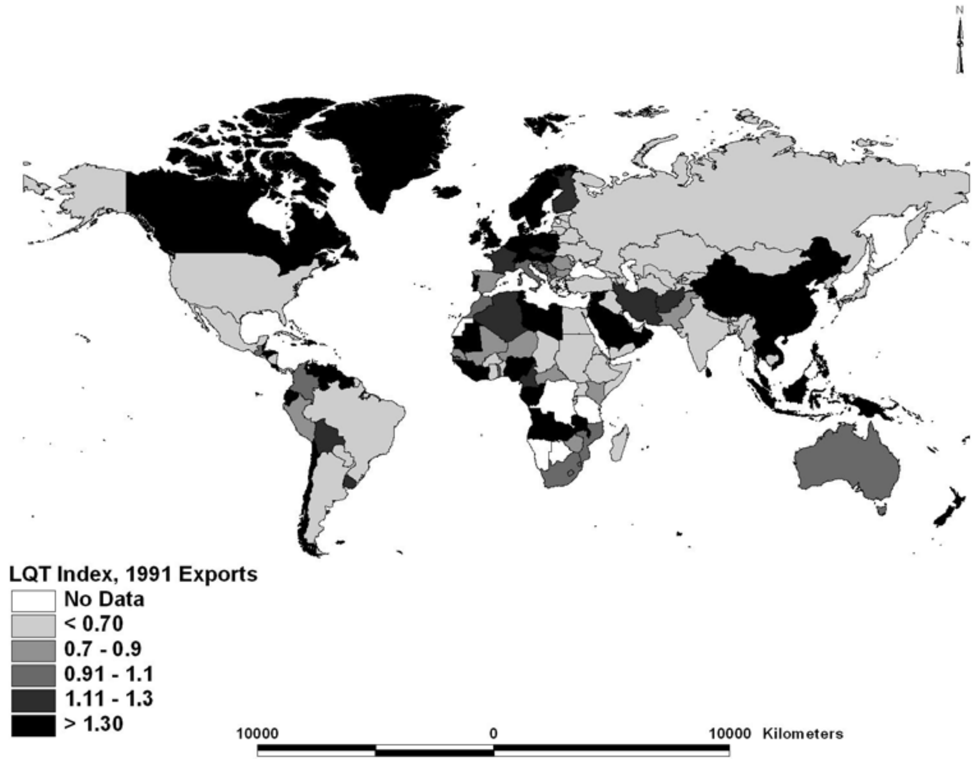
Source. World Trade Organisation (2006).

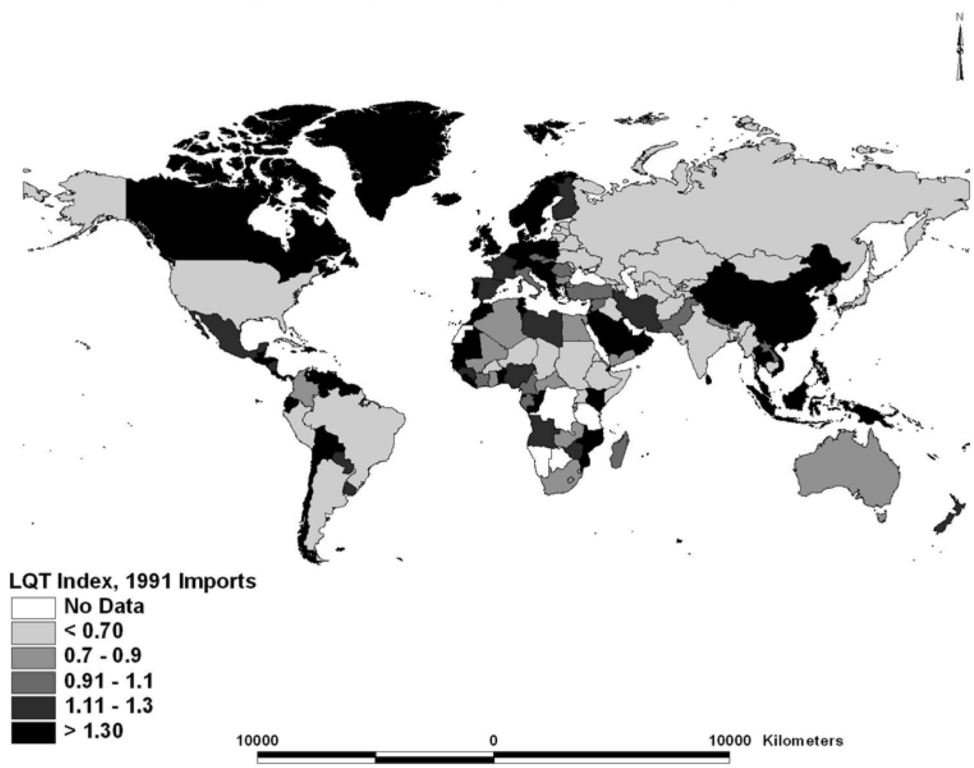
Figure 2.1. Exports and Imports Trade Location Quotients, 2001



Source. Statistics Canada (2004a) and International Monetary Fund (2005b), calculations by the author.

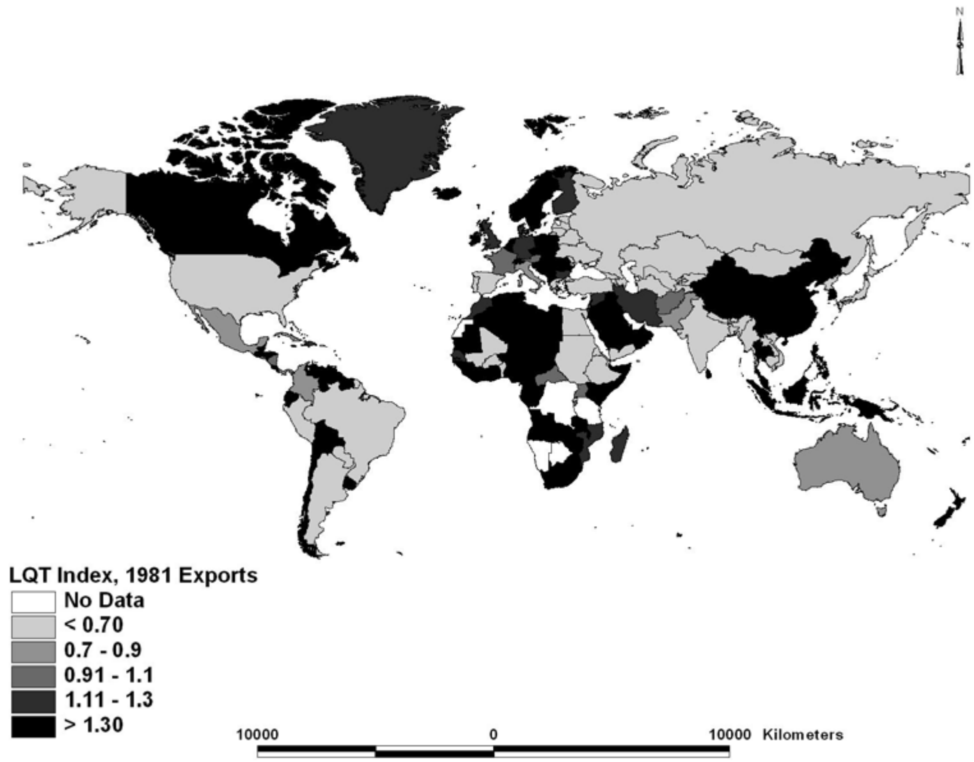
Figure 2.2. Exports and Imports Trade Location Quotients, 1991

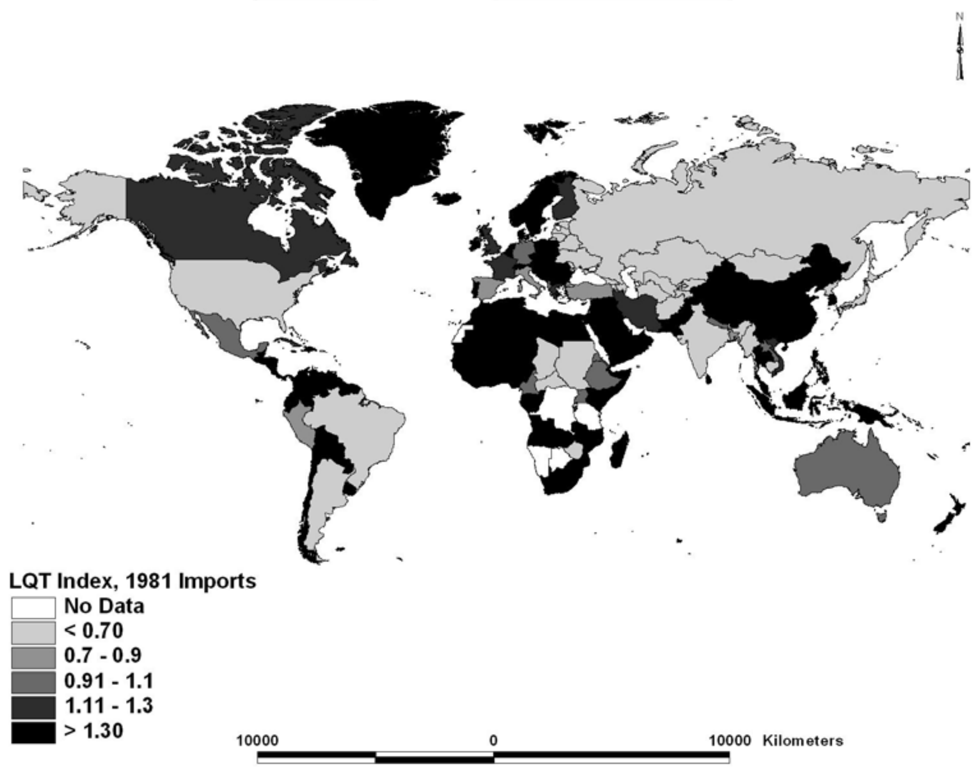




Source. Statistics Canada (2004a) and International Monetary Fund (2005b), calculations by the author.

Figure 2.3. Exports and Imports Trade Location Quotients, 1981



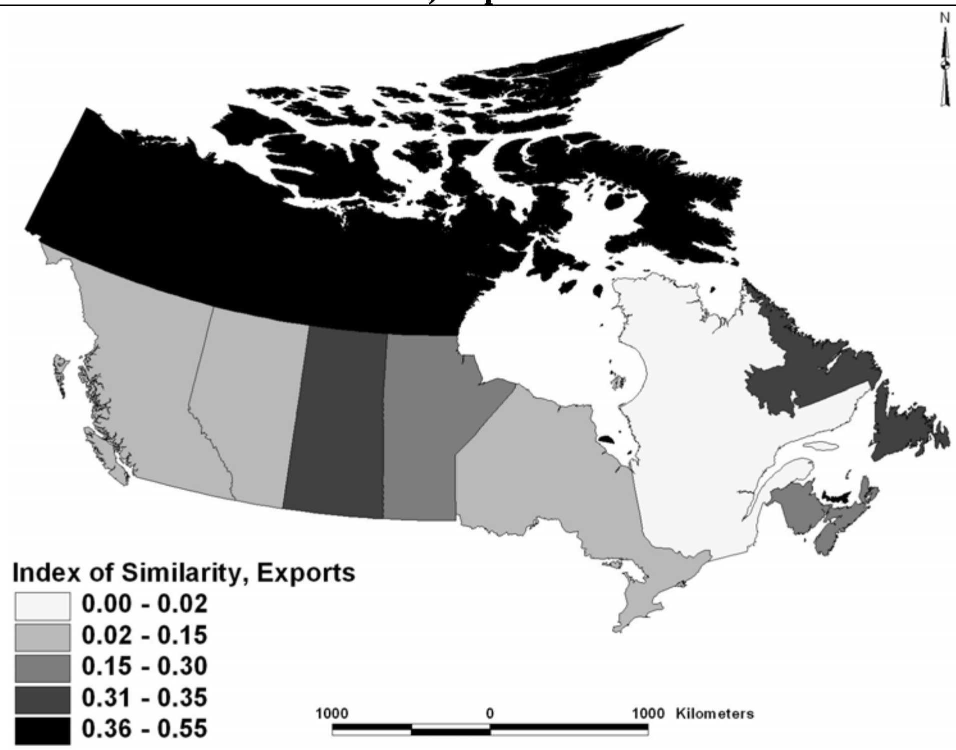


Source. Statistics Canada (2004a) and International Monetary Fund (2005b), calculations by the author.

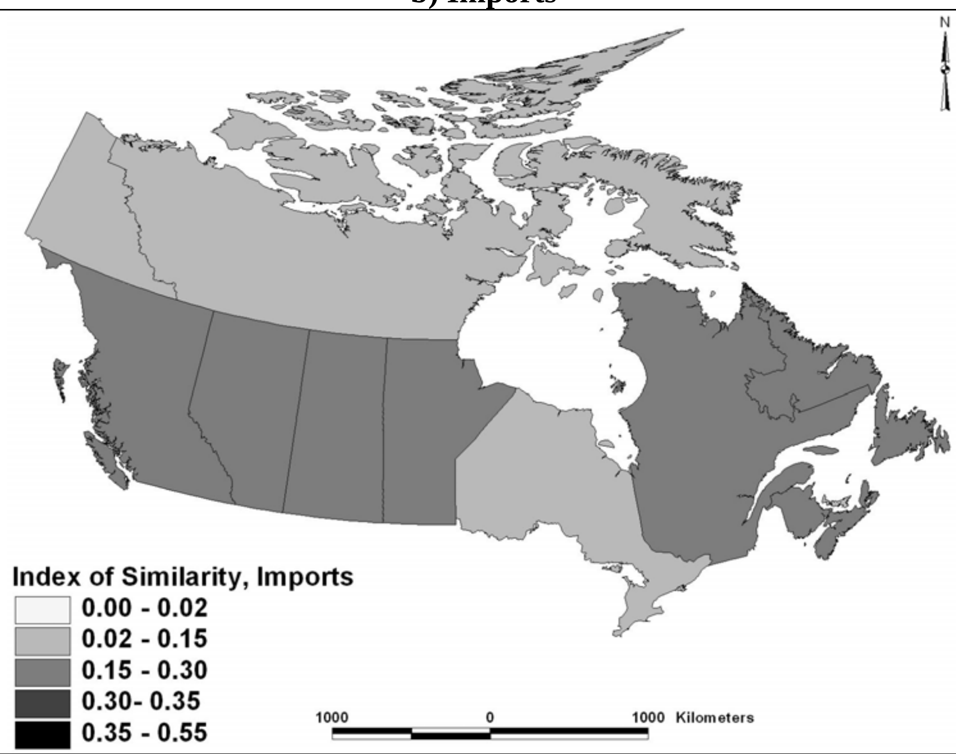
Figure 6.1. Canada, the United States, and the EU-15

Figure 7.1. Indices of Similarity, Exports and Imports

a) Exports



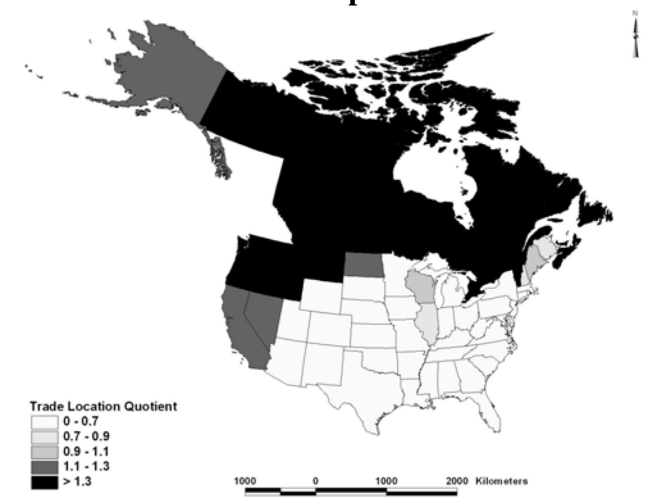
b) Imports



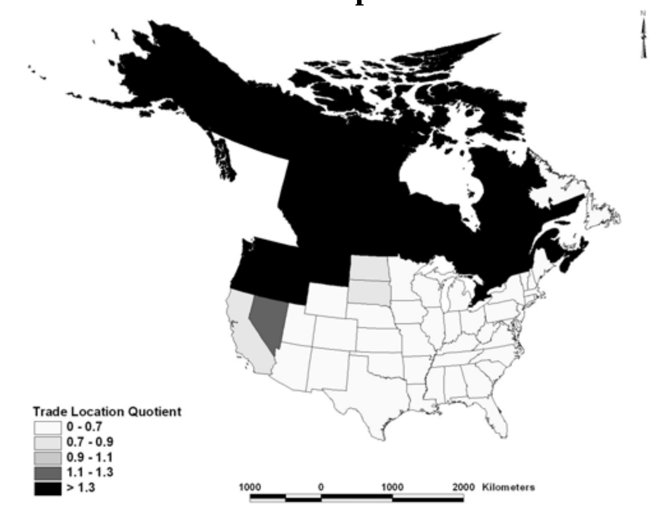
Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

Figure 7.2a. Trade Location Quotients, British Columbia

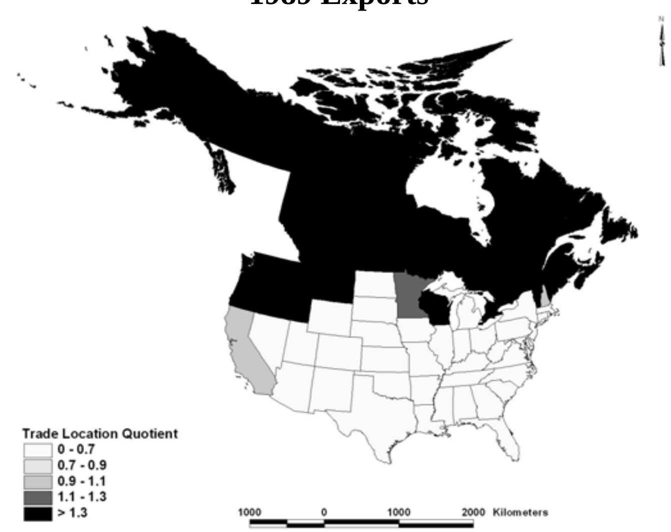
2001 Exports



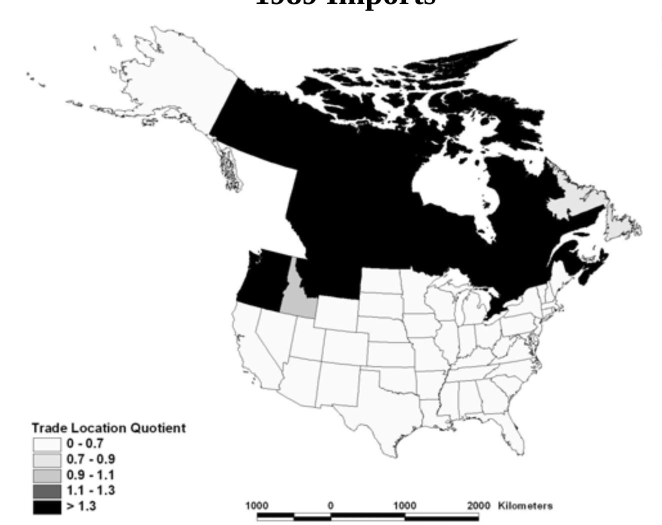
2001 Imports



1989 Exports

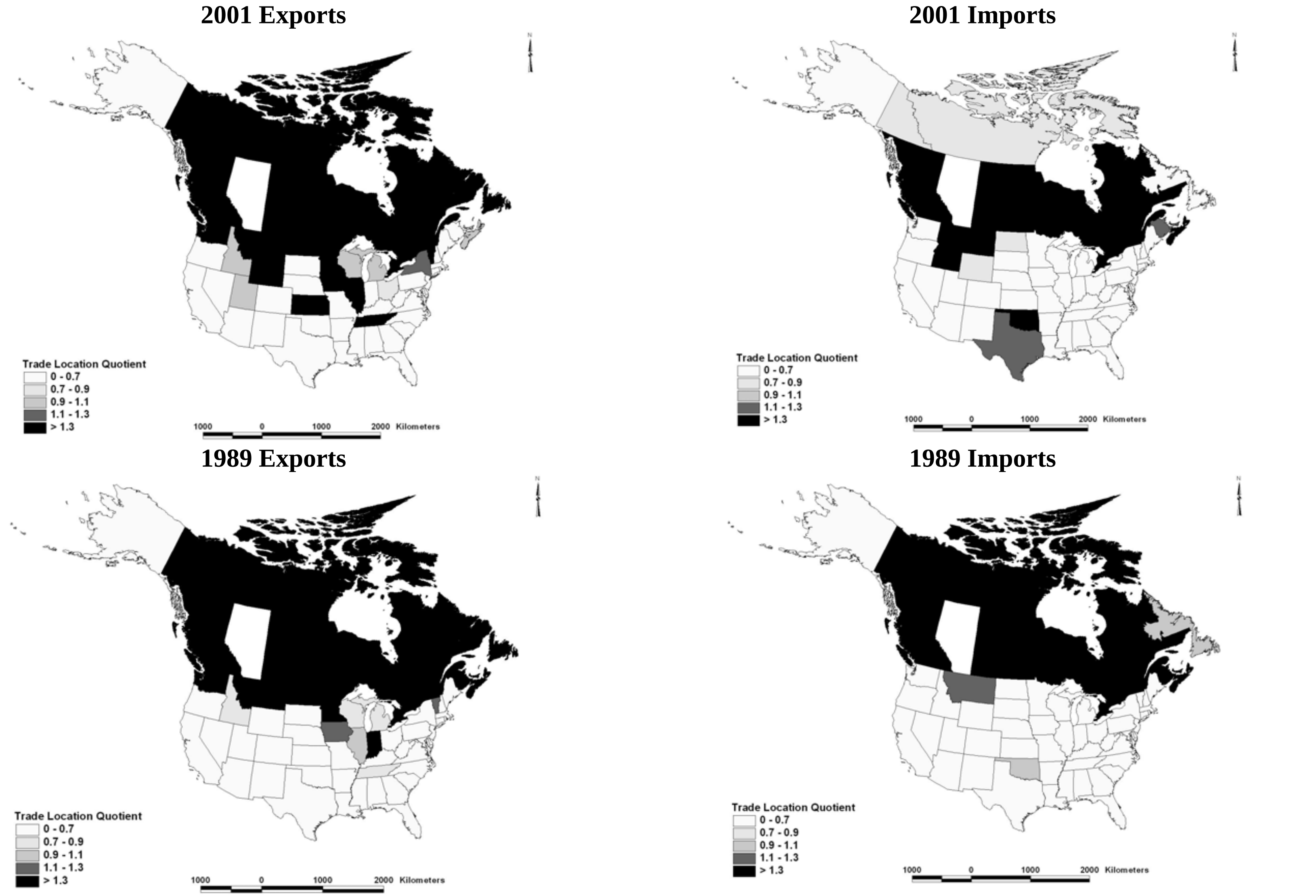


1989 Imports



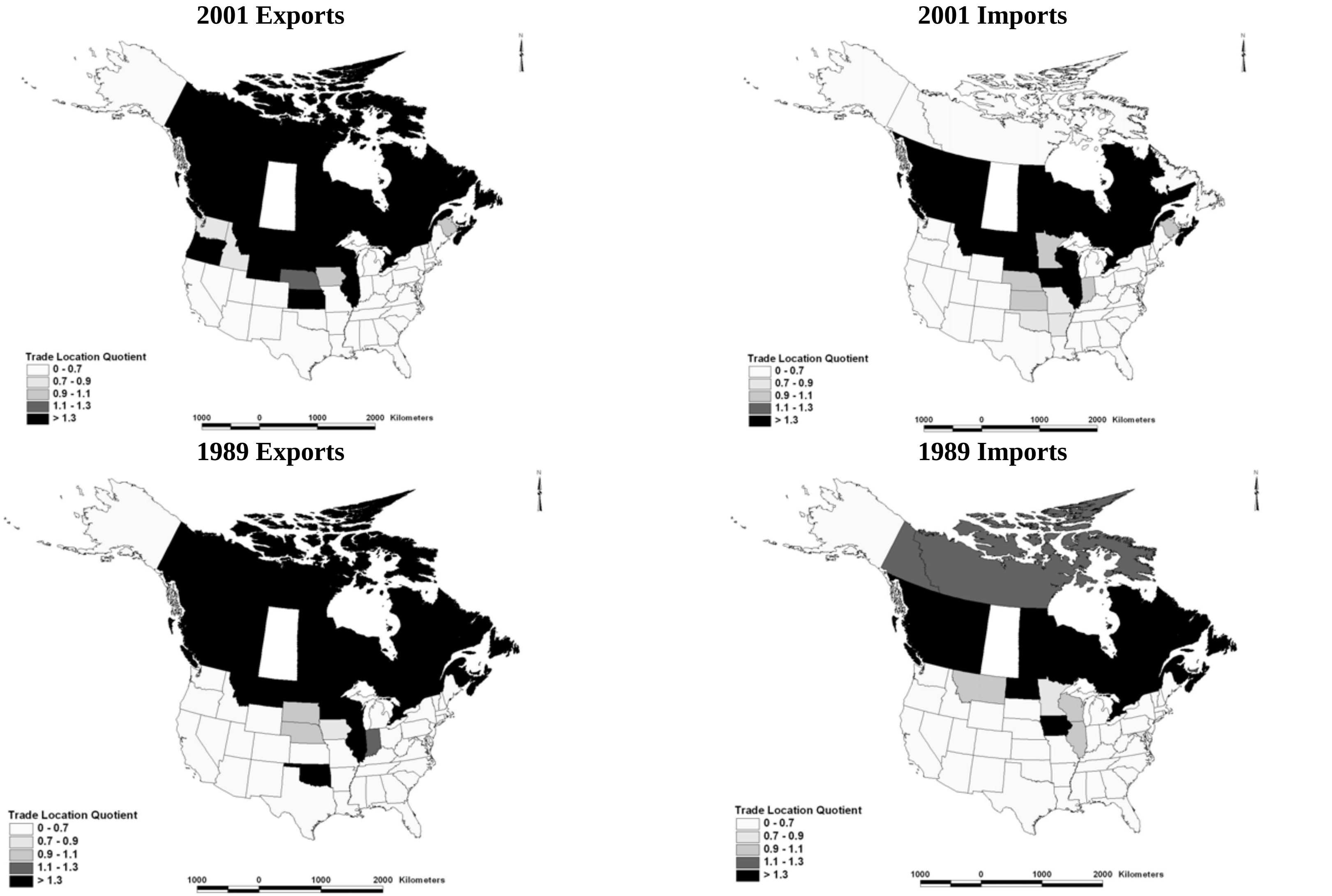
Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

Figure 7.2b. Trade Location Quotients, Alberta



Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

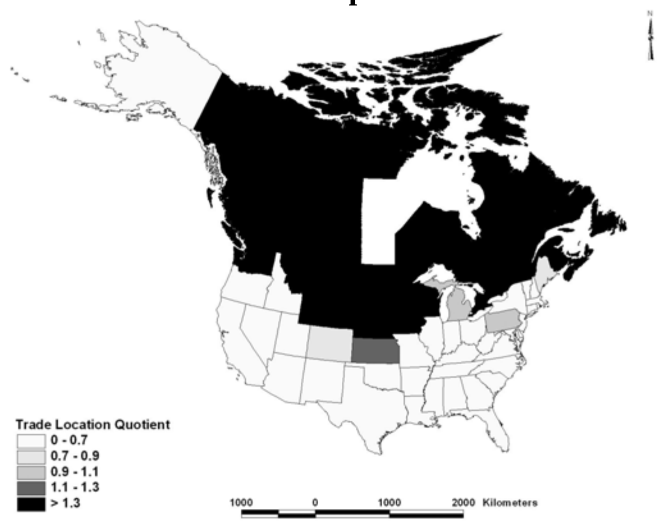
Figure 7.2c. Trade Location Quotients, Saskatchewan



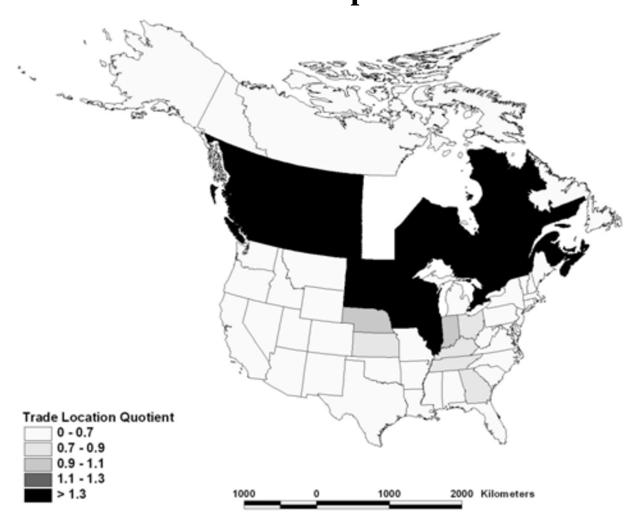
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2d. Trade Location Quotients, Manitoba

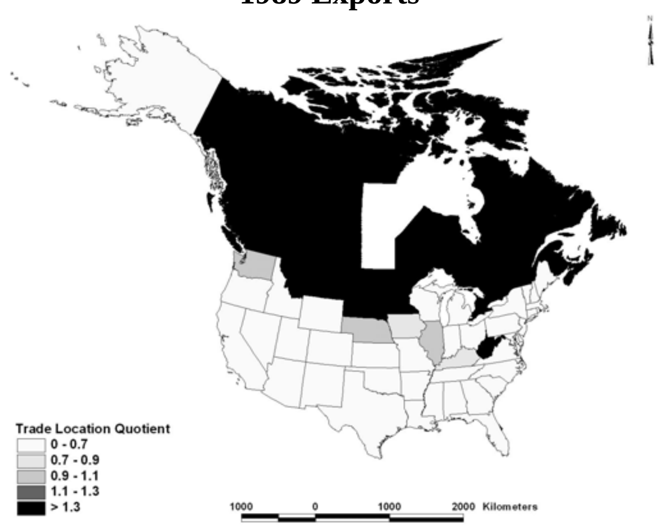
2001 Exports



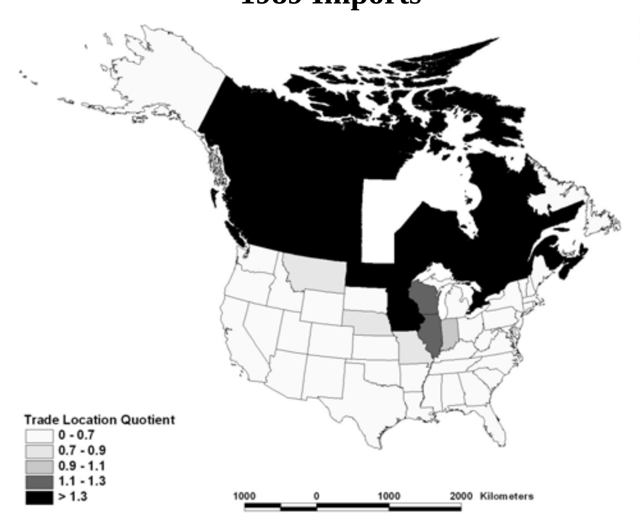
2001 Imports



1989 Exports



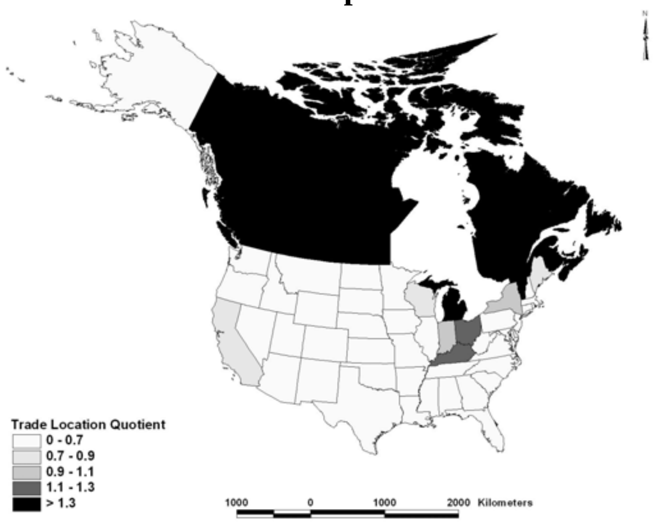
1989 Imports



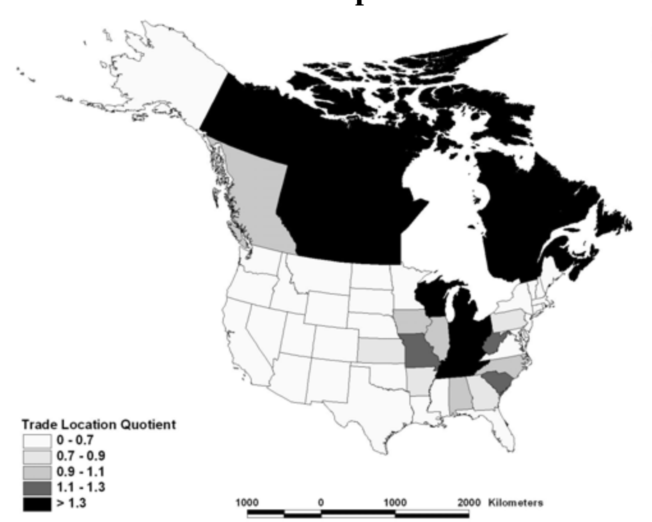
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2e. Trade Location Quotients, Ontario

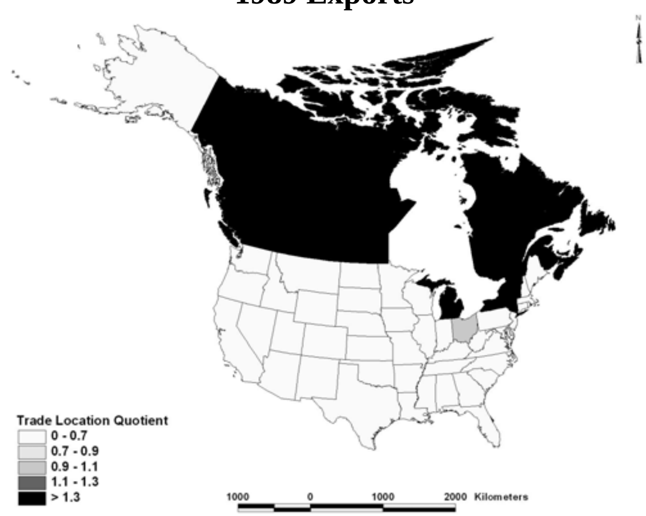
2001 Exports



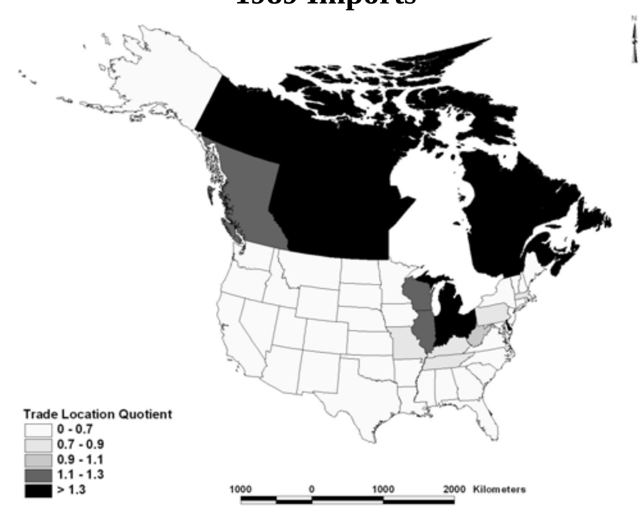
2001 Imports



1989 Exports



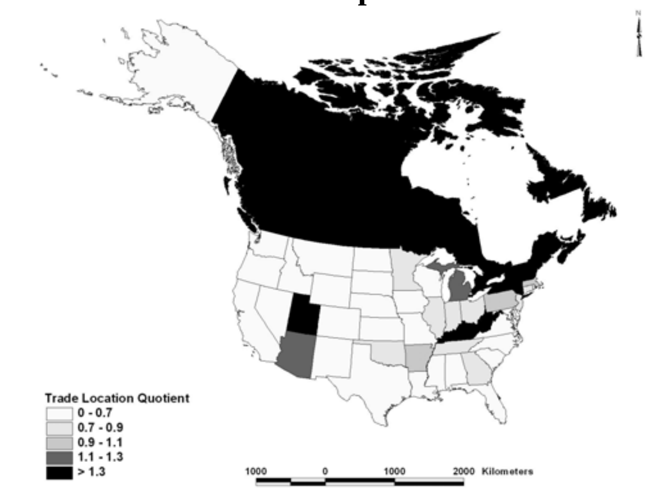
1989 Imports



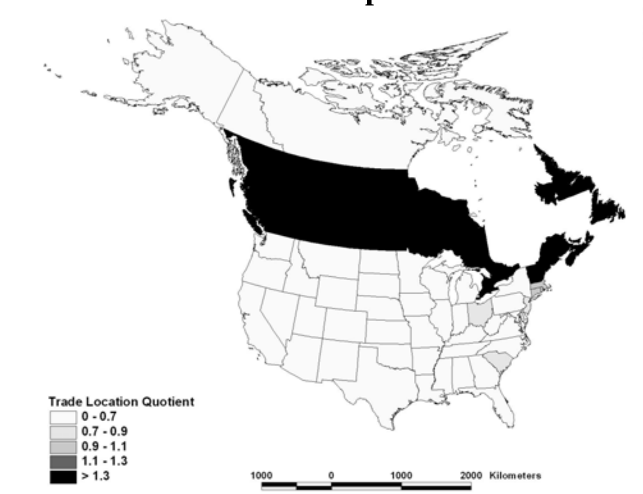
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2f. Trade Location Quotients, Quebec

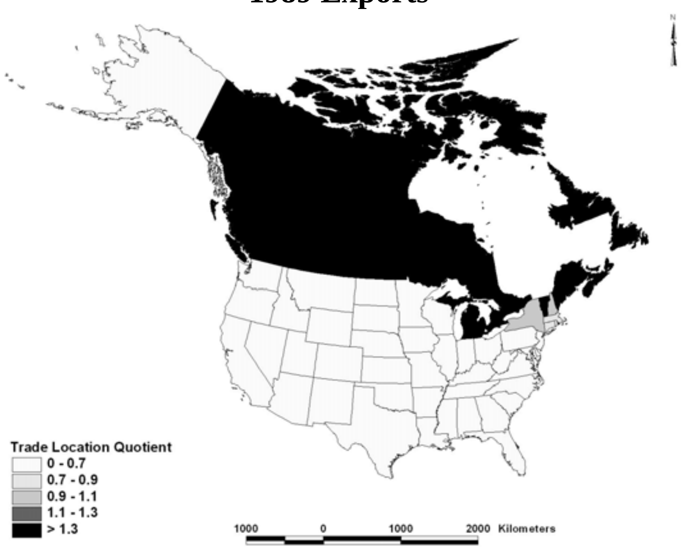
2001 Exports



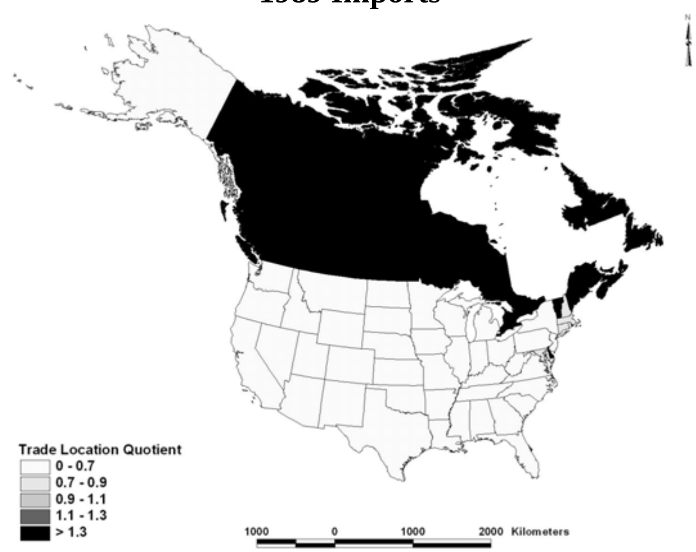
2001 Imports



1989 Exports

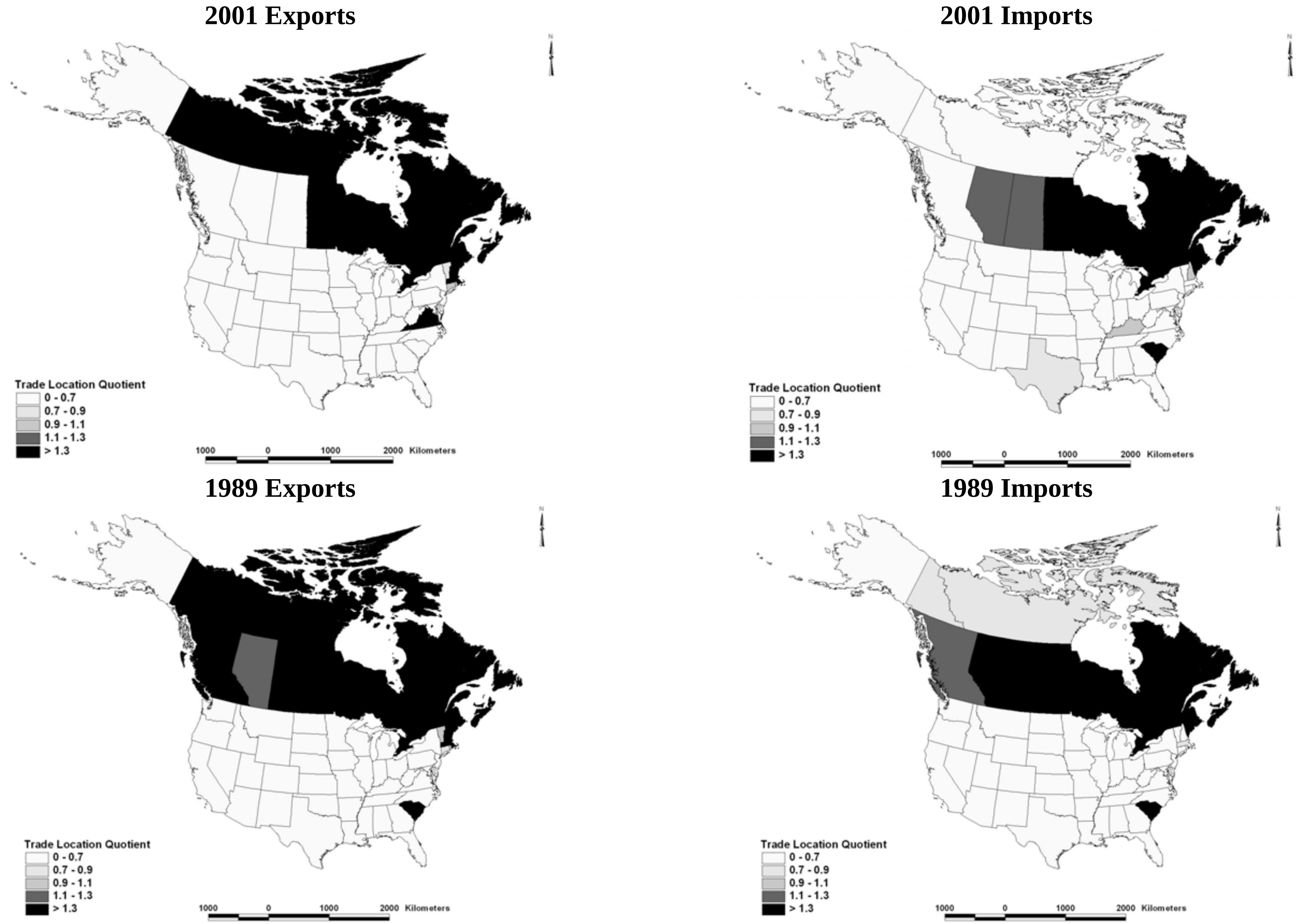


1989 Imports



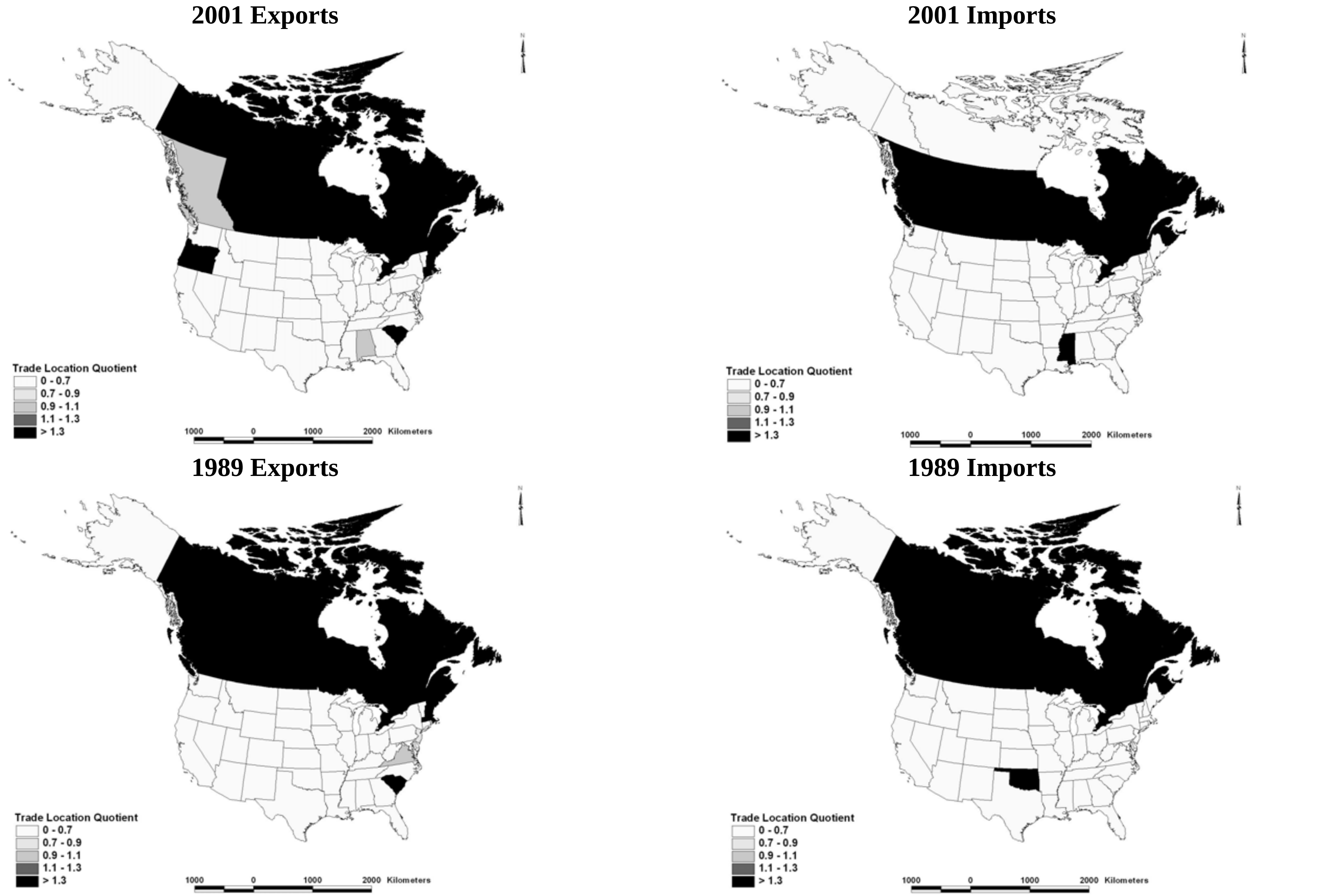
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2g. Trade Location Quotients, New Brunswick



Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

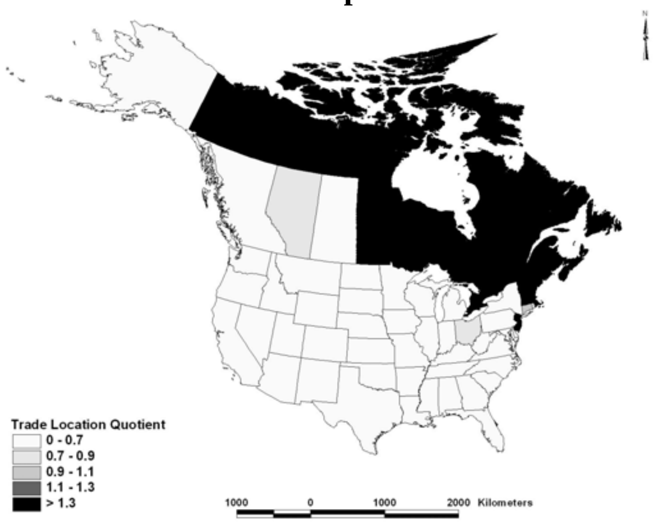
Figure 7.2h. Trade Location Quotients, Nova Scotia



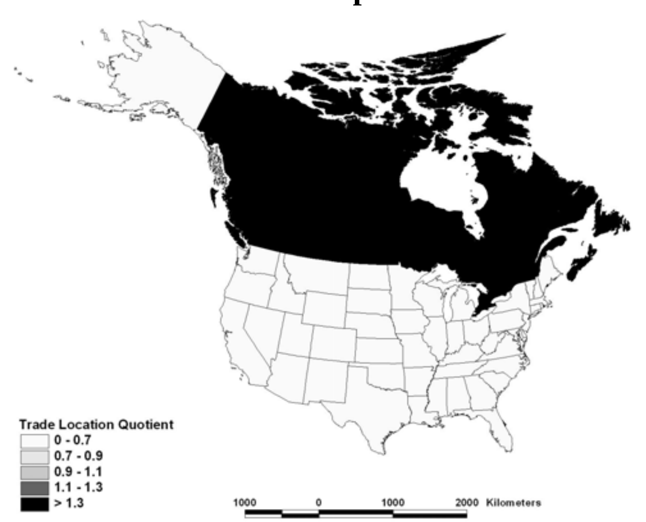
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2i. Trade Location Quotients, Prince Edward Island

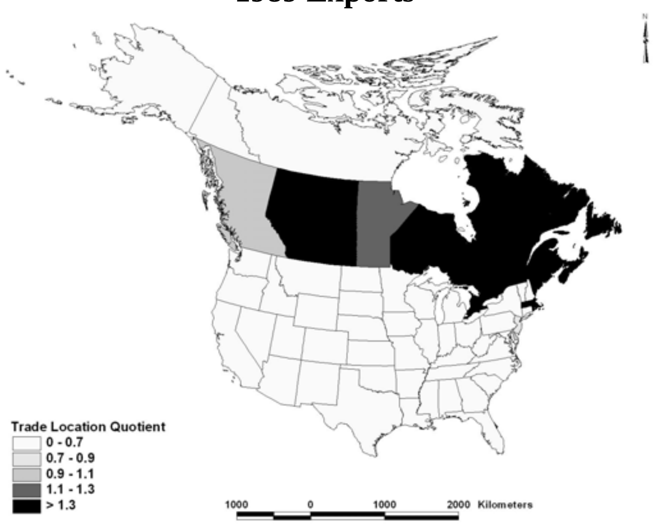
2001 Exports



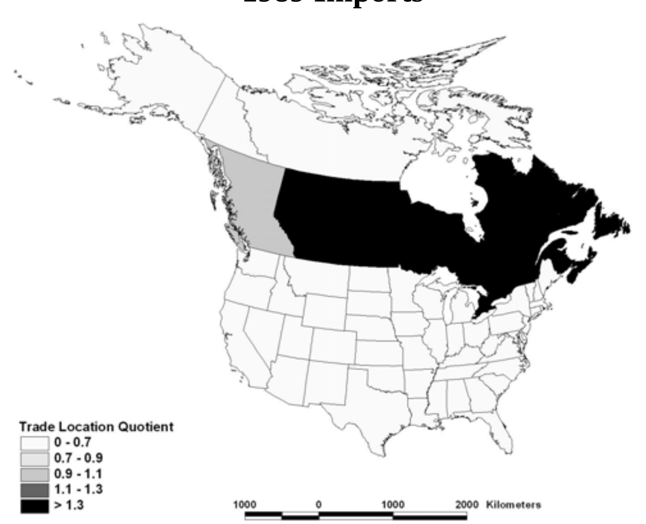
2001 Imports



1989 Exports

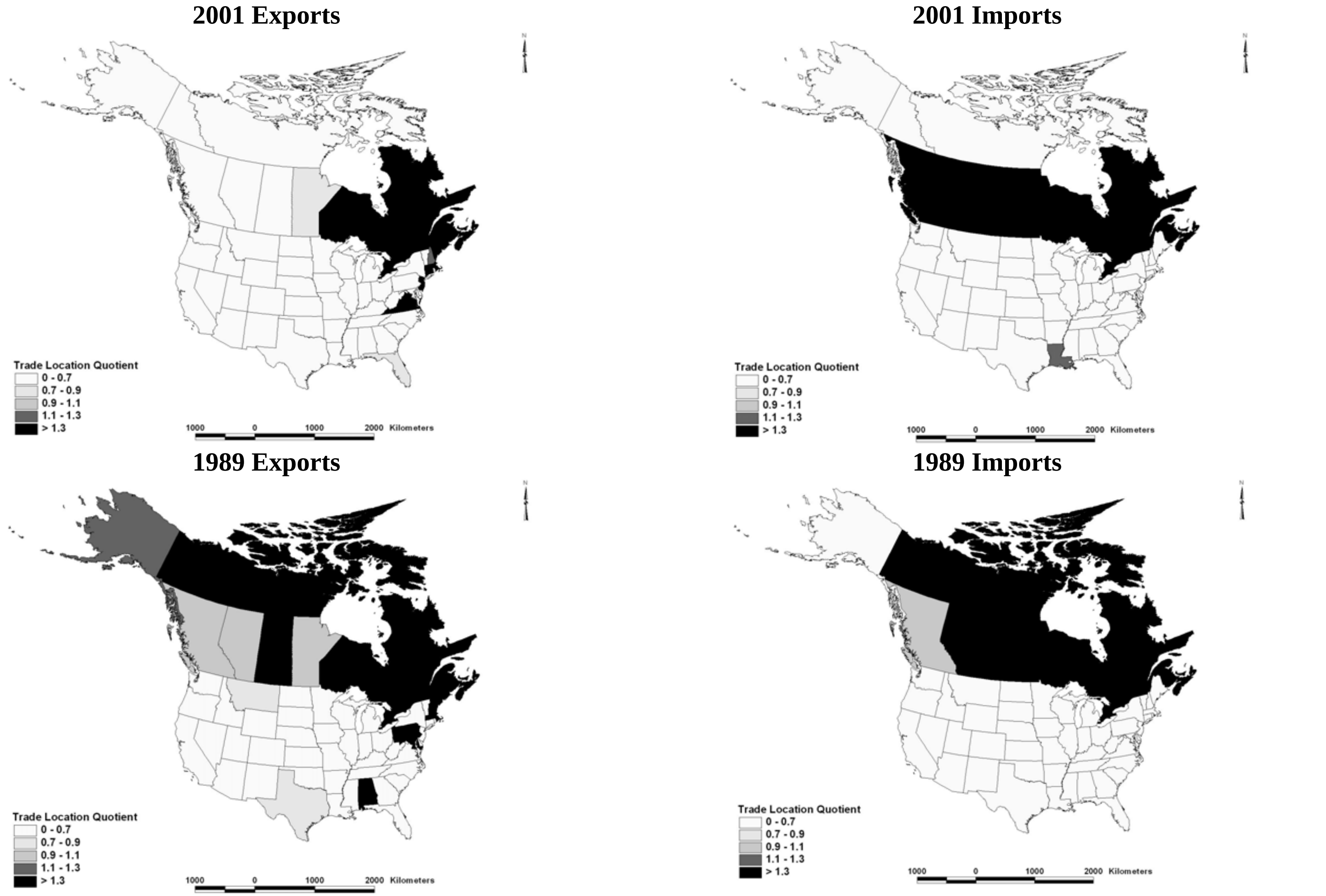


1989 Imports



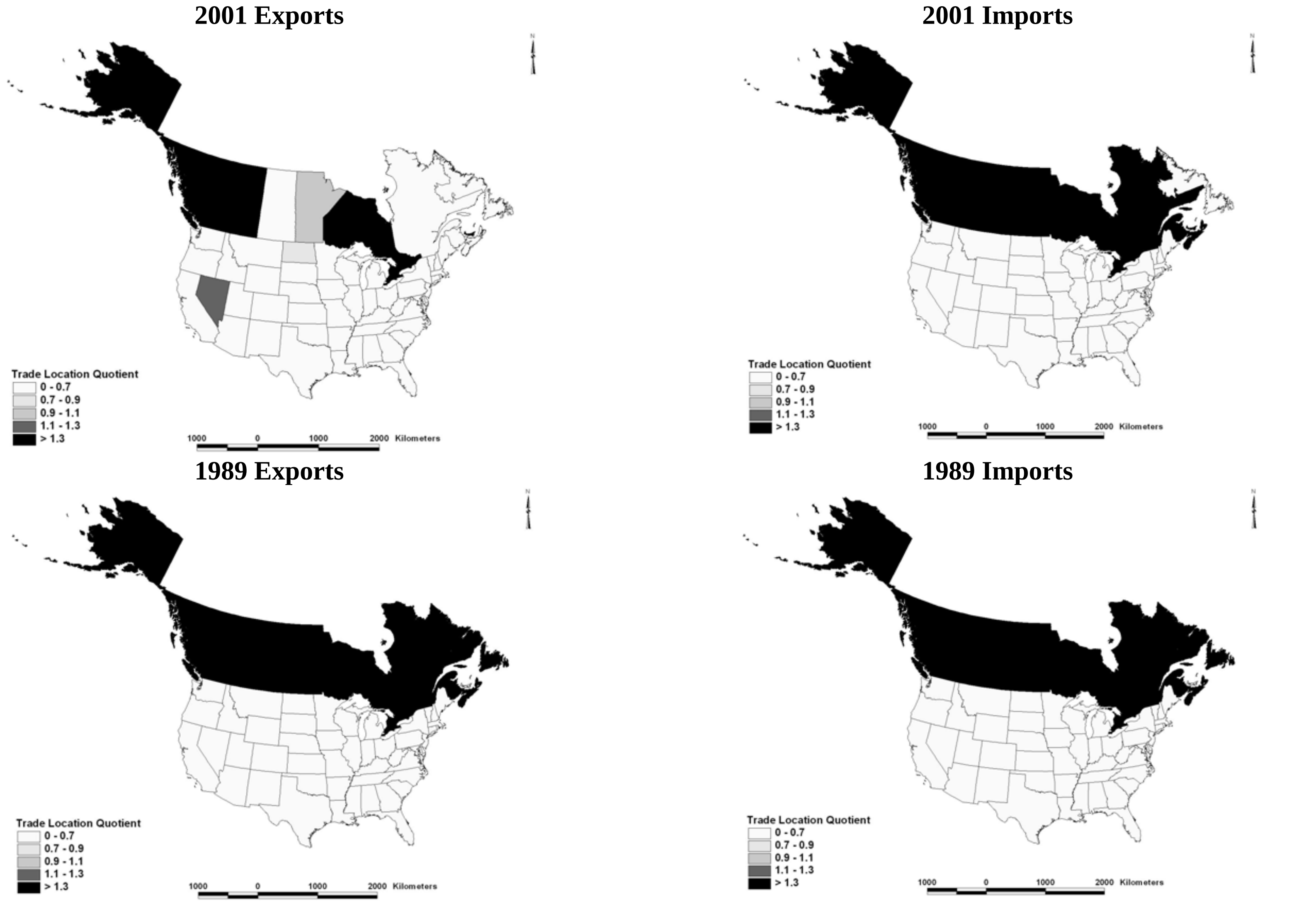
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.2j. Trade Location Quotients, Newfoundland



Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

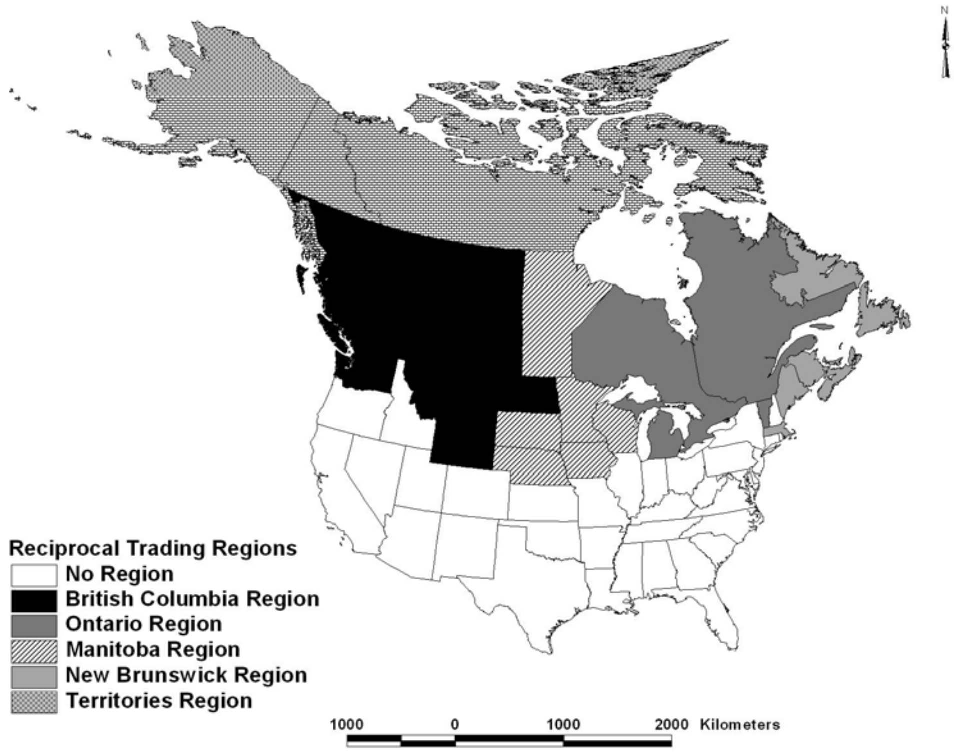
Figure 7.2k. Trade Location Quotients, Territories



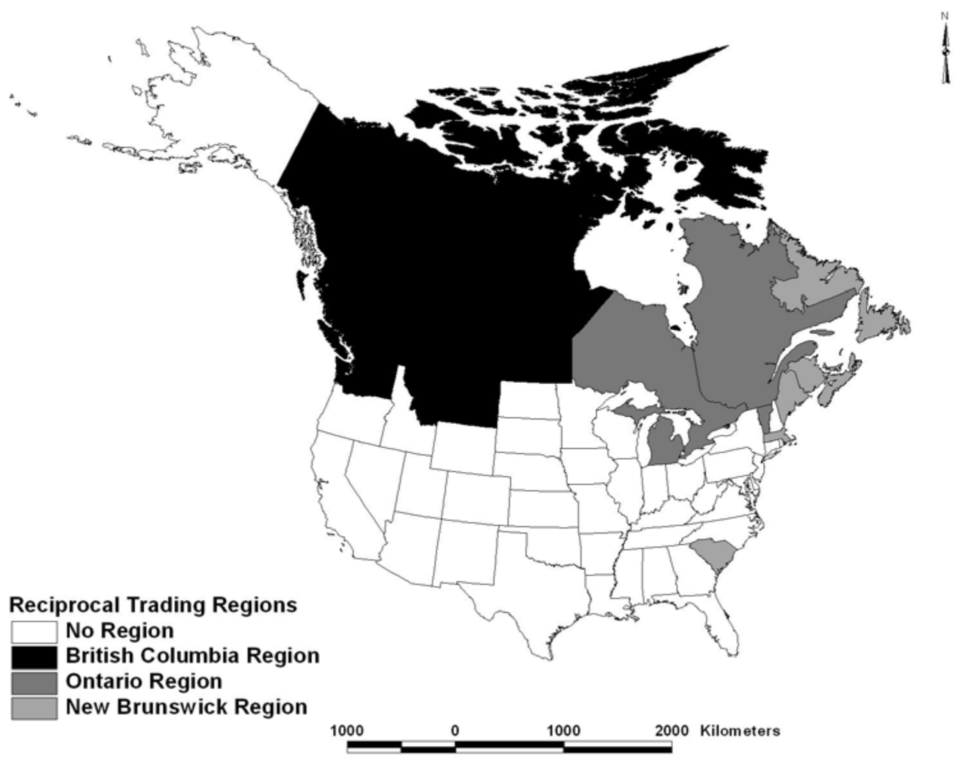
Source. Statistics Canada (1998, 2000, 2004b, 2005a) , calculations by the author.

Figure 7.3. Reciprocal Trading Regions in Canada and the United States, 1.30 Threshold

2001



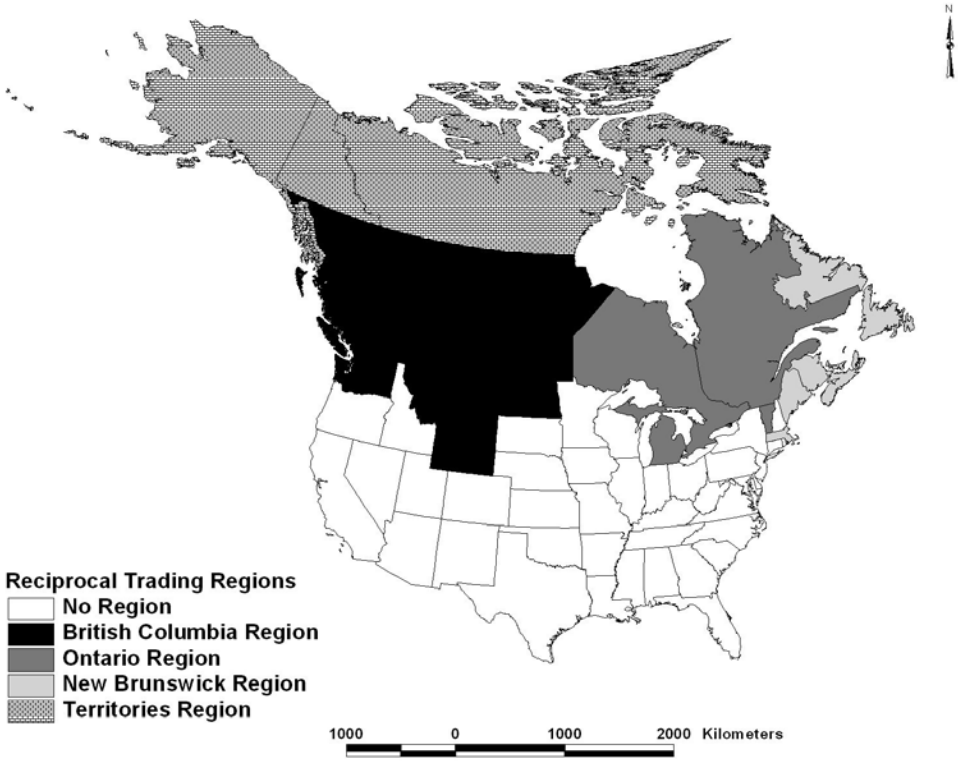
1989



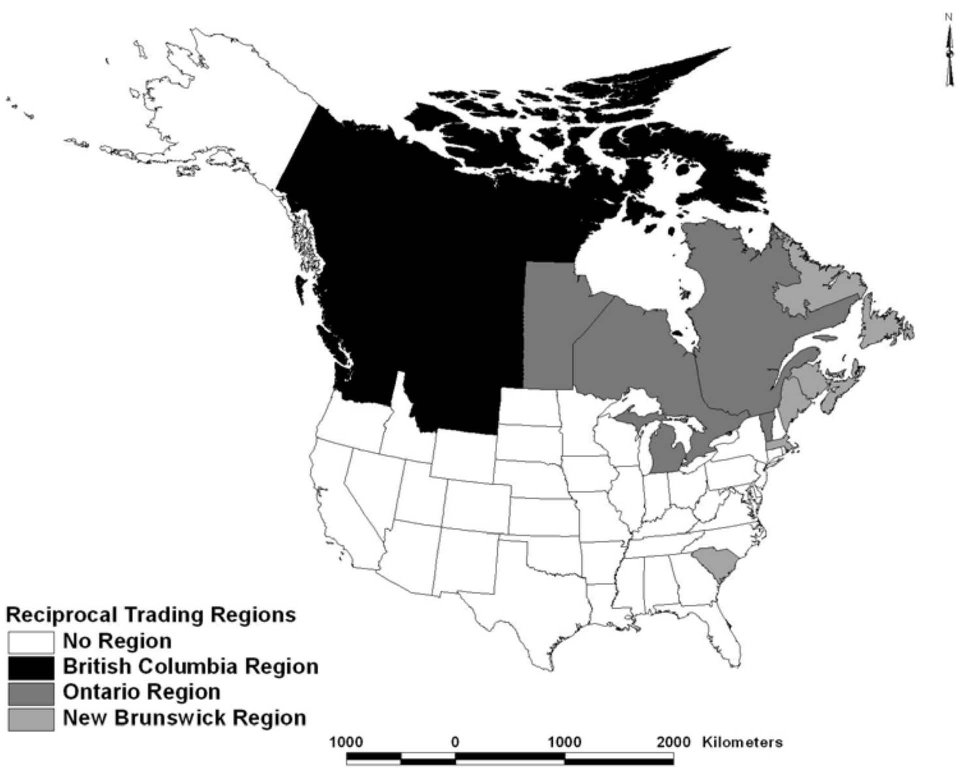
Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

Figure 7.4. Reciprocal Trading Regions in Canada and the United States, 1.20 Threshold

2001



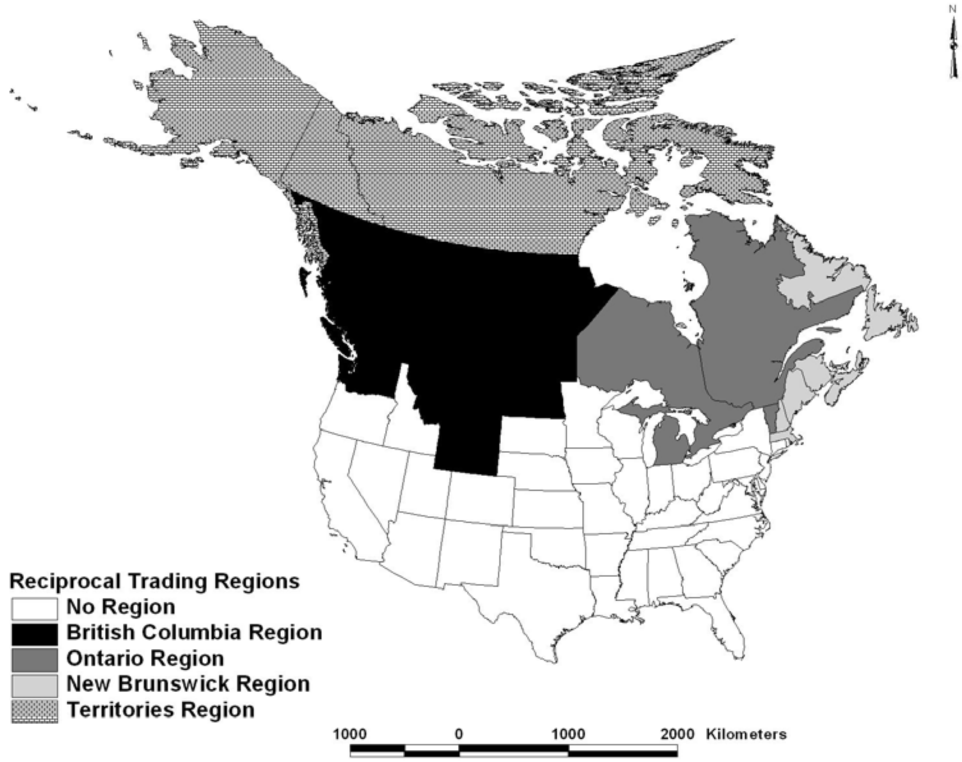
1989



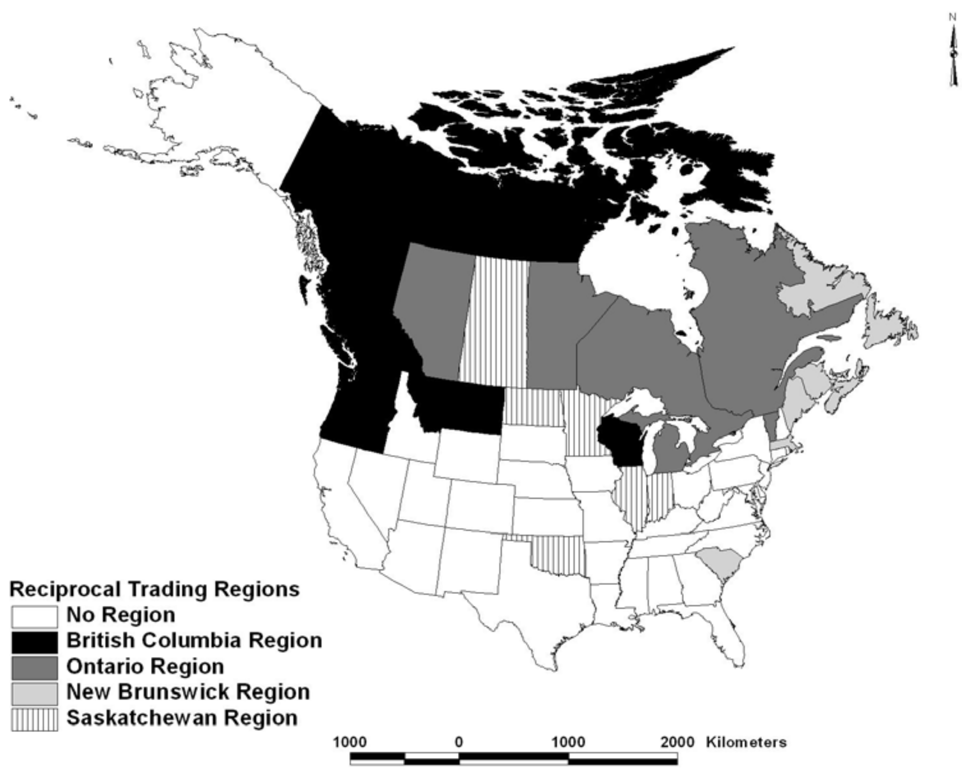
Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

Figure 7.5. Reciprocal Trading Regions in Canada and the United States, 1.10 Threshold

2001



1989



Source. Statistics Canada (1998, 2000, 2004b, 2005a), calculations by the author.

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APPENDIX[52]

The measurement of international trade: sensitivity to trade overlap and product quality

A.1. INTRODUCTION

The methodology employed in this technical appendix to find the appropriate thresholds for trade overlap, γ, and product quality, α, is a statistical analysis that varies these thresholds to test their sensitivity. By varying these thresholds, a number of TWHD and TWVD indices are calculated, with each regressed against the same set of independent variables. If the parameter estimates for the independent variables are not sensitive to changes in γ and α, this measure of intra-industry trade is considered robust. More specifically, if changes in trade overlap, γ, still properly separate one-way from two-way trade and changes in product quality ranges, α, still properly separate vertical from horizontal intra-industry trade, the qualitative empirical results will not change. The actual magnitude of the parameters may change because the level of measured trade types are changing but not the signs and significance of the parameters.

[52] Portions of this Appendix have been published in the following: Andresen, M.A. (2009). A cross-industry analysis of intra-industry trade measurement thresholds: Canada and the United States, 1988-1999. *Empirical Economics* 38(3): 793 - 808.

A.2. THE DEPENDENT VARIABLES

Although, as shown in Table A.1, some previous studies have used $\gamma = 0$ to differentiate between one- and two-way trade, the percentage of U.S.-Canada trade that has greater than 0 percent trade overlap ranges from 97.4 percent to 99.4 percent from 1988 to 1999 (Statistics Canada 2004). Canada and the United States have long been known to have a high degree of intra-industry trade, so the threshold of 0 percent may be too low in this case; however, the threshold of 0 percent is used to facilitate a comparison with previous research. Therefore, the threshold will start at 0 percent, then 10 percent, following Fontagné et al. (1997), and expand to 15, 20, and 25 percent for the sensitivity analysis.

<See Table A.1, page 397>

Two product quality thresholds are used, 15 and 25 percent, that are the values used extensively in the empirical literature. In order to investigate the fragility of these thresholds, ten different combinations of the two thresholds, γ and α, are estimated for both horizontal and vertical differentiation—a total of twenty regressions. Once specification issues are dealt with, the coefficients are checked for correct signs and significance to help determine the robustness of the new intra-industry trade measure, and perhaps, the appropriate combination of thresholds.

A.3. THE INDEPENDENT VARIABLES

The independent variables employed are those common to most previous regression-based empirical intra-industry trade studies at the industry level: product differentiation, market structure, and economies of scale; tariff rates are included to account for the tariff reductions that occurred over the study period due to the Canada-United States Free Trade Agreement and the North American Free Trade Agreement.

There are three common variables used to capture product differentiation in studies on intra-industry trade: the number of product categories within an industry; the Hufbauer (1970) index, which is the ratio of the standard deviation of the export unit values and the unweighted mean of those unit values; and the Fontagné et al. (1997) index, hereafter referred to as the CEPII Index, which is an industry trade-weighted average of unit value ratios. Each of these measures has its limitations. The number of product categories tends to be relatively invariant through time and does not have a natural interpretation for distinguishing between horizontal and vertical intra-industry trade, but is usually associated with horizontal intra-industry trade (Greenaway et al. 1995). The Hufbauer (1970) Index uses the standard deviation of export unit values capturing the degree of dispersion of the unit values, but cannot differentiate between vertical and horizontal product differentiation—this index has not been used in recent studies of intra-industry trade. And the CEPII Index, though using both the import and export unit values, does not give an indication of the degree of dispersion of those unit values.

The following index is employed, that measures the dispersion of the export-import unit value ratios relative to the number of goods traded in industry *j*:

$$\text{Differentiation}_j = \frac{SD\left(\ln \frac{UV^X}{UV^M}\right)}{n_j},$$

where n_j represents the number of product categories within industry *j* that are actually traded and SD represents standard deviation. The unit value ratio ranges from almost zero to infinity, with a skew to the left because the ratio is truncated at zero. Taking the natural logarithm distributes the ratio evenly on either side of zero. The interpretation is as follows: as the standard deviation of the unit value ratio increases, holding the number of traded products constant, vertical product differentiation increases because the dispersion of the unit value ratio has increased capturing a greater range of unit values; and as the number of product categories actually traded decreases, holding the standard deviation of the unit values constant, vertical product differentiation increases because it takes fewer products to maintain a given level of dispersion. Thus the index is positively associated with vertical product differentiation and negatively associated with horizontal product differentiation.

The correlation between the proposed measure of product differentiation and the two measures used in recent studies of intra-industry trade are moderate for the number of product categories within an industry ($r = -0.51$, p-value < 0.001) and insignificant for the CEPII Index ($r = -0.10$, p-value $= 0.19$). The negative correlation between the proposed index and the number of product categories within an industry is expected given that the number of product categories within an industry is a measure of horizontal product differentiation (Greenaway et al. 1995). The proposed index and the CEPII Index, however, were expected to have a positive (and significant) correlation as both measure vertical product differentiation (Fontagné et al. 1997). The two other measures of product differentiation are used below to test the sensitivity of the results.

The concentration ratio measure used is the standard CR4, which measures the share of value-added held by the largest four firms, and economies of scale is measured by minimum efficient scale, calculated by measuring the average size of all firms within an industry—value of shipments per firm. Minimum efficient scale and the concentration ratio are expected to have a negative relationship with horizontal intra-industry trade because increased barriers to entry reduce the number of firms in an industry and, hence, the number of product varieties. There is no expected sign for these variables with vertical product differentiation, but if both variables are significant, they should have the same sign. The variable for tariff barriers is the simple average of tariff rates on goods, calculated at the Harmonized Tariff Schedule 8-digit classification level within each industry. The tariff rate is expected to have different effects on horizontal and vertical intra-industry trade. The tariff may increase or decrease the proportions of either trade type, but a negative relationship with one implies a positive relationship with the other. Traditionally, the tariff rate is thought to have a negative effect on the degree of intra-industry trade (Greenaway and Milner 1986). This hypothesis follows from monopolistic competition theory in horizontally differentiated products. Lancaster (1980) and Krugman (1979, 1980, 1981) illustrate that horizontal intra-industry trade occurs with the products being sold at the same price—the various horizontal intra-industry trade models are summarized in Helpman and Krugman (1985). Therefore a positive relationship is expected with vertical intra-industry trade since tariffs establish a ``price wedge''. Descriptive statistics for the dependent and independent variables are provided in Table A.2.

<See Table A.2, page 398>

A.4. SPECIFICATION OF THE MODEL

Given the nature of the dependent variable, bounded between 0 and 1, a transformation is in order to avoid predicted values outside of this range. The log-odds ratio:

$$\ln\left(\frac{IIT_{jt}}{1 - IIT_{jt}}\right),$$

where IIT_{jt} represents the proportion of vertically/horizontally differentiated trade in industry *j* at time *t* is used in an ordinary least squares framework for estimation using LIMDEP, with the final model being:

$$\ln\left(\frac{IIT_{jt}}{1 - IIT_{jt}}\right) = \alpha_j + \beta_1 \mathrm{Diff}_{jt} + \beta_2 \mathrm{CR4}_{jt} + \beta_3 \mathrm{MES}_{jt} + \beta_4 \mathrm{Tariff}_{jt} + \varepsilon_{jt}.$$

The data set is a panel of 14 industries over 12 years, 168 observations—see data appendix for industry classifications. Cross-section effects are tested by performing a LM test on dummy variables representing the different industries. As shown in Table A.3, all twenty regression specifications strongly reject the classical regression model in favour of panel estimation. Panel estimation, however, can take the form of fixed or random effects. This distinction is important as the fixed effects model is always unbiased, but if appropriate the random effects model is more efficient. The Hausman (1978) specification test is used to test for fixed versus random effects. For horizontal intra-industry trade, the null hypothesis of random effects is rejected in all specifications, p-values ranging from 0.01 to 0.08, in favour of the fixed effects model. However, vertical intra-industry trade only rejects the random effects model in three cases. The random effects model is consistently selected for the specifications with a high degree of trade overlap, but inconsistently for those specifications with a low degree of trade overlap. This suggests that the different specifications exhibit qualitatively different results.

<See Table A.3, page 399>

A.5. RESULTS

If higher thresholds change the ``samples" of the different types of trade—increasing the overlap threshold increases the proportion of one-way trade---model selection and parameter signs are not expected to change if the lower thresholds are correct. The more restrictive models would simply be measuring less of the same type of data, qualitatively. However, if the least restrictive thresholds are not appropriate, i.e. the categories would erroneously group qualitatively different trade types together, model selection and parameter signs are expected to change because these categories would represent qualitatively different types of trade that have different prior expectations. Though the different model selections above are difficult to interpret with respect to the thresholds, vertical intra-industry trade does not consistently select the same model until the overlap threshold is 20 percent.

The results of the sensitivity analysis are shown in Table A.4. In order to assume the appropriate thresholds for trade between Canada and the United States, it is necessary for both the horizontal and vertical differentiation regression results to indicate the same thresholds. Product differentiation is the most consistently estimated parameter in previous studies and the results below are representative of that trend. Product differentiation always has its expected negative sign for horizontal intra-industry trade, though only significant when the quality threshold is 15 percent or trade overlap is 0 percent; vertical intra-industry trade has its expected positive sign for all $\gamma \geq 15$ percent and $\gamma = 0$ percent, though only significant when overlap is 0 and 20 percent.[53] Minimum efficient scale is always negative, as expected, with significance on all but three threshold combinations for horizontal intra-industry trade; vertical intra-industry trade is always positive for $\gamma \geq 10$ percent, implying that the small number of firms model of Shaked and Sutton (1984) represents North American vertical intra-industry, but only becomes consistently significant when trade overlap is 20 and 25 percent. This result is similar to that of model selection. The tariff rates have their expected negative and positive signs for horizontal and vertical intra-industry trade, respectively. The tariff rate parameter is only significant in vertical intra-industry trade when trade overlap is 0 or 20 percent while the tariff rate parameter is always significant for horizontal intra-industry trade when the quality threshold is 15 percent. This latter result is consistent with the finding for product differentiation with horizontal intra-industry trade. Thus far the results are relatively consistent with prior expectations.

<See Table A.4, page 400>

The concentration ratio displays results that are contradictory with expectations for horizontal intra-industry trade and inconsistent for vertical intra-industry trade. The parameter estimate on the concentration ratio is always positive and significant in all but one threshold combination for horizontal intra-industry trade, implying a small number of firms model, such as Eaton and Kierzkowski (1984). However, even if we had the prior expectation of the small number of firms model, minimum efficient scale would then

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[53] The results presented are robust to changing the product differentiation variable to the CEPII Index and the number of product categories in an industry. No significant changes are present in the remaining variables and the performance of the substituted product differentiation variables is not as strong.

have an incorrect sign. The parameter sign for the concentration ratio for vertical intra-industry trade is always negative and significant when $\gamma \geq 10$ percent, implying a large number of firms model such as Falvey (1981). Though there is no prior expectation for the sign of this parameter, it is expected to have the same sign as minimum efficient scale.

A.6. CONCLUSION

The empirical evidence presented in this technical appendix supports the view that the determinants of intra-industry trade depend on whether that trade is horizontally or vertically differentiated. Generally speaking, when the same variable has different prior expectations depending on the trade type, those expectations are confirmed. Product differentiation, tariff rates, and minimum efficient scale all speak to the utility of this separation.

The contradictory and inconsistent results for the concentration ratio indicates omitted variable bias. For both types of intra-industry trade, the concentration ratio parameters are close to zero, relative to minimum efficient scale. If the concentration ratio parameters are indeed those suffering from omitted variable bias, another explanatory variable correlated with the concentration ratio as well as being positively associated with horizontal intra-industry trade and negatively associated with vertical intra-industry trade needs to be included. As with previous studies on the industry-specific determinants of intra-industry trade, the industry characteristics of only one country, Canada, are used. It is generally assumed that the results of estimation between industrialized countries are not sensitive to such data limitations, but perhaps that is not the case here and market structure variables are needed for both Canada and the United States.

Despite the limitations of this study, the results have been quite conclusive. Trade overlap, as it has been used, designates whether a product is inter- or intra-industry trade. Some researchers use any trade overlap greater than zero to define intra-industry trade, while others use a trade overlap of 10 percent. Though horizontal intra-industry trade does not appear to be sensitive to the trade overlap threshold, this is not the case for vertical intra-industry trade. As shown in Table A.2, the mean percentage of vertical intra-industry trade is far more sensitive to changes in the trade overlap threshold than horizontal intra-industry trade: 73 to 29 percent versus 26 to 16 percent, respectively. Therefore, the sensitivity exhibited by vertical intra-industry trade is no surprise. The results presented here indicate that $\alpha = 15$ percent is sufficient to disentangle horizontal from vertical intra-industry trade, but trade overlap has been too low in previous studies. Considering both model specification and sensitivity results, trade overlap should be set at 20 percent, $\gamma = 20$.

Table A.1. Trade Overlap and Product Quality Thresholds

Threshold	Greenaway et al. (1995)	Fontagné et al. (1997)	Greenaway et al. (1999)
Trade Overlap	γ = 0 percent	γ = 10 percent	γ = 0 percent
Product Quality	α = 15, 25 percent	α = 15 percent	α = 15 percent

Table A.2. Descriptives

	Mean	Standard Deviation	Minimum	Maximum
HIIT: $\gamma = 0.10$, $\alpha = 0.15$	0.210	0.202	0.000	0.911
HIIT: $\gamma = 0.10$, $\alpha = 0.25$	0.294	0.228	0.000	0.927
HIIT: $\gamma = 0.15$, $\alpha = 0.15$	0.196	0.206	0.000	0.915
HIIT: $\gamma = 0.15$, $\alpha = 0.25$	0.266	0.229	0.000	0.927
HIIT: $\gamma = 0.20$, $\alpha = 0.15$	0.179	0.193	0.000	0.915
HIIT: $\gamma = 0.20$, $\alpha = 0.25$	0.242	0.216	0.000	0.925
HIIT: $\gamma = 0.25$, $\alpha = 0.15$	0.157	0.165	0.000	0.903
HIIT: $\gamma = 0.25$, $\alpha = 0.25$	0.215	0.187	0.000	0.912
VIIT: $\gamma = 0.10$, $\alpha = 0.15$	0.415	0.208	0.027	0.873
VIIT: $\gamma = 0.10$, $\alpha = 0.25$	0.330	0.208	0.020	0.869
VIIT: $\gamma = 0.15$, $\alpha = 0.15$	0.349	0.197	0.025	0.813
VIIT: $\gamma = 0.15$, $\alpha = 0.25$	0.280	0.192	0.020	0.770
VIIT: $\gamma = 0.20$, $\alpha = 0.15$	0.314	0.197	0.025	0.807
VIIT: $\gamma = 0.20$, $\alpha = 0.25$	0.250	0.191	0.019	0.763
VIIT: $\gamma = 0.25$, $\alpha = 0.15$	0.286	0.191	0.011	0.758
VIIT: $\gamma = 0.25$, $\alpha = 0.25$	0.228	0.186	0.011	0.723
Product Differentiation	0.022	0.036	0.001	0.183
Concentration Ratio	53.937	16.063	22.456	81.551
Minimum Efficient Scale	14.570	14.662	1.747	80.140
Tariff Rate	0.036	0.030	0.002	0.174

Table A.3. Model Selection

Trade Overlap	10		15		20		25	
Quality Threshold	15	25	15	25	15	25	15	25
				Horizontally Differentiated Trade				
LM Test								
H_0: No Panel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hausman Test								
H_0: Random Effects	0.01	0.01	0.01	0.05	0.04	0.04	0.03	0.05
Final Model	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
				Vertically Differentiated Trade				
LM Test								
H_0: No Panel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hausman Test								
H_0: Random Effects	0.04	0.03	0.12	0.07	0.22	0.18	0.26	0.15
Final Model	Fixed	Fixed	Random	Fixed	Random	Random	Random	Random

Table A.4. Sensitivity Analysis

Trade Overlap	0		10		15		20		25	
Quality Threshold	15	25	15	25	15	25	15	25	15	25
Product Differentiation	-42.36	-40.74	-73.13	-23.24	-62.93	-27.03	-52.91	-8.65	-55.94	-14.91
	(-3.04*)	(-3.07*)	(-4.07*)	(-1.57)	(-3.42*)	(-1.55)	(-2.78*)	(-0.47)	(-2.94*)	(-0.78)
CR4	-0.08	0.1	0.27	0.16	0.27	0.18	0.23	0.15	0.25	0.18
	(-1.28)	(1.78*)	(3.38*)	(2.49*)	(3.32*)	(2.34*)	(2.77*)	(1.79*)	(3.00*)	(2.09*)
MES	-0.87	-0.83	-2.06	-1.56	-1.92	-1.43	-1.77	-1.22	-1.44	-0.91
	(-1.58*)	(-1.58*)	(-2.89*)	(-2.66*)	(-2.65*)	(-2.07*)	(-2.36*)	(-1.68*)	(-1.92*)	(-1.20)
Tariff	-13.36	-9.34	-26.51	-13.03	-24.64	-11.51	-22.01	-9.39	-18.54	-5.36
	(-1.82*)	(-1.34)	(-2.79*)	(-1.67*)	(-2.54*)	(-1.25)	(-2.19*)	(-0.97)	(-1.85*)	(-0.53)
R^2	0.77	0.79	0.67	0.63	0.67	0.59	0.66	0.58	0.67	0.57
Product Differentiation	28.81	27.71	-2.66	-2.44	2.62	0.17	5.94	6.11	3.36	3.38
	(5.40*)	(5.48*)	(-0.53)	(-0.61)	(0.69)	(3.88*)	(1.55)	(1.83*)	(0.87)	(0.96)
CR4	-0.02	-0.02	-0.05	-0.05	-0.04	-0.06	-0.04	-0.04	-0.03	-0.04
	(-1.02)	(-1.11)	(-2.34*)	(-2.65*)	(-2.94*)	(-3.35*)	(-2.89*)	(-3.44*)	(-2.65*)	(-3.53*)
MES	-0.18	-0.25	0.32	0.21	0.27	0.34	0.29	0.26	0.28	0.25
	(-0.76)	(-1.08)	(1.59)	(1.31)	(1.59)	(2.21*)	(1.69*)	(1.84*)	(1.64*)	(1.69*)
Tariff	6.24	3.89	-0.37	-0.45	2.65	2.24	3.35	3.63	2.78	2.97
	(1.93*)	(1.29)	(-0.14)	(-0.21)	(1.19)	(1.09)	(1.49)	(1.94*)	(1.23)	(1.50)
R^2	0.59	0.77	0.77	0.88	0.25	0.88	0.25	0.34	0.24	0.34

Notes. t-values reported in parentheses; * indicates 10 percent significance level.