Network of Affiliates and Canada-U.S. Border Effect

By

Nikoo Sarvghad-Moghaddam

A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Master of Applied Science

in

Management Sciences

Waterloo, Ontario, Canada, 2007

Author's declaration for electronic submission of a thesis

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Network of Affiliates and Canada-U.S. Border Effect

The objective of this thesis is to evaluate the influence that the pattern of affiliate linkages- establishments associated with companies as affiliates, subsidiaries and divisions- between U.S. states and Canadian provinces has on the effect of the border on trade between the two countries. The gravity model is used to estimate the border effect. Two hypotheses are tested – that the border effect is greater in the presence of affiliate linkages and that the strength of the border effect varies between industrial sectors.

The results support the first hypothesis indicating that when all sectors combined, the presence of affiliates has a positive impact and it significantly strengthens the Canada-U.S. border effect. However, for the second hypothesis, nine sectors analyzed in this study present mixed results. For six sectors of agricultural, mineral, chemical, plastic, machinery and motor vehicle the border effect is not significantly different in the presence and absence of affiliates, while for the other three sectors of wood, textile, and base metals, the impact of affiliates has been significant. However, for wood and base metals sectors border effect has become stronger and for textile it has become weaker in the presence of affiliates. This research shows how the complicated relationship between trade and foreign direct investment determines firms operating in various sectors make decisions between export and establishing affiliates. The implication of the results can shed light on the study of the border effect and trade policy.

Acknowledgements

I would like to express my sincere gratitude to my supervisor, Dr. Rod McNaughton for his constant support and encouragement throughout this thesis. During the process of conducting this research, I deeply benefited from his valuable insights, recommendations, and encouragements. I could not have completed this work without his guidance.

I also would like to thank my readers, Dr. Scott Jeffrey and Dr. Bon Koo for taking the time to read my thesis and provide constructive comments.

Furthermore, I would like to thank Lynne Wight for her academic guidance during the time of my graduate studies. Her efforts are greatly appreciated.

I would like to thank my husband, Afshin for his support and sacrifices.

Dedication

This thesis is dedicated to my loving husband, Afshin for his love and support.

Table of Contents

List of Tables

List of Figures

1. Introduction

1.1 Background of Research

Recent decades have witnessed radical shifts in international trade policies toward greater economic integration in industrialized countries. Over the past thirty years, many developed countries have abandoned protectionist policies in favour of trade liberalization (Chase, 2003). Consequently, multilateral and regional trade agreements have emerged to provide opportunities for countries to lower economic barriers and facilitate trade.

The expansion of international economic activity has created an image of a worldwide society in which goods flow freely across national borders (Ohmae, 1990). To determine the degree to which globalization has altered the salience of national borders, a quantifying approach that measures the relative densities of economic activity within and between nations would be especially useful. However, for this approach to be meaningful, the focus needs to be on areas where globalization has reduced or eliminated trade barriers.

In this regard, the border separating Canada and the United States of America seems a viable "candidate" for such an evaluation. One of the world's longest and most porous borders, it separates two nations that are very similar both culturally and economically. During the past two decades, implementation of free trade agreements (FTA) which include Canada-Untied States Free Trade Agreement (CUSFTA) and North American Free Agreement (NAFTA), has significantly reduced many trade restrictions between the two countries.

McCallum (1995) provided the first evidence to challenge the economic significance of the border (Okubo, 2003). His study examined trade flows within Canada and between Canada and the U.S. McCallum concluded that the impact of the border on trade between the two countries, or the "border effect," is almost 22. That is, trade among Canadian provinces is 22

times greater than trade between Canadian provinces and the U.S., a significantly greater discrepancy than had been expected.

Two types of study have followed up on McCallum's (1995) findings. The first provides additional estimates of the size of the border effect, while the second explains the surprisingly large estimate of the border effect. Latter studies (Combes et al., 2004; Gould, 1994; Head & Ries, 2001; Min, 1990; Rauch & Trindade, 2002; Wagner, Head, & Ries, 2002; Fukao and Okubo, 2004) focused on informal trade barriers, specifically social and business networks. However, studies focused more on social networks than on business networks. Among the few studies done on business networks, the focus is Japanese Keiretsu (Lawrence, 1991, 1993; Belderbos and Sleuwaegen, 1998; Fukao & Okubo, 2004). Combes et al. (2004) focused on French business networks.

The current thesis focuses on North American business networks. This research explores the relationship between the business networks and the border effect between Canada and the U.S. More specifically, it examines the degree to which establishing or reinforcing corporate affiliates, as a form of overcoming informal trade barriers, is associated with the border effect. In this thesis, network of affiliates includes a parent company and its affiliates, divisions, and subsidiaries. The network of Canadian and American affiliates includes Canadian affiliates of public and private American companies as well as Canadian and American affiliates of public and private Canadian companies.

The importance of this research is twofold: First, it examines the impact of network of affiliates on the border effect in North America, an area for research not explored before. Second, it shows how the complicated relationship between trade and foreign direct investment determines firms operating in various sectors make decisions between export and establishing

affiliates. The implication of the results can shed light on the study of the border effect and trade policy.

Two theories of trade, Heckscher-Ohlin and new trade theory provide background for the gravity model used in the current research. The gravity model predicts the amount of trade between two regions is positively related to the size of their economies and decreases as an exponential function of the distance between them.

1.2 Research Question

The current research models the pattern of trade between provinces and states and estimates the influence of distance, and the interstate/province pattern of corporate affiliations on the border effect. The primary focus is to determine the extent to which the inter-provincial/state pattern of corporate parent-affiliate ownership is associated with the Canada-U.S. border effect. The relationship between foreign direct investment and trade plays an important role in how firms decide to whether establish affiliates or export. Two hypotheses are tested in this regard. First, the overall border effect is significantly greater when provinces or states are linked by affiliate links compared to when they are not. Second, on a sector-by-sector basis, the border effect varies significantly in the presence or absence of affiliate links.

1.3 Data Analysis

Multiple linear regressions are the statistical analysis technique used in this study to estimate the parameters in the gravity model. In the model, the dependent variable is trade and independent variables are gross domestic product (GDP), distance and the border effect.

Sources for trade data are Statistics Canada and Strategis Canada. Provincial and state GDP data are from Statistics Canada and U.S. Bureau of Economic Analysis, respectively. Distance data is from Graphic Maps website and affiliates data are from Directory of Corporate Affiliations. The sector data are limited to nine manufacturing sectors. The description as well as limitation of data will be discussed in chapter 3.

1.4 Thesis Organization

This thesis is composed of five chapters and one appendix. The first chapter provides the foundation for the current thesis by introducing the research problem and justifying why the research has been conducted. The second chapter provides a complete literature review of trade theories, the gravity model and informal barriers to trade. Chapter three details the method and data collection procedures used in the current research. Chapter four summarizes the results of the study. Finally, chapter five discusses the conclusions of the research problem and implications for further research.

2. Literature Review

2.1 Introduction

International trade involves exchange of goods, services, or money between countries. International trade theories explain and discuss the fundamentals of trade for trading partners and deal with the financial dynamics of the trading activity between participating countries.

Two theories dominate economic thinking on the causes of international trade among trading countries (Davis & Weinstein, 2000). One such theory is Heckscher-Ohlin theory, which explains the trade process with respect to inherent differences between countries. 'New trade thoery' is the second theory. This theory explains trade based on productivity and variety advantages from specialization and exchange (even among like economies).

This chapter first reviews both theories. It then discuses the gravity model, which this thesis is based on. Afterwards, an examination of important empirical studies sheds light on the application of theories. Finally, the gaps in the literature are recognized, and two hypotheses are developed.

2.2 Trade Theories

2.2.1 Heckscher-Ohlin Theory

The Heckscher-Ohlin model is a mathematical model of international trade and was developed by two economists, Eli Heckscher and Bertil Ohlin. Heckscher was a Swedish economist and he developed the essentials of the factor endowment theory of international trade. As Heckscher's student, Ohlin developed and elaborated the factor endowment theory. The theory

built on Ricardo's theory of comparative advantage and predicts patterns of trade and production based on the factor endowments of a trading region.

The Heckscher-Ohlin model essentially states that countries have a comparative advantage in goods for which the resources are abundantly available. Relative endowments of the factors of production determine a country's comparative advantage. This is because the prices of goods are ultimately determined by the prices of their inputs. Goods that require locally abundant inputs, will be cheaper to produce than those goods that require inputs that are locally scarce. For example, capital rich countries will have a comparative advantage in capital-intensive goods, while labour-abundant countries will hold a comparative advantage in labour-intensive goods. Trading countries will export products that utilize their abundant factors of production and import products that utilize the countries' scarce factors (Leamer, 1995; Ohlin, 1933).

2.2.2 New Trade Theory

During the late 1970s and early 1980s, researchers such as Helpman (1981), Krugman (1979), and Lancaster (1980) developed new trade theory. The development of the theory was motivated by the failure of trade theories to explain the large differences between the predictions of trade theory and real-world trade flows. As Deardorff (1984) and Helpman and Krugman (1985) argued, the new trade theory was designed to explain the "mystery" of why trade was growing so rapidly between industrial countries with similar economies and endowments of the factors of production. In this situation, there was no clear comparative advantage for any country in many industries. The solution to this puzzle is known as new trade theory.

At the heart of the new trade theory are two insights. First, the theory assumes that economies of scale, combined with nations' resource endowment, stimulate specialization and trade. Economies of scale characterize a production process in which an increase in the scale of the firm causes a decrease in the long run average cost of each unit. Second, the theory assumes imperfect competition, which in fact is more in line with what is seen in the real world.

The Heckscher-Ohlin model assumes that trade is based on perfect competition, whereas perfectly competitive markets are extremely rare in the real world. In an imperfect competitive market, each firm can differentiate its products from the rest, which in fact gives rise to product differentiation. Unlike the Heckscher-Ohlin model, which assumes constant returns to scale and perfect competition, new trade theory bases international trade on economies of scale and imperfect competition.

2.3 The Gravity Model

The gravity model is, perhaps, the most successful empirical trade device to emerge over the last few decades (Anderson, 1979). Because of its simplicity and strong empirical robustness, the gravity model of international trade is the standard framework used to predict how countries trade.

In 1687, Newton established the universal law of gravitation for heavenly bodies (Head, 2003). It states that the attractive force between two objects *i* and *j* is given by:

$$X_{ij} = GM_i M_j / D^2_{ij}$$

Where X_{ij} is the attractive force, G is a gravitational constant depending on the units of measurement for mass and force, M_i and M_j are the masses, and D_{ij} is the distance between the two objects.

The simplest gravity model borrows the idea from the universal law of gravitation. It simply states that economic or social interactions between two geographically defined economic entities are proportional to the size of these entities and inversely related to the distance between them. It can be shown as:

$$X_{ij} = GM_i^{\,a} M_j^{\,b} / D^c{}_{ij}$$

When a = b = 1 and c = 2 it returns to the universal law of gravitation.

Some of the model's applications have been proposed by Ravenstein (1885) for migration flows, Reilly (1931) for consumers' shopping behaviour, Stewart (1947) for social interactions and Tinbergen (1962) for international trade.

Tinbergen (1962) initiated what has continued to be the main application of gravity models, namely, the study of the determinants of trade. He was the first researcher that applied the gravity model to the international trade area (Sohn, 2005). Initially, the model did not have a theoretical foundation but it was empirically successful. This encouraged researchers to provide a theoretical framework behind the model. Now, there is evidence to support that the model is consistent with at least two trade theories, which are Heckscher-Ohlin model and new trade theory.

Anderson (1979) and Bergstrand (1985, 1989) derived the gravity equation from the Heckscher-Ohlin model with differentiated products. On the other hand, Helpman (1984) and Helpman and Krugman (1985) explored the theory for gravity model in a differentiated product framework with increasing return to scale. As Davis and Weinstein (2000) argued, it is

interesting to see that in more than a decade, the gravity model has gone from a theoretical orphan to having more than one claim to maternity.

2.4 Empirical Studies

As previously discussed, the gravity model of trade can be expressed as:

$$X_{ij} = GM^{b}{}_{i} M^{c}{}_{j} / DIST^{d}{}_{ij} \qquad (Equation\ 2.1)$$

Where X_{ij} is the flow from origin *i* to destination *j*, G is the gravitational constant, M_i and M_j are the relevant economic sizes of the two locations and $DIST_{ij}$ is the distance between them. The multiplicative nature of the gravity equation means that the natural logarithm can be taken from both sides of the equation 2.1. A linear relationship between logarithms of trade flows, economic sizes and distance can be obtained as below:

$$\ln X_{ij} = a + b \ln M_i + c \ln M_j + d \ln(DIST_{ij}) \qquad (Equation\ 2.2)$$

In a groundbreaking study, McCallum (1995) used the gravity model to explain the puzzle of the border effect for the first time (Head, Mayer, & Reis, 2002). He measured the impact of the Canada-U.S. border on bilateral trade between the two countries. McCallum's study made use of a Canadian statistical data set that includes both inter-provincial trade flows and flows between Canadian provinces and the U.S. The data set encompasses all ten Canadian provinces and thirty U.S. states that account for 90% of Canada-U.S. trade. McCallum (1995) used gravity-type equations in which trade between the two countries was set as a function of each country's GDP and the distance between. The effect of the border is then estimated by appending to the equation a dummy variable set equal to 0 for inter-provincial trade and 1 for province-to-state trade. The resulting gravity model is:

$$X_{ij} = a + bY_i + cY_j + dDist_{ij} + e\ Dummy + \mu_{ij} \quad (Equation\ 2.3)$$

Where X_{ij} = ln shipments of goods from region *i* to *j*, Y_i = ln GDP of region *I*, Y_j = ln GDP of region *j*, $DIST_{ij}$ = ln distance between region *i* and *j*, e = ln border effect, Dummy = 1 for inter-provincial trade and 0 for province to state trade, and μ_{ij} = Random error assumed to be normally distributed**.** Based on 683 observations, McCallum (1995) showed that trade among Canadian provinces is more than 22 times that between provinces and American states of similar size and proximity, establishing that, the Canada-U.S. border has a substantial impact on trade.

The gravity model incorporates four concepts: 1) trade; 2) economic size; 3) transportation cost; and 4) border effect. The variables to represent these concepts are: 1) trade flows (imports and exports); 2) GDP; 3) distance; and 4) presence of a border, respectively. Trade is measured through trade flows, which consist of total imports and exports. Total imports include all goods that have entered the country by crossing customs and total exports include all goods leaving the country through customs for a foreign destination. The economic size of the exporting and importing countries are measured with GDP, which is the standard measure of the overall size of the economy and is positively correlated with trade. Distance, is negatively correlated with trade and accounts for costs incurred while getting goods to their final destinations. Greater distance between markets means larger costs of transporting goods and services, which encumbers trade and hinders the development of close economic ties. The concept of border is measured by the border effect. Different countries employ different trade policies. In fact, borders exert negative effects on trade because borders give rise to trade barriers such as tariffs and quotas.

Since having been published, McCallum's (1995) groundbreaking research has served as a preliminary exploration of the border effect and remained a reference point for much of the subsequent literature measuring the border effect. For the purpose of the current thesis, the follow-up research to McCallum's study can be divided into two categories: 1) studies that extend McCallum's results and verify his results for other countries or other periods; and 2) studies that attempt to investigate the causes of the border effect by focusing primarily on business and social networks.

One of the most important studies to fall into the first category is Helliwell's (1998) investigation. Following a multi-purpose research strategy, he performed one of the most systematic measurements of the relative importance of the Canada-U.S. border to date. Helliwell employed aggregate inter-provincial and province-state merchandise trade data, traced the border effects from 1988 to 1996, and concluded that the border effect in this period reduces gradually from 19 to 12. The reduction shows that after accounting for the expansion of trade between the United States and Canada since the Free Trade Agreement came into force in 1988, inter-provincial trade linkages in 1996 were still twelve times tighter than those between provinces and states. Unlike what some researchers (e.g., Ohmae, 1990), have claimed, Helliwell's findings confirmed that borders between the countries have not been disappeared. They exist and they have significant impact on trade.

Studies have also been performed to determine the border effect for economies other than Canada and the U.S. These studies, which extend McCallum's (1995) results beyond North American borders, examined whether his findings can be generalized to other regions in the world. Two such studies, performed by Wei (1996) and Nitsch (2000), estimated the size of the border effect for Organization for Economic Cooperation and Development (OECD) and

European countries, respectively. Wei's (1996) study examined the size of the overall border effect in the goods market among OECD countries over the period of 1982-1994. Wei found that an average OECD country during 1982-94 imported 2.5 times as much from an otherwise identical foreign country. Nitsch (2000) measured the border effect among European countries for the period of 1979-1990. Nitsch concluded that a border effect of about 10 exists among European countries. His estimate was substantially lower than McCallum's (1995), but considerably larger than Wei's. The existence of these studies corroborates McCallum's methods and results, and establishes that, with minor modification, the same principles can also be applied to trade relationships outside of North America.

The second group of studies sought to explain the phenomenon of the border effect. As McCallum (1995) shows, the border effect is still significant even when trade barriers are substantially reduced or removed. This could imply factors other than formal trade barriers are behind the border effect. Wolf's (2000) study is an interesting example because it questioned the existence of formal trade barriers as the only reason behind home bias. Wolf (2000) provided an indirect empirical test for the validity of whether the presence of formal trade barriers is the only cause for strong domestic linkage. He augmented the basic gravity model and estimated the border effect at the sub-national level. Wolf (2000) compared 1993 U.S. interstate data with intrastate trade data to determine whether formal trade barriers are the only cause of the border effect. He argued that if in fact they are, the border effect should not be present at the interstate level because formal trade barriers do not exist among states. He further explained that formal trade barriers do not deter trade among states because the strong constitutional protection of interstate commerce implies the absence of formal trade barriers. Wolf concluded that intrastate trade exceeds the interstate trade by a factor of three, which

indicates that factors other than formal trade barriers might be responsible for excessive intrastate trade.

During the past few years, several new studies were conducted in attempt to explain the border effect. Recent attention has turned from formal trade barriers to informal trade barriers such as the inadequate information about international trading opportunities. In this regard, Rauch (2001) focused on the role that social and business networks play in alleviating problems of providing information about trading opportunities and consequently promoting trade. Rauch discussed the trade-creating activities of social and business networks. These networks consist of members of specific ethnic groups such as the Grupos Economicos of Latin America, Business Houses of India, Chaebol of Korea and Keiretsu of Japan as well as affiliates of multinational corporations. Rauch described two strategies by which such networks promote trade. The first is promotion by way of disseminating information on market opportunities. The fact that network members have thorough knowledge of each other helps them match within their networks or refer each other to outside business opportunities. The transfer of information can be intra-national or international. Within a given foreign market, trans-national networks have influence across the supply chain. They can help producers of consumer goods to find appropriate distributors, assemblers to find the right component suppliers, and investors to find joint-venture partners. Internationally, trans-national networks can also facilitate matching between various agents and opportunities. Through provision of market information, they can inform suppliers about consumer preferences in a particular or conversely, enlighten suppliers on how to adapt their products so consumers in a given country will be receptive to their products. Second, networks circulate and spread information about past opportunities business conducts and trustworthiness of potential trade partners, networks

deter opportunism and build trust. For example, in the overseas Chinese network, if a business owner violates an agreement he is blacklisted and the entire Chinese network will refrain from doing business with the person who committed the violation (Weidenbaum & Hughes, 1996).

Empirical studies have also been performed to examine the impacts of networks on trade. Since immigrant links have historically been important in increasing bilateral trade flows between the host country and immigrant home countries, the impacts of immigrants on trade has drawn attention from researchers (Combes et al., 2004; Gould, 1994; Head & Ries, 2001; Min, 1990; Rauch & Trindade, 2002; Wagner, Head, & Ries, 2002). These empirical studies, relating the impact of immigrants on trade, have tended to support Rauch's (2001) reasoning. Immigrant links influence bilateral trade flows since immigrants bring foreign market information when they immigrate. They have the advantage over non-immigrants since they have knowledge of home-country markets, local customs, laws, and business practices. They speak the same language and they have business contacts that consequently can lower the transaction costs of trade.

Combes et al. (2004) suggested that immigrants' knowledge of their home economies is an important mechanism through which they influence both imports and exports. Foreign trade is more costly than domestic transactions because both importers and exporters must identify potential markets as well as obtain access to distribution channels in an unfamiliar environment. Moreover, because trade often depends on contracts for delivery and payment, the development of trust through immigrant contacts can decrease the costs associated with negotiating trade contracts and ensuring their enforcement. For example, the overseas Chinese network promotes trade by providing market information and matching and referral services because they use co-ethnic business societies to keep knowledge of network members'

characteristics fresh. In fact, this increase is done through the mechanisms of market information and matching and referral services, as well as their effect through community enforcement of sanctions that deter opportunistic behaviours.

The empirical evidence regarding the effects of networks of firms on trade is much scarcer than those available on the trade impact of migration patterns. Most studies discussed in the existing literature rely on Japanese Keiretsu, which are well-known business networks. For instance, Lawrence (1993) reviewed earlier papers, such as Lawrence (1991) and Noland (1992), who examined the role of the Keiretsu on Japanese trade. Lawrence (1991) explored the impact of the Keiretsu more explicitly and performed a cross-industry regression analysis. He found statistically significant evidence that the Keiretsu do reduce imports. Noland (1992) performed a similar study in which he concludes that the Keiretsu are associated with higher-than-expected net exports and lower-than-expected imports.

Belderbos and Sleuwaegen (1998) focused on the Japanese electronics industry and performed an econometric analysis of determinants of exports to Europe in 1989 for a sample of 86 firms. Their research indicated that inter-firm relationships between Japanese firms play an important role in export activities. Subcontractor firms in a Keiretsu, of which the parent firm operates manufacturing plants in the European Commission (EC), are found to export relatively more to Europe. They concluded that for those Japanese firms, which invested in distribution subsidiaries in the EC, acquired European firms and extended their market access, exports to Europe are higher.

Head, Ries and Spencer (2004) investigated the role of business networks by examining the pattern of U.S. auto part exports to 26 countries from 1989 to 1994. Among other findings,

they concluded, in general, that U.S. exports to Japan are reduced for parts where Keiretsu sourcing is more important.

Regarding the subject of networks, studies have been conducted to specifically examine the role of affiliates and how they affect trade. For example, Combes et al. (2004) investigated the role that business networks play in shaping trade between 94 French regions. To estimate the trade-creating effects of business networks inside France, they augmented the gravity model. They quantified the bilateral intensity of networks by using the financial structure and location of French firms that belong to the same business group. Combes et al. reported that the links between plants belonging to the same business group multiply trade flows by as much as five in some specifications. These findings suggest that the impact of networks on trade is not negligible and the omission of network effects leads to overestimating the distance coefficient and consequently the role of transport costs. For instance, the impact of transport costs on trade volumes is reduced by as much as 60% when both social and business networks are controlled for.

Fukao and Okubo (2004) used Japanese disaggregated trade data in four machinery industries (i.e., electrical, general, precision, transportation machinery) and analyzed the causes of the decline in Japan's border effect from 1980 to 1995. They modified the standard gravity model to explicitly take into account the firms' network impact. Fukao and Okubo (2004) measured the extent of Japan's international links in a particular industry by using the number of Japanese affiliates in that industry in a particular country. Similarly, they measured foreign countries' network links with Japan in a particular industry by using the number of those countries' affiliates in Japan in the same industry. Fukao and Okubo (2004) found that ownership relations usually enhance trade. Approximately 35% of the decline in Japan's border

effect from 1980 to 1995 in the electrical machinery industry was be explained by the increase of international networks.

2.5 Hypotheses

Few empirical studies have focused on the impact of affiliates on the border effect. Those that actually have did not typically focus on North America. Combes, et al. (2004) and Fukao and Okubo (2004) focused on French and Japanese networks, respectively.

The current investigation attempts to "fill gaps" in the literature by focusing on the North American border effect and examining the associations between the border effect and affiliates. The border separating Canada and the U.S. is about 4000 kilometres, one of the world's longest borders. In fact, Canada and the U.S. are among the most integrated parts of the world (during the past two decades many trade restrictions between the two countries have been significantly reduced or eliminated through the implementation of free trade agreements). The current research seeks to shed light on how significant the impact of province/states affiliates on Canada-U.S. border effect may be.

Hypothesis 1: Overall, the border effect among provinces or states that are linked by affiliate links is significantly greater than the border effect among provinces or states that are not linked by affiliate links.

This hypothesis tests the association between the overall border effect and affiliate links on Canada-U.S trade. What is meant by overall is that the border effect is estimated when all sectors developed in this considered and not across sectors.

The underlying concept of interaction of the border effect and affiliates lies on the relationship between foreign direct investment and trade. Between the two countries, cross-

border supply can take two forms: by arms-length trade and by foreign affiliates. These two forms may be related: depending on a range of circumstances, trade and foreign direct investment could be substitutes or complements.

When the investment is vertical, firms split and divide the production across countries to save costs and be more efficient. In this case, the difference in relative factor endowment is the driving factor and this is particularly useful to explain Foreign Direct Investment (FDI) from developed into developing economies (Grossman & Helpman, 1991; Helpman, 1984).

On the other hand, investment can be horizontal. This is the most common type of FDI and refers to bilateral trade between develop countries. It means that firms produce the same goods and services in different countries. The extent to which firm select to engage in trade rather than establish foreign affiliates depends on the benefits of proximity to the final markets relative to the benefits of concentrating production in one location and exploiting scale economies (Brainard, 1993; Hortsman & Markusen,1992).

If benefits of exporting outweigh supplying through affiliates, FDI complements trade. On the other hand, if the benefits of supplying through affiliates outweigh exporting, FDI substitutes trade. Pontes (2004) stated that the relationship between FDI and trade depends on sectors, the country and time period concerned. This gives rise to the second hypothesis by which the current thesis attempts to measure the impact of affiliates on the border effect across sectors. Across different sectors, the relationship between trade and FDI can be different and consequently the outcome of the impact of affiliates on the border effect can be different. Thus, the second hypothesis holds the following:

Hypothesis 2: On a sector-by-sector basis, the border effect varies significantly in the presence or absence of affiliate links.

This hypothesis does not specify a direction between border effect and affiliates since the relationship between trade and FDI varies across sectors.

2.6 Summary

This chapter reviewed the theoretical framework of this research as well as studies previously conducted on the impact of business and social networks on trade. The overall conclusions of those studies were that business and social networks have impacts on trade. The focus of the current study is on the association between affiliates and the Canada-U.S. border effect, overall and at the sector level; an area of investigation that has seemingly eluded adequate empirical examination.

3. Method

3.1 Introduction

The current research models the pattern of trade between Canadian provinces and U.S. states and estimates the influence of distance, the border effect and inter-province and province-state pattern of corporate affiliations on border separating two nations. This chapter describes the method, data collection procedures and data sources in detail. The hypotheses are tested using ordinary least squares regression. SPSS is the statistical analysis package used and the estimation results are reported in chapter four.

In order to test the two hypotheses discussed in Chapter 2, this study employs equation 2.3. Measures of four variables (trade, GDP, distance, network of affiliates) are also employed. Brown (2003) provided evidence that the border effect is related, at least in part, to tariff barriers. National borders mark differences in policies and regulations that have economic significance. Tariff policies are an important part of the border effect as they create trade costs. Regional trade agreement such as CUSFTA and NAFTA that significantly reduce tariffs are expected to decrease the border effect. According to a report produced by the Department of Foreign Affairs and International Trade (1998), the primary accomplishments of the FTA and NAFTA were to eliminate tariffs on almost all merchandise trade between Canada and the U.S. in ten years since FTA came into effect. Therefore in this study, data for 1998 (the ten year anniversary of FTA) is used.

3.2 Data Sources and Data Preparation

For the purposes of statistical analysis, four separate data sets were used in the current study. These include trade data, GDP data, distance data and affiliate data.

3.2.2 Trade Data

The value of traded goods at the sector level is measured using disaggregate trade data. In order to analyze networks on Canada-U.S. border, it is necessary to examine data at the disaggregated level. The disaggregate data means that trade values are sector-based and they are not overall trade values. For example, instead of overall 1998 trade data between Canada and the U.S., inter-provincial or province-state trade data were used. Furthermore, trade data was gathered for sectors. The disaggregate data sets reveal the value of internationally and inter-provincially traded goods at the sector level for ten Canadian provinces and fifty U.S. states. Because there are ten Canadian provinces that trade (import and export) with nine other Canadian provinces, there are $10 \times 9 = 90$ observations for inter-provincial trade in total. Similarly, there are 50 U.S. states and each trades (i.e., imports and exports) with 10 Canadian provinces which equals $10 \times 50 \times 2 = 1000$ observations for province-state trade.

The statistics for sector-level trade have been obtained from two different sources, as no single source could provide all of the required data. The first source, Statistics Canada's International and Interprovincial Trade flows-Table 386-0002, provided the figures for goods traded among Canadian provinces. The second source, Canada Business and Consumer Site (Strategis Canada), provides sector-level statistics for goods traded among Canadian provinces and U.S. states. Strategis cites Statistics Canada and U.S. Census Bureau as its main sources.

Strategis Canada, which provides Canada-U.S. trade data, classifies both export and import statistics according to the Harmonized Commodity Description and Coding System or Harmonized System (HS). The HS is an international commodity classification system developed under the auspices of the World Customs Organization (WCO). The HS nomenclature is logically structured by economic activity or component material. For example,

animals and animal products are categorized in one section; machinery and mechanical appliances which are grouped by function are categorized in another section.

The HS nomenclature is divided into 21 sections and each section is comprised of one or more chapters, with the entire nomenclature being composed of 97 chapters. Statistics Canada divides traded goods into 27 sections, while Strategis Canada specifies only 21 sections.

According to the Canada Business and Consumer Site (Strategis Canada), the nomenclature is divided into 21 sections, which, in general, group goods produced in the same sector of the economy. For example, section IV, which includes food products, beverages, spirits and vinegar and tobacco products, belongs to agricultural sector of the economy while section VI, which includes products of the chemical or allied industries belongs to chemical products.

Because the sector classification differs between the two sources, inter-provincial data from Statistics Canada cannot be directly compared to international data from Strategis Canada. In order to make the correspondence between the two sources, Table 3.1 which consists of nine sectors has been developed. Each source consists of various sections. Similar sections from each source have been selected and matched together. In other words, the data from two sources have been reclassified to align with each other.

The following nine sectors cover sections 1 to 17 of international and 1 to 26 of inter-provincial trade data: 1) agricultural and food; 2) mineral; 3) chemical; 4) plastic, leather and rubber; 5) wood, lumber and wood pulp; 6) textile, hosiery and clothing; 7) base metals; 8) machinery, mechanical appliances, electrical equipment and electronic; and 9) motor vehicles, other transport equipment & parts. Table 3.1 displays the integrated data classification. For

example, the agricultural and food category covers sections 1-4 in the international trade and sections 1-2 and 8-11 in the inter-provincial trade. Trade data is reported in thousands of Canadian dollars.

Table 3.1- Integrated Sector Level Data Source

	STRATEGIS CANADA	STATISTICS CANADA
Sector	International Trade Product Classification Summary	Inter-Provincial Trade Product Classification Summary
Agricultural, Dairy and Food	Section 1: Live Animals; Animal Products (Chapters 1-5)	Section 1: Grains
	Section 2: Vegetable Products (Chapters 6-14)	Section 2: Other agricultural products
	Section 3: Animal or Vegetable Fats and Oils Products (Chapter 15)	Section 8: Meat, fish and dairy products
	Section 4: Prepared Foodstuffs; Beverages; Tobacco Products (Chapters 16-24)	Section 9: Fruits, vegetables and other food products, feeds
		Section 10:Soft drinks and alcoholic beverages
		Section 11: Tobacco and tobacco products
Mineral	Section 5: Mineral Products, Mineral Fuels (Chapters 25-27)	Section 5: Metal ores and concentrates
	Section 13: Ceramic, Cement, Plaster and Glass Products (Chapters 68-70)	Section 6: Mineral fuels
	Section 14: Precious Metals and Stones (Chapter 71)	Section 7: Non-metallic minerals
Chemical	Section 6: Products of the Chemical or Allied Industries (Chapters 28-38)	Section 25: Petroleum and coal products
		Section 26:Chemicals, pharmaceuticals and chemical products
Plastic, Leather and Rubber	Section 7: Plastics and Rubber Products (Chapters 39-40)	Section 12: Leather, rubber and plastic products
	Section 8: Leather, Raw Hides and Skin Products (Chapters 41-43)	
Wood, Lumber and Wood Pulp	Section 9: Wood Products (Chapters 44-46)	Section 3: Forestry Products
	Section 10: Pulp of Wood ; Paper and Printing Products (Chapters 47-49)	Section 15: Lumber and wood products
		Section 16: Furniture and fixtures
		Section 17: Wood pulp, paper and paper products
		Section 18: Printing and publishing

Table 3.1- Integrated Sector Level Data Source (Continued)

	STRATEGIS CANADA	STATISTICS CANADA
Sector	International Trade Product Classification Summary	Inter-Provincial Trade Product Classification Summary
Textile, Hosiery and Clothing	Section 11: Textiles and Textile Articles (Chapters 50-63) Section 12: Footwear, Headgear and feather Products (Chapters 64-67)	Section 13: Textile products Section 14: Hosiery, Clothing and accessories
Base Metals	Section 15: Base Metals and Articles of Base Metal (Chapters 72-83)	Section 19: Primary metal products Section 20: Other metal products
Machinery, Electrical Equipment and Electronic	Section 16: Machinery and Mechanical Appliances; Electrical Equipment and Electronic Products (Chapters 84-85)	Section 21: Machinery and equipment Section 23 : Electrical, electronic and communications products
Motor Vehicles & Parts	Section 17: Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86-89)	Section 22: Motor Vehicles, Other transport and equipment parts

3.2.3. GDP Data

Provincial and state GDP data was obtained from Statistics Canada's Provincial Domestic Product Table 380-0030 and the U.S. Bureau of Economic Analysis' Gross State Product Data, respectively. GDP data is in millions of Canadian dollars. GDP for U.S. states was first obtained based on U.S. dollars and then converted into Canadian dollars. For this conversion, the 1998 monthly Canada-U.S. exchange rate was obtained from Bank of Canada (1998). Monthly rates were then averaged, which resulted in an average rate of 1.48.

3.2.4. Distance Data

Distance data for the current research was obtained from the Graphic Maps website, which cites U.S. Department of State as its source. The distance is measured between the capital city of the province or state and is reported in kilometres. Although in the literature, there are other

common practices for measuring distance such as geographic centroid of the region (province or state), this thesis uses capital cities of the provinces or states as it builds on McCallum's research.

3.2.5 Affiliate Data

Previously, in section 1.2 "network of affiliates" was defined. For the purpose of the current research, the network of affiliates data includes Canadian affiliates of public and private American companies as well as Canadian and American affiliates of public and private Canadian companies. The network of affiliates data could not be obtained electronically. It was gathered manually from the Directory of Corporate Affiliations (DCA; 1998). DCA is a logically organized business reference tool that covers major public and private businesses in the United States and throughout the world. The set consists of five volumes: 1) Master Index I; 2) Master Index II; 3) U.S. Public Companies; 4) U.S. Private Companies; and 5) International Public and Private Companies.

The data needed for the current study was extracted from Volumes III, IV, and V. From Volume III, the list of those U.S. public companies that have Canadian affiliates were extracted. From volume IV, the list of those U.S. private companies that have Canadian affiliates were extracted. From volume V, the name of those Canadian companies (public and private) that have American affiliates were extracted. For each parent company, the location of headquarter, the number and location of its affiliates, divisions and subsidiaries are provided. Moreover, the directory provides the Standard Industrial Classification (SIC) code for each company.

Because the definitions of affiliate, division and subsidiary differ across sources, for the purpose of clarification those definitions used by DCA are employed here. Based on DCA, an

affiliate is a chartered business owned by a company at less than 50%, a division is an internal unit of a company not incorporated, and a subsidiary is a chartered business owned by a company at 50% or more. In this thesis, subsidiaries, divisions, and affiliates are all included and the word "affiliates" refers to all. The reason for the aggregation is the extreme sparseness of each type.

The ownership information contained in this directory is primarily based upon non-confidential returns filed by Canadian corporations under the Corporations and Labour Unions Returns Act. In addition, information on ultimate foreign parent corporations has been obtained from international publications such as Moody's (1998) and Who Owns Whom (1998).

Table 3.2 was developed to indicate how SIC codes correspond to sectors displayed in Table 3.1. Then, based on Table 3.2, from the list of companies those that their SIC codes match sectors have been selected.

Table 3.2 – Relationship between Table 3.1 and SIC Codes

Table 3-1 Information		**SIC Codes and Description**	
Table Group	**Sector**	**SIC Codes**	**SIC Code Description**
1	Agricultural, Dairy and Food	1	Agricultural Production-Crops
		2	Agricultural Production-Livestock
		8	Forestry & Forest Product
		9	Fishing & Hunting
		20	Food & Related Products
		21	Tobacco Products
2	Mineral	10	Metal Mining
		12	Coal Mining
		14	Non-metallic Minerals
		32	Stone, Clay & Glass Products
3	Chemical	13	Oil& Gas Production
		28	Chemical & Related Products
		29	Petroleum & Coal Products
4	Plastic, Leather and Rubber	30	Rubber & Miscellaneous Plastics
		31	Leather & Leather Products

Table 3.2 – Relationship between Table 3.1 and SIC Codes (Continued)

Table 3-1 Information		SIC Codes and Description	
Table Group	**Sector**	**SIC Codes**	**SIC Code Description**
5	Wood, Lumber and Wood Pulp	24	Lumber & Wood Products
		25	Furniture & Fixtures
		26	Paper & Related Products
		27	Printing & Publishing
6	Textile, Hosiery and Clothing	22	Textiles
		23	Apparel & Other Textile Products
7	Base Metals	33	Primary Metal Industries
		34	Fabricated Metal Products
8	Machinery, Mechanical Appliances, Electrical Equipment and Electronic	35	Industrial Equipment & Machinery
		36	Electronic & Electric Equipment
		38	Instruments & Related Products
9	Motor Vehicles, Other Transport Equipment & Parts	37	Transportation Equipment

3.3 Limitations

There are two limitations in this thesis: First: As a gravity equation on sector-level is estimated, ideally data on sector specific goods would be required instead of overall GDP to be included in the model set-up. Because there are considerable limitations in data availability for the nine sectors that was developed in this thesis, the aggregate GDP as a proxy for economic size of the region is used. The effect of using overall GDP is to attenuate the influence of sector specialization – thus, the origin and destination mass coefficients will be either over or under estimated depending on the level of specialization in the sector. As there are nine different sectors analyzed, the outcome depends on overall interaction of over/under estimation of all sectors.

Second: This thesis examines the affiliate links impact on Canada-U.S. border effect across sectors and is specific to goods rather than goods and services. The reason is that the

focus of this study is on the sector level data to limit the scope of work as the two hypotheses are examined for nine sectors. Moreover, the data extracted from the two websites, Strategis Canada and Statistics Canada can be reconciled better for goods than for services in order to create sector specific data.

3.4 Data Excerpts

Table 3.3 shows an excerpt of Canadian and American companies' ownership profile in 1998. The complete list from which number of affiliates is counted for each sector is attached in Appendix A. Directory of Corporate Affiliations (DCA) separates public and private American companies but does not provide information for Canadian companies. As public and private companies might have some differences of incentives to establish affiliates, conducting separate analyses for each and comparing the differences could shed some light on understanding how these incentives work.

Generally, public companies are more likely to have affiliates. The first reason is that on average they are likely larger. Another reason is that they have a fiduciary responsibility to shareholders, therefore need to seek the lowest cost solutions. They may be listed on both U.S. and Canadian exchanges, therefore it makes sense to have a physical presence in Canada as well as the U.S.

Table 3.3- Excerpt of Company Ownership Profile

Nationality	Company Name	HQ	Subsidiary	Affiliate	SIC Code	CS
Canadian	Avenor, Inc	Quebec		Ontario	26	5
Canadian	Avenor, Inc	Quebec	BC		26	5
Canadian	Cominco, LTD.	BC	Washington		10	2
Canadian	Cominco, LTD.	BC	Arkansas		10	2
Canadian	Cominco, LTD.	BC	Ontario		10	2
Canadian	Cominco, LTD.	BC	Manitoba		10	2
American	Harris Corp.	Florida		Ontario	34	7
American	Harris Corp.	Florida		Quebec	34	7
American	Hewlett-Packard	California		Ontario	35	8
American	Hewlett-Packard	California		Alberta	35	8
American	Hewlett-Packard	California		Saskatchewan	35	8
American	Hewlett-Packard	California		B.C.	35	8

Note. HQ= Head Quarter; CS= Corresponding Sector.

The headquarters indicate the province or state in which the parent companies are located. The subsidiaries, divisions, or affiliates indicate where the affiliated networks are located. The SIC code indicates the standard industrial classification of the company. Based on SIC code, the matching sector from Table 3.2 is assigned.

After all the affiliate data were obtained, together with trade, GDPs and distance data were prepared for regression analysis. Table 3.4 displays excerpts of data for agricultural sector. The Table indicates that in 1998, agricultural trade between Ontario and Illinois was $459,227,000, the GDP of Ontario and Illinois were 372,630 and 629,998 million dollars, respectively and the distance between them is 957 km.

Table 3.4 Excerpt of Agricultural Data

Origin(i)	Destination (j)	Xij	Yi	Yj	Dist (ij)	Dummy
		Trade ($000)	GDP i ($M)	GDP j ($M)	Km	
Ontario	Newfoundland	212,800	372,630	11,232	2,112	1
Ontario	PEI	64,500	372,630	2,851	1,310	1
Ontario	Nova Scotia	449,400	372,630	21,110	1,266	1
Ontario	New Brunswick	372,100	372,630	17,457	1,052	1
Ontario	Quebec	4,231,300	372,630	193,695	729	1
Ontario	Manitoba	583,200	372,630	29,966	1,518	1
Ontario	Saskatchewan	405,400	372,630	28,828	2,041	1
Ontario	California	312,689	372,630	1,669,429	3,542	0
Ontario	Florida	120,818	372,630	617,637	1,529	0
Ontario	Georgia	131,188	372,630	378,891	1,184	0
Ontario	Idaho	3,476	372,630	46,329	2,947	0
Ontario	Illinois	459,227	372,630	629,998	957	0
Ontario	Indiana	171,708	372,630	261,184	710	0

It is important to note that both hypotheses require data to be prepared in the presence and absence of affiliates. Therefore, SPSS software is set to filter data for those states/provinces that have affiliates as well as for those that do not have affiliates and reports the results for each group separately.

3.5 Summary

This chapter explains the models and data used in this study. It describes how the data is gathered and prepared. The end of the chapter also provides excerpts of data.

4. Results

4.1 Introduction

The descriptive statistics of trade, GDP, distance and corporate affiliates shed light on the characteristics of data. In this chapter, multiple regression analysis is used to test two hypotheses discussed in chapter two. The results are reported in this chapter and conclusions are fully discussed in chapter five.

4.2 Hypotheses Testing

As discussed in chapter two, there are two hypotheses that were tested in the current study.
Hypothesis 1: The overall border effect among provinces or states that are linked by affiliate links is significantly greater from the border effect among provinces or states that are not linked by affiliate links.
Hypothesis 2: On a sector by sector basis, the border effect varies significantly in the presence or absence of affiliate links.

4.2.1 Testing Hypothesis 1

Hypothesis 1 examines whether or not the border effect is statistically greater when provinces or states have affiliate links versus when they do not. To test this hypothesis, the multiple regression analysis was conducted for cases with and without affiliates and then the 95% confidence limits for the estimates of the model parameters were compared. If for two cases, the confidence intervals overlap, the border effect is not significantly different between cases

with affiliate links and without links. If the confidence intervals do not overlap, it is significantly different.

To examine the first hypothesis, equation 2-3 was used and trade was regressed onto the independent variables (i.e., GDP, distance, border effect) for all nine sectors combined. The results are reported in Tables 4.1 and 4.2 for cases with and without links, respectively. Both Tables 4.1 and 4.2 display the parameters for variables.

Table 4.1 Regression Results of Trade Regressed onto Independent Variables for Cases with Links-All Sectors Combined

				95 % Confidence Interval for B	
IND VAR	β	B	*p*	Lower Bound	Upper Bound
ln GDP(Origin)	0.54	0.92	<.001	0.80	1.05
ln GDP(Destin)	0.66	1.13	<.001	1.00	1.26
ln (Distance)	-0.44	-1.18	<.001	-1.37	-1.01
(Border Effect)	0.49	2.78	<.001	2.36	3.19
Constant		-3.48	.02	-6.44	-0.52

Note. $N = 272$; Adjusted-$R^2 = .69$; IND VAR= Independent Variables

Table 4.2 Regression Results of Trade Regressed onto Independent Variables for Cases without Links-All Sectors Combined

				95 % Confidence Interval for B	
IND VAR	β	B	p	Lower Bound	Upper Bound
ln GDP(Origin)	0.62	1.204	<.001	1.12	1.29
ln GDP(Destin)	0.79	1.574	<.001	1.49	1.66
ln (Distance)	-0.40	-1.865	<.001	-2.05	-1.68
(Border Effect)	0.37	3.931	<.001	3.49	4.37
Constant		-6.975	<.001	-9.08	-4.87

Note. N = 799; Adjusted-R2 = .69; IND VAR= Independent Variables

The 95 percent confidence intervals are for unstandardized coefficient (B). Since the model is compared for two cases (with and without affiliates), therefore the confidence intervals for B is measured because in each case the variables will be measured in the same way.

As the results displayed in Tables 4.1 and 4.2 reveal, 95% confidence intervals do not overlap in two cases (affiliate present versus affiliate absent). Moreover, the standardized coefficient of the border effect when affiliate links are present is larger compared to the coefficient when affiliate links are absent. In other words, the border effect is stronger when affiliates are present.

4.2.1.1 Multicollinearity

Tables 4.3 and 4.4 provide the collinearity diagnostics for cases with and without links, respectively. Condition indices are used to detect multicollinearity in data. A common rule of thumb is that a condition index over 15 indicates a possible multicollinearity problem and a condition index over 30 suggests a serious multicollinearity problem. For a parameter with high condition index, the next step is to examine the variance proportions. Criteria for "sizable proportion" vary among researchers but the most common criterion is if two or more variables have a variance proportion of .50 or higher on a factor with a high condition index. If this is the case, these variables have high linear dependence and multicollinearity is a problem. As displayed, only when affiliates are present, border effect is correlated with both GDP of origin as well as GDP of destination as the variance proportion of both is 0.58.

Table 4.3 Condition Index and Correlation coefficient Results for Cases with Links

			Variance Proportions			
Dimension	CI	Constant	ln GDP (O)	ln GDP (D)	ln (DIST)	BE
1	1.00	0.00	0.00	0.00	0.00	0.01
2	2.20	0.00	0.00	0.00	0.00	0.81
3	19.97	0.00	0.31	0.31	0.00	0.00
4	22.82	0.00	0.11	0.11	0.80	0.04
5	56.12	1.00	0.58	0.58	0.20	0.15

Note. CI = Condition Index; O = Origin; D = Destination; DIST = Distance; BE = Border Effect.

Table 4.4 Condition Index and Correlation coefficient Results for Cases without Links

			Variance Proportions			
Dimension	CI	Constant	ln GDP (O)	ln GDP (D)	ln (DIST)	BE
1	1.00	0.00	0.00	0.00	0.00	0.01
2	2.10	0.00	0.00	0.00	0.00	0.88
3	13.54	0.00	0.29	0.25	0.00	0.00
4	25.77	0.00	0.36	0.39	0.56	0.02
5	46.54	1.00	0.36	0.36	0.44	0.10

Note. CI = Condition Index; O = Origin; D = Destination; DIST = Distance; BE = Border Effect.

4.2.2. Testing Hypothesis 2

Hypothesis two examined whether in each sector, the border effect is significantly different when the affiliates are present from when they are absent. To test this hypothesis, equation 2.3 was employed again. Regression analyses were computed for each sector for cases with and without links and 95% confidence intervals were compared. If in two cases, at the 5% significance level, the confidence intervals overlap, the border effect is significantly different between cases with links and without links. If the confidence intervals do not overlap, it is not significantly different.

In each sector, the regression results for cases with and without links are summarized in Tables 4.5 through 4.8. Table 4.5 displays the number of cases in each sector, Table 4.6 and 4.7 display the border effect coefficients in both cases, Table 4.8 displays the summary results at the 5% significance level and Table 4.9 shows multicollinearity results for all sectors in both cases.

Table 4.5 Number of Cases for Each Sector

Sector	Cases with Links	Cases without Links	% of Links (Overall)
Agricultural	70	1001	6.5
Mineral	68	1003	6.3
Chemical	110	961	10.2
Leather	52	1019	4.8
Wood	96	975	9.0
Textile	22	1049	2.0
Base Metal	80	991	7.5

Table 4.5 Number of Cases for Each Sector (Continued)

Sector	Cases with Links	Cases without Links	% of Links (Overall)
Machinery	156	915	14.6
Vehicles	39	1032	3.7

Table 4.6 Standardized Border Effect Coefficients for Both Cases with and without Links

	Border Effect Coefficient	
Sector	Cases without Links	Cases with Links
Agricultural	0.41	0.81
Mineral	0.20	0.31
Chemical	0.36	0.50
Plastic	0.29	0.15
Wood	0.33	0.59
Textile	0.33	0.29
Base Metals	0.37	0.50
Machinery	0.25	0.26
Motor Vehicles	0.27	0.46

Table 4.7- Unstandardized Border Effect Coefficients for Both Cases with and without Links

	Unstandardized Border Effect Coefficient (B)	
Sector	Cases without Links	Cases with Links
Agricultural	5.729	4.145
Mineral	2.907	2.548
Chemical	5.096	4.164
Plastic	3.703	1.685
Wood	4.876	2.973
Textile	4.372	1.725
Base Metals	4.726	2.835
Machinery	2.757	2.029
Motor Vehicles	3.822	3.515

Table 4.8 Summary Results for Cases with and without Links in Each Sector

	95% Confidence Intervals					
	Cases with Links		Cases without Links			
Sector	LL	UL	LL	UL	Overlap Results	SS
Agricultural	2.89	5.40	5.15	6.31	Slightly Overlap	-
Mineral	1.39	3.70	2.32	3.50	Overlap	-
Chemical	3.32	5.01	4.51	5.68	Overlap	-
Plastic	0.10	3.27	3.24	4.17	Slightly Overlap	-
Wood	2.08	3.86	4.31	5.45	No Overlap	+
Textile	0.28	3.28	3.88	4.87	No Overlap	+
Base Metals	2.05	3.62	4.27	5.19	No Overlap	+
Machinery	1.42	2.64	2.32	3.19	Slightly Overlap	-
Motor Vehicles	1.65	5.38	3.29	4.35	Overlap	-

Note. LL = Lower Level; UL = Upper Level; SS = Statistical Significance.

As Table 4.8 reveals, among the nine sectors analyzed, the confidence intervals of three sectors (wood, textile and base metals) did not overlap. For three sectors (agricultural, plastic and machinery), the 95% confidence intervals slightly overlapped. For the remaining three sectors (mineral, chemical, and motor vehicles), the 95% confidence intervals overlapped.

Using Table 4.8, the term “slightly overlap” was chosen and used arbitrarily based on the following criterion:

If the overlap difference between upper level of one case and lower level of the other case was less than 0.35, this was considered as slight overlap. If this difference was more than 0.35 it was considered “overlap”. This criterion was chosen completely arbitrarily. As the difference between upper level of cases with links and lower levels of cases without links for three groups of agriculture, plastic, and machinery are 0.25, 0.03 and 0.32, respectively, these three groups are those for which the upper and lower levels slightly overlap.

Table 4.9 Multicollinearity Results for All Sectors

Sector	Multicollinearity		Correlated Variables
	Cases with Links	Cases without Links	
Agricultural	-	-	
Mineral	-	-	
Chemical	+	-	Border Effect, GDP (O), GDP (D)
Plastic	+	-	Border Effect, GDP (O), GDP (D)
Wood	+	-	Border Effect, GDP (O), GDP (D)
Textile	-	-	
Base Metals	+	-	Border Effect, GDP (O), GDP (D)
Machinery	+	-	Border Effect, GDP (O), GDP (D)
Motor Vehicles	+	-	Border Effect, GDP (O), GDP (D)

Note. O = Origin; D = Destination.

To better summarize and understand the results, Table 4.9 was developed to provide insight about multicollinearity across sectors. As Table 4.9 reveals, multicollinearity exists for all of the sectors except for agricultural, mineral and textile sectors. One thing in common for those sectors which showed multicollinearity, is that multicollinearity is seen only for cases with links; correlated variables are border effect, GDP origin and GDP destination.

As displayed in Table 4.8, for three sectors of wood, textile, and base metals, 95% confidence intervals do not overlap which means there is significant difference between the border effects when affiliates are present versus when they are not. Among these sectors, for textile the border effect has become weaker whereas for wood and base metals the border effect has become stronger.

For three sectors (agricultural, plastic, and machinery) the 95% confidence intervals slightly overlapped. For three sectors of mineral, chemical and motor vehicles, 95% confidence intervals overlap. Therefore, for six sectors of agricultural, mineral, chemical and plastic, machinery, and motor vehicle the border effect is not significantly different in the presence and absence of affiliates, which means ownership relations, did not have a significant impact on the border effect.

4.3 Summary

This chapter reported the results for both hypotheses tested in this study. The results from the first hypothesis show that the 95% confidence intervals do not overlap for cases with links and without links. This indicates that there is a significant difference between the border effect when the affiliates are present from when they are not. Specifically, the border effect has become stronger when affiliates exist. The results showed that multicollinearity is observed

only when affiliates were present. The results also showed that the border effect is correlated with GDP of origin as well as GDP of destination.

The results regarding the second hypothesis showed that for three sectors of wood, textile, and base metals, there is a significant difference between the border effects when affiliates are present versus when they are not. Among these sectors, for textile the border effect was weaker whereas for wood and base metals the border effect was stronger.

For six sectors of agricultural, mineral, chemical, plastic, machinery and motor vehicle, the border effect was not significantly different in the presence and absence of affiliates. Multicollinearity was observed across chemical, leather, wood, base metals, machinery and vehicles sectors. The correlated variables were border effect, GDP origin and GDP destination. Table 4.10 summarizes findings of Table 4.8 and 4.9.

Table 4.10 Summary of Tables 4.7 and 4.8

Sector	Overlap Results	Multicollinearity	SS	Border Effect Change
Agricultural	Slightly Overlap	-	-	
Mineral	Overlap	-	-	
Chemical	Overlap	+	-	
Plastic	Slightly Overlap	+	-	
Wood	No Overlap	+	+	Stronger
Textile	No Overlap	-	+	Weaker
Base Metals	No Overlap	+	+	Stronger
Machinery	Slightly Overlap	+	-	
Motor Vehicles	Overlap	+	-	

Note. SS = Statistical Significance.

5. Conclusions and Discussions

5.1 Introduction

The primary focus of the current research was to examine the extent to which inter-provincial/state pattern of corporate parent-affiliate ownership relate to the Canadian-U.S. border at the sector level as well as all sectors combined. The gaps in literature, discussed in Chapter 2 led to the North American focus employed here in this research. For most part, studies have been conducted to evaluate the impact of business networks on trade have tended to focus on Japanese business network.

The current study took advantage of the availability of archival data by regressing trade indicators onto GDP, distance and corporate ownership data for Canada and the U.S in nine sectors. All data were gathered for year the 1998 (the ten-year anniversary of the FTA).

This chapter first concludes the results of the two hypotheses described throughout this thesis. The limitations of the research are summarized to shed light on the boundary of the research problems. The implications for further research explore the potential improvement and extension of the research.

5.2 Conclusions about Hypotheses

Hypothesis 1 stated that the border effect significantly differs when provinces or states are linked by parent-affiliates ownership ties from when they are not. The results supported Hypothesis 1. The existence of links had a significant impact on the Canada-U.S. border effect and the overall border effect (the border effect when all sectors are considered together) has become stronger in the presence of affiliates. One implication of this finding is that for firms

examined in this study, it is more profitable to export rather than establish affiliates. As Hypothesis 1 was tested for all sectors combined, more detailed insight can be provided from the test of Hypothesis 2, which was designed to address the data analysis at the sector level.

Hypothesis two stated that for sectors examined in the current research, the border effect would be significantly different when the affiliates were present from when they were absent. The results were mixed across sectors. For six sectors of agricultural, mineral, chemical, plastic, machinery and motor vehicle, the border effect is not significantly different in the presence and absence of affiliates. In other words, ownership relations did not have a significant impact on the border effect. In agricultural sector, this can be mainly due to existence of tariff and non-tariff barriers. Ten years after NAFTA's implementation, Canadian government still keeps tariffs on place for certain products such as dairy and poultry to protect domestic producers. It is not surprising that this group had the highest border effect among all sectors, according to Table 4.6.

Furtan and Olfert (2002) confirmed that in agricultural industry, there are still barriers to trade. The most obvious barrier seems to be the Canadian Wheat Board which continues to result in reduced trade and ongoing U.S. trade actions against Canada. Trade barriers in the form of institutions are encountered as well as lack of harmonization in standards and regulations. Moreover, in the dairy sector because of substantial trade barriers, there is virtually no FDI and no trade, neither is there any harmonization of regulations and standards. They also reported that in the poultry industry, Canadian government still keeps tariffs on place to protect domestic producers. The existence of these barriers does not let the impact of affiliates on the border effect to be reflected as it otherwise would.

On the other hand, the mineral sector had the smallest border effect among all sectors according to Table 4.6. It seems that for this sector there are few trade barriers to begin with, and therefore the impact of affiliates has not been significant. There are two issues that are worth noting: 1) mineral is the only sector that has more Canadian headquarters with U.S. subsidiaries than U.S headquarters with Canadian subsidiaries; and 2) closer analysis indicated that Canada's export to U.S. is more in raw material, in the form of miscellaneous metal ores, copper, silver, iron and steel while U.S. exports are more in form of processed materials, non-metallic mineral products such as glass products, china and earth ware, and clays products.

The result for chemical sector is somewhat puzzling as chemical is a diverse sector. It is made up of a number of sub-sectors such as basic petrochemicals, basic organic and inorganic chemicals, plastics, man-made fibres, industrial gases, fertilizers, agricultural chemicals, pharmaceuticals and cosmetics. The nature of trade between the two countries is different. While Canadian companies have their export concentrated mostly in crude petroleum and natural gas, American companies have their exports in varieties of products such as pharmaceuticals, cosmetics, plastics, organic and inorganic chemicals. When the number of affiliates is examined, the ratio is not proportional. The number of U.S. firms with Canadian affiliates is almost 13 times as many as Canadian firms with U.S. affiliates.

The overlapping for the motor vehicle sector is consistent with expectations. The overlap could be due to foreign direct investment that has already been well established and strong in place for this sector. As the affiliates are already established, the single year (1998) would not have significant impact. In the motor vehicles sector, the Canada-U.S. Automotive Agreement, known as the Auto Pact, was an important trade agreement between Canada and the United States (signed in 1965). It removed tariffs on cars, trucks, buses, tires, and

automotive parts between the two countries. Before the sign of Auto Pact, due to tariffs, only 3% of vehicles sold in Canada were made in the United States; when the pact was signed it made vast and immediate changes. While in 1964, only 7% of vehicles made in Canada were sent south of the border, but by 1968, this increased to 60%. By the same date, 40% of cars purchased in Canada were made in the United States.

For the three sectors (i.e. wood, textile, base metals), the impact of affiliates appears to be significant which means it makes more sense for firms to establish affiliates rather than exports. However as presented in Table 4.10, the border effect has become stronger for sectors of wood and base metals and weaker for textile.

To interpret the results, understanding the interaction between FDI and trade can be useful. There are two opposing views which regard whether trade and FDI act as complement or substitute. As Pontes (2004) argued, the nature of relationship between the two depends on the sector, the country and the time period concerned.

The theory of horizontal investment (Brainard, 1993; Hortsmann & Markusen, 1992) assumes that the firm that needs to make the decision between export and establishing affiliates faces a trade-off between concentration and proximity to consumers. In this regard, two issues are worth noting: 1) economies of scale; and 2) trade costs. The theory states that if economies of scale are high and trade costs are low, it is profitable for the firm to concentrate production in a single plant and export to foreign markets. Otherwise, if economies of scale in production are low, it pays the firm to supply foreign market through affiliates.

According to Industry Canada (1998), by 1998, 10 years after NAFTA, trade barriers were significantly reduced or eliminated (except for the agricultural sector). Therefore, in the current study (using 1998 data) it is justifiable to assume that because of trade barrier

elimination for almost all sectors except agriculture, trade costs were lowered. This leaves the analysis of sectors to the factor of scale economies. Simply put, since the trade costs are low, economies of scales could be the deciding factor whether the firms in a specific sector decide to trade directly or attempt to establish affiliates.

Chase (2003) discussed the interesting reactions that different sectors show to vertical versus horizontal investment. In his study, Chase measured differences across several sectors in the size and significance of economies of scale. He employed Hufbauer's (1970) method in which he estimated the slope of average cost curves by measuring how value added per worker varies in plants of different sizes. His results for several sectors examined show that base metals, electrical products have the highest economies of scale while textile and plastic, rubber and leather have the lowest. Chase's results can be used to justify results displayed in Table 4.9. Since textile and plastic sectors have low economies of scales, textile and plastic firms would derive little or no gain from the opportunity to increase the scale of output and it is reasonable that establish affiliates. In this case, the relationship between FDI and trade would be complementary and the sector's border effect becomes weaker in the presence of affiliates.

Although electronic and base metals both have high economies of scale, they show different reactions in the presence of affiliates. Consistent with expectations, the base metals sector has become stronger. Because of high economies of scales, this sector would benefit from access to larger markets and it is reasonable to export rather that establish affiliates. In this case, FDI substitutes trade and the sector's border effect appears to be weaker in the presence of affiliates.

Despite having high economies of scale, the machinery and electronic border effect appears to have become weaker in the presence of affiliates. These unexpected results could be

partly due to the characteristics of this sector as it is high technology. Cameron (1998) reported that according to Industry Canada, intra-firm trade is higher in high-technology and R&D intensive sectors compared to other sectors. Ivarsson and Johnsson (2001) confirmed that intra-firm trade tends to be highest in high-technology sectors. The fact that a large part of intra-firm trade is of finished goods with foreign affiliates mainly engaged in marketing and distribution activities, can justify machinery sector positions.

Conversely, in wood sector trade with affiliates abroad is less common as this sector requires low skill labours (Chase, 2003). This could explain why the border effect has become stronger at the presence of affiliates for this sector as the intra-firm trade is less common for furniture, lumber and paper.

5.3 Geographical Analysis

To gain a deeper understanding, the next step was to analyze the most frequent affiliate links that exist for each sector. Therefore, Table 5.1 was prepared to display the provinces/states with the most frequent links in each sector.

Table 5.1 List of Provinces and States with Most Frequent Links in Each Sector

Sector/Links
Agriculture
Illinois - Ontario
Pennsylvania - Ontario
Ontario - California
Quebec - New York
Minnesota - Ontario
Saskatchewan - British Columbia
Saskatchewan - Manitoba

Table 5.1 List of Provinces and States with Most Frequent Links in Each Sector (Continued)

Sector/Links
Mineral
Illinois - Ontario
New York - Ontario
Ontario - Nevada
Ontario - Minnesota
Chemical
New Jersey- Ontario
Pennsylvania - Ontario
New York - Ontario
Ohio - Ontario
Illinois - Ontario
Texas - Alberta
Texas - Ontario
Plastic
Michigan - Ontario
New Jersey - Ontario
Ohio - Ontario
Illinois- Ontario
Texas – Ontario
Wood
New York - Ontario
Michigan - Ontario
Ohio - Ontario
British Columbia - Washington
Quebec - Ontario
British Columbia - Ontario

Table 5.1 List of Provinces and States with Most Frequent Links in Each Sector (Continued)

Sector/Links
Textile
Quebec -New York
Pennsylvania - Ontario
Base Metals
New York - Ontario
Connecticut - Ontario
Illinois to Ontario
Ohio - Ontario
Ontario - Quebec
Machinery
California -Ontario
Illinois - Ontario
Connecticut -Ontario
New York - Ontario
Ohio - Ontario
Pennsylvania - Ontario
New Jersey -Ontario
Michigan - Ontario
Texas -Ontario
Texas - Alberta
Motor Vehicles
Ohio - Ontario
Ontario - Michigan
California – Ontario

As is shown, U.S. affiliates are heavily concentrated in Ontario, Canada's industrial heartland. Ontario's presence is seen in all sectors (no other province comes even close). Among other provinces, Quebec's presence is found in agriculture, Alberta's presence is found in chemical as it has vast deposits of oil and gas reserves. British Columbia in wood and paper sector is present as it contains vast forests.

Among the U.S. states, those with most frequent links are Illinois, Pennsylvania, California, New York, Minnesota, Nevada, New Jersey, Ohio, Texas, Michigan, Washington, and Connecticut. As shown in Figure 5.1, these states are all located in the northeastern United States. The only exception is state of Washington located in the Pacific Northwest region of the U.S. and shares border with the Canadian province of British Columbia. Moreover, with the exception of three states, the aforementioned states are either border-states or states next to them, which are closest to Ontario. Those three states that are located farther to Ontario and do not share border with Canada are California, Nevada, and Texas.

Figure 5.1. Map of the United States of America.

Consistent with expectations, California is seen in the most frequent links in three sectors (i.e., agriculture, electronics motor vehicle). California's economy is a dominant force in the U.S. California's farms are highly productive and agriculture – especially fruits, vegetable, dairy and wine – is a driving factor in U.S. economy. Moreover, since World War II, manufacturing, notably of electronic equipment, computers, machinery, and transportation equipment, has increased enormously. In fact, many high-tech companies are located in Silicon Valley, between Palo Alto and San Jose, because it is the nation's leading producer of semiconductors and is a focus of software development.

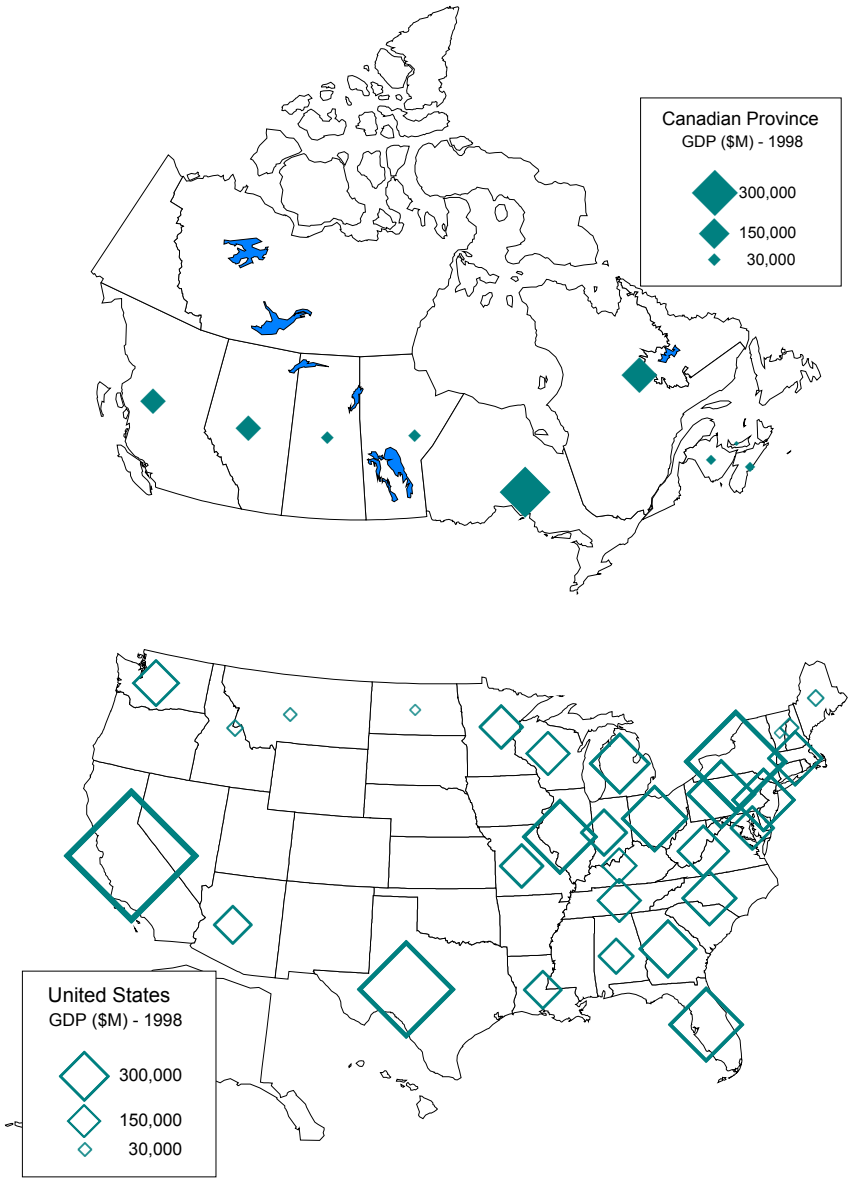
Nevada shows up in the most frequent list in the mineral sector. Because of its favourable geography, the driest state in the nation of U.S. possesses large deposits of minerals and among them are gold, silver, barite, and gypsum. Nevada alone provides 10% of world production of gold.

Shown in Table 5.1, Texas is present presence is seen in chemicals, plastic, machinery and electronics sectors. Possessing enormous natural resources especially oil and gas, Texas is an industrial giant and it is home to the most Fortune 500 companies in the U.S. Chemicals, oil refining, machinery, electronics and transportation equipment are among the major Texas industries.

5.4 The Economic Map of the North America

Figure 5.2 illustrates the 1998 economic map of the North America, utilizing GDP data for provinces and states examined in this study.

Figure 5.2. North American Economic Map (1998).



Source: Statistics Canada (1998)

Each black diamond represents a province and each white diamond a state, with the area of each diamond proportional to gross domestic product of the state or province it represents. The ten diamonds spread out across the northern part of the continent are small and distant from each other in comparison with the larger, more numerous and less distant diamonds that constitute the southern part of the continent.

Figure 5.2 suggests that the higher GDP states are concentrated in the eastern United States, more heavily in the northeastern United States. The only exceptions are California and Texas that have the first and the second largest GDPs in U.S., respectively. This explains multicollinearity observed in data. The correlation between border and GDP is evident and border-states typically have higher GDP.

5.5 Spatial Structure of Canada and the U.S.

Brown (2002) discussed that in addition to relative economic strength, the spatial structure of Canada and the U.S. plays an important role in determining the density of bilateral trade between the two countries. Because much of northern Canada is inhospitable or even uninhabitable, its population is heavily concentrated in relatively few urban centers near the border with the United States. The Canadian market, therefore, is concentrated in pockets widely dispersed over an area 4,000 miles long and 100 miles wide.

Among Canadian provinces, in Canada- U.S. trade, Ontario carries a very heavy load. Ontario has the population of 12.5 million, almost 42% of total population of Canada. It is Canada's financial and manufacturing center, generates about 42% of Canada's GDP and powers the national economy. Its geographical location, population density and access to the transportation systems promote trade.

As Figure 5.3 suggests, the Great Lakes Seaway system provides access to a considerable trading market comprised of the states of New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, and Minnesota, and the Canadian provinces of Quebec and Ontario. The region is home to more than 90 million people, fully one-quarter of North America's population. It accounts for 40 % of U.S. manufacturing and two-thirds of Canada's industrial production. More than 40 provincial and interstate highways connect the region's ports with key cities throughout the United States and Canada, and nearly 30 railroad companies serve the System's ports. It also produces 70% of the value of the nation's machine tools. Nearly half of the Fortune 500 Industrial Companies have headquarters in the U.S. portion of the Great Lakes region. The geography plays an important role in Canada- U.S. trade. Most Canada- U.S. trade is concentrated in Border States most notably, northeastern U.S. states and province of Ontario in Canada.

Figure 5.3. Map of St. Lawrence Seaway.

5.6 Conclusion Summary

The current research reveals that overall, the presence of affiliates has a significant relationship to the Canada-U.S. border trade. When sector level data are analyzed, the results are mixed. Among nine sectors analyzed, for six sectors (i.e., agricultural, mineral, chemical, plastic, machinery, motor vehicle), the border effect is not significantly different in the presence and absence of affiliates. These sectors include those for which either the border effect are highest (agricultural) or lowest such as mineral that border effect has been small to begin with. In case of motor vehicle, the trade barriers between Canada and the U.S. have long been dismantled.

For the other three sectors (i.e., wood, textile, and base metals), the impact of affiliates has been significant. However, for wood and base metals sectors border effect has become stronger and for textile it has become weaker in the presence of affiliates.

The relationship between FDI and trade decides how each sector reacts to the presence of affiliates. For firms in sectors with low economies of scale such as plastic and textile, it is more profitable to supply foreign market through affiliates rather than export. For those with high economies of scale such as base metals the opposite is correct. Machinery seems an exception as it seems because of the nature of industry the intra-firm trade is high and this in fact affects how this sector reacts.

5.7 Limitation of the Research

As mentioned in section 3.3, the current research examined the affiliate links impact on Canada-U.S. border effect and is specific to goods rather than goods and services. Put simply, it does not take into account the impact of services. This is important in some sectors such as electronics since for such sectors services can be provided through affiliates and excluding that might affect results.

Another important limitation involves the correlational nature of the research. As with all correlational studies, caution is suggested and future research is warranted.

5.8 Suggestion for Future Research

1. Further studies can be performed to extend current research results and include service data so to examine the affiliate links impact on Canada-U.S. border effect for both goods and services.

2. This study gives a snapshot of impact of networks on border effect for the single year of 1998, which is the ten anniversary of FTA's implementation. If both hypotheses can be tested for a period starting in 1988 and continue forward, it can provide a more complete picture of networks impacts.

3. Different types of affiliate could have different impacts on cross-border trade. DCA, the reference for affiliate data used in this research, does not distinguish between producing affiliates versus those that are only distributors. Therefore, further analysis, which makes this distinction, can be performed for future research.

4. In this research, nine sectors were discussed generally. As each sector is complex and consists of some sub-sectors, further analyses at the sub-sector level can be done for future research.

References

Anderson, J. (1979). A theoretical foundation for the gravity equation. *American Economic Review, 69*, 106-16.

Belderbos, R., & Sleuwaegen, L. (1998). Tariff jumping DFI and export substitution: Japanese electronics firms in Europe. *International Journal of Industrial Organization, 16*, 601-638.

Bergstrand, J.H. (1985). The gravity model in international trade: some microeconomic foundations and empirical evidence. *Review of Economics and Statistics, 67,* 474-481.

Bergstrand, J. H. (1989). The generalized gravity equation, monopolistic competition and the factor-proportions theory in international trade. *Review of Economics and Statistics, 71*, 143-153.

Brainard, S. L. (1993). *A simple theory of multinational corporations and trade with a tradeoff between proximity and concentration*. NBER working paper 4269.

Brown, M. (2003). *Overcoming distance, overcoming borders: comparing North American regional trade*. Analytical studies branch research Paper series, Statistics Canada.

Cameron, R. A. (1998). *Intra-firm trade of Canadian-based foreign transnational companies.* Industry Canada working paper number 26.

Chase, K. A. (2003). Economic interests and regional trading agreements: The case of NAFTA. *International Organization, 57*, 37-174.

Combes, P., Lafourcade, M., & Mayer, T. (2004). The trade-creating effects of business and social networks: Evidence from France. *Journal of International Economics, 66*, 1-29.

Davis, D. R., & Weinstein, D. E. (2000). International trade as an integrated equilibrium: New Perspectives. *American Economic Review*, *90*, 150-154.

Distance Data. Retrieved September 2005, from Graphic Maps website: http://graphic maps.com/

Deardorff, A. V. (1984). The possibility of factor price equalization, revisited. *Journal of International Economics, 36*, 167-75.

Fukao, K & Okubo, T. (2004). Why has the border effect in the Japanese market declined? The role of business networks in East Asia. *Research Institute of Economy, Trade and Industry (RIETI),* Discussion papers 04016.

Furtan, W.H. & Olfert, M.R. (2002). Economic integration of the U.S. – Canada agriculture sectors. *Agricultural Economics, 55*(2), 178-200.

Gould, D. (1994). Immigrant links to home country: Empirical implications for U.S. bilateral trade flows. *Review of Economics and Statistics, 76,* 302-316.

Grossman, G. M., & Helpman, E. (1991). *Innovation and growth in the global economy.* Cambridge: MIT Press.

Head, K., Mayer, T., & Ries, J. (2002). On the pervasiveness of home market effects. *Economica, London School of Economics and Political Science, 69*, 371-90.

Head, K., & Ries, J. (2001). Increasing returns versus national product differentiation as an explanation for the pattern of U.S.–Canada trade. *American Economic Review, 91*, 858-876.

Head, K., Ries, J., & Spencer, B. (2004). Vertical networks and U.S. auto parts exports: Is Japan different? *Journal of Economics and Management Strategy, 13*, 37-67.

Helliwell, J. (1998). *How much do national borders matter?* Washington DC: Brookings Institution Press.

Helpman, E. (1981). International trade in the presence of product differentiation, economies of scale and monopolistic competition: A Chamberlin-Heckscher-Ohlin approach. *Journal of International Economics, 11*, 305-40.

Helpman, E. (1984). A simple theory of trade with multinational corporations. *Journal of Political Economy, 92*, 451-71.

Helpman, E., & Krugman, P. R. (1985). *Market structure and foreign trade.* Cambridge: MIT Press.

Hortsmann, I. J., & Markusen J. R. (1992). Endogenous market structures in international trade. *Journal of International economics, 32*, 109-129.

Hufbauer, G. C. (1970). *The impact of national characteristics and technology on the commodity composition of trade in manufactured goods.* New York: Columbia University Press.

Ivarsson, I., & Johnsson, T. (2001). TNC strategies and variations in intra-firm trade: The case of foreign manufacturing affiliates in Sweden. *Geografiska Annaler, 18*, 17-34.

Kyoji, F., & Okubo, T. (2004). Why has the border effect in the Japanese market declined? The role of business networks in East Asia. *HEI Working Paper No: 12.*

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics, 9*, 469-79.

Lancaster, K. (1980). A theory of intra-industry trade under perfect monopolistic competition. *Journal of International Economics, 10*, 151-175.

Lawrence, R. (1991). *Efficient or exclusionist? The import behaviour of Japanese corporate group*. Brooking Papers on Economic Activity, 311-31.

Lawrence, R. (1993). Japan's different trade regime: An analysis with particular reference to keiretsu. *Journal of Economic Perspectives, 7*, 3-19.

Leamer, E. (1995). The Hecksher-Ohlin Model in theory and practice.*Princeton Studies in International Economics.*

McCallum, J. (1995). National borders matter: Canada-U.S. regional trade patterns. *American Economic Review*, *85*, 615-23.

Min, P. (1990). Korean immigrants in Los Angeles. *Institute of Social Science Research, ISSR Working Papers 2,* University of California, Los Angeles.

NAFTA @ 10-A Preliminary Report. (2006). Retrieved September 2006, from Department of Foreign affairs website: http:// www.dfait-maeci.gc.ca/eet

Noland, M. (1992). *Public policy, private preferences and the Japanese trade patterns.* Mimeo, John Hopkins University and Institute for International Economics.

Nitsch, V. (2000). National borders and international trade: Evidence from the European Union. *Canadian Journal of Economics, 33*, 1091-1105.

Ohlin, B. (1933). Interregional and International Trade. *The American Economic Review, 23*(4), 680-683.

Ohmae, K. (1990). *The borderless world: Power and strategy in the inter-linked economy*. New York: Harper business.

Okubo, T. (2004). The border effect in the Japanese market. *Journal of Japanese International Economics*, *18*, 1-11.

Pontes, J. P. (2004). A theory of relationship between foreign direct investment and trade. *Economics Bulletin, 6*, 1-8.

Rauch, J. E. (2001). Business and social networks in international trade. *Journal of Economic Literature , 39*, 1177-1203.

Rauch, J. E., & Trindade, V. (2002). Ethnic Chinese networks in international trade. *Review of Economics and Statistics, 84*, 116-130.

Ravenstein, E. G. (1885). The laws of migration. *Journal of the Royal Statistical Society, 48*, 167-227.

Reilly, W. J. (1931). *The law of retail gravitation.* New York: Pilsbury.

Sohn, C. (2005). Does the gravity model explain South Korea trade flows? *The Japanese Economic Review, 56* (4), 417-430.

Statistics Canada. (1998). *International and Inter-provincial Trade flows of goods. Table 386-0002*

Statistics Canada. (1998). *Provincial Domestic Product. Table 380-0030*

Stewart, J.Q. (1947). Suggested principles of social physics. *Science, 106*, 179-180.

Tinbergen, J. (1962). *Shaping the world economy: Suggestions for an international economic policy.* New York: Twentieth Century Fund.

Wagner, D., Head, K., & Ries, J. (2002). Immigration and the trade of provinces. *Scottish Journal of Political Economy, 49*, 507-525.

Wei, S. (1996). Intra-national versus international trade: How stubborn are nations in global integration. *National Bureau of Economic Research, Working Paper 5531.*

Weidenbaum, M., & Hughes, S. (1996). *The Bamboo Network: How expatriate Chinese entrepreneurs are creating a new superpower in Asia*. The Free Press: New York.

Wolf, H. (2000). Intra-national home bias in trade. *Review of Economics and Statistics, 82*, 553-63.

Appendix A- Company Ownership Data

HQ= Head Quarter; Sub =Subsidiary; Div= Division; Hol= Holdings; Aff= Affiliates

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Andres Wines Ltd.	ON		AB			1
Canadian	Andres Wines Ltd.	ON		NS			1
Canadian	Andres Wines Ltd.	ON		BC			1
Canadian	Andres Wines Ltd.	ON		PQ			1
Canadian	Clearly Canadian Beverage Group	BC	CA				1
Canadian	Cott Corporation	ON	CA				1
Canadian	Cott Corporation	ON	MO				1
Canadian	Cott Corporation	ON	ON				1
Canadian	Cott Corporation	ON	ON				1
Canadian	Cott Corporation	ON		AB			1
Canadian	Cott Corporation	ON		BC			1
Canadian	Cott Corporation	ON		NC			1
Canadian	Cott Corporation	ON		CA			1
Canadian	Cott Corporation	ON		CA			1
Canadian	Cott Corporation	ON		FL			1
Canadian	Culinar Inc.	PQ	NJ				1
Canadian	Dover Industries Limited	ON	NS				1
Canadian	Maple Leaf Foods Inc	ON	MB				1
Canadian	National Sea Products Limited	NS	NH				1
Canadian	Premier CDN Enterprises Ltd.	PQ	NY				1
Canadian	Ridley Canada Limited	MB	MN				1
Canadian	Ridley Canada Limited	MB	IA				1
Canadian	Saskatchewan wheat Pool	SK	MB				1
Canadian	Saskatchewan wheat Pool	SK	MB				1
Canadian	Saskatchewan wheat Pool	SK	SK				1
Canadian	Saskatchewan wheat Pool	SK	PQ				1
Canadian	Saskatchewan wheat Pool	SK				MB	1
Canadian	Saskatchewan wheat Pool	SK				ON	1
Canadian	Saskatchewan wheat Pool	SK				ON	1
Canadian	Saskatchewan wheat Pool	SK				BC	1
Canadian	Saskatchewan wheat Pool	SK				BC	1
Canadian	Saskatchewan wheat Pool	SK				BC	1

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Saskatchewan wheat Pool	SK				AB	1
Canadian	The Seagram Company LTD.	PQ	NY				1
Canadian	The Seagram Company LTD.	PQ		NY			1
Canadian	Yogen Fruz Worldwide Inc	ON	IL				1
American	Brown-Forman Corporation	KY			ON		1
American	Campbell Soup Company	NJ			ON		1
American	Dekalb Genetics Corporation	IL			ON		1
American	General Mills, Inc.	MN	ON				1
American	H.J. Heinz Company	PA	ON				1
American	H.J. Heinz Company	PA			ON		1
American	H.J. Heinz Company	PA			ON		1
American	Herbalife International of America Inc	CA			AB		1
American	Hershey Foods Corporation	PA			ON		1
American	International Multifood Corporation	MN			ON		1
American	Kellogg Company	MI			ON		1
American	Mccormick & Company	MD			ON		1
American	Pepsico Inc	NY			ON		1
American	Pioneer Hi-bred International Inc	IA			ON		1
American	The Quacker Oats Company	IL			ON		1
American	Ralston Purina Company	MO			ON		1
American	Sara Lee Corporation	IL			PQ		1
American	Standard Commercial Corporation	NC			ON		1
American	Tootsie Roll Industries Inc	IL			ON		1
American	UST Inc	CT			PQ		1
American	Universal Corporation	VA			ON		1
American	Universal Foods Corporation	WI			ON		1
American	WM. Wrigley Jr. Company	IL			ON		1
American	Ball Horticultural Company	IL			ON		1
American	Borden Inc	OH			ON		1
American	Cargill	MN			MB		1
American	Griffith Laboratories Wordwide Inc	IL			ON		1
American	World's Finest Chocolate Inc	IL			ON		1
Canadian	Barrick Gold Corporation	ON		CO			2
Canadian	Barrick Gold Corporation	ON		NV			2
Canadian	Cambior Inc.	PQ	CO				2
Canadian	Cominco, LTD.	BC	WA				2
Canadian	Cominco, LTD.	BC	AK				2
Canadian	Cominco, LTD.	BC	ON				2
Canadian	Cominco, LTD.	BC	MB				2

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Consumers Packaging Inc.	ON	FL				2
Canadian	Inco Limited	ON	IL				2
Canadian	Inco Limited	ON	WV				2
Canadian	Inco Limited	ON	NY				2
Canadian	Inco Limited	ON	NC				2
Canadian	Inco Limited	ON	NJ				2
Canadian	Inco Limited	ON	CO				2
Canadian	Inco Limited	ON		MB			2
Canadian	Jannock Limited	ON	MS				2
Canadian	Jannock Limited	ON	TN				2
Canadian	Jannock Limited	ON	MS				2
Canadian	Jannock Limited	ON	NY				2
Canadian	Jannock Limited	ON	TX				2
Canadian	Potash Corporation of Saskatchewan Inc	SK	FL				2
Canadian	Potash Corporation of Saskatchewan Inc	SK	TN				2
Canadian	Potash Corporation of Saskatchewan Inc	SK	NC				2
Canadian	Potash Corporation of Saskatchewan Inc	SK	FL				2
Canadian	Potash Corporation of Saskatchewan Inc	SK		NB			2
Canadian	Potash Corporation of Saskatchewan Inc	SK		UT			2
Canadian	Rayrock Yellowknife Resources Inc	ON	NV				2
Canadian	Rayrock Yellowknife Resources Inc	ON	NV				2
Canadian	Rayrock Yellowknife Resources Inc	ON	NV				2
Canadian	Rayrock Yellowknife Resources Inc	ON	NV				2
Canadian	Rio Algom Limited	ON	MN				2
Canadian	Rio Algom Limited	ON				BC	2
Canadian	Rio Algom Limited	ON				MN	2
Canadian	Rio Algom Limited	ON				MN	2
Canadian	Rio Algom Limited	ON				MN	2
Canadian	Zemex Corporation	ON	OH				2
Canadian	Zemex Corporation	ON	GA				2
Canadian	Zemex Corporation	ON	PQ				2
Canadian	Zemex Corporation	ON	NY				2

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Zemex Corporation	ON	TN				2
Canadian	Zemex Corporation	ON	NC				2
American	The Alpine Group, Inc	NY			ON		2
American	American Standard Inc.	NJ			ON		2
American	American Standard Inc.	NJ			ON		2
American	Armstrong World Industrie, Inc	PA			PQ		2
American	Battle Mountain Gold Company	TX			ON		2
American	Echo Bay Mines lTD.	CO	AB				2
American	Exolon-esk Company	NY			ON		2
American	Homestake Mining Company	CA	BC				2
American	Homestake Mining Company	CA				BC	2
American	Medusa Corporation	OH			ON		2
American	Newell Co	IL			ON		2
American	Newell Co	IL			ON		2
American	PPG Industries Inc	PA			ON		2
American	Rock of Ages Corporation	VT	PQ				2
American	Rochester & Pittsburg Coal Company	PA			ON		2
American	Royal Oak Mines Inc	WA		NF			2
American	Royal Oak Mines Inc	WA		ON			2
American	Royal Oak Mines Inc	WA				BC	2
American	Royal Oak Mines Inc	WA				AB	2
American	USG Corporation	IL			ON		2
American	W. Braun Company	IL			ON		2
American	CFB Industries Inc	IL			ON		2
American	Stebbins Engineering & MFG Co	NY			ON		2
American	Superior Graphite Co	IL			ON		2
Canadian	Agrium Inc.	AB	CO				3
Canadian	CCL Industries, Inc.	ON	IL				3
Canadian	CCL Industries, Inc.	ON	NY				3
Canadian	CCL Industries, Inc.	ON	VA				3
Canadian	Computalog LTD.	AB	TX				3
Canadian	Domco Inc.	PQ	IL				3
Canadian	Domco Inc.	PQ	AB				3
Canadian	Domco Inc.	PQ	BC				3
Canadian	Domco Inc.	PQ	MB				3
Canadian	Domco Inc.	PQ	ON				3
Canadian	Nova Corporation	AB	ON				3
Canadian	Nova Corporation	AB	PA				3

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Polydex	ON	KS				3
Canadian	Polydex	ON	KS				3
Canadian	Ranger Oil Limited	AB	TX				3
American	Abbot t Laboratories	IL			PQ		3
American	Abbot t Laboratories	IL			PQ		3
American	Air Products and Chemicals	PA			ON		3
American	Air Products and Chemicals	PA			AB		3
American	Air Products and Chemicals	PA			AB		3
American	Air Products and Chemicals	PA			BC		3
American	Air Products and Chemicals	PA			ON		3
American	Air Products and Chemicals	PA			ON		3
American	Air Products and Chemicals	PA			ON		3
American	Air Products and Chemicals	PA			BC		3
American	Air Products and Chemicals	PA			PQ		3
American	Air Products and Chemicals	PA			ON		3
American	Air Products and Chemicals	PA			MB		3
American	Alberto-Culver Company	IL			ON		3
American	Alliedsignal, Inc	NJ		ON			3
American	Aloette Cosmetics, Inc	PA			ON		3
American	American Home Products Corporation	NJ		ON			3
American	American Home Products Corporation	NJ		ON			3
American	American Home Products Corporation	NJ		ON			3
American	American Home Products Corporation	NJ		ON			3
American	American Home Products Corporation	NJ			PQ		3
American	American Home Products Corporation	NJ			ON		3
American	Amgen Inc	CA			ON		3
American	Amoco Corporation	IL			AB		3
American	Apache Corporation	TX	AB				3
American	Ashland, Inc	KY			ON		3
American	Avon Products Inc	Ny			PQ		3
American	Beauticontrol Cosmetics	TX	ON				3
American	Betzdearborn Inc	PA	ON				3
American	Betzdearborn Inc	PA	ON				3
American	Block Drug Company, Inc	NJ			ON		3

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Cabot Corporation	MA			ON		3
American	Calgon Carbon Corporation	PA	ON				3
American	Carter-Wallace, Inc	NY			ON		3
American	Carter-Wallace, Inc	NY			ON		3
American	Chattem Inc	TN			ON		3
American	Chevron Corporation	CA			BC		3
American	Chevron Corporation	CA			AB		3
American	Chevron Corporation	CA			AB		3
American	Chiron Corporation	CA	ON				3
American	Church & Dwight Co, Inc	NJ			ON		3
American	The Clorox Company	CA			SK		3
American	The Clorox Company	CA			SK		3
American	Colgate-Palmolive Company	NY			ON		3
American	Crompton & Knowles Corporation	CT			PQ		3
American	Crompton & Knowles Corporation	CT			PQ		3
American	Del Laboratories Inc	NY			ON		3
American	Del Laboratories Inc	NY			ON		3
American	Del Laboratories Inc	NY			ON		3
American	Devon Energy Corporation	OK	AB				3
American	The Dow Chemical Company	MI			ON		3
American	The Dow Chemical Company	MI			ON		3
American	Du pont	DE			ON		3
American	Etown Corporation	NJ			PQ		3
American	Ecolab Inc	MN			ON		3
American	Ecoscience Corporation	NJ			ON		3
American	Erly Industries Inc	CA			BC		3
American	Ethyl Corporation	VA			ON		3
American	Exxon Corporation	TX			ON		3
American	FMC Corporation	IL			ON		3
American	FMC Corporation	IL			NS		3
American	Forest Oil Corporation	CO		AB			3
American	H.B Fuller Company	MN			ON		3
American	The Geon Company	OH	ON				3
American	The Gillette Company	MA			ON		3
American	The Gillette Company	MA			PQ		3
American	W.R. Grace & Co	FL			ON		3
American	Graham-Field Health Products, Inc	NY			ON		3
American	Guest Supply Inc	NJ			ON		3
American	Hach Company	CO			MB		3

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Halliburton Company	TX			AB		3
American	M.A. Hanna Company	OH			ON		3
American	Harcor Energy, Inc.	TX	AB				3
American	Hercules Incorporated	DE			ON		3
American	Hercules Incorporated	DE			ON		3
American	Ivax Corporation	FL			ON		3
American	Johnson & Johnson	NJ			ON		3
American	Johnson & Johnson	NJ			ON		3
American	Johnson & Johnson	NJ			PQ		3
American	Johnson & Johnson	NJ			BC		3
American	Eli Lilly and Company	IN			ON		3
American	Lilly Industries Inc	IN			ON		3
American	Lilly Industries Inc	IN			ON		3
American	The Lubrizol Corporation	OH			ON		3
American	The Lubrizol Corporation	OH			ON		3
American	Macdermid Incorporated	CT			ON		3
American	Merck & Co Inc	NJ			PQ		3
American	Mining Services International, Inc	UT	BC				3
American	Mobil Oil Corporation	VA			AB		3
American	Monsanto Company	MO			ON		3
American	Monsanto Company	MO			ON		3
American	Murphy Oil Corporation	AR			AB		3
American	NCH Corporation	TX			ON		3
American	Nabors Industries Inc	TX			AB		3
American	Nalco Chemical Company	IL			ON		3
American	National Service Inustries Inc	GA			PQ		3
American	Nature's Sunshine Products Inc	UT			ON		3
American	Noble Drilling Corporation	TX			NF		3
American	Noble Affiliates Inc	OK			AB		3
American	Occidental Petroleum Corporation	CA				AB	3
American	Olin Corporation	CT			ON		3
American	Owens Corning	OH			ON		3
American	The Procter & Gamble Company	OH			ON		3
American	The Procter & Gamble Company	OH			ON		3
American	Quacker State Corporation	TX			ON		3
American	Ringer Corporation	MN	ON				3
American	Rohm & Haas Company	PA			ON		3
American	Safety-Kleen Corp	IL			ON		3
American	Safety-Kleen Corp	IL			ON		3

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	The Sherwin-Williams Company	OH			ON		3
American	Stanhome Inc	MA			ON		3
American	Tenneco Inc	CT			ON		3
American	3M Canada	MN			ON		3
American	Unocal Corporation	CA	AB				3
American	The Valspar Corporation	MN			ON		3
American	Vulcan Materials Company	AL			BC		3
American	WD-40 Company	CA			ON		3
American	Warner-Lambert Company	NJ			ON		3
American	Western Gas Resources Inc	CO			AB		3
American	Wilshire Oil Co of Texas	NJ			AB		3
American	Witco Corporation	CT			ON		3
American	Ace tank & Equipment Co	WA			ON		3
American	Asbury Carbones, Inc.	NJ	ON				3
American	Blissfield Manufacturing Company	MI			ON		3
American	Flexible Products Company	GA	ON				3
American	Houghton International Inc	PA			ON		3
American	Hunt Oil Company	TX		AB			3
American	S.C. Johnson & Son Inc	WI			ON		3
American	PQ Corporation	PA			ON		3
American	PVS Chemicals Inc	MI			ON		3
American	Parsons & Whittemore Inc	NY			NB		3
American	Parsons & Whittemore Inc	NY			NB		3
American	Schenctady International Inc	NY			ON		3
American	Southwestern Petroleum Corporation	TX	ON				3
American	Stormbecker Corporation	IL			ON		3
American	Wechco Inc	NJ			PQ		3
Canadian	Fishery Products International LTD	NF	MA				4
Canadian	Intertape Polymer Group Inc.	PQ	NJ				4
Canadian	Intertape Polymer Group Inc.	PQ	FL				4
Canadian	Jannock Limited	ON	PQ				4
Canadian	Jannock Limited	ON	ON				4
Canadian	Jannock Limited	ON	MS				4
American	AEP Industries Inc	NJ	ON				4
American	American Biltrite Inc	MA			PQ		4
American	Amoco Corporation	IL			AB		4
American	Bandag, Incorporated	IA			PQ		4

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Brown Group Inc	MO			ON		4
American	Envirodyne Industries Inc	IL			ON		4
American	Florsheim Group Inc.	IL	ON				4
American	Gencorp Inc	OH			ON		4
American	The Goodyear Tire & Rubber Company	OH			PQ		4
American	Matthews International Corp	PA			ON		4
American	Myers Industries Inc	OH			ON		4
American	Samsonite Corporation	CO	ON				4
American	Sealed air Corporation	NJ			ON		4
American	The Standard Products Company	MI			ON		4
American	Tandy Brands Accessories, Inc.	TX	ON				4
American	Vallen Corporation	TX	ON				4
American	Datacard Corporation	MN			PQ		4
American	Datacard Corporation	MN			ON		4
American	Freudenberg-Nok	MI		ON			4
American	Goshen Rubber	IN			ON		4
American	Jomac Inc	PA			PQ		4
American	Kohler Company	WI			ON		4
American	Kohler Company	WI			ON		4
American	Kohler Company	WI			BC		4
American	Marietta Corporation	NY	ON				4
American	NVF Company	DE			ON		4
American	New Balance Athletic Shoe Inc	MA			ON		4
American	Spartan International Inc	MI			ON		4
Canadian	Ackland Limited	ON		BC			5
Canadian	Abitibi-Consolidated Inc.	PQ	ON				5
Canadian	Avenor, Inc	PQ				ON	5
Canadian	Avenor, Inc	PQ	BC				5
Canadian	Data Business Forms Limited	ON	MB				5
Canadian	Data Business Forms Limited	ON	SK				5
Canadian	Data Business Forms Limited	ON	AB				5
Canadian	Data Business Forms Limited	ON	PQ				5
Canadian	Data Business Forms Limited	ON	PQ				5
Canadian	Data Business Forms Limited	ON	AB				5
Canadian	Domtar Inc.	PQ	ON				5
Canadian	Domtar Inc.	PQ		ON			5

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Gunther Mele limited	ON	NY				5
Canadian	Hollinger Inc.	BC	KY				5
Canadian	Hollinger Inc.	BC	IL				5
Canadian	Hollinger Inc.	BC	ON				5
Canadian	Hollinger Inc.	BC	ON				5
Canadian	Hollinger Inc.	BC	ON				5
Canadian	Hollinger Inc.	BC	PQ				5
Canadian	Jannock Limited	ON	PA				5
Canadian	Kruger Inc.	PQ	NF				5
Canadian	Kruger Inc.	PQ	ON				5
Canadian	Kruger Inc.	PQ	NY				5
Canadian	Kruger Inc.	PQ	MI				5
Canadian	Kruger Inc.	PQ		ON			5
Canadian	Kruger Inc.	PQ		ON			5
Canadian	Macmillan Bloedel Limited	BC	ON				5
Canadian	Macmillan Bloedel Limited	BC	AB				5
Canadian	Macmillan Bloedel Limited	BC	WA				5
Canadian	Macmillan Bloedel Limited	BC	GA				5
Canadian	Moore Corpotration Limited	ON	WI				5
Canadian	Premdor Inc	ON	BC				5
Canadian	Premdor Inc	ON		NS			5
Canadian	Premdor Inc	ON		PQ			5
Canadian	Premdor Inc	ON		FL			5
Canadian	E.R. Probyn Ltd.	BC	WA				5
Canadian	E.R. Probyn Ltd.	BC	WA				5
Canadian	Tolko Industries LTD	BC		AB			5
Canadian	Tolko Industries LTD	BC		MB			5
Canadian	Torstar Corporation	ON	NY				5
Canadian	Uniboard Canada Inc	PQ		SK			5
American	ACME United Corporation	CT			ON		5
American	Albany International Corp	NY			PQ		5
American	Albany International Corp	NY			PQ		5
American	American Greetings Corporation	OH			ON		5
American	American Greetings Corporation	OH			ON		5
American	American Locker Group, Inc.	NY			ON		5
American	Bemis Company, Inc	MN			ON		5
American	Boise Cascade Corporation	ID			ON		5
American	Champion International Corp	CT			BC		5
American	Ekco Group Inc	NH			ON		5

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Fort James Corporation	VA			ON		5
American	Fort James Corporation	VA			ON		5
American	P.H. Glatfelter Company	PA			MB		5
American	Hunt Corporation	PA			ON		5
American	International Paper Company	NY			ON		5
American	Ivex Packaging Corporation	IL		ON			5
American	John Manville Corporation	CO			ON		5
American	Kimberly-Clark Corporation	TX	ON				5
American	Kimberly-Clark Corporation	TX	NS				5
American	Kimberly-Clark Corporation	TX	PQ				5
American	LA-Z-Boy Incorporated	MI			ON		5
American	Leggett & Platt Incorporated	Mo			ON		5
American	Leggett & Platt Incorporated	Mo			ON		5
American	Leggett & Platt Incorporated	Mo			ON		5
American	Leggett & Platt Incorporated	Mo			PQ		5
American	The Mead Corporation	OH				ON	5
American	Merril Corporation	MN	PQ				5
American	Herman Miller Inc	MI			ON		5
American	New England Business Service Inc	MA			ON		5
American	Pope & Talbot Inc	OR			BC		5
American	The Reader's Digest	NY			PQ		5
American	The Reynolds and Reynolds Company	OH			ON		5
American	Schawk, Inc.	IL	ON				5
American	Scholastic Corporation	NY			ON		5
American	Sonoco Products Company	SC			ON		5
American	Stone Container Corporation	IL			NB		5
American	Stuart Entertainment Inc.	IA	ON				5
American	Time Warner	NY			ON		5
American	Time Warner	NY			ON		5
American	The Washington Post Company	DC			NS		5
American	John Wiley & Sons Inc	NY			ON		5
American	American Seating Company	MI	ON				5
American	American Trading and Production Corporation	MD			ON		5
American	D.D. Bean & Sons Co	NH			PQ		5
American	Bose Corporation	MA			PQ		5
American	Brodart Company	PA			ON		5
American	Haworth Inc	MI			ON		5

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Hussey Corporation	ME	ON				5
American	Parsons & Whittemore Inc	NY			ON		5
American	Parsons & Whittemore Inc	NY			NB		5
American	Safeguard Business Systems Inc	PA			ON		5
American	Sealy corporation	OH			ON		5
American	Steelcase Inc	MI			ON		5
American	WWF Paper Corporation	PA	PQ				5
Canadian	Consoltex Group Inc.	PQ	NY				6
Canadian	Dominion Textile Inc.	PQ	NY				6
Canadian	Tecsyn International, Inc	ON	AB				6
Canadian	Tecsyn International, Inc	ON	AL				6
Canadian	Tecsyn International, Inc	ON	UT				6
American	Angelica Corporation	MO			ON		6
American	Bell Sports Corp	CA			ON		6
American	Jones Apparel Group Inc	PA			ON		6
American	Rawling Sporting Goods Company	MO			ON		6
American	Warnaco Inc	NY			ON		6
American	American Fast Print Limited	SC			PQ		6
American	Outdoor Technologies Group	IA	MB				6
American	Trimfit Inc	PA			ON		6
American	Woolrich Inc	PA			PQ		6
Canadian	Alcan Aliminum Limited	PQ	OH				7
Canadian	Alcan Aliminum Limited	PQ	CA				7
Canadian	Alcan Aliminum Limited	PQ	ON				7
Canadian	Alcan Aliminum Limited	PQ	AB				7
Canadian	Alcan Aliminum Limited	PQ	ON				7
Canadian	CO-STEEL Inc.	ON	NJ				7
Canadian	Dofasco, Inc.	ON	MI				7
Canadian	Dofasco, Inc.	ON				PQ	7
Canadian	Fisher Gauge Limited	ON	NY				7
Canadian	GSW Inc	ON		AR			7
Canadian	GSW Inc	ON		MO			7
Canadian	Harris Steel Group Inc.	ON	AZ				7
Canadian	Harris Steel Group Inc.	ON	PA				7
Canadian	Harris Steel Group Inc.	ON	MA				7
Canadian	Harris Steel Group Inc.	ON	CA				7
Canadian	Harris Steel Group Inc.	ON	WA				7
Canadian	The Ivaco group	PQ	ON				7

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	The Ivaco group	PQ	ON				7
Canadian	The Ivaco group	PQ	ON				7
Canadian	The Ivaco group	PQ	ON				7
Canadian	The Ivaco group	PQ	ON				7
Canadian	The Ivaco group	PQ	GA				7
Canadian	The Ivaco group	PQ	GA				7
Canadian	Jannock Limited	ON	KY				7
Canadian	Slater Industries Inc	ON	ON				7
Canadian	Slater Industries Inc	ON	PQ				7
Canadian	Slater Industries Inc	ON	IN				7
Canadian	Stelco Inc.	ON	AB				7
Canadian	Stelco Inc.	ON	PQ				7
Canadian	Stelco Inc.	ON	PQ				7
Canadian	Stelco Inc.	ON	MI				7
American	Aluminium Company of America	PA			ON		7
American	Amcast Industrial Corporation	OH			ON		7
American	Atchison Casting Corporation	KS	ON				7
American	Bairnco Corporation	FL			ON		7
American	Barnes Group Inc	CT			ON		7
American	Blount International, Inc	AL			ON		7
American	Cable Design Technologies Corporation	PA	PQ				7
American	Cable Design Technologies Corporation	PA	PQ				7
American	Crown Cork & Seal Company, Inc	PA			ON		7
American	Crown Cork & Seal Company, Inc	PA			ON		7
American	The Eastern Company	CT			ON		7
American	General Magnaplate Corporation	NJ			ON		7
American	Handy & Harman	NY			ON		7
American	Illinois Tool Works Inc	IL			ON		7
American	Illinois Tool Works Inc	IL			ON		7
American	Illinois Tool Works Inc	IL			ON		7
American	Illinois Tool Works Inc	IL			ON		7
American	Industrial Acoustics Company Inc	NY			PQ		7
American	Knape & Vogt MFG Co	MI			ON		7
American	Knape & Vogt MFG Co	MI			PQ		7
American	Masco Corporation	MI			ON		7
American	Masco Corporation	MI			BC		7
American	Masco Corporation	MI			BC		7

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Masco Corporation	MI			BC		7
American	Maxxam Inc	TX			ON		7
American	McDermot International Inc	LA			ON		7
American	National-Standard Co	MI			ON		7
American	Oneida Ltd	NY			ON		7
American	Oregon Steel Mills Inc	OR				ON	7
American	Pitt-Des Moines, Inc.	PA	BC				7
American	Reynolds Methal Company	VA			PQ		7
American	Snap-On tools Corporation	WI			ON		7
American	Standex International Corporation	NH			ON		7
American	The Timken Company	OH			ON		7
American	Worthington Industries Inc	OH			ON		7
American	Aladdin Industries Incorporated	TN			ON		7
American	Alaskan Copper Companies	WA			BC		7
American	Amsted Industries	IL			PQ		7
American	Anamet Inc	CT			ON		7
American	Axia Incorporated	IL			BC		7
American	Eclipse Inc	IL			PQ		7
American	Eclipse Inc	IL			ON		7
American	Eclipse Inc	IL			AB		7
American	Electric Furnace Co	OH			ON		7
American	Erdle Perforating Co.	NY	ON				7
American	Fike Corporation	MO			ON		7
American	Interbath, Inc.	CA	ON				7
American	Metallurg Inc	NY			ON		7
American	Nooter Corporation	MO	PQ				7
American	Peterson American Corp.	MI	ON				7
American	Powers Fastening, Inc.	NY	ON				7
American	Precision Resources Inc	CT				ON	7
American	Slant/Fin Corporation	NY			ON		7
American	Spirol International Corp	CT			ON		7
American	Stackpole LTD	MA			ON		7
American	Star Anchors & Fasteners	NY	ON				7
American	Xtek Inc	OH			ON		7
American	Zippo Manufacturing Company	PA			ON		7
Canadian	Arc International corporation	ON	NJ				8
Canadian	Aim Safety Company Inc.	BC	ON				8
Canadian	Anchor Lamina Inc.	ON	MI				8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Anchor Lamina Inc.	ON	CT				8
Canadian	Anchor Lamina Inc.	ON	ON				8
Canadian	CAE Inc.	ON	PQ				8
Canadian	CAE Inc.	ON	BC				8
Canadian	CAE Inc.	ON	PQ				8
Canadian	CAE Inc.	ON	OH				8
Canadian	CAE Inc.	ON	MN				8
Canadian	Cinram LTD.	ON	IN				8
Canadian	Cinram LTD.	ON	AL				8
Canadian	Cinram LTD.	ON	CA				8
Canadian	Cinram LTD.	ON	CA				8
Canadian	Cinram LTD.	ON	AL				8
Canadian	Cinram LTD.	ON	MA				8
Canadian	Cinram LTD.	ON	CA				8
Canadian	Electrohome Ltd	ON		AB			8
Canadian	Farmatic Research, Inc.	ON	IN				8
Canadian	Gandalf Technologies Inc.	ON	NJ				8
Canadian	Gandalf Technologies Inc.	ON	ON				8
Canadian	Jannock Limited	ON	KY				8
Canadian	Mitel Corporation	ON	PQ				8
Canadian	Mitel Corporation	ON	VA				8
Canadian	Moore Corpotration Limited	ON	IL				8
Canadian	Moore Corpotration Limited	ON	MD				8
Canadian	Moore Corpotration Limited	ON	NY				8
Canadian	Northern Telecom Limited	ON	BC				8
Canadian	Northern Telecom Limited	ON	CA				8
Canadian	Northern Telecom Limited	ON	FL				8
Canadian	Northern Telecom Limited	ON	TN				8
Canadian	Northern Telecom Limited	ON	NC				8
Canadian	Spar Aerospace Limited	ON		PQ			8
Canadian	Spar Aerospace Limited	ON		DE			8
Canadian	Spar Aerospace Limited	ON		VA			8
Canadian	TSC Shannock Corporation	BC	PQ				8
Canadian	Toromont Industries LTD	ON				AB	8
Canadian	Unican Security Systems Ltd.	PQ	NC				8
Canadian	Unican Security Systems Ltd.	PQ	NC				8
Canadian	Unican Security Systems Ltd.	PQ	NC				8
Canadian	Unican Security Systems Ltd.	PQ	IL				8
Canadian	Wajax Limited	BC	PQ				8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Wajax Limited	BC	PQ				8
Canadian	Wajax Limited	BC	PQ				8
Canadian	Wajax Limited	BC	PQ				8
Canadian	Wajax Limited	BC	PQ				8
Canadian	Wajax Limited	BC	AB				8
Canadian	Wajax Limited	BC	WA				8
Canadian	Westburne Inc	PQ		NY			8
American	AT &T Corporation	NY			NB		8
American	Active Voice Corporation	WA	ON				8
American	Acuson Corporation	CA			ON		8
American	Allergan, Inc	CA			ON		8
American	Alliedsignal, Inc	NJ			PQ		8
American	Alliedsignal, Inc	NJ			ON		8
American	Alliedsignal, Inc	NJ			BC		8
American	Alliedsignal, Inc	NJ			ON		8
American	Alliedsignal, Inc	NJ			ON		8
American	Alliedsignal, Inc	NJ			ON		8
American	Alliedsignal, Inc	NJ			ON		8
American	American Precision Industries Inc.	NY			ON		8
American	Andrew Corporation	IL			ON		8
American	The Antec Corporation	IL	ON				8
American	Apple Computer, Inc.	CA			ON		8
American	Applied Power Inc	WI			ON		8
American	Baker Hughes Incorporated	TX			AB		8
American	Barnes Group Inc	CT			ON		8
American	Becton Dickinson & Company	NJ			ON		8
American	Bink Sames Corporation	IL			ON		8
American	Biomet	IN			ON		8
American	The Black & Decker Corporation	MD			ON		8
American	Briggs & Stratton Corporation	WI			ON		8
American	C-COR Electronics, Inc	PA			ON		8
American	CBS Corporation	PA			ON		8
American	CTS Corporation	IN			ON		8
American	Cantel Industries, Inc	NJ	ON				8
American	Cascade Corporation	OR			ON		8
American	Cascade Corporation	OR			ON		8
American	Cascade Corporation	OR			ON		8
American	Catalina Marketing Corporation	FL			PQ		8
American	Caterpillar Inc	IL			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Chase Corporation	MA		MB			8
American	Checkpoint Systems Inc	NJ	ON				8
American	Cincinnati Milacron Inc	OH			ON		8
American	Circon Corporation	CA			ON		8
American	Comdisco, Inc	IL			ON		8
American	Comdisco, Inc	IL			PQ		8
American	Compaq Computer	TX			ON		8
American	Crane Co.	CT		ON			8
American	Crane Co.	CT			PQ		8
American	Daniel Industries	TX			AB		8
American	Data General Corporation	MA			ON		8
American	Deer & Company	IL			ON		8
American	Dell Computer Corporation	TX			ON		8
American	Diebold Incorporated	OH			ON		8
American	Digital Microwave Corporation	CA			ON		8
American	Dionex Corporation	CA			ON		8
American	Dover Corporation	NY			AB		8
American	Dresser Industries Inc.	TX	ON				8
American	Dresser Industries Inc.	TX		AB			8
American	EG & G Inc	MA			ON		8
American	EG & G Inc	MA			PQ		8
American	Eastman Kodak Company	NY			ON		8
American	Encore Computer Corporation	FL			PQ		8
American	Farr Company	CA			PQ		8
American	Flowserve Corporation	OH			ON		8
American	Fluke Corporation	WA			ON		8
American	GTE Corporation	CT			BC		8
American	GTE Corporation	CT			PQ		8
American	General Datacomm Industries Inc	CT			ON		8
American	General Electric Company	CT			ON		8
American	General Electric Company	CT			ON		8
American	General Electric Company	CT			ON		8
American	General Instrument Corporation	PA			ON		8
American	Genicom Corporation	VA	ON				8
American	Genicom Corporation	VA	ON				8
American	The Genlyte Group Incorporated	NJ			PQ		8
American	The Gillette Company	MA			ON		8
American	Global Industrial Technologies	TX	ON				8
American	The Gorman-Rupp Company	OH			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Graco Inc.	MN	ON				8
American	HMI Industries	OH	ON				8
American	HMI Industries	OH	ON				8
American	HMI Industries	OH		ON			8
American	Handleman Company	MI			ON		8
American	Harmon Industries Inc	MO			PQ		8
American	Harris Corporation	FL			ON		8
American	Harris Corporation	FL			PQ		8
American	Hasbro Inc	RI			PQ		8
American	Hasbro Inc	RI			ON		8
American	Hastings Manufacturing Company	MI			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			ON		8
American	Hewlett-Packard Company	CA			AB		8
American	Hewlett-Packard Company	CA			AB		8
American	Hewlett-Packard Company	CA			AB		8
American	Hewlett-Packard Company	CA			SK		8
American	Hewlett-Packard Company	CA			SK		8
American	Hewlett-Packard Company	CA			BC		8
American	Hewlett-Packard Company	CA			BC		8
American	Hewlett-Packard Company	CA			BC		8
American	Hewlett-Packard Company	CA			MB		8
American	Hewlett-Packard Company	CA			NS		8
American	Hewlett-Packard Company	CA			PQ		8
American	Hewlett-Packard Company	CA			PQ		8
American	Hewlett-Packard Company	CA			NB		8
American	Honeywell Inc	MN			ON		8
American	Hubbell Incorporated	CT			ON		8
American	ICO Inc	TX			ON		8
American	Ikon Office Solutions Inc	PA			AB		8
American	Ikon Office Solutions Inc	PA			AB		8
American	Ikon Office Solutions Inc	PA			NS		8
American	Ikon Office Solutions Inc	PA			BC		8
American	Ingersoll-Rand Company	NJ			PQ		8
American	Instron Corporation	MA			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	International Business Machines Corporation	NY	ON				8
American	International Comfort products	TN	ON				8
American	Johnson Worlwide Associate Inc	WI			ON		8
American	Juno Lighting Inc	IL			ON		8
American	K-Tel International Inc	MN			MB		8
American	Katy Industries Inc	CO			ON		8
American	Kennametal Inc	PA			ON		8
American	Koss Corporation	WI			ON		8
American	LSI Logic Corp	CA			AB		8
American	The Lamson & Sessions Co	OH			PQ		8
American	Liuski International, Inc.	GA	ON				8
American	The Lincoln Electric Company	OH			ON		8
American	Litton Industries	CA			AB		8
American	Litton Industries	CA			AB		8
American	Litton Industries	CA			ON		8
American	Litton Industries	CA			ON		8
American	Litton Industries	CA			ON		8
American	Lockheed Martin Corporation	MD			ON		8
American	Lockheed Martin Corporation	MD			ON		8
American	Lockheed Martin Corporation	MD			PQ		8
American	Loews Corporation	NY			ON		8
American	Lufkin Industries Inc	TX			AB		8
American	Lufkin Industries Inc	TX			AB		8
American	MTS Systems Corporation	MN			ON		8
American	Mark IV Industries Inc	NY			ON		8
American	Maytag Corporation	IA	ON				8
American	Medtronic Inc	MN			ON		8
American	Mentor Graphics Corporation	OR			ON		8
American	Micro Warehouse Inc	CT			ON		8
American	Micros Systems Inc	MD			BC		8
American	Millipore Corporation	MA			ON		8
American	Mine Safety Appliences Co	PA			ON		8
American	Moore Products Co	PA			ON		8
American	Motorola Inc	IL			ON		8
American	Motorola Inc	IL			BC		8
American	Movado Group Inc	NJ			ON		8
American	Nacco Industries Inc	OH			ON		8
American	National Oil-well Inc.	TX	AB				8
American	Navistar International Corporation	IL			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Nordson Corporation	OH			ON		8
American	Nortek Inc	RI			ON		8
American	Novel Inc	UT			ON		8
American	Oak Industries Inc	MA			ON		8
American	Pall Corporation	NY			ON		8
American	Parker Hannifin Corporation	OH			ON		8
American	Parker Hannifin Corporation	OH			ON		8
American	Parker Hannifin Corporation	OH			PQ		8
American	Patterson Dental Company	TX	PQ				8
American	Periphonics Corp	NY			ON		8
American	Pitney Bowes Inc	CT			ON		8
American	Pittway Corporation	IL			PQ		8
American	Plantronics Inc	CA			PQ		8
American	Polaroid Corporation	MA			ON		8
American	Performed Line Products	OH			ON		8
American	Premark International Inc	IL			ON		8
American	QMS Inc	AL			ON		8
American	Quantum Corporation	CA	ON				8
American	Raytheon Company	MA			ON		8
American	Recoton Corporation	NY			ON		8
American	Richardson Electronics LTD	IL			ON		8
American	Robbins & Myers Inc	OH			ON		8
American	Rockwell International Corporation	CA	ON				8
American	Rockwell International Corporation	CA	ON				8
American	SPS Technologies Inc	PA			ON		8
American	ST. Jude Medical Inc	MN			PQ		8
American	Scientific-Atlanta Inc	GA			ON		8
American	Sensormatic Electronics Corporation	FL			ON		8
American	Sensormatic Electronics Corporation	FL			PQ		8
American	Sentry Technology Corp	NY			ON		8
American	Sierra Semiconductor	CA	BC				8
American	A.O. Smith Corporation	WI			ON		8
American	Smith International Inc	TX			AB		8
American	Sparton Corporation	MI			ON		8
American	Specialty Equipment Companies Inc	IL			ON		8
American	Storage Technology Corporation	CO			ON		8
American	Sun Microsystems Inc	CA			ON		8
American	Sunbeam Corporation	FL			ON		8
American	Sunrise Medical Inc.	CA	ON				8
American	Symbol Technologies Inc	NY			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	TB Wood's Corporation	PA			ON		8
American	Tech Data Corporation	FL			ON		8
American	Tecumesh Products Company	MI			ON		8
American	Tektronix Inc	OR			ON		8
American	Tektronix Inc	OR			BC		8
American	Tektronix Inc	OR			PQ		8
American	Tektronix Inc	OR			PQ		8
American	Teleflex Incorporated	PA			PQ		8
American	Teleflex Incorporated	PA			BC		8
American	Tellabs Operations Inc	IL			ON		8
American	Telxon Corporation	OH			ON		8
American	Telxon Corporation	OH			AB		8
American	Telxon Corporation	OH			PQ		8
American	Texas Instruments Incorporated	TX			ON		8
American	Thermo Electron Corporation	MA			PQ		8
American	Thomas & Bets Corporation	TN			PQ		8
American	Thomas Industries Inc	KY			PQ		8
American	Trans-Lux Corporation	CT			ON		8
American	Tyco International LTD	NH			ON		8
American	Unisys Corporation	PA	ON				8
American	United Technologies Corporation	CT			ON		8
American	VWR Scientific Products	PA			ON		8
American	Valley Forge Corporation	CA	BC				8
American	Varco International Inc	CA			AB		8
American	Wang Laboratories Inc	MA			ON		8
American	Watts Industries Inc	MA			ON		8
American	Whirpool Corporation	MI			ON		8
American	Whitman Corporation	IL	ON				8
American	Whitman Corporation	IL	NS				8
American	Whitman Corporation	IL	PQ				8
American	Windmere-Durable Holdings	FL			ON		8
American	Woodhead Industries Inc	IL			ON		8
American	Xerox Corporation	CT			ON		8
American	Xilinx Inc	CA			ON		8
American	Zero Corporation	CA			BC		8
American	Accu-Sort Systems Inc	PA				PQ	8
American	Ancra International LLC	CA			ON		8
American	Bentley Nevada Corporation	NV			AB		8
American	Bissell Inc.	MI	ON				8
American	Besser Company	MI			ON		8

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
American	Brinkmann Instruments Inc	NY			ON		8
American	Bun-o-Matic Corporation	IL			ON		8
American	Carter Day International	MN			MB		8
American	Dukane Corporation	IL			ON		8
American	Elliot Company	PA			ON		8
American	Enterprises International Inc	WA			ON		8
American	Fugro Group Companies	TX	NS				8
American	Fugro Group Companies	TX	NF				8
American	Hardings, Inc.	NY	ON				8
American	Humphery Products Company	MI			ON		8
American	Lennox International Inc	TX			AB		8
American	Lennox International Inc	TX			ON		8
American	Leviton MFG Co Inc	NY			PQ		8
American	MTD Products Inc	OH			ON		8
American	Martin Sprocket & Gear Inc	TX			ON		8
American	New Hermes Incorporated	GA			ON		8
American	Panduit Corp	IL			ON		8
American	The Producto Machine Co	CT			ON		8
American	Rauland-Borg Corporation	IL	ON				8
American	Remington Products Company LLC	CT			ON		8
American	S & C Electric Company	IL			ON		8
American	Simplex Time Recorder Co	MA			ON		8
American	Smith Corona Corp	NY	ON				8
American	Thermo Electric Co Inc	NJ			ON		8
American	Thermon Manufacturing Company	TX			AB		8
American	Union Pump Company	MI			ON		8
American	Up-Right Inc	CA			ON		8
American	Victaulic Company of America	PA			ON		8
American	Jervis B. Webb Company	MI			ON		8
American	Webb, Murray & Associates	TX			ON		8
American	Whiting Corporation	IL			ON		8
Canadian	CAE Inc.	ON	MB				9
Canadian	CAE Inc.	ON	VA				9
Canadian	Davie Industries Inc.	PQ	PQ				9
Canadian	Long Manufacturing, Ltd.	ON	TX				9
Canadian	Long Manufacturing, Ltd.	ON	IN				9
Canadian	Long Manufacturing, Ltd.	ON	MI				9
Canadian	Long Manufacturing, Ltd.	ON	PA				9
Canadian	Long Manufacturing, Ltd.	ON	MI				9
Canadian	Magellan Aerospace Corporation	ON	OH				9

Nationality	Company Name	HQ	Sub	Div	Hol	Aff	Sector
Canadian	Magellan Aerospace Corporation	ON		MB			9
Canadian	Magellan Aerospace Corporation	ON		MA			9
Canadian	Magna International Inc.	ON	MI				9
Canadian	Magna International Inc.	ON	MI				9
Canadian	TCG International Inc	BC	ON				9
Canadian	TCG International Inc	BC	WA				9
American	Arvin Industries, Inc	IN			ON		9
American	The Boeing Company	WA			ON		9
American	Champion Parts Inc	IL			ON		9
American	Champion Parts Inc	IL			ON		9
American	Chrysler Corporation	MI			ON		9
American	Chrysler Corporation	MI			ON		9
American	Dana Corporation	OH			ON		9
American	Eaton Corporation	OH			ON		9
American	Eaton Corporation	OH			ON		9
American	Eaton Corporation	OH			ON		9
American	Eaton Corporation	OH			ON		9
American	Eaton Corporation	OH			ON		9
American	Fleetwood Enterprises Inc	CA			ON		9
American	Genuine Parts Company	GA			AB		9
American	Genuine Parts Company	GA			AB		9
American	Lancaster Colony Corporation	OH			ON		9
American	Lawson Products Inc	IL			ON		9
American	Portec Inc	IL			PQ		9
American	Rockwell International Corporation	CA	ON				9
American	Rockwell International Corporation	CA	ON				9
American	Rockwell International Corporation	CA	ON				9
American	Rockwell International Corporation	CA	ON				9
American	Rockwell International Corporation	CA	ON				9
American	Rockwell International Corporation	CA	ON				9
American	Simpson Industries Inc	MI			ON		9
American	Standard Motor Product Inc	NY			ON		9
American	Thor Industries, Inc.	OH	ON				9
American	Reyco Industries, Inc	MO	ON				9
American	Thomas Built Buses Inc	NC			ON		9
American	UIS Inc	NJ			ON		9
American	UIS Inc	NJ			MB		9