MEASURING THE ECONOMIC IMPACTS OF THE NORTH AMERICAN FREE TRADE AGREEMENT

by

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STATEMENT BY AUTHOR

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DEDICATION

To my mom and dad, Maria Enriqueta Cepeda Ruiz

and Ricardo H. Cavazos Galvan

To Victoria Mendoza Gutierrez

To Nidhi Thakur

To Arie Ellstein

To all my friends

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ABSTRACT

Regional trade agreements have acquired new vigor since the middle of the 80's. Coincidentally, during this period world trade has increased at a higher growth rate than gross domestic product. Currently, almost every country belongs to at least one regional preferential trading arrangement. The general purpose of this thesis is to explore the economic impact of the North American Free Trade Agreement (NAFTA) on bilateral trade flows between the United States, Mexico, and Canada. To accomplish the objective, a seemingly unrelated regression model of import demand and export supply is specified and estimated. Econometric results indicate the importing country's gross domestic product was the biggest driving force in explaining bilateral trade flows between NAFTA members. The real exchange rate between NAFTA members showed evidence of J-curve adjustment patterns. Finally, after controlling for income and real exchange rates, NAFTA, the preferential trading arrangement itself, had a statistically significant effect on members' bilateral trade flows.

I. INTRODUCTION

Most economists argue in favor of free trade. Reaching a state of nature in which trade is unimpeded is justified as efficient. International trade leads to an increase in competition, which leads, in turn, to greater innovation, and finally, enhanced innovation fuels economic growth (Frankel 2000). However, there is no unique roadmap for achieving free trade. The demonstrations against free trade in Seattle in December 1999 are compelling evidence that not everyone is convinced that free trade improves living conditions.

Using the arguments in the preceding paragraph as motivation, this thesis has three objectives: (1) to describe the evolution of the North American Free Trade Agreement (NAFTA), (2) to identify the determinants of bilateral trade flows and their evolution among the NAFTA members, and (3) to measure the economic impact of the rest of the world on bilateral trade flows between NAFTA members. To accomplish the objectives, a system of equations describing bilateral trade flows between NAFTA members is constructed and estimated as a seemingly unrelated regression model. By proceeding in this way it is possible to offer a statistical measure of confidence about the results. By understanding NAFTA's impact on trade flows and on the rest of the world policymakers can comprehend the benefits and risks of engaging in free-trade agreements, consumers have access to cheaper imports and better quality products, and producers are subjected to stronger competition and forced to innovate.

Why is free trade so important? What are the benefits of free trade? What is the best way to achieve it? Should the reduction and elimination of tariffs be orchestrated by multilateral organizations like the World Trade Organization or should countries negotiate preferential trading arrangements? Highly respected economists such as Paul Krugman and Jagdish Bhagwati stand opposite each other on the last question presented: Krugman favors bilateral negotiations while Bhagwati endorses multilateral organizations. Why is this the case? Is either of them wrong? Could they both be right, even though, they present contrasting arguments? The shifting organization of the international economy cannot be denied; regional blocs are being formed, and their effects have to be analyzed. In this process of reorganization, a country's location, national borders, and neighbors have gained fundamental importance.

Geography continues to be a key variable in the current geopolitical and economic conformation of trading blocs in the world. The North American Free Trade Agreement is an example of the economic, political, and social incentives occurring because of geographical locations. What is the impact of this free trade agreement on member countries? What is the impact on the rest of the world? What has been the evolutionary pattern of trade flows between member countries? In a Vinerian sense, would the trading arrangement be considered trade creating or trade diverting? Questions such as these are of fundamental importance in academic research, public policy research institutions, and in policymakers' minds. It is questions like these that motivate this research.

Although the new wave of regionalism is apparently here to stay, it is much different from the previous wave of the 1960's. The new wave is fueled by the United States' departure from the multilateral scheme of liberalizing trade in the General Agreement on Trade and Tariffs (GATT). Likewise in Europe, the regional economic bloc that was once called the European Economic Community (EEC) has evolved in an accelerated fashion during the decade of the 90's. This economic bloc has been the trailblazer for economic integration. Its name has been modified to the European Union (EU) to show its evolution into a deeply integrated and highly coordinated economy. The Union is cemented by a single currency, free mobility of labor among members, and joint governance and regulatory mechanisms.

As these trading blocs are formed and expanded, their members experience both increases and decreases in their trade flows. Simultaneously, non-members experience gains and losses in welfare as a consequence of the formation or expansion of preferential trading arrangements around them. Measuring whether benefits outweigh the costs of engaging in such partnerships is an empirical matter, to be determined case by case. This thesis intends to analyze the evolution, determinants, and economic impact of NAFTA on bilateral trade flows between members and non-members. It must be said, however, not everything that can be formulated theoretically is empirically measurable. Additionally, in the macroeconomic context so many events occur simultaneously that it is extremely difficult to completely separate them from each other.

Chapter 2 introduces the concepts needed to understand what are preferential trade agreements. The chapter begins by pointing out the most common and important reasons to create trade agreements. The logic compelling individuals and governments to reach such agreements will be examined. This chapter presents a few of the most well-known preferential trading arrangements highlighting their swift proliferation and expansion. Additionally, special attention is given to differences between and within preferential trading arrangements. Finally, welfare implications are explained and relevant concepts such as trade creation, trade diversion, beggar-thy-neighbor, and trade warfare are presented. Additionally, situations were free trade agreements could be welfare improving are analyzed through a possibility theorem.

Chapter 3 illustrates concepts regarding NAFTA. The discussion includes topics such as its nature, foundations and history, and member countries and their economies. The chapter presents evaluations, hypothesized gains, and losses of the trade agreement by academicians before its passage. In this evaluation, specific concerns about the controversial sectors (agriculture, automobiles, textiles and apparel, and energy) are included, as well as brief discussions about labor and foreign direct investment. The three countries' perspectives are contrasted to show particular considerations before entering negotiations. Finally, an exposition of some of NAFTA's organizations,

institutions, as well as speculations on the future evolution of the trade agreement are included.

Chapter 4 presents a literature review of gravity trade models, income and price effects, and places the modeling approach of this thesis in context within the international trade literature. The gravity model has been and still is the standard model in empirical studies of international trade to measure bilateral trade flows. Nonetheless, in the beginning its theoretical foundations were weak at best. However, as it was continually used, economists provided theoretical underpinnings to justify its implementation.

The common variables included in gravity models are both countries' gross domestic products and the distance between them. However, other variables have been included. In this thesis the real exchange rate has been taken into account. In this manner, one objective is to estimate income and price elasticities and thus compare these newly calculated values with previous research. Finally, the location of this research in the literature is given.

In Chapter 5 the theoretical justification for the model is presented along with the econometric specification. Theoretically, the model developed would be analogous to a system of demand equations for a representative consumer. The variables included represent the usual elements in demand equations such as income, own price, and prices of substitutes and complements. Empirically, trade between two countries has been caused mainly by two reasons: differences in factor endowments and some degree of monopolistic market power by firms.

Previous research has shown that the gravity equation is flexible enough to account for these two phenomena, which is another reason to utilize such framework.

Regarding the econometric specification, it is common practice to estimate international trade flow models with single-equation models. In this thesis, the estimation is done as a system of seemingly unrelated equations. This particular econometric specification is an innovative way to estimate the hybrid gravity model created. Currently, there appears to be no other paper in the literature that has used this approach. In the best case, when the disturbances across equations are contemporaneously correlated, the seemingly unrelated regression procedure is more efficient than ordinary least squares. On the other hand, in the worst case, when the disturbances are not correlated, it is equivalent to ordinary least squares.

Chapter 6 presents the empirical analysis performed on the data. It starts with a general description about the evolution of bilateral trade flows between NAFTA members. It then describes the steps performed in order to arrive at the final coefficient values. It presents and discusses the coefficient estimates for the model selected as the one that bests describes bilateral trade flows between NAFTA members.

The hybrid gravity equation model estimated performed well. It was able to account for and explain the determinants of international trade between Canada, Mexico, and the United States. The gross domestic products and the bilateral

real exchange rates produced plausible results. When income increases so does consumption for all types of goods domestic and imported. The bilateral real exchange only met expectations in two out of six cases. The other four displayed evidence of a J-Curve effect. That is, in the short-run after a real depreciation of the exchange rate the deficit in the balance of trade worsens and gradually improves in the long-run. However, given the lack of statistical significance for this variable in the United States-Canada equations the presence of a J-Curve should be looked upon carefully in these two cases.

The regression analysis showed that NAFTA has had heterogeneous effects in each country. The biggest and most noticeable took place in the smallest economy, matching expectations once more. The effects of NAFTA for Mexico are in the magnitude of approximately 11.5% when looking at the equation describing U.S. imports from Mexico and 21.9% in the equation describing the U.S. exports to Mexico. The estimated gains to Canada and the United States are smaller than the ones just presented. These gains for Canada and the United States are 11.2% and 3.9% approximately when talking about U.S. imports from Canada and U.S. exports to Canada, respectively.

Despite all these gains for NAFTA members, some countries in the rest of the world probably saw their welfare decrease due to the formation of NAFTA. This question is probed in the model with the inclusion of the importing country's real bilateral exchange rate with its biggest non-NAFTA trading partners. This is the first study that utilizes this approach thus making the inclusion of these

variables highly innovative. The objective was to abstain from using indicator variables to measure trade creation and trade diversion effects. In addition, these variables provide a better statistic to understand the welfare effects. Even though, Winters and Chang (2000) were the first to try and employ the terms of trade their approach is different from this one.

Following with the chronology the estimated models were subjected to hypothesis tests in order to ascertain the robustness of the calculated coefficient values. In the end —after all the hypothesis tests— the second version of the model, which incorporated the rest of the world and some individual real bilateral exchange rates, was chosen as the one that could best identify the determinants, describe the evolution, and portray the effects of bilateral trade flows between NAFTA members on themselves and the rest of the world.

Finally, Chapter 7 presents the conclusions and areas of further research. Two conclusions are striking: (1) a considerable portion of international trade is driven by income, in this case represented by gross domestic product and (2) the effects of the real exchange rates accumulate slowly over time. To appropriately capture them it is necessary to employ a dynamic econometric specification.

With regard to NAFTA, the free trade agreement had mixed effects. Its biggest impacts were found in the smallest economy, Mexico. This result would point out that bilateral trade liberalization can definitely benefit the smallest members of preferential trading arrangements, perhaps more noticeably than the bigger members.

With respect to the rest of the world, the interpretation is not completely straightforward. It is easy to explain a negative sign on the corresponding bilateral real exchange rate with the biggest non-NAFTA trading partners: imports coming into or exports going from a NAFTA member would be trade competing and would tend to reduce NAFTA bilateral trade flows. However, it is more complicated to explain a positive sign. The interpretation would be that imports and exports would increase NAFTA trade flows. In heuristic terms, imports from non-NAFTA countries apparently complement bilateral trade flows among NAFTA members.

Finally, further research should be directed towards testing the endogeneity and simultaneity problem between gross domestic product and trade flows and real exchange rate and trade flows. Hausman tests could be used to test these propositions. Additionally, auto-regressive tests should be performed to understand fully the form the error disturbances are taking. After all this research, it is not possible to answer a simple yet highly complex question: are we closer to free trade or not? The tentative answer is maybe. As new trading blocs are formed and expanded intra-bloc trade becomes freer. On the other hand, what happens to inter-bloc trade? This latter question is not answered unequivocally using the methods of this thesis.

2. PREFERENTIAL TRADE AGREEMENTS

2.1 What Are Preferential Trade Agreements?

2.1.1 Definition and Reasons To Create Them

In trade theory, global welfare is maximized when all countries exchange goods and services freely. So far, worldwide free trade has not been attained nor is it close in hand. The multilateral efforts within the General Agreement on Trade and Tariffs (*GATT*) now known as the World Trade Organization (*WTO*) have always encountered political obstacles and have not been successful in eliminating barriers to trade. As an alternative, governments contemplated regionalism. Due to the failure of the Uruguay Round, countries eagerly embraced the idea of forming regional economic blocs (Baldwin 1993). As a result, free-trade agreements have again appeared and proliferated providing a second-best approach to achieving free trade.

A free-trade agreement is a preferential arrangement among countries in which tariff rates among them are reduced to zero, although different members of the arrangement can and may set external tariffs for non-members at different rates (Krueger 1997). Article XXIV of *GATT's* regulations allows countries to enter into preferential trading arrangements provided that three requirements are met: (1) preference has to be 100%; (2) preferences cover substantially all aspects of trade; and (3) the average tariff barrier against third countries is no higher after the union than before.

The motivations countries have to create, join, and expand preferential trade areas vary. The common incentives consist of the gains from trade which allow a country to develop, to strengthen domestic policy reform, increments in multilateral bargaining power, access guarantees, strategic linkages, and strategic multilateral and regional interaction with other countries (Whalley 1998). Usually several of these reasons are present when attempts to create a preferential trading arrangement are made. Some of the items presented above are more closely related to politics than to economics. Politics adds a strategic dimension to the countries' international relations.

2.1.2 Well-known Trade Agreements

Currently different types of preferential trade agreements are operating and others are being negotiated. The differences between these trading arrangements are not essential at this point. However, attention will be devoted to this topic later in this chapter, especially to differences in the degree of economic integration. The differences will have a considerable impact on the welfare implications of each type of preferential trade agreement.

At present, the most visible and important preferential trading arrangement is the European Union (EU), but is closely followed by the North American Free Trade Agreement (NAFTA). The European countries' success in uniting various dissimilar economies into a single, large economy and coordinating agricultural, industrial, labor and migration, as well as monetary, and social policies is worthy

of praise. Other preferential trading arrangements have emulated the EU in order to achieve a similar degree of economic integration (Table 2.1).

Table 2.1 includes one preferential trade agreement from six different regions in the world. Other agreements are not presented. However, Schott (1989), Lawrence (1996), Bhagwati and Panagariya (1996b), and Whalley (1998) have comprehensive lists of preferential trade agreements. An interesting feature is the possibility of overlapping free-trade agreements. This situation is not feasible when dealing with customs unions, common markets, or single markets because members of such trading arrangements cannot unilaterally become members of an outside free-trade agreement (Krueger 1997).

With overlapping agreements, a particular country can be included as a member in multiple free trade agreements. This is the case for the NAFTA countries with their membership in the Forum for Asia Pacific Economic Cooperation (APEC). Likewise, individually the United States and Mexico have other free trade agreements with Israel and the EU, respectively. Once again, this is not possible with any other type of preferential trade agreement.

The situation of overlapping free trade agreements creates the “Hub-and-Spoke” model. The Hub-and-Spoke model arises whenever a country or set of countries (the hub) has free trade agreements with two other countries or two sets of countries individually and separately (the spokes). Additionally, these two “spokes” do not have a free trade agreement between them. This trading

Table 2.1

Selected Preferential Trading Arrangements			
Name of Preferential Trade Agreement	**Member Countries**	**Date Established**	**Broad Objectives**
Africa			
Central African Customs and Economic Union (UDEAC)	Cameroon, Central African Republic, Chad, the Congo, Equatorial Guinea, Gabon	Signed 1964 Effective 1966	Common market
Asia			
Forum for Asia-Pacific Economic Cooperation (APEC)	Australia, Brunei, Canada, Chile, China, Hong Kong, Indonesia, Japan, Malaysia, Mexico, New Zealand, Papua New Guinea, Philippines, Singapore, South Korea, Taiwan, Thailand, United States	Established 1989 Bogor Declaration 1994	Draft free trade agreement that aims for "open regionalism" and free trade and investment by 2010
Europe			
European Union (EU)	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom	Treaty of Rome 1957 Single European Act establishing Internal Market 1992 Maastricht Treaty 1992	Customs Union: economic and monetary union
North America			
North American Free Trade Agreement (NAFTA)	Canada, Mexico, United States	Signed 1992 Effective 1994	Free Trade Area
South America			
Southern Cone Common Market (MERCOSUR)	Argentina, Brazil, Paraguay, Uruguay	Signed 1991 Treaty of Asuncion	Common Market
Middle East			
Gulf Cooperation Council (GCC)	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates	Established 1981	Common Market

Source: Lawrence (1996)

arrangement creates inefficiencies and disadvantages for the two “spokes.” First, exports from the hub have preferential access into the spokes. Second, locations in the hub would be in an advantageous position to attract foreign direct investment. Finally, some trade between the spokes would have been redirected through the hub to meet rules of origin and qualify for duty free passage (Wonnacott 1996a and Wonnacott 1996b).

2.2 Differences between Preferential Trading Arrangements

There are different types of preferential trading arrangements. The differences between preferential trading arrangements are relevant because they are fundamental determinants of the degree of economic integration. Additionally, they influence the way in which particular protection structures and coordination mechanisms are designed. The different types of preferential trade agreements and their descriptions are presented in Table 2.2.

Three major differences stand out between free-trade agreements and other preferential trading arrangements. The first substantial difference is the degree of economic integration. The ranking of these arrangements, in increasing order of economic integration, is free trade agreement, customs union, common market, and the single market. Consequently, the customs union would be an improvement in economic integration over the free-trade agreement and the common market over the customs union.

Table 2.2

Classification of Preferential Trading Arrangements	
Types of Preferential Trading Arrangement	**Description**
Free Trade Agreement	Tariff rates among members are zero. External tariffs may be at different rates for different members of the agreement
Customs Union	Zero duty between members on imports of goods and services, and a common external tariff.
Common Market	Movement of goods, services, and factors of production is free. Usually countries enter into a Customs Union and permit free mobility of factors of production among members.
Single Market	All producers and consumers within arrangements are governed by the same rules.

Source: Krueger (1997).

The second big difference is the presence of Rules of Origin (ROO) in free-trade agreements, exclusively. ROOs become a necessary device to avoid having the benefits of duty-free status leak out of the arrangement. This leak occurs when imports coming in through the country with the lowest tariff are then transshipped to other members. This phenomenon is commonly known as trade deflection (Krueger 1997). ROOs create perverse incentives for producers to lobby the government for protection and to switch from cheaper to more expensive suppliers in order to have particular products qualify for duty-free status.

Third, the expansion mechanism of the free trade agreement becomes convoluted and cumbersome. With every new entrant new ROOs have to be negotiated. This is a consequence of different comparative advantages by industry and different factor endowments. In turn, lobbyists and rent seekers in all countries have opportunities from which they can profit. If a free trade agreement is supposed to evolve into a more economically integrated entity, such as a

customs union, the first step is the homogenization of the external tariff. This evolution entails more coordination and cooperation mechanisms between countries. For a more detailed analysis of the differences between free trade agreements and customs unions see Wonnacott 1996a and Krueger 1997.

Adding to the complexity of free trade agreements, there exist several differences between them. These differences arise due to geography and transportation costs. This intra-classification specifically delineates the geographic location of the countries associated in a free trade agreement relative to their partners. Proximity issues between nations are important because, according to Krugman (1991b), they create “natural” or “unnatural” trading blocs. Additionally, the closer two countries are to each other, the lower transportation costs tend to be.

Returning to Krugman (1991b) and Summers (1991), a “natural” trading bloc would be composed of countries trading among themselves even without the existence of a preferential trading arrangement. This occurrence is generally among neighboring countries. Typically, they are each other’s main markets and thus have a high volume of trade and low transport costs. By contrast, “unnatural” trading blocs would be those formed among non-neighboring countries that do not have a high initial volume of trade and where transport costs between them are considerable. These arguments appear to be logical, but Bhagwati and Panagariya (1996a, 1996b) provide counter arguments and

examples where these definitions do not apply. In these authors' minds geography does not influence a country's trading partners.

Finally, there might be other non-economic ties binding countries together into a trading relationship. For instance, former colonies could still have a close political relationship with their colonial governments. Another possibility or explanation could be that sharing the same language and familiarity with rules and regulations, as well as with institutions, organizations, and firms provides a certain degree of confidence and trust between trading partners. Perhaps some other historic event such as a war created a particular bond among any number of countries (Eichengreen and Irwin 1998).

It should be mentioned that the term "natural trading blocs" is quite ambiguous. Given the examples above, there are many reasons why there might be an initial volume of trade between countries that are not neighbors. However, for purposes of this thesis, natural trading blocs will be those that are formed between neighboring countries with low transport costs in the shipment of goods. This phenomenon mostly takes place between countries located in the same continent. The term unnatural trading blocs will be left to inter-continental trading arrangements with high transport costs.

2.3 Welfare Implications of Preferential Trading Arrangements

Is a country entering into a preferential trading arrangement better or worse off? What kind of effects will this rearrangement in the world's commercial geography have on this country's and the world's welfare? Apparently, it would

seem that any rearrangement of the commercial geography that lowers trading barriers and leads the world closer to free trade would always increase net welfare. Jacob Viner (1950) was the first to point out that this was not necessarily true. The liberalization of trade between two countries could decrease overall welfare in the world even though welfare between these two countries would increase.

Essentially, estimating welfare effects in the presence of a preferential trading arrangement turns into a completely empirical matter (Krueger 1999). The reason is that there are so many countries in the world with differences in factor endowments, in comparative advantages, and in types of preferred industries that a conclusion from one particular case might not be appropriate in another.

There are several distinct ways, theoretical as well as applied, to measure welfare outcomes. The major dividing line is whether the analysis is static or dynamic. In a static framework, there are three important issues to be addressed: trade creation and trade diversion, beggar-thy-neighbor effects, and trade warfare. In the dynamic mode, the question to be evaluated consists of establishing whether the specific preferential trade agreement is a stumbling or a building bloc for more trade liberalization among countries. All these concepts are central for determining welfare effects of preferential trading arrangements on the world and the member countries.

2.3.1 Static Analysis

2.3.1.1 Trade Creation and Trade Diversion

When countries create or expand an existing preferential trading arrangement, economists talk about trade-creation or trade-diversion effects. When trade-creation occurs, a member country's domestic production of an item falls and is displaced by lower-cost products from a partner country. This is so because importing the good becomes cheaper than producing it at home. Conversely, trade diversion takes place when a member country replaces tariff-ridden imports from the rest of the world, the low-cost supplier, with imports from the higher cost partner country (Krueger 1997). If trade-diversion effects outweigh trade-creation then the world as a whole is worse off due to the creation of that preferential trade agreement. The important determinant here is to identify the pre-arrangement supplier (de Melo and Panagariya 1993).

Summers (1991) and Krugman (1991b) have argued that when preferential trading arrangements are formed between "natural" trading partners trade creation will outweigh trade diversion. However, Bhagwati and Panagariya (1996a, 1996b) dispute this conclusion. They explain that the foregone or redistributed tariff revenues among member countries should also be considered in the welfare calculations. If this redistribution effect is not accounted for it will bias the analysis and produce incorrect conclusions.

2.3.1.2 Beggar-thy-neighbor Effects

What exactly happens to the terms of trade among countries when a preferential trading arrangement is formalized? Once again, this is a matter that has to be analyzed on a case-by-case basis. Whenever a preferential trading arrangement comes into effect, distortions in relative prices among member countries are eliminated as a consequence of the elimination of tariffs. On the other hand, distortions in relative prices between members and non-members are created or maintained. This structural change will increase trade between members due to substitution from products originally acquired from the rest of the world and now purchased from a partner country. A logical occurrence then, is for demand of non-partner products to fall. In order for markets to be in equilibrium, the price of these third party products will have to decrease as well, creating a positive terms-of-trade effect for the member countries and reducing welfare for non-members (Fernandez 1997).

2.3.1.3 Trade Warfare

Trading blocs have incentives to modify the terms of trade and increase their welfare at the expense of the rest of the world. The logic of this argument is to raise tariffs in order to exploit the trading blocs' market power. However, the rest of the world will most likely retaliate against this bloc. If a trading bloc beggars another trading bloc, the former might initiate a trade war that leaves everyone worse off. The terms of trade of all trading blocs cannot improve simultaneously; some of them must deteriorate. While this deterioration or

improvement of the terms of trade is taking place, trade diversion will gradually reduce world efficiency and consequently world welfare.

2.3.2 Dynamic Analysis

2.3.2.1 Stumbling Blocs or Building Blocs

In this sub-section the objective is not to determine whether the immediate impact of a preferential trading arrangement is “good” or “bad.” Undoubtedly, this is part of the analysis, but not the whole story. The analysis must be complemented with a dynamic perspective. It is important to establish whether this process of trading bloc formation and trade liberalization will eventually lead to worldwide free trade or not. If these preferential trading arrangements are building blocs, they will accelerate the evolution to worldwide free trade. If, on the other hand, they are stumbling blocs they will retard and impede worldwide free trade.

It could be possible that membership in trading blocs increases until only a few blocs are left. Summers (1991) argues that achieving free trade will be easier in such cases because the bargaining and negotiating process simplifies with fewer interested parties. On the other hand, if the number of regional trading blocs increases but these blocs can closely replicate the world’s factor endowments, members will have no need to trade with countries outside the bloc. This outcome would be free trade inside the bloc and no trade outside the bloc (Leamer 1994). However, as factor endowments change and member

countries more closely resemble each other in relative factor intensities, inter-bloc trade could resume.

Other contributions by Krugman (1991a), and Spilimbergo and Stein (1996) reach contradicting conclusions. Krugman (1991a) argues that each time the number of trading blocs is reduced world welfare will be also reduced until there is one single bloc, meaning free trade. At this point welfare automatically increases. On the other hand, Spilimbergo and Stein (1996) cite Deardorff and Stern's model in which welfare monotonically increases as the world consolidates into fewer trading blocs.

There is no clear and obvious answer to this debate. The only theoretical tool that can be applied in this case is the Kemp-Wan theorem, which states that it is possible to form a customs union and have it be welfare enhancing for all countries, members and non-members, by choosing the appropriate tariff vector and set of lump-sum payments (Kemp and Wan 1976). However, this is only a possibility theorem (Bhagwati and Panagariya 1996a) and there are potential drawbacks. The theorem cannot be applied empirically because it never states what will happen if the trading agreement expands and most importantly that it will expand in a Kemp-Wan welfare enhancing manner (Bhagwati 1993). Other studies by Grossman and Helpman (1995), Levy (1997), and McLaren (2002) provide political-economy arguments for the expansion of preferential trade arrangements and the welfare outcomes associated with them.

2.4 Summary

The economics surrounding preferential trading arrangements are more complicated than meets the eye. First, the rearrangement of the international economy into economic blocs does not always imply welfare enhancing movements towards worldwide free trade. In practice, the formation or expansion of preferential trading arrangements simultaneously creates and eliminates distortions in the relative prices non-members and members face. Measuring the overall effect of free-trade agreements has to be done on a case-by-case basis, because different preferential trade arrangements have differing impacts as a consequence of their particular characteristics. Both the static and dynamic issues raised in this chapter should be considered in order to produce adequate welfare conclusions for both the countries involved in the formation of any kind of preferential trading arrangement and the rest of the world. This wave of regionalism has shown new vigor and will probably increase in magnitude. These are signs that regionalism is here to stay. It is in all countries' best interest to pay careful attention and analyze this economic phenomenon.

3. THE NORTH AMERICAN FREE TRADE AGREEMENT

3.1 NAFTA

3.1.1 What Is It?

The North American Free Trade Agreement, or NAFTA, created the first partnership between two highly developed countries —the United States and Canada— and one middle-income nation, Mexico. The objective was to eliminate obstacles to the flow of goods, services, and investment, protect intellectual property rights, and establish a fair and expeditious dispute settlement mechanism (Ready 1993). This institutional bond culminated years of intense negotiations by all three countries. As a consequence, beginning January 1, 1994 the members obtained preferential access to each other's market. On that date, NAFTA united approximately 372 million people with a joint gross national product of US$ 7 trillion (Wise 1998).

NAFTA established the terms and schedules for the member governments to gradually reduce tariffs on goods, investment, and services flowing between the three countries. The tariffs for approximately half of all the import categories were eliminated instantly and most of the remaining tariffs would disappear within a five-year period. For a few sensitive industries the parties agreed on a fifteen-year time span for gradual reduction of tariffs. NAFTA covers six areas of economic activity (see Table 3.1).

Table 3.1

NAFTA's Six Areas	
Area	**Items in Each Area**
Market Access	tariffs and nontariff barriers, rules of origin, government procurement, automobiles, and other industrial sectors
Regulations	safeguards, subsidies, trade remedies, and standards
Services	principles of services, financial services, insurance, land transportation, telecommunications, and others services
Investment	
Intellectual Property	
Dispute Settlement	

Source: Ready (1993).

The areas in the table include sensitive issues, which prolonged negotiations more than expected. Even though NAFTA encompassed numerous goods, a select few were not included. For example, oil production and refining, was a problematic area given that the Mexican Constitution prohibits foreign investment in large parts of the petroleum industry. Additionally, free labor mobility among members was excluded from the negotiating table (Hufbauer and Schott 1992). Agriculture was another highly susceptible sector in which the reduction in tariffs will take fifteen years. Some experts argue (Wise 1998) NAFTA surpasses previous trade agreements in the treatment of trade in services and intellectual property rights as well as in the establishment of comprehensive procedures for settling disputes.

3.1.2 History and Foundations

The idea of creating a North American trilateral economic partnership came to light for the first time in Ronald Reagan's 1979-80 presidential campaign as part of his foreign policy platform. At that time the other countries involved,

Canada and Mexico, had no interest in such an accord. Both countries were fearful of undue influence by the United States. In the Mexican case, the development model of import substitution did not favor free trade. Several events created an ideal climate for the United States to embrace regionalism. For instance, the European Union (EU) succeeded in creating a single unified market, U.S. products had been losing competitiveness in foreign markets, and the Uruguay Round negotiations had been progressing slowly.

Canada was quick to change its mind. During the 1983-84 period Canada's declining productivity and trade position could no longer be ignored. These two issues forced the country to start looking for a formal agreement that would guarantee access to the U.S. markets. Although it was beneficial, the Canada-U.S. Free Trade Agreement (*CUSTA*) would have limited economic impacts in both countries given the similarities in their economies: in factor endowments, and levels of development, already low tariffs on Canada-U.S. trade, and the exclusion of key sectors. During 1987-88, *CUSTA* negotiations concluded positively and on January 1, 1989 the agreement came into effect. The accord was viewed as an evolutionary phenomenon because of the already large flow of goods between these countries.

In Mexico, a few more years had to pass until policy makers realized the need to modify its development strategy of import substitution. Mexico had a long history of protectionist measures in the form of import tariffs. It wasn't until the plummeting of oil prices followed by a balance-of-payments crisis and external

pressure by international financial organizations that the State became unable to fulfill its role as the engine of growth for the economy. A sharp change in economic policy came about in 1982.[1]

By the end of 1985 Mexican authorities initiated a profound process of deregulation and trade liberalization (Aspe 1993). The measures taken included the reduction in the levels and dispersion of tariffs, and nearly total elimination of quantitative trade restrictions. The chronology of the process is presented in Figure 3.1.

3.1.3 Members and Description Of The Economies

The three NAFTA signatories are the United States, Canada, and Mexico. Their combined population in 2000 was of 410.3 million (World Bank 2002). The United States accounts for 68.6%, Mexico for 23.8%, and Canada only for 7.4% of the 410 million people. Clearly the majority of consumers are located in the United States. Similarly, gross domestic product is not distributed evenly across the three countries. Table 3.2 provides an idea of the countries relative sizes and differences in population and GDP.

[1] The only area in the Mexican economy that was completely export oriented before the opening of the economy was the maquiladora program. This program started in 1965 (Cooney 2001). U.S. manufactured parts were and still are shipped into Mexico for assembly. Then the assembled parts are shipped back for distribution. These imported parts are placed “in bond” to avoid taxes because they will be utilized in exportable goods (Ready 1993).

Figure 3.1

Mexican Process of Trade Liberalization

1985	Mexican government starts unilateral trade liberalization program • Elimination of import permits on 80% of tariff items subject to quantitative restrictions • Gradual phase out of remaining quotas. Mexico and the United States sign bilateral agreement on subsidies and countervailing duties
November 1985	Mexico starts negotiations to be admitted into the General Agreement on Tariffs and Trade (GATT)
July 1986	Mexico becomes member of the GATT
1987	Mexico and the United States sign a framework agreement to set up principles and procedures to resolve controversies on trade and investment
Dec. 87- Dec 88	Maximum tariff brought down from 100% to 20% Items subject to trade restrictions went from 1200 to 325
October 1989	Mexico and the United States sign new framework agreement to start conversations to facilitate trade and investment
March 1990	Trade and Investment relations with Canada are ruled by the Trade Agreement of 1946, the Agreement on Industry and Energy Cooperation, and the Memorandum of Understanding on Trade Related Issues of 1984
June 1990	Mexico and the United States start working on a Free Trade Agreement
End of 1991	Less than 10% of total import value subject to import licensing of imports
December 1992	Signing of the North American Free Trade Agreement (NAFTA) by Canada, Mexico, and the United States
1993	Inclusion of the side agreements in NAFTA by the Clinton administration
January 1, 1994	NAFTA becomes effective

Source: Aspe, 1993

Several aspects of Table 3.2 merit comment. The differences between the United States, Canada, and Mexico are huge: the Canadian and Mexican economies are about 10 and 5%, respectively, of the size of the United States in 2000. The Canadian economy is twice that of Mexico with just one third of Mexico's population. Canada and the United States, in comparison to Mexico, are at very different stages in their economic development (Bosworth, Lawrence, and Lustig 1992). As such, wages and technical efficiency are similar in Canada and the United States, but not in Mexico. There are also marked differences in resource endowments and environmental, health, safety, and labor laws and standards between the United States and Canada *vis-à-vis* Mexico (Brown 1991).

Table 3.2

Descriptive Statistics for NAFTA Countries

Country	Population millions		Average Annual Growth Rate 1994-2000 (%)	GDP (82-84 US$ billions)		Average Annual Growth Rate 1994-2000 (%)
	1994	2000		1994	2000	
Canada	29.0	30.7	0.82	521.3	613.1	2.52
Mexico	89.6	98.0	1.35	284.6	333.6	2.46
United States	260.6	281.6	1.15	4758.9	5733.2	2.92
Total	379.2	410.3	1.17	5564.7	6679.8	2.86

Sources: Bureau of Economic Analysis (2001); Instituto Nacional de Estadistica Geografia e Informatica (2001); Statistics Canada (2001); International Monetary Fund, International Financial Statistics, various issues; World Bank (2001).

All three countries exhibit high rates of GDP growth. In particular, the Mexican average growth rate (2.46%) is perhaps surprising. At the end of 1994, Mexico suffered a severe balance-of-payments crisis, causing the economy to plummet. During 1995 Mexican GDP experienced a negative growth rate of 6.2%

in real terms. However, by 1996 GDP already had grown 5% due to the dynamic growth and activity of the external sector. Mexican maquiladora and manufacturing exports to the United States increased due to depreciated nominal and real exchange rates.

Even though the flow of goods North and South across the Mexico-U.S. border has increased at a high rate since the Mexican Peso crisis at the end of 1994, strong trade relations had already been established since Mexico's trade liberalization in 1985. This relationship could be characterized as one of relatively free trade. However, there was room for improvement on both sides. According to Lustig (2001) many Mexican products faced a higher U.S. tariff than the 20% maximum tariff prevailing in Mexico. Additionally, before NAFTA about 20% of exports into Mexico were still subject to licensing. On the other hand, U.S. imports of textiles, steel, and agricultural products from Mexico were subject to restrictions.

Finally, the growth in U.S. per capita GDP during the 1990's enabled U.S. consumers to purchase at unprecedented rates and stimulated U.S.-Mexico trade. The average annual growth rate of real per capita GDP in the United States was 2.6% from 1991 to 1999. Likewise, real per capita personal disposable income's average annual growth rate was 1.8% during the same period (Table 3.3).

Table 3.3

U.S. per capita Descriptive Series

	Disposable Personal Income per capita (Dollars)		Gross Domestic Product per capita (Dollars)	
year	Current Dollars	Chained 1996 Dollars	Current Dollars	Chained 1996 Dollars
1991	17,710	19,919	23,691	26,423
1992	18,616	20,318	24,741	26,938
1993	19,121	20,384	25,735	27,363
1994	19,820	20,709	27,068	28,194
1995	20,613	21,055	28,131	28,676
1996	21,385	21,385	29,428	29,428
1997	22,262	21,838	31,029	30,436
1998	23,359	22,672	32,489	31,474
1999	24,314	23,191	34,063	32,512

Source: Economic Report of the President 2001. Table B-31.

The evolution of trade flows with NAFTA has been notable.[2] For example, Mexican exports to the United States have grown from $43 billion in 1993 to $109 billion in 1999. Consequently, the number of Mexican export-oriented firms has increased considerably to over 30,000 in 1999. Mexico's percentage in U.S. imports has increased from 6.9% in 1993 to 10.7% in 1999. Likewise, Mexican imports from the United States amounted to $105 billion. Currently, Mexico is the second largest trading partner for the United States only behind Canada.

Even before NAFTA, Mexican exports into Canada were relatively free: around 82% entered as duty free in 1989 under the most-favored-nation principle of the Canadian General Preference treaty and other arrangements. Nonetheless, duties prevailed in labor-intensive sectors such as textiles and

clothing (Lustig 2001). Currently, Mexico-Canada trade has increased considerably in percentage terms due to NAFTA. Aggregating imports and exports, trade has increased 129% from 1993 to 1999 totaling $9.3 billion. Canada has become the second most important market for Mexican products. Likewise for Canadian firms Mexico has become the third most important market.

All these elements made NAFTA an enticing and unique opportunity for the members to increase their incomes, reorient their economies toward export markets, and take advantage of each other's abundant resources. NAFTA institutionalized these economic policy changes conferring a degree of permanence to them by providing judicial security for international transactions and preventing future Mexican governments from elevating tariff barriers and isolating the Mexican economy. Likewise, NAFTA protects Canada and Mexico from capricious United States trade policy (Bosworth, Lawrence, and Lustig 1992).

3.2 Evaluations of NAFTA before Its Passage

Ever since rumors of the possibility of a North American Free Trade accord started circulating, academics, think tanks, and private parties in the three countries started evaluating the potential impact of such a trade agreement. The majority of these pre-NAFTA studies were conducted using computable general

[2] The explanation and figures presented in this paragraph and in the subsequent one come from Lustig (2001).

equilibrium models (*CGE*) which modeled numerically final consumer markets, industrial sectors, and resource allocation.

Trade liberalization has certain theoretical benefits. It is important to highlight these benefits before discussing the results of *CGE* models. First, decreases in final consumer prices occur due to competition among domestically produced goods and imports. Second, distortions in relative prices caused by tariffs and subsidies are reduced. Third, specialization will induce a more efficient resource allocation among industries. Fourth, transaction costs are reduced by the elimination of uncertainty in government policies. Finally, political ties among member countries will become tighter and governments will have to cooperate among themselves on other common issues.

Turning to the pre-NAFTA *CGE* models, their results depended heavily on the assumptions the modelers incorporated.[3] For example there were questions about how many markets to include, expected growth rates in respective countries' GDPs, whether key sectors were accounted for, how fast tariff and non-tariff barriers would be reduced, what kind of technology firms possessed, what kind of preferences consumers had, and some aggregation biases. Differing assumptions about these characteristics of the CGE models made the welfare evaluations of NAFTA vary considerably.

Nonetheless, evaluations of NAFTA using *CGE* models suggested certain numerical gains from creating a Free Trade Area (*FTA*) by lowering tariffs. It is

[3] For theoretical justifications of *CGE* models see Brown (1992).

likely that *CGE* models underestimated the gains and benefits that the members derived from NAFTA. *CGE* models typically do not incorporate (1) the real exchange rate and its dynamics, (2) accurate figures on the flow of foreign direct investment, nor (3) the effects of NAFTA as a commitment device (Lawrence 1992; Tornell and Esquivel 1995). Despite these shortcomings, the models provided useful results.

Brown (1992) classifies the *CGE* models applied to NAFTA into three generations. The first generation models were static in nature and with constant returns-to-scale technology. The second generation incorporated increasing returns to scale and imperfect competition. The last generation were dynamic models that included intertemporal utility, profit maximization, and attitudes towards risk and uncertainty. The welfare gains projected vary with the type of model, technology, and assumptions. Other studies done by Brown (1991), Klein and Salvatore (1995), and Levy and Van Wijnbergen (1995) are summarized in Table 3.4.

From the predicted results it seems that Mexico would benefit the most from establishing a *FTA,* the United States would capture the smallest gains, and Canada's outcome would lie in between. However, increases in real GDP do not imply the absence of job displacement or adjustment costs. To detect these, a sector analysis follows.

Table 3.4

Predicted Impact of NAFTA Before its Passage on Member Countries' GDPs				
		Predicted changes in GDP due to the formation of a free trade area (%)		
Author	**Description of procedure/Characteristics of study**	**Mexico**	**United States**	**Canada**
Brown (1991)	Five regions. First three are NAFTA countries. Fourth includes 31 other major trading countries. Fifth region aggregates whatever countries are left. Data of 29 product categories from 1989.	0-5	0.1-0.3	0-0.7
Klein and Salvatore (1995)	Estimate long-run simulations from 1994 to 2003 with Wharton Econometric Forecasting Association's econometric model of the Mexican Economy	3.8-5.2	0.64	
Levy and Van Wijnbergen (1995)	Dynamic model applied to Mexican agricultural sector. Two scenarios: immediate liberalization and gradual liberalization over five years.	42.4 * 40.1 **		

* Immediate liberalization (Billions of dollars net discounted value)

** Gradual liberalization (Billions of dollars net discounted value)

3.2.1 Sector-specific Evaluations

This brief review of specific sectors will cover the more controversial areas in NAFTA. More detailed reviews are found in Hufbauer and Schott (1992), Bosworth, Lawrence, and Lustig (1992), and Andere and Kessel (1992), among others. The sectors covered are agriculture, automobiles, textiles and apparel, and energy. Additionally, two other sections will include the developments in labor and foreign direct investment inflows into Mexico.

3.2.1.1 Agriculture

Agriculture was one of many sensitive sectors in NAFTA negotiations. When negotiations were taking place, agriculture was relatively larger in Mexico than in the United States. Agriculture accounted for 7% of GDP and 24% of employment in Mexico whereas it only accounted for 1.6% of GDP and 2% of employment in the United States (Burfisher, Robinson, and Thierfelder 2001). Agricultural trade is still dominated by U.S. exports of grains, oilseeds, and livestock products to Mexico and horticultural products —tomatoes, citrus, and tropical fruits— imported by the United States. In the early stages of the negotiations, Mexico-Canada trade was small, with grains exported to Mexico and beer imported into Canada. The United States and Canada were two of the world's largest and most efficient grain exporters, whereas Mexico was a competitive exporter of horticultural products (Hufbauer and Schott 1992).

Before NAFTA, the United States had an average tariff on Mexican agricultural exports of 4% in 1990. Additionally, there were non-tariff barriers,

such as, quantitative restraints on meat and dairy products, sugar and products containing sugar, peanuts, and cotton. Lastly, imports of fruits and vegetables were regulated through marketing orders as well as health and sanitary standards. In Mexico, there were licensing requirements on imports of grains and oilseeds, and health and sanitary requirements on live animals and animal products.

According to Josling (1992), the winners from a *FTA* would include U.S. producers of grains, particularly corn, and of livestock products; and fruit and vegetable producers in northern Mexico. On the other hand, the losers would be Mexican grain farmers and U.S. fruit and vegetable producers. Maize is Mexico's principle staple crop and main rural employer. Corn occupies the largest acreage of any crop, it is the most costly in terms of fiscal subsidies, and it is the most protected (Levy and Van Wijnbergen 1995).[4] One of the central issues in NAFTA discussions was the pace of maize liberalization. Mexican policy makers knew that too quick a removal of trade barriers would cause social and political problems. But Mexican officials did not want to forego the fiscal savings and induced efficiency from maize liberalization.

In this sector NAFTA immediately eliminated Mexican import licenses. These restrictions covered approximately 25% of U.S. agricultural exports in 1991. Grains, wheat, corn, rice, oilseeds, and oilseeds products would have unrestricted access into Mexico within ten to fifteen years. From 1993 to 1998

U.S. agricultural exports to and imports from NAFTA countries increased by an annual average of 9.5 and 13.8%, respectively (Burfisher, Robinson, and Thierfelder 2001).

3.2.1.2 Automobiles

Automobiles and automotive parts are key sectors in all NAFTA countries. However, the automotive sectors and trade vary considerably across the three countries. U.S.-Canada trade in automobiles amounted to US$ 40.4 billion in 1988. U.S. exports to the other two countries accounted for US$ 28.5 billion in 1991. In the same year, automobiles and their parts were the largest component of Mexico's manufacturing exports to the United States (Ready 1993). Due to NAFTA, Mexican tariffs on automobiles were reduced from 20 to 10% immediately. The remaining 10% will be gradually eliminated over 10 years. Tariffs on the majority of automobile parts and the restrictions on buses and trucks will be reduced within 5 years. In the automotive sector, the rules of origin specify a minimum 62.5% content of North American parts and labor in order to qualify for the benefits of NAFTA. This rule-of-origin requirement comes from the desire to keep the benefits of trade from leaking outside the member countries.

Before the application of NAFTA, the Mexican auto industry was highly distorted. Regulations in this sector included requirements for domestic content, limits on imports of new vehicles, no imports of used vehicles, and limits on foreign ownership of the automobile parts industry (Burfisher, Robinson, and

[4] Maize and beans account for as much as 70% of Mexico's arable land and for about 35% of its

Thierfelder 2001). NAFTA facilitated the regional integration of this industry, which in turn made U.S. parts and vehicle manufacturers more efficient. From 1993 to 1998 U.S. automobile imports from Mexico increased by 149.5%. Additionally, U.S. producers utilized plants located in Mexico to meet the demand for automobiles in the United States.

There was considerable fear about the implementation of NAFTA in the automobile industry with regard to wages, employment, and investment. However, the data suggest those concerns were not warranted. For example, from 1993 to 1996 hourly wages for U.S. automobile production workers rose by 5.6% and employment in this sector in the United States from 1994 to 1996 grew by 14.1%. Finally, investment in new manufacturing and equipment in the United States by the big three automotive companies was approximately $39.1 billion dollars compared with only $3 billion in Mexico (Burfisher, Robinson, and Thierfelder 2001).

3.2.1.3 Textiles and Apparel

Prior to NAFTA, most observers estimated small expected gains in the textile and apparel sectors because U.S.-Mexico trade in these sectors represented a small percentage of U.S. production. Additionally, the industry in the United States was declining and had just invested in more capital-intensive technology. Thus, textile and apparel imports from Mexico were seen as a considerable threat.

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rural employment. Specifically, maize generates 29% of rural employment and uses 42% of

With NAFTA Mexico eliminated trade barriers on denim, underwear, and thread, among others (Ready 1993). Products such as yarns, fabrics, most household furnishings, and other apparel would be tariff free over a six-year period. As in the automotive sector, rules of origin apply to textiles and apparel. These regulations require that garments be manufactured from the yarn-spinning stage forward in North America to qualify for NAFTA benefits.

Since the beginning of NAFTA, textile and apparel production in the United States has increased. However, due to technological change, employment in the sector has declined and wages have risen. Mexican exports to the United States have surged while, those from Asia have decreased as a consequence of the rules of origin. These rules of origin have made foreign manufacturing and other types of firms relocate to Mexico to take advantage of NAFTA and to enjoy easier access to the U.S. and Canadian economies.[5]

3.2.1.4 Energy

The natural resources and products included in the energy sector are petroleum, natural gas, and electricity. This sector is a special case because the Mexican Constitution reserves the right to exploit certain strategic resources exclusively to the federal government. Besides the legal perspective, the petroleum industry will always evoke memories of one of Mexico's proudest moments, according to most Mexicans, the expropriation of petroleum by President Lazaro Cardenas in 1938.

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arable land (Tornell and Esquivel 1995).

Despite its nationalistic feelings, Mexico modified parts of its Constitution in an effort to modernize its productive sector in anticipation of NAFTA negotiations. Subtle changes were made to the Mexican Constitution to permit foreign firms to participate in the production of petrochemicals classified as "secondary".[6] The Mexican government has always been willing to offer service contracts for oil exploration and drilling. However, foreign firms would rather work on risk contracts because if they eventually strike petroleum, they would be entitled to a share of the profits. Such a proposition has been and will be denied completely by the Mexican government.

Meanwhile, the state-run monopoly *Petroleos Mexicanos* (*PEMEX*) has not been able to modernize its equipment and invest enough resources in oil and natural gas exploration and production. This sector could benefit immensely from an open market and competition. However, this issue was left unresolved by President Zedillo (1994-2000).[7] Additionally, the Mexican economy has diversified into manufactured goods and grown less dependent on oil-exports (Figure 3.2).

As with petroleum and natural gas, only the Mexican federal government can generate and transfer electricity to consumers. Electrical generating equipment in Mexico is outdated and pollutes the environment. Investment in this

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[5] http://www.area-development.com/past/0800/features/sup_mexico.html accessed on 05/19/02.
[6] The Constitution makes a distinction between primary and secondary products. The former are exclusively reserved for State exploitation and the latter are open to private and foreign investment.

area has fallen short of the required and electricity markets could benefit from competition.

3.2.2 Labor

Labor has always been controversial in NAFTA. An example of the polemics surrounding labor and jobs was Ross Perot's hyperbole of the "giant sucking sound" of jobs moving South (Burfisher, Robinson, and Thierfelder 2001). On one hand, labor groups in the United States feared job losses, lower wages, and more lax environmental, safety and health regulations. On the other hand, firms looking to maximize profits had incentives to relocate to Mexico and take advantage of the low wages and corporate taxes that still prevail. In Mexico labor is abundant as a consequence of demographic trends: in 2000, one third of the population was under the age of 15, only 5% were 65 or older; and the median age was 22 years (INEGI 2001).

Undoubtedly, the abundance of labor has attracted firms to relocate. An additional advantage of relocating, besides cheap labor, is to maintain access to U.S. markets given the common border and relatively low transport costs. Finally, advocates of NAFTA argued that economic integration was essential to make a more competitive manufacturing sector in the United States. This way each country could specialize and utilize fully their abundant resource.

Before NAFTA, economic studies estimated that around half a million people would be dislocated over a decade due to the trade liberalization.

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[7] President Ernesto Zedillo tried to continue the privatization process in this sector, but his

Likewise, the U.S. Department of Labor found that only about 2% of sectoral employment would be affected. The evidence of the post-NAFTA period shows that the effects have been small and have been countered by other macroeconomic factors. The Clinton administration created the NAFTA-*Trade Adjustment Program* to help individuals whose jobs were affected by the agreement. The number of cases filed to this assistance program has been small (Burfisher, Robinson, and Thierfelder (2001). In short, NAFTA has had little discernable effect on aggregate employment in the United States although some workers have been displaced in U.S. labor markets and adjustment costs have appeared, especially in manufacturing.

3.2.3 Foreign Direct Investment

As a consequence of Mexico's closed model of development, foreign investment was not viewed favorably until 1989. The phobia against foreign investment was exemplified in President Echeverria's enactment of the "Law to Promote Mexican Investment and Regulate Foreign Investment" in 1973 (Tornell and Esquivel 1995). Gradually, foreign direct investment (FDI) has become more important for Mexican economic development. Until 1983 FDI accounted for about 10% of total investment in Mexico. By 1987 FDI had been slowly rising, reaching close to twenty times its amount in the decade of the seventies. In 1989, the Mexican government headed by President Salinas relaxed the

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initiative was not supported by his own political party and was thus defeated in the Mexican Chamber of Deputies.

regulations regarding foreign direct investment by eliminating the 49% maximum on foreign capital in various sectors. Until the last quarter of 1993 and first quarter of 1994 and after the U.S. Congress approved NAFTA, FDI flows into Mexico have increased considerably. The trend in foreign direct investment is presented in Figure 3.3.

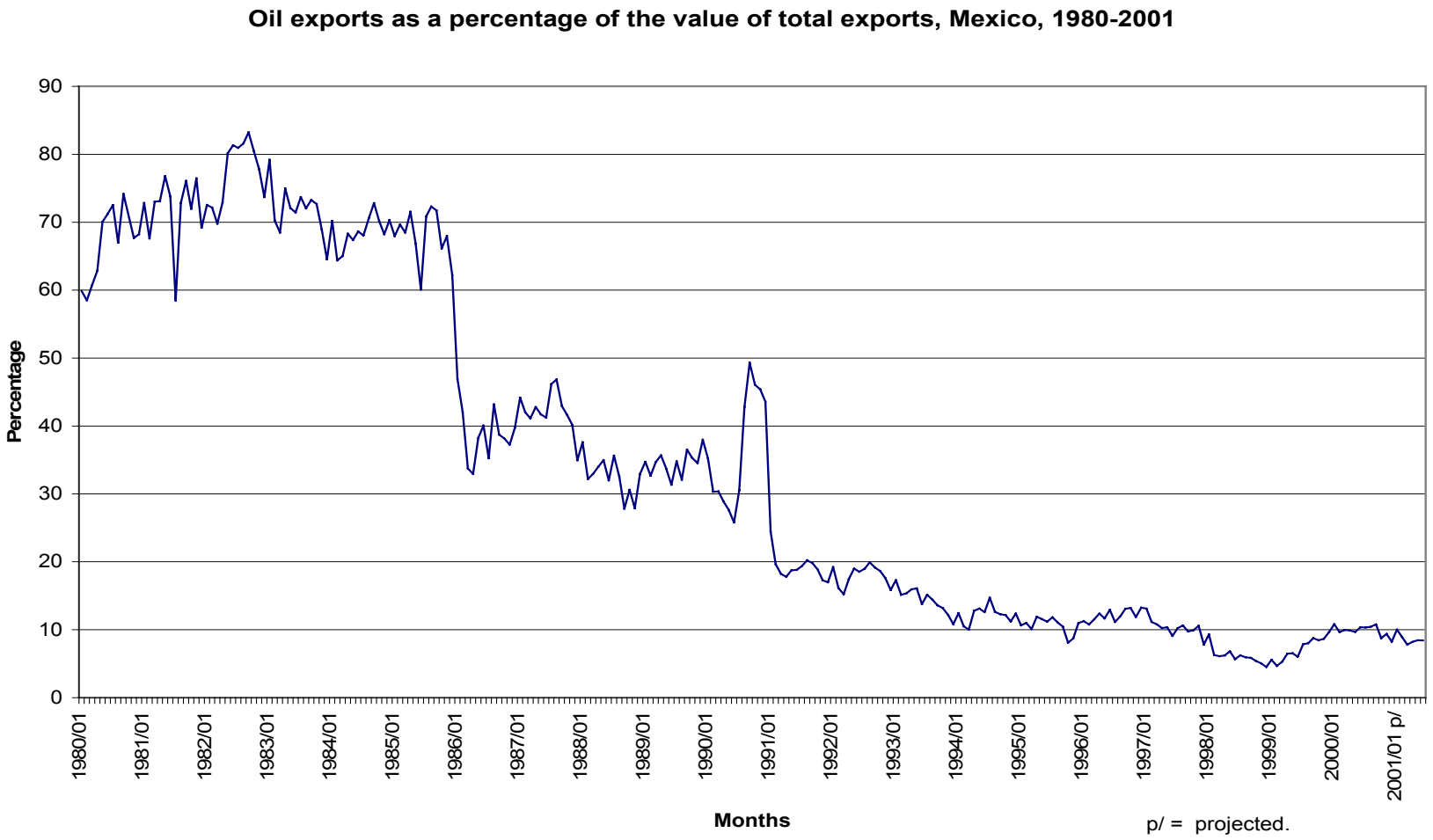
From Figure 3.3 it is possible to discern that FDI flows into Mexico are distinctly different since the passage of NAFTA. According to Lustig (2001), Mexican firms with foreign direct investment employ around 20% of all workers in the formal sector, with wages 48% higher than the national average. The United States and Canada are the first and fifth largest sources of FDI into Mexico, respectively.

3.3 Perspectives on NAFTA

In the last part of the eighties and the decade of the nineties countries have turned to regional trade agreements. In the North American continent two *FTAs* came into effect within five years of one another. It was the second, NAFTA*,* that expanded trade and investment, established novel forms of conflict resolution, and special opportunities for its members. However, NAFTA was built on the foundations of the *CUSTA*.

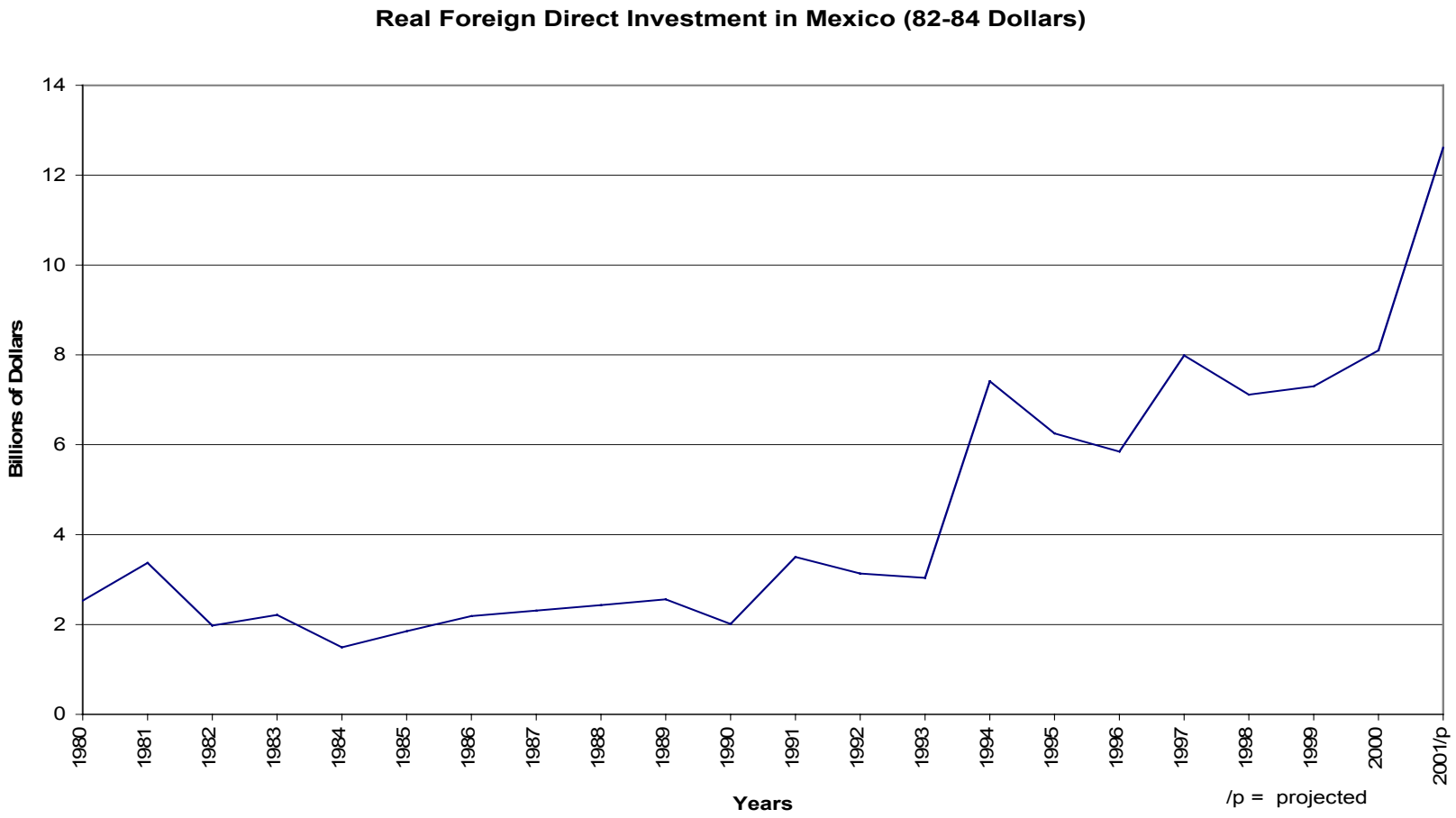
In *CUSTA* the two countries involved were looking to remove tariff barriers. In particular, Canadians wanted to avoid U.S. trade rules on dumping

Figure 3.2



Source:Instituto Nacional de Estadistica, Geografia, e Informatica (2001)

Figure 3.3



Source: Banco de Mexico (2001). (http://www.banxico.org.mx)

and countervailing duties and to obtain preferential access to U.S. markets. On the other hand, the United States wanted unrestricted access for its foreign direct investment into Canada. Additionally, it wanted to enter into specific service sectors in which U.S. firms were competitive, and to curtail Canadian industrial subsidies (Lawrence 1996). This *FTA* did not include the following areas: basic telecommunications, transportation, culture, media, doctors, dentists, lawyers, and childcare. Each country's point of view about NAFTA is presented next.

3.3.1 Mexican Perspective

NAFTA must be viewed from the wider context of the transformation of the Mexican development model from an import substitution, highly protectionist regime to an export-oriented, open-economy model. NAFTA was one of the final steps in the chronology of the process. From the policy point of view, NAFTA became the commitment device that sealed Mexican economic changes. NAFTA aided the Mexican economy to achieve macroeconomic stability because it impedes Mexico from reneging on its schedule to remove tariff barriers. This assurance promotes the inflow of foreign direct investment. Additionally, the preferential treatment and market access Mexican products enjoy in the United States and Canadian markets is a valuable asset. This relationship creates a competitive advantage for Mexico *vis-à-vis* other low wage countries. Finally, from the political viewpoint, it is prohibitively costly to pull out from an international agreement.

NAFTA confers the potential for higher growth through increases in commercial flows of goods. It also elevates the rate of investment in plant and equipment to maintain internationally competitive firms (Ramirez 1993). However, not all aspects of NAFTA are positive for the Mexican economy. In agriculture, the United States and Canada are more efficient producers of grains. As mentioned earlier, corn is one Mexico's staple foods employing a considerable amount of people. With the opening of this sector, migration from rural to urban areas including to the United States will be one of the consequences as cheaper U.S produced corn is imported into Mexico. Without minimizing the adjustment costs Mexico will face, NAFTA will provide incentives to increase Mexican competitiveness and income.

3.3.2 Canadian Perspective

From the Canadian perspective, being left out of NAFTA negotiations was worse than being included. Canadians could not prevent Mexican products from entering the United States in a preferential manner and they would still face the competition from Mexico, as a member of NAFTA or not. On the other hand, Canada wanted to preserve and enhance the advantages of *CUSTA* and obtain preferential access to Mexican markets (Smith 1996). Finally, Canada would avoid the Hub-and-Spoke model because the costs of trilateral negotiations would be lower than negotiating separate bilateral trade agreements.

3.3.3 United States Perspective

From the United States' perspective, NAFTA has had a small, but positive, impact on the economy. This is not surprising due to the size of the U.S. economy. As in the Canadian case, NAFTA built upon *CUSTA*. There has not been a "sucking sound" as many of the critics of NAFTA predicted. The important issue is that it commits Mexico to the principles of the trading relationship between Canada and the United States (Riley 1999).

However, the United States did not obtain everything it wanted in the negotiations with Mexico. The latter reserved the right not to open the energy sector to foreign risk contracts in petroleum exploration. Additionally, the United States wanted symmetry in all three countries when dealing with foreign investment. Nonetheless, Canada and Mexico reserved the right to screen acquisitions of domestic companies (Weintraub 1993). The concessions the United States made in certain areas could motivate lobby groups such as the fruit and vegetable growers, the sugar producers, and the truckers and teamsters to impede the completion of NAFTA.[8] On the positive side, cheaper imports from Mexico have helped consumers and producers purchasing final and intermediate goods, respectively. Additionally, as the Mexican economy has grown so have U.S. exports into Mexican markets.

[8] This last lobby group has already managed to delay the entrance of Mexican trucks and drivers to make deliveries in the United States.

3.4 Institutions

In order for NAFTA to function properly a series of institutions and organizations had to be created. A Trade Commission with officials from the three countries was instated. The Commission's objective is to help settle disputes among the members before any of them has to resort to the dispute settlement mechanism in the agreement. There are some drawbacks because the Commission is understaffed and sometimes it could arbitrate trade problems from a particular nation's viewpoint.

However, NAFTA has committees and working parties comprised of members of the three countries in many areas like trade in goods, trade in agriculture, technical standards, sanitary and phitosanitary standards, financial services, and rules of origin (Weintraub 1996). Rosters of panelists deal with dispute settlement issues. In addition, the side agreements on the environment and labor standards created commissions on these topics, the North American Commission for Environmental Cooperation and the Commission for Labor Cooperation, respectively. It would seem the committees were created as they were needed and perhaps more of them will be required in the future.

While these committees were formed, certain organizations were established as a result of NAFTA: the North American Development Bank (*NADBank*) and the Border Environment Cooperation Commission (*BECC*). These organizations are binational, only between Mexico and the United States. They were established especially to deal with environmental problems along the

U.S.-Mexico border. For a detailed explanation of the institutions and organizations derived from NAFTA refer to McKinney (2000).

3.5 Trends and Future

Currently several countries have arrangements permitting the free flow of goods. Some of these associations are the EU, NAFTA, the Southern Cone Common Market (MERCOSUR), the Caribbean Community (CARICOM), the Central African Customs and Economic Union (UDEAC), and the Association of Southeast Asian Nations Free Trade Agreement (ASEAN). Among these arrangements, the EU is the most advanced in its conception and form because of its provisions for labor mobility, monetary union, and social issues.

NAFTA, in the form it was negotiated, is not a strong or weak agreement (Weintraub 1996), it is not a customs union, and it does not have all the features and provisions the EU possesses. However, it certainly is more than just a free trade agreement. The ultimate goal in NAFTA is to reach a deep level of integration among the member economies. This level of integration implies choosing production locations based not on national borders, but on economic variables such as labor and capital costs as well as productivity, scale economies, transaction and transport costs, and stability and continuity in economic policies.

When the EU was formed no one could have predicted the deep level of integration it would achieve. In a similar manner, no one can predict the extent to which the North American countries will integrate. It is not clear whether NAFTA

will be a building block to reach a bigger trade arrangement or not.[9] If it serves as a building block, there are two possible paths to take: expansion and deeper integration. It could be that expansion comes before deeper integration, or vice versa. As events have unfolded it seems that the former is most likely.

In December 1994, then President Clinton launched the agreement to create a Free Trade Area of the Americas between thirty-four American nations by the year 2005 (Lawrence 1996). This initiative was well received by all countries demonstrating the advantage Mexico and Canada possess by having preferential treatment and access to U.S. markets. It is in these two nations' best interest to be included in all negotiations to conserve their preferential treatment and access. It is more likely that the evolution of NAFTA will be highly dominated by the attitude and policy measures the United States takes because of its position as the biggest economy.

Internally the United States has faced strong opposition with respect to entering NAFTA and later with the idea of enlarging the free-trade zone. Perhaps, it is only a signal that internal matters among NAFTA countries should be dealt with initially and before expansion. As some academicians point out, deeper integration should be attained first. Controversial issues such as competition policy, social policy, and macroeconomic management, among others need to be settled. Additionally, certain consultation and communication mechanisms should be put in practice. All this should be done with the goal of

[9] Riley (1999) quotes Bhagwati regarding this topic. He, [Bhagwati] argues that there are several

reducing uncertainty to any NAFTA member derived from economic policy variables such as monetary and exchange rate management.

attitudes members of a FTA can take. Among these, there is the possibility that the regional bloc becomes inward looking.

4. LITERATURE REVIEW

4.1 Regression Analysis to Measure Bilateral Trade Flows

Most ex-post studies of NAFTA*'s* impact have employed econometric models (Krueger 1999). In fact, regression analysis has been used in a considerable number of studies to gauge the effects of preferential trading arrangements. Researchers have employed econometric techniques rather than general equilibrium models because the former allow them to specifically measure income and price effects on import and export flows between countries. This approach yields elasticities, which measure the sensitivity in the behavior of exports and imports with respect to income and price changes.

It could be argued a general equilibrium approach would be more suitable because of the strong theoretical assumptions in neoclassical economic theory. However, the effects and impacts of an *FTA* are complex and maybe disguised with other simultaneous shocks to final or intermediate markets. Additionally, the partial equilibrium approach allows the analysis to be conducted in a simple, uncomplicated manner, and the loss of explanatory power is likely minimal compared to a general equilibrium model. Finally, the objective of this thesis is to provide a description, analysis, and conclusions on the impact of NAFTA on bilateral trade flows between the member countries. Thus this objective excludes expansion into particular microeconomic areas.

The models employed in this document are a variant of gravity models or gravity equations. An explanation of the gravity equation's theoretical underpinnings and econometric specification are presented in the next section.

4.2 Gravity Models

Researchers have been interested in bilateral trade flows and their determinants for a number of years and reasons. First, there are abundant data to analyze international flows of goods between countries.[10] The data can be obtained in a disaggregated manner with different periodicity. Finally, the parameter estimates obtained can be employed to analyze a variety of macroeconomic issues such as the determination of price levels and the deficit in the balance of trade.

Several empirical studies of international trade have measured the determinants and effects of bilateral trade patterns through gravity equation models for over thirty years (Bergstrand 1985; Deardorff 1998; Eichengreen and Irwin 1998; Sanso, Cuairan, and Sanz 1993). Stated succinctly, the gravity model is a reduced form from a partial equilibrium model of export supply and import demand (Bergstrand 1985). The high empirical explanatory power of the models, even when applied to a wide variety of countries and time periods, and their good statistical fit (R^2 values ranging from 65 to 95%) have made gravity equations popular in applied analysis. As a consequence, the gravity equation has earned the nickname of the "workhorse" for empirical studies in international trade.

The typical specification of the gravity equation model relates trade flows between two countries as a function of their incomes, proxied by their respective gross domestic products (GDPs), and transport costs, proxied by the distance between the two states. According to Deardorff (1998), the "standard" gravity equation is specified as follows

$$T_{i,j} = A\frac{Y_i Y_j}{D_{i,j}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.1)$$

where $T_{i,j}$ is the value of exports from country *i* to country *j*, the *Y's* are their respective national incomes, $D_{i,j}$ is a measure of the distance between them, and *A* is a constant of proportionality. Additionally, researchers usually include a set of indicator variables to explore the effects of regionalism when *FTAs* are present as well as other variables to measure tariffs and distribution costs.[11]

When the gravity equation first appeared in the trade literature, few attempts were made to justify it theoretically. The econometric models were constructed in an ad-hoc way to test the hypotheses researchers identified as interesting. Subsequently, theoretical justifications to existing models were sought. It was not long before economists identified the theoretical underpinnings of gravity equations. Currently, there are multiple theories explaining their origin.

Anderson (1979) provided the first theoretical foundations for the gravity equation based on the properties of expenditure systems with the maintained hypothesis of homothetic preferences across regions. The assumptions in his

[10] Abundant data do not necessarily mean that they are easy or cheap to obtain.

model make it the simplest form of gravity equation. As a first attempt, the conception of this model was generally accepted. Later, Helpman and Krugman (1985) and Bergstrand (1985, 1989, 1990) derived gravity models from monopolistic competition models allowing for intra-industry or intersectoral specialization. Detailed descriptions of the methodologies used to derive gravity equations and the evolution of assumptions and theoretical underpinnings to justify them are contained in Deardorff (1998) and Baier and Bergstrand (2001).

It has been common practice to estimate the gravity model as linear in the logarithms of the original variables with a single-equation specification using cross-section data. However, alternative functional forms have been employed: log-linear, first difference, and Box-Cox transformations (Eichengreen and Irwin 1998; Baier and Bergstrand 2001; Sanso, Cuairan, and Sanz (1993)). Different functional forms of the gravity equation result in good statistical fit: R^2 values range from 30 to 80% using cross sectional data. Additionally, Egger (2000) has tested for fixed *vis-à-vis* random effects in models using panel data. He argues the appropriate specification should be one with fixed country and time effects.

The theoretical model and econometric specification used in this thesis to explain bilateral trade flows and to test hypotheses are a variant of the typical gravity equation. The model presented here incorporates elements from papers that explicitly estimated import demand and export supply equations. Accordingly, in this thesis's framework, income and price effects become

[11] See Anderson (1979), Bergstrand (1985), and Deardorff (1998) among others for various

essential due to their role as explanatory variables and thus it is necessary to review them.

4.3 Income and Price Effects

It is generally accepted that import demand is a function of income and own price. Several hypotheses have been tested in previous empirical studies of import demand and export supply, but two issues always surfaced: income and price effects.[12] Policy makers are often concerned with the magnitude of these effects because of their macroeconomic impact. Representative individuals are also aware of income and price effects because changes in these parameter values can affect their marginal propensity to consume. This last argument applies both to producers and consumers because in factor markets producers have derived demands for factors of production.

The most important aspects of estimating income and price effects are surveyed and summarized in several articles. Two of the most comprehensive, (Magee (1975); Goldstein and Khan (1985)), highlight the most controversial issues in past studies: modeling assumptions, the choice of variables, and econometric estimators. These survey articles provide detailed descriptions of the early trade literature starting in the decade of the 30's and their chronological evolution until the more modern trade papers up to the mid 80's. No survey

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specifications of gravity models.

[12] In international trade when researchers refer to income and price they usually refer to gross domestic product and real exchange rates. In what follows whenever the term price effects appears it refers to the real exchange rate effect.

articles similar to the two mentioned above have been published since 1985.[13] Accordingly, trade literature prior to 1985 will be mentioned briefly here.

The papers reviewed have been classified according to several criteria. Table 4.1 presents a summary of the characteristics of these papers. Starting with the type of model specification, trade flows among countries have been estimated with single-equation models. This is permissible because researchers typically have assumed a perfectly elastic import supply function. Within single-equation models the assumptions concerning lag structure, number of lags included, types of variables to better measure price and income effects, and additional variables to include have varied considerably across studies.

Other researchers have questioned the exogeneity of certain variables especially when estimating import demand and export supply equations. They proposed simultaneous equation models to obtain consistent estimates of income and price effects (Goldstein and Khan 1978). Later, Rose and Yellen (1989); Rose (1991); and Zhang (1996) challenged the assumption of the relationship and the causality direction between the real exchange rate as a determinant of the balance of trade. In their view, the causal relationship is reversed: the trade balance is assumed to drive the real exchange rate.

[13] Refer to Magee (1975) and Goldstein and Khan (1985) for a detailed revision of earlier studies.

Table 4.1

Summary of Trade Studies presented in the Literature Survey								
Authors/Date of publication	Type of model	Lag Structure	Causality	Countries Analyzed	Sectors Analyzed	Sample Period	Type of Data	Periodicity of the Data
Goldstein and Khan (1978)	Simultaneous equations	One lag of dependent variable	real exchange rate to trade balance	Aggregate exports for eight industrial countries	Export demand and supply	1955-1970	Time-series	quarterly
Krugman and Baldwin (1987)	Single-equation	unconstrained approach	real exchange rate to trade balance	United States	Import demand and export supply equations on non-oil, non-agricultural data	1977.2-1986.4	Time-series	quarterly
Carter and Pick (1989)	Single-equation	polynomial distributed lags	real exchange rate to trade balance	United States	Import demand and export supply equations	1973-1985	Time-series	quarterly
Noland (1989)	Single-equation	Gamma lags	real exchange rate to trade balance	Japan	Import demand and export supply equations	1970.1-1985.4	Time-series	quarterly
Rose and Yellen (1989)	Single-equation	unconstrained approach	trade balance to real exchange rate	U. S. trade flows to six industrialized nations	Aggregate Trade Balance	1960.1-1985.4	Time-series	quarterly
Lawrence (1990)	Single-equation	second-order Almon lags	real exchange rate to trade balance	United States	Import demand and export supply equations on non-oil, non-agricultural data	1976-1990	Time-series	semi-annual
Rose (1991)	Single-equation	unconstrained approach	trade balance to real exchange rate	U. S. trade flows to five industrialized nations	Aggregate Trade Balance	1974-1986	Time-series	monthly
Zhang (1996)	Single-equation	Dickey-Fuller Tests	trade balance to real exchange rate	China	Aggregate Trade Balance	1991.M1-1996.M2	Time-series	monthly
Doroodian, Jung, and Boyd (1999)	Single-equation	Shiller lags	real exchange rate to trade balance	United States	Aggregate Trade Balance for Manufactures and Agriculture only	1977.1-1991.4	Time-series	quarterly

The majority of the papers reviewed here focus on the U.S. trade balance. Only Noland (1989) and Zhang (1996) focused on other countries such as Japan and China, respectively. The range of issues analyzed is wide. Besides estimating income and price effects, Krugman and Baldwin (1987) and Lawrence (1990) provide a comprehensive analysis of other possible influences on the U.S trade balance. In contrast, Carter and Pick (1989), Noland (1989), and Doroodian, Jung, and Boyd (1999) only report income (in some cases) and price effects. Finally, Rose and Yellen (1989); Rose (1991); and Zhang (1996) question the existence of a causality relationship from the real exchange rate to the balance of trade.

Among the studies focusing on the United States, data classification and usage varies. Some use more disaggregated data, referring to exports and imports as dependent variables, and with different classification forms. Krugman and Baldwin (1987) and Lawrence (1990) use the aggregate non-oil and non-agricultural data. Rose and Yellen (1989) and Rose (1991) present U.S. bilateral trade flows to six and five industrialized countries, respectively. Meanwhile, Carter and Pick (1989), and Doroodian, Jung, and Boyd (1999) employ data separated by industrial categories. The data format utilized in each study is relevant because it can affect the estimation results. It is possible that measurement error would be lower with more disaggregated data. Aggregation can mask and confound distinct effects present in less aggregated data. Noland

and Zhang use aggregate data for Japan and China, respectively, for which measurement error may be present.

A critical assumption in all the foregoing models is acknowledging the possibility of lagged effects in the price and income variables. As Noland (1989) points out, the majority of earlier trade models forced the impact of income and price to be felt contemporaneously. The consequence of this restriction was small or statistically insignificant elasticites, especially with respect to the real exchange rate. It is widely suspected that the effects of the real exchange rate build slowly over time. However, no theory for choosing lags is presented in the literature. Instead, the appropriate lag distribution is chosen using intuition or sample-based tests in econometric models. This treatment of lags raises several questions. First, the estimation period has to be long enough to allow for the inclusion of lags in the model. Second, the periodicity of the data has to be such that the number of observations allows the model to pick up the impact of the lagged effects. The effects of exchange rates might be attenuated with annual data, for example. However, longer samples may increase the likelihood of structural or institutional changes occurring some time within the sample period.[14]

The periodicity of the data used in the articles presented ranges from monthly (Rose 1991; Zhang 1996) to quarterly (Krugman and Baldwin 1987; Carter and Pick 1989; Noland 1989; Rose and Yellen 1989; Doroodian, Jung, and Boyd 1999) to semi-annual (Lawrence 1990). The authors considered that

[14] This refers to the “Lucas Critique.” See Lucas, (1976).

higher periodicity data were better to account for lags. It could be argued that semi-annual data are less likely to capture lagged effects than quarterly or monthly data. The estimation period's length varied from five years (Zhang 1996, 1991:M1 to 1996:M2) to twenty-five (Rose and Yellen 1989, 1960.1 to 1985.4;). The other articles' estimation period spanned approximately fifteen years.

The econometric specification and estimation procedures differ across these studies owing to differences in conceptual approaches and desired solutions. For instance, Krugman and Baldwin (1987), Carter and Pick (1989), Noland (1989), and Lawrence (1990) estimate import demand and export supply equations. On the other hand, Rose and Yellen (1989), Rose (1991), and Doroodian, Jung, and Boyd (1999) estimate an aggregate balance of trade equation. The last authors perform their estimations only for manufactured and agricultural goods.

The estimation procedures vary from ordinary least squares (Krugman and Baldwin 1987; Carter and Pick 1989; Lawrence 1990) to more sophisticated methods. For example, Rose and Yellen (1989) use instrumental variables; Noland (1989), Rose (1991), and Doroodian, Jung, and Boyd (1999) use maximum likelihood techniques.

The lag structure employed in these studies varies. A very common and frequently encountered form of lag structure in the econometrics literature is the polynomial distributed lags. In the trade studies reviewed here, only Carter and Pick (1989) employ it. The others chose to specify different lag structures:

Noland (1989) uses gamma lags; Lawrence (1990) a second-order Almon lag; and Doroodian, Jung, and Boyd (1999) employ Shiller lags. For their part, Krugman and Baldwin (1987), Rose and Yellen (1989), and Rose (1991) take an unconstrained approach and specify the number of lags and their form in an unrestricted manner. Finally, Zhang (1996) applies augmented Dickey-Fuller tests to identify the appropriate number of lags.

Selected results from the literature for separate import demand equations are presented in Table 4.2. All the income and price values shown in Table 4.2 are elasticities. The income variable confirms the hypothesis about its role as an influential force on import demand. The estimated income elasticities and standard errors or t-statistics corroborate this. The magnitude of the estimated income elasticities is well above unity with the exception of 0.419 obtained by Carter and Pick (1989). However, Carter and Pick only estimated income impacts on agricultural trade. It is possible that the level of data aggregation resulted in smaller parameter values. Additionally, the income effects are presumed to have an immediate impact because three quarters of the studies in Table 4.2 do not include lagged values of this variable. The exception, Noland (1989), estimates an average value of 0.61 and 1.33 quarters for adjustments in exports and imports, respectively, in the presence of income variations. It can be concluded that in Japanese trade equations, changes in income have a relative immediate impact.

Table 4.2

Single-equation estimates of import and export demand

(Selected Statistics)

	Krugman and Baldwin (1987)[1]		Lawrence (1990)[2]		Noland (1989)[3]		Carter and Pick (1989)[2]	
Effect	U.S. Export Volume (*Foreign Import Demand*)	U.S. Import Volume (*U.S. Import Demand*)	U.S. Real Exports (*Foreign Import Demand*)	U.S. Real Imports (*U.S. Import Demand*)	Export Demand from ROW	Japanese Import Demand	Export Unit Value	Import Unit Value
Income Elasticity	2.42 (0.13)	2.87 (0.12)	1.6 (33.7)	1.81 (7.9)	1.36	1.66	0.42 (0.5)	NA
Real Exchange Rate Elasticity (RER)	-1.33 (0.11)	0.86 (0.14)	-1.05 (12.2)	-1.47 (14.3)	-0.41	-0.67	0.32 (1.6)	0.87 (6.8)
Number of Lags included in RER (quarters)	9	9	5**	4**	4.6*	9.3*	4	3
Number of Lags included in income (quarters)	NA	NA	NA	NA	0.6*	1.3*	NA	NA

ROW = Rest of the World.

NA = Not applicable

* = Average number of lags in which the adjustment takes place.

** = Semiannual lags.

1/ Standard errors in parenthesis

2/ T-statistics in parenthesis

3/ The four elasticity figures presented are significant at 1% level

Turning to price effects, the reader will note that not all price effects are negative. More generally, the parameter estimates by Krugman and Baldwin (0.86); Noland (-0.41 and –0.67); and Carter and Pick (0.322 and 0.868) suggest a J-Curve pattern of adjustment, meaning that a real depreciation will worsen the deficit in the balance of trade in the short run, improving it only in the long run. To capture these short- and long-run effects, the models included lagged values of the exchange rate. The studies with aggregate data, interestingly enough, estimate the time of adjustment to exchange rate shocks from 2 to 2.5 years. Once again, Carter and Pick find the shortest adjustment period.

The remaining four articles Rose and Yellen (1989), Rose (1991), Zhang (1996), and Doroodian, Jung, and Boyd (1999) focus almost exclusively on the role of the real exchange rate in the analysis. Their approach differs because they estimate an aggregate trade balance equation, in contrast to the other studies already mentioned which estimate demand functions. Only Doroodian, Jung, and Boyd (1999) found a statistically significant relationship stemming from the real exchange rate to the real balance of trade. They find a J-Curve pattern for agricultural trade. The other three papers either found no evidence regarding the role of the exchange rate as a determinant of the trade balance, or whatever evidence was found (Zhang) suggested the real exchange rate was a function of the balance of trade. Only the researchers who worked with more disaggregated data found evidence that would sustain the hypothesis about the dependence of the trade balance on the real exchange rate with this approach.

What useful lessons can be extracted from these articles? First, to explain the evolution of bilateral trade flows between the NAFTA countries using gravity equations would be effective and efficient because the models are easy to specify, their statistical fit is considerably high, and, in general, most of the data required to estimate them are available. Second, exogeneity and the causality direction between the variables involved must be tested and accounted for to obtain adequate parameter values. Third, the level of data aggregation may affect empirical results. Different studies with distinct levels of data aggregation obtain dissimilar results. Finally, attention must be paid to the possible existence of lagged effects in the explanatory variables. This must be contemplated in the structure of the empirical model.

4.4 Location of this Study in the Literature

In this thesis, estimates of trade flows among the NAFTA members are obtained with a variant of the gravity equation. It is common in gravity equations to omit the real exchange rate as an explanatory variable leaving the income variable to capture most of the effects of trade. However, the foregoing literature review suggests a price variable —that is, the real exchange rate— should be included in the estimation. The empirical objectives are twofold: to explain the bilateral flow of goods; and to disentangle and measure the effects of income, price, NAFTA, and rest of the world on bilateral trade flows. The econometric issues raised in the preceding subsection will be considered. The framework used in this thesis integrates a system of equations that includes variables to

measure the impacts of: income, the contemporaneous and lagged real exchange rate, NAFTA and trade barriers, and the rest of the world on bilateral trade flows. The data employed have quarterly periodicity.

5. THE MODEL

5.1 Theoretical Model

The literature review in the previous chapter suggests that it is possible for the gravity equation to be derived from different structural models. Moreover, the gravity equation has performed well explaining trade flows between countries without regard to the possible causes and, consequently, whether trade is inter- or intra-industry. The usual explanations for international trade posit differences in factor endowments, which create comparative advantages, and monopolistic competition or increasing returns to scale among firms. NAFTA provides an interesting opportunity to measure trade flows by applying the gravity model. It would be possible to gauge, in the same case study, bilateral trade flows caused by differences in factor endowments such as Mexico-U.S. or Mexico-Canada trade as well as intra-industry trade between the United States and Canada.

Krugman (1981) pointed out that much of world trade occurs between countries with similar factor endowments and such trade is intra-industry in character: two-way trade in similar products. Later, Markusen (1986) developed a theoretical model combining scale economies and differences in resource endowments to suggest that trade between developing and developed countries is inter-industry whereas trade between developed nations is primarily intra-industry. Finally, Evenett and Keller (1998) and Feenstra, Markusen, and Rose (2001) analyzed the alternative trade theories —Heckscher-Ohlin and Increasing

Returns— that could provide the structural foundation for the gravity model. Their objective was to determine if either of the two theories could account for the success of the gravity equation. They concluded both models explain different components of the international variation of production patterns and composition of trade flows.

In light of this evidence, it is possible to assume that inter- and intra-industry trade occur simultaneously and the essential difference lies in the countries that trade between themselves. Given the above results of Evenett and Keller, and Feenstra, Markusen and Rose no trade theory will be assumed *a-priori* as a foundation for the gravity model in this thesis. Both Heckscher-Ohlin and Increasing Returns trade theories can be considered as the foundations for the structural model of the economy.

Turning to the structure and determinants of trade flows, Krugman and Obstfeld (1994) establish that any country's current account is a function of the real exchange rate and disposable income, that is

$$CA = CA(EP^*/P, Y^d) \qquad (5.1)$$

where CA stands for current account, EP^*/P is the real exchange rate and Y^d is disposable income. Disaggregating the real exchange rate, E is the nominal exchange rate, P^* is the foreign price index, and P is the domestic price index. Going into more detail, the current account is related to and can be decomposed

further into imports and exports. The following identity expresses this relationship.

$$CA \equiv EX - IM \qquad (5.2)$$

where EX stands for exports and IM stands for imports. By combining the two expressions above it is possible to establish that imports and exports are affected and determined by the real exchange rate and disposable income. The following expression summarizes this relationship.

$$CA = EX(EP^*/P, Y^d) - IM(EP^*/P, Y^d) \qquad (5.3)$$

The balance on the current account is not of particular interest in this thesis. However, the evolution and variation of its two components are of central importance. Accordingly with (5.3), there are two elements that determine the current account, an import demand and an export supply. It is also logical to assume that each NAFTA country's current account is influenced by its respective real exchange rate and disposable income. Thus, combining these functions for the whole set of NAFTA members yields six foreign trade equations: three import demands and three export supplies.

The specification of the theoretical model is analogous to a system of demand equations for the consumer. The difference is the representative unit. In this case, rather than focusing on the representative consumer focus is on individual countries. As such, the maximization exercise will be on the whole country's utility or social welfare. Additionally, in the model's specification the institutional bonds and economic integration created by NAFTA between the

United States, Mexico, and Canada have to be considered. This situation suggests the existence of certain economic effects emerging in any one of the NAFTA countries that could simultaneously influence the three countries' import demands and export supplies. This situation parallels the simultaneous determination of consumer demand in a system of equations.

Borrowing the usual setup from the microeconomic consumer problem and adapting it to the present situation, the theoretical demand model is the following.

$$
\begin{aligned}
x_{US,MEX} &= x^{M}_{US,MEX}(q_{US,MEX}, q_{US,j}, M_{US}) \\
x_{MEX,US} &= x^{X}_{MEX,US}(q_{US,MEX}, q_{MEX,j}, M_{MEX}) \\
x_{US,CAN} &= x^{M}_{US,CAN}(q_{US,CAN}, q_{US,j}, M_{US}) \\
x_{CAN,US} &= x^{X}_{CAN,US}(q_{US,CAN}, q_{CAN,j}, M_{CAN}) \\
x_{CAN,MEX} &= x^{M}_{CAN,MEX}(q_{CAN,MEX}, q_{CAN,j}, M_{CAN}) \\
x_{MEX,CAN} &= x^{X}_{MEX,CAN}(q_{CAN,MEX}, q_{MEX,j}, M_{MEX})
\end{aligned}
\qquad (5.4)
$$

where $x_{US,MEX}$ and $x_{MEX,US}$ are the U.S import demand from Mexico and the U.S export supply to Mexico, respectively. The definitions of $x_{US,CAN}, x_{CAN,US}, x_{CAN,MEX}$, and $x_{MEX,CAN}$ are analogous. Defining the arguments in expressions (5.4), $q_{US,MEX}, q_{US,CAN}$, and $q_{CAN,MEX}$ are the US-Mexico, US-Canada, and Canada-Mexico real exchange rates, respectively; $q_{US,j}, q_{MEX,j}$, and $q_{CAN,j}$ are the real exchange rates between the United States and its major trading partners other than Mexico or Canada, the other terms represent the corresponding arguments for Mexico and Canada. Finally, M_{US}, M_{MEX}, and M_{CAN}, are the income variables

included, (i.e. GDP and per capita GDP) for the United States, Mexico, and Canada.

The expressions presented above are import demands and export supplies. The arguments in (5.4) may be interpreted in a fashion analogous to those in a microeconomic demand system. The terms $q_{US,MEX}$, $q_{US,CAN}$, or $q_{CAN.MEX}$ play the role of own price depending on the equation. To see this, consider the first in equation in (5.4). The real exchange rate indicates the "price" of importing goods from Mexico to the United States. M_{US}, M_{MEX}, and M_{CAN} correspond to income, and finally, $q_{US,j}$, $q_{MEX,j}$, and $q_{CAN,j}$ can be interpreted as the prices of substitutes or complements in a consumer's demand system.

5.2 Econometric Formulation

The econometric specification employed in this thesis follows the seemingly unrelated regression model (Zellner 1962). This specification allows for the possibility of having common factors influencing the disturbances in the different equations that have not been specified explicitly in the matrices of explanatory variables (Johnston and DiNardo 1997). By proceeding in this manner the coefficient estimates obtained from the complete set of equations will be consistent and efficient compared to the estimation of each equation individually by ordinary least squares. On the other hand, if the equations are actually unrelated then estimating them through a seemingly unrelated

regression model is equivalent to applying ordinary least squares on each individual equation (Greene 2000).

The econometric model corresponding to (5.4) is specified in the following manner

$$y_{ij,t} = \mathbf{X}'_{it}\boldsymbol{\beta}_i + \varepsilon_{it} \quad i, j = 1,\ldots,m; t = 1,\ldots,T \qquad (5.5)$$

where $y_{ij,t}$ denotes exports from country *i* to country *j* (or imports of country *j* from country *i*) in the t^{th} time period, $\mathbf{X}'_{it}$ is a row vector of relevant explanatory variables in the t^{th} time period, $\boldsymbol{\beta}_i$ is a conformable vector of coefficients to be estimated, and ε_{it} is an error term assumed to be distributed $\varepsilon \sim N(\mathbf{0}, \sum \otimes \mathbf{I}_T)$.

The data included in the set of explanatory variables were: the gross domestic product of the importing country, the per capita gross domestic product of the importing country, the contemporaneous and possibly 8 lagged values[15] of the real exchange rate from country *i* to country *j*, the contemporaneous value of the real exchange rate from country *j* to country *k*, where *k* represents the importing country's biggest trading partners apart from the NAFTA members. A dummy variable taking the value of one from the year 1994 onwards was also included. The purpose of this indicator variable is to account for reductions in tariff and non-tariff barriers between the members due to the implementation of NAFTA. Finally, seasonal dummy variables for the first, second, and third

[15] The reason for including as many as eight lags comes from the international trade literature. The studies by Krugman and Baldwin (1987) and Lawrence (1990), (see Chapter 4) suggest that lags in the real exchange rate go back to approximately two years. With quarterly data, 8 lags would capture any lagged effects of real exchange rates.

quarters were included to account for any type of seasonal occurrence in the trade patterns.

5.2.1 Expected Signs of Coefficients

According to Krugman and Obstfeld (1994) gross domestic product has a positive effect on imports and exports. This variable represents total income and acts as the budget constraint of the economy. If income increases, the budget constraint is enhanced and consumption for all types of goods, domestic and imported, will also be augmented. This effect will generate an increase in the quantity of imports demanded by domestic consumers. In this particular case, only the importing country's gross domestic product was included.

Another income variable included in each equation was the importing country's per capita gross domestic product. If gross domestic product acted as the budget constraint for the whole economy, the per capita version acts as the individual's budget constraint. In a similar fashion, the expected coefficient would be positive. This happens to be the case because an increase in per capita gross domestic product increases the individual consumer's purchasing power. The relationship is exactly the same as with gross domestic product, if the individual's income increases the consumption of all types of goods, domestic and imported, will increase.

The other important variable is the real exchange rate between the origin and destination countries of the exports (imports). The effects of the real exchange rate on imports and exports have an inverse relation. From the

importing country's point of view, the real exchange rate acts as the own price of imports. The expected sign of its coefficient is negative because an increase in the real exchange rate means it takes more domestic currency to purchase the same amount of goods in foreign currency. If the real exchange rate increases the quantity of imports demanded would decrease, recall the real exchange rate is given by EP^*/P. This increase in the real exchange rate can be due to increases in nominal exchange rate, E, and the foreign price index P^*, or decreases in the domestic price index, P. An increase in the nominal exchange rate (E) implies a dollar depreciation against the other currency, which makes imports more expensive. An increase in the foreign price level also makes imports more expensive. This is the case because the equivalent amount in domestic currency to the new price in foreign currency would be at a higher level. Finally, a decrease in the domestic price level makes imports more costly to domestic consumers in comparison to domestically produced goods.

From the exporting country's point of view, the expected sign of the real exchange rate in the export equations would be positive. There are two reasons for this. The first one represents the importing country's point of view. If the nominal exchange rate (E) depreciates against the other currency, imports become more expensive, but simultaneously exports become cheaper and gain competitiveness in international markets. This gain in competitiveness boosts the home country's level of exports demanded in other countries. If the foreign price level increases foreign citizens will demand fewer domestically produced goods

and more imports. Finally, if the domestic price level goes down relative to the foreign price level, domestic producers will try to sell more of their production abroad and not in domestic markets.

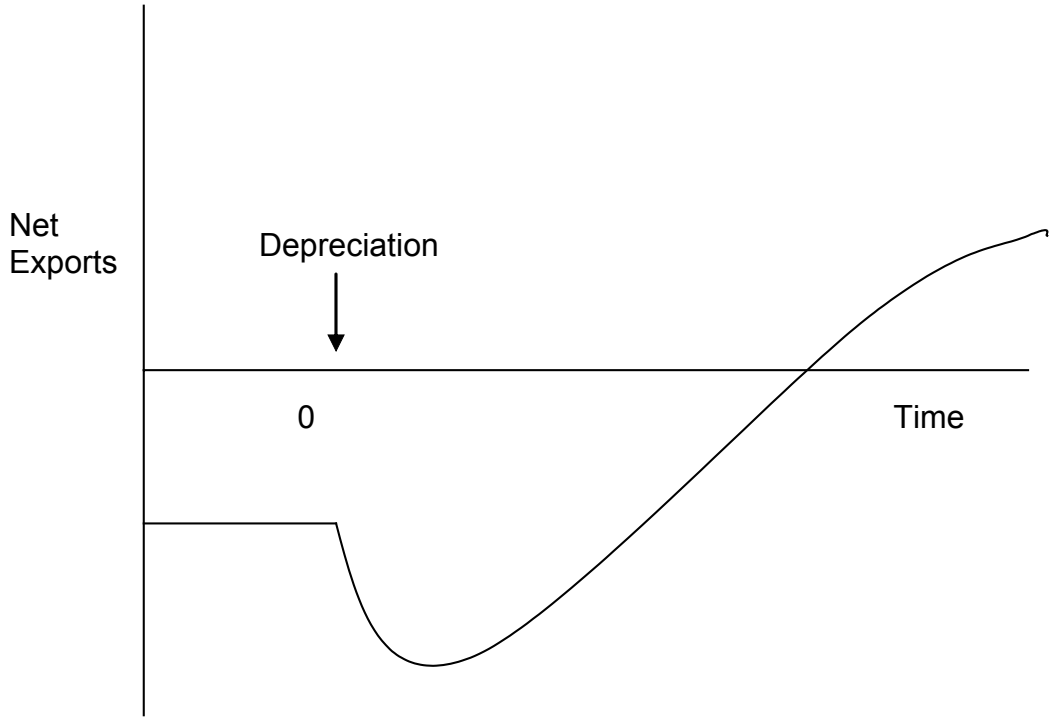
The second reason for an expected positive coefficient on the real exchange rate in export supply equations is a technical one. The definition of the variables is the same in both the import demand and export supply equations. If in the former equations a negative sign is expected, then in the latter equations the expected sign should be the opposite.

If the real exchange rate variable's estimated coefficient sign does not match expectations in either the import demand or export supply equations then it is likely that a J-Curve is present. This adjustment process obtained its name from the pattern it describes (Figure 5.1). In the presence of a J-Curve, a real depreciation has a perverse effect, increasing the deficit in the balance of trade in the short run, and only improving in the long run. With the inclusion of lagged values of the real exchange rate it would be possible to identify such outcome.

The next explanatory variable in equations (5.4) is the real exchange rate of principle trading partners not members of NAFTA. The reasons to include the importing country's real exchange rate with respect to its biggest trading partners are twofold. First, the real exchange rates are included to account for trade increases or trade decreases. These real exchange rates measure the relative cost of imports from non-NAFTA countries as well as the relative attractiveness of exports to non-NAFTA trading partners. Second, they are included to account

Figure 5.1

The J-curve



A real depreciation leads initially to a deterioration, then to an improvement in the trade balance

for the effect between NAFTA and the rest of the world. In typical gravity equation models (Frankel and Rose 2002 and Krueger 1999, among others) indicator variables are used to measure trade creation and trade diversion effects. These indicator variables take the value of one when the export (import) flows go from a country that belongs to a preferential trading arrangement to one that does not belong to the same preferential trading arrangement. The common interpretation established in the literature states that if the coefficient associated with these dummy variables is positive then there is trade creation; if it is negative, the effects are trade diverting. This procedure has several important flaws.

First, the effects being measured should not be called trade creation or trade diversion, but rather more modest names such as trade increase or trade decrease. If one desires to measure trade creation or trade diversion, then it is necessary to include information in the model about prices and tariffs from the members of the preferential trade agreement as well as from non-members. This is so because for trade creation or trade diversion to occur a country must become the cheapest supplier or stop being the cheapest supplier of a certain product, respectively. In either case, information about which country is the cheapest producer of a certain good is needed before and after the application of the preferential trading arrangement. To measure trade creation or diversion time series observations or panel data would be required instead of the cross-section data used in many gravity models.

The data on tariffs are available at a very disaggregated level, product by product. However, to obtain an adequate measure of tariff barriers for the whole economy is exceedingly difficult.[16] Given these difficulties, no attempt is made to measure trade creation or trade diversion effects in this thesis. Nonetheless, trade increases or decreases between NAFTA members and non-members are measured by the coefficient on the real exchange rate variables for other countries. If these variables' signs are negative, then imports from other countries would be competing with the ones from NAFTA members. On the other hand, if the signs are positive, a trade enhancing effect between imports from countries outside NAFTA and NAFTA members is implied.

The next explanatory variable is an indicator variable included to measure the effects likely created by NAFTA. These effects are reductions in tariffs and non-tariffs barriers, enhanced institutional bonds between the three countries, increases in competition due to market size enhancement, reduced transaction and enforcement costs, and less insecurity in international exchange.[17] The expected sign on this coefficient is positive. However, the data used are highly aggregated and the effects of NAFTA may not be sufficiently strong to register statistically significant positive coefficients.

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[16] One of the few studies that used an aggregate tariff measure is Anderson and Marcouiller (2002). However, this aggregate tariff is calculated as a simple average of all products' tariffs of each country's economy. It is uncertain as to what exactly this measure is portraying.

[17] If the reader is interested in this last issue refer to Anderson and Marcouiller (2002). The authors explore the effects of homogenizing jurisdictional boundaries and the elimination of corruption in international transactions. They argue that preferential trading arrangements aid in closing those gaps.

5.3 Sample Data

In this section, a brief description of the data is presented. A more detailed description of the data is provided in Appendix A. The time series were taken from different statistical sources in the United States, Mexico, Canada, and other countries. The sample's spans the period from 1986.1 to 2001.4 for all variables. All observations are quarterly and expressed in 1982-1984 U.S. Dollars.

6 DESCRIPTIVE TRENDS, ESTIMATION, RESULTS, AND HYPOTHESIS TESTS

This chapter begins with a general description of bilateral trade flows between the three NAFTA members. Subsequently, estimation results from the econometric model are examined. Next, the models were subjected to several hypothesis tests in order to ascertain the robustness of the coefficient values previously estimated. Finally, gross domestic product (income) and real exchange rate (price) elasticities and their confidence intervals are calculated and analyzed.

6.1 Descriptive Trends in the Data

The first noticeable element of the bilateral trade flows between the three NAFTA members is a considerable increase in two-way trade (Figure 6.1, Figure 6.2, and Figure 6.3). This phenomenon is evidenced in a stronger manner from 1994 onwards in all three cases. Thompson and Cavazos (2002), found there is a statistically significant breakpoint in the observations preceding and following the passage of NAFTA.

Despite such pronounced growth in the NAFTA period, the absolute values of bilateral trade flows between the three countries differ considerably. In the last quarter of 2001 U.S. imports from and U.S. exports to Canada were $28,141 and $21,691 million (82-84 dollars), respectively. In comparison, the value of U.S. imports from and U.S. exports to Mexico were each 65% of the

Figure 6.1

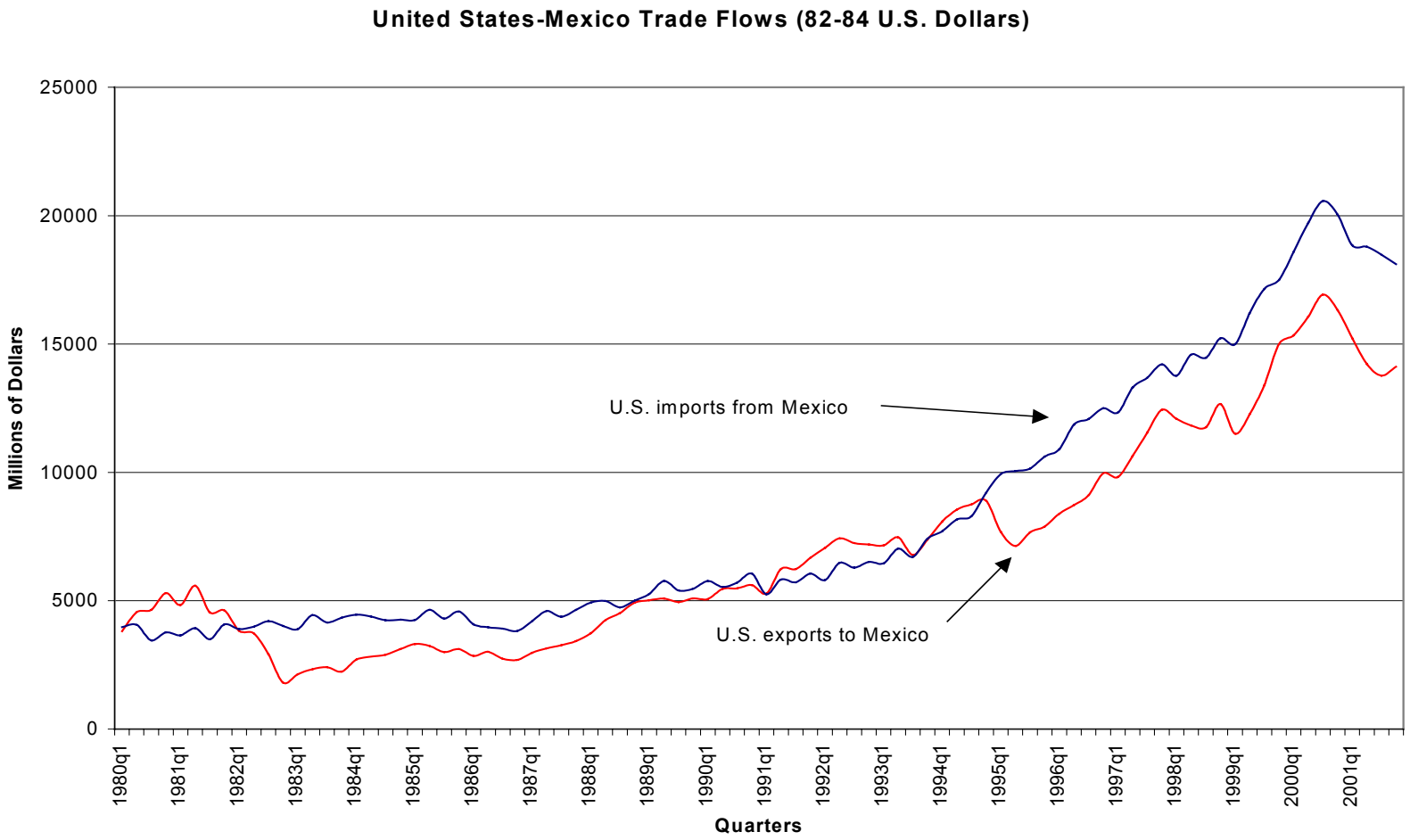

United States-Mexico Trade Flows (82-84 U.S. Dollars)
Millions of Dollars
25000
20000
15000
10000
5000
0
U.S. imports from Mexico
U.S. exports to Mexico
1980q1
1981q1
1982q1
1983q1
1984q1
1985q1
1986q1
1987q1
1988q1
1989q1
1990q1
1991q1
1992q1
1993q1
1994q1
1995q1
1996q1
1997q1
1998q1
1999q1
2000q1
2001q1
Quarters

Figure 6.2

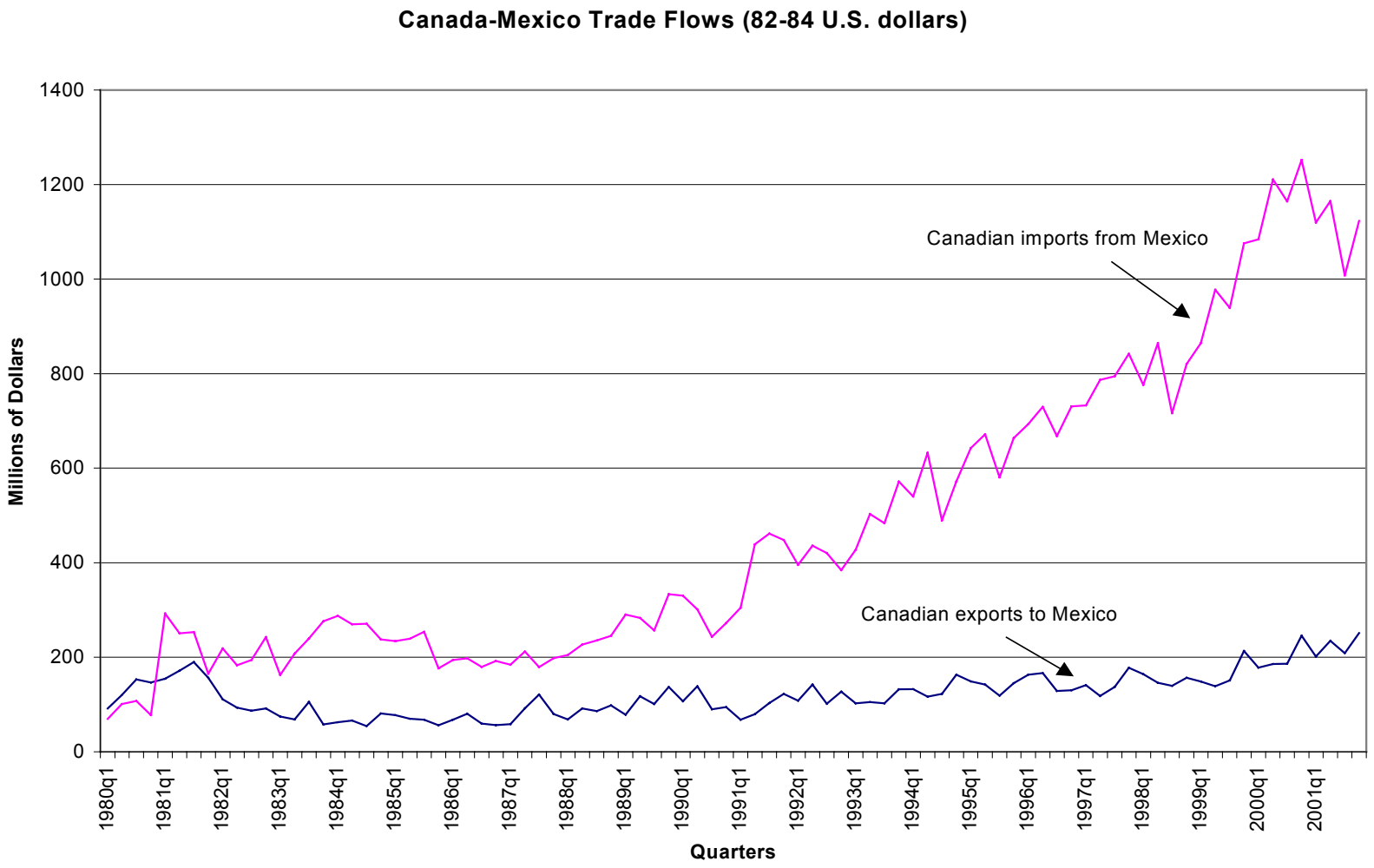
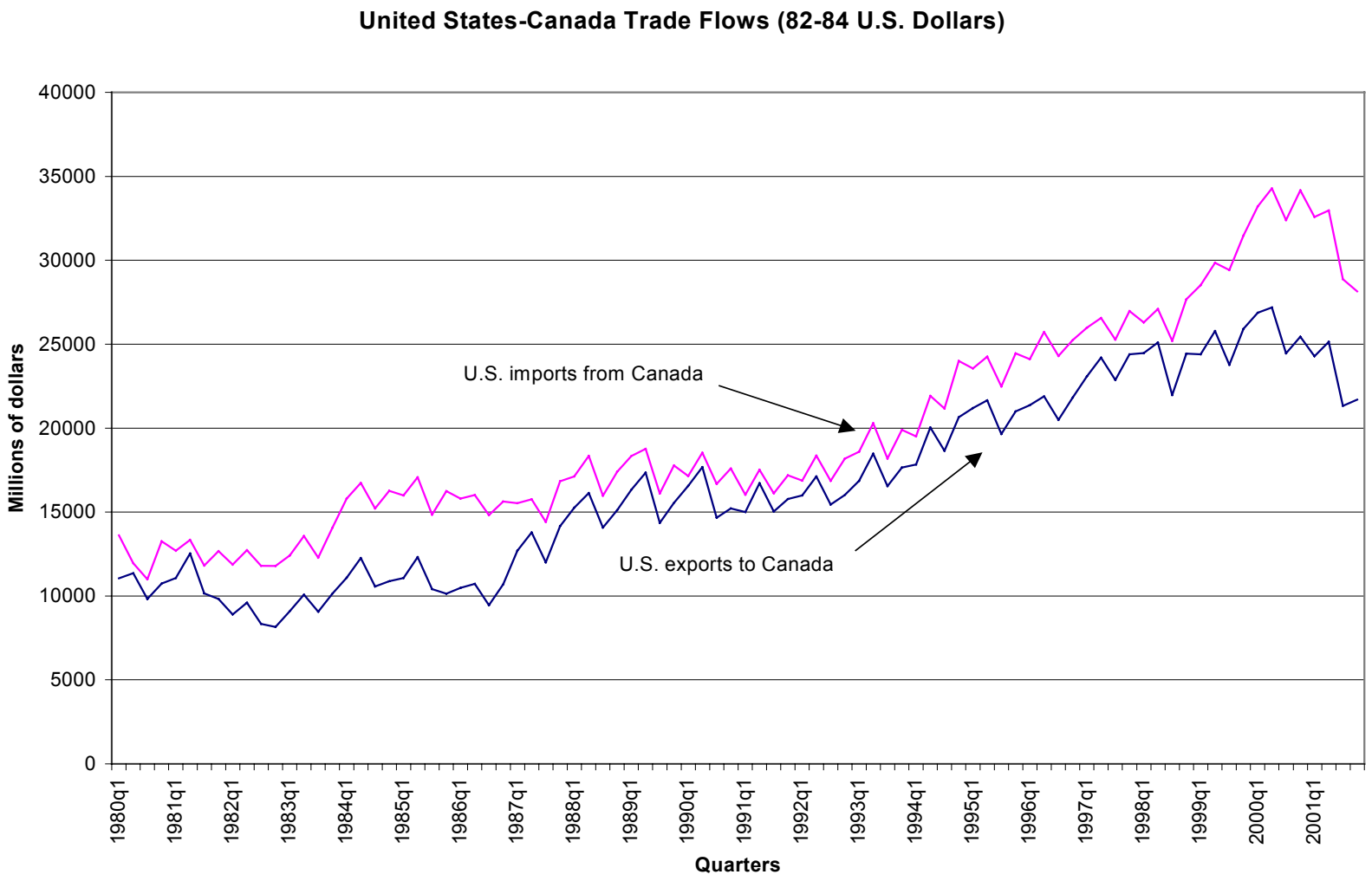

Canada-Mexico Trade Flows (82-84 U.S. dollars)
Millions of Dollars
1400
1200
1000
800
600
400
200
0
Canadian imports from Mexico
Canadian exports to Mexico
1980q1
1981q1
1982q1
1983q1
1984q1
1985q1
1986q1
1987q1
1988q1
1989q1
1990q1
1991q1
1992q1
1993q1
1994q1
1995q1
1996q1
1997q1
1998q1
1999q1
2000q1
2001q1
Quarters

Figure 6.3


United States-Canada Trade Flows (82-84 U.S. Dollars)
Millions of dollars
40000
35000
30000
25000
20000
15000
10000
5000
0
U.S. imports from Canada
U.S. exports to Canada
1980q1
1981q1
1982q1
1983q1
1984q1
1985q1
1986q1
1987q1
1988q1
1989q1
1990q1
1991q1
1992q1
1993q1
1994q1
1995q1
1996q1
1997q1
1998q1
1999q1
2000q1
2001q1
Quarters

dollar value traded among the United States and Canada. Similarly, Canada-Mexico trade flows represent a minute amount, only 3% and 1%, of imports coming to the United States from Canada and exports going in the opposite direction. However, Canadian imports from and exports to Mexico have grown 108% and 89%, respectively, since 1994.

6.2 Estimation and Results

Estimation of the model was performed in several stages. In this section there is a detailed description of each stage.

6.2.1 First Stage

Three alternative versions of the model were estimated. The difference between each version was the manner in which the rest of the world was handled. In the first version of the model, the individual time series of the importing country's bilateral real exchange rate with its biggest trading partners other than NAFTA members were aggregated to create a "rest-of-the-world" (ROW) real exchange rate. For the United States this series aggregated the real exchange rates for the United States vis-à-vis China, France, Germany, Japan, Korea, Singapore, Taiwan, and United Kingdom. For Mexico, the ROW real exchange rate summarized this country's bilateral real exchange rates with Germany, Japan, New Zealand, and South Africa. Finally, for Canada, it

compacted Canada's bilateral real exchange rate with China, Germany, Japan, Saudi Arabia, and the United Kingdom.[18]

In the second version of the model, several countries were selected from the simple average of ROW exchange rates just described. The criteria for selecting which countries to extract was a 10% or higher trade share with any NAFTA member. In the United States' case China and Japan were removed and the individual U.S.-China and U.S.-Japan real exchange rates were included as explanatory variables. The same procedure was undertaken for Mexico and Canada. The countries selected in the Mexican case were Germany and Japan. Likewise for Canada, the countries extracted from the aggregated time series were China and Japan. Similar to the United States' case, the individual bilateral real exchange rates series of the countries extracted from the aggregated ROW real exchange rate series were incorporated as explanatory variables.

The last version of the model only presents changes in the United States' case. Two more countries were removed from the second version's aggregated rest-of-the-world real exchange rate series. Those countries were Germany and the United Kingdom. The U.S. bilateral real exchange rates with those countries were included individually as explanatory variables. The setup for the Mexican and Canadian cases remained as in the second version. The reason for not modifying these two countries' setup was that their remaining trading partners represented a small amount of trade. Tables B.3, B.4, and B.5 contain the

[18] The information about which countries are the United States', Canada's, and Mexico's biggest

estimated coefficient values for the three models in stage one and is located in Appendix B.

6.2.2 Second Stage

The second stage consisted in eliminating statistically insignificant lags in the bilateral real exchange rate series that played the role of the imports' own price. This last variable was the U.S.-Mexico, U.S.-Canada, and Canada-Mexico bilateral real exchange rates depending on the equation. The criteria used to eliminate the lags were the p-values associated with the coefficients' t-statistic. If the p-value was greater than .15 that particular lag was discarded. Once the first set of lags not meeting the critical p-value were purged, the model was estimated again with the remaining lags.

The lagged coefficient estimates from this run that did not meet the critical p-value were eliminated. The criterion applied remained unchanged. Once the insignificant lags were cut from the model, coefficient values were estimated one last time. The values obtained from this version were the final coefficient estimates for the three alternative versions.

6.2.3 Results

The coefficients for only the second version of the model are reported in Table 6.1. [19]

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trading partners come from the Bureau of the Census for the United States and from United Nations Statistics Division for Canada and Mexico.

[19] The coefficient estimates for the first and third versions of the model are displayed in Tables B.9 and B.10 in Appendix B. The specification tests performed on the model suggested the second version fitted the data more precisely. The detailed explanation follows in the text.

Table 6.1 Final Estimated Coefficients Second Version

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-13314.2	[.000]	Constant	13685.5	[.000]
USGDP1	0.074221	[.000]	MXGDP1	0.556644	[.000]
USGDPC	-14.8372	[.000]	MXGDPC	-20.7709	[.019]
REXUSMEX	-13806.4	[.000]	REXUSMEX	-62667.6	[.000]
REXUSMEX-1			REXUSMEX-1		
REXUSMEX-2			REXUSMEX-2	-13654.7	[.029]
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4	-3798.93	[.484]
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6			REXUSMEX-6		
REXUSMEX-7			REXUSMEX-7	-18843.1	[.004]
REXUSMEX-8			REXUSMEX-8	-2225.8	[.715]
NAFTA	1123.31	[.008]	NAFTA	1821.2	[.000]
Q1	-740.113	[.000]	Q1	27.9038	[.898]
Q2	-113.262	[.547]	Q2	-41.3794	[.844]
Q3	-129.881	[.485]	Q3	760.259	[.001]
REXUSROW2	8172.06	[.070]	REXMXROW2	-3058.26	[.000]
REXUSCAN	-1252.47	[.559]	REXCNMX	-26738.6	[.000]
REXCHJPUS	-132990	[.167]	REXMXGE	914.313	[.147]
REXCHRUSCHINA	28332.6	[.000]	REXMXJP	69007.8	[.020]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	1709.54	[.816]	Constant	11929.6	[.257]
USGDP1	0.083533	[.000]	CANGDP	0.357693	[.000]
USGDPC	-18.6628	[.000]	CANGDPC	-2.20955	[.354]
REXUSCAN	11692.6	[.048]	REXUSCAN	-40382	[.000]
REXUSCAN-1			REXUSCAN-1		
REXUSCAN-2	-12625.8	[.021]	REXUSCAN-2		
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6			REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	2474.9	[.003]	NAFTA	739.976	[.280]
Q1	-823.65	[.031]	Q1	1802.4	[.000]
Q2	336.536	[.361]	Q2	1920.37	[.000]
Q3	-1443.93	[.000]	Q3	-1661.83	[.000]
REXUSROW2	6838.13	[.453]	REXCNROW2	10019.4	[.000]
REXUSMEX	-11815.2	[.130]	REXCNMX	-5229.85	[.217]
REXCHJPUS	365747	[.061]	REXCNCHI	-9727.05	[.216]
REXCHRUSCHINA	33156.2	[.006]	REXCNSAR	-3746.04	[.837]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-11.2422	[.989]	Constant	225.13	[.000]
CANGDP	0.037863	[.000]	MXGDP1	9.10E-03	[.001]
CANGDPC	-0.451378	[.009]	MXGDPC	-0.327053	[.251]
REXCNMX	129.225	[.666]	REXCNMX	-251.688	[.367]
REXCNMX-1			REXCNMX-1		
REXCNMX-2			REXCNMX-2	-56.0379	[.681]
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4		
REXCNMX-5			REXCNMX-5		
REXCNMX-6	854.836	[.000]	REXCNMX-6	208.178	[.129]
REXCNMX-7			REXCNMX-7	-19.8184	[.886]
REXCNMX-8			REXCNMX-8		
NAFTA	-123.206	[.009]	NAFTA	2.48365	[.811]
Q1	79.5092	[.002]	Q1	-14.0604	[.043]
Q2	68.3773	[.001]	Q2	-9.1869	[.161]
Q3	-92.2701	[.000]	Q3	-3.60862	[.632]
REXCNROW2	-341.32	[.055]	REXMXROW2	78.2002	[.001]
REXUSCAN	-3268.71	[.000]	REXUSMEX	-1962.86	[.000]
REXCNCHI	-492.309	[.373]	REXMXGE	-75.2987	[.000]
REXCNSAR	2409.18	[.071]	REXMXJP	-526.534	[.610]

Sample 1986:1 2001:4

REXUSROW2=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHUKUS+REXCHFRUS+REXCHGEUS)/6;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

The model's variance-covariance matrix is presented in Table 6.2.

Table 6.2

Variance-Covariance Matrix of Estimated Residuals					
270356.4	123867.7	397199	224687.4	12244.9	-3071.443
123867.7	309822.5	305595.2	118729.6	-2878.574	2694.641
397199	305595.2	1034772	513157.8	3252.503	-1733.731
224687.4	118729.6	513157.8	568691.1	6829.874	-1189.275
12244.9	-2878.574	3252.503	6829.874	2708.899	-329.3763
-3071.443	2694.641	-1733.731	-1189.275	-329.3763	304.4006

6.2.3.1 GDP or "Income" Effects

The income variable, represented by the importing country's gross domestic product, had a positive effect in all estimated equations. Additionally, it was highly significant in five of the six equations. The exception was the Mexican gross domestic product in the equation describing Canadian exports to Mexico. The other income variable, gross domestic product per capita, displays a negative sign everywhere. However, the magnitude of its effects and statistical significance are mixed and unclear. To eliminate this uncertainty the partial derivative of the trade flows in every equation with respect to GDP was calculated to examine the marginal effect of GDP on trade flows.[20] Although the coefficients associated with GDP per capita are negative, evaluating the partial derivatives at sample means results in positive GDP elasticities in all six equations (Table 6.3). The elasticity values support the expectation of the

[20] The derivative takes the following form: $\frac{\partial T_i}{\partial GDP} = \beta_{GDP} + \beta_{GDPpercap} \Big/ POP$, where T_i represents trade flows, β_{GDP} is the estimated coefficient associated with gdp, $\beta_{GDPpercap}$ is the estimated coefficient associated with per capita gdp, and POP is the importing country's total population. Subscripts on GDP are suppressed for convenience.

positive relationship and importance of income in determining the amount of goods imported by NAFTA members.

Table 6.3

Current Period GDP and Rest-of-the-World Elasticities*												
U.S. imports from Mexico		U.S. exports to Mexico		U.S. imports from Canada		U.S. exports to Canada		Canadian imports from Mexico		Canadian exports to Mexico	
GDP	2.11 **[.000]**	GDP	2.27 **[.000]**	GDP	**0.64 [0.01]**	GDP	1.49 **[.000]**	GDP	3.84 **[.000]**	GDP	**2.44 [.000]**
U.S.-Rest of the World	0.27 **[.07]**	Mexico-Rest of the World	-0.70 **[.000]**	U.S.-Rest of the World	0.10 [.453]	Canada-Rest of the World	0.44 **[.000]**	Canada-Rest of the World	-0.49 **[.055]**	Mexico-Rest of the World	1.14 **[.001]**
U.S.-Canada	-0.08 [.559]	Canada-Mexico	-0.86 **[.000]**	U.S.-Mexico	-0.09 [0.13]	Canada-Mexico	-0.07 [.217]	U.S.-Canada	-3.67 **[.000]**	U.S.-Mexico	-2.56 **[.000]**
U.S.-Japan	-0.08 [.167]	Mexico-Germany	0.25 [.147]	U.S.-Japan	0.09 **[.061]**	Canada-China	**-0.09** [.216]	Canada-China	-0.14 [.373]	Mexico-Germany	-1.33 **[.000]**
U.S.-China	0.32 **[.000]**	Mexico-Japan	0.28 **[0.02]**	U.S.-China	0.17 **[.006]**	Canada-Saudi Arabia	-0.05 [.837]	Canada-Saudi Arabia	1.15 **[.071]**	Mexico-Japan	-0.14 [0.61]

p-values in brackets.

*Elasticities calculated by the delta method at the means of all variables, dependent and explanatory.

Bold number indicate statistically significant elasticities.

6.2.3.2 Real Exchange Rate Effects "Own Price"

Bilateral real exchange rates (brer) that play the role of own price. The U.S.-Mexico, U.S.-Canada, and Canada-Mexico exchange rates take this role in the respective pairs of equations. The results obtained are interesting because (1) the coefficients' signs do not seem to match previous expectations and (2) some equations do not have lags of this variable. It is only in the first equation that the associated coefficient has the expected negative sign. The fact that the coefficients' signs do not match expectations suggests the inclusion of lagged exchange rates may be important.

Previously, in Chapter 4, it was acknowledged that the real exchange rate's effects build slowly over time. Additionally, trying to measure all of these lagged effects in the current period could impose unnecessary restrictions on the model and lower the degrees of freedom. Moreover, when attempting to interpret the estimated coefficients, there appears to be evidence of a J-Curve effect in five of the six equations. This J-Curve effect implies the existence of institutional factors that prevent the immediate adjustment of bilateral trade flows to fluctuations in exchange rates: such factors may include stickiness in prices, slow pass-through from the exchange rate into import and export prices, and binding contracts previously agreed upon. Empirically, when faced with a J-Curve the amount of goods imported increases relative to the quantity exported and the deficit in the current account worsens before it begins to improve.

In order to corroborate the results explained in the preceding paragraph elasticity values were calculated for these six exchange rates (Table 6.4). These elasticities are "total-effect elasticities" because they incorporate all contemporaneous and lagged effects.[21] The value of the elasticities verified the presence of a J-Curve effect in four of the six estimated equations. The most notorious of these J-Curves appeared in the second equation, U.S. exports to

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[21] The elasticity takes the following form: $\mathrm{E}_i = \sum_{j=0}^{J} \frac{\partial T_{i,t-j}}{\partial REX_{t-j}} * \left(\frac{REX_{t-j}}{T_{i,t-j}} \right)$, where j counts the number of lags included in the regression equation, $T_{i,t-j}$ represents bilateral trade flows, and REX_{t-j} represents the real bilateral exchange rate. There will be as many terms in this sum, J, as lags in the bilateral trade flow equation.

Mexico, followed by a more subtle one in the equation describing Canadian imports from Mexico. The exceptions were U.S. imports from Mexico, which displayed the expected sign in the current period, and the Canadian exports to Mexico equation, whose elasticity is always positive.

Table 6.4

Exchange Rate Elasticities*						
Equation	**U.S. imports from Mexico**	**U.S. exports to Mexico**	**U.S. imports from Canada**	**U.S. exports to Canada**	**Canadian imports from Mexico**	**Canadian exports to Mexico**
Current Period	-0.24 [.000]	-1.28 [.000]	0.34 [.048]	-1.38 [.000]	0.06 [.666]	-0.52 [.367]
lag 1						-0.11 [.681]
lag 2		-0.27 [.029]	-0.37 [.021]			
lag 4		-0.08 [.484]				
lag 6					0.37 [.000]	0.41 [.129]
lag 7		**-0.37** [.004]				-0.04 [.886]
lag 8		**-0.04** [.715]				
Sum	-0.24 [.000]	-2.04 [.000]	-0.03 [.818]	-1.38 [.000]	0.43 [.012]	-0.26 [.606]

p values in brackets

lag 3 and lag 5 are not shown because they were statistically insignificant in the final stage of estimations

*Elasticities calculated by the delta method at the means of all variables, dependent and explanatory

Finally, the elasticity values in both U.S.-Canada equations show there is evidence of a J-curve. However, these values are close to zero and, more importantly, the associated t-statistics and probabilities do not allow rejection of the null hypothesis that the estimated elasticity values are not different from zero. This last piece of information suggests these results should be taken with some skepticism.

6.2.3.3 NAFTA Effects

The effects emanating from NAFTA were captured through an indicator variable. It is true that this method is less refined than is desired. Nonetheless, it is impossible to quantify everything NAFTA represents. It is not possible to quantify some types of non-tariff barriers such as phyto-sanitary standards or the way NAFTA became a commitment mechanism for Mexican trade policy. Additionally, data on aggregate tariffs by country are simply not available. There are regulations for each disaggregated product and even if some economy-wide measure of tariffs could be obtained, it is not clear what it would stand for as a proxy.

Despite its shortcomings, the indicator variable yielded appealing results. NAFTA affected each of the three countries in dissimilar manners. Its effects on Mexico are more visible than in the United States and Canada. The estimated coefficient values show that in both United States-Mexico equations NAFTA had a positive statistically significant effect. In concrete terms U.S. imports from Mexico have increased by 11.5% and U.S. exports to Mexico have increased by 21.9% due to NAFTA.[22]

In the United States-Canada equations, only one NAFTA coefficient is statistically significant. This is probably because the United States and Canada had already formalized their trading partnership into the CUSTA in 1989. In essence, bilateral trade had already begun to adjust to liberalization between

these countries. Additionally, Canada and the United States have a long history as each other's biggest trading partners. Given all these circumstances, it is perhaps not surprising that not all the NAFTA indicators are statistically significant. Even though the results are to be taken with caution, in percentage terms U.S. imports from Canada increased 11.2% and U.S. exports to Canada increased by 3.9% due to NAFTA.[23]

The new developing trade partnership between Canada and Mexico registers as statistically significant only in one equation: Canadian imports from Mexico. However, the estimated NAFTA coefficient is negative and shows a decrease of 21.3%. The effects of NAFTA on Canadian exports to Mexico are also negative, however, only marginal: a decrease of 1.9%. These figures contradict the descriptive analysis in the first part of this chapter displayed in Figure 6.2, to the pronounced increase in products coming into Canada from Mexico, and from the tests of structural change performed on the bilateral trade flows by Thompson and Cavazos (2002).

Finally, all NAFTA coefficients were jointly tested in a Lagrange multiplier test. The results of this test suggest that NAFTA's effects are definitely different from zero. The p-value obtained allowed rejection of the null hypothesis at a 99% level of confidence.

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[22] These percentages were calculated by dividing the estimated coefficient over the dependent variable's mean.

[23] These percentages were calculated in the same manner as the previous ones, dividing, thee estimated coefficient over the dependent variable's mean.

6.2.3.4 Rest of the World Effects

Even though for both Canada and Mexico trade with the United States amounts to about 75% of their total trade, the United States has no single trading partner accounting for even half of all its trade. The U.S. trade is highly diversified and has a significant trade relationship with China and Japan, among other countries. Moreover, omitting U.S. trade with the rest of the world would be a serious oversight. The way in which the rest of the world was included in the econometric model was an innovation made in this thesis. Additionally, with this methodology the unrefined indicator variables commonly used to capture trade effects of other countries in previous studies were eliminated.

Winters and Chang (2000) argue that utilizing indicator variables is not appropriate. When one analyzes empirically the effects of a preferential trading arrangement on the rest of the world, it should be examined through the terms of trade because these can increase or decrease a country's welfare. In this case, by using the real exchange rate, the terms of trade are being included indirectly in the foreign and domestic price indices. In any case, the method of measuring the effects of the rest of the world on NAFTA trade has moved away from simple dummy variables.

The interpretation of the estimated coefficients on these "rest-of-the-world" variables and the importing country's bilateral real exchange rates with its biggest trading partners would suggest two things. On one hand, if the coefficient has a positive sign, imports coming into or exports going from that NAFTA member

would increase NAFTA trade and benefit that pair of countries (the NAFTA member and that particular non-member). On the other hand, if the coefficient has a negative sign, then imports or exports, depending on the type of equation, between that pair of countries would tend to decrease NAFTA trade flows and hurt that particular pair of countries.

Looking at Table 6.1 five out of six equations present both positive and negative signs on these coefficients. Only the equation describing U.S. imports from Mexico presents all positive coefficients. This explanation and interpretation becomes highly speculative at this point because due to the highly aggregated data it is not possible to unequivocally say that imports are complementary or substitutes to another country's imports, exports, or to domestically produced goods. An analogous explanation applies to the effects of ROW exchange rates on exports. Table 6.3 presents the Rest-of-the-World elasticities calculated at the means of the dependent and explanatory variables.

6.2.3.5 Seasonal Effects

The last effects to be interpreted are the quarterly indicator variables included in all equations. These were expressly incorporated to pick up any seasonal pattern in the data. As suspected, the equations that involve Canada either with the United States or with Mexico display the most pronounced seasonality. The explanation does not have to do with economic factors but with meteorological and geographic ones. Canada is the northernmost country in NAFTA and as such has the longest and coldest winters of the three countries.

This situation most likely slows productive economic activity during the winter months. In the U.S.-Mexico trade equations only one quarterly indicator is significant in each.

6.3 Hypothesis Tests

A last set of hypotheses were tested regarding the econometric specification.[24] These tests were expressly intended to examine and verify the number of lags included and which rest-of-the-world variable aggregation would best portray NAFTA bilateral trade flows.

6.3.1 Lagrange Multiplier Tests to Account for Lags

The first set of tests employed were Lagrange Multiplier statistics. These particular statistics were chosen because they yield the smallest Chi-squares compared to Wald and Likelihood ratio tests. If the null hypothesis is rejected with Lagrange multipliers it will also be rejected with Wald or Likelihood ratio tests statistics (Berndt 1991). The first Lagrange multiplier test compared a full model with 8 lags against a static one. The second compared a model incorporating 4 lags against a model with no lags. Finally, the last Lagrange multiplier test in this set contrasted a 4 lag model against an alternative 8 lag model. The results, reported in Table 6.5, are mixed and in some cases do not substantiate *a priori* expectations about the existence and presence of lagged effects caused by the “own-price” variable. Only in three cases the null

[24] All three versions of the model were subjected to the same hypothesis tests.

hypothesis were rejected in favor of the alternatives. The magnitudes of the χ^2 values and associated probabilities corroborate the previous statement.

Table 6.5

Lagrange multiplier Tests of Alternative Specifications (p-values in parenthesis)

	Static vs 8 lags	Static vs 4 lags	4 lags vs 8 lags	Lags in export equations only	Lags in import equations only	Alternative ROW Specifications	
						ROW2	ROW3
ROW1	57.84	34.64	28.53	47.42	21.50	45.77	55.20
	[0.16]	**[0.07]**	[0.24]	**[0.00]**	[0.61]	**[0.00]**	**[0.00]**
ROW2	53.69	20.16	38.36	27.57	23.85		10.44*
	[0.27]	[0.69]	**[0.03]**	[0.28]	[0.47]		**[0.03]**
ROW3	58.80	22.57	41.59	32.87	24.32		
	[0.14]	[0.55]	**[0.01]**	[0.11]	[0.44]		
Chi-square degrees of freedom	48	24	24	24	24	6	6 (*4)

Lagged values for the bilateral real exchange rate variable playing the role of the price of imports only

Bold numbers indicate statistically significant Chi-square values.

A second set of Lagrange multiplier tests was undertaken to investigate the possibility of including lags only in either export or import equations, respectively. For the first case, the null hypothesis consisted in assuming all lagged coefficients in the import equations were zero against an alternative that they were not. This procedure involves estimating a restricted model with lags only in the export equations. For the second case, the null hypothesis was similar to the one just explained above. The difference was the lagged coefficients in the export equations were hypothesized to take a value of zero. A restricted model

with lags only in the import equations was estimated. The results are also displayed in Table 6.5.

The information contained in Table 6.5 regarding the preceding tests is interesting. It is surprising that the null hypothesis cannot be rejected in the second case (lags present only in import equations) and it is unclear whether it can be rejected for the first one (lags only in export equations). The results of these two tests suggest differences in the lag structure specification of each equation in the model. These tests verify and support that the elimination of unnecessary lags in the previous stage was not only appropriate but was also justified to ensure a parsimonious econometric model. However, the outcomes of the tests do not explicitly show which lags should be eliminated or kept.

6.3.2 Lagrange Multiplier Tests to Account for the Rest of the World

The third set of tests performed on the model was intended to inspect which rest-of-the-world variable was better suited to capture the effects of non-NAFTA trade. The question was whether a more aggregate variable such as the one in the first version compared against not so aggregated variables as in versions two and three would be more appropriate better suited to account for the rest of the world. The results of the tests are presented in Table 6.5.

The possibility of having completely aggregated exchange rates (ROW1) was strongly rejected when compared individually to ROW2 and ROW3. When the second version (ROW2) was compared to ROW3 the p- value suggests the null hypothesis of ROW2 can be rejected. However, not in such a definite

manner as the two previous ones. This result would suggest that among the set of each country's biggest trading partners, the exchange rates for the largest trading partners should be included individually. Consequently, as the volume of trade decreases the other countries in the set can be aggregated before being incorporated in the model.

6.3.3 Davidson and MacKinnon Tests for Model Specification

The fourth and last set of tests performed on the model were designed by Davidson and MacKinnon (1983). This test is non-nested and intended to contrast different models purporting to explain the same event. The rationale for applying this test was to compare the final econometric specification of the three estimated versions of the model against each other. Essentially, the final remaining lags and the specific rest-of-the-world variable in one version should be mutually tested against the other two alternatives individually and jointly. But the three models are not nested so that the multivariate non-nested tests of Davidson and MacKinnon become necessary.[25] The outcomes from the tests would suggest which version of the model explains bilateral trade flows between NAFTA members better. The tests' results are shown in Table 6.6.

The outcomes from these Davidson and MacKinnon (DM) tests support the previous set of test results in which the various rest-of-the-world specifications were tested. The DM test results indicate ambiguity regarding the

[25] Table B.11 located in Appendix B provides details about which exact variables are being tested against each other.

first and second alternatives. The reader will notice that the first alternative specification (ROW1) was rejected when compared to the other two versions individually and jointly. When the direction of the test was reversed and the second alternative (ROW2) was compared to ROW1 and the third alternative (ROW3) individually and jointly the test did not reject all null hypotheses. Variable ROW3 failed to unmistakably reject the second version. The ambiguity arises at this point because ROW1 and jointly ROW1 and ROW3 did reject the second version. This points out that the best model to explain bilateral trade flows between NAFTA members is between the first and second alternatives. Additionally, the joint rejection of ROW2 by ROW1 and ROW3 is apparently driven solely by ROW1. When the test examined ROW3 against ROW1 and ROW2 individually and jointly all null hypotheses were rejected.

Table 6.6

Davidson and MacKinnon Tests						
				Alternative		
Null	Row1	Row2	Row3	Row2 and Row3	Row1 and Row3	Row1 and Row2
Row1		6.344	5.942	20.059		
		0.000	**0.000**	**0.000**		
Row2	4.068		1.659		8.565	
	0.002		**0.098**		**0.000**	
Row3	4.630	1.828				10.805
	0.002	**0.069**				**0.000**

Each specification of the rest of the world is being tested jointly with lags

The first 3 columns are t-statistics and the rest are F statistics.

P-values in bold type

After all these tests, the final step consisted in choosing the version of the model that could best explain bilateral trade flows. The second alternative version was chosen. This version of the model endured the majority of the

hypothesis tests. This conclusion holds, even though, version one rejected version two in the DM tests. This rejection casts a bit of doubt on the model's reliability; however, there certainly is no better alternative.

7 SUMMARY AND CONCLUSIONS

This thesis started by stating three objectives: to describe the evolution of NAFTA, to identify the determinants of bilateral trade flows and their evolution among NAFTA members, and to measure the economic impact of the rest of the world on bilateral trade flows between NAFTA members. As stated, the objectives appear uncomplicated enough; however the analysis was more complicated for many reasons. Probably the biggest difficulty, was the realization that there is no controlled laboratory experiment that can be performed to measure NAFTA's impacts. Further, in the macroeconomic context so many events happen simultaneously that it is quite difficult and perhaps sometimes impossible to isolate their effects completely from each another.

Nonetheless, researching and writing, in general, about the economics of preferential trading arrangements and, in particular, about NAFTA has been an illuminating experience. The economics of preferential trading arrangements are more complicated than meets the eye. They are an exercise in selecting second best options because, currently and in the foreseeable future, the first-best option — worldwide free trade— is not attainable.

As a consequence of the realization that worldwide free trade is not attainable, there has been a renewed interest by governments to engage in free trade agreements. This second wave of regional economic integration started with the U.S.-Israel free trade agreement in 1985. It continued through the decade of the 90's and has not lost any momentum. During that period, the

European Union has integrated and expanded to become the most successful example of a preferential trading arrangement. Because of the new found vigor and increasing number of preferential trading arrangements it is worthwhile to investigate the effects of such agreements on member and non-member countries.

With the idea of analyzing these impacts as motivation, Chapter 2 investigated what are preferential trading arrangements, the reasons countries create them, the inherent differences between the various types of preferential trading arrangements, and their welfare effects. It may seem counterintuitive that if obstacles to trade are eliminated, some countries could actually have a reduction in social welfare. However, with the implementation of preferential trading arrangements this situation is possible because of the displacement non-member countries' trade flows face when a preferential trading arrangement is created. Additionally, there is no clear consensus on whether forming free trade areas will lead the rest of the world closer to free trade. On this last point, there is serious debate between highly respected economists with no obvious answer. Even one of the economists, Paul Krugman, has stated contradicting arguments regarding the welfare effects of preferential trading arrangements. The future evolution of freer trade is uncertain and whether the world is closer to free trade due to the presence of regional economic blocs is not apparent.

Going from a general discussion about preferential trading arrangements, Chapter 3 set the stage for the particular free trade area to be investigated,

NAFTA. Detailed descriptions of the agreement, its members and their trade history, economies, and motivations to engage in such partnership were offered. The more problematic sectors and areas involved in the negotiation of NAFTA were discussed. Although it may be less appreciated outside of Mexico, NAFTA represented the commitment device that conferred permanence to trade liberalization in Mexico. This commitment meant the complete abandonment of the import-substitution industrialization model. In Mexico, this development model was abused as it was employed for longer than it was intended or even useful. Additionally, engaging in NAFTA meant privileged access for Mexican products to one of the largest markets in the world as well as stimulation of a considerable amount of foreign direct investment. For Canada and the United States, NAFTA meant having unimpeded access to another country's markets and, perhaps, as important, easier access to cheaper labor. NAFTA opened the door for Canadian and U.S. firms to reduce on variable costs substantially.

In order to measure and quantify the effects of NAFTA, Chapter 4 reviewed previous research about preferential trading arrangements and bilateral trade flows. Two approaches to measure trade flows were surveyed: the gravity model, nicknamed the "workhorse" of international trade studies, and the import-demand and export-supply framework, which allows the effects of income and real exchange rates to be measured in an elasticity format. Both approaches provide relatively simple means for measuring the impacts of free trade agreements. In past research, these two methods have often been treated as

mutually exclusive. However, in this thesis they have been combined. Abandoning the gravity model which has consistently shown empirical success would not seem well advised. Moreover, by also employing the import-demand and export-supply approached and by estimating the impact of the determinants of bilateral trade flows between NAFTA members for each country, allowed this research to answer more questions than by using either one of the two methodologies in isolation.

Chapter 5 presented the econometric specification of the hybrid gravity equation. The model is termed “hybrid” because it incorporates the variables commonly used in gravity models such as the importing country’s gross domestic product and an indicator variable to measure the effects of NAFTA. On the other hand, this hybrid also includes the real exchange rate between the origin and destination countries to account for price effects. This variable is usually employed in import-demand and export-supply frameworks. In addition, gravity equations are typically specified as single-equation models. In contrast, the hybrid model employs six equations, two for each NAFTA member, estimated as a seemingly unrelated system. Another innovation of the model is the inclusion of real exchange rates between each NAFTA member and its most prominent non-NAFTA trading partners. These variables were included to account for trade with the rest of the world. The intention of including these exchange rates was to obtain a measure of the relative cost of imports from non-NAFTA members and attractiveness of exports to those countries. Winters and Chang (2000) argue

that the appropriate way to measure the effects of preferential trading arrangements on the rest of the world is through the terms of trade. Including real exchange rates is consistent with using the terms of trade to measure the impacts of free trade agreements because the real exchange rate is constructed using the ratios of domestic price levels of trading partners. The main objective was to replace the indicator variables usually employed to account for trade with the rest of the world with more information variables.

In Chapter 6, the estimation results were presented. The hybrid gravity model performed well. Before the final specification was chosen several sets of hypothesis tests were performed to choose lagged values of the bilateral real exchange rate. Once these were done the coefficient values provided useful information. In particular the income variable performed according to expectations. Even though the per capita gross domestic product variable presented a negative sign in all equations, the income elasticity values showed that its effects are considerably diminished by the population figures. It is safe to say that income or gross domestic product definitely has an important influence on bilateral trade flows between NAFTA members.

The bilateral real exchange rate that took the role of own price did not match expectations in four of the six equations. There was evidence of the presence of a J-curve in those four equations. Nonetheless, the model was able to recognize such a phenomenon and no erroneous judgements were made. It was confirmed that this variable's effects accumulate slowly over time. The

inclusion of lags is a necessary step in order to obtain a well-specified econometric model. Additionally, it was possible to determine that the bilateral real exchange rate is a determinant of trade flows between NAFTA members and it should definitely be included in such research.

The NAFTA indicator variable displayed heterogeneous results. Forgetting for a moment the unrefined way in which these measurements were done, the evidence pointed out that Mexico benefited more from NAFTA than the United States and Canada. Unfortunately, I was unable to obtain a more accurate measure of NAFTA, such as a weighted average tariff by country, and thus the statistical significance of this variable cannot be solely attributed to the free-trade agreement. It is necessary for further research to find a better measure for NAFTA than a dummy variable. Additionally, NAFTA's impact as a commitment device was overlooked due to the difficulties in quantifying some of its particular characteristics.

When the research's scope is broadened to look at the evolution of NAFTA, perhaps starting with the CUSTA, it may be possible to establish with more certainty the gains that this preferential trading arrangement has brought to Canada and the United States. From the evidence obtained here there was approximately 5% increase for U.S.-Canada trade flows. However, these results should be taken carefully due to their lack of statistical significance. Finally, for Canada and Mexico trade flows, NAFTA showed a negative impact. This is puzzling and currently I cannot offer any explanation.

The impact of the rest of the world on NAFTA members' bilateral trade flows is a subject that should be investigated with more depth in future research. In this first attempt, interesting results emerged. The rest of the world had both, positive and negative, effects on bilateral trade flows between NAFTA members. According to the interpretation of this variable a positive coefficient would imply a trade enhancing effect due to NAFTA. On the contrary, if the coefficient is negative, NAFTA had a trade decreasing or trade competing effect on bilateral trade flows. Because, I believe, this is the first research paper to include the rest of the world in this manner further research should be devoted to the interpretation of these coefficients.

The chosen econometric model was subjected to various hypothesis tests. The tests were used to select lag structure and the type of aggregation for the rest-of-the-world variables, individually and then jointly. The second version of the model, which treated the rest-of-the-world in a more disaggregated manner than the first version jointly with the lag structure performed the best on all hypothesis test. Due to this information and evidence, the second version was chosen as the one that could best explain the evolution and variation in bilateral trade flows between NAFTA members. However, there are areas where further research is needed. These areas are related to endogeneity (i.e. Hausman tests) and error term structure (i.e. auto-regressive tests). Once these areas have been examined the model's robustness will be enhanced considerably.

Given the foregoing results obtained from relatively sophisticated models and econometric methods, what does all this mean? Why should anyone care? First, the theory of preferential trading arrangements does not indicate unambiguous improvements in welfare for all countries. Despite widespread support for free trade agreements, economic theory does not provide unequivocal support for such agreements.

Second, it is not clear that by creating free trade areas the world is closer to free trade. Respected academicians come to contradicting conclusions regarding this topic. If this movement towards regionalization implies free trade is being approached, of what use would multilateral trade organizations be? Would it be better to completely bypass multilateral negotiations because of protracted negotiation periods, the intractably large number of negotiating parties, and the highly sensitive sectors that many countries want to protect?

Third, this thesis suggests that liberalizing trade may be highly beneficial for small economies. In Mexico's case, the projected outcomes definitely point in that direction. However, these potential rewards for small economies do not come without risks. Whenever two or more countries engage in such partnerships, they become mutually dependent. When economic growth occurs the benefits are many and abundant for all. However, when economic times are not so good, economic integration means trading partners share losses which may cause severe problems in smaller economies. Such is likely the case with the transmission of the United States' recession to Canada and Mexico during

the latter part of 2001 and beginning of 2002. Over that period the growth rate of Mexico's gross domestic product has been negative, suggesting Mexico's smaller economy is affected more adversely than the larger economies of its NAFTA partners.

Fourth, it is important to understand that free trade has more benefits than just inducing increases in trade flows. In the long run, free trade produces economic growth due to its impact on competition and innovation. Not all sectors in each economy will benefit. There are adjustment and displacement costs. However, on the aggregate and in the long run, the general overall level of welfare will be increased. Policy makers should appreciate these longer run effects of free trade. On the macroeconomic side, imports and exports determine the deficit in the trade balance and free trade brings cheaper imports of final and intermediate goods. This affords consumers enhanced choice and access to better quality products. Moreover, cheap imports permit consumers to purchase more with constraining budgets. On the other hand, one must not forget that free trade by itself will not correct income distribution and wealth concentration problems, which are probably the cause for demonstrations against freer trade.

Finally, the future evolution of NAFTA is not clear. Most evidence suggests it will be expanded thereby inducing a higher degree of economic integration. Whether NAFTA will ultimately lead to the formation of a single economic union as the European Union is not clear. Substantive differences in the three member economies may preclude such a union. In any case, if

expansion is the next step, the accession mechanism must be defined. If deeper integration is the next step, then coordination and cooperation policies have to be defined and implemented in all countries. In short, there are still a considerable number of issues to be addressed before any further integration is achieved as a result of NAFTA.

APPENDIX A DATA DESCRIPTION

A description summary of the time series used in this thesis is presented in Table A.1. It includes the names of the series, the source, the period it covers, and the website address, if it was taken from an agency's electronic site in the Internet. Some of the series were not free of charge (especially those taken from Statistics Canada). The written description of the sources follows.

A.1 Data Sources

The data were taken from different statistical offices in the United States, Mexico, Canada, other countries, and some international organizations. The statistical offices in the United States were the Bureau of Economic Analysis (BEA), the Federal Reserve Bank in Saint Louis (FRED), and the Bureau of Labor Statistics (BLS). In Mexico, the sources were the Instituto Nacional de Geografia, Estadistica e Informatica (INEGI) and the Banco de Mexico (Banxico). In Canada, the sources were Statistics Canada (Statcan) and the Bank of Canada. For other countries, the Monthly Bulletin of Statistics of the Republic of China (MBSRC), the Chinese Central Bank (CCB), the National Statistics Office of the Republic of Taiwan (NSORT), and the National Statistics Office of Korea (NSOK) were used. Finally from international sources, the International Monetary Fund's International Financial Statistics (IFS), the World Bank (World Bank), and the Population Reference Bureau's (PRB).

The U.S. GDP in current dollars came from the BEA. From the FRED: total exports from the United States to Mexico, total exports from the United States to Canada, total imports of the United States from Mexico, total imports of the United States from Canada, and the U.S Dollar exchange rates to Canadian Dollars, German Marks, French Francs, Chines Yuan, Japanese Yen, Singapore Dollars, South Korean Wons, British Pounds, New Zealand Dollars, and South African Rand. From BLS came the U.S. Consumer Price Index for all urban consumers. From the INEGI: the Mexican GDP in current pesos and the Mexican Consumer Price Index and from the Banco de Mexico: the U.S. Dollar to Mexican Peso exchange rate. From Statcan: the Canadian GDP, total exports from Canada to Mexico, total imports of Canada from Mexico, the United Kingdom, France, Germany, New Zealand, and Japan's Consumer Price Indices. The Canadian Consumer Price Index was taken from Statcan and the Bank of Canada. From the MBSRC: the Chinese Consumer Price Index. From the NSORT: the Taiwanese Consumer Price Index. From the CCB: the U.S dollars to Taiwan's Dollars exchange rate. From the NSOK: the Korean Consumer Price Index.

From the IMF *International Financial Statistics Yearbook 1999,* from the World Bank's web page *Country at a Glance Tables* and from the PRB's web page the U.S, Mexican, and Canadian populations. From the IMF International Financial Statistics Singapore's, South Africa's, and Saudi Arabia's Consumer Price Index, and Saudi Arabia's riyal exchange rate to the U.S Dollar.

A.2 Transformations to the Data

The raw data series were transformed. First, if the periodicity of the series was monthly the observations were summed to obtain quarterly observations. Second, all gross domestic product, import, and exports series were deflated using the U.S. Consumer Price Index (U.S. CPI) for all urban consumers 1982-1984 dollars in order to obtain real data. Finally, the Mexican and Canadian gross domestic product series were first multiplied by the U.S. Dollar-Mexican peso and U.S. Dollar-Canadian Dollar nominal exchange rate and then deflated with the U.S. CPI with the procedure just described.

The real exchange rate series were created using the following formula:

$$q = \frac{E * P^f}{P^h} \qquad (A.1)$$

where q is real exchange rate, E is the nominal exchange rate defined as U.S dollars per one unit of foreign currency, P^f represents the foreign country's consumer price index, and P^h represents the domestic consumer price index.

Table A.1

Data Sources			
Name of Series	**Source**	**Period**	**Web Address**
Canada's Consumer Price Index	Statistics Canada and Bank of Canada	1984-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800002
Canada's Gross Domestic Product	Statistics Canada	1980-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800002
China's Consumer Price Index	Monthly Bulletin of Statistics of the Republic of China	1984-2001	Various Issues
Exchange rate for U.S. Dollars to British Pounds	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to Canadian Dollars	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to Chines Yuan	Federal Reserve Bank of Saint Louis	1981-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to French Francs	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to German Marks	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to Japanes Yen	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to Mexican Pesos	Banco de Mexico	1980-2001	http://www.banxico.org.mx
Exchange rate for U.S. Dollars to New Zelands Dollar	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange Rate for U.S. Dollars to Saudi Arabia's currency	International Financial Statistics	1984-2002	Various Issues
Exchange rate for U.S. Dollars to Singapore Dollars	Federal Reserve Bank of Saint Louis	1981-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to South African Rands	Federal Reserve Bank of Saint Louis	1971-2001	http://www.stls.frb.org/fred/data/exchange.html

Table A.1 ---- *continued*

Exchange rate for U.S. Dollars to South Korean Wons	Federal Reserve Bank of Saint Louis	1981-2001	http://www.stls.frb.org/fred/data/exchange.html
Exchange rate for U.S. Dollars to Taiwan's Dollars	Central Bank of China	1979-2001	http://www.cbc.gov.tw/eng/index.html
France's Consumer Price Index	Statistics Canada	1986-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800004
Germany's Consumer Price Index	Statistics Canada	1986-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800005
Japan's Consumer Price Index	Statistics Canada	1986-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800006
Korea's Consumer Price Index	National Statistics Office	1981-2001	http://www.nso.go.kr/cgi-bin/sws_888.cgi
Mexican Consumer Price Index	Instituto Nacional de Estadistica, Geografia e Informatica	1980-2001	http://www.inegi.gob.mx/
Mexico's Gross Domestic Product	Instituto Nacional de Estadistica, Geografia e Informatica	1980-2001	http://www.inegi.gob.mx/
New Zealand's Consumer Price Index	Statistics Canada	1986-2002	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800007
Saudi Arabia's Consumer Price Index	International Financial Statistics	1984-2001	Various Issues
Singapore's Consumer Price Index	International Financial Statistics	1985-2001	Various Issues
South Africa's Consumer Price Index	International Financial Statistics and Statistics South Africa	1984-2001	Various Issues and http://www.statssa.gov.za/default2.asp
Taiwan's Consumer Price Index	National Statistics of Taiwan, the Republic of China	1980-2001	http://www.stat.gov.tw/
Total Exports from United States to Canada	Federal Reserve Bank of Saint Louis	1974-2001	http://www.stls.frb.org/fred/data/exchange.html
Total Exports from United States to Mexico	Federal Reserve Bank of Saint Louis	1974-2001	http://www.stls.frb.org/fred/data/exchange.html

Table A.1 ---- *continued*

Total United States' Imports from Canada	Federal Reserve Bank of Saint Louis	1974-2001	http://www.stls.frb.org/fred/data/exchange.html
Total United States' Imports from Mexico	Federal Reserve Bank of Saint Louis	1974-2001	http://www.stls.frb.org/fred/data/exchange.html
United Kingdom's Consumer Price Index	Statistics Canada	1986-2001	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&ArrayPick=1&ArrayId=3800003
United States Consumer Price Index (All Urban Consumers)	Bureau of Labor Statistics	1980-2001	http://www.bls.gov
United States Gross Domestic Product	Bureau of Economic Analysis	1980-2001	http://www.bea.gov/bea/dn1.htm.
Canada's population		1980-1999	
Mexico's population	International Monetary Fund, International Financial Statistics; World Bank Country at a Glance Tables;	2000	(http://www.worldbank.org/data/countrydata/countrydata.html#AAG
United States' population	Population Reference Bureau	2001	(http://www.prb.org/Content/NavigationMenu/Other_reports/2000-2002/sheet1.html

APPENDIX B TABLES OF ESTIMATED COEFFICIENTS

Table B.1

Equation's Name and Definition	
Name	**Definition**
USIMMX	United States imports from Mexico
USEXMX	United States exports to Mexico
USIMCN	United States imports from Canada
USEXCN	United States exports from Canada
CNIMMX	Canadian imports from Mexico
CNEXMX	Canadian exports to Mexico

Table B.2

Variable's Name and Definition			
Variable's Name	**Definition**	**Variable's Name**	**Definition**
USGDP1	U.S. gross domestic product	REXMXROW1	Real exchange rate Mexico-Rest of the World 1
USGDPC	U.S. gross domestic product per capita	REXMXROW2	Real exchange rate Mexico-Rest of the World 2
REXUSMEX	Real exchange rate US-Mexico	REXUSCAN	Real exchange rate US-Canada
REXUSMEX-1	Lag 1 of real exchange rate US-Mexico	REXUSCAN-1	Lag 1 of real exchange rate US-Canada
REXUSMEX-2	Lag 2 of real exchange rate US-Mexico	REXUSCAN-2	Lag 2 of real exchange rate US-Canada
REXUSMEX-3	Lag 3 of real exchange rate US-Mexico	REXUSCAN-3	Lag 3 of real exchange rate US-Canada
REXUSMEX-4	Lag 4 of real exchange rate US-Mexico	REXUSCAN-4	Lag 4 of real exchange rate US-Canada
REXUSMEX-5	Lag 5 of real exchange rate US-Mexico	REXUSCAN-5	Lag 5 of real exchange rate US-Canada
REXUSMEX-6	Lag 6 of real exchange rate US-Mexico	REXUSCAN-6	Lag 6 of real exchange rate US-Canada
REXUSMEX-7	Lag 7 of real exchange rate US-Mexico	REXUSCAN-7	Lag 7 of real exchange rate US-Canada
REXUSMEX-8	Lag 8 of real exchange rate US-Mexico	REXUSCAN-8	Lag 8 of real exchange rate US-Canada
NAFTA	NAFTA dummy	CANGDP	Canada gross domestic product
Q1	First quarter dummy	CANGDPC	Canada gross domestic product per capita
Q2	Second quarter dummy	REXCNCHI	Real exchange rate Canada-China
Q3	Third quarter dummy	REXCNSAR	Real exchange rate Canada-Saudi Arabia
REXCHJPUS	Real exchange rate US-Japan	REXCNROW1	Real exchange rate Canada-Rest of the World 1
REXCHRUSCHINA	Real exchange rate US-China	REXCNROW2	Real exchange rate Canada-Rest of the World 2
REXCHUKUS	Real exchange rate US-United Kingdom	REXCNMX	Real exchange rate Canada-Mexico
REXCHGEUS	Real exchange rate US-Germany	REXCNMX-1	Lag 1 real exchange rate Canada-Mexico
REXUSROW1	Real exchange rate US-Rest of the World 1	REXCNMX-2	Lag 2 real exchange rate Canada-Mexico
REXUSROW2	Real exchange rate US-Rest of the World 2	REXCNMX-3	Lag 3 real exchange rate Canada-Mexico
REXUSROW3	Real exchange rate US-Rest of the World 3	REXCNMX-4	Lag 4 real exchange rate Canada-Mexico
MXGDP1	Mexico gross domestic product	REXCNMX-5	Lag 5 real exchange rate Canada-Mexico
MXGDPC	Mexico gross domestic product per capita	REXCNMX-6	Lag 6 real exchange rate Canada-Mexico
REXMXGE	Real exchange rate Mexico-Germany	REXCNMX-7	Lag 7 real exchange rate Canada-Mexico
REXMXJP	Real exchange rate Mexico-Japan	REXCNMX-8	Lag 8 real exchange rate Canada-Mexico

REXUSROW1=(REXCHUKUS+REXCHFRUS+REXCHGEUS+REXCHJPUS+REXCHRUSCHINA+REXCHUSKOR+REXCHTWUS+REXCHRSIGUS)/8;
REXUSROW2=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHUKUS+REXCHFRUS+REXCHGEUS)/6;
REXUSROW3=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHFRUS)/4;
REXMXROW1=(REXMXGE+REXMXJP+REXMXNZ+REXMXSAF)/4;
REXMXROW2=(REXMXNZ+REXMXSAF)/2;
REXCNROW1=(REXCNUK+REXCNGE+REXCNJP+REXCNCHI+REXCNSAR)/5;
REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.3 First Stage Estimates ROW1

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	4.77717	[.999]	Constant	12776.1	[.000]
USGDP1	0.054121	[.000]	MXGDP1	0.578892	[.000]
USGDPC	-9.54982	[.000]	MXGDPC	-30.5977	[.000]
REXUSMEX	1605.11	[.796]	REXUSMEX	-56371.4	[.000]
REXUSMEX-1	-7333.45	[.315]	REXUSMEX-1	-6160.81	[.454]
REXUSMEX-2	-9175.18	[.203]	REXUSMEX-2	-6367.67	[.428]
REXUSMEX-3	2330.45	[.750]	REXUSMEX-3	-3804.83	[.640]
REXUSMEX-4	28.8169	[.997]	REXUSMEX-4	2719.89	[.749]
REXUSMEX-5	1727.97	[.818]	REXUSMEX-5	2896.56	[.730]
REXUSMEX-6	-9215.24	[.187]	REXUSMEX-6	-5556.05	[.474]
REXUSMEX-7	-9099.91	[.187]	REXUSMEX-7	-11582.7	[.131]
REXUSMEX-8	5989.5	[.267]	REXUSMEX-8	-2690.32	[.679]
NAFTA	887.263	[.010]	NAFTA	1842.97	[.000]
Q1	-533.307	[.012]	Q1	-170.2	[.497]
Q2	-222.999	[.287]	Q2	-207.478	[.402]
Q3	-232.316	[.258]	Q3	436.628	[.100]
REXUSROW1	-23150.5	[.000]	REXMXROW1	-1305.21	[.013]
REXUSCAN	-2582.47	[.212]	REXCNMX	-10743.2	[.135]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	22197.6	[.000]	Constant	2870.65	[.556]
USGDP1	0.046613	[.000]	CANGDP	0.46658	[.000]
USGDPC	-9.97677	[.000]	CANGDPC	-6.75171	[.002]
REXUSCAN	30349.7	[.001]	REXUSCAN	-22808.2	[.105]
REXUSCAN-1	-12499.4	[.357]	REXUSCAN-1	9731.26	[.526]
REXUSCAN-2	-33029.8	[.014]	REXUSCAN-2	-8522.97	[.582]
REXUSCAN-3	13259.4	[.344]	REXUSCAN-3	3606.45	[.824]
REXUSCAN-4	2165.71	[.882]	REXUSCAN-4	-9130.06	[.584]
REXUSCAN-5	9116.1	[.523]	REXUSCAN-5	3928.88	[.809]
REXUSCAN-6	-20999.4	[.119]	REXUSCAN-6	-5240.09	[.736]
REXUSCAN-7	2198	[.867]	REXUSCAN-7	-340.262	[.982]
REXUSCAN-8	-2178.23	[.808]	REXUSCAN-8	2905.86	[.773]
NAFTA	2623.42	[.000]	NAFTA	1681.95	[.006]
Q1	-588.025	[.149]	Q1	1370.07	[.001]
Q2	174.197	[.664]	Q2	1704.13	[.000]
Q3	-1606.04	[.000]	Q3	-1608.95	[.000]
REXUSROW1	-19518.5	[.015]	REXCNROW1	16307.7	[.000]
REXUSMEX	11142.5	[.212]	REXCNMX	-261.042	[.952]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	1953.79	[.000]	Constant	207.917	[.001]
CANGDP	0.032734	[.000]	MXGDP1	7.75E-03	[.014]
CANGDPC	-0.472637	[.000]	MXGDPC	-0.096784	[.758]
REXCNMX	410.006	[.412]	REXCNMX	-318.312	[.354]
REXCNMX-1	-401.892	[.540]	REXCNMX-1	-92.2604	[.706]
REXCNMX-2	292.748	[.652]	REXCNMX-2	135.109	[.578]
REXCNMX-3	-350.331	[.591]	REXCNMX-3	-12.8374	[.958]
REXCNMX-4	-144.069	[.831]	REXCNMX-4	-179.4	[.474]
REXCNMX-5	66.3053	[.920]	REXCNMX-5	-146.857	[.549]
REXCNMX-6	551.306	[.382]	REXCNMX-6	225.101	[.336]
REXCNMX-7	-408.443	[.514]	REXCNMX-7	197.21	[.394]
REXCNMX-8	400.666	[.381]	REXCNMX-8	-225.095	[.232]
NAFTA	-49.684	[.213]	NAFTA	2.24822	[.847]
Q1	51.7268	[.025]	Q1	-12.8033	[.100]
Q2	50.07	[.016]	Q2	-3.97063	[.599]
Q3	-84.7108	[.000]	Q3	3.72282	[.668]
REXCNROW1	-1211.68	[.000]	REXMXROW1	-3.46088	[.872]
REXUSCAN	-3755.26	[.000]	REXUSMEX	-2052.41	[.000]

Sample 1986:1 2001:4

REXUSROW1=(REXCHUKUS+REXCHFRUS+REXCHGEUS+REXCHJPUS+REXCHRUSCHINA+REXCHUSKOR+REXCHTWUS+REXCHRSIGUS)/8;

REXMXROW1=(REXMXGE+REXMXJP+REXMXNZ+REXMXSAF)/4;

REXCNROW1=(REXCNUK+REXCNGE+REXCNJP+REXCNCHI+REXCNSAR)/5;

Table B.4 First Stage Estimates ROW2

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-14515.9	[.001]	Constant	13752.3	[.000]
USGDP1	0.076717	[.000]	MXGDP1	0.530407	[.000]
USGDPC	-15.4956	[.000]	MXGDPC	-16.3902	[.063]
REXUSMEX	-9880.69	[.078]	REXUSMEX	-61536.5	[.000]
REXUSMEX-1	-6048.58	[.330]	REXUSMEX-1	-1811.74	[.844]
REXUSMEX-2	-1890.18	[.756]	REXUSMEX-2	-11374.8	[.214]
REXUSMEX-3	6231.72	[.300]	REXUSMEX-3	-2731.85	[.767]
REXUSMEX-4	-460.66	[.942]	REXUSMEX-4	-3403.92	[.719]
REXUSMEX-5	417.684	[.947]	REXUSMEX-5	415.513	[.964]
REXUSMEX-6	-8254.19	[.153]	REXUSMEX-6	-10691.1	[.219]
REXUSMEX-7	-3718.67	[.516]	REXUSMEX-7	-10087	[.239]
REXUSMEX-8	12978.3	[.005]	REXUSMEX-8	-5662.97	[.426]
NAFTA	1120.97	[.009]	NAFTA	1919.18	[.000]
Q1	-785.501	[.000]	Q1	57.8312	[.785]
Q2	-218.28	[.260]	Q2	-29.7801	[.885]
Q3	-195.762	[.304]	Q3	833.287	[.000]
REXUSROW2	8665.4	[.064]	REXMXROW2	-3596.72	[.000]
REXUSCAN	-61.8863	[.978]	REXCNMX	-29629.2	[.000]
REXCHJPUS	-204477	[.054]	REXMXGE	1074.49	[.081]
REXCHRUSCHINA	30470.1	[.000]	REXMXJP	97340.3	[.001]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	-934.241	[.922]	Constant	15665.9	[.141]
USGDP1	0.087257	[.000]	CANGDP	0.393844	[.000]
USGDPC	-19.1663	[.000]	CANGDPC	-2.77883	[.282]
REXUSCAN	19712.2	[.025]	REXUSCAN	-49505.6	[.000]
REXUSCAN-1	-12616.7	[.284]	REXUSCAN-1	2311.7	[.851]
REXUSCAN-2	-27475.9	[.018]	REXUSCAN-2	-3568.69	[.773]
REXUSCAN-3	29736.6	[.014]	REXUSCAN-3	15887.6	[.222]
REXUSCAN-4	253.153	[.984]	REXUSCAN-4	-4948.77	[.719]
REXUSCAN-5	2571.44	[.843]	REXUSCAN-5	-8609.96	[.518]
REXUSCAN-6	-21517	[.065]	REXUSCAN-6	-6765.69	[.593]
REXUSCAN-7	8249.24	[.465]	REXUSCAN-7	8829.59	[.471]
REXUSCAN-8	3672.89	[.637]	REXUSCAN-8	1542.8	[.850]
NAFTA	2369.11	[.009]	NAFTA	470.836	[.504]
Q1	-905.813	[.021]	Q1	1838.79	[.000]
Q2	161.588	[.666]	Q2	1908.93	[.000]
Q3	-1497.59	[.000]	Q3	-1687.17	[.000]
REXUSROW2	3643.8	[.699]	REXCNROW2	9448.79	[.000]
REXUSMEX	-17879.5	[.058]	REXCNMX	-8554.67	[.062]
REXCHJPUS	427580	[.043]	REXCNCHI	-8216.25	[.325]
REXCHRUSCHINA	33261.3	[.017]	REXCNSAR	-8342.56	[.657]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-912.683	[.315]	Constant	239.401	[.000]
CANGDP	0.042705	[.000]	MXGDP1	8.84E-03	[.002]
CANGDPC	-0.565047	[.001]	MXGDPC	-0.203775	[.485]
REXCNMX	363.627	[.475]	REXCNMX	-94.3574	[.755]
REXCNMX-1	19.8576	[.974]	REXCNMX-1	-156.742	[.467]
REXCNMX-2	425.305	[.484]	REXCNMX-2	126.644	[.556]
REXCNMX-3	-302.516	[.620]	REXCNMX-3	-84.4001	[.693]
REXCNMX-4	-490.137	[.441]	REXCNMX-4	-121.902	[.578]
REXCNMX-5	-47.0022	[.940]	REXCNMX-5	-100.695	[.638]
REXCNMX-6	865.457	[.149]	REXCNMX-6	297.543	[.145]
REXCNMX-7	-56.6843	[.923]	REXCNMX-7	237.233	[.241]
REXCNMX-8	617.699	[.154]	REXCNMX-8	-381.012	[.023]
NAFTA	-132.709	[.003]	NAFTA	8.08511	[.444]
Q1	79.9127	[.002]	Q1	-13.3101	[.059]
Q2	67.6386	[.001]	Q2	-6.52372	[.334]
Q3	-93.298	[.000]	Q3	2.7853	[.720]
REXCNROW2	-372.053	[.034]	REXMXROW2	72.5603	[.004]
REXUSCAN	-2730.44	[.000]	REXUSMEX	-2364.48	[.000]
REXCNCHI	-441.705	[.423]	REXMXGE	-77.5324	[.000]
REXCNSAR	3801.06	[.006]	REXMXJP	629.66	[.554]

Sample 1986:1 2001:4

REXUSROW2=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHUKUS+REXCHFRUS+REXCHGEUS)/6;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.5 First Stage Estimates ROW3

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-7953.13	[.087]	Constant	11605.1	[.000]
USGDP1	0.067742	[.000]	MXGDP1	0.471397	[.000]
USGDPC	-13.804	[.000]	MXGDPC	-19.5139	[.009]
REXUSMEX	-9041.21	[.082]	REXUSMEX	-44200.5	[.000]
REXUSMEX-1	-6722.29	[.252]	REXUSMEX-1	1990.25	[.814]
REXUSMEX-2	-4129.08	[.472]	REXUSMEX-2	-13855.4	[.097]
REXUSMEX-3	4560.25	[.423]	REXUSMEX-3	87.3573	[.992]
REXUSMEX-4	-688.508	[.908]	REXUSMEX-4	-3225.39	[.707]
REXUSMEX-5	-468.509	[.936]	REXUSMEX-5	2314.88	[.783]
REXUSMEX-6	-8552.26	[.113]	REXUSMEX-6	-7406.82	[.344]
REXUSMEX-7	-3812.67	[.479]	REXUSMEX-7	-18327.5	[.018]
REXUSMEX-8	12486.1	[.006]	REXUSMEX-8	-7520.37	[.250]
NAFTA	952.753	[.010]	NAFTA	2259.94	[.000]
Q1	-700.766	[.000]	Q1	-53.9308	[.817]
Q2	-305.715	[.063]	Q2	-116.756	[.613]
Q3	-242.117	[.130]	Q3	508.105	[.040]
REXUSROW3	29100.4	[.007]	REXMXROW2	-2476.13	[.000]
REXUSCAN	-3342.67	[.074]	REXCNMX	-13821.1	[.056]
REXCHJPUS	93321.1	[.458]	REXMXGE	557.08	[.395]
REXCHRUSCHINA	20792.9	[.000]	REXMXJP	82461.2	[.010]
REXCHUKUS	3764.9	[.000]			
REXCHGEUS	-15670.2	[.000]			
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	2532.01	[.779]	Constant	3344.61	[.772]
USGDP1	0.060277	[.000]	CANGDP	0.593667	[.000]
USGDPC	-11.3684	[.000]	CANGDPC	-6.36708	[.024]
REXUSCAN	18630.5	[.022]	REXUSCAN	-60545.1	[.000]
REXUSCAN-1	-12686.1	[.231]	REXUSCAN-1	2217.61	[.854]
REXUSCAN-2	-30941.4	[.004]	REXUSCAN-2	13581.2	[.258]
REXUSCAN-3	24723.1	[.024]	REXUSCAN-3	24215.7	[.055]
REXUSCAN-4	5547.13	[.632]	REXUSCAN-4	-12070.2	[.370]
REXUSCAN-5	-669.963	[.956]	REXUSCAN-5	-24587	[.063]
REXUSCAN-6	-21605.4	[.040]	REXUSCAN-6	-9152.08	[.453]
REXUSCAN-7	4224.12	[.678]	REXUSCAN-7	11754.6	[.319]
REXUSCAN-8	2132.32	[.769]	REXUSCAN-8	9461.84	[.235]
NAFTA	822.998	[.296]	NAFTA	-746.779	[.298]
Q1	-536.558	[.102]	Q1	2005.54	[.000]
Q2	147.678	[.636]	Q2	2006.09	[.000]
Q3	-1516.63	[.000]	Q3	-1816.37	[.000]
REXUSROW3	88263.8	[.000]	REXCNROW2	7915.83	[.002]
REXUSMEX	-13946.9	[.131]	REXCNMX	-13580.7	[.006]
REXCHJPUS	760968	[.005]	REXCNCHI	-10861.8	[.205]
REXCHRUSCHINA	14655.8	[.248]	REXCNSAR	23176.7	[.243]
REXCHUKUS	4212.05	[.014]			
REXCHGEUS	-34099.5	[.000]			
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-802.752	[.417]	Constant	188.525	[.001]
CANGDP	0.036231	[.000]	MXGDP1	9.50E-03	[.001]
CANGDPC	-0.3778	[.049]	MXGDPC	-0.396907	[.169]
REXCNMX	618.756	[.243]	REXCNMX	169.479	[.567]
REXCNMX-1	1.63396	[.998]	REXCNMX-1	-177.998	[.381]
REXCNMX-2	491.795	[.426]	REXCNMX-2	107.529	[.596]
REXCNMX-3	-359.011	[.563]	REXCNMX-3	-44.3163	[.825]
REXCNMX-4	-508.293	[.431]	REXCNMX-4	-97.3464	[.636]
REXCNMX-5	-63.0777	[.920]	REXCNMX-5	-49.7516	[.804]
REXCNMX-6	826.665	[.176]	REXCNMX-6	333.206	[.082]
REXCNMX-7	-101.761	[.864]	REXCNMX-7	142.426	[.453]
REXCNMX-8	503.21	[.253]	REXCNMX-8	-403.631	[.011]
NAFTA	-101.143	[.027]	NAFTA	6.57453	[.527]
Q1	85.7373	[.001]	Q1	-15.6942	[.023]
Q2	69.9855	[.000]	Q2	-7.73219	[.242]
Q3	-92.6721	[.000]	Q3	-2.07455	[.786]
REXCNROW2	-402.97	[.030]	REXMXROW2	97.8289	[.000]
REXUSCAN	-2835.72	[.000]	REXUSMEX	-2061.77	[.000]
REXCNCHI	-707.284	[.226]	REXMXGE	-76.4768	[.000]
REXCNSAR	3783.22	[.013]	REXMXJP	-321.836	[.762]

Sample 1986:1 2001:4

REXUSROW3=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHFRUS)/4;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.6 Second Stage Estimates ROW1

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-2586.9	[.492]	Constant	14028.2	[.000]
USGDP1	0.054365	[.000]	MXGDP1	0.618227	[.000]
USGDPC	-9.20792	[.000]	MXGDPC	-34.8969	[.000]
REXUSMEX	-11652.1	[.001]	REXUSMEX	-60585.9	[.000]
REXUSMEX-1			REXUSMEX-1	-5291.38	[.357]
REXUSMEX-2			REXUSMEX-2		
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4		
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6	-9680.55	[.008]	REXUSMEX-6		
REXUSMEX-7	-6337.33	[.177]	REXUSMEX-7	-15639.7	[.004]
REXUSMEX-8	5842.23	[.167]	REXUSMEX-8	2298.37	[.708]
NAFTA	666.863	[.051]	NAFTA	1751.47	[.000]
Q1	-513.594	[.013]	Q1	-222.357	[.379]
Q2	-152.203	[.448]	Q2	-228.817	[.358]
Q3	-168.578	[.395]	Q3	415.012	[.125]
REXUSROW1	-21861.9	[.000]	REXMXROW1	-1784.07	[.001]
REXUSCAN	-2183.12	[.288]	REXCNMX	-15457.9	[.037]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	21144	[.001]	Constant	4821.03	[.314]
USGDP1	0.051663	[.000]	CANGDP	0.46085	[.000]
USGDPC	-11.2153	[.000]	CANGDPC	-7.07939	[.000]
REXUSCAN	27664.6	[.000]	REXUSCAN	-15037.1	[.137]
REXUSCAN-1	-13840.6	[.137]	REXUSCAN-1		
REXUSCAN-2	-15930.3	[.049]	REXUSCAN-2	-9598.62	[.171]
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6	-5383.48	[.209]	REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	2572.52	[.000]	NAFTA	1814.41	[.003]
Q1	-660.32	[.107]	Q1	1212.22	[.001]
Q2	216.608	[.590]	Q2	1591.77	[.000]
Q3	-1578.31	[.000]	Q3	-1628.3	[.000]
REXUSROW1	-22777.4	[.003]	REXCNROW1	14504.2	[.000]
REXUSMEX	4084.49	[.624]	REXCNMX	-510.135	[.898]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	1766.53	[.000]	Constant	232.142	[.000]
CANGDP	0.034214	[.000]	MXGDP1	6.87E-03	[.028]
CANGDPC	-0.483318	[.000]	MXGDPC	-0.14194	[.655]
REXCNMX	-316.668	[.342]	REXCNMX	-481.624	[.122]
REXCNMX-1			REXCNMX-1		
REXCNMX-2	432.332	[.110]	REXCNMX-2	94.927	[.552]
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4	-237.46	[.095]
REXCNMX-5			REXCNMX-5		
REXCNMX-6			REXCNMX-6		
REXCNMX-7			REXCNMX-7	242.187	[.049]
REXCNMX-8	409.446	[.080]	REXCNMX-8		
NAFTA	-77.6558	[.053]	NAFTA	6.00955	[.605]
Q1	53.6334	[.018]	Q1	-15.0703	[.047]
Q2	52.3112	[.009]	Q2	-7.32503	[.312]
Q3	-86.909	[.000]	Q3	-3.57939	[.668]
REXCNROW1	-1039.48	[.000]	REXMXROW1	-28.2288	[.151]
REXUSCAN	-3796.29	[.000]	REXUSMEX	-1531.7	[.002]

Sample 1986:1 2001:4

REXUSROW1=(REXCHUKUS+REXCHFRUS+REXCHGEUS+REXCHJPUS+REXCHRUSCHINA+REXCHUSKOR+REXCHTWUS+REXCHRSIGUS)/8;

REXMXROW1=(REXMXGE+REXMXJP+REXMXNZ+REXMXSAF)/4;

REXCNROW1=(REXCNUK+REXCNGE+REXCNJP+REXCNCHI+REXCNSAR)/5;

Table B.7 Second Stage Estimates ROW2

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-13233.3	[.000]	Constant	13878.4	[.000]
USGDP1	0.075345	[.000]	MXGDP1	0.557943	[.000]
USGDPC	-15.2078	[.000]	MXGDPC	-20.5515	[.020]
REXUSMEX	-14167.3	[.000]	REXUSMEX	-62903.2	[.000]
REXUSMEX-1			REXUSMEX-1		
REXUSMEX-2			REXUSMEX-2	-13699.7	[.032]
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4	-3988.12	[.465]
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6			REXUSMEX-6		
REXUSMEX-7			REXUSMEX-7	-18537.1	[.005]
REXUSMEX-8			REXUSMEX-8	-2701.44	[.660]
NAFTA	1125.07	[.008]	NAFTA	1834.73	[.000]
Q1	-752.447	[.000]	Q1	31.4706	[.884]
Q2	-118.291	[.530]	Q2	-37.3671	[.858]
Q3	-132.62	[.476]	Q3	772.641	[.001]
REXUSROW2	8623.74	[.059]	REXMXROW2	-3144.95	[.000]
REXUSCAN	-1101.07	[.609]	REXCNMX	-27770	[.000]
REXCHJPUS	-129041	[.186]	REXMXGE	930.915	[.140]
REXCHRUSCHINA	29021.8	[.000]	REXMXJP	71648.7	[.015]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	-227.675	[.978]	Constant	12621.9	[.229]
USGDP1	0.086722	[.000]	CANGDP	0.365099	[.000]
USGDPC	-19.3883	[.000]	CANGDPC	-2.50043	[.298]
REXUSCAN	11879.1	[.050]	REXUSCAN	-40441.8	[.000]
REXUSCAN-1			REXUSCAN-1		
REXUSCAN-2	-12969	[.029]	REXUSCAN-2		
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6	2079.4	[.647]	REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	2568.74	[.003]	NAFTA	744.048	[.279]
Q1	-858.283	[.027]	Q1	1780.19	[.000]
Q2	331.028	[.374]	Q2	1912.51	[.000]
Q3	-1443.08	[.000]	Q3	-1657.21	[.000]
REXUSROW2	7286.11	[.430]	REXCNROW2	10058.3	[.000]
REXUSMEX	-14333.3	[.105]	REXCNMX	-5649.63	[.183]
REXCHJPUS	383244	[.052]	REXCNCHI	-8904.09	[.262]
REXCHRUSCHINA	36048.4	[.005]	REXCNSAR	-5309.11	[.770]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-320.79	[.718]	Constant	226.518	[.000]
CANGDP	0.038609	[.000]	MXGDP1	8.98E-03	[.001]
CANGDPC	-0.461671	[.009]	MXGDPC	-0.319565	[.262]
REXCNMX	158.754	[.691]	REXCNMX	-254.781	[.362]
REXCNMX-1			REXCNMX-1		
REXCNMX-2	71.0633	[.822]	REXCNMX-2	-53.5875	[.697]
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4		
REXCNMX-5			REXCNMX-5		
REXCNMX-6	730.848	[.011]	REXCNMX-6	212.469	[.123]
REXCNMX-7			REXCNMX-7	-24.015	[.863]
REXCNMX-8	243.762	[.378]	REXCNMX-8		
NAFTA	-126.838	[.007]	NAFTA	3.02222	[.771]
Q1	81.2339	[.002]	Q1	-14.1039	[.042]
Q2	68.2158	[.001]	Q2	-9.19802	[.160]
Q3	-93.4447	[.000]	Q3	-3.74285	[.619]
REXCNROW2	-304.097	[.093]	REXMXROW2	77.0133	[.001]
REXUSCAN	-3105.74	[.000]	REXUSMEX	-1951.25	[.000]
REXCNCHI	-442.401	[.433]	REXMXGE	-74.7069	[.000]
REXCNSAR	2669.57	[.054]	REXMXJP	-539.287	[.602]

Sample 1986:1 2001:4

REXUSROW2=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHUKUS+REXCHFRUS+REXCHGEUS)/6;
REXMXROW2=(REXMXNZ+REXMXSAF)/2;
REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.8 Second Stage Estimates ROW3

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-13591.5	[.006]	Constant	15214.2	[.000]
USGDP1	0.071951	[.000]	MXGDP1	0.558713	[.000]
USGDPC	-14.3049	[.000]	MXGDPC	-20.634	[.018]
REXUSMEX	-19046.8	[.000]	REXUSMEX	-62827.4	[.000]
REXUSMEX-1			REXUSMEX-1		
REXUSMEX-2			REXUSMEX-2	-12141.8	[.055]
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4	-4619.66	[.399]
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6			REXUSMEX-6		
REXUSMEX-7			REXUSMEX-7	-19290.8	[.004]
REXUSMEX-8	5372.78	[.082]	REXUSMEX-8	-1978.22	[.751]
NAFTA	863.308	[.037]	NAFTA	1969.77	[.000]
Q1	-703.413	[.000]	Q1	17.7921	[.934]
Q2	-182.726	[.288]	Q2	-62.5934	[.763]
Q3	-161.38	[.340]	Q3	753.824	[.001]
REXUSROW3	27270.2	[.026]	REXMXROW2	-3314.08	[.000]
REXUSCAN	-1429.66	[.493]	REXCNMX	-31293.4	[.000]
REXCHJPUS	-441.559	[.997]	REXMXGE	633.927	[.317]
REXCHRUSCHINA	25853.1	[.000]	REXMXJP	83589.5	[.005]
REXCHUKUS	3623.05	[.000]			
REXCHGEUS	-11562.5	[.005]			
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	1615.92	[.855]	Constant	2394.45	[.831]
USGDP1	0.078511	[.000]	CANGDP	0.41347	[.000]
USGDPC	-17.0367	[.000]	CANGDPC	-2.70767	[.306]
REXUSCAN	10868.1	[.073]	REXUSCAN	-43948.2	[.000]
REXUSCAN-1			REXUSCAN-1	5559.71	[.462]
REXUSCAN-2	-15656.7	[.011]	REXUSCAN-2		
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6	2419.27	[.605]	REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	1579.56	[.060]	NAFTA	536.2	[.431]
Q1	-728.89	[.038]	Q1	1956.28	[.000]
Q2	241.784	[.472]	Q2	1998.83	[.000]
Q3	-1477.96	[.000]	Q3	-1735.34	[.000]
REXUSROW3	66635.7	[.005]	REXCNROW2	9519.98	[.000]
REXUSMEX	-23565.7	[.009]	REXCNMX	-5059.19	[.256]
REXCHJPUS	680894	[.004]	REXCNCHI	-11754	[.145]
REXCHRUSCHINA	25829.6	[.049]	REXCNSAR	15016.9	[.439]
REXCHUKUS	4409.14	[.019]			
REXCHGEUS	-26753	[.001]			
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-1187.37	[.219]	Constant	216.094	[.000]
CANGDP	0.03975	[.000]	MXGDP1	9.25E-03	[.001]
CANGDPC	-0.429624	[.028]	MXGDPC	-0.402553	[.163]
REXCNMX	296.133	[.480]	REXCNMX	-198.778	[.482]
REXCNMX-1			REXCNMX-1		
REXCNMX-2	102.971	[.755]	REXCNMX-2	-34.8184	[.804]
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4		
REXCNMX-5			REXCNMX-5		
REXCNMX-6	764.049	[.010]	REXCNMX-6	224.33	[.113]
REXCNMX-7			REXCNMX-7	-56.4987	[.692]
REXCNMX-8	509.125	[.085]	REXCNMX-8		
NAFTA	-143.293	[.003]	NAFTA	3.4705	[.738]
Q1	93.7558	[.001]	Q1	-15.2604	[.027]
Q2	73.2853	[.000]	Q2	-9.73627	[.134]
Q3	-97.6788	[.000]	Q3	-5.87655	[.434]
REXCNROW2	-226.08	[.239]	REXMXROW2	79.478	[.001]
REXUSCAN	-2813.7	[.000]	REXUSMEX	-1776	[.000]
REXCNCHI	-539.442	[.363]	REXMXGE	-71.428	[.000]
REXCNSAR	3713.58	[.013]	REXMXJP	-781.263	[.455]

Sample 1986:1 2001:4

REXUSROW3=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHFRUS)/4;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.9 Final Estimates ROW1

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-1012.35	[.776]	Constant	14133.9	[.000]
USGDP1	0.054281	[.000]	MXGDP1	0.60811	[.000]
USGDPC	-9.4746	[.000]	MXGDPC	-34.5276	[.000]
REXUSMEX	-12505.2	[.001]	REXUSMEX	-61372	[.000]
REXUSMEX-1			REXUSMEX-1	-2171.7	[.697]
REXUSMEX-2			REXUSMEX-2		
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4		
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6			REXUSMEX-6		
REXUSMEX-7	-10303	[.000]	REXUSMEX-7	-12682.9	[.013]
REXUSMEX-8			REXUSMEX-8	-160.834	[.978]
NAFTA	832.712	[.016]	NAFTA	1830.86	[.000]
Q1	-522.387	[.015]	Q1	-242.142	[.340]
Q2	-122.894	[.558]	Q2	-225	[.369]
Q3	-152.719	[.463]	Q3	398.377	[.142]
REXUSROW1	-22357.4	[.000]	REXMXROW1	-1890.03	[.000]
REXUSCAN	-2255.89	[.275]	REXCNMX	-15827	[.029]
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	18604	[.002]	Constant	5713.29	[.228]
USGDP1	0.051636	[.000]	CANGDP	0.468479	[.000]
USGDPC	-10.7743	[.000]	CANGDPC	-7.44698	[.000]
REXUSCAN	21646.1	[.000]	REXUSCAN	-14488.4	[.150]
REXUSCAN-1			REXUSCAN-1		
REXUSCAN-2	-25645.7	[.000]	REXUSCAN-2	-9889.82	[.158]
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6			REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	2749.85	[.000]	NAFTA	1801.51	[.003]
Q1	-630.891	[.131]	Q1	1170.32	[.001]
Q2	238.24	[.563]	Q2	1565.59	[.000]
Q3	-1565.18	[.000]	Q3	-1624.63	[.000]
REXUSROW1	-27481	[.000]	REXCNROW1	13750.6	[.001]
REXUSMEX	52.2486	[.994]	REXCNMX	-916.191	[.818]
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	1866.21	[.000]	Constant	218.548	[.001]
CANGDP	0.034038	[.000]	MXGDP1	6.47E-03	[.035]
CANGDPC	-0.49162	[.000]	MXGDPC	-0.058486	[.851]
REXCNMX	-401.581	[.228]	REXCNMX	-386.563	[.209]
REXCNMX-1			REXCNMX-1		
REXCNMX-2	559.497	[.037]	REXCNMX-2	35.2872	[.819]
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4	-256.664	[.063]
REXCNMX-5			REXCNMX-5		
REXCNMX-6			REXCNMX-6		
REXCNMX-7			REXCNMX-7	256.094	[.035]
REXCNMX-8	251.19	[.253]	REXCNMX-8		
NAFTA	-67.9449	[.093]	NAFTA	4.536	[.696]
Q1	49.3838	[.031]	Q1	-13.5968	[.075]
Q2	50.9761	[.012]	Q2	-6.35536	[.384]
Q3	-85.6196	[.000]	Q3	-1.55308	[.853]
REXCNROW1	-1098.95	[.000]	REXMXROW1	-22.836	[.237]
REXUSCAN	-3790.2	[.000]	REXUSMEX	-1728.35	[.000]

Sample 1986:1 2001:4

REXUSROW1=(REXCHUKUS+REXCHFRUS+REXCHGEUS+REXCHJPUS+REXCHRUSCHINA+REXCHUSKOR+REXCHTWUS+REXCHRSIGUS)/8;

REXMXROW1=(REXMXGE+REXMXJP+REXMXNZ+REXMXSAF)/4;

REXCNROW1=(REXCNUK+REXCNGE+REXCNJP+REXCNCHI+REXCNSAR)/5;

Table B.10 Final Estimates ROW3

Parameters	USIMMX	Pvalue	Parameters	USEXMX	Pvalue
Constant	-10872.7	[.008]	Constant	14451.7	[.000]
USGDP1	0.070429	[.000]	MXGDP1	0.562024	[.000]
USGDPC	-14.0426	[.000]	MXGDPC	-22.7657	[.008]
REXUSMEX	-17332	[.000]	REXUSMEX	-59543.8	[.000]
REXUSMEX-1			REXUSMEX-1		
REXUSMEX-2			REXUSMEX-2	-10997.9	[.058]
REXUSMEX-3			REXUSMEX-3		
REXUSMEX-4			REXUSMEX-4	-3300.25	[.536]
REXUSMEX-5			REXUSMEX-5		
REXUSMEX-6			REXUSMEX-6		
REXUSMEX-7			REXUSMEX-7	-18687.2	[.003]
REXUSMEX-8			REXUSMEX-8	-4328.09	[.472]
NAFTA	916.59	[.022]	NAFTA	1966.24	[.000]
Q1	-699.231	[.000]	Q1	-20.1867	[.926]
Q2	-159.911	[.349]	Q2	-74.4304	[.724]
Q3	-150.036	[.372]	Q3	695.214	[.003]
REXUSROW3	21405.7	[.060]	REXMXROW2	-3019.66	[.000]
REXUSCAN	-2337.09	[.245]	REXCNMX	-27644.8	[.000]
REXCHJPUS	11765.9	[.921]	REXMXGE	637.16	[.316]
REXCHRUSCHINA	23160.9	[.000]	REXMXJP	75664.7	[.013]
REXCHUKUS	2756.04	[.003]			
REXCHGEUS	-9025.99	[.017]			
Parameters	**USIMCN**	**Pvalue**	**Parameters**	**USEXCN**	**Pvalue**
Constant	1876.07	[.818]	Constant	-160.735	[.989]
USGDP1	0.074081	[.000]	CANGDP	0.42247	[.000]
USGDPC	-15.6904	[.000]	CANGDPC	-2.66659	[.325]
REXUSCAN	10237.5	[.082]	REXUSCAN	-46065.9	[.000]
REXUSCAN-1			REXUSCAN-1	8100.08	[.314]
REXUSCAN-2	-14717.8	[.009]	REXUSCAN-2		
REXUSCAN-3			REXUSCAN-3		
REXUSCAN-4			REXUSCAN-4		
REXUSCAN-5			REXUSCAN-5		
REXUSCAN-6			REXUSCAN-6		
REXUSCAN-7			REXUSCAN-7		
REXUSCAN-8			REXUSCAN-8		
NAFTA	1496.88	[.063]	NAFTA	475.437	[.487]
Q1	-673.611	[.049]	Q1	2008.11	[.000]
Q2	271.718	[.410]	Q2	2027.45	[.000]
Q3	-1464.58	[.000]	Q3	-1750.18	[.000]
REXUSROW3	66826.6	[.004]	REXCNROW2	9445.06	[.000]
REXUSMEX	-19606.8	[.009]	REXCNMX	-4933.29	[.273]
REXCHJPUS	649394	[.005]	REXCNCHI	-12655.6	[.122]
REXCHRUSCHINA	23895.4	[.054]	REXCNSAR	20194.5	[.313]
REXCHUKUS	4058.67	[.026]			
REXCHGEUS	-25880.9	[.001]			
Parameters	**CNIMMX**	**Pvalue**	**Parameters**	**CNEXMX**	**Pvalue**
Constant	-295.139	[.741]	Constant	217.225	[.000]
CANGDP	0.036357	[.000]	MXGDP1	9.57E-03	[.000]
CANGDPC	-0.365436	[.053]	MXGDPC	-0.425179	[.119]
REXCNMX	179.106	[.657]	REXCNMX	-261.841	[.301]
REXCNMX-1			REXCNMX-1		
REXCNMX-2	56.203	[.854]	REXCNMX-2		
REXCNMX-3			REXCNMX-3		
REXCNMX-4			REXCNMX-4		
REXCNMX-5			REXCNMX-5		
REXCNMX-6	892.549	[.000]	REXCNMX-6	187.156	[.036]
REXCNMX-7			REXCNMX-7		
REXCNMX-8			REXCNMX-8		
NAFTA	-129.812	[.007]	NAFTA	1.99724	[.845]
Q1	89.7793	[.001]	Q1	-15.6499	[.018]
Q2	73.2689	[.000]	Q2	-9.92596	[.120]
Q3	-94.3899	[.000]	Q3	-5.66949	[.440]
REXCNROW2	-323.736	[.083]	REXMXROW2	81.7116	[.000]
REXUSCAN	-3288.16	[.000]	REXUSMEX	-1769.87	[.000]
REXCNCHI	-691.232	[.229]	REXMXGE	-72.8975	[.000]
REXCNSAR	2872.55	[.047]	REXMXJP	-881.589	[.329]

Sample 1986:1 2001:4

REXUSROW3=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHFRUS)/4;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

Table B.11

Details of the models compared in Davidson and MacKinnon Tests

	Variables included being tested*					
Alternative Model	Equation1	Equation 2	Equation 3	Equation 4	Equation 5	Equation6
ROW1	**REXUSMEX-7 and REXUSROW1;**	**REXUSMEX-1; REXUSMEX-7; REXUSMEX-8; REXMXROW1**	REXUSCAN-2 and REXUSROW1	**REXUSCAN-2 and REXCNROW1**	**REXCNMX-2; REXCNMX-8; REXCNROW1**	REXCNMX-2; REXCNMX-7; REXMXROW1
ROW2	**REXUSROW2; REXUSCAN; REXCHJPUS; REXRUSCHINA**	**REXUSMEX-2; REXUSMEX-4; REXUSMEX-7; REXUSMEX-8; REXMXROW2; REXCNMX; REXMXGE; REXMXJP**	REXUSCAN-2; REXUSROW2; REXUSMEX; REXCHJPUS; REXCHRUSCHINA	**REXCNROW2; REXCNMX; REXCNCHI; REXCNSAR**	**REXCNMX-6; REXCNROW2; REXUSCAN; REXCNCHI; REXCNSAR**	**REXCNMX-2; REXCNMX-6; REXCNMX-7; REXMXROW2; REXUSMEX; REXMXGE; REXMXJP**
ROW3	REXUSROW3; REXUSCAN; REXCHJPUS; REXCHRUSCHINA; REXCHUKUS; REXCHGEUS	REXUSMEX-2; REXUSMEX-4; REXUSMEX-7; REXUSMEX-8; REXMXROW2; REXCNMX; REXMXGE; REXMXJP	REXUSCAN-2; REXUSROW3; REXUSMEX; REXCHJPUS; REXCHRUSCHINA; REXCHUKUS; REXCHGEUS	REXUSCAN-1; REXCNROW2; REXCNMX; REXCNCHI; REXCNSAR	REXCNMX-2; REXCNMX-6; REXCNROW2; REXUSCAN; REXCNCHI; REXCNSAR	**REXCNMX-6; REXMXROW2; REXUSMEX; REXMXGE; REXMXJP**

*The variables included in the table are the only ones that differ between alternative versions and being tested.

REXUSROW1=(REXCHUKUS+REXCHFRUS+REXCHGEUS+REXCHJPUS+REXCHRUSCHINA+REXCHUSKOR+REXCHTWUS+REXCHRSIGUS)/8;

REXUSROW2=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHUKUS+REXCHFRUS+REXCHGEUS)/6;

REXUSROW3=(REXCHUSKOR+REXCHTWUS+REXCHRSIGUS+REXCHFRUS)/4;

REXMXROW1=(REXMXGE+REXMXJP+REXMXNZ+REXMXSAF)/4;

REXMXROW2=(REXMXNZ+REXMXSAF)/2;

REXCNROW1=(REXCNUK+REXCNGE+REXCNJP+REXCNCHI+REXCNSAR)/5;

REXCNROW2=(REXCNUK+REXCNGE+REXCNSAR)/3;

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