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# **Defining North American Economic Integration**

North American Agrifood Market Integration: Current Situation and Perspectives

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## **Defining North American Economic Integration**

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**Abstract:** Economic integration has important implications for growth, producers, and consumers, but definitions and measures of economic integration are numerous and varied. This paper defines economic integration, discusses why integration is important, and evaluates four prominent measures of integration for North America before and after NAFTA.

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## I. Overview

"Economic integration" is a term that is often used but rarely defined. In popular contexts, to "integrate" means to "make whole" or to "unite." In the economic context, however, the practical meaning of economic integration is the removal of barriers to commercial exchange. This concept applies to all forms of commercial exchange: goods and services (e.g. buying and selling final goods and services), production (buying, selling, and combining inputs such as materials and capital), and employment. Barriers to commercial exchange can be natural (e.g. mountains, oceans, and distance), cultural (e.g. information, language, and preferences), and political (e.g. borders, tariffs, quotas, and administrative standards). Since human economic activity is synonymous with commercial exchange, falling barriers to exchange define economic integration.

Understanding the idea of economic integration may be straightforward, but measuring it is not. The academic literature has identified a wide range of measures that capture various aspects of integration. Of these, the four most frequently used measures are product-level prices, factor markets, trade volumes, and product availability. All four are valuable measures that effectively capture different aspects of economic integration. The differences between the measures suggest that some might be more useful in certain contexts than in others. A comparison between the different measures suggests that the last two might generate the most meaningful insights into North American economic integration because conditions in Mexico, a developing country, are quite different than in Canada and the United States.

To motivate the different measures of economic integration, the next section of the paper briefly discusses why economic integration is important. As defined above,

economic integration is clearly important for growth, which ultimately determines each country's standard of living. Integration also drives change, which often is difficult and is therefore resisted. These changes directly affect producers and consumers, and therefore it is important to be able to identify the results of measures designed to foster economic integration, like trade agreements. The sections that follow therefore discuss each different measure of integration and what they tell us about integration in North America.

## II. Introduction: Why integration is important in the Americas

Fifty years ago, Latin America and other developing regions were at the peak of Import Substitution Industrialization. Having rejected the open markets and free trade that characterized the world fifty years before, the conventional wisdom suggested that the path to growth and prosperity was to focus inward and rely on government to generate the big push that would lead to development. Exhaustion of the ISI model, the relative success of the export-oriented East Asian countries, and the debt crisis triggered a reconsideration of the closed economy approach. In the mid 1980s and early 1990s Latin America dismantled barriers to trade and enacted sweeping reforms. The goal of these reforms was to integrate the previously closed countries into the world economy.

Economic integration is important for total national well-being because it affects aggregate growth. Growth ultimately determines each nation's standard of living. On the macro level, Frankel and Romer (1999) showed that countries that trade more internationally have higher incomes. The World Bank's 1993 report The East Asian Miracle suggested that export promotion strategies explained much of the rapid and sustained growth of the Asian Tigers. European incomes converged as the European

countries reduced barriers to trade (Ben-David 1993). These are just three examples of many studies that find a positive link between economic integration and growth.<sup>1</sup>

Economic integration is also important to individual producers. Exposure to foreign markets is associated with higher rates of innovation within establishments (Alvarez and Robertson, 2004). Bernard and Jensen (1999) find a positive link between firm-level productivity and exposure to foreign markets.<sup>2</sup> Integration with world markets increases access to intermediate inputs and ideas that can enhance productivity.

Economic integration also increases actual and potential competition, which can be challenging in both positive and negative ways. Firms under competition from more efficient foreign producers often shrink and lay off workers, while others are able to respond aggressively and increase productivity.

Growth, innovation, and productivity are not the only potential benefits of trade. Most trade models suggest that the gains from trade are largest for consumers because consumers are able to buy goods more cheaply through imports. The potential size of the gains to consumers is quite large. Bradford and Lawrence (2004), for example, estimate that if markets were integrated, and prices were equalized, then developing countries could experience gains over US\$103 billion and developed countries could experience gains over US\$450 billion.

Lured by the promise of these gains, but frustrated by the stalled Uruguay round, countries pursued regional trade agreements. Europe advanced towards a single currency. In the Americas, several regional trade agreements emerged. Brazil,

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<sup>1</sup> Of course, these studies have not escaped criticism. There is an ongoing debate about the specific policies that might contribute to growth through economic integration and the importance of other factors, such as institutions, that also affect growth. We discuss this debate later in the paper.

<sup>2</sup> Neither of these studies conclusively shows that the causality runs from exporting to higher productivity, and therefore may suggest that more productive firms are the ones that export.

Argentina, Paraguay, and Uruguay formed MERCOSUR. The United States, Canada, and Mexico successfully negotiated the North American Free Trade Agreement. Trade agreements soon formed what is now called the "spaghetti bowl" of trade agreements in the Americas (IADB 2002, Estevadeordal and Robertson 2004).

The goal of these agreements was to foster integration by lowering various political barriers to commercial exchange. Tariffs and quotas drive wedges between prices. As these barriers fall, holding all other factors constant, prices converge. The agreements also strive to harmonize standards and eliminate other "non tariff" barriers. Lowering these political barriers may also reduce natural barriers as well, such as distance. While obviously not being able to change physical distance, trade agreements that increase the volume of trade can result in falling transportation costs because the average cost of transportation falls as the volume of trade increases (transportation exhibits economies of scale, as Hummels (2004) describes). Therefore, trade agreements could contribute to price convergence over and above the effect of reducing political barriers to trade.

These arguments suggest that an obvious metric for measuring integration would be to directly measure transportation costs between two countries. Surprisingly, very few studies directly incorporate transportation costs. Barrett and Li (2002) are one exception, and even they acknowledge that one can never observe all possible transactions costs that contribute to driving a wedge between international prices.<sup>3</sup> In the North American case, although about 70% of trade is transported by truck, different goods have different transportation costs related to weight. If one is interested in a particular good, changes in

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<sup>3</sup> See also Beghin and Fang (2002).

transportation costs might be a good way to measure changes in integration, but, at the aggregate level, these comparisons are less straightforward.

Even with the added benefit of falling average transportation costs, regional agreements may or may not sufficiently reduce barriers to integration. Nearly 20 years after reforms began, the Inter American Development Bank now reports that Latin Americans are frustrated with the lack of growth and are losing their enthusiasm for reforms. At least two possible explanations could reconcile the lack of success with the findings that trade and growth are linked. First, trade liberalization may be a necessary, but not sufficient, condition for growth. Rodrik and Subramanian (2002) argue that "institutions rule:" protections of property rights, lack of corruption, healthy financial markets, infrastructure, and education may also be necessary conditions for growth. This may be particularly true for Mexico's NAFTA experience (Tornell, Westerman, and Martinez 2004). Another reason is that reforms may not have been completely carried out (Fontaine 2002). In the case of international economic integration, the implication is that agreements that reduce tariffs may not be enough to actually facilitate integration if other, less transparent, barriers take the place of tariffs, quotas, and licenses.

Therefore, it makes sense to take a multifaceted approach to understanding, measuring, and evaluating integration. While the academic literature contains several different measures of economic integration,<sup>4</sup> I present the measures that have received the most attention - price convergence, factor markets, trade volumes, and product availability<sup>5</sup> - in the next four sections. Schiff and Winters (2003) offer an excellent

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<sup>4</sup> Studies that discuss how political and legal integration relate to economic integration include Eichengreen (1996) and Echandi (2001).

<sup>5</sup> There are several other measures that appear in the literature that are not discussed. Krueger, Salin, and Gray (2002), for example, apply a probabilistic measure that draws on the industrial organization literature that is closely related to the price measures discussed in section III.



overview of how regional agreements contribute to these measures. In each section, I discuss the applicability of each measure for measuring integration in North America before and after NAFTA. The final section offers concluding thoughts.

## II. Price Convergence

When trading, buyers and sellers must agree on a price. Therefore, the fundamental mechanism underlying international economic integration is price equalization. Since different countries often use different currencies, economists use the term *purchasing power parity* (PPP) to discuss comparisons of prices in different currencies. If PPP holds, then currency-adjusted prices are equal across countries.

There are three ways to use prices as a metric for integration. The first is a convergence in absolute price levels. After accounting for natural, cultural, and political barriers to trade, price levels of identical products should be equal. The second is to follow price movements over time: prices of similar products should move in similar ways over time in integrated markets, regardless of whether or not the levels of the prices are equal. The third is to examine the range of variation of prices. This approach is based on the idea that prices in integrated markets should exhibit less variation than prices in segmented markets because arbitrage reduces the range in which prices can vary.

A growing number of studies use price levels of similar goods in different countries. The focus of these studies ranges from very specific products, such as pesticides in the United States and Canada (Carlson et al. 1999), to a wide range of products over many countries (Bradford and Lawrence 2004). Carlson et al. (1999) find pesticide and herbicide prices differ between North Dakota and Manitoba and attribute these differences to differences in patents, market size, and number of available

substitutes. Bradford and Lawrence (2004) also find that price differences in the European Union seem to be large and persistent. Producer prices exhibit differences as large as 20% in adjacent countries and reach 30%-50% between continents.

The second approach follows prices over time. There are several variations of this theme. Some papers measure the speed at which prices converge back to some differential. Froot, Kim, and Rogoff (1995) examine deviations from PPP over 700 years and find that deviations are quite persistent. Others suggest that goods in integrated markets should change prices in comparable ways, such as in the same direction and approximately the same time (Xu 2003). Other authors use similar approaches, such as Betts and Kehoe (1991),<sup>6</sup> but the findings are often mixed.

Engel and Rogers (1996) employ a third approach. They posit bands that define the range of price movements that do not elicit arbitrage. Price movements out of these bands would invite arbitrage and bring prices back within the bands. Transportation costs increase the range in which prices can fluctuate without attracting competition. Therefore, they suggest that a measure of market integration is the variance of goods between cities. Close cities should have narrow bands because transportation costs are lower, and therefore the overall variance of prices should be a function of distance and market barriers. As market barriers fall, the variance of price movements should also fall to reflect increasing integration.<sup>7</sup>

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<sup>6</sup> For readers interested in econometrics, these studies include Granger causality, error-correction models, cointegration tests (e.g. Ghosh 2003, Mohanty, Peterson, and Smith 1996, Mohanty and Langley 2003, Moodley, Kerr, and Gordon 2000, Paul, Miljkovic, and Ipe 2001), and vector autoregression (VAR) models (e.g. Dawson and Dey 2002). Baulch (1997) criticizes these studies, noting that transfer costs are significant and introduces a technique to incorporate transfer costs into the analysis. The problem with this approach, however, is that it requires some data on transfer costs which are often very difficult to find.

<sup>7</sup> Berkowitz and deJong (2003) employ this approach when examining Russian integration.

While prices might offer some of the most intuitive measures of integration, studies in this area face at least three significant problems. First, data are generally scarce. This is particularly true for data on price levels. Some recent studies (e.g., Bradford and Lawrence 2004, Parsley and Wei 2001) use detailed price data from cities around the world to estimate the degree of market fragmentation and the degree to which prices tend towards equalization. These data sets are relatively new, and offer potentially important insights that are still emerging.

Second, prices can diverge for reasons not directly related to economic integration. Prices may differ due to differences in demand elasticities, taxes, availability of substitutes, and other factors (Carlson et al.1999, Knetter and Slaughter 1999).

Another significant factor could be the presence of non tariff barriers, such as administrative requirements and standards. These act as barriers to trade that are often difficult to observe but could have significant effects on prices. Therefore, it would be important to at least discuss the possible magnitude of these and other influences when using the price criterion for market integration.

Differences in monetary policy across countries may generate differences in price levels. Second, the relationship between exchange rates and domestic prices is not well understood. In order to compare price levels between countries that use different currencies, one has to use some measure of the exchange rate. If the exchange rate is perfectly flexible and only moves to offset differences in inflation between two countries, then using the exchange rate is not a problem. Many studies find that exchange rates in general do not always move to offset differences in inflation levels. Taylor (2000), for example describes some of the methodological problems involved in even addressing the question. Campa and Goldberg (2002) find only partial "pass through" in the short run,

which means that prices and exchange rates do not move perfectly to offset each other, which makes price equalization across countries problematic.

This problem probably affects comparisons between all countries, but some countries are affected more than others. The North American case is an excellent example. Canada and the United States have relatively similar inflation rates, while Mexico and the United States have very different inflation rates. Figure 1a plots the Canadian CPI (relative to the U.S. CPI) and the nominal Canadian-United States exchange rate. This figure illustrates two important points. First, the relative inflation rate moves over a very small range (from .92 to 1.02), suggesting that U.S. and Canadian inflation rates are very similar. Second, the Canadian dollar is relatively flexible and moves with inflation to offset the difference in inflation between the two countries. This suggests a relatively well-functioning exchange rate.

Figure 1b, on the other hand, plots the Mexican CPI (relative to the U.S. CPI) and the nominal peso-dollar exchange rate. The figure also reveals two important stylized facts. First, the scale of Mexican-U.S. inflation comparison is over 40 times larger than the scale for the Canadian-U.S. inflation ratio, showing that Mexican inflation rises significantly relative to U.S. inflation over the 1986-2000 period. Second, there is generally a large gap between the movement of the peso and the difference in exchange rates. In fact, the nominal exchange rate only changes to offset the relative difference in price levels during the 1994:12 peso crisis. This is important because it suggests that Mexican prices, relative to U.S. prices, are rising.<sup>8</sup>

The relative inflexibility of the exchange rate in Mexico affects the trade balance. Figures 2a and 2b illustrate how changes in the real exchange rate (calculated as the

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<sup>8</sup> As expected, the gap between the relative inflation levels and the exchange rate has resulted in a corresponding change in the Mexican trade balance. See Robertson (2003).

nominal exchange rate times the ratio of the inflation indices in the two countries) affect the trade balance in Mexico and Canada. The real exchange rate follows the trade balance closely in both countries, but the movements of the real exchange rate are much smaller in Canada and therefore Canada has (proportionally) smaller swings in the trade balance.

These figures illustrate that attempts to compare prices as a way to measure integration would have to take into account the macroeconomic imbalance implied by the difference in inflation rates and the adjustment in the different currencies. In the United States-Canadian case, this does not seem to be a very serious problem because the exchange rate tends to effectively offset differences in inflation rates. In the Mexican case, however, the exchange rate is not as effective and therefore confounds price comparisons.

Third, and perhaps more vexing for those wishing to apply the price metric to the Mexican case would be the problem illustrated in Figure 3. As the figure implies, the coefficient of variation<sup>9</sup> of prices increases in the NAFTA period, which often happens during inflationary periods (Parks 1978, Glezakos and Nugent 1986). This complicates the comparison of price levels, changes, and the variance because not all prices respond in the same way to inflation. Domberger (1987) and Debelle and Lamont (1997) find that differences in inflation increase relative price variability. These papers seem to suggest that using either relative prices or variation in prices as a metric for market integration could be significantly complicated by differences in inflation rates. In the

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<sup>9</sup> The coefficient of variation is the variance divided by the average price level. The variance would increase as the level increases, but dividing by the average removes the effect average inflation.

Mexican case, price convergence or a convergence in the variation of prices that would be due to trade could be swamped by the relatively high rates of inflation in Mexico.

### III. Factor Markets (Capital and Labor)

In addition to goods markets, barriers to commercial exchange can apply to factor markets. In addition, the two are related. In a model in which prices are related to costs (and, in perfect competition, equal marginal costs), product market integration can be analyzed by focusing on factor markets. The two most common factor markets are capital and labor. The neoclassical trade models, such as the Heckscher-Ohlin model, suggest that wages and returns to capital would equalize in integrated markets. It does not matter why the markets are integrated. Free mobility of labor and capital might equalize factor prices, and, in theory, product market integration that equalizes prices should also equalize factor prices. Formally, the result that product price equalization leads to factor price equalization is known as the factor price equalization theorem.

We have already discussed some of the problems encountered when trying to observe whether or not product market prices equalize, so we now focus on the mobility of capital and labor. One important difference between capital and labor is that capital is generally assumed to be more internationally mobile than labor. NAFTA in particular was designed to facilitate capital flows. A large and voluminous literature tests for capital market integration. These papers generally find relatively integrated capital markets, but Oh (2003), for example, finds that European capital market integration is still far from complete.

As with product-market integration, one can think about factor market integration both in terms of flows and prices. In addition to being designed to facilitate capital flows, NAFTA was also designed to complement earlier reforms liberalizing capital markets.

Factor flows have historically been more restricted between Mexico and the United States than between Canada and the United States, and therefore I will focus most of the discussion on factor markets to the Mexican-United States case.

In Mexico, foreign capital faced restrictions under the 1973 Foreign Investment Law *The Law to Promote Mexican Investment and to Regulate Foreign Investment*. The 1973 law established a general limit of 49% foreign ownership in Mexican businesses. In 1983, the Mexican government reformed the *maquiladora* program by relaxing controls on foreign investment for the Mexican border region. In May 1989, the Salinas de Gortari administration relaxed this law for the rest of the country by eliminating all existing administrative requirements and broadened the interpretation of the 1973 law to facilitate capital flows (Ros 1994). Thus, is it not surprising that the pattern of capital flows changed up to and after NAFTA.

Figure 4 illustrates some of the changes in capital flows into Mexico over the 1980-2000 period by plotting aggregate net flows of both foreign direct investment and portfolio investment. Several important features of the graph deserve mention. First, the change in the foreign investment law in 1989 was followed by a sharp increase in portfolio investment, which reversed during 1994. As evident in the graph, portfolio investment is more volatile than FDI and therefore has been a concern to Mexican policy makers.

Starting with NAFTA, however, the relative structure of foreign investment is very different than it was during the 1990-1994 period. In particular, there is a noticeable increase in the trend of FDI starting in 1994 (before the peso crisis). Whether or not this capital flow helps to integrate markets, however, is not addressed in Figure 4. The most prevalent example of foreign direct investment in Mexico has been the *maquiladora*

industry. The maquiladora industry remains controversial. The recent media focus on "outsourcing" is only new in the sense that outsourcing has been extended to include traditionally "white-collar" jobs. The debate over outsourcing "blue-collar" jobs to Mexico has centered on the maquiladora industry.

Maquiladoras are assembly plants in Mexico that export goods assembled with imported inputs. These are largely foreign firms that have been the engine behind Mexican manufacturing growth over the last 20 years.<sup>10</sup> The rise in maquiladora establishments and employment potentially represents direct integration of the U.S. and Mexican economies because it represents a fragmentation of the production process. Production of a final good can be broken into stages, such as design, materials, assembly, and marketing. Maquiladoras become part of the production chain of U.S. companies because they perform the assembly stage of production and therefore tighten the links between the two countries.

Figure 5 shows the evolution of employment and establishments in Mexico's maquiladora industry. The changes in the foreign investment law in 1983 are evident here, as both establishments and employment rise rapidly after this date. The rate of increase increases again following NAFTA. Since 2000, however, both employment and the number of plants have been falling. The decline in maquiladora activity has raised serious concerns among Mexican policy makers.

Several analysts have suggested that this decline represents a loss of Mexican competitiveness relative to other countries, such as China. Others have suggested that the decline is actually evidence of very close integration between U.S. and Mexican markets. Figure 6 (taken from Hanson and Robertson 2004) suggests that U.S. manufacturing

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<sup>10</sup> The Mexican maquiladora program has also been studied as a possible explanation of rising inequality in Mexico. See Feenstra and Hanson (1997)



output and Mexican maquiladora output are actually very closely related, which might suggest that capital flows have been a force integrating North America. The relative decline of the maquiladora employment and establishments might therefore be attributed to the U.S. recession.

As with products and capital, one measure of integration is the volume of flows crossing the border. With labor, most people think about the illegal flows across the U.S.-Mexican border. Few people think about the legal flows. Thousands of people cross the border every day to work and shop. Figure 7 shows the Mexican government's official statistics on monthly legal border crossings. The trends are clearly increasing in the NAFTA period, although they appear to be strongly procyclical because they fall during the 1994 crisis. The rising number of legal border crossings is evidence of rising integration.

Whether or not these flows are consistent with other measures of labor market integration, however, remains a subject of debate. As mentioned earlier, NAFTA was partially designed to facilitate capital flows. Labor flows were specifically excluded from the main agreement. Furthermore, several measures were implemented concurrently with NAFTA that were designed to make labor less mobile across the border. Operation Hold the Line, Operation Gatekeeper, and Operation Rio Grand<sup>11</sup> were three initiatives of the U.S. border patrol to increase migration costs to Mexican workers seeking employment in the United States. Operation Hold the Line was implemented in 1993 and focused on El Paso. Operation Gatekeeper went into effect in October 1994 in San Diego. Operation Rio Grand in McAllen, Texas was launched in August 1997. All

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<sup>11</sup> See <http://uscis.gov/graphics/publicaffairs/factsheets/bpops.htm> for more information about these initiatives.

of these provisions are designed to increase the cost of migration and therefore drive a wedge between labor markets in Mexico and the United States.

Reliable illegal immigration data are difficult to find, complicating studies of labor flows. As with product markets, an alternative metric of labor market integration is absolute wage convergence. That is, similar workers should earn similar wages in integrated labor markets. As is well known, Mexican and U.S. wages are quite different. Figure 8 illustrates the long-run (1963-1999) gap in the dollar value of U.S. and Mexican average wages. Panel A shows that the gap is very large and persistent. The wages do seem to exhibit some similarity in movement over the 36 year span, as illustrated in Panel B of Figure 8. Both real U.S. and dollar-valued Mexican wages rise from 1963 to about 1980. Starting in 1980, U.S. real wages begin a gradual decline that lasts until about 1995. Concurrent with the debt crisis (1982) and the peso crisis (1994), Mexican wages fall sharply. Overall, however, absolute convergence might be evaluated by comparing the ratio of dollar wages in each country, as illustrated in Panel C. Over the 36 year period, there is evidence of dollar-valued wage convergence that was interrupted by the debt and peso crises.

As with product prices, comparing wages between countries is complicated when countries use different currencies and when the currencies do not adjust to offset differences in inflation rates. Therefore, one can consider an alternative measure that is based on real domestic purchasing power. Rather than transforming Mexican wages into dollars using the nominal exchange rate, we could transform Mexican wages into real wages using the Mexican CPI and transform U.S. wages into real wages using the U.S. CPI. These two series are then divided by the value in some base year (e.g. 1963) so that we can compare real wage movements relative to the differential in the base year.

Like Figure 8, Figure 9 contains three panels that illustrate the comparison of U.S. and Mexican real wages. Panel A graphs the two series without normalizing the wages to be equal to one in the base year. The main message in this panel is that U.S. and Mexican real wages follow a surprisingly similar pattern of rising before 1980 and falling afterwards. Not surprisingly, Mexican wages are much more volatile than U.S. wages, as is evident in Panel B. When both wage series are normalized to one in 1963, we see that real Mexican wages rise more and fall more than U.S. wages. As we saw when using the dollar measure of wages, the debt crisis of the early 1980s coincided with a very large decline in Mexican purchasing power. This large drop in relative wages is evident in Panel C, in which we take the ratio of the normalized Mexican and U.S. wage series. In terms of relative purchasing power, the drops that followed the debt crisis and the peso crisis interrupted a trend towards wage convergence and create the impression of wage divergence over the 1980-1998 period.

Rising trade seems consistent with the convergence in the dollar-valued wages, but inconsistent with the purchasing-power-based wage measures. In both cases, a large gap persists. The wage gap between U.S. and Mexican workers, however, does not necessarily imply that labor markets are segmented. The cost of crossing the border effectively drives a wedge between wages that might represent an equilibrium differential. That is, workers might migrate if the expected gains from migrating are larger than the cost of crossing the border, but would not migrate if the gain is smaller. Thus, workers would continue to migrate until the difference between wages in the two countries returned to the cost of migrating. For example, if wages increase in the United States so that the gap is larger than the migration cost, workers would leave Mexico as

long as the gap persisted and would stop migrating when the gap returned to the cost of migrating.

One implication of this approach is that labor markets can be considered integrated even in the presence of an absolute wage differential if wages in the two countries move in the same direction. That is, labor markets are integrated if wage shocks in the United States are transmitted to Mexico. This is the basic premise behind Robertson (2000). By matching U.S. and Mexican household surveys, Robertson (2000) analyzes the transmission to of U.S. labor market shocks into Mexico. This approach generates two criteria for labor market integration. The first is that Mexican wages would respond to U.S. wage shocks. The second measures the speed at which wages respond and return to the equilibrium wage differential.

The results suggest that U.S. and Mexican labor markets are closely integrated. Mexican wages respond to U.S. wage shocks and return to the equilibrium differential relatively quickly. Furthermore, the results suggest that the Mexican border region is more closely integrated with the United States than the Mexican interior is. Wages in the Mexican border cities (Tijuana, Ciudad Juarez, Nuevo Laredo, and Matamoros) exhibit stronger responses to U.S. wage shocks and return more quickly to the equilibrium differential.

Robertson (2004) analyzes both absolute and relative wage convergence before and after NAFTA. The results from both absolute and relative wages suggest that there is very little evidence of increased labor market integration following NAFTA. These results are somewhat surprising, given the fact that trade and foreign investment increase following NAFTA, and both of these measures are expected to contribute to labor market integration. A more direct comparison of the different factors that can integrate labor

markets, however, suggests a possible explanation. Regression analysis that directly compares trade, foreign investment, migration controls, and wages, suggests that, as expected, trade and foreign investment are positively correlated with wages and therefore contribute to market integration. Border enforcement, while formally separate from NAFTA, increased during the implementation of NAFTA. Border enforcement is negatively correlated with Mexican wages and may have mitigated the gains that came from rising trade and investment.<sup>12</sup>

#### IV. Trade Volumes

If existing barriers inhibit trade, falling barriers should increase trade volumes. Therefore, perhaps the most intuitive measure of economic integration is the volume of trade. Courchene (2003), for example, leads his discussion of North American economic integration with a discussion of how trade flows have increased between Canada and the United States. International trade theory suggests that international trade is sufficient to integrate markets and most people probably think of trade volumes first when thinking about exchange between countries (Barrett 2001). Furthermore, trade data are easily accessible and rising trade flows often follow trade liberalization measures.

In terms of trade volume, Canada is the largest United States trading partner. Trade between the United States and Canada increased greatly between 1986 and 1999. Figure 10a shows that between 1986 and 1999 Canada's share of total United States trade rose. Since 1999, however, this share has been falling. Interestingly, if one includes 1985, there is no statistically significant trend in Canada's share of United States trade over the 1985-2003 period. Figure 10b, which shows Canada's share of U.S. exports and

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<sup>12</sup> Hanson, Robertson, and Spilimbergo (2002) also find that rising U.S. border enforcement depresses Mexican wages.

imports, illustrates that, while Canada's share of U.S. exports has been rising steadily over the last 12 years, Canada's share of U.S. imports rose from 1987 to 1995, and has been falling since 1996, but, overall, the changes have been relatively small.

The change in trade volume between Mexico and the United States has received much attention. Figure 11 shows the change in total United States-Mexican trade between 1985 and 2003. Trade between Mexico and the United States has been increasing over the entire period, with a spike following the peso crisis. Trade volumes fall with the onset of the United States recession in 2000, but recover somewhat in 2002. Figure 11 also shows the trend before and after NAFTA. The trend in total trade is higher in the NAFTA period (post 1994:1) than before NAFTA. It is important to note that the change in trade is not likely to be due to the peso crisis or changes in the exchange rate. Figure 2a shows that the real exchange rate follows the same pattern before and after the peso crisis, and that the peso crisis corrected the overvaluation of the peso. The persistence of the trend, therefore, is most suggestive of a real effect of economic integration.

Figures 12a and 12b contain further evidence that suggests that North America is becoming more economically integrated. Figure 12a shows the evolution of Mexico's share of total U.S. exports between 1985 and 2003. Figure 12b shows the evolution of Mexico's share of total U.S. imports over the same period. The first important point is the contrast in scale between these figures and Figures 10a and 10b. Mexico's share of U.S. imports and exports more than doubles over the last 20 years. Since NAFTA, Mexico's share of total U.S. imports rises by nearly 50%, and Mexico's share of U.S. exports rises by approximately 100%. Mexico began liberalizing trade when it joined the GATT in 1986. Tariffs fell sharply between 1986 and 1988 and remained stable until the

peso crisis in 1994:12. Both 12a and 12b show that Mexico's share of U.S. exports and imports falls between 1985 and 1987, but starts climbing in 1987 and continues to rise for the rest of the period.

The peso crisis in 1994 did affect imports and exports between Mexico and the United States. Figures 12a and 12b illustrate two different ways to think about changes in Mexico's share of U.S. trade. The first is the *level* of the share of trade. Both figures show that the level of the share of trade is higher in the NAFTA period than before. Mexico's share of U.S. exports fell sharply during the crisis, as Mexico's domestic demand collapsed, but the recovery was particularly robust. The second is the rate of increase. Figure 12a reflects the econometric result that the rate of increase of Mexico's share of total U.S. exports is higher after NAFTA than before, although this seems to level out somewhat with the 2000 U.S. recession.

The change in imports reflects a somewhat different pattern. Mexico's peso collapse made Mexican goods much less expensive for the United States, and Mexico's exports to the United States increased as a result. Interestingly, there seems to be a clear structural break at that time. Mexico's share of U.S. imports remains at a higher level and continues to increase. The rate of increase is slightly higher (and the difference is statistically significant) in the post NAFTA period, suggesting that both the level and the rate of increase of Mexico's share of U.S. trade increased after NAFTA.

Jakab *et al* (2001) present a related measure based on trade volumes. They first calculate the *potential* trade volumes between country pairs that are based on the characteristics of countries that contribute to trade (distance, income, border, language, and other factors). They then compare observed trade levels and the potential, as well as calculating the speed of convergence towards the potential trade level. Estevadeordal and

Robertson (2004) conduct a similar exercise for the Americas in preparation for the Free Trade Agreement of the Americas. They find that the gravity model actually underpredicts Mexico's trade volumes prior to the FTAA, which, suggests that Mexico is already trading more than would be expected based on the usual gravity model estimates. Mexico's trade is expected to increase with the FTAA.

## V. Product Availability

Knetter and Slaughter (1999) and Broda and Weinstein (2004) suggest two different possible measures of market integration that have deep roots in theory but have received relatively little empirical attention. Simply put, these involve looking at the range of products traded. Product markets might be integrated if prices equalize, as discussed earlier, but empirically one can only compare the prices of goods that are actually present in the market. Increasing the range of goods that are traded, and therefore increasing the choices of products available to producers, is one of the most significant gains from trade liberalization.

Knetter and Slaughter (1999) develop a useful metric to measure market "thickness," which is essentially a count of the number of goods in which trade is observed divided by the total number of possible goods. This measure therefore ranges from zero to one as market thickness increases. They then calculate this measure for a sample of 24 OECD countries and 122 "world" countries. Not surprisingly, country pairs within the OECD trade a wider range of goods than the world in general. They also find that, in general, markets have become more "thick" over time, although this pattern was not uniform during the 1980s. Unfortunately, they are unable to link the trends with changes in trade barriers, making it difficult to determine whether falling trade barriers increase the range of goods traded.



Broda and Weinstein (2004), on the other hand, find stronger links between liberalization and the number of goods traded. Defining goods by both category and country (assuming each country's variety is unique), they find that between 1972 and 2001, the number of varieties that the United States imported grew from 74,667 (7731 goods from an average of 9.7 countries) to 259,215 (16,390 goods from an average of 15.8 countries). One interesting finding is that, in terms of rank in supplying varieties to the United States, Canada moved from fourth to first and Mexico moved from thirteenth to eighth. Focusing their empirical analysis on the United States, they find that the increase in varieties increased U.S. welfare by 3 percent.

## VI. Conclusions

Economic integration is synonymous with falling barriers to commercial exchange. International economic integration is important because it is linked to growth and has significant effects on producers and consumers. Defining, measuring, and evaluating integration is therefore important but is not always straightforward. Comparing prices between the United States and Mexico is complicated by the fact that the two countries have different inflation rates and the peso-dollar exchange rate does not adjust to offset the difference. An alternative is to focus on factor markets. Capital flows increased after NAFTA, and seem to be a factor integrating the two economies. Legal labor flows have also increased, but, apart from and concurrent with NAFTA, the United States raised border enforcement in ways that may have mitigated the integrating effects of product and capital market integration. As a result, there is little evidence that labor markets are more integrated following NAFTA.

The more promising measures of integration seem to be those that focus on either the breadth or depth of trade volumes. Falling transportation costs and falling barriers to

trade facilitate goods flows and make it easier for both producers and consumers to obtain goods at a lower cost. Following NAFTA, both the level and the rate of increase of Mexico's share of U.S. exports and imports rose, suggesting an increasing depth of product-market integration.

One of the most promising measures of economic integration in North America is one that measures the breadth of product-market trade. Trade agreements lower barriers to the trade of currently traded products, but also make trade in new products possible. Trade in new products has a very significant potential for increasing the welfare of producers and consumers throughout North America.

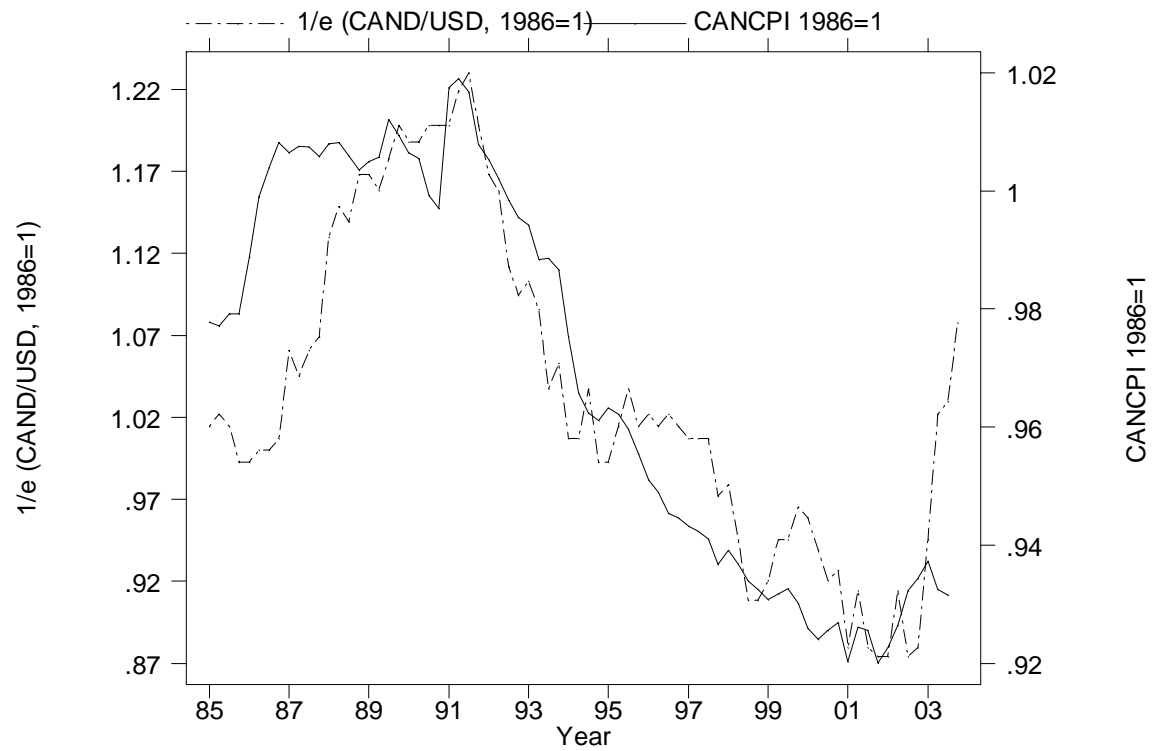
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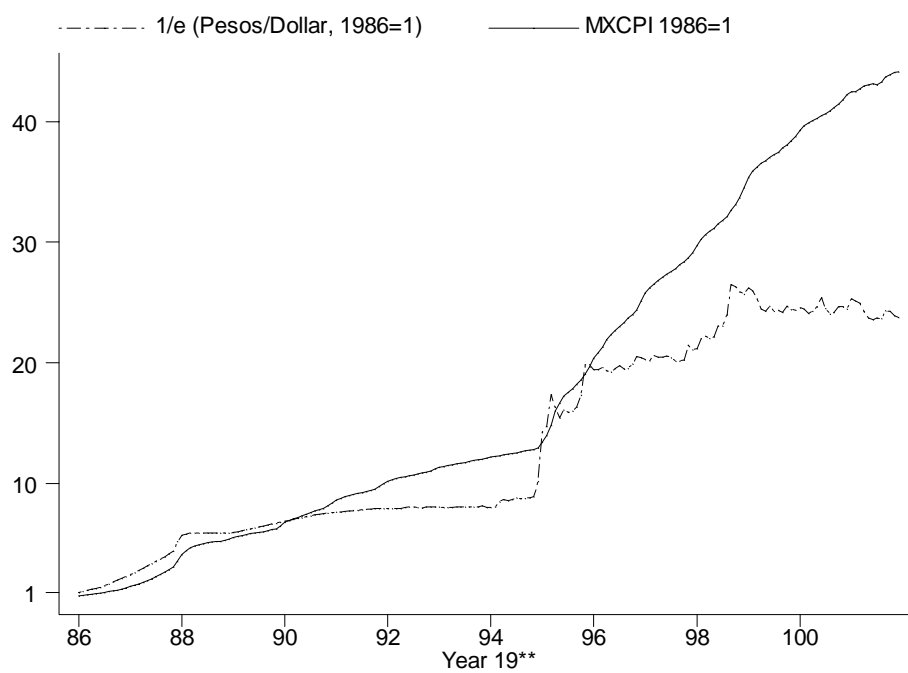
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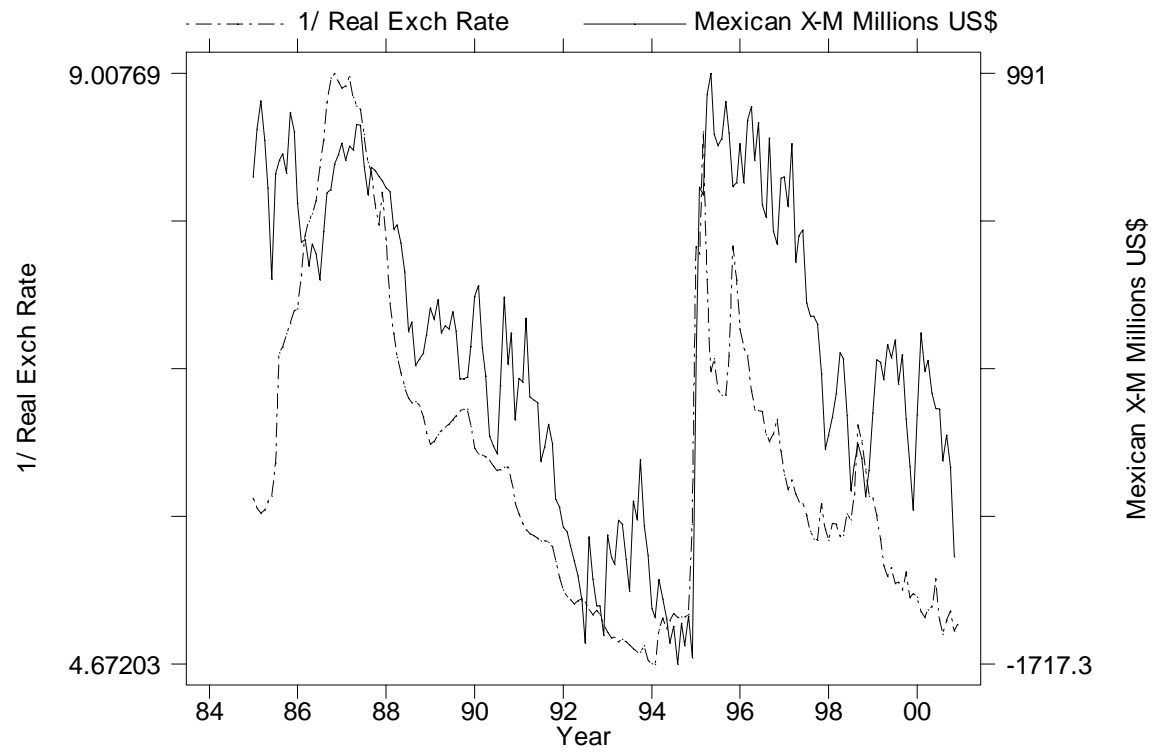
**Figure 1a: Relative Inflation and the Exchange Rate in Canada**



**Figure 1b: Relative Inflation and the Exchange Rate in Mexico**

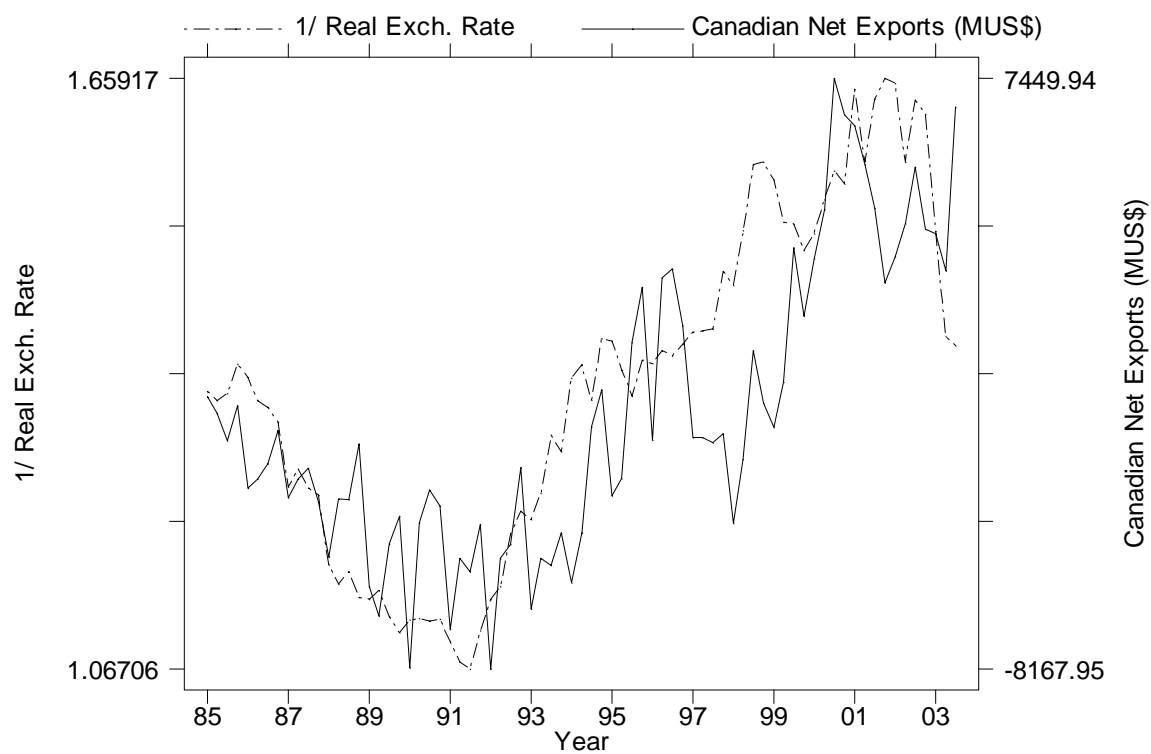


**Figure 2a: Real Exchange Rate and Net Exports in Mexico**

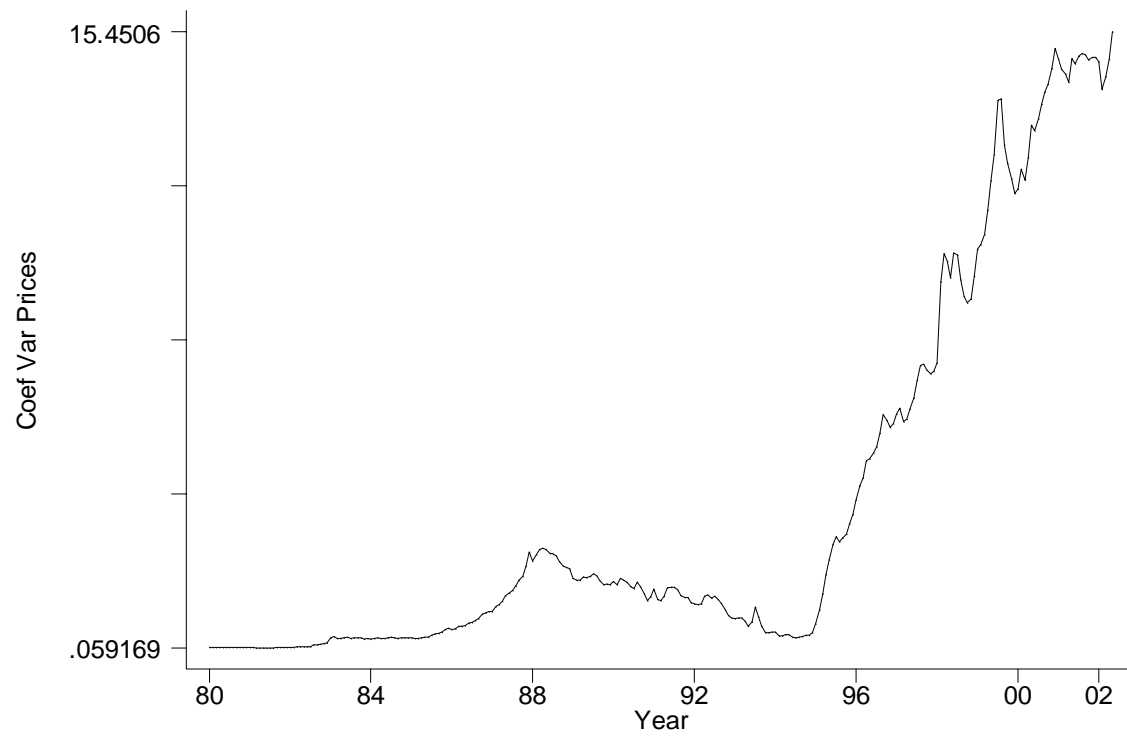




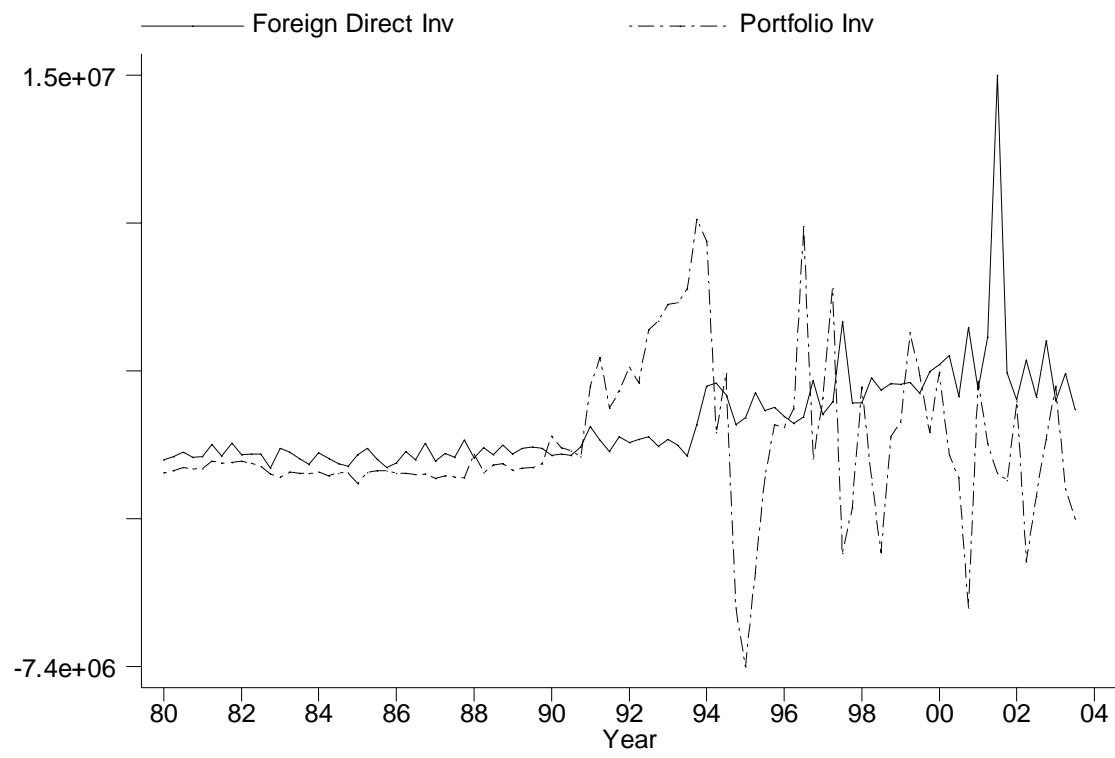
**Figure 2b: Real Exchange Rate and Net Exports in Canada**



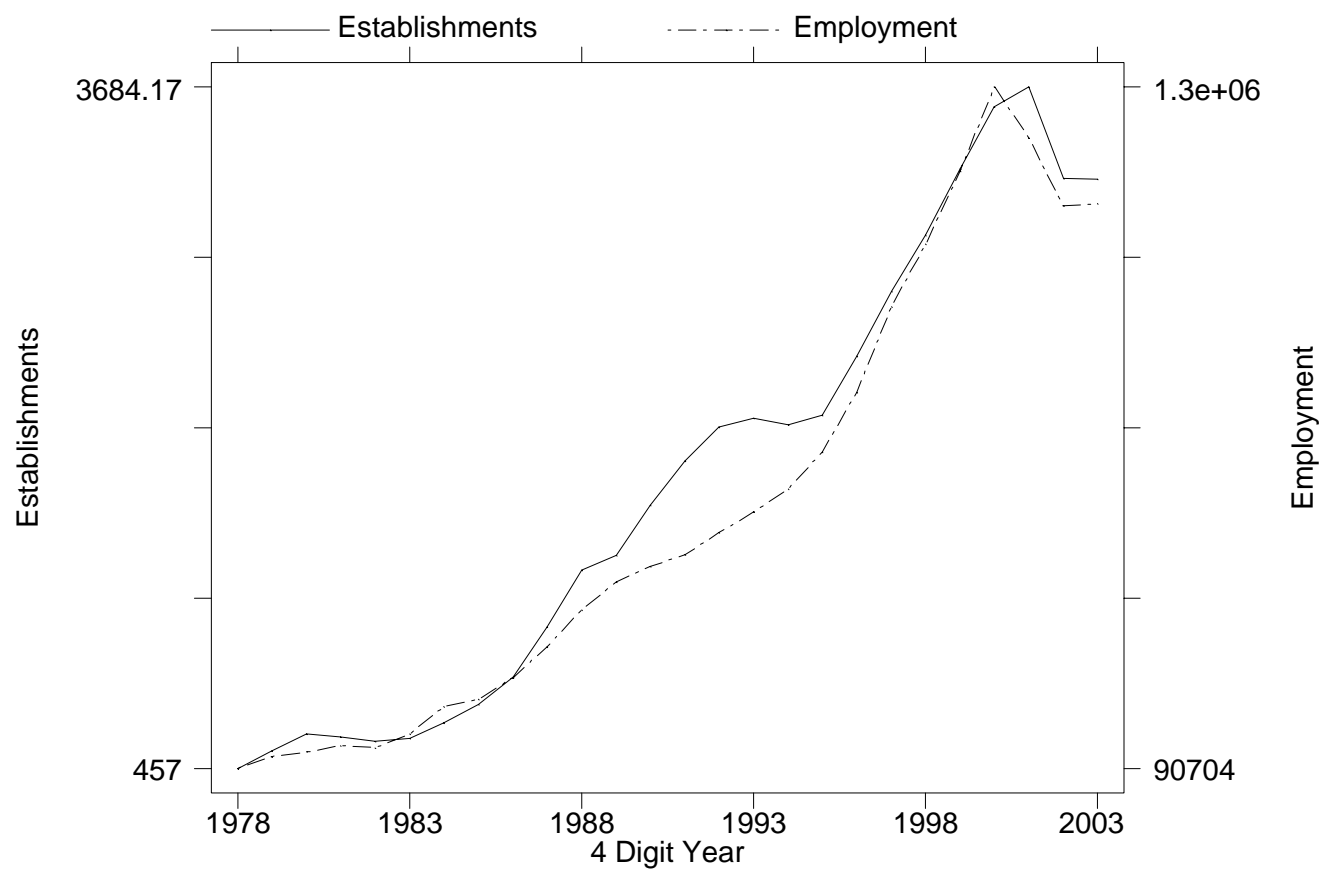
**Figure 3: Coefficient of Variation of Mexican Product Prices**



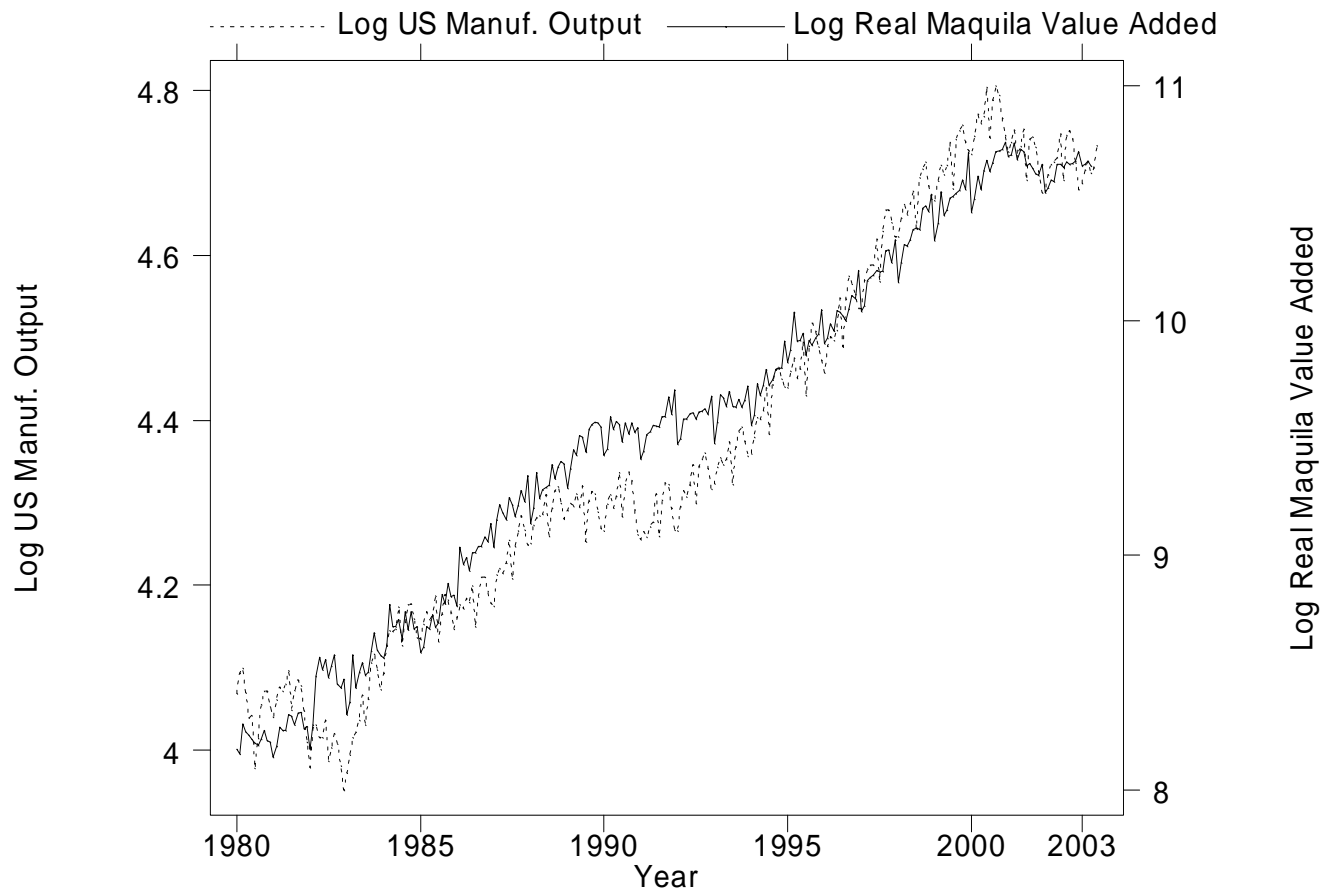
**Figure 4: Capital Flows to Mexico**



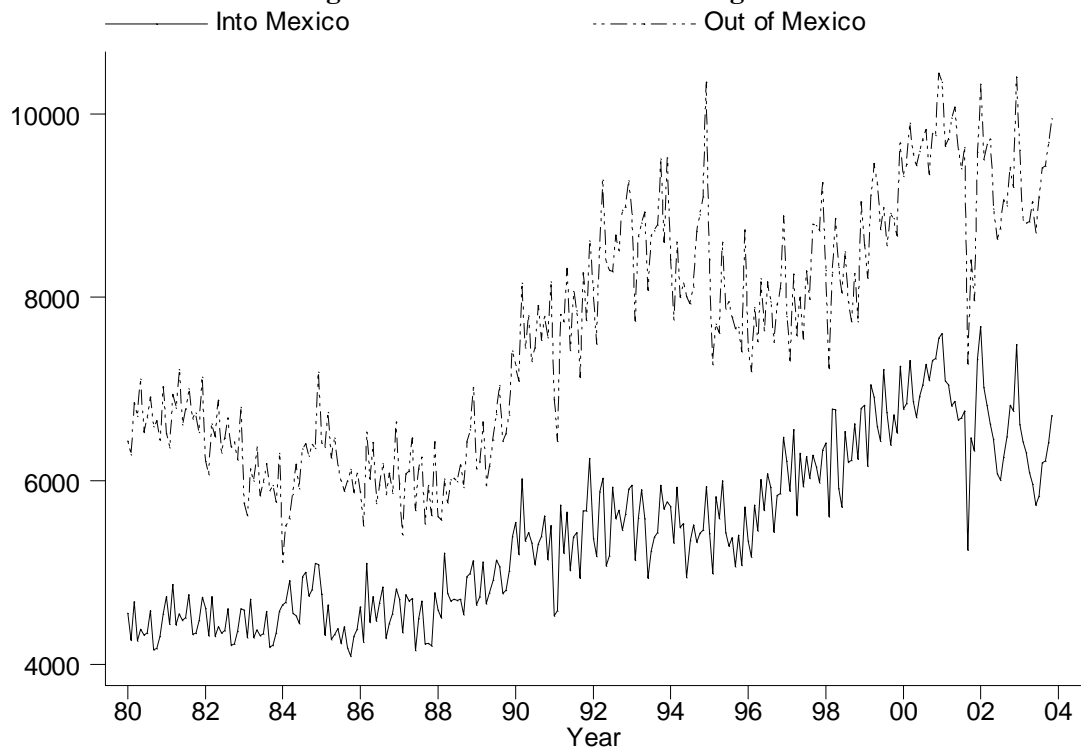
**Figure 5: Establishments and Employment in the Maquiladora Industry**



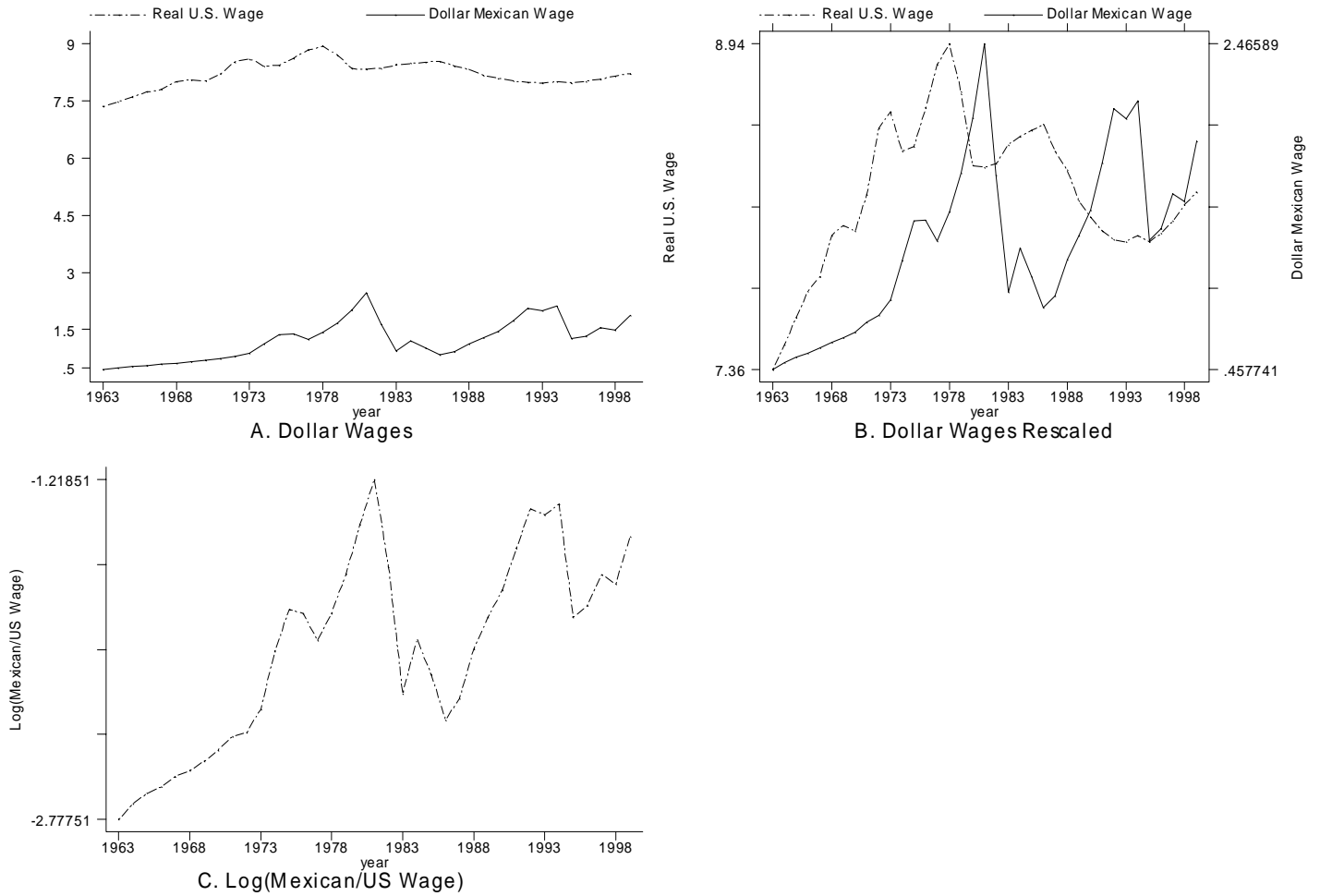
**Figure 6: Output in U.S. Manufacturing and Mexican Maquiladoras**



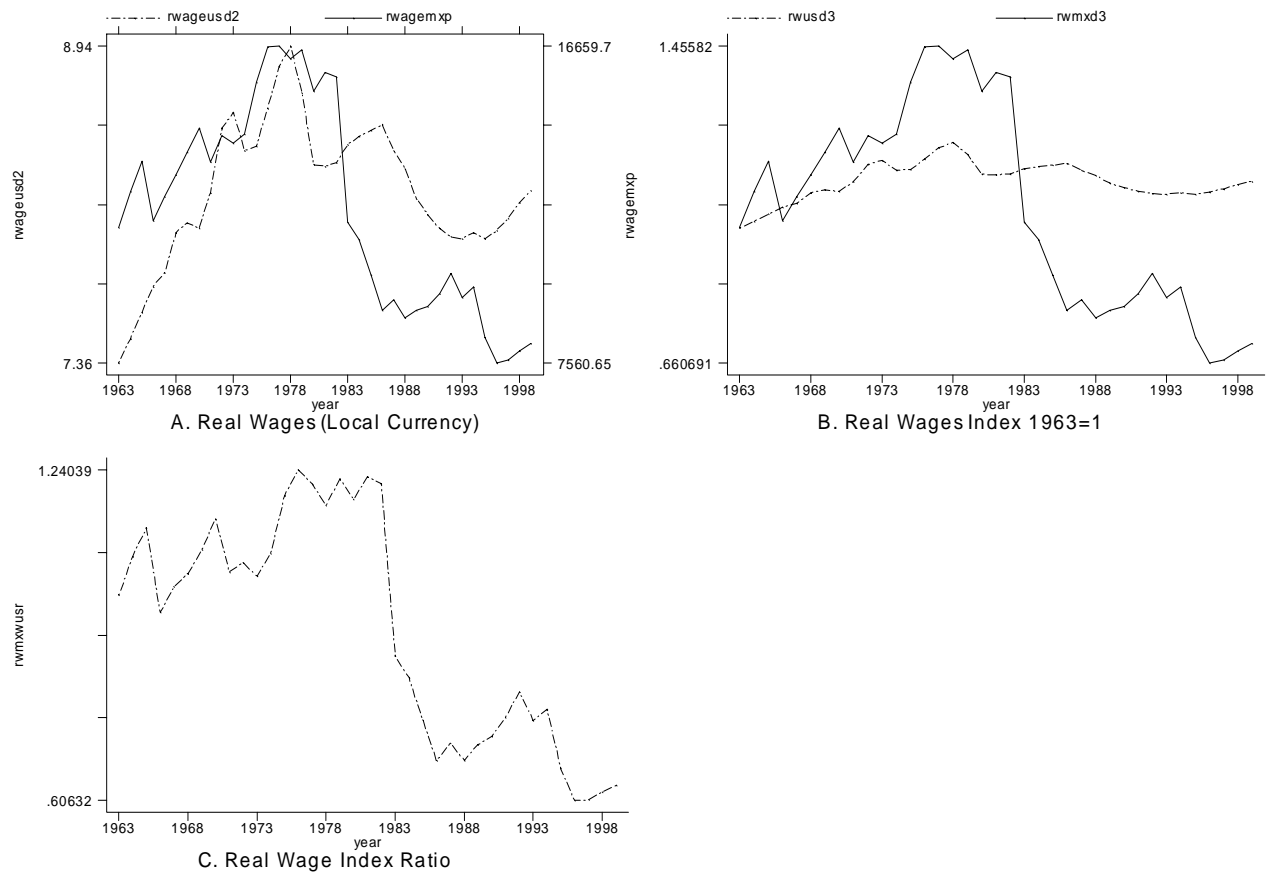
**Figure 7: Mexican Border Crossings**



**Figure 8: Comparing Mexican and U.S. Dollar Wages**



**Figure 9: Comparing Indexed Mexican and U.S. Wages**

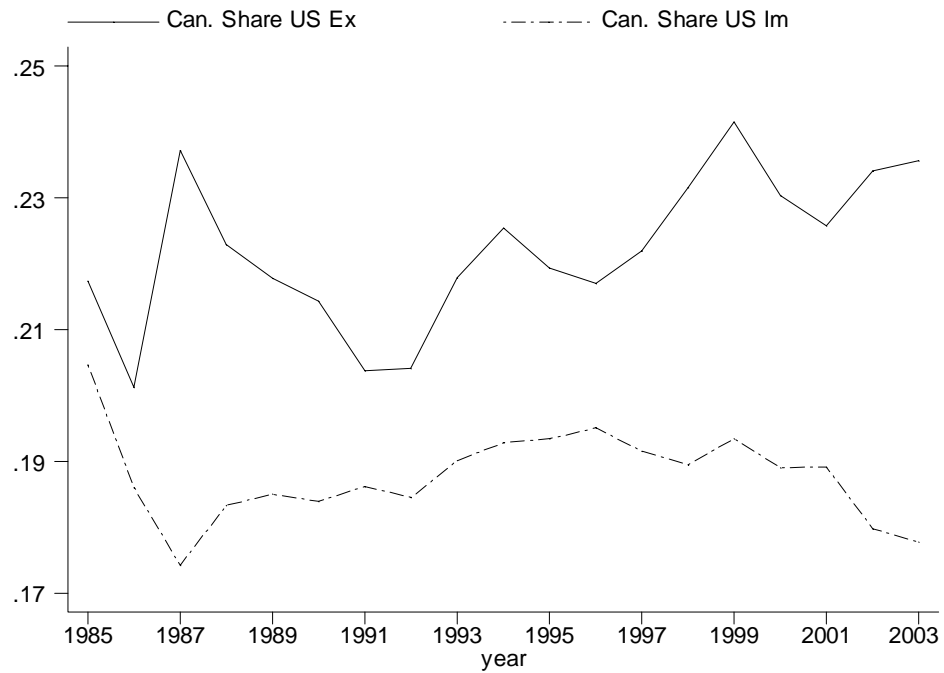




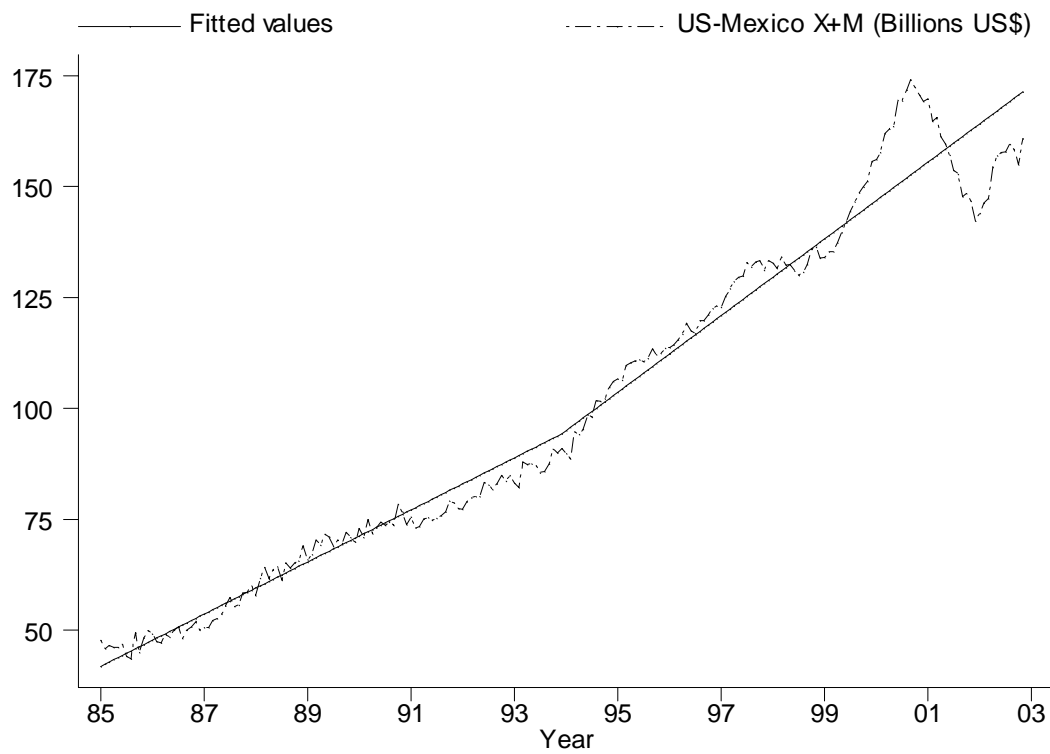
**Figure 10a: Canada's Share of U.S. Total Trade**



**Figure 10b: Canada's Share of U.S. Imports and Exports**

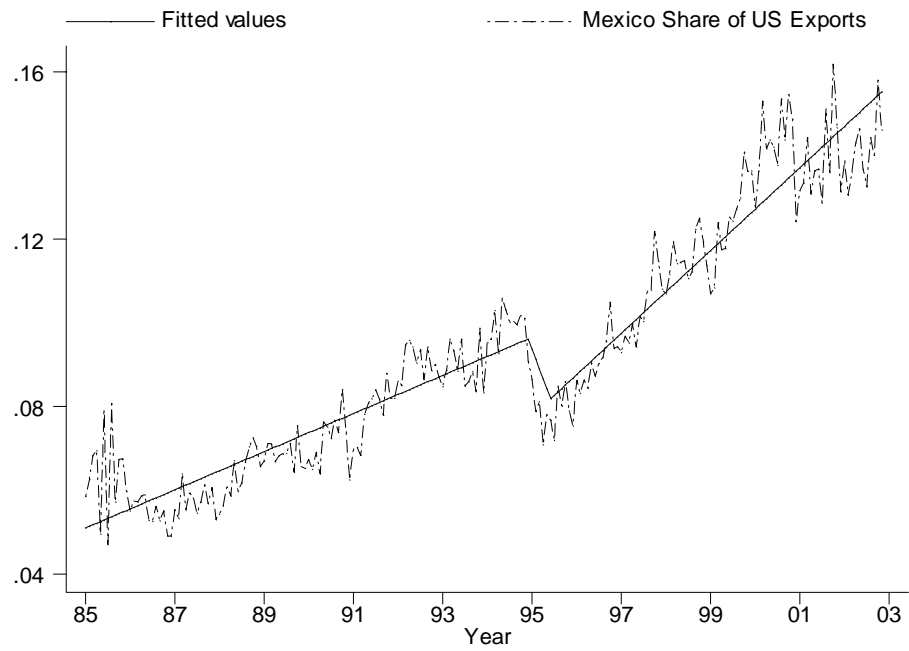


**Figure 11: Total U.S.-Mexico Goods Trade**



**Notes:** Both trend terms are significant at the 1% level. The main slope (standard error) is 0.490 (0.016) and the marginal post NAFTA slope (standard error) is 0.232 (0.028).

**Figure 12a: Mexico's Share of U.S. Goods Exports**



**Figure 12b: Mexico's Share of U.S. Goods Imports**

