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The NAFTA Preference and U.S.-Mexico Trade

Laurie-Ann Agama
U.S. International Trade Commission

Christine A. McDaniel
U.S. International Trade Commission

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Address correspondence to:
Office of Economics
U.S. International Trade Commission
Washington, DC 20436 USA

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Laurie-Ann Agama

Christine A. McDaniel

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Abstract:

This paper focuses on the U.S. tariff preference afforded to Mexico vis-à-vis non-NAFTA trading partners, and allows us to evaluate the impact of NAFTA in a manner consistent with the idea behind a preferential trading agreement. The estimation technique exploits the time-varying dimension of the tariff preference, over 1983 to 2001. We find that a higher tariff preference corresponds to increased U.S. import demand for goods, and that import demand was more responsive to changes in the tariff preference once NAFTA was in place than it was on average.

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1. Introduction

Since 1993, U.S. trade has grown more quickly with NAFTA partners than with non-NAFTA partners. U.S.-Mexico trade in particular has expanded significantly and rapidly. Since 1993 when NAFTA was announced, trade data from the U.S. Department Commerce indicate that real U.S. exports to Mexico have increased by 93 percent, compared to 35 percent for Canada and 20 percent for non-NAFTA partners. Real U.S. imports from Mexico have increased by 190 percent, compared to 69 percent for Canada and 59 percent for non-NAFTA partners.

How much of this trade growth can be attributed to NAFTA is a question of considerable interest. However, NAFTA is not a particularly clean policy to assess. To what extent trade growth can be attributed to NAFTA is obscured by several pre- and post-NAFTA events and policy changes. Mexico's unilateral trade liberalization and domestic reforms occurred well before NAFTA was implemented in 1994.[1] The establishment of the World Trade Organization and its associated agreements in 1995, other bilateral and sectoral trade negotiations (Mexico-Chile in 1999, Mexico-EC and Mexico-Israel in 2000), Mexico's exchange rate policy change in 1994, and the business cycle further confound the identification of the effects of NAFTA. Further, Mexico has been increasing its presence in not only the U.S. market but in nearly every major region's marketplace since 1994.

Prior to NAFTA, several studies projected economy wide impacts of NAFTA, using applied general equilibrium models.[2] The results converged on the main finding that NAFTA would provide positive gains to member countries, namely, large and positive effects on the Mexican economy, and

1 In the mid-1980s, Mexico took significant steps towards domestic reform and trade liberalization, resulting in a reduction in the average ad valorem tariff from about 25 percent to 13 percent over 1985 to 1993. Increased trade corresponded with Mexico's unilateral trade liberalization, and Mexico's total trade (in nominal terms) increased 186 percent over 1985 to 1993 and further by 128 percent over 1993 to 1999. Mexico's GDP increased 119 percent during these pre-NAFTA years, and further by 20 percent following NAFTA.

2 Burfisher, Robinson and Thierfelder (2001) provide a comprehensive analysis of the debate and actual post-NAFTA data, a review of simulation analyses that projected economy wide impacts of NAFTA, and, in drawing lessons from the NAFTA debacle, the authors provide a context in which to consider future FTAs.

small and positive effects on the U.S. economy. Minimal effects on the Canadian economy were expected as most bilateral trade barriers were eliminated, or had begun to be phased-out, with the 1989 Canada-U.S. FTA (see Brown, Deardorff and Stern (1992) and Brown (1992) for taxonomy of the AGE results from studies prior to NAFTA).

There have been relatively few econometric studies of the trade effects of NAFTA. Some of the first studies to econometrically examine the trade effects of NAFTA typically employed a time series estimation approach. Due largely to data limitations, blunt instruments such as time dummy variables were used to capture the effects of NAFTA.[3] Using a gravity model approach at the macro level, Gould (1998) finds that both U.S. imports from Mexico and U.S. exports to Mexico were about 16 percent higher on average each year, over 1994-1996 due to NAFTA. This translates into a cumulative impact of about $20.5 billion in imports, and $21.3 billion in exports, over that period. Also using a gravity model approach, Krueger (1999) finds that NAFTA did not have large effects on trade relative to other factors.

Recent studies attempt more direct measures of the Agreement. Romalis (2001) exploits the cross-commodity variation in the actual U.S. tariff preference that is afforded to Canada and Mexico vis-à-vis non-NAFTA partners in 2001. He finds that the industries with the larger preferences also experience larger changes in U.S. import share. Beginning in 1994, Mexican trade appears to very rapidly respond to NAFTA preferences, with each 1 percentage point change in the preference linked to a 0.18 to 0.28 percentage point rise in Mexico's share of U.S. imports.

Another recent study that uses tariff data to examine trade effects is Clausing (2001) who examines the US-Canada FTA. Clausing examines the responsiveness of import shares to tariff changes from that Agreement at the product level and finds substantial trade creation effects. To our knowledge, we are the first to exploit the time variation in the tariff preference and consider a responsiveness of import demand to the actual tariff preference while isolating the NAFTA preference.

In this paper we estimate the effects of NAFTA on U.S. import demand for Mexican goods and Mexico's demand for U.S. exports, using tariff data to capture the actual policy changes over time. Tariffs have been coming down across the globe, and North American tariffs began to decline long before NAFTA. Thus, in order to observe the relevant policy change from the preferential trading agreement, we use the actual tariff preference afforded to Mexico vis-à-vis non-NAFTA trading partners. This allows us to isolate the observed policy change in a manner consistent with the idea behind a preferential trading agreement. We exploit the time-varying dimension of the tariff preference over 1989 to 2001 on the import side (due to data limitations we begin at 1989). We examine the tariff preference over 1993 to 2001 on the export side. Mexico did not grant the U.S. a tariff preference prior to NAFTA.

U.S. import demand for Mexican goods and Mexico's demand for U.S. goods both appear to be responsive to changes in the actual tariff preference, that each country affords to the other relative to its non-NAFTA trading partners. On average, a one percentage point increase in the tariff preference corresponds to somewhere between an 11.2 and 16.5 percent increase in U.S. import demand for Mexican goods, and an additional 4.4 to 3.8 percent, respectively, during the NAFTA period. On the export side, a one percentage point increase in the NAFTA tariff preference corresponds to roughly a 5.1 to 6.7 percent increase in Mexico's demand for U.S. goods.

The paper is organized as follows. In section 2, we describe the tariff preference and changes in North American trade. In section 3 we provide the theoretical framework and section 4 evaluates the results. The last section concludes.

2. Tariff Preferences and North America Trade

In order to capture the actual preference afforded to Mexico vis-à-vis non-NAFTA trading partners, we calculate the difference between the tariff rate applied to imports from Mexico and the tariff

3 Gould (1998) and USITC (1997).

rate applied to imports from non-NAFTA trading partners. We regard the non-NAFTA rate better than the often-used MFN rate, particularly at the HTS-6 level, given the various arrangements and trading agreements that the U.S. has with particular countries, e.g., developing countries (Generalized System of Preferences), Andean region, and Caribbean countries. Using the MFN rate will tend to over-state the actual preference.

Applied U.S. tariff rates were calculated as the ratio of calculated duties to customs value. The tariff preference that the United States affords to Mexico vis-à-vis its non-NAFTA trading partners was calculated as the difference between the non-NAFTA applied tariff rate and the Mexican applied tariff rate. The tariff preference was calculated at the 6-digit HTS level, and the average over all lines represents the aggregate figure. This series goes back to 1989.

We are also interested in the responsiveness of Mexico's demand for U.S. exports to tariff preferences. Due to lack of available data for Mexican calculated duties and customs value data, the tariff preference that Mexico affords to the United States vis-à-vis its non-NAFTA trading partners was calculated as the difference between Mexico's MFN rate and the NAFTA rate, according to Mexico's NAFTA staging schedule. The difference between these rates represents Mexico's NAFTA tariff preference over 1993 to 2001. Mexican tariff data and NAFTA staging schedule are available from the Official Gazette, Secretary of the Economy of the Mexican Government.

The data in Table 1 shows U.S. average tariffs for Mexico, Canada and the rest of the world in 1989, 1993 and 2001. The U.S. simple average tariff applied to imports from Mexico declined from 4.01 percent in 1989 to 3.15 percent in 1993 before falling further to 0.52 percent in 2001. U.S. simple average tariff rates applied to Canadian goods followed a similar pattern, although average tariff rates declined sharply between 1989 and 1993, as the Canada-U.S. FTA was implemented. U.S. simple average tariffs on goods imported from the rest of the world also declined during this period, albeit at a much slower pace. The Uruguay Round negotiations, which concluded shortly after NAFTA was signed,

are primarily responsible for this reduction and slightly offset the margin of preference afforded to NAFTA trading partners.

In 1989, U.S. tariffs on Mexican goods were actually lower, on average, than tariff rates applied to imports from Canada and the rest of the world, largely due to GSP benefits. However, by 2001, U.S. tariffs applied to Mexican goods were higher than tariffs on Canadian goods but remained significantly lower than rates applied to imports from non-NAFTA partners. U.S. tariffs applied to imports from Mexico actually declined at a faster pace than tariffs applied to non-NAFTA partners primarily due to NAFTA. The result was a significant increase in the U.S. tariff preference for Mexican goods. The trade-weighted average tariff data show a similar trend although the decline in tariffs for Mexico is more pronounced, reflecting the rapid increase in trade in goods with lower tariffs between the United States and Mexico before and after NAFTA.

Figure 1 plots U.S. simple average tariffs for Mexico, Canada, and non-NAFTA partners. This figure illustrates the important but understated fact, that Mexico already received a lower tariff than its competitors in the U.S. market prior to NAFTA, and that Mexico's tariff preference (the difference between Mexico's tariff and non-NAFTA partners' tariff) was actually declining well before NAFTA came into force. Beginning in 1974, Mexico received duty-free access to the U.S. market for several thousand commodities under GSP. Up until 1994, Mexico faced a relatively low tariff due to its GSP benefits.[4] Also, a significant portion of Mexico's exports entered the United States at reduced duties under the production-sharing provisions of the U.S. tariff schedule. According to some sources, in 1993 more than half of Mexico's exports, in value terms, entered the United States duty free.[5] Figure 2 shows

4 GSP is a trade preference granted by developed countries to developing countries on a nonreciprocal basis. GSP benefits are accompanied by a certain degree of uncertainty because benefits can be suspended at any time due to competitive need limits. That is, the U.S. can use competitive need limits to suspend GSP treatment to imports from developing countries. The competitive need limit has been shown to reduce affected imports (Devault 1996).
5 USITC (1997), pp. 2-3.

Mexico's trade with the United States rose much more sharply than Mexico's trade with the rest of the world.

Mexican Reforms Prior to NAFTA

In many ways, NAFTA capped a decade of improved and expanded bilateral trade and investment ties more than drastically changing these ties. Both U.S. investments into Mexico and U.S trade with Mexico began to rise sharply before 1994. Prior to NAFTA, Mexico significantly liberalized its trade regime by reducing tariffs on an MFN basis and eliminated quantitative restrictions on imports. In 1986, Mexico joined the General Agreement on Tariffs and Trade (GATT), and as part of its accession agreement, Mexico reduced and bound its tariffs. Mexico also committed to other trade-enhancing reforms. Indeed, much of the increase in Mexico's domestic production and international trade over the past two decades occurred prior to 1994, and begins with Mexico's domestic reform and unilateral trade liberalization in the mid-1980s.

NAFTA

While the signing of NAFTA eliminated GSP treatment for goods imported from Mexico, NAFTA provisions addressed both tariffs and nontariff barriers to trade and investment. The Agreement removed tariffs on goods over a 15-year period, established disciplines that covered a broad range of nontariff barriers, committed the signatories to high security levels and openness for foreign direct investors and intellectual property rights owners, liberalized services trade, and created dispute settlement mechanisms.[6]

Figure 3 graphs the tariff preference that the U.S. has afforded Mexico since 1989. This is the difference between the tariff rate (ad valorem) applied to Mexico and the tariff rate applied to non-NAFTA partners. As can be seen there is quite a bit of time variation in the preference. The tariff

preference for Mexico began increasing under GSP, prior to the implementation of NAFTA, and continued to increase after 1994. The preference margin for Mexico widened during the post-NAFTA years as U.S. tariffs on Mexican goods fell more rapidly than U.S. tariffs on goods imported from the rest of the world. The tariff preference rose in 1991, reached a peak in 1998 and then declined slightly in 2001 as U.S. tariffs against the world continued to decline at a much slower pace.

As can be seen in figure 4, Mexico greatly reduced its tariffs from an initial position of high tariffs averaging above 25% in 1985 to an average level of 10 percent against all imports by 1999. Mexico also removed virtually all quantitative restrictions governing most imports by the early 1990s. Thus, when NAFTA came into effect, the effect of Mexico's trade liberalization was still influencing trade flows between the U.S. and Mexico. This complication suggests some caution in the interpretation of any results regarding the effects of NAFTA.

While a certain amount of the pre-1994 economic growth and trade may have been investment-induced in anticipation of NAFTA, it remains that NAFTA is not a particularly clean policy to assess. Herein lies the problem with measuring the effects of NAFTA with blunt instruments such as time dummy variables.

Table 2 shows the distribution of NAFTA- and non-NAFTA-U.S. trade flows changed from 1993, the year before NAFTA, to 2001, eight years after the agreement was implemented. While U.S. trade with NAFTA partners increased more than that with the rest of the world, U.S. trade with Mexico increased by a substantially higher amount than that with Canada. Mexico's increased importance in U.S. trade is seen in real terms, as Mexico's share of U.S. imports increased from 6.7 percent to 11.5 percent, and the share of U.S. exports destined to Mexico increased from 9.2 to 13.6 over this period.

While on the surface the increased share of Mexico's imports in the U.S. may be suggestive of

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6 See USITC (1997).

some trade diversion,[7] Mexico also increased its share of imports in nearly every major region of the world since 1993. Table 3 shows Mexico's share of imports increased not only in the U.S. but in South and Central America, Asia and Europe. Prior to NAFTA, Mexico's share of imports in the world rose over 1989 to 1993 but that appears largely due to its increased presence in U.S. imports. Since 1993, Mexico has been exporting more not only to the U.S., but to nearly every major region in the world.

3. Econometric Analysis

Theoretical Framework

The import demand and export demand equations derived from a standard micro-theoretic framework can be used to estimate trade effects of NAFTA. Much has been written on the theory behind, and the actual estimation of, the time series behavior of the quantities and prices of merchandise imports and exports (see Goldstein and Khan 1985). Instead of reviewing the empirical trade literature here, we focus on the significant developments in the literature that are relevant to our empirical specification.

Following the assumption that neither imports nor exports are perfect substitutes for domestic goods, we adopt the imperfect substitutes model. This assumption rests on two observations. First, neither domestic nor foreign goods have full market share, and second, each country imports and exports goods (see Goldstein and Khan (1985), Magee (1975), and Rhomberg (1973) for discussion on the competing models). Suppose that the consumer maximizes utility subject to a budget constraint, and the resulting demand for imports (and exports) can be expressed as a function of income levels in the importing region, the import (export) good's own price, and the domestic substitute price. An imperfect substitutes model of U.S. imports with Mexico can be presented generally as:

$$I^{d,US} = f\left(Y^{US}, PI^{US}, P^{US}, e\right) \qquad (1)$$

7 See Krueger (1999) for discussion on trade creation and trade diversion under NAFTA.

$$I^{s,US} = f\left(PI^{Mex}, P^{Mex}\right) \quad (2)$$

$$X^{d,US} = f\left(Y^{Mex}, PX^{US}, P^{Mex}, e\right) \quad (3)$$

$$X^{s,US} = f\left(PX^{US}, P^{US}\right) \quad (4)$$

$$PI^{US} = PX^{Mex}(1+T^{US})/e \quad (5)$$

$$PI^{Mex} = PX^{US}(1+T^{Mex})e \quad (6)$$

$$I^{d,US} = I^{s,US}/e \quad (7)$$

$$X^{d,US} = X^{s,US} \quad (8)$$

Equation (1) represents the quantity of U.S. import demand from Mexico ($I^{d,US}$) as a function of the nominal income level in the U.S., (Y^{US}), domestic currency prices paid by importers in the U.S. (PI^{US}), the price of domestically produced goods in the U.S. (P^{US}), and the exchange rate *(e)* that is included to reflect the extent to which exchange rate changes affect import demand through price feedback effects. Equation (2) represents the quantity of U.S. imports supplied from Mexico as a function of domestic currency prices paid by importers and the price of domestically produced goods in Mexico. Equation (3) represents the quantity of U.S. exports demanded by Mexico ($X^{d,US}$) as a function of the nominal income level in Mexico in domestic currency (Y^{mex}), domestic currency prices received by U.S. exporters (PX^{us}), the price of domestically produced goods in Mexico in U.S. dollars (P^{Mex}), and the exchange rate *(e)*. Equation (4) represents the quantity of U.S. exports supplied to Mexico as a function of domestic currency prices received by U.S. exporters and the U.S. domestic price. The price of domestically produced goods in each region are P^{US} and P^{Mex} and the nominal exchange rate (e) links the two currencies and is expressed in dollars per peso. The proportional tariff is T in each region, and for simplification, we exclude subsidy rates.

We exclude the possibility of inferior goods and domestic complements for imports, which seems reasonable at the aggregate level. Income elasticities and cross price elasticities of demand are assumed to be positive and own-price elasticities of demand are assumed to be negative. Assuming no money illusion (doubling income and prices has no affect on the consumer's demand), then income can be

expressed in real terms and import prices can be expressed in terms relative to the domestic price.

Aggregation issues

Aggregate data are used for our estimation purposes. One advantage of aggregate data is avoiding the measurement errors of disaggregated data, and the consequent misspecification in the disaggregated functions. The well-known concern with aggregate data is aggregation bias and that the sectoral aggregation is veiling changes in the sectoral composition.[8] The main issue of concern on aggregate data for our purposes is whether the variation in the applied tariff rate (calculated as collected duties divided by customs value) reflects changes in the tariff rate over time or compositional changes. We examine this issue by calculating a tariff index and determining how closely the applied tariff rate and the tariff index vary over time, by sector. A tariff index holds the composition of trade constant and does not allow changes in the composition of trade to affect changes in the applied tariff rates. A Fisher Ideal tariff index reflects trade shares for two years (1989 and 2001) and is appropriate here because it does not bias the index either towards the pre-NAFTA or post-NAFTA periods. The Fisher Ideal tariff index is calculated as:

$$\sqrt{s_{i,89} \cdot t_{i,t}} \cdot \sqrt{s_{i,01} \cdot t_{i,t}}$$

where $s_{i,89}$ and $s_{i,01}$ are the trade shares for sector i in 1989 and 2001, respectively, and $t_{i,t}$ is the applied tariff rate for sector i in year t.

The results show that the applied tariff rate follows the tariff index very closely over time, by sector. The correlation between the index and applied rate across sectors is between 0.90 and 0.99. This suggests that the continual tariff changes that we wish to examine are driven by the phase-ins of tariff changes, and not the composition of trade and that we can learn something from aggregate data.

Specification

The theoretical relationship between prices and quantities is simultaneous. However, in practice, the supply side is often addressed only by assumption. The prevailing practice in the time series work on import and export equations has been to assume that the price elasticity of supply for imports and exports is infinite. This is appealing because it allows single equation estimation of import and export demand. A popular argument for this assumption is that firms are operating at less than full capacity and prices are less than flexible. A decrease in demand would lead firms to cut production instead of price; an increase in demand would cause firms to increase their capacity (but would not affect prices). In other words, the supply curve remains flat until all firms have reached full capacity.

If the supply elasticities are less than infinite, then one should estimate the full structural simultaneous model or solve for and estimate the reduced form expressions for quantities and prices as functions of only the exogenous variables in the system. In a broad survey of the estimation of trade equations, Goldstein and Kahn (1985, p. 1048) maintain that the infinite supply elasticity assumption is probably more defensible for a country's imports than for its exports. They point out that it is unlikely that a large country can increase its export supply at a constant price unless a large pool of unemployed resources exists. Thus, below we test whether the domestic price is endogenous in the import and export demand equation. Results from tests for endogeneity suggest that domestic prices are endogenous in each trade equation. Therefore we estimate equation (1) using 2SLS, with the exogenous variables from (1) and (2) as instruments. Similarly, we estimate equation (3) using 2SLS, with the exogenous variables from (3) and (4) as instruments.

Another specification issue is how to treat import prices and domestic prices in the import demand regression, and export prices and domestic competing prices in the export demand regression. There is precedent for using relative prices. However, there is also support for including them separately. Relative prices in the specification essentially constrain the demand elasticities to be equal in magnitude

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8 See Goldstein and Khan (1985) and Madalla (1977).

but opposite in sign. That is, the import (export) demand elasticity with respect to import (export) prices to be equal in magnitude but opposite in sign to the elasticity with respect to domestic (foreign) prices. Houthakker and Magee (1969) estimate import and export demand elasticities for many countries as a function of income and relative prices. Specifically, they include the price of imports relative to the price of domestic goods in the import demand equation, and the price of exports relative to the price of competing goods in the foreign market. Their results are encouraging as they find positive income elasticities and negative price elasticities. However, Murray and Ginman (1976) explicitly test the constraint that the demand elasticities are equal in magnitude but opposite in sign and find that their results reject this hypothesis. They argue that prices in import demand models should be included separately else the model will be misspecified. For these purposes, we include the U.S. domestic price and competing Mexican import price variables separately in the import demand equation; and, we include the Mexican domestic price and competing U.S. export price variables separately in the export demand equation.

Finally, because U.S. imports from Mexico face competition not only from U.S. producers, but also from "third country" import sources, we include the Mexican import price relative to the price of competing imports. Similarly, we include the U.S. export price relative to the price of competing exports in the export demand equation, which captures the dominant relative price competition that occurs among exports.

The estimated import demand equation is:

$$i_t^{d,US} = \alpha + \beta_1 y_t^{US} + \beta_2 pi_t^{US} + \beta_3 p_t^{US} + \beta_4 e_t + \beta_5 PREF_t + \beta_6 PESO + \varepsilon_t \qquad (9)$$

and the estimated export demand equation is:

$$x_t^{d,US} = \alpha + \beta_1 y_t^{mex} + \beta_2 px_t^{mex} + \beta 3 p_t^{mex} + \beta_4 e_t + \beta_5 PREF_t + \beta_6 PESO + \beta_7 DOMLIB + \varepsilon_t \qquad (10)$$

where the actual tariff preference is denoted as *PREF*. The lower case letters represent variables in logarithmic form. Time dummy variables were used to control for the peso crisis *(PESO)* during the last quarter of 1994 and first quarter of 1995 and the domestic liberalization regime change *(DOMLIB)* during 1985 to 1988. The domestic liberalization period is only singled out in the export demand equation. Equation (9) represents U.S. import demand for Mexican goods and equation (10) represents Mexican demand for U.S. exports. Due to evidence of serial correlation, a first order autoregressive specification with a multiplicative seasonal autoregressive term was included.[9]

Data

The data set used for the estimation is aggregate and covers the time period 1983 to 2001 on a quarterly basis. The real value of imports and exports was used to represent import and export quantity. U.S. Department of Commerce provides U.S. trade data and calculated duties at the 6-digit HTS level. Applied U.S. tariff rates were calculated as the ratio of calculated duties to customs value. Mexican tariff data and Mexico's NAFTA staging schedule are available from the Official Gazette, Secretary of the Economy of the Mexican Government.

BEA provides import and export price indices, which we used to deflate customs value of U.S. imports from Mexico. U.S. personal consumption expenditures represent income in the import demand equation, and Mexican per capita GDP represents domestic income in the export demand equation. BLS provides the CPI, GDP and personal consumption expenditure data for the U.S., and Instituto Nacional de Estadistica, Geografia e Informatica (INEGI) reports most of these data for Mexico. The IMF provides the nominal exchange rate.

9 With both an AR(1) and SAR term, the error term is a first order autoregressive process with multiplicative seasonal autoregressive terms, and the results from Durbin-Watson tests and Breusch-Godfrey Lagrange multiplier tests for general, high-order, ARMA errors indicated no serial correlation in the residuals. In addition, results from Ramsey's regression specification error test indicated no evidence

4. Results

The econometric results for U.S. import demand are reported in table 4. The first set of results is from the specification that uses the simple NAFTA dummy variable. The second set reports results from the specification that uses the tariff preference variable, and the third set included the preference variable interacted with the NAFTA time dummy variables. While the peso crisis was economically important, the peso dummy *(PESO)* was not always statistically significant. One possible reason for this could be that the nominal exchange rate variable is capturing the effect of the peso crisis. Thus, we report results with and without the peso crisis dummy variable.

While our interest is in the coefficients on the preference variables, it is useful to consider the resulting coefficients on the other variables in the equation. Income and the nominal exchange rate explained much of the variation in import demand. As expected, increased income corresponds to increased import demand, and as the peso depreciated with respect to the dollar, import demand rose. The sign on the relative import price was positive, not as expected, but it was not significant except in the third specification. One possible explanation for this is measurement error due to using the Mexican domestic price index as a proxy for the Mexican import price. Another possible explanation is an upgrade in quality and variety of Mexican imports, but this is just a conjecture; we can make no conclusive statement on this point. The coefficient on domestic price was positive but not significant, indicating possibly that domestic and Mexican import goods are not close substitutes, at least not on the aggregate level on which this analysis was conducted.

Considering the first set of results, the coefficient on NAFTA time dummy variable is positive and statistically significant, and indicates that U.S. import demand for Mexican goods was approximately 0.10 percent higher over the last quarter of 1993 to the end of 2001 than for the entire period. This

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of specification error.

coefficient cannot explain the trade effect of NAFTA per se since it is capturing not only NAFTA but all other events during these years that affected trade. Some of these events may have positively affected trade; others may have negatively affected trade. This result reflects the net effect of all trade-related events during this period.

The second set of results suggests that U.S. import demand is responsive to the tariff preference. The coefficient on the tariff preference variable captures the overall responsiveness of import demand to the tariff preference (shown in figure 3) over the entire period, whether due to GSP, NAFTA, or another program. Overall, controlling for the peso crisis, each one percent increase in the U.S. tariff preference for Mexico corresponds to approximately 18.6 percent increase in U.S. import demand for Mexico's goods, and 19.4 not controlling for the peso crisis.

Next, we examine whether the responsiveness to the tariff preference is different from the average responsiveness over the entire period. Interestingly, the results indicate that the response to the NAFTA preference was higher than the average response. Each one percent increase in the tariff preference for Mexico corresponds to approximately a 16.5 percent increase in U.S. import demand for Mexico's goods, and an additional 3.8 percent, respectively, during the NAFTA period controlling for the peso crisis (and 11.2 and 4.4 not controlling for the peso crisis); the coefficients are statistically significant. The *PESO* variable was significant in this specification and thus the latter set of results is probably more valid.

The coefficient on the tariff preference can be interpreted as the implied elasticity of substitution. Our results suggest that, in general, a one percent increase in the tariff preference corresponds to about a 18.6 percent increase in U.S. import demand for Mexican goods. When the NAFTA period is considered exclusively, the average responsiveness is about 16.45 percent, and the NAFTA responsiveness is 3.80 percent greater than the average. In other words, on average, the responsiveness of import demand to changes in the tariff preference was greater during the NAFTA years. This estimate is large relative to previous estimates of the responsiveness of import demand to price changes. For example, Erkel-Rousse

and Mirza (2002) recently estimated trade price elasticities with time series data and reported estimates up to 13. However, our methodology differs in that we estimate responsiveness to changes in the actual tariff preference.

Another implication from our results is the impact on trade. Since NAFTA was implemented, the cumulative impact of NAFTA-related tariff preferences on U.S.-Mexico trade amounts to approximately $11.2 billion. The econometric results from which this estimate is calculated were statistically significant at the five percent level and a 95 percent confidence interval suggests a range of the cumulate trade impact from $9.9 to $12.5 billion. This figure reflects only the tariff preference aspect of NAFTA. It is interesting to compare it to the trade effects from NAFTA of $20.5 billion found by Gould. Note that Gould's figure reflects the trade effects of all aspects of NAFTA as well as all other trade-related events and so the disparity between our figure and Gould's is not surprising.

The econometric results for Mexican demand for U.S. exports are reported in table 5. Because our calculated tariff preference series is only from 1994 through 2001 we can only consider the responsiveness to the NAFTA tariff preference. On the other hand, the export demand specification was a somewhat cleaner exercise in that our pricing series match the theoretical specification. The results on the control variables were generally as expected. Increases in the Mexican domestic price correspond to increases in U.S. export demand, as expected. Mexico's per capita GDP is positively and significantly related to export demand, also as expected. The U.S. export price appears not to be a significant determinant of export demand. The peso crisis was not significant, again, probably captured in the nominal exchange rate, which was negative and significant as expected. Mexico's domestic reform period appears not to have had a significant affect on export demand in this model.

The first column reports the results from the specification that uses the simple NAFTA dummy variable for comparative purposes. Mexico's demand for U.S. exports was positively and significantly higher during the NAFTA years than overall. The results indicate that demand for U.S. exports was

approximately 0.11 percent higher over the last quarter of 1993 to the end of 2000 than for the entire period. Again, this coefficient cannot explain the trade effect of NAFTA per se since it is capturing not only NAFTA but also all other events during these years that affected trade.

The second set of results is from the specification that isolates NAFTA with Mexico's NAFTA tariff preference afforded to the U.S. relative to its non-NAFTA trading partners. Mexico's demand for U.S. exports appears to have responded positively and significantly to the NAFTA tariff preference. A one percent increase in the tariff preference corresponds to a 6.65 percent increase in Mexico's demand for U.S. exports. We note that the responsiveness to the tariff preference is stronger on the import side than the export side for U.S. trade with Mexico. One possible reason for this is that export demand was more responsive to other factors, such as the production-sharing arrangements between U.S. and Mexican industries and the related investment provisions. However, we do not systematically explore these issues here.

5. Concluding Remarks

In this paper we examine the trade effects of NAFTA and focus on the U.S. tariff preference afforded to Mexico vis-à-vis non-NAFTA trading partners. This allows us to observe the policy change in a manner consistent with the idea behind a preferential trading agreement. Prior to NAFTA, Mexico was receiving U.S. tariff preferences under the U.S. under the Generalized System of Preferences (GSP) and a sizable share of Mexican exports entered under GSP or at low rates under production-sharing arrangements. Benefits from these programs, particularly GSP, are granted with a certain degree of uncertainty, whereas NAFTA tariffs locked in the tariff cuts. Thus, it is informative to exploit the time variation in the tariff preference to consider the responsiveness of imports to the tariff preference, both in general and under the FTA. We find that U.S. import demand for Mexican goods is responsive to tariff preferences, and that responsiveness is greater during the NAFTA years. We also find that Mexico's

demand for U.S. exports was responsive to the NAFTA preference. The increased import demand responsiveness to the tariff preference was NAFTA was in place could reflect the confidence and certainty that accompanied the NAFTA-related tariff cuts; it may also reflect the corresponding removal of nontariff barriers and investment-related provision in NAFTA that indirectly affected trade.

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Figure 1. U.S. Tariffs for Mexico, Canada, and Non-NAFTA Parners

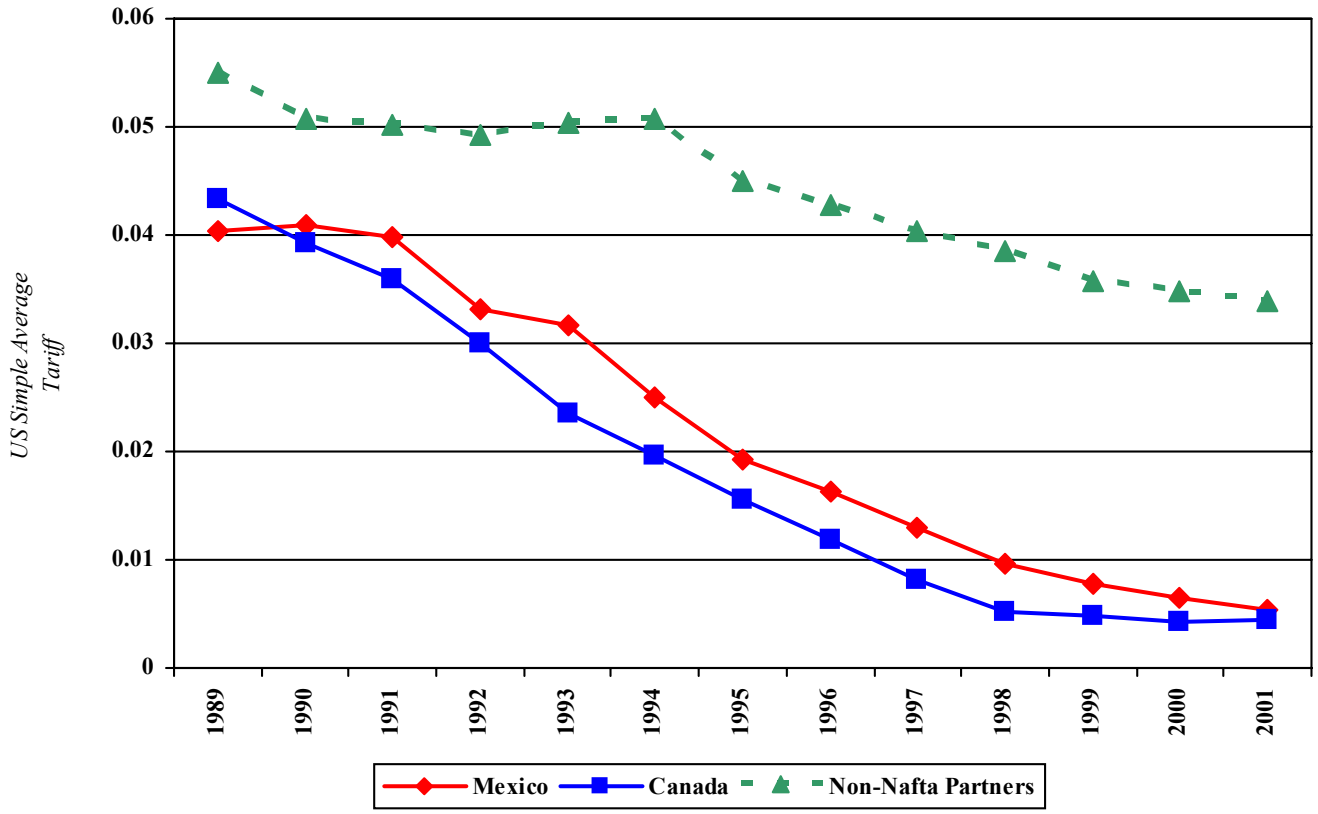

Figure 2. Mexican Trade with the United States and Rest of World, US$, billions

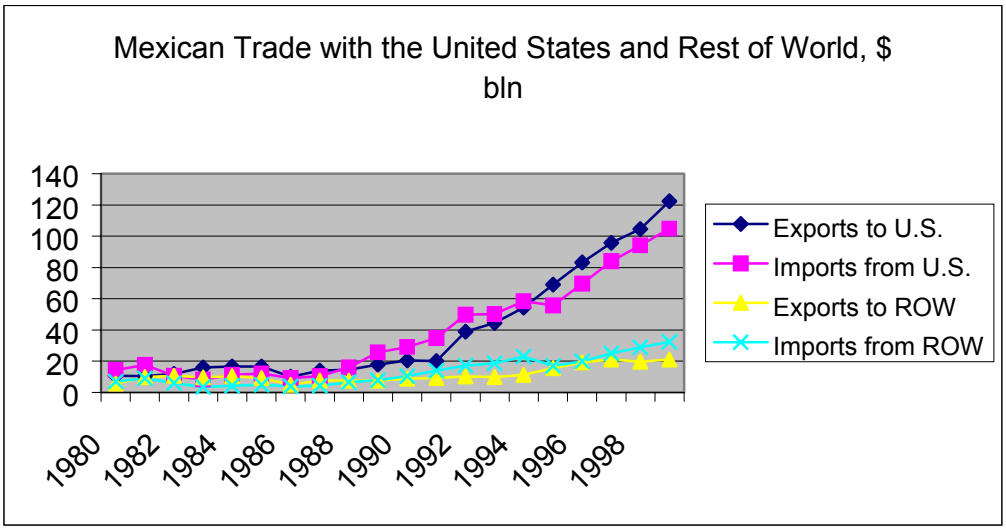

Figure 3. NAFTA preference for Mexico, 1989-2001

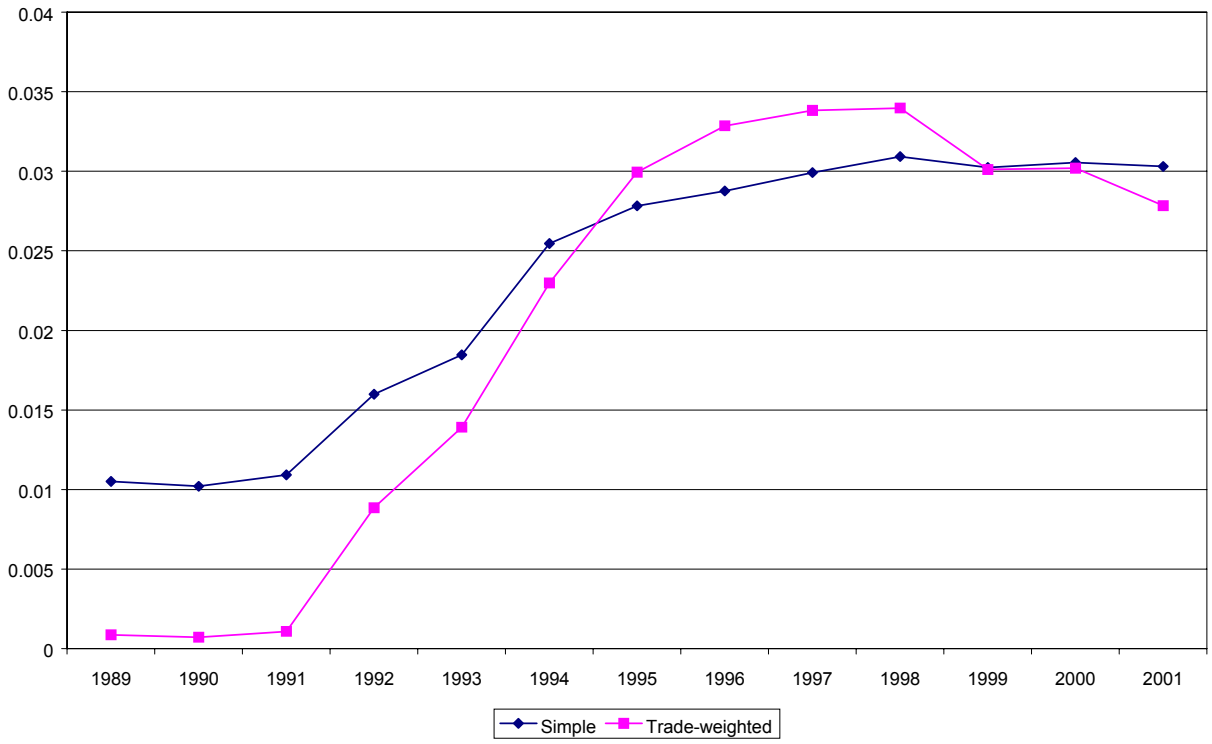

Figure 4. Mexican Tariff Liberalization (1993-1999)

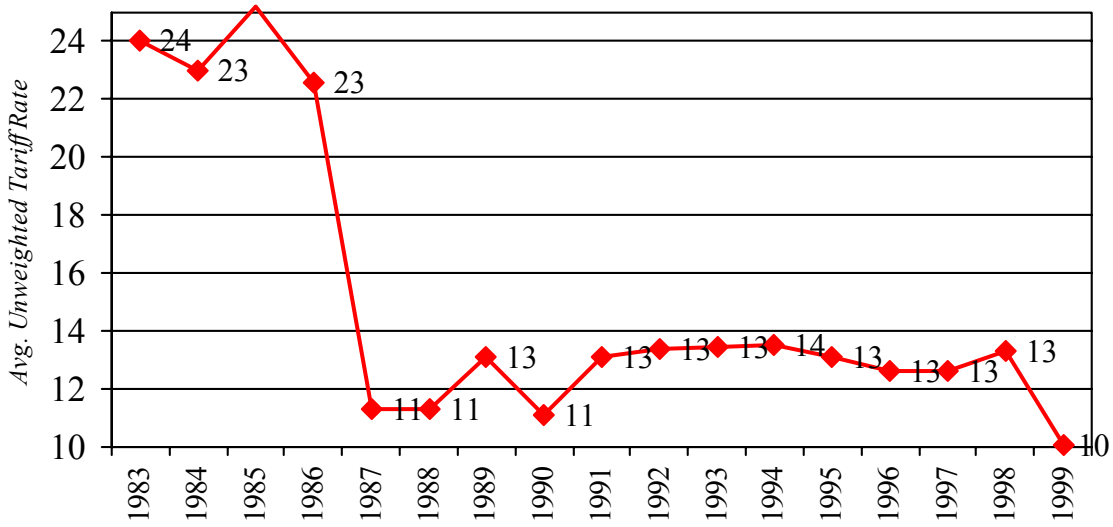

Figure 5. Mexico's Real GDP, constant 1995 $ millions (1980-1999)

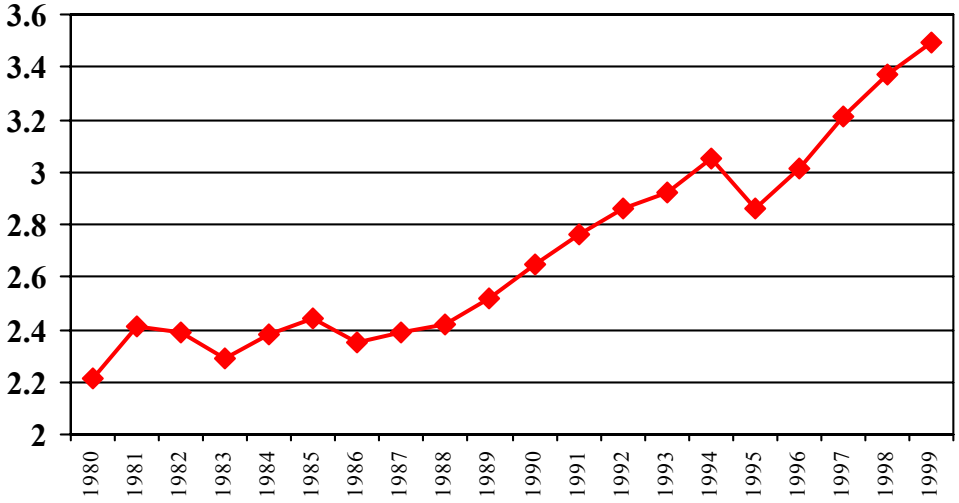

Table 1: Simple and Trade-Weighted Average Tariffs on Mexico, Canada, and World (ad valorem)

	Simple Average			Trade-Weighted		
	Mexico	Canada	World	Mexico	Canada	World
1989	4.01 %	4.33 %	5.39 %	3.13 %	0.82 %	3.44 %
1993	3.15 %	2.35 %	4.54 %	2.07 %	0.37 %	3.19 %
2001	0.52 %	0.45 %	2.67 %	0.18 %	0.04 %	1.64 %

Table 2: Value of U.S. Goods Trade with Mexico, Canada, and the rest of the world, billions of 2001 US$, 1993 and 2001

U.S. Imports from:	1993	Share of U.S. trade	2001	Share of U.S. trade	Growth in Trade over 1993 to 2001 (% change)
World	669		1133		70
Mexico	45	.067	131	.115	190
Canada	129	.192	217	.191	69
Rest of World	495	.741	785	.693	59
U.S. Exports to:					
World	511		666		30
Mexico	47	.092	91	.136	93
Canada	107	.209	145	.217	35
Rest of World	357	.699	431	.647	20

Table 3. Mexico's Share of World and Region Imports, 1989, 1993, 1999

	1989	1993	1999
World	0.83 %	1.37 %	2.44 %
U.S.	3.73 %	7.15 %	11.69 %
South and Central America	38.75 %	16.04 %	24.55 %
Asia	0.30 %	0.13 %	0.16 %
Europe	0.20 %	0.17 %	0.23 %

Table 4. The Tariff Preference and U.S. Import Demand

	NAFTA Dummy		Tariff Preference		Tariff Preference and NAFTA	
NAFTA Dummy	0.1015 ** (0.0468)	0.1077 ** (0.0458)				
Tariff Preference			18.64 ** (7.10)	19.44 ** (7.768)	16.45 ** (6.41)	11.17 * (6.65)
Tariff Pref*NAFTA					3.80 ** (1.84)	4.43 ** (2.00)
y^d	1.1032 *** (0.3709)	1.1361 *** (0.3671)	0.8078 (0.7617)	0.9768 (0.722)	0.1802 (0.5117)	0.7099 (0.4847)
p^m	0.1676 * (0.0988)	0.1502 (0.0944)	0.4564 * (0.2396)	0.393 * (0.222)	0.6826 *** (0.1616)	0.4995 *** (0.1494)
p^d	0.0089 (0.0064)	0.0086 (0.0065)	0.0041 (0.0063)	0.0029 (0.006)	0.0047 (0.0056)	0.0011 (0.0056)
Exchange rate	0.1586 *** (0.0438)	0.1608 *** (0.0429)	0.0497 (0.1036)	0.0521 (0.1043)	-0.0197 (0.0832)	0.0545 (0.0808)
Peso	0.0388 (0.0441)		0.0397 (0.0362)		0.0611 * (0.0328)	
Constant	8.10 *** (2.71)	7.86 *** (2.67)	10.617 * (5.804)	9.32 (5.54)	15.79 *** (3.81)	11.79 *** (3.63)
F-statistic	1373	1529	985	1095	1067	1209
PV of F-statistic	0.00	0.00	0.00	0.00	0.00	0.00
D-W-statistic	2.01	2.01	2.03	2.02	1.95	1.94
Std.error of reg.	0.0559	0.0559	0.0434	0.0436	0.04	0.04
No. of obs.	48	48	50	50	50	50

Note: Standard errors are in parentheses. *** indicates statistical significance at the 10 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 1 percent level.

Table 5. The Tariff Preference and Mexican Demand for U.S. Exports

	NAFTA Dummy		NAFTA Tariff Preference	
NAFTA Preference			5.146 ** (2.216)	6.654 ** (2.595)
NAFTA Dummy	0.1095 * (0.0615)	0.1115 * (0.0605)		
y^d	0.3182 *** (0.0659)	0.3091 *** (0.0647)	0.3276 *** (0.0673)	0.3355 (0.0706)
P^x	0.0106 (0.0143)	0.0149 (0.0143)	0.0082 (0.0137)	0.0045 (0.0137)
p^d	0.0051 *** (0.0016)	0.0056 *** (0.0015)	0.0042 ** (0.0017)	0.0037 ** (0.0018)
Exchange rate	-0.1566 * (0.0819)	-0.1841 ** (0.0809)	-0.1706 ** (0.0829)	-0.1814 ** (0.0866)
Peso	-0.0463 (0.0531)		-0.0405 (0.0505)	
DMT	0.0314 (0.0768)	0.0360 (0.0773)	0.0381 (0.0749)	0.0375 (0.0748)
Constant	14.75 *** (1.15)	14.40 *** (1.15)	14.94 *** (1.08)	15.25 *** (1.082)
F-statistic	866	960	881	943
PV of F-statistic	0.00	0.00	0.00	0.00
D-W-statistic	2.01	2.00	1.98	1.97
Std.error of regression	0.062	0.062	0.061	0.062
No. of obs.	70	70	70	70

Note: Standard errors are in parentheses. *** indicates statistical significance at the 10 percent level, ** indicates significance at the 5 percent level, and * indicates significance at the 1 percent level.