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## ABSTRACT

Aggregate and more micro data on trade between the U.S., Canada, and Mexico are used to attempt to assess the early effects of Mexican entry into NAFTA. Although the fraction of Mexican trade with the U.S. and Canada has risen sharply, a number of factors have contributed to this result. Mexican reduction of tariffs and quantitative restrictions and the Mexican alteration of exchange rate policy at the end of l994 were both important. Based on early returns, the impact of NAFTA over its first three years does not appear to have been large relative to the effects of these other events.



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# TRADE CREATION AND TRADE DIVERSION UNDER NAFTA

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Until the l980s, the liberalization of international trade on a multilateral basis was the great success story of the postwar era, and certainly contributed in a major way to the rapid economic growth of the international economy. World trade had grown at more than twice the rate of growth of real world GDP, and had provided a highly permissive environment for economic policy, even in those developing countries that then chose inward-looking trade policies. Even the European Union, which was the sole meaningful exception to the proposition that the global trade regime had become increasingly multilateral under GATT, had experienced growth in its trade with its non-EU trading partners at a rate not only above its own rate of growth but also above the average rate of growth of trade for all countries.

Starting in the mid-l980s, however, preferential trading arrangements (PTAs) began mushrooming alongside continuing multilateral trade liberalization. Spurred by the shift in U.S. policy, under which the U.S. changed from a total commitment to free trade to a "two-track" approach resorting to PTAs as a way to achieve trade liberalization in addition to supporting the open multilateral system, PTAs have proliferated.[2] While some of these have been bilateral agreements between two small countries, some have entailed the development of discriminatory trading arrangements between fairly large countries. In some instances (such as the countries of

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[2] See World Trade Organization (1995), Appendix Table l, for an enumeration of the 95 agreements (of which 25 had been notified since l990) notified to GATT under Article XXIV of its Articles, and the 11 agreements covered or notified under the l979 Enabling Clause.

Eastern Europe), countries have formed Free Trade Agreements (FTAs) with existing customs unions (especially the European Union). In other cases, new groupings have been formed.

Prominent among these new groupings has been the North American Free Trade Agreement (NAFTA) which superseded the Canada-U.S. Free Trade Agreement (CUSFTA) when Mexican entry into NAFTA was ratified by all three countries. Economists and policy makers have spent a considerable amount of time analyzing PTAs and their likely impact on the open multilateral trading system,[3] both from an analytical and an empirical viewpoint.

From an analytical viewpoint, models have proliferated. The original Vinerian (l950) distinction between trade creation, under which countries lowering their tariffs shifted away from reliance on high-cost domestic industry to imports from the lower-cost partner countries, and trade diversion (where low-cost production in the rest of the world is displaced by higher-cost production in the partner country), has been modified and amended in a number of ways. Despite these analytical advances, however, the initial Vinerian conclusion – that PTAs could enhance or reduce welfare – remains. The issue of the net effect of PTAs on the welfare of the member countries and on the world economy is therefore an empirical issue.[4] Moreover, even if there were a clear-cut analytical answer to the question of the sign of the effects, the magnitude of these effects would still be of interest.

To date, however, most empirical work estimating the effects of NAFTA has been based on simulation models. This is largely because the NAFTA has been so new that data were not

[3] See Bhagwati, Krishna, and Panagariya (l999), Bhagwati and Krueger (l995), and Krueger (l997b) for statements of the arguments.

[4] Kemp and Wan (1976) developed a theorem which stated that, if the trade with the rest of the world of a PTA remains as large (or larger), item by item, as it was before formation of the PTA, potential welfare of the PTA partners must be enhanced and the welfare of the rest of the world cannot have been reduced. While apparently powerful, the theorem is difficult to use empirically to estimate the effects of PTAs because of the myriad of other changes that take place in the international economy at the same time as PTAs are formed. To a lesser degree, the same objection holds for any empirical work, including that presented below, in attempting to estimate the effects of PTAs.

available with which to attempt an estimate of the initial impacts of the agreement on trade flows. In this paper, an attempt is made to assess the effects of NAFTA, with special emphasis on U.S.-Mexican trade patterns. A first section provides some general background and the considerations that are pertinent to any such assessment. A second then provides data on what has happened to trade flows. A third section then uses gravity models and "shift-and-share" analysis to attempt to sort out the various influences at work. As will be seen, the evidence to date bears out most economists' initial predictions: that for the U.S., the impact of NAFTA has been relatively small, and that for Mexico, changes in trade flows to date do not give much support to the view that NAFTA might be seriously trade-diverting.

## 1. THE NAFTA AGREEMENT AND IMPORTANT CHRONOLOGY

As is well known, the NAFTA agreement came into effect on January 1, l994. Its passage through the United States Congress was surprisingly contentious when it was finally brought forward for consideration in the fall of l993. However, there had been a presumption that NAFTA would come into effect from the time that President Salinas first announced his government's desire to enter into such an agreement, and a strong presumption that it would become a reality after President Bush and President Salinas signed an agreement in June l990 that they would negotiate to enter into such an agreement.[5]

Thus, certainly from l990 onward, trading relations between Canada, the U.S., and Mexico were affected in some degree by anticipation of the FTA. A first difficulty that any empirical analysis must confront is that one cannot assume (even if there were no other shifts in the international economy) that data from the early l990s yield an accurate picture of the "without NAFTA" scenario.

[5] See Hufbauer and Schott (1992), Chapter l, for a description of the processes by which NAFTA came into being. See also Hufbauer and Schott (l993) for their initial assessment of the agreement.

Second, although the agreement came into effect on January l, l994, not all tariffs between the U.S., Canada, and Mexico were removed on that date. Indeed, for most commodities, there was a schedule over a ten or fifteen-year period, depending on the commodity category, during which tariffs would be phased out.[6] Hence, it must be borne in mind not only that anticipated reduction of trade barriers may have influenced trade flows prior to l994, but also that trade flows in l994 and afterward were not entirely free of duty.

Third, liberalization of trade, both under the WTO and unilaterally by some countries, was continuing to take place, and undoubtedly affected trade patterns. At the same time, the moves toward FTAs with the European Union on the part of former COMECON countries, and other preferential trading arrangements may also have affected trade patterns.

These complications alone would be enough to suggest caution in the interpretation of any empirical findings regarding the impact of NAFTA. But, in fact, several other events – mostly affecting Mexican trade -- that were taking place were probably more important in influencing trade patterns than simply the anticipation of trade flows and the gradual phase-in of tariff reductions. First, and probably most important, Mexico had begun to liberalize her entire trade regime in the mid l980s. From an initial position in l985 of high tariffs and quantitative restrictions governing most imports, Mexico had removed virtually all-quantitative restrictions on imports by l990. In addition, tariffs had been greatly reduced, so that it was estimated that Mexico had an average tariff level of l0 percent (compared to the U.S. average level of 4 percent for imports from Mexico) against U.S. imports by the early l990s. Hence, Mexico had liberalized her external trade by eliminating almost all-quantitative restrictions and greatly reducing tariffs on an MFN basis prior to NAFTA. Just as one would not expect all reactions to entry into NAFTA to have

[6] See Hufbauer and Schott (l993) for particulars of these phase-out schedules. See also the NAFTA itself (l993).

occurred in or after l994, so too the Mexican trade liberalization of the late l980s was undoubtedly still resulting in altered trade flows by the time NAFTA became an influence.

In addition to liberalizing the external trade regime, however, the Mexican government had also adopted a "nominal anchor" exchange rate regime starting in l987. Under this regime, the peso was permitted to depreciate according to a preset schedule in a proportion less than the inflation differential between the United States and Mexico. Thus, the Mexican peso was appreciating in purchasing power parity terms after l987,[7] and the cumulative real appreciation since l987 had become significant by the early l990s. This was reflected in sharp changes in the percentage of Mexico's GDP that was in the tradables sector. Mexican exports as a share of GDP fell from a high of l9.7 percent in l987 to a low of 12.7 percent of GDP in l992, while imports rose from l3.4 percent of GDP in l987 to a high of l8.8 percent of GDP in l994 (and were even higher following the l994 devaluation).[8] Thus, the share of tradables in GDP rose markedly from the mid l980s, spurred by the liberalization of the trade regime; however, the influence of the real exchange rate offset some of that trend between l987 and l993, and undoubtedly spurred export growth and retarded import growth after l994. Some part of the increase in Mexico's share of the U.S. market after NAFTA would have occurred if the trade regime had remained unaltered: under a constant set of tariffs, Mexican producers' (of both exportable and import-competing goods) ability to match competitors was clearly influenced by the changes in the real exchange rate.

l994 was an election year in Mexico, and it was marred by a number of events. Among them, there was the Chiapas uprising at the start of the year and there were three political assassinations, each of which was followed by a significant loss of foreign exchange reserves. When the new government assumed power late in l994, an effort to undertake a l5 percent

[7] See Krueger (l997a) for estimates of the behavior of the real exchange rate over this period.
[8] Data are from International Monetary Fund, International Financial Statistics Yearbook, l998.

devaluation triggered further mass shifts from the peso into foreign currencies. The government withdrew from the foreign exchange market, and the peso depreciated significantly in real terms, by a factor initially equal to almost 50 percent.[9]

It is evident that both the real appreciation that had taken place prior to l994 and the subsequent real depreciation would have affected incentives for both imports and exports from Mexico. While it is not obvious what the effects would have been on Mexican trade patterns among trading partners, it must nonetheless be recognized that the real depreciation of the peso that year, given its magnitude, was a larger influence on trade than was the entry into NAFTA (given that the total reduction in tariffs at the end of l5 years would average only l5 percent, contrasted with the 50 percent real depreciation).

In conjunction with other policy responses to the "tequila crisis" of late l994-early l995, the Mexican government imposed a surcharge on all imports entering Mexico, except those entering under NAFTA (because the agreement precluded such a tax). The tax was subsequently raised when the government encountered revenue losses from oil when the oil price fell in l998 and early l999. These measures were clearly discriminatory in favor of NAFTA members, and could only have resulted in trade diversion.

The world therefore did not hold still for Mexican entry into NAFTA, and the events just discussed undoubtedly affected trade. How much they did so is difficult to judge: an assessment based on data available to date is the purpose of this paper.

Several hypotheses have been put forth as to the effects of NAFTA. Some have viewed the agreement as entirely benign, believing that the vast preponderance of new trade would be "trade creating." Support for this view came both from the relatively low initial level of Mexican

[9] To be sure, the increase in the price of foreign exchange, which was more than l00 percent, triggered domestic price increases, so that by the end of l994 real depreciation from a year earlier was down to 50 percent -- still a

and U.S. tariffs, and also from the observation that the United States was already Mexico's largest trading partner. The contrary viewpoint was based on several considerations. First, some, such as Bhagwati (Bhagwati and Krueger, l995), pointed to the protectionist pressures in the United States, and predicted that increased imports from Mexico might be countered with additional anti-dumping (AD) and countervailing duty (CVD) cases against other countries, especially the East Asian exporters. A second consideration was rules of origin (ROOs), which in effect gave Mexican exporters duty-free entry into the U.S. market only if there was sufficiently high North American content in the exported good. That, in turn, would tend to encourage Mexican exporters to source their inputs from other North American producers, rather than from East Asian producers.[10] Yet a third argument was that U.S. direct foreign investors in Mexico (as, for example, auto assemblers) would be favored by the agreement and would tend to source from the United States.

## 2. THE PATTERN OF TRADE FLOWS

Given all the other changes that were taking place as NAFTA was negotiated and phased in, it would require a very careful specification of the determinants of trade patterns and related variables for the U.S., Canada, and Mexico to disentangle the various influences at work on the pattern of trade among NAFTA partners before and after the start of NAFTA.

Moreover, comprehensive data are available through l997 or l998 (depending on the particular series), thus allowing observation of only the first four or five years of operation of NAFTA -- a length of time not even halfway through the tariff phase-out period, and probably not even long enough to allow for adjustment lags in any event.

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very large number.

[10] See Krueger (l993) for the argument.

Nonetheless, a first pass can be undertaken, and can provide at least some limits on the estimates of the likely magnitude of these various effects. Table l provides some overall data on NAFTA trading patterns. Table la presents the data for the U.S. As can be seen, American exports to Mexico constituted 6.9 percent of all U.S. exports in l980, stood at 7.2 percent of U.S. exports in l990, and rose unevenly thereafter to a peak of l1.6 percent of U.S. exports in l998. Imports from Mexico followed a similar pattern, although the trend is unbroken: Mexico's share of U.S. imports doubled from l980 to l998. Even from l993, Mexico's share of the U.S. market had increased by 50 percent.

Canada started out with U.S. trade more than twice the volume of Mexico's. Canadian trade constituted about l6 percent of all U.S. exports and imports in l980. The shares rose considerably by l985 and then stayed around those levels in the following years. In l998, Canadian goods accounted for 22.7 percent of U.S. exports and l8.8 percent of American imports. Thus, there was a noticeable increase in U.S. trade with Canada, although the rapid growth in share was concentrated in the early l980s.

From the Canadian vantage point, trade with Mexico was relatively unimportant prior to NAFTA, accounting for only around a half a percent of Canadian exports and 1.5 percent of Canadian imports. Canadian exports to Mexico almost doubled from l990 to l998, albeit from a very small base, and share was relatively constant. Canadian imports from Mexico increased from about l.2 percent in l990 to about 2.5 percent by l998. Thus, although growth has been dramatic, it has been from a very small base.

By contrast, the U.S. looms large in Canadian trading patterns. The United States already accounted for 61 percent of Canada's exports in l980. That share had risen to 75 percent by l990, and reached 86.5 percent by l998. On the import side, the share of Canadian imports originating in

the U.S. has remained fairly steady at around two-thirds of the total. Thus, Canadian exports to the U.S. seem to have gained share for Canada, whereas Canada does not appear to have imported proportionately more from the U.S. after NAFTA. Indeed, it is noteworthy that Canada's concentration of trade with the U.S. is even greater than Mexico's in some years.

Turning to Mexico's trade, more than 60 percent of Mexico's trade on both the export and import side were with the United States in l980, well before there was any thought of a PTA. There was rapid growth of maquildora exports in the l980s, and Mexican export data are difficult to interpret.[11] During the l980s, the share of Mexico's trade destined for the U.S. market increased, but rose even more dramatically during the l990s, reaching 85 percent by the mid l990s.

Hence, the aggregate statistics convey a reasonably clear picture: there is little question but that trade ties among the NAFTA partners intensified in the l990s. It is possible to disaggregate the data to some extent, and to examine the behavior of exports and imports of commodity categories. At the one-digit level, there are l0 categories in the UN commodity trade data. Unfortunately, data for 1998 are available only for the U.S. while for Canada and Mexico the latest available year is 1997, but they still permit some inferences. Of the l0 one-digit commodity categories, three – manufactured goods classified chiefly by material, machinery and transport equipment, and miscellaneous manufactured articles, accounted for half or more of each NAFTA country's imports and exports.[12] Table 2 reports on the results for those three categories.

[11] Maquiladora exports from Mexico to the U.S. came under special provisions of the U.S. tariff law that permitted exportation materials and semi-finished goods from the U.S. for working and reimportation, with duty paid only on the value added portion. These firms assumed increasing importance during the l980s and naturally probably had a lower fraction of value added in exports than other goods. Data on Mexican exports appear not to have included maquiladora exports prior to l990 and to have included them thereafter. See the note to Table lc.

[12] Interpretation of the data for these groups is also subject to the qualification mentioned in footnote 11 regarding the inclusion/exclusion of maquiladora trade. Of the other one-digit categories for Mexico, there do not appear to be any clear-cut trends. The shares of intra-NAFTA imports and exports in SITC-2 (Crude Materials, Inedible, Except Fuels), for example, went respectively from 83.7 and 74.0 in l990, to 84.1 percent and 66.6 in l997. Chemicals' (the next largest category after the three reported in Table 2) shares went from 69.6 to 72.8 on the import side and from 46.1 to 47.4 on the export side.

As can be seen, there are distinct differences in the behavior of different commodity groups across the countries. For the United States, there was an increase of about 12 percentage points in the share of exports of Manufactured Goods Classified by Material destined for NAFTA partners while the share of Miscellaneous Manufactured Articles increased by 6.5 percentage points. The third major manufacturing category (Machinery and Transport Equipment) increased by only 3.3 percentage points. The share of American imports originating in NAFTA partners rose by about one percentage point for Manufactured Goods Classified by Material, rose by 7.5 percent for Machinery and Transport Equipment, and nearly tripled for Miscellaneous Manufactures.

Canadian shares of exports to NAFTA trading partners show smaller changes than for the U.S., with a 4.5 percentage point increase in the share of Miscellaneous Manufactured Articles being the biggest share change. On the import side, however, Canadian imports originating in NAFTA partners rose markedly in each category: the largest increase was for Miscellaneous Manufactures.

Mexico, too, shows large differences in patterns across the three major commodity groups. Mexican exports of Manufactured Goods Classified by Materials destined for NAFTA had an almost unchanged share,[13] while Miscellaneous Manufactures' share going to NAFTA partners rose dramatically from 79.0 percent to 93.2 percent. Machinery and Transport Equipment, of which 90.3 percent was already exported to NAFTA partners in l990, increased their share to 92.1 percent by l997.

## 3. TRADE CREATION OR TRADE DIVERSION?

[13] It is likely that this is because of the maquiladora law which permitted imports of those goods with duty paid only on value added, as mentioned in footnote l2. The fact that maquiladora exports are presumably reported on the basis of their price, rather than their value added, makes interpretation of these statistics subject to considerable uncertainty.

The crude data are sufficient to indicate that there has been an expansion of trade, both absolutely and as a percentage of total trade, among the NAFTA countries in the l990s. Two important questions, however, cannot be answered on the basis of those data. The first is the extent to which NAFTA, as contrasted with the other concurrent events described above, accounted for the change in trade patterns. And, given the answer to the first, the second is the extent to which the increase in trade among NAFTA partners reflects "trade creation" and shifts of production to locations with comparative advantage, and to what extent it reflects trade diversion and a shift from low-cost producers in the rest of the world to higher cost producers in the NAFTA countries.

Several lines of approach can be made in attempting to provide some partial insights into these questions. First, one can examine trade data to ask whether there are categories in which the level of imports from the rest of the world fell as intra-NAFTA trade increased. To the extent that declines in import volumes from third countries were associated with increasing imports from NAFTA countries, there would be a strong presumption of trade diversion.[14] While a finding of declines in import volumes from third countries would provide a very strong presumption of trade diversion, it is clear that in the context of rapidly growing total trade volumes – as was the case for the NAFTA countries and the rest of the world – there could be significant trade diversion that took place as the increment in trade volumes was sourced in NAFTA countries.

To consider this possibility, a second line of attack is to employ "shift and share" analysis to examine the changes in volumes and patterns between commodity groups and among NAFTA countries and the rest of the world. If Mexico's share of imports from the U.S. market increased,

[14] Even when such cases are found, there remain questions as to whether commodity classifications are entirely homogeneous. It could also happen, of course, that supplies from other countries were reduced for reasons independent of NAFTA. To examine these questions, however, would require a fairly detailed analysis of individual commodity groups and is well beyond the scope of this paper.

for example, it could of course be because Mexican imports of the good were rising rapidly and the U.S. was the low-cost supplier.[15] But if the shifts in share toward Mexico are concentrated in commodity groups where there is a presumption that other countries may enjoy a comparative advantage, one can use these findings as a starting point for investigating the trade diversion hypothesis.

The third line of attack is to estimate "gravity equations," estimating the determinants of trade patterns, and then seek to ascertain what shifts may have come about because of NAFTA. Each of these approaches is undertaken in what follows.

3a. Decreasing Absolute Trade with the Rest of the World?

As mentioned above, the Kemp-Wan theorem points out that if item-by-item trade flows with the rest of the world are no smaller after the formation of a PTA than they were prior to it, the PTA cannot have harmed world welfare and must have benefited the PTA members. However, there is no natural restatement of the theorem in a dynamic setting such as the growing world economy. Indeed, in general, one would expect most shifts in demand and supply to result in increased or reduced shares, rather than in absolute declines. Nonetheless, it is worthwhile examining the data to see if there are instances where intra-NAFTA trade increased while trade between NAFTA countries and the rest of the world declined.[16]

At the three-digit level, however, there are few commodity categories in which imports of any NAFTA country from the rest of the world fell while rising within NAFTA. There was simply

[15] Note that there is nothing in theory that says that shares should remain constant. One country might have low average costs and rapidly rising marginal costs, while another might have a higher average cost, but a flat (and therefore after a point lower than the first country's) marginal cost curve.

[16] A more sophisticated approach might be to examine the data for cases in which the share of, e.g., Mexican exports, in third countries fell while that in the U.S. and Canada remained constant or rose. The argument would be that, had the increase in share been because of an improved competitive position, Mexico's share of other markets need not have fallen. Like any other analysis, some assumptions would be necessary to permit the interpretation, but it might nonetheless be useful. It was beyond the scope of this paper, however, to undertake such an analysis.

too much growth in total trade (and/or too little trade diversion under NAFTA) during this period. Whether that should be interpreted as a situation in which multilateral trade liberalization dominated the effects of liberalization with PTAs is an open question. But on the basis of the data, one certainly cannot infer trade diversion.

3b. Shift and share Analysis

A second step in the analysis is to assess the extent to which increases in intra-NAFTA trade took place at the expense of the shares of trade of countries outside NAFTA. Here, data up to the four-digit level are available. We start by examining the shifts in shares for Mexican imports into the U.S. market. Table 3 and present the data at the one-digit level and Table 4 gives data for two-digit commodity groups. It covers all two-digit commodities in which Mexico gained at least 3 percentage points of share in the U.S. market in the period from l992 to l998,[17] and gives as well the average for all Mexican exports. It also attempts to bring in the height of tariffs as a consideration in estimating the extent of trade creation and trade diversion. Data are also provided to attempt a rough assessment of the extent to which the increased Mexican share was at the expense of East Asian countries.

A first point to notice is that the average tariff rate as calculated by U.S. tariff collections on imports from Mexico was generally less than the average tariff rate for the comparable (at the 2-digit level) imports from the East Asian countries. There may be several reasons for this, and some are perhaps instructive as to why changes in trade patterns are not more sharply reflected in the data. It should be recalled that the “maquiladora” industries in Mexico were entitled to duty-free entry into the United States of those components which had been exported to Mexico and were being reexported to the United States. In a sense, maquiladora industries were nothing other

than parts of a PTA under which the rule of origin was set at l00 percent on parts. To the extent that a higher fraction of Mexican exports to the U.S. in l990 (and earlier years) came in under these special sections of the tariff code, or to the extent that the reexported fraction of the value of Mexican exports was higher than the comparable exports from East Asia, the reported tariff rate for Mexico would have been lower even pre-NAFTA.

It is also noteworthy that, in a few cases, the average tariff rate actually rose. This could reflect one of several phenomena. It could, of course, represent a changing commodity composition (at the more disaggregated level) of trade within a 2-digit commodity group, with a shift toward commodities with higher duty rates. It could also be the result of the imposition of anti-dumping or countervailing duties upon imports. Which of these explanations is correct, or whether there is another one, is not known.

Bearing in mind the many qualifications to the interpretation of the data, the numbers in Table 4 are nonetheless useful. For U.S. imports as a whole, Mexico gained about four percentage points of share over the l992 to l998 period, while East Asia lost about 2.5 points of share.[18] For all commodities, the average tariff collected on imports from Mexico fell from 2.0 percent in l992 to l.4 percent in l998, while that from the four Asian countries fell from 4.1 to 3.2 per cent.[19] In some cases (look, for example, at furniture and parts thereof (SITC 82), where duties collected on imports from Mexico averaged 0.8 percent in l992 contrasted with a 9.9 percent average duty rate for the four Asian countries), disparities in average tariff collections were already marked in l992. In other categories, average duties collected on imports from Mexico fell, while those from the

[17] There are 68 2-digit commodity groups for which data were available for Mexico's exports into the U.S. market. Of those, 18 gained 3 or more percentage points of share, 36 either stayed the same or gained less than 3 percentage points, 10 lost less than 3 percentage points, 4 lost more than 3 percentage points.

[18] Over the same period, Japan lost (for total U.S. imports) 4.9 percentage points of share, while China gained 3.0 points of share, the rest of Asia gained l.7 percentage points, industrial countries gained 0.6 percentage points, and the rest of the world lost l.7 percentage points of share.

four Asian countries remained constant or fell much less sharply. Except for vegetables and fruit (SITC 05), where Mexico was in fact at a tariff disadvantage in 1992, and beverages (SITC 11), none of the commodity groups which gained the largest shares changed its tariff advantage over the Asian countries by more than 2 percent. Inspection of the numbers for other 2-digit commodities (not reported here) also does not exhibit any marked pattern.

Turning to Table 3, data are presented on imports into the U.S. and into the rest of the world, combined with data on Mexico's exports. Using the average of l987-88 as a base, the share of Mexican exports in the imports of the U.S. and the rest of the world was calculated.[20] The shares so calculated were then applied to U.S. and rest of the world imports in l990, l993, l997, and 1998 to estimate what Mexico's exports would have been had her share of the two markets been unaltered. The difference between that number and the actual Mexican exports to each market was then taken as the "shift" in Mexican exports in the two markets.

This was done both for total trade and for one-digit commodity groups. Some interesting patterns emerge. For the late l980s and early l990s, Mexican exports appear to have been gaining share (relatively slowly) in the U.S. market but losing share in the rest of the world. After the early l990s, and especially after 1994, however, Mexico gained share both in the U.S. and in the rest of the world. The gains in shares are most pronounced in the commodities focused upon in Table 2: manufactures classified chiefly by materials, machinery and transport equipment, and miscellaneous manufactures. In each of these categories, about half or more of the increment to Mexican exports was accounted for by increased share. Moreover, in each of these categories, the

[19] As mentioned above, the Asian crisis does not appear to have significantly affected these trends: use of l996 data would reveal much the same pattern.

[20] A precise calculation would have included Canadian data with those of the U.S. and subtracted Canadian imports from the rest of the world total. In light of the small share of Canada in Mexico's trade and in world trade, Canadian trade was not netted out from that of the rest of the world, nor were Mexico's exports to Canada netted

increased Mexican share in trade with the rest of the world was almost as large as the proportionate increase in share in trade with the U.S.

Given the Mexican real appreciation of the early l990s, and the devaluation of l994, a reasonable interpretation might be that Mexican exporters were able to expand their output slowly, if at all, in the years of real appreciation, but nonetheless shifted their exports toward the U.S. After the peso devaluation, however, it would appear that Mexican exports increased sharply both for the U.S. and for the rest of the world. Hence, from the viewpoint of Mexico, it is far more plausible to argue that supply shifts associated with trade liberalization and real devaluation account for the increased Mexican share of the U.S. market than that exports were shifted from the rest of the world to the U.S. Of course, it is plausible that this shift toward the U.S. market as a result of increased export supply was met with protectionist measures in the U.S. which meant that the Mexican gain was at the expense of other exporters rather than of high-cost U.S. producers. But the fact that Mexico increased share in the rest of the world as well suggests that Mexico was generally a more attractive source for imports, especially after the l994-5 devaluation, than it had been earlier.

3c. Gravity Equations

An alternative means of attempting to estimate the effects of NAFTA or other preferential trading arrangements is by means of gravity equations. Although the theoretical foundations for these relations are less than robust,[21] these models perform well empirically and can be useful for estimating changes in the trading relationships among countries.

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out of rest of world imports and added to imports into the U.S. Given relative magnitudes, this omission cannot have affected the numbers significantly.

[21] See the papers in Frankel (l998) for some perspectives on the analytical underpinnings of gravity equations. An imperfect competition model can generate the predictions, but their fit seems much better than would be expected on the basis of that analysis.

The estimation procedure was conventional: the log of exports was regressed on distance, GDPs, and a variety of other variables. Dummy variables were then added when both countries were members of a PTA (NAFTA, MERCOSUR, the Andean Community, the European Union, ASEAN or the Australia-New Zealand CER) or when the importing country was a member of one of these PTAs while the exporting country was not a member of the same PTA. In addition, to test for the impact of NAFTA on East Asian countries, a NAFTA-East Asian dummy variable was added if the importing country was a NAFTA member and the exporter was Japan, China, Hong Kong, Singapore, or South Korea.

Data were collected on trade values, GDP, population, exchange rates, languages, and distance for the years l987, l989, l991, l993, l995 and l997.[22] A pooled time-series-cross-section regression was then estimated, with the following form:

Exports(I,J) = C+a11(D89)+a12(D91)+a13(D93)+a14(D95)+a15(D97)

+b1(GDP(I))+b2(GDP(J))+c1(GDPPC(I))+c2(GDPPC(J))

+e1(DIST(I,J))+e2(REMOTE(I))+e3(REMOTE(J))+e4(CONTIG(I,J))+f(SL(I,J))

+dum1(PTA(I,J))+dum2(TREND PTA(I,J))

+dum3(NOPTA(I),PTA(J))+dum4(TREND NOPTA(I),PTA(J))

where I and J are the exporting and importing countries, respectively;[23] D89, D91, etc. are year dummies (with no dummy for l987); GDPs are the GDPs in the respective years and countries

[22] Data sources are as follows: for trade data, Statistics Canada, The World Trade Analyzer, based on UN COMTRADE data; for GDP, population, exchange rates, International Monetary Fund, International Financial Statistics, lines 99b.c, 99.z, and rf; for languages, national capitals, and contiguity, Central Intelligence Agency, World Factbook l997, and for distances, http://www.indo.com/distance. Exports, GDP, and per capita GDPs are all expressed in l997 U.S. dollars. The U.S. PPI series available through the Bureau of Labor Statistics was used to adjust for inflation.

[23] There are 61 countries included in the sample. These are the countries used by Frankel (l997), less Taiwan and Yugoslavia for which there are no IFS country pages. Trade between these countries accounts for 78-80 percent of world trade. Inclusion of additional countries raises problems because the recorded amounts of trade are often zero between small country pairs. In the reported results we also excluded Iran, Kuwait, Algeria, and Ethiopia since these countries turned out to be outliers in earlier regression rounds.

converted into constant 1997 dollars; GDPPCs are per capita incomes; DIST(I,J) is the distance between I and J; REMOTE(I) and REMOTE(J) are each a weighted (by GDP) average of the distance from the country's trading partners; CONTIG(I,J) is a dummy variable which is one when the trading partners have a common land border; SL(I,J) is one when both countries have the same language. PTA(I,J) is one if both I and J are in the respective PTA. (NOPTA(I),PTA(J)) is one if the importer is a PTA member while the exporter is not in the same PTA. These two dummies were also interacted with the number of years elapsed since 1987. Most of these variables require little comment. Remoteness is added to gravity equations to take into account the fact that some countries (e.g., Australia and New Zealand) are further away from most of their trading partners than other countries. Two "remote" countries might be expected to trade more with each other, and trade more at a distance than countries with many relatively proximate trading partners. Contiguity likewise is added because a common border may lower transport costs or other costs of doing business.

Non-oil exports were taken as the dependent variable. Examination of the residuals after estimating the gravity equation for total exports revealed that several oil exporters (especially Iran, Algeria and Kuwait) were outliers by large multiples of the other countries. For Iran, the effects of the U.S. embargo may have contributed to the large residual, but removal of oil exports from all countries seemed a better solution. Results reported here therefore refer to nonoil exports.

Table 5 presents the estimated equation. As can be seen, the coefficients on the income, distance, remoteness, contiguity, and common language are highly significant and similar in magnitude to those reported in most gravity equation estimates. The negative coefficients on the time dummies presumably are offsetting the combined positive influences of incomes.

For present purposes, it is the coefficients attaching to the dummy variables for the PTA relationships that are of interest. Turning first to the NAFTA variables, it should be recalled that there are only three countries involved, and that NAFTA began after l987. The coefficient on both partners being in NAFTA is positive and insignificant. However, the trend is also positive (3 percent per year), although with a t-statistic of only 0.55. If an importer was in NAFTA, while the exporter was in the rest of the world, imports into the NAFTA country from the exporter's country were on average 46 percent less than they were predicted to be without the dummy variable.[24] There is no apparent trend in the relationship over time between NAFTA members as importers and third countries as exporters.[25] It is interesting that both for NAFTA and for other trading blocs, the direct effect on PTA members (as judged by the coefficient on the dummy) appears to be relatively smaller than the apparent impact on imports from non-PTA members.

It is interesting to examine the coefficients of the dummy variables for the European Union. There, the estimates indicate a 7 percent greater trade among countries when both are in the EU than otherwise, although it is not significant. If anything, there is an estimated marginally significant decrease in the tendency of EU partners to trade with each other over time. When only the importing country is in the EU, expected trade is estimated to be 23 percent (since exp(0.21) = 1.23) larger than otherwise with a strongly significant coefficient. The trend, however, is negative.

[24] Note that the benchmark is when both countries are not in a PTA. In the case of a non-NAFTA exporter exporting to NAFTA, the coefficient says that exports were only exp(-0.61) = 0.54 of what they would have been if neither trading partner had been in NAFTA. This seems a very large number: it is not clear whether trade ties between Canada, the U.S. and Mexico were abnormally strong (relative to the predictions of the gravity model) even prior to NAFTA or other factors may account for this result.

[25] The common language variable is highly significant, as is contiguity. For revision, these two variables will be omitted to examine whether the fact that NAFTA countries are contiguous (the U.S. with each of them) and have a common language between the U.S. and Canada may be picking up some of NAFTA's influence. It will also be of interest to examine the changes, if any, in the EU coefficients. It is expected that addition of l998 data may also enable a clearer interpretation of results.

MERCOSUR is the one PTA for which some evidence has been presented indicating that trade diversion may have dominated.[26] Interestingly, the coefficients on the MERCOSUR membership and trend when the trading partners are both members are not significant (and the coefficient on the level of trade is negative), but the trend when the importer is a member of MERCOSUR and the exporter is not is positive and highly significant. This probably reflects the opening up of the MERCOSUR countries to the world at the same time as they were forming the customs union among themselves.

Interestingly, the ASEAN dummy variables have the most significant coefficients and they are surprisingly large in the estimated magnitude of the effect. This may reflect Singapore's very significant role in entrepot trade with both Malaysia and Indonesia. Examination of whether this, or an alternative hypothesis, accounts for the magnitude and significance of the coefficients would require, among other things, data from earlier years prior to ASEAN's formation.

If one examines the coefficients on the right hand side of Table 5, it seems clear that there is little evidence of major alterations of trade patterns as a result of preferential trading arrangements. Most of the coefficients are not highly significant; even when they are, the estimated orders of magnitude are small.

## 4. CONCLUSIONS

It is, of course, still early days for NAFTA. Tariffs have not as yet been entirely eliminated for trade with Mexico. Even for trade with Canada, tariffs were not entirely eliminated until the l990s, and trade disputes still occur. And other events, especially affecting Mexican trade via the change in the real exchange rate and trade liberalization, appear to have dominated whatever effects NAFTA may have had on trade patterns to date.

[26] See Yeats (l998) for the analysis.

As noted at the outset, about two-thirds of Mexico's trade was with the United States even prior to NAFTA. The maquiladora industries that were established in Mexico took advantage of the duty-free treatment on the materials component of imports reexported to the United States prior to NAFTA. And the fact that Mexico had liberalized her trade in the mid and late l980s should have meant an increasing share of her GDP in trade, which in fact happened. When two thirds of that trade was already with the United States, it should not be surprising that trade to the U.S. increased. That the share with the U.S. went up as rapidly as it did raises some questions, but the evidence seems to indicate that those commodity categories in which Mexican exports to the U.S. grew most rapidly were also those categories in which it grew most rapidly with the rest of the world. That alone provides some comfort that that expansion of trade was trade "creating," and not diverting.

Still, there are some grounds for concern. There remain several years before the NAFTA agreement has brought tariffs down to zero with Mexico. There are occasional anecdotes reporting shifts of location in production that are based on NAFTA-derived advantages.[27] And the coefficients, while not highly significant, for trade among NAFTA countries are positive, while the only significant coefficient implies that NAFTA countries import less than predicted from non-NAFTA trading partners. Finally, the increase in the shares of NAFTA countries in U.S. markets has, in some instances, been dramatic. It will be of interest, several years hence, to reexamine the effects of NAFTA on the trading patterns of its members.

[27] See, for example, Financial Times, March 3l, l999, P. l, in which it was reported that $600 million of textile investment were planned in Mexico, and that Mexico had already displaced China as the largest supplier of textiles to the U.S. The manager of a Taiwanese-owned textile company in Mexico reported that his company's choice of a Mexican location was based on NAFTA and the advantages it incurred.

Table l. NAFTA TRADING PATTERNS

a. UNITED STATES TRADE

U.S. Exports
(billions of U.S. dollars and percent)

| Year | Total Exports | Exports to Mexico | Percent | Exports to Canada | Percent |
|---|---|---|---|---|---|
| 1980 | 220.8 | 15.1 | 6.9 | 35.4 | 16.0 |
| 1985 | 213.1 | 13.6 | 6.4 | 47.3 | 22.2 |
| 1990 | 393.1 | 28.4 | 7.2 | 83.0 | 21.1 |
| 1991 | 421.8 | 33.3 | 7.9 | 85.1 | 20.2 |
| 1992 | 447.3 | 40.6 | 9.1 | 90.2 | 20.2 |
| 1993 | 465.4 | 41.6 | 8.9 | 100.2 | 21.5 |
| 1994 | 512.4 | 50.8 | 9.9 | 114.3 | 22.3 |
| 1995 | 583.5 | 46.3 | 7.9 | 126.0 | 21.6 |
| 1996 | 622.9 | 56.8 | 9.1 | 132.6 | 21.3 |
| 1997 | 687.6 | 71.4 | 10.4 | 150.1 | 21.8 |
| 1998 | 680.0 | 79.0 | 11.6 | 154.2 | 22.7 |

U.S. Imports
(billions of U.S. dollars and percent)

| Year | Total Imports | Imports from Mexico | Percent | Imports from Canada | Percent |
|---|---|---|---|---|---|
| 1980 | 257.0 | 12.8 | 5.0 | 42.0 | 16.3 |
| 1985 | 361.6 | 19.4 | 5.4 | 69.4 | 19.2 |
| 1990 | 517.0 | 30.8 | 6.0 | 93.8 | 18.1 |
| 1991 | 509.3 | 31.9 | 6.3 | 93.7 | 18.4 |
| 1992 | 552.6 | 35.9 | 6.5 | 101.3 | 18.3 |
| 1993 | 600.0 | 40.7 | 6.8 | 113.6 | 18.9 |
| 1994 | 689.3 | 50.4 | 7.3 | 132.0 | 19.1 |
| 1995 | 771.0 | 62.8 | 8.1 | 148.3 | 19.2 |
| 1996 | 817.8 | 74.1 | 9.1 | 159.7 | 19.5 |
| 1997 | 898.7 | 87.2 | 9.7 | 171.4 | 19.1 |
| 1998 | 944.6 | 96.1 | 10.2 | 178.0 | 18.8 |

b. CANADIAN TRADE

Canadian Exports
(billions of U.S. dollars and percent)

| Year | Total Exports | Exports to Mexico | Percent | Exports to U.S. | Percent |
|---|---|---|---|---|---|
| 1980 | 67.7 | 0.4 | 0.6 | 41.1 | 60.6 |
| 1985 | 90.8 | 0.3 | 0.3 | 68.3 | 75.2 |
| 1990 | 126.4 | 0.5 | 0.4 | 95.4 | 75.4 |
| 1991 | 126.2 | 0.4 | 0.3 | 95.6 | 75.8 |
| 1992 | 133.4 | 0.6 | 0.5 | 103.9 | 77.8 |
| 1993 | 140.7 | 0.6 | 0.4 | 114.4 | 81.3 |
| 1994 | 161.3 | 0.7 | 0.4 | 133.1 | 82.5 |
| 1995 | 190.2 | 0.8 | 0.4 | 152.9 | 80.4 |
| 1996 | 200.1 | 0.9 | 0.4 | 164.8 | 82.3 |
| 1997 | 213.0 | 0.9 | 0.4 | 177.3 | 83.2 |
| 1998 | 211.4 | 0.9 | 0.4 | 182.8 | 86.5 |

Canadian Imports
(billions of U.S. dollars and percent)

| Year | Total Imports | Imports from Mexico | Percent | Imports from U.S. | Percent |
|---|---|---|---|---|---|
| 1980 | 61.0 | 0.3 | 0.5 | 41.2 | 67.5 |
| 1985 | 78.7 | 1.0 | 1.2 | 54.1 | 68.7 |
| 1990 | 119.7 | 1.5 | 1.2 | 75.3 | 62.9 |
| 1991 | 120.5 | 2.1 | 1.8 | 75.0 | 62.3 |
| 1992 | 124.8 | 2.2 | 1.8 | 79.3 | 63.5 |
| 1993 | 134.9 | 2.7 | 2.0 | 87.8 | 65.0 |
| 1994 | 151.5 | 3.1 | 2.1 | 99.6 | 65.8 |
| 1995 | 163.3 | 3.8 | 2.3 | 109.0 | 66.7 |
| 1996 | 170.0 | 4.3 | 2.5 | 114.6 | 67.4 |
| 1997 | 195.5 | 5.0 | 2.5 | 131.9 | 67.5 |
| 1998 | 200.3 | 5.1 | 2.5 | 136.8 | 68.3 |

c. MEXICAN TRADE
(billions of U.S. dollars and percent)

Mexican Exports

| Year | Total Exports | Exports to U.S. | Percent | Exports to Canada | Percent |
|---|---|---|---|---|---|
| 1980 | 18.0 | 12.5 | 69.4 | 0.1 | 0.8 |
| 1985 | 26.8 | 19.0 | 70.8 | 0.4 | 1.8 |
| 1990 | 40.7 | 32.3 | 79.43 | 0.2 | 0.8 |
| 1991 | 42.7 | 34.0 | 79.5 | 1.1 | 2.7 |
| 1992 | 46.2 | 37.5 | 81.1 | 1.0 | 2.2 |
| 1993 | 51.8 | 43.1 | 83.3 | 1.5 | 3.0 |
| 1994 | 60.9 | 51.9 | 85.3 | 1.5 | 2.4 |
| 1995 | 79.5 | 66.5 | 83.6 | 2.0 | 2.5 |
| 1996 | 96.0 | 80.7 | 84.0 | 2.2 | 2.3 |
| 1997 | 110.4 | 94.5 | 85.6 | 2.2 | 2.0 |
| 1998 | 106.8 | 87.3 | 81.8 | 4.9 | 4.5 |

Mexican Imports

| Year | Total Imports | Imports from U.S. | Percent | Imports from Canada | Percent |
|---|---|---|---|---|---|
| 1980 | 17.7 | 10.9 | 61.6 | 0.3 | 1.8 |
| 1985 | 13.4 | 9.0 | 66.6 | 0.2 | 1.8 |
| 1990 | 30.0 | 19.8 | 66.1 | 0.4 | 1.3 |
| 1991 | 49.9 | 36.9 | 73.9 | 0.7 | 1.4 |
| 1992 | 62.1 | 44.3 | 71.3 | 1.1 | 1.7 |
| 1993 | 65.4 | 46.6 | 71.2 | 1.2 | 1.8 |
| 1994 | 79.3 | 57.0 | 71.8 | 1.6 | 2.0 |
| 1995 | 72.5 | 54.0 | 74.5 | 1.4 | 1.9 |
| 1996 | 89.5 | 67.6 | 75.6 | 1.7 | 1.9 |
| 1997 | 109.8 | 82.2 | 74.8 | 2.0 | 1.8 |
| 1998 | 106.9 | 79.0 | 73.9 | 0.9 | 0.8 |

Source: International Monetary Fund, Direction of Trade Statistics, various issues.
Note: There is a break in many time series on Mexican exports: maquiladora trade was excluded in some series before the early l990s and then included thereafter. The IMF-IFS data provide a consistent time series for aggregate exports, but do not give data for exports to individual countries. For this table, IFS data were used for total Mexican exports, and for years prior to

l991, the difference between total exports as reported by IFS and DOTS was taken to be exports from maquiladora: that amount was also added to the DOTS numbers for exports to the U.S.

Table 2. Percentage Shares of Intra-NAFTA Trade for the U.S., Canada, and Mexico in Selected One-Digit SITC Categories (SITC 6, 7, and 8)

| Country/Commodity Group | l990 | l99l | l992 | 1993 | l994 | l995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|---|
| United States | | | | | | | | | |
| Exports | | | | | | | | | |
| Manufactures Classified by Material | 38.7 | 37.9 | 43.0 | 45.1 | 46.5 | 41.4 | 43.6 | 45.8 | 50.5 |
| Machinery and Transport Equipment | 31.4 | 30.2 | 30.8 | 32.1 | 33.6 | 31.6 | 31.8 | 33.0 | 34.7 |
| Miscellaneous Manufactured Articles | 25.6 | 26.9 | 29.2 | 29.9 | 32.0 | 28.7 | 28.3 | 30.5 | 32.1 |
| Imports | | | | | | | | | |
| Manufactures Classified by Material | 30.4 | 30.8 | 33.2 | 32.3 | 31.9 | 35.6 | 36.3 | 35.6 | 31.6 |
| Machinery and Transport Equipment | 23.2 | 23.6 | 27.3 | 27.2 | 28.6 | 29.4 | 31.5 | 32.1 | 30.7 |
| Miscellaneous Manufactured Articles | 6.1 | 6.1 | 10.0 | 10.5 | 11.9 | 13.4 | 15.5 | 17.1 | 16.4 |
| Canada | | | | | | | | | |
| Exports | | | | | | | | | |
| Manufactures Classified by Material | 80.3 | 77.1 | 79.2 | 81.7 | 83.5 | 81.4 | 81.8 | 83.5 | n.a. |
| Machinery and Transport Equipment | 89.2 | 88.8 | 90.0 | 89.3 | 90.7 | 88.6 | 89.3 | 89.7 | n.a. |
| Miscellaneous Manufactured Articles | 83.8 | 83.3 | 84.3 | 85.1 | 87.6 | 86.8 | 86.7 | 88.3 | n.a. |
| Imports | | | | | | | | | |
| Manufactures Classified by Material | 67.3 | 69.1 | 70.6 | 70.1 | 70.9 | 71.6 | 74.8 | 75.1 | n.a. |
| Machinery and Transport Equipment | 75.8 | 74.5 | 74.6 | 77.6 | 80.2 | 80.2 | 81.2 | 80.3 | n.a. |
| Miscellaneous Manufactured Articles | 56.6 | 59.3 | 58.9 | 59.7 | 63.5 | 63.5 | 65.0 | 65.8 | n.a. |
| Mexico | | | | | | | | | |
| Exports | | | | | | | | | |
| Manufactures Classified by Material | 75.2 | 74.1 | 81.7 | 81.0 | 79.6 | 70.8 | 72.4 | 75.7 | n.a. |
| Machinery and Transport Equipment | 90.3 | 86.8 | 92.9 | 94.3 | 94.2 | 93.5 | 92.2 | 92.1 | n.a. |
| Miscellaneous Manufactured Articles | 79.0 | 75.4 | 92.8 | 93.4 | 93.7 | 92.0 | 93.0 | 93.2 | n.a. |
| Imports | | | | | | | | | |
| Manufactures Classified by Material | 71.2 | 68.8 | 75.6 | 74.3 | 71.6 | 79.7 | 79.2 | 76.6 | n.a. |
| Machinery and Transport Equipment | 77.3 | 72.0 | 72.6 | 71.9 | 71.2 | 76.5 | 78.2 | 78.3 | n.a. |
| Miscellaneous Manufactured Articles | 76.1 | 74.9 | 78.7 | 78.8 | 76.4 | 82.6 | 84.6 | 83.7 | n.a. |

Sources:
1). For 1990-97: Adjusted UN data as presented in Statistics Canada's World Trade Analyzer.
2). For 1998: USITC's Trade DataWeb, available at http://dataweb.usitc.gov/scripts/user_set.asp.
Note: 1998 numbers should be interpreted with some caution since they come from a different data source.

Table 3. Shifts in Shares at the One-Digit Level, Mexican Exports to the U.S. 1990 to l997
(billions of U.S. dollars)

| Commodity Category and Year | Total U.S. Imports | Mexico's Actual Exports to the U.S. | Mexico's Exports if Constant Share of U.S. Imports | Change Due to Change in U.S. Share | Total Imports of ROW | Mexico's Actual Exports to ROW | Mexico's Exports to ROW at Constant Share | Change Due to Change in ROW Share |
|---|---|---|---|---|---|---|---|---|
| TOTAL | | | | | | | | |
| 1990 | 510.9 | 20.4 | 17.0 | 3.4 | 2920.3 | 8.8 | 10.1 | -1.3 |
| 1993 | 621.6 | 44.4 | 20.7 | 23.8 | 3268.7 | 9.9 | 11.3 | -1.4 |
| 1997 | 899.1 | 94.8 | 29.9 | 64.9 | 4667.7 | 20.9 | 16.1 | 4.8 |
| 1998 | 944.6 | 96.1 | 31.4 | 64.7 | n.a. | n.a. | n.a. | n.a. |
| SITC-0 (Food and live animals) | | | | | | | | |
| 1990 | 23.0 | 2.7 | 2.4 | 0.4 | 230.1 | 0.3 | 0.6 | -0.3 |
| 1993 | 24.8 | 3.1 | 2.6 | 0.6 | 266.0 | 0.4 | 0.7 | -0.4 |
| 1997 | 33.8 | 4.6 | 3.5 | 1.1 | 328.3 | 1.6 | 0.9 | 0.6 |
| 1998 | 35.9 | 4.5 | 3.7 | 0.8 | n.a. | n.a. | n.a. | n.a. |
| SITC-1 (Beverages and tobacco) | | | | | | | | |
| 1990 | 4.8 | 0.3 | 0.3 | -0.1 | 34.7 | 0.1 | 0.0 | 0.0 |
| 1993 | 5.9 | 0.3 | 0.4 | -0.1 | 41.4 | 0.1 | 0.1 | 0.0 |
| 1997 | 7.7 | 0.7 | 0.5 | 0.2 | 52.8 | 0.2 | 0.1 | 0.1 |
| 1998 | 8.2 | 0.9 | 0.6 | 0.3 | n.a. | n.a. | n.a. | n.a. |
| SITC-2 (Crude materials, inedible, except fuels) | | | | | | | | |
| 1990 | 14.3 | 0.9 | 0.5 | 0.4 | 147.1 | 0.3 | 0.6 | -0.2 |
| 1993 | 15.9 | 0.9 | 0.5 | 0.3 | 132.3 | 0.3 | 0.5 | -0.2 |
| 1997 | 23.0 | 1.3 | 0.8 | 0.5 | 176.9 | 0.7 | 0.7 | 0.0 |
| 1998 | 22.8 | 1.0 | 0.8 | 0.2 | n.a. | n.a. | n.a. | n.a. |
| SITC-3 (Mineral fuels, lubricants, and related materials) | | | | | | | | |
| 1990 | 65.8 | 6.2 | 6.8 | -0.6 | 284.9 | 4.5 | 5.7 | -1.2 |
| 1993 | 59.3 | 5.0 | 6.1 | -1.1 | 233.7 | 2.7 | 4.7 | -2.0 |
| 1997 | 83.7 | 8.9 | 8.7 | 0.2 | 339.2 | 2.7 | 6.8 | -4.0 |
| 1998 | 62.2 | 5.5 | 6.4 | -0.9 | n.a. | n.a. | n.a. | n.a. |
| SITC-4 (Animal and vegetable oils, fats and waxes) | | | | | | | | |
| 1990 | 0.8 | 0.0 | 0.0 | 0.0 | 12.1 | 0.0 | 0.0 | -0.0 |
| 1993 | 1.2 | 0.0 | 0.0 | 0.0 | 13.9 | 0.0 | 0.0 | 0.0 |
| 1997 | 1.7 | 0.0 | 0.0 | 0.0 | 23.7 | 0.0 | 0.0 | 0.0 |
| 1998 | 1.6 | 0.0 | 0.0 | 0.0 | n.a. | n.a. | n.a. | n.a. |
| SITC-5 (Chemicals and related products, n.e.c.) | | | | | | | | |
| 1990 | 23.0 | 0.9 | 0.7 | 0.2 | 271.3 | 1.0 | 0.9 | 0.1 |
| 1993 | 32.0 | 1.2 | 1.0 | 0.3 | 317.3 | 1.1 | 1.1 | 0.1 |
| 1997 | 49.8 | 2.0 | 1.5 | 0.5 | 447.7 | 2.4 | 1.5 | 0.8 |
| 1998 | 56.4 | 1.5 | 1.7 | -0.1 | n.a. | n.a. | n.a. | n.a. |

Table 3 continued

| Commodity Category and Year | Total U.S. Imports | Mexico's Actual Exports to the U.S. | Mexico's Exports if Constant Share of U.S. Imports | Change Due to Change in U.S. Share | Total Imports of ROW | Mexico's Actual Exports to ROW | Mexico's Exports to ROW at Constant Share | Change Due to Change in ROW Share |
|---|---|---|---|---|---|---|---|---|
| SITC-6 (Manufactured goods classified chiefly by material) | | | | | | | | |
| 1990 | 65.1 | 2.5 | 2.2 | 0.3 | 496.6 | 0.9 | 1.1 | -0.2 |
| 1993 | 73.6 | 4.5 | 2.5 | 2.0 | 541.6 | 1.2 | 1.2 | -0.0 |
| 1997 | 108.0 | 8.9 | 3.7 | 5.2 | 720.8 | 3.3 | 1.6 | 1.7 |
| 1998 | 117.4 | 7.6 | 4.0 | 3.6 | n.a. | n.a. | n.a. | n.a. |
| SITC-7 (Machinery and transport equipment) | | | | | | | | |
| 1990 | 218.2 | 6.1 | 4.2 | 1.9 | 993.5 | 1.2 | 1.3 | -0.0 |
| 1993 | 281.5 | 23.6 | 5.5 | 18.1 | 1179.6 | 3.5 | 1.5 | 2.0 |
| 1997 | 410.0 | 53.6 | 8.0 | 45.7 | 1731.7 | 8.6 | 2.2 | 6.3 |
| 1998 | 431.6 | 55.0 | 8.4 | 46.6 | n.a. | n.a. | n.a. | n.a. |
| SITC-8 (Miscellaneous manufactured articles) | | | | | | | | |
| 1990 | 83.2 | 0.9 | 0.6 | 0.3 | 350.2 | 0.3 | 0.2 | 0.0 |
| 1993 | 111.4 | 5.7 | 0.8 | 4.9 | 426.7 | 0.5 | 0.3 | 0.2 |
| 1997 | 154.0 | 14.6 | 1.1 | 13.5 | 573.9 | 1.3 | 0.4 | 0.9 |
| 1998 | 169.2 | 15.9 | 1.3 | 14.7 | n.a. | n.a. | n.a. | n.a. |
| SITC-9 (Commodities and transactions n.e.c.) | | | | | | | | |
| 1990 | 12.8 | 0.0 | 0.0 | 0.0 | 99.8 | 0.1 | 0.0 | 0.1 |
| 1993 | 16.0 | 0.0 | 0.0 | 0.0 | 116.1 | 0.1 | 0.0 | 0.1 |
| 1997 | 27.5 | 0.2 | 0.0 | 0.2 | 272.6 | 0.1 | 0.0 | 0.0 |
| 1998 | 39.3 | 4.0 | 0.0 | 4.0 | n.a. | n.a. | n.a. | n.a. |

Sources:

1). For 1987-97: Statistics Canada, World Trade Analyzer.

2). For 1998: USITC, Trade DataWeb.

Notes:

1). Some quantities are reported as "0.0" or "-0.0" due to rounding.

2). Constant shares are calculated as the average of the 1987 and 1988 share.

3). ROW stands for "rest of the world" and excludes Mexico and the U.S.

**4). 1998 numbers should be interpreted with some caution since they come from a different data source.**

Table 4. Tariff Rates, Changes in Share in U.S. Imports from East Asia and Mexico 1992 and l998

| Commodity Category SITC Code and Name | Tariff Rates (%) | | | | Shares of U.S. Imports (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | Mexico | | East Asia | | Mexico | | East Asia | |
| | 1992 | 1998 | 1992 | 1998 | 1992 | 1998 | 1992 | 1998 |
| 76 Telecoms and Sound Recording and Reproducing Equipment | 0.6 | 0.3 | 2.5 | 2.2 | 13.6 | 25.3 | 18.2 | 10.1 |
| 84 Apparel and Clothing Accessories | 1.1 | 0.8 | 5.3 | 4.2 | 3.6 | 12.3 | 32.5 | 17.0 |
| 05 Vegetables and Fruit | 9.2 | 6.5 | 7.8 | 9.1 | 22.0 | 29.5 | 1.5 | 0.6 |
| 78 Road Vehicles | 1.4 | 1.3 | 5.8 | 5.2 | 6.7 | 13.7 | 2.4 | 2.6 |
| 06 Sugars, Sugar Preparations, and Honey | 5.9 | 4.5 | 7.5 | 7.0 | 2.6 | 9.4 | 1.9 | 2.2 |
| 87 Professional, Scientific, Controlling Instruments | 0.7 | 0.6 | 4.0 | 2.8 | 10.6 | 17.3 | 7.7 | 6.7 |
| 11 Beverages | 4.6 | 8.2 | 12.8 | 10.6 | 6.3 | 12.6 | 0.4 | 0.4 |
| 26 Textile Fibers and Their Wastes | 2.1 | 3.1 | 9.8 | 12.4 | 4.9 | 10.0 | 17.7 | 22.5 |
| 71 Power Generating Machinery and Equipment | 0.9 | 1.0 | 2.7 | 2.3 | 8.9 | 13.6 | 2.2 | 2.2 |
| 65 Textile Yarn, Fabrics, Made-Up Articles | 1.6 | 1.5 | 4.4 | 4.9 | 4.4 | 9.0 | 16.5 | 13.8 |
| 74 General Industrial Machinery, Equipment, and Parts | 0.7 | 0.9 | 4.5 | 3.8 | 6.2 | 10.8 | 10.8 | 7.3 |
| 75 Office Machines and Automatic Data Processing Machines | 0.5 | 0.4 | 2.0 | 1.6 | 2.6 | 7.1 | 34.4 | 33.1 |
| 55 Essential Oils, Resinoids, Perfume Materials; Toilet, Polishing, and Cleansing Preparations | 2.8 | 2.9 | 4.9 | 5.1 | 4.1 | 8.1 | 5.1 | 1.7 |
| 81 Prefabricated Buildings; Fixtures and Fittings | 1.5 | 1.2 | 8.0 | 7.0 | 12.0 | 15.7 | 42.0 | 9.9 |
| 67 Iron and Steel | 3.0 | 4.3 | 10.2 | 10.6 | 2.8 | 6.3 | 7.7 | 8.2 |
| 82 Furniture and Parts Thereof | 0.8 | 0.8 | 9.9 | 8.9 | 13.4 | 16.5 | 24.5 | 8.6 |
| 77 Electrical Machinery, Appliances, Parts | 0.6 | 0.4 | 2.4 | 1.6 | 13.7 | 16.9 | 20.1 | 20.5 |
| 62 Rubber Manufactures | 1.4 | 1.7 | 7.1 | 7.0 | 1.8 | 4.9 | 12.7 | 10.0 |
| **AVERAGE, ALL 2-DIGIT COMMODITIES** | **2.0** | **1.4** | **4.1** | **3.2** | **6.5** | **10.2** | **11.7** | **9.4** |

Source: USITC, Trade DataWeb.

Notes:

l). Tariff rates are calculated as the actual import charges divided by the customs value of imports.

2). East Asia = Hong Kong, South Korea, Singapore, Taiwan.

Table 5. Gravity Equation Estimates

| Variable | Coef. | t-stat. |
|---|---|---|
| C | -43.57 | -41.16 |
| | | |
| D87 | -0.04 | -0.58 |
| D91 | -0.15 | -2.35 |
| D93 | -0.14 | -2.00 |
| D95 | -0.22 | -3.06 |
| D97 | -0.22 | -2.79 |
| | | |
| GDP(I) | 0.97 | 70.32 |
| GDP(J) | 0.89 | 106.86 |
| GDPPC(I) | 0.41 | 24.58 |
| GDPPC(J) | 0.25 | 21.77 |
| | | |
| DIST(I,J) | -0.95 | -49.05 |
| REMOTE(I) | 1.03 | 13.55 |
| REMOTE(J) | 0.90 | 10.23 |
| CONTIG(I,J) | 0.14 | 2.56 |
| SL(I,J) | 0.73 | 20.89 |

| Variable | Coef. | t-stat. |
|---|---|---|
| Both in NAFTA | 0.11 | 0.33 |
| Both in NAFTA*Trend | 0.03 | 0.55 |
| Importer in NAFTA | -0.61 | -6.33 |
| Importer in NAFTA*Trend | 0.00 | 0.15 |
| | | |
| Both in EU | 0.07 | 1.08 |
| Both in EU*Trend | -0.02 | -1.50 |
| Importer in EU | 0.21 | 3.15 |
| Importer in EU*Trend | -0.02 | -1.95 |
| | | |
| Both in MERCOSUR | -0.19 | -0.85 |
| Both in MERCOSUR*Trend | 0.01 | 0.31 |
| Importer in MERCOSUR | -1.01 | -10.62 |
| Importer in MERCOSUR*Trend | 0.04 | 2.59 |
| | | |
| Both in ASEAN | 1.00 | 5.52 |
| Both in ASEAN*Trend | 0.00 | 0.08 |
| Importer in ASEAN | 0.25 | 3.48 |
| Importer in ASEAN*Trend | 0.01 | 0.78 |
| | | |
| Both in Andean Group | 0.40 | 2.23 |
| Both in Andean Group*Trend | 0.08 | 2.59 |
| Importer in Andean Group | -0.44 | -5.28 |
| Importer in Andean Group*Trend | 0.00 | 0.22 |
| | | |
| Both in CER | 0.50 | 1.95 |
| Both in CER*Trend | 0.05 | 1.18 |
| Importer in CER | 0.11 | 0.77 |
| Importer in CER*Trend | -0.08 | -4.14 |
| | | |
| Importer in NAFTA, Exporter in East Asia | 0.78 | 4.03 |
| Importer in NAFTA, Exporter in East Asia*Trend | -0.04 | -1.17 |

Method: OLS with time fixed effects, using White heteroscedasticity-consistent standard errors and covariance, with a correction for first-order autocorrelation in the disturbances.
Number of observations: 15484 (2129 observations excluded: dependent variable was zero)

| | | | |
|---|---|---|---|
| Adjusted R-squared: | 0.79 | F-statistic: | 1438.15 |
| S.E. of regression: | 1.29 | Mean dependent variable: | 18.02 |

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