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An Econometric Analysis of Trade Diversion under NAFTA

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Abstract

We provide an econometric analysis of whether or not the tariff preferences extended to Canada and Mexico under NAFTA may have resulted in trade diversion. A review of previous studies, both descriptive and econometric, suggests that trade diversion has occurred especially as evidenced by Mexico's increased shares of U.S. imports apparently at the expense of several Asian countries. We use a conceptual framework based on a partial-equilibrium model of differentiated product industries under monopolistic competition for many countries. The model is implemented empirically using a fixed-effect panel analysis of U.S. imports at the Harmonized System (HS) 2-digit level for the period, 1992-98. Of the 70 sets of regressions that were run, the coefficients of the tariff rates were statistically significant in 15 cases. The strongest evidence of trade diversion was found mainly for U.S. imports of textile and apparel products. We also estimated regressions for selected commodities at the HS 4-digit level. The results suggest trade diversion for textiles, apparel, and some footwear products but not for trade in motor cars and vehicles and television receivers, which may have been more influenced by changes in foreign direct investment and outsourcing rather than tariff preferences.

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An Econometric Analysis of Trade Diversion under NAFTA*

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I. Introduction

Prior to and since the inception of the North American Free Trade Agreement (NAFTA) in January 1994, there has been a great deal of interest in policy and academic circles about the impact that NAFTA might have on the trade and economic welfare of the NAFTA members – Canada, Mexico, and the United States – and nonmembers. In this paper, we investigate the effects of NAFTA on trade diversion at a highly disaggregated level of commodity detail. The rationale for this approach is that the creation of a preferential trading arrangement like NAFTA involves the interplay of the removal of the differential structure of tariffs between member countries and the maintenance of these national tariffs with respect to nonmembers. In addition, we know that rules of origin were designed to provide special preferences for selected sectors in the NAFTA to the possible detriment of nonmembers.

We begin in Section II with a brief review of the complexities of distinguishing the effects of NAFTA from the myriad of other forces at work before and following the inception of NAFTA. We also discuss the approaches and conclusions of some pertinent studies of the effects of NAFTA. In Section III, we discuss the conceptual framework that provides the basis for our analysis and, in Section IV, the empirical implementaion of our econometric investigation and a description of the data. Our empirical results are reported in Section V. Conclusions and implications for further research are presented in Section VI.

II. NAFTA in Context and a Review of the Literature

If we were able to do a controlled exper iment, we would want to compare the economic situation before and after NAFTA was created. Unfortunately, in the social sciences, the ability to construct a controlled experiment is typically hampered because other things are happening that will serve to

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confound the design and interpretation of the experiment. Thus, for example, as Krueger (2000, pp. 762-65) has noted, there are a number of difficulties that arise in evaluating the effects of NAFTA. These include: (1) anticipation beginning in 1990 that negotiations would lead to creation of NAFTA; (2) the phasing out of NAFTA tariffs over a 10-15 year time period beginning in 1994; (3) trade liberalization being undertaken elsewhere at the same time that NAFTA was being implemented; (4) continuing responses to Mexico's unilateral trade liberalization initiated in the late 1980s; and (5) the real appreciation of the Mexican peso from 1987-94 and subsequent depreciation in the course of Mexico's financial crisis in late 1994.[1] Given all of the foregoing currents of change, it is by no means an easy matter to isolate the effects of NAFTA. Nonetheless, some efforts have been made that are worthy of attention.

Gould (1998) used a gravity-model approach in determining how NAFTA may have affected the growth of North American trade. The model is estimated in log first differences with aggregated bilateral trade flows on a quarterly basis for 1980 through 1996 and measures of real GDP, GDP price deflators, real exchange rates, and dummy variables to represent changes in the trade regimes during the period involved. His empirical results suggest that, in its first three years: (1) NAFTA may have stimulated the growth of U.S. aggregate exports to Mexico but not U.S. imports from Mexico; (2) U.S. bilateral trade into Canada and Canadian-Mexican trade were not affected by NAFTA; and (3) trade diversion was probably negligible.

Krueger (1999b, 2000) examined the changing patterns of trade flows and noted that the trade relationships among the NAFTA countries intensified considerably in the 1990s. But she did not find much evidence that imports from the rest of the world declined as intra-NAFTA trade increased. Krueger also concluded that tariff differentials for U.S. imports from Mexico and East Asia did not appear to have changed dramatically. Further, she conducted a "shift in share" analysis and found that the increase of Mexico's share in its trade with the United States was not much different than with the rest of the world, reflecting both the impact of Mexico's unilateral liberalization and the peso

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anonymous referees. Funding for the research was provided in part by the Japan Foundation, Center for Global Partnership.

[1] See Lustig (2001) for a review of Mexico's economic performance and policies since 1980.

depreciation after 1994. Finally, on the basis of fitting some gravity equations, she found little evidence that trade patterns had been significantly altered by preferential trading arrangements, although the results did suggest that NAFTA countries imported less than predicted from nonmember countries.[2] On the basis of the foregoing, Krueger concluded that NAFTA was almost certainly trade-creating rather than trade-diverting.[3]

In some earlier work, Krueger (1993, 1999a) called attention to the importance of rules-of-origin (ROO) as protectionist devices in free trade agreements. In this connection, James and Umemoto (1999, 2000) focused attention on the restrictive ROO affecting especially market access in NAFTA for textiles and wearing apparel from East Asia. On the basis of examining changes in market shares prior to and following the implementation of NAFTA, they concluded that there was prima facie evidence of trade diversion. They also examined changes in trade shares of footwear and electrical machinery, which were subject to ROO in the NAFTA, and concluded that there was little evidence of trade diversion in footwear and none in the case of electrical machinery. James and Umemoto present a model of ROO, but they do not implement this model in their empirical analysis of changes in trade shares.

Burfisher, Robinson, and Thierfelder (2001) provide a useful survey of the impact of NAFTA on the United States that covers both macroeconomic issues and structural adjustments. They point out the fallacies in much of the macroeconomic discussion related to NAFTA involving the effects on

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[2] For more comprehensive studies of preferential trading arrangements using a gravity-model approach, see Soloaga and Winters (2001) and Wall (2002). Solaga and Winters find no evidence of trade diversion from NAFTA. However, Wall (p. 31) finds that: "… because of the North American bloc, total Japanese exports and imports were, respectively, 5.4 percent and 9.2 percent lower, implying a 7 percent decrease in Japanese total trade with the world." Coughlin and Wall (2000) use a gravity-model approach in analyzing how NAFTA has changed the pattern of exports of U.S. states to foreign geographic destinations. See also Karemara and Ojah (1998) for a gravity-model analysis comparing the trade impacts for selected manufactures for the ASEAN members and NAFTA. Their data end in 1993, however, so that they do not capture the trade effects following the inception of NAFTA in 1994.

[3] Agama and McDaniel (2002) estimate aggregate import-demand functions using quarterly data on real exports and imports and U.S. and calculated Mexican tariff rates for 1983-2001. They conclude (p. 3) that: "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 2.4 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."

U.S. labor markets, the balance of trade, aggregate employment effects, and the effects of the peso crisis. With regard to structural adjustments, they focus on agricultural transition, the rationalization of automobile production and parts, and the effects of ROO on textiles and apparel. They note that intra-NAFTA trade in agricultural products has risen, and there is evidence that Mexico has taken steps to liberalize its agricultural policies and to lock in these reforms. Prior to NAFTA, Mexico had significant distortions in its automobile sector, and, with NAFTA, these distortions were phased out. In negotiating NAFTA, it was specified that vehicles should have a 62.5 percent North American content. In response to the phase-out of the Mexican restrictions and implementation of the ROO, Burfisher et al. cite evidence of significant rationalization effects in the production of autos and parts that have benefited the North American auto industry. However, they do not address the question of whether trade diversion has occurred. Finally, with regard to textiles and apparel, Burfisher et al. conclude that there is rather clear evidence of trade diversion especially vis-à-vis East Asia, which corresponds to what James and Umemoto (1999, 2000) found in their research as noted above.

Arndt and Huemer (2001, 2002) provide graphical analyses of the changes in the dollar value of U.S. exports and imports and the shares accounted for by Canada, Mexico, and Japan on a quarterly basis from 1990-I to 2001-II. Since the inception of NAFTA in 1994, Mexico has displaced Japan as the second largest market for U.S. exports while Canada's share of U.S. exports has remained relatively unchanged. What is more striking is that Mexico's share of U.S. imports has risen from around 8 percent in 1994 to 12 percent in 2001, while Japan's share has fallen from about 18 percent to 12 percent in this same period. Arndt and Huemer also depict changes in U.S. imports and import shares at the industry level for motor vehicles, television sets, and textiles and apparel. They show that Mexico apparently increased its share of U.S. imports of automobiles at the expense of Japan, its share of U.S. television imports at the expense of China, Japan, Korea, and Taiwan, and its share of U.S. imports of textiles and apparel at the expense of China and other Asian suppliers. Finally, Arndt and Huemer provide graphical evidence of the importance of foreign outsourcing from the United States to Mexico especially and to Canada for motor vehicles, television sets, and textiles and apparel. While this outsourcing predates NAFTA, they show that there has been a significant increase in U.S.

exports of components to and imports of end products from its NAFTA partners since 1994. Arndt and Huemer conclude accordingly that NAFTA has had a significant impact on intra-North American trade through the combination of discriminatory tariff reductions resulting in trade diversion and through increased outsourcing that reflects the reorganization and relocation of production and the exchange of component inputs and end products.

By far the most ambitious and comprehensive study of the trade effects of NAFTA is Romalis (2001), which came to our attention after we had completed our own study. Setting out a conceptual framework, Romalis develops reduced-form equations in which the shares of U.S. imports of commodities sourced from Canada or Mexico depend on the tariff preferences under NAFTA extended to the two countries. He makes allowance for the time varying effects of tariff preferences by interacting the preferences present in 2000 with annual time dummies. He also introduces control measures for commodity and industry characteristics. Working at the 8-digit Harmonized System (HS) level, he tracks U.S. bilateral trade with Canada and Mexico for 6,874 commodities annually from 1989 to 2000 and constructs the preferential tariff rates that apply to these commodities. Based on his regression results, he finds that NAFTA has had a significant effect on U.S. imports from Canada and especially from Mexico. Further, he finds no statistical evidence of trade creation in analyzing the growth of U.S. imports of the commodities covered. Romalis concludes therefore that NAFTA has been primarily trade diverting.

We turn now to our own research, which, as mentioned, will focus on a disaggregated level for selected manufactured goods, using a version of the gravity model that may serve to identify the presence or absence of trade diversion as the consequence of NAFTA. Our work is related to what James and Umemoto and Arndt and Huemer have done descriptively in analyzing intra-NAFTA trade and is in the same spirit as Romalis insofar as we use an explicit theoretical model and econometric analysis to try to identify the forces at work that have affected NAFTA's trade.

III. Conceptual Framework

In order to illustrate the effects of NAFTA, we focus on how it may have affected the shares of member and non-member countries in U.S. imports at a detailed commodity level. For this purpose,

we have developed a partial-equilibrium trade model of differentiated-product industries under monopolistic competition with *N* countries. The model is patterned after earlier work along these lines by Helpman and Krugman (1985), Markusen (1986), and Bergstrand (1989). The technical details of the model can be found in Fukao, Okubo, and Stern (2003).[4]

According to the model, with product differentiation, the percentage of imports from country *n* in U.S. total imports of industry *z* products depends on the relative import price (including tariffs) of country *n*'s products in U.S. total imports of industry *z* products and the variety of products supplied by industry *z* in country *n*. In the model, the relative import price of country *n*'s product in U.S. total imports is mainly determined by U.S. trade barriers against country *n*, country *n*'s relative wage rate, and cost of transportation from country *n*. Because of the free-entry assumption, the variety of industry *z* products supplied by country *n* is endogenously determined by the zero-profit condition. Country *n*'s variety of industry *z* products is a decreasing function of this country's relative wage rate and other countries' trade barriers against this country. It is also an increasing function of this country's endowment of the industry *z* specific factor, which we assume to be constant over time.

In the model, the creation of NAFTA will reduce U.S. imports from non-member countries through the following two mechanisms. First, it will increase the relative import price (including tariff) of the non-member countries' product in U.S. total imports in comparison with the import price of member countries. Second, it will reduce the variety of industry *z* products supplied by non-member countries. The magnitude of the second effect will be greater if the United States is an important destination of non-member countries' exports. Therefore, the percentage of imports from country *n* in U.S. total imports depends on the relative U.S. tariff rate on country *n*'s products and the

[4] We had planned initially to develop a structural model that would take into account the demand and supply conditions in both NAFTA member and nonmember countries. This would have enabled us to distinguish more directly the changes in trade creation and diversion and to assess the welfare effects involved. However, because of resource and data constraints, we decided to use a partial-equilibrium modeling approach and to focus on changes in the shares of Mexico and Canada and other U.S. partner countries in U.S. imports. As will be noted below, our approach abstracts from the possible changes in market shares due to shifts in foreign direct investment and outsourcing by U.S. multinationals induced by NAFTA. In addition, it may be important to determine the extent to which imports into the United States from Mexico and Canada may have displaced U.S. production. But this lies outside our model as well.

product of the relative U.S. tariff rate on country *n*'s products and the percentage of exports of the commodity from country *n* to the United States in the total exports of this country.

As indicated in Fukao, Okubo and Stern (2003), the conceptual basis for our empirical analysis is given by equation (1):

$$(1)\quad \ln(s_{z,n,1}(t)) = l_{z,n} - l_{z,1}\left(\ln(w_n(t)) - \sum_{i=2}^{N} s_{z,i,1}{}^{0} \ln(w_i(t))\right) - l_{z,2}\left(\ln(T_{n,1}(t)) - \sum_{i=2}^{N} s_{z,i,1}{}^{0} \ln(T_{z,i,1}(t))\right) + l_{z,3} v_{z,n,1}{}^{0}\left(\ln(T_{n,1}(t)) - \sum_{i=2}^{N} s_{z,i,1}{}^{0} \ln(T_{z,i,1}(t))\right) + e_{z,n}(t)$$

where $s_{z,n,1}$, w_n, and $T_{z,n,1}$ denote the percentage of imports from country *n* in U.S. total imports of industry *z* products, country *n*'s wage rate, and one plus the tariff and tariff equivalent of non-tariff barriers of U.S. imports used in the output by industry *z* in country *n*. $v_{z,n,1}$ is the percentage of exports of industry *z* in country *n*. $l_{z,n}$ depends on country-specific factors such as distance from the United States and each country's endowment of industry-specific production factors $e_{z,n}(t)$ is the usual error term. The three elasticity values, $\lambda_{z,1}$, $\lambda_{z,2}$, and $\lambda_{z,1}$, are positive. Using panel data, we can estimate the above equation as a fixed-effect model.

IV. Empirical Implementation

As stated, our objective is to evaluate the trade-diversion effects from the creation of NAFTA in the U.S. import market on the basis of equation (1). For this purpose, we use a fixed-effect panel analysis for manufactured commodities at the Harmonized System (HS) 2-digit level from 1992 to 1998. Data for 1998 were the latest comprehensive data available at the time of writing. Our regressions cover the entire spectrum of U.S. manufactured goods imports, HS 30 to HS 99, for the domain of U.S. trading partners.

From our theoretical analysis, we derived the following equation for regression analysis:

$$(2)\quad \ln(s_{z,n}(t)) = a_0 + a_{z,1}\ln(w_n(t)) + a_{z,2}\ln(T_n(t))$$

$$+ a_{z,3} v_{z,n}{}^{0} \ln(T_n(t)) + \sum_n a_{z,n,4} COUNTRYDUM_{z,n} + \sum_t a_{z,t,5} TIMEDUM_{z,t}(t) + e_{z,n}(t)$$

The dependent variable is the natural logarithm of each country's import share in the U.S. market for each commodity in each year.[5] On the right-hand side, the first independent variable is the natural logarithm of wage rates in each year in each exporting country. We approximated each exporting country's wage rates by its GDP per capita in U.S. dollars. The second independent variable is the natural logarithm of one plus U.S. tariff rates against each exporting country. The third independent variable is the product of the percentage of exports of the commodity from each country to the United States in total exports of this country in 1991 and the natural logarithm of one plus tariff rates toward each export.[6] According to our theoretical model, we expect negative signs for the coefficients of these three variables.[7] In order to control for country-specific factors that are not included in the independent variables, such as distance from the United States and each country's endowment of industry-specific production factors, we use country dummies. The time dummies stand for macro shocks such as changes in average U.S. tariff rates against all the countries and changes in world GDP.

The import shares are calculated from the HS 2-digit import data in U.S. Census Bureau, *U.S. Imports of Merchandise on CD-ROM* and *U.S. Imports History on CD-ROM*. GDP per capita data are from the *World Development Indicators on CD-ROM 2000* (World Bank). Percentages of each country's exports of each commodity to the United States in total exports of this country are taken from Statistics Canada, *World Trade Analyzer*. Data on bilateral tariff rates are taken from the

[5] When one country's import share is zero, we treated it as a missing observation. Therefore our data are an unbalanced panel. If there were some variables that strongly affect the chances for observation (non-zero imports) but not the outcome under study, it would be more appropriate to take account of the sample-selection process by estimating a selection model, such as Heckman (1979). But in our case, there seems to be no such variable. So we did not take account of sample-selection bias. For more detail on this issue, see Manning, Duan, and Rogers (1987).

[6] In addition, we considered U.S. NTBs. We used frequency measures of U.S. NTBs in 1993 at the HS 4-digit level, obtained from OECD, *Indicators of Tariffs and Non-Tariff Trade Barriers 1997*. We assumed that U.S. NTBs against all the countries were identical and constant until 1993, and that the NTBs against Canada and Mexico became zero after 1994. Therefore, our NTB variables were almost identical with the NAFTA dummy variables. As a consequence, we do not report below the results using the NTB measures.

[7] The question arises as to whether using import shares as the dependent variable is the best way of getting at trade diversion. That is, changes in import shares may be influenced by a variety of structural factors on both the supply and demand sides that, as noted above, are not being taken into account in the model.

TRAINS dataset of UNCTAD.[8] The data at the 2-digit level are compiled by taking a weighted average of 6-digit HS tariff rates, using U.S. import shares of each 6-digit HS commodity in 1991 as weights.

As we will report in the next section, $a_{z,3}$, the estimated coefficients of the product of the percentage of exports of the commodity from each country to the United States in total exports of this country in 1991 and the natural logarithm of one plus tariff rates toward each export are not significant and do not have the expected negative sign in many commodities. Because of this we have also estimated the following equation, which does not include this variable:

$$(3)\qquad \ln(s_{z,n,1}(t)) = a_0 + a_{z,1}\ln(w_n(t)) + a_{z,2}\ln(T_{n,1}(t)) + \sum_n a_{z,n,4}COUNTRYDUM_{z,n} + \sum_t a_{z,t,5}TIMEDUM_{z,t}(t) + e_{z,n}(t)$$

Both reductions in tariff rates among NAFTA countries and removal of NTBs might have trade-diversion effects. In order to check this, we replaced the tariff variables with a NAFTA dummy in equation (4) below. The NAFTA dummy takes value one for Canada and Mexico after the creation of NAFTA in 1994. In order to take account of the fact that NAFTA trade barriers are phased out gradually over time, we also used a lagged NAFTA dummy in equation (5), which takes value one for Canada and Mexico after 1995:

$$(4)\qquad \ln(s_{z,n}(t)) = a_0 + a_{z,1}\ln(w_n(t)) + a_{z,2}NAFTADUM_n(t) + \sum_n a_{z,n,4}COUNTRYDUM_{z,n} + \sum_t a_{z,t,5}TIMEDUM_{z,t}(t) + e_{z,n}(t)$$

$$(5)\qquad \ln(s_{z,n}(t)) = a_0 + a_{z,1}\ln(w_n(t)) + a_{z,2}LAGGEDNAFTADUM_n(t) + \sum_n a_{z,n,4}COUNTRYDUM_{z,n} + \sum_t a_{z,t,5}TIMEDUM_{z,t}(t) + e_{z,n}(t)$$

We expect positive signs for coefficients of the NAFTA dummy and the lagged NAFTA dummy.

The above equations (2)—(5) were estimated by OLS with fixed effects with a correction for first-order autocorrelation in the disturbances. It should be noted that there is a

[8] Data on tariff rates are available at 6-digit HS for 1993, 1994, 1996, and 1998. We have used 1993 tariff rates for 1992. Tariff rates for 1995 and 1997 are calculated as the average of 1994 and 1996 and 1996 and 1998, respectively.

possibility that industries defined by HS 2-digit codes might be too broad and include too many commodities with different characteristics. To take this into account, we have also estimated the above equations for selected industries at the HS 4-digit level from 1992 to 1998.

V. Empirical Results

As mentioned above, we estimated regression equations for the HS 2-digit U.S. imports of manufactured goods for the period, 1992-98. There were 60 sets of regressions that were run. It turned out that the coefficients of the tariff rates were statistically significant in 15 of the 60 cases. The results for these 15 cases are reported in boldface in table 1.[9]

For the 15 commodities noted in table 1, the coefficients of tariff rates were negative and significant at the 5% level in either equation (2) or (3). In most cases, these coefficients were generally greater than 20. When this coefficient takes a value 20, it means that a 5% reduction of U.S. tariff rates on imports from one country will double that country's share in U.S. total imports. Therefore, our results suggest that tariff rates have significant effects on U.S. trade in the case of these commodities.

We should note that for a substantial number of commodities, such as pharmaceutical products and electric machinery, U.S. tariff rates on imports from Canada and Mexico were negligible even before 1994. In these cases, we cannot argue that NAFTA had a significant trade-diversion effect. Table 2 shows U.S. tariff rates on imports of the fifteen commodities from Canada and Mexico in 1993 and 1996. For six of the fifteen categories, indicated in boldface, U.S. tariff rates on imports from either Canada or Mexico were greater than 2.5% in 1993. Probably we can infer relatively large trade-diversion effects in these uses.

[9] The estimated coefficients of GDP, country dummies, and time dummies are not reported because of space limitations but are available from the authors on request. The coefficients of the NAFTA dummies and lagged NAFTA dummies were either insignificant or had unexpected signs in most cases. Only in the cases of HS 43 (Furskins), HS 50 (Silk), and HS 60 (Knitted or Crocheted Fabrics) were the lagged NAFTA dummies positive and significant at the 5% level.

To clarify matters in more detail, figure 1 shows U.S. tariff rates on imports from Canada, Mexico, and the rest of the world and the two NAFTA country shares in U.S. imports for each of these 6 commodities. It would appear that for textiles and apparel products, which include HS 51 Wool & Animal Hair, including Yarn & Woven Fabric, HS 52 Cotton, including Yarn and Woven Fabric Thereof, HS 60 Knitted or Crocheted Fabrics, and HS 62 Apparel Articles and Accessories, Not Knit etc., U.S. tariff rates towards Canada and Mexico were reduced considerably after 1994. On the other hand, U.S. tariff rates towards the non-NAFTA countries remained relatively high during the period. Reflecting these discriminatory tariff cuts, the shares of Canada and Mexico in U.S. imports increased substantially. For the other two commodity categories, HS 46 Mfr of Straw and HS 79 Zinc, although U.S. tariff rates towards Canada and Mexico were reduced after 1994, the tariff rates towards the non-NAFTA countries were also reduced. We do not observe therefore substantial increases in the Canadian or Mexican shares in U.S. imports in these two cases. We conclude therefore, based on figure 1 and our regression results in table 1, that the creation of NAFTA had significant trade-diversion effects on U.S. imports mainly in the cases of textile and apparel products.

As already mentioned, it is possible that commodities defined by HS 2-digit codes might be too broad and include too many commodities with different characteristics to permit rigorous analysis. To take this into account, we have also estimated our equations for selected commodities at the HS 4-digit level from 1992 to 1998. The commodities have been selected following James and Umemoto (1999, 2000), who focused on such labor-intensive goods as textiles, apparel, leather products and footwear, and electronic products. We also included motor cars and vehicles since these were subject to a rule of origin as noted earlier. The specific 4-digit commodities that we selected are as follows:

HS 4202 Travel Goods, Handbags, Wallets, Jewelry Cases, Etc.
HS 6002 Knitted or Crocheted Fabrics, NES
HS 6109 T-Shirts, Singlets, Tank Tops, Etc., Knit or Crochet
HS 6115 Pantyhose, Socks & Other Hosiery, Knit or Crochet
HS 6401 Waterproof Footwear, Rubber or Plastic, Bond Sole
HS 8529 TV Receivers, Incl. Video Monitors & Projectors
HS 8703 Motor Cars & Vehicles for Transporting Persons

In order to take account of the fact that NAFTA tariffs are being phased out gradually over time, we also used a lagged NAFTA dummy, which takes the value one for Canada and Mexico after

1995. In the case of automobile trade, the United States had already liberalized its imports from Canada prior to NAFTA. To take account of this, we used a Mexico dummy, which takes the value one for Mexico after 1994 for regressions for "motor cars and vehicles."

Before evaluating the regression results, we provide in figures 2 and 3 an overview of U.S. tariff rates and imports from NAFTA and non-NAFTA countries for the seven commodities defined by the HS 4-digit codes that we have selected. For almost all commodities, Canada and Mexico received substantial tariff margins of preference after NAFTA, and it can be seen that NAFTA tariffs were phased out gradually over time. We should further note that tariff rates were very low in the cases of "TV receivers" and "motor cars." It appears from figure 2 that, in the cases of apparel, such as "T-shirts" and "socks," and "TV receivers" and "motor vehicles," Mexico increased its share in U.S. imports more substantially than Canada. Canada gained more in "travel goods" and "waterproof footwear."

The regression results are reported in detail in table 3 and summarized in table 4. It is evident that both tariff rates and the NAFTA dummies are significant in general. For "travel goods" and "motor cars," neither variable is significant.[10] For "socks," only the NAFTA dummy is significant. For "TV receivers," only tariff rates are significant. For many commodities, GDP per capita is insignificant or has an unexpected positive sign.

It thus appears from these more disaggregated results that NAFTA has resulted in significant trade diversion especially in textiles, apparel, and some footwear products. Since U.S. tariff rates were relatively low in the cases of "TV receivers" and "motor cars," and since it may be the case that foreign direct investment and outsourcing are important in these industries, the changes in import shares noted may reflect these determinants, which lie outside the focus of our model.

VI. Conclusions and Implications for Further Research

In this paper, we have developed and implemented a framework for analyzing how tariff preferences in the NAFTA may affect U.S. imports from Canada and Mexico. Based on trade and tariff

[10] Probably, we obtained insignificant results in the case of "travel goods" because this category covers too many different types of commodities.

information at the 2-digit and 4-digit levels of the Harmonized System, our econometric analysis has suggested that NAFTA has resulted in trade diversion especially in U.S. imports of textiles and apparel products from Mexico. Evidence based on other studies suggests that these imports have come at the expense especially of Asian suppliers.

Our research and some of the other studies that we have noted demonstrate the importance of commodity disaggregation in analyzing the effects of preferential trading arrangements as well as the need to consider how foreign direct investment and outsourcing may have interacted with tariff preferences in influencing patterns of trade and specialization in the NAFTA and non-NAFTA countries.

References

Arndt, Sven and Alex Huemer. 2001, 2001. "North American Trade After NAFTA: Part I, Part II, and Part III," *Claremont Policy Briefs*, Issue No. 01-01, 01-02, and 02-01. Claremont Graduate University.

Agama, Laurie-Ann and Christine A. McDaniel. 2002. "The NAFTA Preference and U.S.-Mexico Trade," in process (October).

Bergstrand, Jeffrey H. 1989. "The Generalized Gravity Equation, Monopolistic Competition, and the Factor Proportions Theory of International Trade," *Review of Economics and Statistics* 71:143-53.

Burfisher, Mary E., Sherman Robinson, and Karen Thierfelder. 2001. "The Impact of NAFTA on the United States," *Journal of Economic Perspectives* 15:125-44.

Coughlin, Cletus C. and Howard J. Wall. 2000. "NAFTA and the Changing Pattern of State Exports," Working Paper 2000-029, Research Division, Federal Reserve Bank of St. Louis (October).

Fukao, Kyoji, Toshihiro Okubo, and Robert M. Stern. 2003. "Trade Diversion under NAFTA," in Robert M. Stern (ed.), *Japan's Economic Recovery: Commercial Policy, Monetary Policy, and Corporate Governance*. Cheltenham, U.K.: Edward Elgar Publishing, Ltd.

Gould, David M. 1998. "Has NAFTA Changed North American Trade?" Federal Reserve Bank of Dallas, *Economic Review*, First Quarter, pp. 12-23.

Heckman, James. 1979. "Sample Bias as a Specification Error," *Econometrica* 47:153-62.

Helpman, Elhanan and Paul Krugman. 1985. *Market Structure and Foreign Trade*. Cambridge: MIT Press.

James, William E. and Masaru Umemoto. 1999. "Rules of Origin and the Competitive Position of Asian Textiles and Apparel Producers in the North American Market," ICSEAD Working Paper Series, Vol. 99-1 (January).

James, William E. and Masaru Umemoto. 2000. "NAFTA Trade with East Asia: Rules of Origin and Market Access in Textiles, Apparel, Footwear, and Electrical Machinery," *ASEAN Economic Bulletin* 17:293-309.

Karemara, David and Kalu Ojah. 1998. "An Industrial Analysis of Trade Creation and Diversion Effects of NAFTA," *Journal of Economic Integration* 13:400-25.

Krueger, Anne O. 1993. "Free Trade Agreements as Protectionist Devices: Rules of Origin," National Bureau of Economic Research, Working Paper 4342.

Krueger, Anne O. 1999a. "Are Preferential Trading Agreements Trade-Liberalizing or Protectionist?" *Journal of Economic Perspectives* 13:105-24.

Krueger, Anne O. 1999b. "Trade Creation and Trade Diversion under NAFTA," National Bureau of Economic Research, Working Paper 7429 (December).

Krueger, Anne O. 2000. "NAFTA's Effects: A Preliminary Assessment," *The World Economy* 23:761-75.

Lustig, Nora. 2001. "Life is not Easy: Mexico's Quest for Stability and Growth," *Journal of Economic Perspectives* 15:85-106.

Manning, W. G., N. Duan, and W. H. Rogers. 1987. "Monte Carlo Evidence on the Choice Between Sample Selection and Two-Part Models," *Journal of Econometrics* 35:59-82.

Markusen, James. 1986. "Explaining the Volume of Trade: An Eclectic Approach," *American Economic Review* 76:1002-11.

Romalis, John. 2001. "NAFTA's Impact on North American Trade," in process.

Soloaga, Isidro and L. Alan Winters. 2001. "Regionalism in the Nineties: What Effect on Trade?" *North American Journal of Economics and Finance* 121:1-29.

Wall, Howard J. 2002. "Has Japan Been Left Out in the Cold by Regional Integration?" Federal Reserve Bank of St. Louis, *Review* 84: 25-36.

Table 1. Regression Results: All the HS 2-Digit Manufactured Commodities

		Equation 2			Equation 3		Equation 4		Equation 5	
HS Code	Definition	Tariff	Share Tariff	No. of Obs	Tariff	No. of Obs	Nafta Dummy	No. of Obs	Lagged Nafta Dum.	No. of Obs
		t-value	t-value	F-value	t-value	F-value	t-value	F-value	t-value	F-value
30	**Pharmaceutical Products**	**-35.43**	**-31.68**	**366**	**-17.57**	**538**	**0.37**	**632**	**0.46**	**632**
		(-3.13)	**(-0.39)**	**2.25**	**(-1.78)**	**1.11**	**(0.44)**	**1.51**	**(0.61)**	**1.53**
31	Fertilizers						0.58	599	0.37	599
							(0.70)	0.79	(0.49)	0.76
32	Tanning & Dye Ext etc;	23.49	-149.775	428	7.47	614	0.12	634	0.20	634
	Dye, Paint, Putty etc; Inks	(2.74)	(-3.69)	2.95	(1.06)	1.16	(0.16)	0.88	(0.30)	0.88
33	Essential Oils etc;	-4.94	3.53	486	5.61	718	0.55	741	0.59	741
	Perfumery, Cosmetic etc Preps	(-0.61)	(0.11)	0.75	(0.74)	0.91	(0..81)	1.17	(0.96)	1.20
34	Soap etc; Waxes, Polish etc;	45.30	24.08	465	18.07	647	0.20	667	0.33	667
	Candles; Dental Preps	(4.33)	(0.47)	3.71	(2.42)	1.22	(0.27)	0.76	(0.48)	0.78
35	Albuminoidal Subst; Modified Starch;	-20.49	206.70	319	3.76	632	0.33	650	0.28	650
	Glue; Enzymes	(-1.15)	(2.06)	0.66	(0.31)	1.28	(0.50)	1.29	(0.47)	1.29
36	Explosives; Pyrotechnics;									
	Matches; Pyro Alloys etc									
37	**Photographic or Cinematographic Goods**	**-38.10**	**-466.37**	**306**	**-16.57**	**537**	**-0.07**	**588**	**0.02**	**588**
		(-2.23)	**(-2.14)**	**3.45**	**(-1.68)**	**1.52**	**(-0.09)**	**0.85**	**(0.03)**	**0.85**
38	Miscellaneous Chemical Products	-6.64	22.42	338	-11.26	580	-0.38	596	-0.37	596
		(-0.34)	(0.20)	1.49	(-0.86)	2.68	(-0.56)	2.24	(-0.60)	2.25
39	Plastics and Articles Thereof	-2.60	-121.99	576	-7.31	790	0.28	791	0.35	791
		(-0.20)	(-1.46)	1.52	(-1.22)	0.99	(0.38)	0.81	(0.52)	0.83
40	Rubber and Articles Thereof	-4.74	30.82	479	-1.62	698	0.41	716	0.44	716
		(-0.32)	(0.48)	2.99	(-0.14)	2.86	(0.53)	2.89	(0.62)	2.90
41	Raw Hides and Skins	26.47	-67.98	488	0.59	702	0.52	722	0.49	722
	(No Furskins) and Leather	(1.61)	(-0.24)	1.71	(0.05)	2.19	(0.59)	2.16	(0.61)	2.16
42	Leather Art; Saddlery etc;	-1.84	5.31	628	12.42	781	0.41	782	0.42	782
	Handbags etc; Gut Art	(-0.10)	(0.14)	0.98	(1.27)	0.81	(0.54)	0.63	(0.60)	0.64
43	Furskins and Artificial Fur;	-7.96		677			1.43	695	1.46	695
	Manufactures Thereof	(-1.02)		2.05			(1.84)	1.94	(2.06)	2.05
44	**Wood and Articles of Wood;**	**-69.71**	**181.05**	**636**	**-43.89**	**814**	**-0.27**	**834**	**-0.20**	**834**
	Wood Charcoal	**(-3.93)**	**(1.22)**	**4.03**	**(-2.93)**	**2.92**	**(-0.46)**	**1.97**	**(-0.37)**	**1.96**
45	**Cork and Articles of Cork**	**-183.42**	**254.84**	**139**	**-11.17**	**680**	**-0.10**	**755**	**-0.02**	**755**
		(-4.50)	**(0.90)**	**3.62**	**(-0.75)**	**0.26**	**(-0.14)**	**0.46**	**(-0.03)**	**0.46**
46	**Mfr of Straw, Esparto etc.;**	**-17.07**	**82.79**	**351**	**-3.48**	**668**	**-0.36**	**670**	**-0.29**	**670**
	Basketware & Wickerwrk	**(-1.98)**	**(3.26)**	**2.09**	**(-0.65)**	**1.72**	**(-0.56)**	**1.70**	**(-0.50)**	**1.69**
47	Wood Pulp etc;						-0.03	656	0.10	656
	Recovd (Waste & Scrap) Ppr & Pprbd						(-0.04)	1.24	(0.14)	1.24
48	Paper & Paperboard & Articles	-65.11	562.94	484	-0.83	634	0.28	707	0.40	707
	(Inc Papr Pulp Artl)	(-1.36)	(0.88)	0.67	(-0.03)	0.86	(0.44)	0.99	(0.68)	1.02
49	**Printed Books, Newspapers etc;**	**-330.47**	**156.36**	**483**	**-203.63**	**721**	**0.13**	**789**	**0.17**	**789**
	Manuscripts etc	**(-3.72)**	**(0.40)**	**2.66**	**(-3.35)**	**2.25**	**(0.22)**	**0.85**	**(0.30)**	**0.86**

		Equation 2			Equation 3		Equation 4		Equation 5	
HS Code	Definition	Tariff t-value	Share Tariff t-value	No. of Obs F-value	Tariff t-value	No. of Obs F-value	Nafta Dummy t-value	No. of Obs F-value	Lagged Nafta Dum. t-value	No. of Obs F-value
50	Silk, including Yarns and Woven Fabric Thereof	8.29 (0.76)	-64.12 (-1.27)	292 1.61	-5.56 (-0.82)	635 0.93	2.09 (2.39)	648 1.61	1.63 (2.16)	648 1.48
51	**Wool & Animal Hair, including Yarn & Woven Fabric**	**-91.60 (-3.73)**	**43.55 (3.21)**	**358 2.79**	**-10.06 (-1.36)**	**663 1.44**	**0.53 (0.74)**	**664 1.28**	**0.64 (0.98)**	**664 1.33**
52	**Cotton, including Yarn and Woven Fabric Thereof**	**-35.17 (-1.10)**	**46.93 (0.59)**	**502 1.79**	**-31.52 (-2.85)**	**715 2.15**	**0.91 (1.06)**	**716 1.25**	**1.06 (1.36)**	**716 1.34**
53	Veg Text Fib Other; Veg Fib & Paper Yns & Wov Fab									
54	Manmade Filaments, including Yarns & Woven Fabrics	-0.83 (-0.04)	-16.46 (-1.11)	345 1.67	-5.00 (-0.48)	650 1.94	0.12 (0.14)	651 1.92	0.30 (0.38)	651 1.94
55	Manmade Staple Fibers, including Yarns & Woven Fabrics	-36.75 (-0.70)	44.27 (0.59)	448 1.43	-9.26 (-1.19)	638 3.72	0.40 (0.53)	639 3.58	0.48 (0.70)	639 3.60
56	Wadding, Felt etc; SP Yarn; Twine, Ropes etc.	-6.43 (-0.26)	-8.74 (-0.81)	421 0.75	-22.08 (-1.25)	649 1.09	0.07 (0.08)	650 0.90	0.29 (0.39)	650 0.92
57	Carpets and Other Textile Floor Coverings	-86.97 (-1.49)	4.18 (0.15)	266 1.59	-24.90 (-1.24)	687 2.55	0.41 (0.61)	688 2.40	0.48 (0.79)	688 2.43
58	Spec Wov Fabrics; Tufted Fab; Lace; Tapestries etc.	1.09 (0.03)	-23.48 (-0.61)	487 1.05	-8.83 (-0.87)	666 1.40	0.70 (1.00)	667 1.43	0.86 (1.34)	667 1.53
59	Impregnated etc Text Fabrics; Tex Art for Industry	9.57 (0.45)	-22.42 (-0.70)	356 1.02	7.48 (0.52)	603 0.60	0.13 (0.16)	604 0.57	0.22 (0.30)	604 0.57
60	**Knitted or Crocheted Fabrics**	**-89.64 (-3.56)**	**86.33 (2.58)**	**377 4.40**	**-10.49 (-1.24)**	**584 4.44**	**1.17 (1.45)**	**585 4.50**	**1.43 (1.94)**	**585 4.72**
61	Apparel Articles and Accessories, Knit or Crochet	-38.36 (-1.47)	37.05 (1.02)	646 0.81	-5.43 (-0.93)	868 0.91	0.91 (1.19)	869 0.99	0.97 (1.39)	869 1.05
62	**Apparel Articles and Accessories, Not Knit etc.**	**-56.69 (-2.86)**	**65.50 (2.55)**	**678 2.29**	**-8.57 (-1.37)**	**927 6.76**	**0.16 (0.22)**	**928 6.53**	**0.21 (0.31)**	**928 6.54**
63	Textile Art Other; Needlecraft Sets; Worn Text Art	-13.09 (-0.64)	6.20 (0.20)	600 0.59	1.34 (0.13)	813 0.49	0.06 (0.09)	814 0.49	0.11 (0.17)	814 0.49
64	Footwear, Gaiters etc. and Parts Thereor	14.64 (0.46)	-41.46 (-0.90)	448 1.96	-5.56 (-0.71)	737 1.30	0.48 (0.62)	738 1.29	0.50 (0.70)	738 1.31
65	Headgear and Parts Thereof	-17.16 (-0.78)	38.91 (1.08)	523 2.50	-10.51 (-0.98)	737 1.59	0.26 (0.33)	738 1.48	0.28 (0.40)	738 1.49
66	**Umbrellas, Walking-Sticks, Riding-Crops etc. Parts**	**-12.92 (-1.61)**	**45.99 (1.25)**	**376 0.91**	**-12.80 (-2.42)**	**573 1.79**	**0.32 (0.36)**	**637 1.20**	**0.40 (0.50)**	**637 1.22**
67	Prep Feathers, Down etc; Artif Flowers; H Hair Art									
68	Art of Stone, Plaster, Cement, Asbestos, Mica etc.	4.04 (0.44)	-19.57 (-0.18)	469 1.44	-13.01 (-1.85)	665 2.61	0.37 (0.59)	681 2.31	0.40 (0.70)	681 2.33
69	Ceramic Products	-3.81 (-0.66)	8.85 (0.75)	426 1.30	-6.00 (-1.49)	699 0.74	0.44 (0.70)	720 0.53	0.46 (0.80)	720 0.55

		Equation 2			Equation 3		Equation 4		Equation 5	
HS Code	Definition	Tariff t-value	Share Tariff t-value	No. of Obs F-value	Tariff t-value	No. of Obs F-value	Nafta Dummy t-value	No. of Obs F-value	Lagged Nafta Dum. t-value	No. of Obs F-value
70	Glass and Glassware	1.36 (0.10)	-4.56 (-0.12)	477 0.63	-4.47 (-0.72)	686 0.63	0.16 (0.25)	687 0.57	0.18 (0.30)	687 0.58
71	Nat etc Pearls, Prec etc Stones, PR Met etc; Coin	52.68 (2.96)	-162.21 (-3.59)	598 2.19	18.36 (1.60)	821 1.50	0.23 (0.34)	847 1.40	0.31 (0.51)	847 1.42
72	Iron and Steel	33.58 (2.21)	5.74 (0.13)	487 1.96	21.83 (1.78)	743 2.05	-0.08 (-0.10)	764 1.62	-0.005 (-0.01)	764 1.62
73	Articles of Iron or Steel	-9.48 (-0.75)	9.99 (0.25)	528 1.22	-2.83 (-0.32)	716 1.45	0.27 (0.45)	738 1.36	0.26 (0.47)	738 1.37
74	Copper and Articles Thereof	82.19 (4.28)	-75.60 (-1.56)	480 3.74	15.63 (1.09)	711 1.66	0.37 (0.53)	732 1.57	0.49 (0.79)	732 1.61
75	Nickel and Articles Thereof	199.76 (1.42)	-149.94 (-0.52)	318 1.28	-35.00 (-0.41)	588 0.71	-0.26 (-0.34)	650 0.57	0.01 (0.01)	650 0.56
76	Aluminum and Articles Thereof	13.36 (0.64)	10.93 (0.05)	429 3.45	16.92 (1.21)	678 4.37	-0.47 (-0.67)	700 4.25	-0.33 (-0.51)	700 4.23
77										
78	Lead and Articles Thereof	-26.56 (-1.16)	-76.10 (-0.34)	244 1.08	-5.93 (-0.35)	534 0.98	-0.34 (-0.40)	591 1.46	-0.05 (-0.06)	591 1.44
79	**Zinc and Articles Thereof**	**-64.66** **(-1.96)**	**29.62** **(0.77)**	**256** **1.33**	**-20.09** **(-1.29)**	**568** **1.44**	**-0.14** **(-0.17)**	**586** **1.09**	**-0.07** **(-0.09)**	**586** **1.09**
80	Tin and Articles Thereof									
81	Base Metals Other; Cermets; Articles Thereof	-37.87 (-1.33)	60.31 (0.80)	295 1.25	-21.45 (-1.60)	562 0.93	-0.41 (-0.58)	576 0.67	-0.35 (-0.55)	576 0.67
82	**Tools, Cutlery etc. of** **Base Metal & Parts Thereof**	**-31.37** **(-2.90)**	**-12.65** **(-0.16)**	**434** **1.52**	**-5.26** **(-0.89)**	**640** **0.93**	**0.26** **(0.39)**	**659** **0.86**	**0.20** **(0.33)**	**659** **0.86**
83	Miscellaneous Articles of Base Metal	-15.10 (-1.75)	-25.77 (-0.62)	333 1.84	10.10 (1.48)	649 1.00	0.31 (0.45)	668 0.84	0.38 (0.60)	668 0.87
84	Nuclear Reactors, Boilers, Machinery etc.; Parts	3.74 (0.30)	149.08 (1.25)	648 1.61	-4.95 (-0.52)	863 2.92	0.08 (0.12)	888 2.93	0.17 (0.26)	888 2.94
85	**Electric Machinery etc; Sound Equip;** **TV Equip; Pts**	**-26.60** **(-2.67)**	**218.66** **(1.86)**	**650** **2.69**	**-13.75** **(-1.83)**	**855** **4.06**	**0.02** **(0.02)**	**881** **3.78**	**0.19** **(0.29)**	**881** **3.79**
86	Railway or Tramway Stock etc; Traffic Signal Equip									
87	Vehicles, Except Railway or Tramway, and Parts etc	-1.23 (-0.10)	17.95 (0.60)	502 0.67	8.96 (0.81)	704 2.19	0.52 (0.67)	724 2.68	0.62 (0.87)	724 2.72
88	Aircraft, Spacecraft, and Parts Thereof									
89	Ships, Boats and Floating Structures	-48.10 (-1.03)	-63.96 (-0.34)	299 0.77	-30.43 (-1.19)	498 0.79	0.02 (0.02)	551 0.47	0.26 (0.30)	551 0.49

		Equation 2			Equation 3		Equation 4		Equation 5	
HS Code	Definition	Tariff t-value	Share Tariff t-value	No. of Obs F-value	Tariff t-value	No. of Obs F-value	Nafta Dummy t-value	No. of Obs F-value	Lagged Nafta Dum. t-value	No. of Obs F-value
90	**Optic, Photo etc, Medic or Surgical Instruments etc.**	**-11.46 (-1.76)**	**-2.78 (-0.08)**	**583 1.49**	**-17.36 (-3.67)**	**755 4.28**	**0.14 (0.23)**	**778 2.23**	**0.09 (0.16)**	**778 2.23**
91	Clocks and Watches and Parts Thereof	14.63 (1.50)	13.66 (0.69)	443 0.86	12.03 (1.41)	637 0.77	-0.29 (-0.35)	657 0.78	-0.32 (-0.41)	657 0.79
92	Musical Instruments; Parts and Accessories Thereof	-3.60 (-0.39)	60.43 (0.61)	421 1.06	5.71 (1.04)	640 1.96	-0.11 (-0.16)	659 1.88	0.01 (0.01)	659 1.88
93	Arms and Ammunition; Parts and Accessories Thereof									
94	Furniture; Bedding etc; Lamps Other etc; Prefab BD	-8.53 -1.51	90.87 2.28	589 1.66	0.48 (0.12)	779 0.90	0.18 (0.32)	780 0.92	0.26 (0.51)	780 0.94
95	Toys, Games & Sport Equipment; Parts & Accessories	-7.75 (-1.76)	24.84 (1.16)	436 2.09	-6.46 (-1.82)	749 3.38	0.55 (0.85)	773 2.82	0.56 (0.96)	773 2.85
96	Miscellaneous Manufactured Articles									
97	Works of Art, Collectors' Pieces and Antiques									
98	Special Classification Provisions, Other									
99	Special Import Provisions, Other									

Table 2. U.S. Tariff Rates: Selected HS 2-Digit Commodities (%)

			U.S. Tariff Rates	
HS Code	Definition	Year	On Imports from Canada	On Imports from Mexico
30	Pharmaceutical Products	93	1.53	0.34
		96	0.00	0.00
37	Photographic or Cinematographic Goods	93	0.00	0.00
		96	0.00	0.00
44	Wood and Articles of Wood;	93	0.53	0.26
	Wood Charcoal	96	0.08	0.10
45	Cork and Articles of Cork	93	0.00	0.00
		96	0.00	0.00
46	**Mfr of Straw, Esparto etc.;**	**93**	**0.00**	**3.01**
	Basketware & Wickerwrk	**96**	**0.00**	**0.00**
49	Printed Books, Newspapers etc;	93	0.00	0.00
	Manuscripts etc	96	0.00	0.00
51	**Wool & Animal Hair,**	**93**	**11.03**	**15.75**
	including Yarn & Woven Fabric	**96**	**1.01**	**3.23**
52	**Cotton,**	**93**	**4.57**	**8.98**
	including Yarn and Woven Fabric Thereof	**96**	**0.88**	**2.65**
60	**Knitted or Crocheted Fabrics**	**93**	**6.66**	**13.33**
		96	**1.33**	**4.55**
62	**Apparel Articles and Accessories,**	**93**	**6.70**	**12.93**
	Not Knit etc.	**96**	**1.23**	**3.19**
66	Umbrellas, Walking-Sticks,	93	0.05	0.00
	Riding-Crops etc. Parts	96	0.01	0.00
79	**Zinc and Articles Thereof**	**93**	**2.01**	**2.69**
		96	**0.35**	**0.00**
82	Tools, Cutlery etc. of	93	1.16	0.22
	Base Metal & Parts Thereof	96	0.24	0.04
85	Electric Machinery etc; Sound Equip;	93	0.28	0.56
	TV Equip; Pts	96	0.14	0.05
90	Optic, Photo etc,	93	1.31	0.05
	Medic or Surgical Instrments etc.	96	0.25	0.02

Table 3. Regression Results: Selected HS 4-Digit Commodities

4202 TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC

# of regressions	1	2	3	4	5	6
const	−8.619 [−40.33]**	−9.502 [−84.73]**	−8.583 [−32.73]**	−9.595 [−54.01]**	−9.667 [−73.03]**	−9.668 [−73.13]**
GDP per capita	−0.225 [−0.38]	1.079 [2.01]**	−0.642 [−0.73]	0.87 [1.04]	0.902 [1.08]	0.925 [1.10]
tariff	15.072 [0.85]	10.06 [0.8]	15.263 [0.85]	7.207 [0.57]		
share*tariff	−22.778 [−0.78]		−24.2 [−0.83]			
t1			0.149 [0.67]	0.018 [0.08]	0.035 [0.16]	0.033 [0.15]
t2			0.131 [0.68]	0.097 [0.5]	0.114 [0.59]	0.114 [0.59]
t3			0.037 [0.22]	0.131 [0.76]	0.143 [0.84]	0.151 [0.88]
t4			0.146 [0.87]	0.257 [1.56]	0.263 [1.60]	0.262 [1.59]
t5			0.026 [0.16]	0.028 [0.18]	0.028 [0.17]	0.027 [0.17]
t6			0.032 [0.2]	−0.091 [−0.57]	−0.092 [−0.57]	−0.091 [−0.57]
NAFTA					0.341 [0.50]	
NAFTA(Lag)						0.46 [0.74]
# of obs.	570	733	570	733	733	733
R-squared	0.002	0.009	0.0046	0.019	0.018	0.019
F-statistics	0.3	2.79	0.24	1.38	1.37	1.41

6002 KNITTED OR CROCHETED FABRICS, NESOI

# of regressions	1	2	3	4	5	6
const	−5.34 [−4.72]**	−6.437 [−5.51]**	−5.908 [−4.7]**	−7.588 [−6.16]**	−7.741 [−6.25]**	−7.631 [−6.14]**
GDP per capita	1.708 [1.27]	1.125 [0.83]	0.731 [0.5]	−0.336 [−0.23]	−0.215 [−0.14]	−0.08 [−0.05]
tariff	−52.04 [−3.06]**	−20.37 [−3.06]**	−61.01 [−2.48]**	−18.71 [−2.59]**		
share*tariff	55.107 [1.45]		70.903 [1.41]			
t1			0.209 [0.75]	0.395 [1.61]	0.61 [2.54]**	0.613 [2.56]**
t2			−0.195 [−0.71]	−0.107 [−0.44]	0.128 [0.55]	0.132 [0.57]
t3			−0.445 [−1.61]	−0.269 [−1.12]	−0.075 [−0.32]	−0.028 [−0.12]
t4			−0.42 [−1.64]*	−0.279 [−1.14]	−0.166 [−0.68]	−0.161 [−0.66]
t5			−0.167 [−0.69]	−0.226 [−0.93]	−0.16 [−0.66]	−0.153 [−0.63]
t6			−0.036 [−0.15]	−0.257 [−1.08]	−0.212 [−0.89]	−0.207 [−0.86]
NAFTA					1.19 [1.62]	
NAFTA(Lag)						1.218 [1.8]*
# of obs.	385	421	385	421	421	421
R-squared	0.054	0.029	0.0887	0.0627	0.05	0.05
F-statistics	5.79	4.98	3.25	2.68	2.15	2.23

6109 T-SHIRTS, SINGLETS, TANK TOPS ETC, KNIT OR CROCHET

# of regressions	1	2	3	4	5	6
const	−7.183 [−31.83]**	−8.046 [−141.60]**	−7.817 [−27.57]**	−8.592 [−66.01]**	−8.642 [−66.74]**	−8.641 [−66.82]**
GDP per capita	−0.306 [−0.26]	0.0029 [0.05]	−0.072 [−0.64]	−0.063 [−1.15]	−0.065 [−1.18]	−0.066 [−1.19]
tariff	−55.471 [−1.82]*	−5.547 [−1.40]	−13.84 [−0.45]	−3.976 [−1.05]		
share*tariff	83.197 [1.51]		1.224 [0.02]			
t1			0.779 [3.42]**	0.902 [4.86]**	0.937 [5.04]**	0.935 [5.04]**
t2			0.733 [3.23]**	1.016 [5.60]**	1.056 [5.82]**	1.055 [5.82]**
t3			0.468 [2.12]**	0.794 [4.44]**	0.801 [4.50]**	0.831 [4.66]**
t4			0.419 [1.87]*	0.605 [3.34]**	0.606 [3.35]**	0.606 [3.35]**
t5			0.214 [0.96]	0.326 [1.82]*	0.325 [1.82]*	0.325 [1.82]*
t6			−0.189 [−0.86]	0.021 [0.12]	0.017 [0.10]	0.017 [0.10]
NAFTA					1.712 [2.18]**	
NAFTA(Lag)						1.655 [2.31]**
# of obs.	367	776	367	776	776	776
R-squared	0.02	0.003	0.1062	0.0915	0.097	0.098
F-statistics	2.01	0.99	3.87	7.87	8.37	8.45

6115 PANTYHOSE, SOCKS & OTHER HOSIERY, KNIT OR CROCHET

# of regressions	1	2	3	4	5	6
const	−7.13 [−6.74]**	−6.3 [−5.61]**	−8.339 [−6.64]**	−6.982 [−5.22]**	−6.764 [−5.08]**	−6.921 [−5.20]**
GDP per capita	0.307 [0.22]	1.487 [1.30]	−1.173 [−0.68]	0.856 [0.61]	1.139 [0.82]	0.958 [0.69]
tariff	−1.821 [−0.17]	−0.821 [−0.11]	−4.556 [−0.42]	−1 [−0.13]		
share*tariff	−10.394 [−1.05]		−8.286 [−0.83]			
t1			0.414 [1.39]	0.195 [0.78]	0.249 [1.00]	0.236 [0.95]
t2			0.245 [0.92]	0.117 [0.47]	0.179 [0.73]	0.161 [0.66]
t3			0.26 [0.91]	0.235 [0.93]	0.244 [0.98]	0.238 [0.95]
t4			−0.08 [−0.24]	0.008 [0.03]	0.025 [0.10]	0.058 [0.23]
t5			0.184 [0.62]	0.045 [0.17]	0.065 [0.25]	0.052 [0.20]
t6			−0.324 [−1.12]	−0.143 [−0.55]	−0.123 [−0.48]	−0.135 [−0.52]
NAFTA					1.757 [2.18]**	
NAFTA(Lag)						1.283 [1.75]*
# of obs.	328	454	328	454	454	454
R-squared	0.008	0.005	0.0403	0.013	0.026	0.022
F-statistics	0.63	0.84	1.1	0.57	1.17	0.96

6401 WATERPROOF FOOTWEAR, RUBBER OR PLASTICS, BOND SOLE

# of regressions	1	2	3	4	5	6
const	−5.269 [−4.73]**	−6.399 [−5.53]**	−4.325 [−3.57]**	−4.555 [−3.42]**	−4.679 [−3.46]**	−5.259 [−3.95]**
GDP per capita	−0.946 [−0.45]	0.119 [0.06]	−2.571 [−1.05]	−3.43 [−1.44]	−3.93 [−1.67]*	−3.036 [−1.31]
tariff	−38.176 [−3.23]**	−20.49 [−3.28]**	−33.19 [−2.62]**	−12.79 [−1.86]*		
share*tariff	−65.387 [−1.26]		−55.47 [−1.05]			
t1			0.355 [0.72]	0.772 [1.72]*	1.084 [2.56]**	1.083 [2.62]**
t2			−0.254 [−0.56]	0.277 [0.67]	0.646 [1.7]*	0.675 [1.82]*
t3			0.002 [0.00]	0.54 [1.39]	0.746 [2.02]**	0.902 [2.48]**
t4			−0.019 [−0.05]	0.443 [1.15]	0.617 [1.64]*	0.627 [1.71]*
t5			−0.826 [−2.26]**	−0.742 [−2.19]**	−0.681 [−2.01]**	−0.684 [−2.07]**
t6			−0.393 [−1.05]	−0.13 [−0.37]	−0.107 [−0.31]	−0.098 [−0.29]
NAFTA					1.48 [1.5]	
NAFTA(Lag)						2.788 [3.28]**
# of obs.	199	238	199	238	238	238
R-squared	0.114	0.057	0.1442	0.1744	0.138	0.178
F-statistics	6.37	5.4	3.36	3.64	3.47	4.69

8528 TV RECVRS, INCL VIDEO MONITORS & PROJECTORS

# of regressions	1	2	3	4	5	6
const	−7.927 [−20.19]**	−8.599 [−80.08]**	−8.109 [−14.09]**	−8.869 [−28.39]**	−9.097 [−40.89]**	−9.086 [−40.96]**
GDP per capita	0.346 [0.19]	−0.208 [−0.12]	0.28 [0.15]	−0.138 [−0.08]	−0.322 [−0.18]	−0.409 [−0.23]
tariff	−89.614 [−3.22]**	−51.08 [−2.68]**	−83.96 [−1.87]*	−32.48 [−1.05]		
share*tariff	99.218 [1.66]*		96.675 [1.52]			
t1			0.532 [1.25]	0.68 [1.72]*	0.887 [2.58]**	0.875 [2.56]**
t2			−0.139 [−0.33]	0.003 [0.01]	0.212 [0.64]	0.201 [0.60]
t3			0.213 [0.51]	0.341 [0.9]	0.574 [1.86]*	0.556 [1.79]*
t4			0.184 [0.43]	0.253 [0.65]	0.507 [1.63]	0.509 [1.64]*
t5			0.276 [0.84]	0.149 [0.48]	0.142 [0.46]	0.143 [0.46]
t6			0.108 [0.33]	0.121 [0.39]	0.133 [0.43]	0.132 [0.43]
NAFTA					−0.139 [−0.16]	
NAFTA(Lag)						−0.341 [−0.42]
# of obs.	281	320	281	320	320	320
R-squared	0.046	0.03	0.0647	0.0489	0.045	0.045
F-statistics	3.52	3.62	1.62	1.48	1.34	1.36

8703 MOTOR CARS & VEHICLES FOR TRANSPORTING PERSONS

# of regressions	1	2	3	4	5	6	7
const	−8.617 [−8.73]**	−10.58 [−26.49]**	−8.518 [−2.41]**	−10.65 [−24.17]**	−10.52 [−24.42]**	−10.53 [−24.46]**	−10.8 [−24.14]**
GDP per capita	0.251 [2.03]**	0.276 [2.13]**	0.251 [2.01]**	0.261 [1.97]**	0.255 [1.92]*	0.254 [1.92]*	0.261 [1.99]**
tariff	−72.9 [−0.51]	39.727 [1.63]	−28.94 [−0.06]	36.401 [1.48]			54.57 [2.02]**
share*tariff	51.06 [0.29]		−2.787 [0.00]				
t1			−0.429 [−0.64]	0.131 [0.46]	0.18 [0.62]	0.183 [0.64]	0.18 [0.63]
t2			−0.467 [−0.7]	0.223 [0.8]	0.268 [0.94]	0.271 [0.96]	0.27 [0.96]
t3			−0.236 [−0.36]	0.155 [0.57]	0.181 [0.67]	0.217 [0.79]	0.143 [0.53]
t4			−0.497 [−1.18]	0.1 [0.38]	0.113 [0.43]	0.113 [0.43]	0.096 [0.37]
t5			−0.847 [−2.59]**	−0.312 [−1.12]	−0.318 [−1.13]	−0.319 [−1.14]	−0.31 [−1.12]
t6			−0.418 [−1.26]	0.028 [0.1]	0.027 [0.10]	0.027 [0.10]	0.029 [0.11]
NAFTA					0.548 [0.79]		
NAFTA(Lag)						0.61 [0.96]	
Mexico							1.679 [1.59]
# of obs.	173	278	173	278	278	278	278
R-squared	0.038	0.035	0.0926	0.0567	0.049	0.05	0.069
F-statistics	1.75	3.55	1.43	1.44	1.23	1.28	1.57

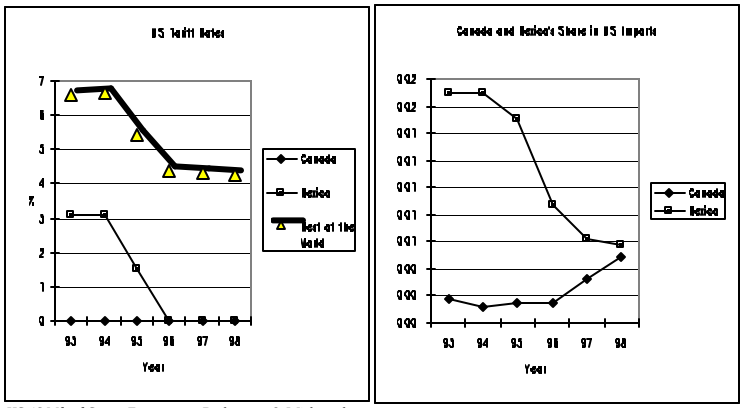
[ ]: t-value
** 5% significant
* 10% significant

Country Dummies are omitted
Time dummies (t1=1992, t2=1993, t3=1994, t4=1995, t5=1996, t6=1997)

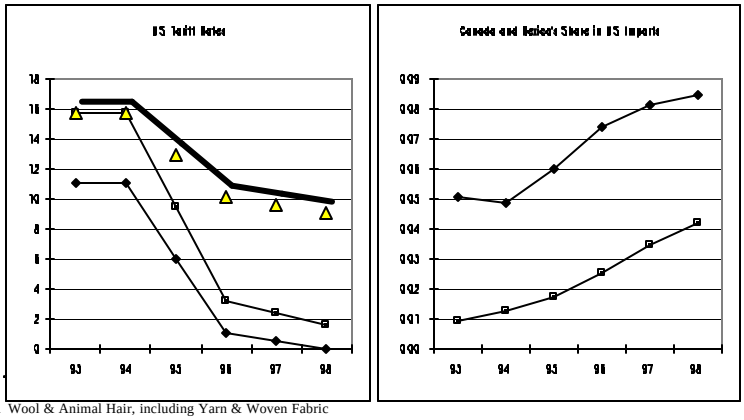
4202	TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC
6002	KNITTED OR CROCHETED FABRICS, NESOI
6109	T-SHIRTS, SINGLETS, TANK TOPS ETC, KNIT OR CROCHET
6115	PANTYHOSE, SOCKS & OTHER HOSIERY, KNIT OR CROCHET
6401	WATERPROOF FOOTWEAR, RUBBER OR PLASTICS, BOND SOLE
8528	TV RECVRS, INCL VIDEO MONITORS & PROJECTORS
8703	MOTOR CARS & VEHICLES FOR TRANSPORTING PERSONS

Table 4. Summary of Regression Results of Table 3

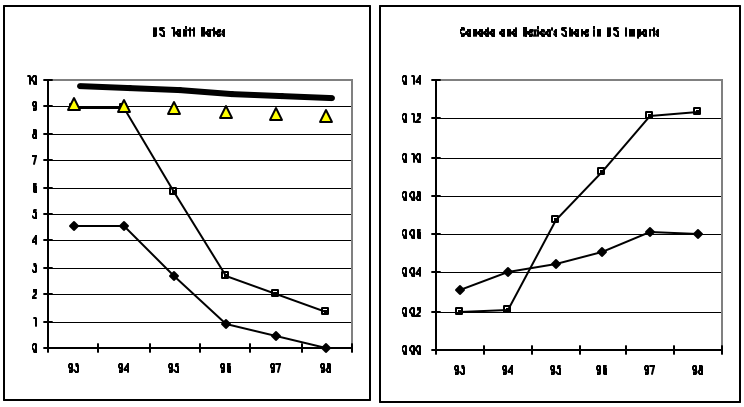
Commodities		Tariff	NAFTA or NAFTA(Lag)
4202	TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC	–	–
6002	KNITTED OR CROCHETED FABRICS, OTHER	**	*
6109	T-SHIRTS, SINGLETS, TANK TOPS ETC, KNIT OR CROCHET	*	**
6115	PANTYHOSE, SOCKS & OTHER HOSIERY, KNIT OR CROCHET	–	**
6401	WATERPROOF FOOTWEAR, RUBBER OR PLASTICS, BOND SOLE	**	**
8528	TV RECVRS, INCL VIDEO MONITORS & PROJECTORS	**	–
8703	MOTOR CARS & VEHICLES FOR TRANSPORTING PERSONS	–	–



HS 46 HS 46 Mfr of Straw, Esparto etc.; Basketware & Wickerwrk

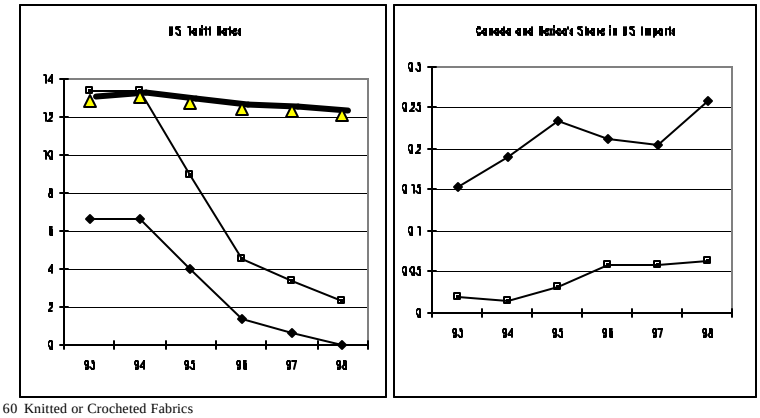


HS 51 Wool & Animal Hair, including Yarn & Woven Fabric

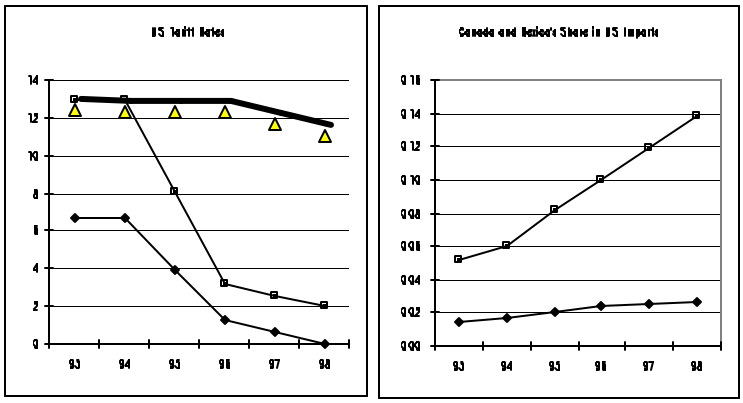


HS 52 Cotton, including Yarn and Woven Fabric Thereof

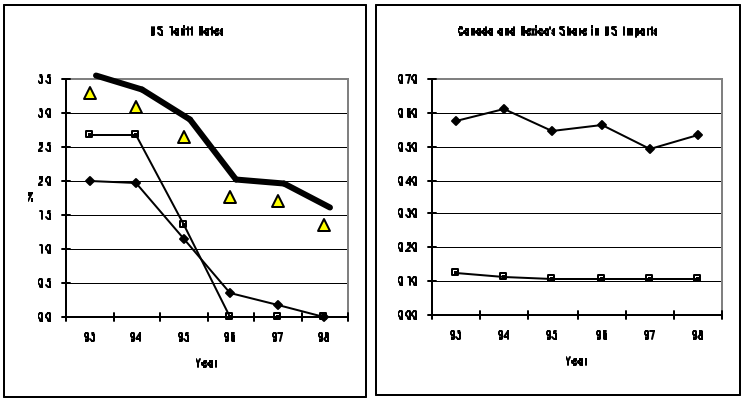
Figure 1. U.S. Tariff Rates and Imports: Selected HS 2-Digit Commodities



HS 60 Knitted or Crocheted Fabrics



HS 62 Apparel Articles and Accessories, Not knit etc.



HS 79 Zinc and Articles Thereof

Figure 1. U.S. Tariff Rates and Imports: Selected HS 2-Digit Commodities (continued)

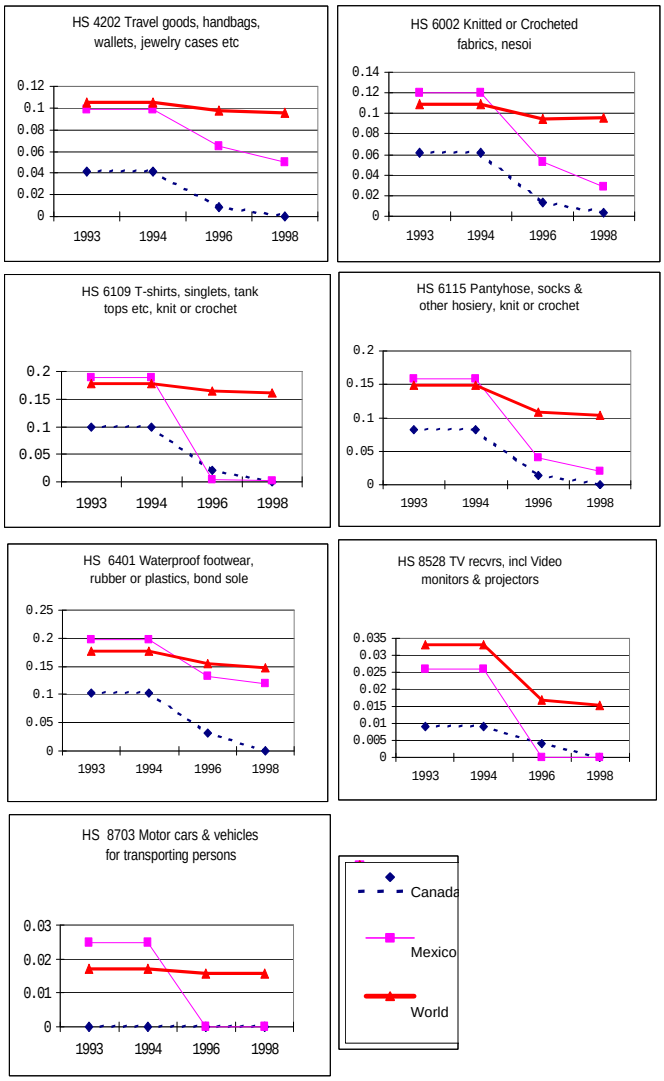


Figure 2. U.S. Tariff Rates: Selected HS 4-Digit Commodities

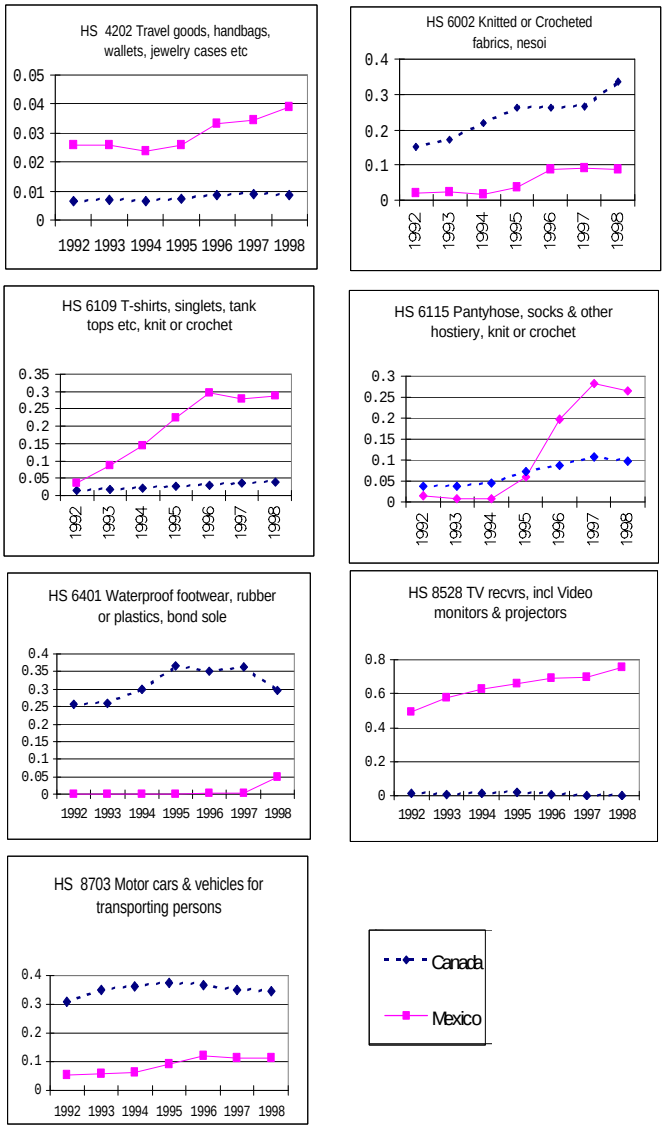


Figure 3. U.S. Imports: Selected HS 4-Digit Commodities