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# The WTO Promotes Trade, Strongly But Unevenly

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## Abstract



This paper furnishes robust evidence that the GATT/WTO has had a powerful and positive impact on trade. The impact has, however, been uneven. GATT/WTO membership for industrial countries has been associated with a large increase in trade estimated at about 40 percent of world trade. The same has not been true for developing country members, although those that joined after the Uruguay Round have benefited from increased trade. Similarly, there has been an asymmetric impact between sectors, with WTO membership associated with substantially greater trade in sectors where barriers are low. These results are consistent with the history and design of the institution, which presided over significant trade liberalization by the industrial countries except in sectors such as food and clothing; largely exempted developing countries from the obligations to liberalize under the principle of special and differential treatment; but attempted to redress the latter by imposing greater obligations on developing country members that joined since the Uruguay Round.

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## I. INTRODUCTION AND MOTIVATION

The General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO), were set up to promote world trade. That trade increased courtesy of this institution may seem self-evident. To the doubters, Bhagwati (1991) has this succinct riposte:

"*A common criticism is that the GATT in truth is the General Agreement to Talk and Talk: It has delivered nothing. This is nonsense*." (p.5)

However, in one of the first and very few empirical analyses of this question, Rose (2002a and 2002b), after an impressively meticulous and comprehensive scrutiny, has argued that there is no evidence that the World Trade Organization (WTO) has increased world trade. To quote Rose (2002a):

"*My quantitative examination indicates that there is little reason to believe that the GATT/WTO has had a dramatic effect on trade. In particular, once standard gravity effects have been taken into account, bilateral trade cannot be strongly and dependably linked to membership in the WTO or its predecessor the GATT."*

In this paper, we attempt to reconcile the apparent inconsistency between the well-entrenched belief in the benefits of the WTO and the conclusion of Rose's analysis. We will furnish evidence that Rose's analysis is incomplete and can be misread seriously. The incompleteness is on two grounds.

On econometric grounds, Rose's analysis needs to be refined methodologically in one important respect to incorporate the results of Anderson and van Wincoop (2003), who show that a gravity equation grounded in theory needs to include fixed effects. On economic grounds, it needs to be further elaborated to take account of the asymmetric manner in which the WTO has effected trade liberalization in the post-war period. Once these are done, we find robust evidence that the WTO (and its predecessor, the GATT) has promoted world trade. We estimate that the WTO may have increased world trade by about 40 percent or about $2.8 trillion in 2000.

Interestingly, our results on the WTO's trade impact are exactly in line with what they should be given the liberalization asymmetries. We emphasize three types of asymmetries: between developed and developing countries; between developing countries that joined the WTO before and after the Uruguay Round; and between sectors where the WTO has been effective in bringing down trade barriers and those—notably agriculture, and textiles and clothing—where it has been less effective. Rose (2002a and 2002b) notes these asymmetries but does not pursue them empirically. Instead he focuses on the average behavior of WTO members which could obscure the great unevenness in the patterns of trade liberalization across members, across time, and across products. The verdict on the ineffectiveness of the WTO is overturned once one refines the econometric specification and takes account of these asymmetries.

*First asymmetry: Developed versus developing countries*

It is well-recognized that the WTO, especially its predecessor the GATT, has been a two-tier organization, with far greater liberalization obligations imposed on its developed than its developing country members. As Table 1 shows, developed countries, under successive rounds of trade negotiations, have successfully reduced their tariff barriers. These numbers suggest that industrial countries, under the aegis of the GATT, reduced their average tariffs from over 15 percent in 1947 to about 4.5 percent today.

This, combined with the fact that the rules have required that developed countries not impose non-tariff barriers (especially quantitative restrictions), has meant that the WTO should have been a motor of overall trade liberalization by industrial countries. Of course, during the post-war era industrial countries did seek recourse to nontariff barriers, in violation of the spirit if not the letter of WTO rules. They included, voluntary export restraints (in cars and steel), explicit quantitative restrictions (agriculture and clothing), and anti-dumping. Although many of these barriers were sectoral in nature, their imposition could have offset the effects of the tariff liberalization. Whether they did so is an empirical question that we allow the data to settle.

In contrast, and since the early days of the GATT, developing countries have had far fewer obligations to liberalize. This reluctance of developing countries to take on obligations to liberalize under the WTO was codified under the principle of special and differential treatment (S&D), which has defined the terms of developing country participation or rather virtual non-participation. In terms of developing countries' own liberalization, S&D consisted of two elements.[2]

First, developing countries have not, until the Uruguay Round, really participated in tariff liberalization in the various rounds. This is reflected in Table 2 which illustrates that until the Uruguay Round developing countries had "bound" less than one-third of their tariff lines compared to nearly 85 percent for industrial countries.[3] That is, developing countries had no commitments as regards their tariffs for over two-thirds of their imports. And even on the thirty percent of the bound lines, the commitments to liberalize were weak because the bound rate was well above the applied, the pre-negotiation rate, typically by over 10 to 15 percentage points.

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[2] S&D also had another pillar, the grant of preferential market access by developed countries to their developing country trading partners, which led to the institution of GSP and similar schemes (see Wolf, 1986 for an excellent analysis of the rationale and consequences of S&D).

[3] When a country "binds" its tariffs in the GATT/WTO (or undertakes tariff "bindings"), it commits not to raise its tariffs above the level at which the tariff is "bound." Note that these numbers relate to the late 1980s; for much of the post-war period the proportion of bindings was even smaller.

Second, the permissiveness of the GATT toward developing countries extended not just to tariff liberalization but also the basic rules on non-tariff barriers, particularly their use of quantitative restrictions for balance of payments reasons that was sanctioned under Article XVIII:B of the GATT.[4]

Indeed, a number of the large developing countries invoked the right to use quantitative restrictions on their imports for the major part of the post-war period; in some instances this right extended to over 5 decades. This is illustrated in Table 3. In practice, the right to use quantitative restrictions generally coincided with their actual use. This use of quantitative restrictions was a crucial aspect of special and differential treatment.

*Second asymmetry: New versus old developing country members*
The second, temporal asymmetry, in the WTO derives from the above. As the Uruguay Round progressed, it became clear that one of its objectives was to narrow the gap between developed and developing countries in terms of their respective obligations to liberalize trade barriers. This objective was particularly important in defining the terms of accession of new WTO members, namely those that joined after the Uruguay Round negotiations had commenced. The Chinese accession in 2001 is a case in point. The accession came at the end of a 13-year process in which the list of liberalization obligations imposed on China grew steadily. China was given a shorter phase-in period to complete the liberalization obligations than earlier developing country members. At the end of the phase-in period, China's trade regime will be more open than most of the existing developing country members of the WTO today. The Chinese case has its special features, but the more demanding nature of liberalization obligations could have applied to other new WTO members as well.

*Third asymmetry: Protected and liberal sectors in developed countries*
Third, there has been asymmetry in the liberalization between different sectors. While developed countries brought down their trade barriers, they exempted a number of key sectors--agriculture, textiles and clothing--from their liberalization efforts. In fact, this exemption was reflected not just in the fact that tariffs remained high in these sectors. The rules on the prohibition of quantitative restrictions were themselves bent to allow their use in these sectors. The Multi-Fiber Arrangement, which was a vast system of bilateral quantitative restrictions imposed by developed countries on their imports from developing countries, was a violation of the basic rules of the GATT. The same was true of agriculture. Table 4 confirms that the food, clothing, and footwear sectors are indeed highly protected sectors, with average tariffs well above the average for the industrial sector as a whole, and with significant peak tariffs, particularly in agriculture.

These three asymmetries are well-known. The question is whether they actually show up in the data on the patterns of trade. Furthermore, once these asymmetries are taken into account, would the data reveal that the WTO has promoted trade substantially and in the way it has been designed? The objective of this paper is to examine systematically this question. It is

[4] For a fuller discussion of the history and consequences of Article XVIII: B, see Eglin (1987) and WTO (2003).

organized as follows. Section II presents the econometric model and estimation methodology, and briefly describes the data and their sources. Section III discusses the results. Section IV offers some concluding remarks.

## II. ECONOMETRIC SPECIFICATION AND DATA

### A. Model and Estimation Issues

We adopt an extended gravity model that has enjoyed empirical success in terms of its ability to explain a relatively large fraction of variations in the observed volume of trade. In theory, the gravity model can be justified by a variety of theories, including monopolistic competition (Helpman and Krugman, 1995) and a Heckscher-Ohlin model with specialization (Anderson, 1979; Deardorff, 1998; and Anderson and van Wincoop, 2003).

Empirically, it has been used to analyze the effects of regional trade blocs (see Frankel, 1997 and the references cited therein) and currency unions (Frankel and Rose, 2000; Glick and Rose, 2002; Rose, 2000; and Persson, 2001) among other subjects. In contrast to a majority of earlier studies (and to Rose, 2002a), we adopt the version of the gravity model suggested by Anderson and van Wincoop (2003) that includes country fixed effects in the regression. More precisely, our specification is of the following form:

$$\text{LogImport}(j,k,t) = Z(j,k,t)\,? + ? \; a_i M_i + ? \; ?_h X_h + ß_1 \text{FTA}(j,k,t) + ß_2 \text{GSP}(j,k,t) +$$

$$ß_3 \text{WTO-DVED}(j,k,t) + ß_4 \text{WTO-DING}(j,k,t) + e_{j,k,t}$$

where Z(j,t) is a list of variables, including log GDP, log per capita GDP, log land area of importers and exporters, greater circle distance between j and k, dummies for common language and colonial links, shared borders, and currency, and a dummy for landlocked and island countries. Essentially, the list includes all the covariates in Rose (2002a).

$M_i$'s are a list of importer dummies (that take the value of one if i=j, and zero otherwise). $X_i$'s are a list of exporter dummies (that take the value of one if h=k, and zero otherwise). The $M_i$'s and $X_i$'s are essentially dummies that serve to proxy for "multilateral resistance" in Anderson and van Wincoop (2003).[5] These dummies were not included in most of the regressions in Rose (2002a).

[5] Trade between two countries depends not just on the policy and physical barriers between them but also on the barriers between these countries and the rest of the world (hence the term "multilateral resistance"). Importer and exporter dummies proxy for the latter kind of barriers.

FTA(j,k,t) is a dummy variable that takes on a value of 1 if j and k belong to a common free trade area or common market in year t.[6]

GSP (j,k,t) is a dummy variable that takes on a value of 1 if the importing industrial country grants preferences under the generalized scheme of preferences (GSP) to exporting country k in year t and where j and k are not members of a free trade area or common market in year t.

WTO-DVED(j,k,t) is a dummy variable for importer j that is a developed country WTO member and where j and k are not in a common free trade area or customs union and where j does not grant GSP preferences to k in year t.

WTO-DING(j,k,t) is a dummy variable for importer j that is a developing country WTO member and where j and k are not in a common free trade area or customs union and where j does not grant GSP preferences to k in year t.

$e_{j,k,t}$ is a normally distributed random error term that has a zero mean and a constant variance.

There are several important differences between our specification and that in Rose (2002a) that are worth making clear at the outset. First, we focus on imports by j from k as the regressand, whereas Rose focused on the average of j's imports from k and j's exports to k. All theories that underlie a gravity-like specification yield predictions on unidirectional trade rather than total trade. Hence, our specification is more closely grounded in theory.

Moreover, the trade effects of the WTO and the GSP really relate to imports. When a country j grants GSP preferences to k, or when j liberalizes its imports under the WTO, there is reason to expect j's imports from k to increase but there is no theoretical reason why j's exports to k should also increase by the same proportion. Even if Abba Lerner symmetry were to hold—that is, removal of import barriers serves to raise exports as well as imports--it would only do so at the level of a country's aggregate rather than bilateral trade.

The argument in favor of trade (exports plus imports) rather than imports could be based on the view that the WTO also regulates export taxes and export subsidies. In practice, export taxes have rarely, if ever, been the subject of liberalization negotiations, in part because industrial countries have seldom used them. Export subsidies, on the other hand, have been the focus of WTO rules and negotiations, but elimination of these subsidies would tend to *reduce* exports. The impact of the WTO on a measure of trade (regressand) that included exports would even in theory be ambiguous. For these reasons, Rose's (2002a) attempt at measuring the impact of the WTO when only one of the two trading countries is in the WTO seems problematic.[7]

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[6] The FTAs included in our analysis are those reported in Rose (2002a) and updated through 2000. Appendix Table 6 lists all the FTAs used in our study.

[7] The other dummy that Rose (2002a) uses to capture possible WTO effects, namely when both members in a country pair are WTO members, does not suffer from the deficiencies noted above.

Another advantage of our specification is that we can meaningfully differentiate importer and exporter characteristics and their effects (e.g. importer's log GDP and exporter's log GDP as separate regressors) on trade, whereas Rose had to rely on a symmetric composite of the importer and exporter characteristics (e.g., the sum of the importer's and exporter's log GDP's as a single regressor). Under our approach, for example, we can measure whether import liberalization benefits all exporters or just those that are members of the WTO. Thus, we are able to identify whether there is discrimination between WTO and non-WTO members and also to measure the potential public good benefits of the WTO.

Second, as Deardorff (1998), Anderson and van Wincoop (2003), and Wei (1996) emphasized, the standard gravity model might have been misspecified in ignoring a "multilateral resistance" or "remoteness" term. Anderson and van Wincoop (2003) suggest that empirically, the inclusion of country fixed effects captures "multilateral resistance" reasonably well and thus corrects this misspecification. In Rose (2002a), the benchmark regression and indeed all specifications, save one, do not include country fixed effects. In our analysis, we include country fixed effects in all the specifications.

Third, our specification of the GSP and WTO dummies is different from that in Rose. We rely on the fact that FTAs, the GSP, and the WTO involve different degrees of liberalization, and hence define them mutually exclusively in order to be able to isolate the impact of each, purged of any "contamination" from the other.[8] Therefore, the WTO dummies in our analysis are coded to exclude country pairs belonging to the same FTA/customs union agreement or involved in GSP relationships. Similarly, the GSP dummy is coded to exclude country pairs belonging to an FTA or customs union.

### B. Data and Sources

The data that we use and their sources are explained in detail in the Appendix. Most of our data are from Rose (2002a) which are posted on his website. The main difference is our use of imports rather than trade as the dependent variable which we obtain from the IMF's Direction of Trade Statistics. We deflate imports by the US consumer price index. Also we update all the Rose variables for the year 2000. Our panel data set consists of observations for every 5 years beginning in 1960.

The tariff and import data we use for the disaggregated estimations are obtained respectively from the TRAINS (Trade Analysis Information Systems) and COMTRADE databases of the United Nations (See the Appendix for details). Descriptive statistics for the basic data are in Appendix Table 1. The list of countries in the aggregate and disaggregate estimations is presented in Appendix Tables 2-4. Consistent with WTO practice, but unlike Rose, we exclude South Africa, Turkey, and Yugoslavia from the category of industrial countries. The list of sectors used in the disaggregate estimations is in Appendix Table 5 The list of free

[8]We also report the results when these variables are defined as in Rose (2002a). It turns out that the GSP coefficients are affected much more than the WTO coefficients.

trade areas is described in Appendix Table 6, while Appendix Table 7 provides data on the number of observations falling into the different categories (WTO, FTAs, GSP etc.).

## III. RESULTS

### A. Asymmetry between industrial and developing countries

We now turn to the regression analysis. The basic gravity model, reported in Table 5, works well, yielding plausible estimates for the standard covariates—GDP, GDP per capita, distance—which are highly significant and very much in line with typical estimates from the literature. Tables 5 and 6 contain the core results for aggregate trade in panel and cross-section contexts, respectively. The basic Rose result about the ineffectiveness of the WTO in increasing trade is illustrated in column 1. Indeed, if membership in the WTO is undifferentiated, with all countries treated alike, our result is a more damning indictment of the WTO than even that in Rose (2002a). He found that membership in the WTO had no significant effect on trade. We find that membership has a significantly *negative* effect on trade: the average WTO member trades about 19 percent [exp(-0.174)-1] less than the average in the sample (column 1).

But as we explained in the earlier section, the evolution of the WTO and its precursor the GATT, most notably involving the special treatment of developing countries, makes it essential to treat this group differently from industrial countries. Once this is done as in column 2, we see that the average result of undertrading obscures a significant difference between the behavior of industrial country members of the WTO and its developing country members. The coefficient on the former is positive and highly significant. As will be seen, this is a result that is highly robust.

On the other hand, the coefficient on the developing country WTO importer dummy is negative and significant.[9] This result is, on the other hand, not robust; indeed, it is quite fragile. For example, when we exclude observations with values of trade less than $500,000, the negative coefficient turns positive, although it is statistically insignificant. There are plausible reasons to believe that small-valued observations are subject to sampling and measurement error. In particular, idiosyncratic shifts in the behavior of a single importer or even a single shipment may dominate the variations in the reported import value.[10]

Table 6 reports a sequence of cross-sectional estimations every five years from 1965 to 2000. The coefficients on the industrial country WTO dummy are positive and significant for each

[9] It is worth noting that t-statistics for the industrial country WTO dummy is almost always above 10, signifying that the coefficient estimates have a high degree of precision.

[10] For these reasons, the remaining results reported in the paper will exclude observations with trade values less than $500,000, although we would emphasize that not doing so does not alter the basic nature of the results.

of the 8 regressions reported, while those on the developing country dummy are insignificant in all but one year.

This result is consistent with the history of asymmetric trade liberalization in the WTO that we described earlier. Industrial countries reduced their tariff barriers under successive trade rounds while developing countries were accorded the freedom to maintain their trade barriers under the principle of special and differential treatment. The known asymmetry in tariff reductions shows up nicely in the data. Changes in nontariff barriers apparently not large enough to completely offset the tariff reductions.

If these results are interpreted causally, we can actually quantify the contribution of the WTO to increasing global trade. The coefficient for the industrial country dummy in the panel regression is 0.50 (column (4)). This implies that industrial countries' bilateral imports has on average been about 65 percent more [exp(0.50)-1] by virtue of their membership in the WTO. Taken literally, our results would imply that in 2000, aggregate imports of industrial countries would have been higher by about $2.8 trillion than without the WTO, representing about 42 percent of world trade.

This estimate is clearly overstated because it does not take into account a substitution effect: if one country joined the WTO its aggregate trade would increase as we have estimated it; but if all countries joined the WTO there would be some displacement of imports from non-WTO members by those from WTO members. Having said that, we note that there are also reasons that our estimates may have understated the true impact of the WTO membership in raising world trade if there is positive feedback from higher trade to higher economic growth (see Frankel and Romer, 1999), which in turn spurs even more trade (the gravity equation examines trade for a given level of income). Of course, if the WTO had not accorded the freedom to developing countries to maintain trade barriers, and had required trade liberalization of them, the positive impact on global trade could have been greater still.

Some additional features of the world trading system are brought out by the results. Members of the WTO are obliged to extend trade privileges granted to any country (member or non-member) to all other members of the WTO under the MFN principle. But members are not obliged to extend the same privilege to non-members of the WTO. They can do so if they wish but there is no legal obligation to do so. In practice, do they?

In column 5 of Table 5, each of the two WTO dummies is disaggregated into two dummies, depending on whether the exporter is also a WTO member. For industrial country WTO members, the coefficients on the dummy when the exporter is also a WTO member is greater than when the exporter is not a member (0.58 versus 0.29) and this difference is statistically significant.[11] It appears that non-members do not seem to benefit equally from the liberalization under the WTO. This difference, which highlights the benefits of WTO membership, could arise for two reasons. The first is explicit discrimination; that is, barriers

[11] The F-test (with a value of 40.7) suggests that the null hypothesis of the equality of coefficients is easily rejected.

could be higher against imports from non-WTO members than from members. The second is akin to a product composition effect: that is, even though all goods are treated alike regardless of their provenance, barriers are higher on *products* of greater interest to non-members because these products have not been the subject of the reciprocity negotiations in the WTO.[12] Being out of the WTO can thus have two types of disadvantages.

This result, however, also points to the possible public good benefit of the WTO. The fact that imports from WTO non-members is positive and significant rather than zero could arise from the fact that WTO members extend some of the privileges of their WTO-induced liberalization to non-members. In our results, the public good benefit amounts to about 34 percent [exp(0.29)-1] additional exports for non-members to industrial country WTO members.

In Table 7, we put our core specification through the usual hoops—the robustness-checks exercise. As the Table confirms, our core result—particularly the positive impact of the WTO on industrial countries—remains unchanged. The hoops include: adding quadratic gravity terms, using Rose's (2002a) definition of the GSP and WTO dummies, using alternative estimation procedures: weighted least squares (with trade, real GDP, and real GDP per capita as weights), country-pair random and fixed effects, and finally, discarding outlying observations.[13]

In all cases, the industrial country dummy is highly significant and the magnitude of the coefficient remains broadly stable, except in the case of country-pair random fixed effects estimations, where the coefficient value declines to between 0.1 and 0.2, while remaining statistically significant. The developing country dummy is generally positive and significant but the magnitudes are typically very small. One reason why the industrial country WTO coefficient values decline in the estimation with country-pair effects is that they could themselves proxy for the WTO effects, which are also bilateral in nature. Introducing country-pair effects, almost removes the cross-section WTO effect by construction, leaving the WTO dummy to pick up largely the time-series effects.

### B. Asymmetries between new and old developing country members

The next question we address is whether there has been any change in the trading patterns of WTO members in the recent past. There is a priori reason to expect changes because it is widely believed that the Uruguay Round marked a watershed in the status of developing countries in the WTO. Specifically, special and differential treatment came under attack in the Uruguay Round. A concerted effort was supposedly made to ensure that developing countries were integrated into the trading system, most notably by requiring them to take on more obligations to liberalize their trade regimes. A related development was on the front of

[12] We are grateful to Alan Winters for drawing our attention to this point.

[13] Specifically, we discard values of the dependent variable that are three and two standard deviations away from the mean, respectively.

new entrants to the WTO. By many accounts, post-Uruguay Round accessions are supposed to have been qualitatively different in the sense of extracting more trade liberalizing concessions from prospective entrants. But does the data support the proposition that the Uruguay Round really marked a watershed for developing countries?

Table 8 attempts to shed light on this question. For the purposes of this table, developing country members are disaggregated into those that were members prior to the Uruguay Round ("old members") and those that joined after it ("new members"). Given that the Uruguay Round negotiations lasted eight years, the question arises as to what is the appropriate cut-off date that distinguishes a possible regime change in the way the WTO treated its old and new members.

One possibility would be to make 1995--the date of the formal creation of the WTO—as the cut-off date. But this would be too legalistic; indeed the creation of the WTO with its notion of a single undertaking—whereby all countries adhered to all the Uruguay Round agreements--was the *culmination* of the process of integrating developing countries into the trading system.[14] In the absence of a strong justification for any one particular date, we allow the data to tell us whether and when there was a regime shift. Therefore, in our regressions, we successively define new members as those that joined after 1990, 1991, 1992, 1993, 1994, and 1995. We then test the hypothesis that WTO membership had a different impact on trade for these new members compared with the old ones.

These results are reported in Table 8. Regressions for the year 2000 are reported in columns 1-6 while those for 1995 are in columns 7-11. Three features stand out. First, regardless of the cut-off date used for defining new members, the coefficients of the new and old dummies are significantly different from each other.[15] This is suggestive of a regime change.

Second, the regressions for 2000 indicate that the coefficient on the new WTO member dummy is positive and significant for all definitions of new members except when 1995 is used as the cut-off date for defining new members. The average coefficient value is about 0.28, representing extra trade of about 30 percent for new members.

But how is one to reconcile regime change with the fact that the coefficient on new members becomes smaller in size and statistically insignificant when 1995 is used as the cut-off date? Columns 7-11 shed some light on this question. When regressions for bilateral imports in 1995 are estimated, the coefficients on new members that were significant in the 2000 trade equation become small and insignificant. This suggests the possibility of a time lag in the impact of WTO membership consistent with the practice of having the liberalization

[14] In private correspondence, Patrick Low of the WTO suggests that a date as early as the Mexican accession to the GATT in 1986 could be seen as the beginning of the process of integrating developing countries into the trading system.

[15] As Table 8 shows, the null hypothesis for equality of coefficients is rejected by the F-tests at the 1 or 5 percent level in eight (nearly 9) of the 11 cases.

obligations phased in over a period of time. Countries that joined in the early 1990s experienced no significant increase in openness in 1995 but by 2000 they appear to have done so that was worth about an extra 30 percent of trade.

We would note, however, that the coefficient on old developing country members is still not positive and statistically significant. This suggests that their obligations to liberalize even after the Uruguay Round have not become stringent enough to actually lead them to be more open than non-WTO members. Evidently, eliminating special and differential still has a long way to go.

These are important findings because they sit at odds with the popular view that developing countries were actually integrated into the trading system in the aftermath of the Uruguay Round. In trade terms this did not happen for the old members of the WTO. Although developing countries' *bound* tariffs may have come down in the Uruguay Round, actual tariffs barely budged.

Table 9 shows that, although the percentage of tariff lines for which bindings (commitments) were taken on by developing countries increased by 50 percentage points due to the Uruguay Round, the actual tariff reductions brought about by the Round were small: only 27 percent of tariff lines involved reductions in applied tariffs, and on these, the reduction was 8 percent. In other words, if tariff reductions are calculated on all tariff lines, the reduction would be about 2 percent. This lack of reductions in applied tariffs appears to be reflected in our result that old WTO members continued to be no more open than WTO non-members even after the Uruguay Round. The irony relating to S&D in the Uruguay Round was that it was eliminated in areas—such as TRIPs—where maintaining it may actually have been welfare-enhancing. But S&D was preserved in the conventional area of trade liberalization in goods where its dilution would have been unambiguously welfare-enhancing.

### C. Asymmetries between sectors

In this sub-section, we turn our attention to the asymmetry in the trade liberalization across sectors. The proposition that we wish to test is whether WTO membership has a differential impact for the industrial countries between protected and unprotected sectors. If WTO membership is a proxy for trade liberalization, then it should have had a greater impact on trade volumes where barriers came down compared with sectors where barriers have remained high.

To explore this issue, we go to a recently available data set on disaggregated bilateral trade (disaggregated at the Harmonized System (HS) 4-digit level) that was not used by Rose (2002 a or b).[16] We adopt a two-step strategy. In the first step, we identify sectors that are commonly considered to be highly protected by developed countries and sectors that are supposed to have been liberalized. In the second step, we fit a variation of the augmented

[16] Rose (2002a) does suggest that a sectoral analysis could shed further light on the impact of WTO membership.

gravity model to these data. The objective is to see whether actual patterns of trade volume reflect the known difference in trade barriers.[17]

We begin by describing how we select disaggregated tariff categories into the highly protected and liberalized sectors. First, we sort United States (ad valorem) *MFN* tariff rates at the HS 4-digit level (on imports from other developed WTO members) in 1990 and 2001 in descending order. We do the same for the European Union's tariff rates.

Second, we identify the set of 4-digit sectors in which both the U.S. and the EU have tariff rates that are greater than ten percent in both years. Note that these sectors may have additional specific tariffs. A complete list of these products is presented in Appendix Table 3. These 4-digit sectors can be broadly grouped into four categories: agricultural products, clothing, footwear, and other highly protected manufactured products. For each country pair and year, we then sum up the 4-digit imports within each of the four categories. Note that the data base does not have information on non-tariff barriers at this level of disaggregation. Therefore, while we are confident that the sectors that we have chosen are highly protected by developed countries, we cannot be sure if we have left out some other highly protected sectors (due to nontariff barriers).

Third, we also collect the set of 4-digit sectors that both the U.S. and the EU have zero ad valorem and specific tariff rates. We take out agricultural products and raw materials from this list on the ground that there may be various non-tariff barriers that the information in the data base does not capture. We label the remaining set of zero-tariff 4-digit sectors as unprotected sectors.

We specify a system of five equations, one for each of the following sectors: (i) unprotected manufacturing; (ii) clothing; (iii) footwear; (iv) agriculture; and (iii) other highly protected manufacturing.

$$\text{LogImport}(j,k,S,t) = Z(j,t)\,?_l + ?\ a_i M_i + ?\ ?_{hl} X_h + ß_{1l}\text{FTA}(j,k,t) + ß_{2l}\text{GSP}(j,k,t) + ß_{3l}\,\text{WTO-DVED}(j,k,t) + ß_{4l}\text{WTO-DING}(j,k,t) + e_{j,k,l,t}$$

where S is an index representing the 5 sectors for which this equation is estimated. The regressors are common for all the equations. The equations have the standard gravity formulations and are identical to that described in Section II. Since the error terms in the five equation are potentially correlated, we estimate the five equations jointly using the Seemingly Unrelated Regression (SUR) technique. Allowing such cross-equation error correlations makes SUR more general than OLS. Each of the five equations has importer and exporter fixed effects and year effects. To allow for maximum flexibility, we do not restrict the parameters on similar regressors in different equations to be the same.

[17] For details of the data used in this part of the analysis see the Appendix, while Appendix Table 2 provides the list of countries covered.

The hypothesis that we test is a simple one. Sectors with the highest protection in industrial countries are those where the WTO has been least successful. Hence, WTO membership should have less impact than in sectors characterized by low levels of protection.

The United Nations WITS trade database has disaggregated data beginning in 1989. Consistent with our aggregate estimations reported earlier, we use data for 1990, 1995, and 2000 and discard observations with import values less than US$500,000.

Table 10 presents the results for these estimations. The results for the sector with low protection (column 1) are consistent with the results for aggregate trade: for example, the industrial country WTO dummy is positive and highly significant with a coefficient value of 0.62 which is greater than the coefficient value of 0.5 in the aggregate estimations. We would expect WTO membership to lead to greater trade where it has effected greater liberalization and this is confirmed by our results. The developing country WTO dummy is positive and insignificant as in the aggregate estimations. This is therefore a reassuring benchmark against which we can compare the results for the protected sectors.

For three of the four protected sectors—clothing, footwear and other manufacturing—the coefficients of the industrial country dummy are insignificantly different from zero. Formally, they are also significantly smaller than the coefficient in the unprotected sector.[18] This provides confirmation that the WTO has not had any significant impact on trade in these sectors as we have postulated.[19] For the fourth sector—agriculture—the industrial country WTO dummy is negative and significant. It appears that the exemption of agriculture from WTO disciplines has provided the freedom to industrial countries to throttle trade by introducing very high levels of protection. The permissiveness toward agriculture has proved very costly indeed because the coefficient estimates suggest that the typical industrial country imports of agricultural products is about 60 percent [exp(-0.87)-1] less than that of the average importer in our sample.

### D. Other Results

Our analysis also yields a number of additional findings that are worth noting. The first relates to the complaint that industrial countries' trade policies discriminate against developing countries. Industrial country tariffs are highest in agriculture and textiles and clothing which are sectors of particular export interest to developing countries. This elicits the claim (e.g., Oxfam, 2003) about the unfairness of industrial countries' trade policies. Column 6 of Table 5 sheds light on this question. The coefficient of the dummy relating to

[18] The hypothesis that the coefficient of the industrial country WTO dummy in the unprotected sector is equal to that in each of the protected sectors is rejected in three instances at the 1 percent level and in one instance at the 10 percent level (the chi-square values are reported in Table 10).

[19] The developing country WTO dummy is also insignificant in three of the four protected sectors.

industrial country imports from other industrial countries is greater than that relating to imports from developing countries and this difference is statistically different.[20] In other words, industrial countries do appear to trade more amongst themselves than with developing countries, *ceteris paribus.* The magnitudes of the coefficients suggest that trade with developing countries is about 37 percent less than trade with other industrial countries. But we cannot definitively assign this difference to higher barriers rather than to other factors that we may not have controlled for such as product composition, differential transportation costs etc.

On the other hand, the results on the developing country coefficients in the same column suggest that developing countries also trade less amongst themselves than with developed countries although whether this is a manifestation of the Heckscher-Ohlin prediction or due to greater trade barriers is not clear. But the difference in the two coefficients is not significant (at the ten percent level).[21]

The second finding relates to the role of the GSP. As in Rose (2002a), GSP imparts a positive fillip to trade. The GSP coefficients are always positive and statistically and economically significant. But we would note that the disparity in effects between the GSP and the WTO are considerably less than in Rose (2002a); indeed our results suggest that the WTO has a greater economic impact than the GSP.

The proper comparison is between industrial country imports under the GSP and under the WTO. Columns 4 and 6 of Table 5 allows us to answer this question. Column (4) suggests that, in terms of industrial country imports, the GSP effect (coefficient value of 0.39) is smaller than the WTO (0.5) effect. Even if we compare industrial country imports from developing countries under the GSP and the WTO, we find that the GSP (coefficient value of 0.35) has a smaller effect than the WTO (0.39). In principle, these coefficients should be different from each other because the GSP provides for duty-free access for certain sectors whereas under the WTO the access is subject to the MFN tariff which is always non-negative. The smaller GSP coefficient suggests that product exclusions and the other restrictions under the GSP mitigate its benefits to an extent that makes it not very different from liberalization under the WTO.[22]

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[20] The F-test (with a value of 17.1) for the null hypothesis of equality of the two coefficients is rejected at the 5 percent level.

[21] The F-statistic for the null hypothesis of equality of coefficients is 1.9.

[22] When we defined the GSP and WTO dummies in a manner consistent with Rose (2002a), we find that the GSP dummy becomes negative and insignificant, while the industrial country WTO dummy remains positive and significant, albeit with a lower point estimate of 0.21 (Table 7). This is to be expected, as we are looking for the trade effect of the GSP over and above any WTO effect.

The third finding relates to the evolution in the various coefficients over time (Table 6). It is interesting that the magnitude of the coefficients on the FTA, GSP, and WTO dummies declines strikingly over time. The FTA dummy declines from 2.3 in 1970 to 0.4 in 2000 while the GSP dummy declines from 2.2 in 1975 to 0.6 in 2000. One reason for the decline in the FTA and GSP coefficients could be the reduction in average MFN tariffs—brought about by liberalization under the WTO—which reduces the value of preferential access under the GSP and free trade agreements. The temporal behavior of these coefficients could either be a testimony to the benefits of the WTO or to unilateral liberalization around the globe.

But how can one explain the decline in the magnitude of the WTO coefficient itself? There are two possible answers. First, imports by non-members of the WTO could be increasing at a differentially rapid pace because of unilateral liberalization by them. Second, it could also be the case that as the WTO expands its membership, bringing within its fold a larger share of world trade, the distinction between WTO and non-WTO membership diminishes.[23] Our analysis does not allow us to isolate these different effects.

We would conclude this section with some observations on methodology and in particular on the performance of the gravity model as we have specified it. The gravity model appears to perform well in the sense that its results seem to be consistent with what we know about the operation of the WTO, GSP, and FTAs individually and relative to each other. The trading system more broadly seems to be well explained by the gravity specifications.

First, in the aggregate panel estimations (Table 5), the FTA coefficient is significantly different from the WTO coefficient consistent with the former effecting deeper liberalization by reducing tariffs to zero.[24] In the disaggregated estimations (Table 10), this pattern continues to hold for the protected sectors. But in the unprotected sectors, the FTA and WTO coefficients, although positive and significant individually, are not statistically different from each other (at the 1 percent level) which is what we would expect given that the MFN tariff is zero: in such a case, an FTA and the WTO should produce similar outcomes. Furthermore, the fact that the industrial country WTO coefficient is greater in the unprotected sectors (Table 10) than in aggregate (Table 5) is also consistent with our priors that WTO membership should lead to more trade precisely where the institution has presided over greater liberalization.

Second, the GSP dummies are insignificant in three of the four protected sectors which is consistent with the observation that industrial countries have always tended to exempt the most protected sectors from the benefits granted to developing countries under the GSP program.[25]

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[23] Between 1970 and 2000, the percentage of observations involving imports by non-WTO members declines from 31 percent to 14 percent.

[24] The F-test (value of 85.4) rejects the null hypothesis of the equality of coefficients.

[25] Mattoo et. al. (2003) document this for the US GSP scheme.

## E. Caveats and Comments

One of our main and robust findings is that industrial country WTO membership is associated with greater trade. In our sample, however, all industrial countries are WTO members.[26] How can we be sure that we are picking up a WTO effect rather than an industrial country effect?

In response we would make a number of points. First, insofar as industrial countries have several distinguishing characteristics collectively and individually we control for them respectively through our various covariates—GDP, per capita GDP, proximity etc.—and our fixed effects. In other words, the results on the WTO dummy do not follow simply because they are richer or larger than other countries or in some ways geographically or historically distinctive. Nevertheless, it is still possible that there are residual characteristics of industrial countries that are unobservable and therefore omitted from our set of regressors, biasing our results.

Second, it is beyond the scope of this paper to demonstrate that the trade liberalization undertaken by industrial countries under the successive multilateral rounds of trade negotiations would not have occurred if there were no GATT/WTO. However, if the null hypothesis is that the various rounds of liberalization have not generated discernible patterns in trade volumes, the evidence in this paper can reject that hypothesis.

Third, there is some suggestive evidence that what we have found is a trade/WTO effect rather than a pure industrial country effect. For example, the fact that the WTO coefficient is different between protected and unprotected sectors, or that the coefficient is different between exporters that are and are not members of the WTO, or that the GSP and WTO coefficients are different for industrial countries suggest that it is trade and trade policy factors rather than industrial country status per se that underlie these differences.

Finally, in Appendix Table 8, we replicate Rose's results and report some variations. The main result is that Rose's results appear to be sensitive to the inclusion of country fixed effects:[27] when the country effects are included, the WTO dummy (when both countries are members) becomes positive and significant, with the point estimate suggesting greater trade for the average WTO member of between 14 and 34 percent over non-members.

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[26] If our sample had contained industrial countries that were not members of the WTO, we could more easily have isolated the WTO effect from the industrial country effect.

[27] See the coefficient of the WTO dummy (when both are members) in columns 2 and 4 in Appendix Table 8 which include fixed effects and their counterpart specification without fixed effects (columns 1 and 3, respectively).

## IV. SUMMARY AND CONCLUDING REMARKS

Rose (2002a) has seriously called into question the effectiveness and hence the usefulness of the WTO as a multilateral institution. His analysis implies that the WTO, whose raison d'etre is to promote trade, has failed to do so.

Our paper shows, however, that the GATT/WTO has done a splendid job of promoting trade wherever it was designed to do so and correspondingly failed to promote trade where the design of rules militated against it. The WTO has served to increase industrial country imports substantially, possibly by about 65 percent, the result of successive rounds of tariff liberalization. But it has done a less good job of increasing the imports of developing countries because developing countries were essentially exempted from the basic GATT/WTO mission of progressively lowering import barriers under the so-called principle of special and differential treatment. Luckily, given that industrial countries have accounted for nearly two-thirds of global imports during the period 1960-2000, the positive impact on global trade has been substantial, creating an additional 40 percent worth of current world trade.

Second, there is some evidence that this permissiveness of the WTO toward developing countries has changed since the Uruguay Round. The good news is that new members are significantly different from old members in that membership in the WTO for the former group is associated with an increase in trade of close to 30 percent relative to non-members. The bad news is that the Uruguay Round has had little effect on the old members, who continue to be no more open than non-WTO members even in the aftermath of the Round. Special and differential treatment of developing countries is therefore alive and well for the old members of the GATT/WTO. The latter is consistent with the actual pattern of trade liberalization undertaken, or rather not undertaken, by developing countries in the Uruguay Round.

Third, WTO membership in sectors with high protection in the industrial countries—food, clothing, and footwear—has had no impact on trade. The link between protection and trade is discernible in the data.

Indeed, our paper is also very reassuring about the basic gravity model as we have specified it. The results are consistent with what one knows about the way the WTO, GSP, and FTAs work individually and relative to each other. The trading system as a whole seems to be well explained by appropriately specified gravity equations.

We believe that our findings are important as the trading community assembles in Cancun to determine how to make the WTO more effective. Indeed, our main results provide a natural agenda for the WTO in the period ahead. First, special and differential treatment needs to be re-evaluated. In the Doha Round of trade negotiations, development concerns have largely been articulated in terms of increased market access, and provision of technical and financial assistance to developing countries are high on the agenda. Our analysis suggests that the focus on the export or market access side of special and differential treatment needs to be balanced by devoting greater attention to the import side. The permissiveness of the GATT/WTO in the past in this regard needs to be re-evaluated because, if the results of this

paper are correct, this permissiveness has had a detrimental impact on developing countries in terms of foregone trading opportunities.

Second, high protection in industrial countries in sectors such as clothing and textiles have had a similar dampening effect on trade. Liberalization in these sectors also needs to be high on the agenda of the Doha Round. This nice symmetry—the need for greater liberalization by developing countries by abandoning the embrace of S&D and for industrial countries to reduce barriers in highly protected sectors—of course sets up the possibility of striking the mutually beneficial bargains that is at the heart of the WTO-reciprocity framework. Even without venturing into uncharted territories such as investment and competition policy, there is a lot that the WTO and the Doha Development Agenda can accomplish in the good old-fashioned domain of trade in goods.

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Table 1: MFN Tariff Cuts by Industrial Countries 1/

| Implementation Period | Round | Weighted Tariff Reduction | Implied Tariff Level at period beginning 2/ |
|---|---|---|---|
| 1948-63 | First five GATT rounds (1947-62) a/ | 36 percent | 15.4 |
| 1968-72 | Kennedy Round (1964-67) b/ | 37 percent | 11.3 |
| 1980-87 | Tokyo Round (1973-79) c/ | 33 percent | 8.3 |
| 1995-99 | Uruguay Round d/ | 38 percent | 6.2 |

Source: WTO website: www.wto.org/english/thewto_e/minist_e/min99_e/english/about_e/22fact_e.htm
1/ Industrial products excluding petroleum.
2/ Derived from column 3 and applied to the 2001 tariff level of 4.5 percent reported in Finger, Ingco, and Reincke (1996).
a/ US only
b/ US, Japan, EC(6), and UK
c/ US, EU(9), Japan, Austria, Finland, Norway, Sweden and Switzerland
d/ US, EU(12), Japan, Austria, Finland, Norway, Sweden, and Switzerland

Table 2: Percentage of Tariffs "Bound"1/ in the GATT Prior to Uruguay Round

| | Industrial Countries 2/ | Developing Countries 3/ |
|---|---|---|
| Industrial Products | 84.7 | 31.8 |
| All Merchandise Trade | 80.2 | 30.1 |

1/ The terms "bound" refers to the commitment by countries in the WTO not to raise tariffs beyond a certain level. The fewer the "bound" tariffs, the less the commitment to liberalize trade barriers. The percentages are weighted averages over all product groups and by each country's MFN imports.
2/ Includes Australia, Austria, Canada, Switzerland, European Union, Finland, Hong Kong, Japan, Norway, New Zealand, Singapore, Sweden, and the U.S.
3/ Includes 21 countries for which data are available in the WTO's Integrated Data Base (see Table 1 in Finger, Ingco, and Reincke, 1996).

Source: Tables G.2 in Finger, Ingco, and Reincke (1996)

**Table 3. Use of Trade Restrictions for Balance of Payments Reasons in the GATT/WTO: Selected Examples 1/**

| | *Years of Invocation 2/* | *Duration 2/* |
|---|---|---|
| Argentina | early 1970s–91 | Approx. 20 |
| Bangladesh | early 1970s- | 30+ |
| Brazil | 1949–95 | 46 |
| Chile | 1949–late 70s | Approx. 30 |
| Colombia | 1985–92 | 7 |
| Egypt | mid-1960s–95 | Approx. 30 |
| Ghana | late 1950s–late 80s | Approx. 30 |
| India | 1949–2000 | 51 |
| Indonesia | late 1950s–early 80s | Approx. 30 |
| Korea | 1968–late 80s | Approx. 30 |
| Nigeria | 1984–98 | 14 |
| Pakistan | 1949–2001 | 52 |
| Peru | late 1960s–91 | Approx. 30 |
| Philippines | 1980–95 | 15 |
| Sri Lanka | 1949–98 | 49 |
| Tunisia | mid-1960s–97 | Approx. 30 |
| Turkey | mid-1950s–97 | Approx. 40 |

Source: GATT/WTO documents and Eglin, *World Economy* (1987).

1/ This table does not necessarily indicate how long countries have actually been using quantitative restrictions; rather, it refers to how long countries have sought legal cover for them in the GATT/WTO under Articles XII B and hence escaped multilateral pressure to eliminate the measures. The table does not include all countries that have invoked the balance-of-payments exceptions to justify trade restrictions.

2/ The years of invocation and duration are not exact.

Table 4: Tariffs in Highly Protected Sectors in the U.S. and European Union, 1989 and 2001

| | *1989* | | | | *2001* | | | |
|---|---|---|---|---|---|---|---|---|
| | *EU* | | *US* | | *EU* | | *US* | |
| Sector | Max. | Average | Max. | Average | Max. | Average | Max. | Average |
| Clothing | 23 | 16 | 36 | 17 | 13 | 12 | 33 | 13 |
| Food | 180 | 25 | 25 | 14 | 75 | 17 | 350 | 28 |
| Footwear | 20 | 13 | 48 | 25 | 17 | 17 | 48 | 22 |
| Misc. manufactures | 28 | 12 | 38 | 14 | 22 | 13 | 38 | 14 |

Source: United Nations, WITS Trade Database

The average and maximum tariffs are unweighted averages of HS-8 digit tariff lines that make up the corresponding HS 4-digit categories listed in Appendix Table 3 and grouped under the 4 categories in this table.

Table 5: Core Regressions. Panel, 1960-2000

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Distance | -1.293 | -1.289 | -0.970 | -0.970 | -0.964 | -0.960 |
| | *0.021* | *0.021* | *0.017* | *0.017* | *0.017* | *0.017* |
| Real GDP importer | 1.084 | 1.106 | 0.630 | 0.635 | 0.673 | 0.650 |
| | *0.076* | *0.076* | *0.061* | *0.061* | *0.061* | *0.061* |
| Real GDP partner | 0.137 | 0.184 | 0.300 | 0.329 | 0.309 | 0.287 |
| | *0.080* | *0.080* | *0.065* | *0.065* | *0.065* | *0.066* |
| Real GDP per capita importer | -0.008 | -0.039 | 0.246 | 0.239 | 0.196 | 0.225 |
| | *0.073* | *0.072* | *0.058* | *0.058* | *0.058* | *0.058* |
| Real GDP per capita partner | 1.236 | 1.195 | 0.666 | 0.642 | 0.652 | 0.683 |
| | *0.078* | *0.078* | *0.065* | *0.065* | *0.065* | *0.065* |
| Common language | 0.318 | 0.304 | 0.161 | 0.155 | 0.151 | 0.152 |
| | *0.040* | *0.040* | *0.032* | *0.032* | *0.032* | *0.032* |
| Common border | 0.302 | 0.313 | 0.118 | 0.120 | 0.117 | 0.118 |
| | *0.098* | *0.094* | *0.070* | *0.069* | *0.069* | *0.069* |
| Landlocked | -1.309 | -1.908 | -0.496 | -0.508 | -0.590 | -0.575 |
| | *0.448* | *0.440* | *0.540* | *0.539* | *0.539* | *0.538* |
| Island | -4.951 | -2.705 | 2.613 | 2.473 | 2.588 | 2.605 |
| | *1.132* | *0.340* | *0.742* | *0.743* | *0.738* | *0.741* |
| Area | -0.045 | 0.281 | 0.330 | 0.300 | 0.311 | 0.326 |
| | *0.088* | *0.049* | *0.130* | *0.130* | *0.129* | *0.130* |
| Common colony | 0.690 | 0.677 | 0.576 | 0.572 | 0.567 | 0.557 |
| | *0.066* | *0.065* | *0.053* | *0.053* | *0.053* | *0.054* |
| Current colony | 0.590 | 0.548 | 0.742 | 0.727 | 0.781 | 0.751 |
| | *0.259* | *0.262* | *0.173* | *0.174* | *0.171* | *0.174* |
| Ever colony | 1.407 | 1.398 | 1.174 | 1.171 | 1.179 | 1.176 |
| | *0.090* | *0.088* | *0.065* | *0.065* | *0.065* | *0.065* |
| Common currency | 0.952 | 0.957 | 0.679 | 0.685 | 0.707 | 0.695 |
| | *0.124* | *0.123* | *0.089* | *0.089* | *0.088* | *0.089* |
| Free trade area | 0.667 | 1.170 | 0.739 | 0.943 | 0.950 | 0.946 |
| | *0.081* | *0.080* | *0.050* | *0.056* | *0.056* | *0.056* |
| GSP | 0.314 | 1.351 | 0.009 | 0.387 | 0.382 | 0.350 |
| | *0.054* | *0.090* | *0.041* | *0.061* | *0.061* | *0.063* |
| WTO member | -0.174 | | 0.081 | | | |
| | *0.030* | | *0.024* | | | |
| Industrial country WTO member | | 0.963 | | 0.499 | | |
| | | *0.083* | | *0.055* | | |
| Developing country WTO member | | -0.280 | | 0.029 | | |
| | | *0.031* | | *0.025* | | |
| Industrial country importer and partner WTO members | | | | | 0.578 | |
| | | | | | *0.056* | |
| Industrial country importer WTO member, but not partner | | | | | 0.292 | |
| | | | | | *0.066* | |
| Developing country importer and partner WTO members | | | | | -0.007 | |
| | | | | | *0.026* | |
| Developing country importer WTO member, but not partner | | | | | 0.091 | |
| | | | | | *0.044* | |
| Industrial country importer WTO member, partner industrial country | | | | | | 0.614 |
| | | | | | | *0.061* |
| Industrial country importer WTO member, partner developing country | | | | | | 0.392 |
| | | | | | | *0.061* |
| Developing country importer WTO member, partner industrial country | | | | | | 0.048 |
| | | | | | | *0.035* |
| Developing country importer WTO member, partner developing country | | | | | | -0.015 |
| | | | | | | *0.033* |
| Importer and exporter fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Time effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 63641 | 63641 | 46081 | 46081 | 46081 | 46081 |
| Sample | All imports | | All imports excluding values less than $500,000 | | | |
| R-square | 0.724 | 0.726 | 0.743 | 0.744 | 0.744 | 0.744 |
| Root mean square error | 1.752 | 1.748 | 1.132 | 1.131 | 1.129 | 1.130 |
| F-test 1/ | | | | 11.1, 85.44, 109.85 | 40.68, 5.18 | 17.05, 1.88 |

1/ Column 4. Numbers correspond to the following three null hypotheses: GSP=WTO, FTA=WTO, FTA=GSP

Column 5. Exporter in WTO = Exporter not in WTO for industrial country and developing country WTO importers, respectively

Column 6. Industrial country exporter = Developing country exporter for industrial and developing country importers, respectively

Regressand: log real imports. Robust standard errors (clustered by country-pairs) reported below coefficient estimates.

Table 6: Cross-Section Results

| | 1965 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|---|
| FTA | 1.388 | 2.086 | 1.765 | 1.908 | 1.037 | 1.087 | 0.781 | 0.671 |
| | *0.255* | *0.217* | *0.172* | *0.170* | *0.162* | *0.147* | *0.122* | *0.076* |
| GSP | | 1.164 | 2.264 | 2.301 | 0.912 | 0.547 | 0.494 | 0.447 |
| | | *0.367* | *0.200* | *0.191* | *0.193* | *0.174* | *0.153* | *0.105* |
| Industrial country WTO member | 1.624 | 1.978 | 2.286 | 2.331 | 1.201 | 0.904 | 0.578 | 0.622 |
| | *0.278* | *0.268* | *0.196* | *0.185* | *0.188* | *0.166* | *0.146* | *0.097* |
| Developing country WTO member | 0.047 | 0.445 | -0.065 | 0.050 | -0.042 | -0.169 | -0.119 | 0.070 |
| | *0.464* | *0.261* | *0.074* | *0.070* | *0.066* | *0.058* | *0.053* | *0.049* |
| Importer and exporter fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.749 | 0.756 | 0.747 | 0.760 | 0.762 | 0.783 | 0.785 | 0.787 |
| Number of observations | 2892 | 3523 | 4577 | 5113 | 5594 | 6227 | 7618 | 8369 |
| Root mean square error | 1.035 | 1.035 | 1.142 | 1.129 | 1.090 | 1.075 | 1.077 | 1.106 |

Regressand: log real imports.

Robust standard errors reported below coefficient estimates. Intercepts and other (standard) covariates not reported for ease of presentation.

Table 7. Robustness Checks

| *Specification* | *FTA* | *GSP* | *Industrial WTO member* | *Developing WTO member* |
|---|---|---|---|---|
| Additional quadratic gravity terms | 0.988 | 0.446 | 0.583 | 0.053 |
| (for real GDP and real GDP per capita) | *0.055* | *0.060* | *0.054* | *0.025* |
| Rose definition of GSP and WTO dummies | 0.688 | -0.047 | 0.211 | 0.022 |
| (i.e. not defined mutuually exclusively) | *0.046* | *0.023* | *0.069* | *0.027* |
| Weighted least squares (log imports as weight) | 0.894 | 0.439 | 0.535 | 0.024 |
| | *0.055* | *0.060* | *0.055* | *0.025* |
| Weighted least squares (log real GDP as weight) | 0.933 | 0.411 | 0.516 | 0.027 |
| | *0.055* | *0.061* | *0.055* | *0.025* |
| Weighted least squares (log real GDP per capita as weight) | 0.895 | 0.391 | 0.493 | 0.008 |
| | *0.055* | *0.060* | *0.055* | *0.026* |
| Country-pair random effects | 0.712 | 0.083 | 0.180 | 0.118 |
| | *0.039* | *0.043* | *0.039* | *0.018* |
| Country-pair fixed effects | 0.631 | 0.014 | 0.109 | 0.155 |
| | *0.043* | *0.046* | *0.041* | *0.019* |
| Excluding values of log imports 3 s.d. away from mean | 0.951 | 0.368 | 0.480 | 0.031 |
| | *0.056* | *0.061* | *0.055* | *0.025* |
| Excluding values of imports 2 s.d. away from mean | 0.978 | 0.314 | 0.426 | 0.041 |
| | *0.058* | *0.061* | *0.056* | *0.025* |

Regressand: log real imports
Robust s tandard errors (clustered by country-pairs) reported below coefficient estimates. Intercepts and coefficients for standard covariates not reported for ease of presentation. All regressions include time effects and, with the exception of the regression with country-pair effects, also include importer and exporter fixed effects.

Table 8: New and Old Developing Country Members in the WTO 1/

| *Time period for regressions* | *2000* | | | | | | *1995* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| FTA | 0.680 | 0.680 | 0.672 | 0.673 | 0.648 | 0.622 | 0.794 | 0.798 | 0.802 | 0.799 | 0.785 |
| | *0.076* | *0.076* | *0.076* | *0.076* | *0.076* | *0.075* | *0.122* | *0.123* | *0.123* | *0.123* | *0.123* |
| GSP | 0.452 | 0.452 | 0.444 | 0.444 | 0.413 | 0.380 | 0.502 | 0.507 | 0.513 | 0.509 | 0.491 |
| | *0.104* | *0.104* | *0.105* | *0.105* | *0.104* | *0.104* | *0.152* | *0.153* | *0.153* | *0.153* | *0.152* |
| Industrial country WTO member | 0.630 | 0.630 | 0.622 | 0.622 | 0.597 | 0.570 | 0.588 | 0.593 | 0.598 | 0.594 | 0.579 |
| | *0.096* | *0.096* | *0.096* | *0.096* | *0.096* | *0.096* | *0.146* | *0.147* | *0.147* | *0.147* | *0.146* |
| Old member | -0.005 | -0.005 | 0.021 | 0.023 | 0.006 | -0.014 | -0.153 | -0.148 | -0.143 | -0.144 | -0.151 |
| | *0.050* | *0.050* | *0.051* | *0.051* | *0.051* | *0.050* | *0.053* | *0.053* | *0.054* | *0.055* | *0.054* |
| New member (1990) | 0.297 | | | | | | 0.053 | | | | |
| | *0.070* | | | | | | *0.078* | | | | |
| New member (1991) | | 0.297 | | | | | | 0.065 | | | |
| | | *0.070* | | | | | | *0.095* | | | |
| New member (1992) | | | 0.286 | | | | | | 0.089 | | |
| | | | *0.086* | | | | | | *0.109* | | |
| New member (1993) | | | | 0.282 | | | | | | 0.075 | |
| | | | | *0.089* | | | | | | *0.114* | |
| New member (1994) | | | | | 0.218 | | | | | | 0.042 |
| | | | | | *0.098* | | | | | | *0.144* |
| New member (1995) | | | | | | 0.093 | | | | | |
| | | | | | | *0.118* | | | | | |
| Importer and exporter fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations with new members | 751 | 634 | 570 | 551 | 377 | 234 | 566 | 432 | 387 | 373 | 178 |
| F-test for equality of coefficients 2/ | 12.53 | 12.53 | 8.49 | 7.89 | 4.40 | 0.77 | 4.72 | 4.33 | 4.47 | 3.78 | 1.82 |
| Prob > F | 0.000 | 0.000 | 0.004 | 0.005 | 0.036 | 0.382 | 0.030 | 0.038 | 0.035 | 0.052 | 0.177 |
| R-square | 0.787 | 0.787 | 0.787 | 0.787 | 0.787 | 0.787 | 0.785 | 0.785 | 0.785 | 0.785 | 0.785 |
| Number of observations with new members | 8369 | 8369 | 8369 | 8369 | 8369 | 8369 | 7618 | 7618 | 7618 | 7618 | 7618 |
| Root mean square error | 1.105 | 1.105 | 1.105 | 1.106 | 1.106 | 1.106 | 1.076 | 1.076 | 1.076 | 1.076 | 1.076 |

1/ Cut-off date for defining new member is in brackets.

2/ Between old and new member.

Regressand: log real imports

Robust standard errors reported below coefficient estimates. Intercepts and coefficients for standard covariates not reported for ease of presentation.

Table 9: Tariff Bindings and
Reductions of Developing Countries in the Uruguay Round 1/

| | |
|---|---|
| Percent of lines bound pre-Uruguay Round | 30.1 |
| Percent of lines bound post-Uruguay Round | 80.8 |
| Percent of lines unaffected by tariff reductions in Uruguay Round | 72.3 |
| Percentage tariff reduction on lines affected by tariff reductions | 8.1 |
| Post-Uruguay Round applied rate | 13.3 |
| Post-Uruguay Round bound rate | 25.2 |

1/ Includes 21 countries for which data are available in the WTO's Integrated Data Base (see Table 1 in Finger, Ingco, and Reincke, 1996).

Source: Finger, Ingco, and Reincke (1996)

Table 10: Sectoral Results, Panel, 1990-2000
(Seemingly Unrelated Regressions)

| | Unprotected manufacturing | Highly protected manufactures 1/ | Clothing | Footwear | Food |
|---|---|---|---|---|---|
| FTA | 0.432 | 0.494 | 0.709 | 0.343 | 0.176 |
| | *0.108* | *0.180* | *0.150* | *0.201* | *0.211* |
| GSP, excluding FTA | 0.724 | -0.385 | 0.740 | -0.743 | 0.064 |
| | *0.150* | *0.249* | *0.207* | *0.277* | *0.292* |
| Industrial country WTO member | 0.618 | 0.076 | 0.294 | -0.240 | -0.866 |
| | *0.132* | *0.219* | *0.182* | *0.243* | *0.257* |
| Developing country WTO member | 0.096 | -0.080 | -0.071 | -0.295 | -0.681 |
| | *0.080* | *0.133* | *0.110* | *0.147* | *0.155* |
| Importer and exporter fixed effects | Yes | Yes | Yes | Yes | Yes |
| Time effects | Yes | Yes | Yes | Yes | Yes |
| Chi-square test for equality of coefficients 2/ | | 6.70 | 2.98 | 13.21 | 30.37 |
| Prob>chi-square | | 0.01 | 0.08 | 0.00 | 0.000 |
| Number of observations | 4035 | 4035 | 4035 | 4035 | 4035 |
| R-squared | 0.861 | 0.702 | 0.793 | 0.647 | 0.598 |
| Root mean squared error | 1.052 | 1.751 | 1.455 | 1.945 | 2.050 |

1/ Excludes clothing and footwear.

2/ Between industrial country dummy in unprotected manufacturing and that in each of the other sectors.

Regressand: log real imports. Robust standard errors (clustered by country-pairs) reported below coefficient estimates. Intercepts and coefficients for all the standard covariates listed in Table 5 are not reported for ease of presentation.

## Appendix : Data Description and Sources

*Aggregate estimations*

Estimating the model requires data on bilateral aggregate trade, incomes, population, distance, as well as geographical, cultural, and historical information. The study uses a panel data set which covers 172 Fund member countries during the five-year periods from 1960 to 2000. The list of countries in the sample is presented in Appendix Table 1.

Our data set is a slightly modified and updated version of Rose's (2002a) data set, which is downloadable from Andrew Rose's web-site. That paper describes the data set in detail, and we will only comment on a few data issues here. We use bilateral imports rather than trade as the regressand which we obtain from the IMF's *Direction of Trade Statistics*. Bilateral imports are those reported by the importing country and measured in U.S. dollars and deflated by US CPI (1982–1983 prices) for urban areas (available from freelunch.com). Real GDP, per capita GDP and population data come from the World Bank's *World Development Indicators* (WDI). WTO and FTA dummies for 2000 are extended based on the information available from the WTO official web site (wto.org).

*Data and sources for disaggregated estimations*

The TRAINS (Trade Analysis Information System) of the UNCTAD contains information on tariff and nontariff barriers at the most detailed commodity level. We utilize the US and EU MFN tariff schedules for 1989 and 2001 that are reported in 8-digit HS 1988/1992 and HS 1996 classifications, respectively.[28]

Our objective is to determine the list of industries subject to high and zero protection both in the US and EU for 1989 and 2001 respectively.[29] We use ad valorem rates for these purposes.[30] For each product at 4-digit disaggregation level we calculate a simple average of ad valorem rates applied to all 8-digit subsections within that product. We treat a given industry as protected if its average ad valorem tariff rate both in the US and the EU exceeded 10 percent. Similarly, a given 4-digit industry is considered to be unprotected if all the 8-digit subsections have zero tariffs (both ad valorem and non-ad valorem).

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[28] The 1989 EU tariff lines do not have MFN rates but instead conventional and autonomous rates are reported. We treat conventional tariff rates as MFN rates since they apply to the imports originating in WTO member countries. When conventional tariff rates do not exist for a product the autonomous rates are applied.

[29] The last two decades witnessed gradual decline in trade barriers. For industries with no protection we use 1989 data since industries that were not subject to trade barriers are also likely to be so in 2001. Applying the same logic we use 2001 tariff schedules for the list of highly protected industries.

[30] We cannot make use of non-ad valorem tariff rates since their use requires information on prices.

There are thirty three and forty one 4-digit industries that qualify as protected and unprotected, respectively. For each protected and unprotected industry, we obtain bilateral import data in 1990, 1995, and 2000 which cover 147 countries. The import data which come from the United Nations' COMTRADE database are disaggregated at the HS 1988/1992, 4-digit level and are deflated by US urban CPI (1982–1984 prices).[31] We define four broad product categories—food, clothing, footwear, and miscellaneous manufacturing and, then, sort protected and unprotected industries by categories.[32] Not surprisingly, all unprotected industries fall into the miscellaneous manufacturing category. For a given year and country pair we obtain the value of imports in each broad category by summing bilateral imports of all products within that category. Thus, for protected industries our data contain bilateral imports in food, clothing, footwear, and manufacturing. All industries with zero tariff rates are aggregated into unprotected manufacturing. The remaining variables are the same as those used in the aggregate estimations.

[31] Since the list of unprotected industries is obtained using tariff line for 2001 which is reported in HS 1996 classification, we use the concordance from HS 1996 to HS 1988/1992.

[32] See Appendix Table 3 for the list of industries by level of protection and broad category.

Appendix Table 1. Descriptive Statistics

| *Variable* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|
| Log imports | 12.01 | 2.23 | 8.52 | 21.01 |
| Log distance | 8.11 | 0.85 | 3.78 | 9.42 |
| Log real GDP importing country | 23.97 | 2.38 | 17.03 | 29.41 |
| Log real GDP partner country | 24.23 | 2.23 | 16.99 | 29.41 |
| Log real per capita GDP importing country | 7.73 | 1.63 | 4.09 | 10.52 |
| Log real per capita GDP partner country | 7.78 | 1.62 | 4.07 | 10.52 |
| Number landlocked | 0.23 | 0.45 | 0.00 | 2.00 |
| Number islands | 0.29 | 0.51 | 0.00 | 2.00 |
| Common land border | 0.04 | 0.19 | 0.00 | 1.00 |
| Common language | 0.23 | 0.42 | 0.00 | 1.00 |
| Common colony | 0.08 | 0.26 | 0.00 | 1.00 |
| Ever colony | 0.03 | 0.18 | 0.00 | 1.00 |
| Current colony | 0.00 | 0.04 | 0.00 | 1.00 |
| Common currency | 0.01 | 0.11 | 0.00 | 1.00 |
| Log product land area | 24.69 | 3.06 | 11.39 | 32.77 |
| Free trade area | 0.03 | 0.18 | 0.00 | 1.00 |
| GSP (excl. FTAs) | 0.16 | 0.37 | 0.00 | 1.00 |
| Developing country WTO member (excl. FTAs and GSP) | 0.17 | 0.37 | 0.00 | 1.00 |
| Industrial country WTO member (excl. FTAs and GSP) | 0.28 | 0.45 | 0.00 | 1.00 |

46081 observations, spanning every five years between 1960 and 2000

Sources: Rose (2002a) and IMF's Direction of Trade Statistics (see Appendix).

Appendix Table 2: List of Countries in the Sample
(Dates of GATT/WTO accession in parenthesis)

**Industrial Countries:**

AUSTRALIA (1948)
AUSTRIA (1951)
BELGIUM (1948)
CANADA (1948)
DENMARK (1950)
FINLAND (1950)
FRANCE (1948)
GERMANY (1951)
GREECE (1950)
ICELAND (1968)
IRELAND (1967)
ITALY (1950)
JAPAN (1955)
LUXEMBOURG (1948)
NETHERLANDS (1948)
NEW ZEALAND (1948)
NORWAY (1948)
PORTUGAL (1962)
SPAIN (1963)
SWEDEN (1950)
SWITZERLAND (1966)
UNITED KINGDOM (1948)
UNITED STATES (1948)

**Developing Countries**

ALBANIA (2000)
ALGERIA
ANGOLA (1994)
ANTIGUA AND BARBUDA (1987)
ARGENTINA (1967)
ARMENIA
AZERBAIJAN
BAHAMAS
BAHRAIN (1993)
BANGLADESH (1972)
BARBADOS (1967)
BELARUS
BELIZE (1983)
BENIN (1996)
BERMUDA (1948)
BHUTAN
BOLIVIA (1990)
BOTSWANA (1987)
BRAZIL (1948)
BULGARIA (1996)
BURKINA FASO (1963)
BURMA(Myanmar) (1948)
BURUNDI (1965)
CAMBODIA
CAMEROON (1963)
CAPE VERDE
CENTRAL AFRICAN REP. (1963)
CHAD (1963)
CHILE (1949)
CHINA (2001)
COLOMBIA (1981)
COMOROS (1948)
CONGO, DEM. REP. OF (ZAIRE) (1971)
CONGO, REP. OF (1963)
COSTA RICA (1990)
COTE D'IVORIE (IVORY COAST) (1963)
CROATIA (2000)
CYPRUS (1963)
CZECH REPUBLIC (1993)
DJIBOUTI (1994)
DOMINICA (1993)
DOMINICAN REP. (1950)
ECUADOR (1996)
EGYPT (1970)
EL SALVADOR (1991)
EQUATORIAL GUINEA
ESTONIA (1999)
ETHIOPIA
FIJI (1993)
GABON (1963)
GAMBIA (1965)
GEORGIA (2000)
GHANA (1957)
GRENADA (1994)
GUATEMALA (1991)
GUINEA (1994)
GUINEA-BISSAU (1994)
GUYANA (1966)
HAITI (1950)
HONDURAS (1994)
HONG KONG (1986)
HUNGARY (1973)
INDIA (1948)
INDONESIA (1950)
IRAN
IRAQ
ISRAEL (1962)
JAMAICA (1963)
JORDAN (2000)
KAZAKHSTAN
KENYA (1964)
KIRIBATI
KOREA,SOUTH(R) (1967)
KUWAIT (1963)
KYRQYZ REPUBLIC (1998)
LAO PEOPLE'S DEM. REP.
LATVIA (1999)
LESOTHO (1988)
LIBERIA
LIBYA
LITHUANIA (2001)
MACEDONIA
MADAGASCAR (1963)
MALAWI (1964)
MALAYSIA (1957)
MALDIVES (1983)
MALI (1993)
MALTA (1964)
MAURITANIA (1963)
MAURITIUS (1970)
MEXICO (1986)
MOLDVA (2001)
MONGOLIA (1997)
MOROCCO (1987)
MOZAMBIQUE (1992)
NAMIBIA (1992)
NEPAL
NICARAGUA (1950)
NIGER (1963)
NIGERIA (1960)
OMAN (2000)
PAKISTAN (1948)
PANAMA (1997)
PAPUA N.GUINEA (1994)
PARAGUAY (1994)
PERU (1951)
PHILIPPINES (1979)
POLAND (1967)
QATAR (1994)
REUNION (1948)
ROMANIA (1971)
RUSSIA
RWANDA (1966)
SAMOA
SAO TOME & PRINCIPE
SAUDI ARABIA
SENEGAL (1963)
SEYCHELLES
SIERRA LEONE (1961)
SINGAPORE (1973)
SLOVAK REPUBLIC (1993)
SLOVENIA (1994)
SOLOMON ISLANDS (1994)
SOMALIA
SOUTH AFRICA (1948)
SRI LANKA (1948)
ST. KITTS&NEVIS (1994)
ST.LUCIA (1993)
ST.VINCENT&GRE (1993)
SUDAN
SURINAME (1978)
SWAZILAND (1993)
SYRIA
TAJIKISTAN
TANZANIA (1961)
THAILAND (1982)
TOGO (1964)
TONGA
TRINIDAD&TOBAGO (1962)
TUNISIA (1990)
TURKEY (1951)
TURKMENISTAN
UGANDA (1962)
UKRAINE
UNITED ARAB EMIRATES (1994)
URUGUAY (1953)
UZBEKISTAN
VANUATU
VENEZUELA (1990)
VIETNAM
YEMEN, REPUBLIC OF
YUGOSLAVIA, SOCIALIST FED. REP. OF (1966)
ZAMBIA (1982)
ZIMBABWE (1948)

Sources: Rose (2002a) and WTO website on accession (http://www.wto.org/english/thewto_e/acc_e/acc_e.htm).

Appendix Table 3. List of "New" Members
(defined according to various cut-off dates listed below)

| *1990* | *1991* | *1992* | *1993* | *1994* | *1995* |
|---|---|---|---|---|---|
| Bolivia | El Salvador | | | | |
| Costa Rica | Guatemala | Mozambique | Bahrain | Angola | Brunei |
| Tunisia | Mozambique | Namibia | Czech Republic | Djibouti | Benin |
| Venezuela | Namibia | Bahrain | Dominica | Grenada | Bulgaria |
| El Salvador | Bahrain | Czech Republic | Fiji | Guinea | Ecuador |
| Guatemala | Czech Republic | Dominica | Mali | Guinea-Bissau | Mongolia |
| Mozambique | Dominica | Fiji | Slovak Republic | Honduras | Panama |
| Namibia | Fiji | Mali | St. Lucia | Papua New Guinea | Kyrgyz Republic |
| Bahrain | Mali | Slovak Republic | St. Vincent and Grenadines | Paraguay | Estonia |
| Czech Republic | Slovak Republic | St. Lucia | Swaziland | Qatar | Latvia |
| Dominica | St. Lucia | St. Vincent and Grenadines | Angola | Slovenia | Albania |
| Fiji | St. Vincent and Grenadines | Swaziland | Djibouti | Solomon Islands | Croatia |
| Mali | Swaziland | Angola | Grenada | St. Kitts and Nevis | Georgia |
| Slovak Republic | Angola | Djibouti | Guinea | United Arab Emirates | Jordan |
| St. Lucia | Djibouti | Grenada | Guinea-Bissau | | Oman |
| St. Vincent and Grenadines | Grenada | Guinea | Honduras | | |
| Swaziland | Guinea | Guinea-Bissau | Papua New Guinea | | |
| Angola | Guinea-Bissau | Honduras | Paraguay | | |
| Djibouti | Honduras | Papua New Guinea | Qatar | | |
| Grenada | Papua New Guinea | Paraguay | Slovenia | | |
| Guinea | Paraguay | Qatar | Solomon Islands | | |
| Guinea-Bissau | Qatar | Slovenia | St. Kitts and Nevis | | |
| Honduras | Slovenia | Solomon Islands | United Arab Emirates | | |
| Papua New Guinea | Solomon Islands | St. Kitts and Nevis | Brunei | | |
| Paraguay | St. Kitts and Nevis | United Arab Emirates | Benin | | |
| Qatar | United Arab Emirates | Brunei | Bulgaria | | |
| Slovenia | Brunei | Benin | Ecuador | | |
| Solomon Islands | Benin | Bulgaria | Mongolia | | |
| St. Kitts and Nevis | Bulgaria | Ecuador | Panama | | |
| United Arab Emirates | Ecuador | Mongolia | Kyrgyz Republic | | |
| Brunei | Mongolia | Panama | Estonia | | |
| Benin | Panama | Kyrgyz Republic | Latvia | | |
| Bulgaria | Kyrgyz Republic | Estonia | Albania | | |
| Ecuador | Estonia | Latvia | Croatia | | |
| Mongolia | Latvia | Albania | Georgia | | |
| Panama | Albania | Croatia | Jordan | | |
| Kyrgyz Republic | Croatia | Georgia | Oman | | |
| Estonia | Georgia | Jordan | | | |
| Latvia | Jordan | Oman | | | |
| Albania | Oman | | | | |
| Croatia | | | | | |
| Georgia | | | | | |
| Jordan | | | | | |
| Oman | | | | | |

Source: WTO's website on accession (http://www.wto.org/english/thewto_e/acc_e/acc_e.htm) and based on definitions described in text.

Appendix Table 4: List of Countries in the Disaggregate Estimations

Albania
Algeria
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahamas, The
Bahrain, Kingdom of
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bolivia
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cameroon
Canada
Central African Rep.
Chad
Chile
China,P.R.: Mainland
China,P.R.:Hong Kong
Colombia
Comoros
Congo, Republic of
Costa Rica
Croatia
Cyprus
Czech Republic
Côte d'Ivoire
Denmark
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Estonia
Ethiopia
Fiji
Finland
France
Gabon
Gambia, The
Georgia
Germany
Ghana
Greece
Grenada
Guatemala
Guinea
Haiti
Honduras
Hungary
Iceland
India
Indonesia
Iran, I.R. of
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Korea
Kuwait
Kyrgyz Republic
Latvia
Lithuania
Luxembourg
Macedonia, FYR
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Mauritius
Mexico
Moldova
Morocco
Mozambique
Nepal
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Romania
Russia
Rwanda
Samoa
Saudi Arabia
Senegal
Seychelles
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sri Lanka
St. Kitts and Nevis
St. Lucia
St. Vincent & Grens.
Sudan
Suriname
Sweden
Switzerland
Syrian Arab Republic
Tanzania
Thailand
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Vanuatu
Venezuela, Rep. Bol.
Vietnam
Yemen, Republic of
Zambia
Zimbabwe

Sources: United Ntaions' TRAINS and COMTRADE databases.

Appendix Table 5: List of sectors by classification

| *A. Sectors with high tariff barriers in 1989* | | *B. Sectors with zero tariff barriers in 2001* | |
|---|---|---|---|
| HS 1988/1992 | DESCRIPTION | HS 1988/1992 | DESCRIPTION |
| | **FOOD** | | **UNPROTECTED MANUFACTURING** |
| 0704 | Cabbages, cauliflowers, kohlrabi, kale...etc, f | 3704 | Photographic plates, film, paper..., exposed bu |
| 0710 | Vegetables, frozen | 3706 | Cinematographic film, exposed and developed |
| 1517 | Margarine; edible preparations of animal or veg | 4901 | Printed books, brochures, leaflets and similar |
| 1901 | Malt extract; food preparations of flour, etc , | 4902 | Newspapers, journals and periodicals |
| 2002 | Tomatoes prepared or preserved otherwise than b | 4904 | Music, printed or in manuscript |
| 2403 | Other manufactured tobacco and substitutes; hom | 4905 | Maps, etc (incl. atlases, wall maps...), printe |
| | | 4907 | New stamps; stamp-impressed paper; banknotes; c |
| | **CLOTHING** | 4911 | Other printed matter, including printed picture |
| 5111 | Woven fabrics of carded wool or of carded fine | 8408 | Compression-ignition,combustion piston engines( |
| 5112 | Woven fabrics of combed wool or of combed fine | 8409 | Accessory parts suitable for engines of heading |
| 6101 | Men's or boys' overcoats... and similar article | 8411 | Turbo-jets,turbo-propellers and other gas turbi |
| 6102 | Woman's or girls' overcoats and similar article | 8413 | Pumps for liquids,with or without measuringdevi |
| 6103 | Men's or boys' suits, ensembles, etc, knitted o | 8414 | Air or vacuum pumps,exhausting and compression |
| 6104 | Women's or girls' suits, ensembles, etc, knitte | 8419 | Machinery,plant or lab equipment for all purpos |
| 6105 | Men's or boys' shirts, knitted or crocheted | 8424 | Mechanical appliances for projecting,stem,sand |
| 6106 | Women's or girls' blouses, etc, knitted or croc | 8471 | Automatic data processing,magnetic,optical read |
| 6109 | T-shirts, singlets and other vests, knitted or | 8483 | Transmission shafts,cranks,clutches,sahft coupl |
| 6110 | Jerseys, pullovers, cardigans and similar artic | 8501 | Electric motors and generators |
| 6111 | Babies' garments and clothing accessories, knit | 8516 | Electric instantaneous,domestic appliances,othe |
| 6112 | Track-suits, ski-suits and swimwear, knitted or | 8524 | Records,tapes for sound/ similarly roecorded ph |
| 6114 | Other garments, knitted or crocheted, nes | 8539 | Electtic filament,discharge lemps,ulta-violet,i |
| 6115 | Panty hose, tights, etc, and footwear, knitted | 8802 | Other aircraft,spacecraft,and spacecrats launch |
| 6203 | Men's or boys' suits, ensembles, jackets, blaze | 8803 | Parts of goods of heading No. 88.01,88.02 |
| 6204 | Women's or girls' suits, ensembles, jackets, bl | 8805 | Aircraft launching gear,deck-arrestor,parts of |
| 6206 | Women's or girls' blouses, shirts and shirt-blo | 8901 | Cruise ships,excursion/ferry-boats,similar for |
| 6209 | Bables' garments and clothing accessories | 8902 | Fishing vessels;factory ships other for process |
| 6211 | Track suits, ski suits and swimwear; other than | 8903 | Yachts,other vessels for pleasure/sports,rowing |
| 6303 | Curtains (incl. drapes) and interior blinds; cu | 8904 | Tugs and pusher craft |
| 6308 | Sets of woven fabric and yarn, for making up in | 8905 | Navigation vessels,floating or submersible dril |
| | | 8906 | Other vessels including warships,lifeboats othe |
| | **FOOTWEAR** | 8908 | Vessels and other floating structures for break |
| 6401 | Waterproof footwear... | 9014 | Direction finding conpasses;other navigational |
| 6402 | Other footwear with outer soles and uppers of r | 9020 | Other breathing appliances,gas masks,neither me |
| 6404 | Footwear with rubber, plastic, leather soles an | 9029 | Revolution counters,mileomoters,pedometers & th |
| | | 9305 | Parts,accessories of articles of heading 93.01 |
| | **HIGHLY PROTECTED MANUFACTURING** | 9506 | Articles,equipments for general physical exerci |
| 6911 | Tableware,kitchenware,other household,toilet ar | 9601 | Worked ivory,bone,tottoise-shell,coral,other an |
| 7013 | Glass articles used for indoor decoration or si | 9701 | Hand made decorative materials,other than paint |
| 8704 | Motor vehicles for the transport of goods | 9702 | Original engravings,prints,lithographs |
| | | 9703 | Original sculptures and statuary,in any materia |
| | | 9704 | Postage,revenue stamps,pastal stationery,and th |

Source: United Nations' TRAINS database.

## Appendix Table 6: List of Free Trade Areas/Customs Unions

Data on free trade areas and customs union (FTAs) for the years 1950-1995 comes from Rose (2002a). For 2000, we use the WTO's website on regional agreements (www.wto.org/english/tratop_e/region_e/regfac_e.htm) by selecting all agreements notified to the WTO whose date of entry into force fell between 1996 and 2000. Thus, the FTAs covered in our sample include:

ASEAN
EEC/EC/EU
US-Israel
NAFTA
CARICOM
Turkey — Slovenia
EC — Slovenia
EC — Lithuania
EC — Estonia
EC — Latvia
Chile — Mexico
Chile — Mexico
Mexico — Israel
Georgia — Armenia
Georgia — Azerbaijan
Georgia — Kazakhstan
Georgia — Turkmenistan
Georgia — Ukraine
Latvia — Turkey
Turkey — Former Yugoslav Republic of Macedonia
EC — South Africa
EC — Morocco
EC — Israel
EC — Mexico
Estonia — Ukraine
Poland — Turkey
EFTA — Morocco
Bulgaria — Former Yugoslav Republic of Macedonia
Hungary — Latvia
Hungary — Lithuania
Poland — Latvia
Poland — Faroe Islands
Kyrgyz Republic — Moldova
Kyrgyz Republic — Ukraine
Kyrgyz Republic — Uzbekistan
Bulgaria — Turkey
Czech Republic — Turkey
EAEC
CEFTA accession of Bulgaria
Slovak Republic — Turkey
PATCRA
ANZCERTA
CACM
SPARTECA
Mercosur
EC — Tunisia
Estonia — Turkey
Slovenia — Israel
Poland — Israel
Estonia — Faroe Islands
Czech Republic — Estonia
Slovak Republic — Estonia
Lithuania — Turkey
Israel — Turkey
Romania — Turkey
Hungary — Turkey
Czech Republic — Israel
Slovak Republic — Israel
Slovenia — Croatia
Hungary — Israel
CEFTA accession of Romania
CEFTA accession of Slovenia
Poland — Lithuania
Slovak Republic — Latvia
Slovak Republic — Lithuania
Canada — Chile
Czech Republic — Latvia
Czech Republic — Lithuania
Canada — Chile
Slovenia — Estonia
Slovenia — Former Yugoslav Republic of Macedonia
Slovenia — Latvia
Slovenia — Lithuania
EC — Faroe Islands
Canada — Israel
EC — Slovenia
EFTA — Estonia
EFTA — Latvia
EFTA — Lithuania
EC — Turkey

Sources: Rose (2002a) and WTO's website on regional agreements (www.wto.org/english/tratop_e/region_e/regfac_e.htm)

Appendix Table 7: Composition of Sample in Core Specification 1/
(corresponding to columns 3-6 in Table 5)

| | Number of Observations |
|---|---|
| FTA | 1586 |
| of which industrial country importers | 805 |
| GSP (excluding FTA) | 7357 |
| Industrial country importing members of WTO (excl. GSP andd FTA) | 7784 |
| Developing country importing members of WTO (excl. GSP and FTA) | 12957 |
| Other (=developing countries not members of the WTO) | 15592 |
| Total | 46081 |
| | |
| *Memorandum items* | |
| GSP including FTAs | 7528 |
| Industrial country WTO importers | 15946 |
| of which: in FTAs | 805 |
| in GSP | 7515 |
| in FTAs and GSP | 158 |
| Developing country WTO importers | 19062 |
| of which: in FTAs | 533 |

1/ That is, for sample comprising trade values greater than $500,000

Appendix Table 8. Sensitivity of Core Specification of Rose (2002a)

| | | | | |
|---|---|---|---|---|
| Log distance | -1.152 | -1.349 | -1.149 | -1.347 |
| | *0.024* | *0.025* | *0.024* | *0.025* |
| Log product real gdp | 0.941 | 0.240 | 0.938 | 0.215 |
| | *0.010* | *0.059* | *0.010* | *0.059* |
| Log product real per capita GDP | 0.252 | 0.260 | 0.253 | 0.288 |
| | *0.015* | *0.055* | *0.015* | *0.055* |
| Common language | 0.339 | 0.294 | 0.332 | 0.294 |
| | *0.044* | *0.047* | *0.045* | *0.047* |
| Common border | 0.550 | 0.328 | 0.546 | 0.323 |
| | *0.119* | *0.113* | *0.119* | *0.112* |
| Landlocked | -0.292 | 0.966 | -0.292 | 1.108 |
| | *0.037* | *0.309* | *0.037* | *0.309* |
| Island | 0.051 | 1.897 | 0.051 | 1.866 |
| | *0.038* | *0.247* | *0.038* | *0.247* |
| Log product area | -0.104 | 0.475 | -0.102 | 0.488 |
| | *0.008* | *0.042* | *0.008* | *0.042* |
| Common colony | 0.616 | 0.587 | 0.608 | 0.572 |
| | *0.076* | *0.070* | *0.077* | *0.070* |
| Current colony | 1.097 | 0.669 | 1.049 | 0.585 |
| | *0.248* | *0.310* | *0.246* | *0.306* |
| Ever colony | 1.268 | 1.325 | 1.280 | 1.337 |
| | *0.117* | *0.114* | *0.118* | *0.114* |
| Common country | 0.032 | 0.288 | 0.042 | 0.350 |
| | *0.994* | *0.620* | *0.987* | *0.614* |
| Common currency | 1.186 | 1.308 | 1.175 | 1.292 |
| | *0.130* | *0.131* | *0.130* | *0.131* |
| Free trade area | 0.798 | 0.678 | 0.823 | 0.997 |
| | *0.093* | *0.105* | *0.118* | *0.118* |
| GSP 1/ | 0.820 | 0.613 | | |
| | *0.033* | *0.033* | | |
| One country in WTO 1/ | -0.133 | 0.038 | | |
| | *0.067* | *0.052* | | |
| Both countries in WTO 1/ | -0.138 | 0.127 | | |
| | *0.071* | *0.058* | | |
| GSP 2/ | | | 0.698 | 0.824 |
| | | | *0.073* | *0.065* |
| One country in WTO 2/ | | | -0.174 | 0.060 |
| | | | *0.068* | *0.054* |
| Both countries in WTO 2/ | | | -0.089 | 0.295 |
| | | | *0.073* | *0.058* |
| Country fixed effects | No | Yes | No | Yes |
| Time effects | Yes | Yes | Yes | Yes |
| R-square | 0.650 | 0.709 | 0.650 | 0.709 |
| Number of observations | 49378 | 49378 | 49378 | 49378 |
| Root mean square error | 1.990 | 1.817 | 1.989 | 1.816 |

1/ As defined in Rose (2002a)

2/ Defined mutually exclusively. That is, GSP excludes common FTA country pairs, and WTO dummies exclude common FTA and GSP country-pairs

Regressand log real trade. Robust standard errors (clustered by country pairs) reported below coefficient estimates. Columns 1 and 2 correspond to the specification in columns 1 and 4 in Table 1 of Rose (2002a).