The Effects of Multilateral Trade Liberalization on the Extensive and the Intensive Margins of Trade.

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Abstract

This paper examines empirically the effects of WTO and RTA membership on the extensive and the intensive margins of trade. Using disaggregated data for a sample of 177 countries, the main findings of this paper are that WTO membership tends to increase the number of products traded between members (extensive margin), and tends to increase the average sales per product line (intensive margin). I further detect substantial heterogeneity when I examine these effects for various subsamples of the data (e.g., by degree of product differentiation or level of development of a country). This demonstrates that many of the aggregate effects estimated in the existing literature (e.g., Rose 2004) hide a substantial amount of variation in the WTO's effect on trade. Finally, accounting for multilateral resistance as in Anderson and van Wincoop (2003), I find that the WTO effect becomes insignificant, while

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the RTA membership boosts trade between members and between members and outsiders at least in the aggregate level.

Keywords: WTO, Regional Trade Agreements, Extensive margin, Intensive Margin, Poisson Regression.

JEL Classification Numbers : F13, F15

1 Introduction

One of the well documented facts in international economics is the outstanding increase in world exports after World War II. This contrasts with the previous period, the inter war era, when world trade faced a dramatic reduction. The post-war trade recovery coincided with the creation of the General Agreement on Tariffs and Trade (GATT) in 1947, which was later replaced by the World Trade Organization (WTO) in 1995, whose purpose was to reduce trade barriers and help the free flow of trade among the members. GATT started with 23 members and has now reached over 150 current members. On the other hand, the number of regional trade agreements (RTAs) and the number of countries participating in them has experienced a large increase especially during the last 30 years. Until the establishment of the WTO there have been 124 notifications of RTAs and since 1995 about 300 new ones.

Apart from these empirical facts, there are some theoretical arguments that connect multilateral trade liberalization with trade boosting effects. These arguments focus on the terms of trade argument and political- commitment argument. According to the first argument, trade liberalization helps countries to coordinate their trade policies and not get involved in tariff increases that reduce the volume of trade. If a large country imposes an import tariff, this harms the foreign exporters' terms of trade as the world price for their products will fall. To avoid this, governments will impose higher than optimal tariffs and this would harm world trade. GATT/WTO membership could be a mechanism that ensures that the country members do not get involved in such tariff wars (Bagwell and Staiger, 1999, 2001). The second argument claims that participation in the WTO commits governments in their private sectors to policies that aim at freeing trade. This commitment could result in avoiding efficiency losses, that are the results of maintaining high tariffs to protect import competing sectors (Staiger and Tabellini, 1999). This commitment is also enhanced by the dispute settlement mechanism by the WTO.

All these arguments and empirical facts indicate that we should attribute some trade enhancing role to the creation of WTO and RTAs.[1] This common logic was challenged by Rose (2004a), who finds no significant trade boosting role for the WTO membership in a large panel of 178 countries. Other authors refine Rose's analysis but there is no concluding consensus on the effect of the WTO membership on trade. Some studies confirm Rose's result but some others find a positive effect. These studies are based on aggregate trade data.

Recently Felbermayr and Kohler (2006) in a study reveal the importance of considering total trade but also its decomposition in two margins: the extensive and intensive margin. The extensive margin is usually defined as the number of products traded between a pair of countries or the number of markets to which a country exports. The intensive margin is defined as the average trade volume in already existing products or destination markets. The authors decompose trade in the two margins and they are able to uncover a positive effect of WTO membership on the two trade margins. This was the first study in which even though aggregate trade data are used, trade growth is decomposed through a Tobit estimation. In the current study, the number of product categories traded between a pair of countries in a given year and the trade volume per product category are used as definitions for the extensive and intensive margins respectively.

In this study we use highly disaggregated data to the fourth and fifth digit and we construct measures of the two trade margins. We start by replicating Rose's insignificant

[1] Later in this paper we will refer to the terms trade creation and trade diversion. The former term means that an RTA partner substitutes another RTA member's less efficient industry in the production of a good. This effect is beneficial. The latter term means that an RTA partner substitutes a more efficient non-member supplier of a good, by exploiting the preferential tariff it faces from other RTA members. This effect is harmful. While conventional practice is to measure welfare losses from trade diversion to assess the desirability of an RTA, in the current paper we follow the majority of the empirical literature that use dummy variables to pick up the trade creation and diversion effects. See Cardamone (2007), for a survey of the literature that uses dummy variables to assess the effects of trade creation and diversion of different RTAs.

effects for the WTO when we aggregate our trade flows in the way he does in his analysis and use his benchmark specification. However, once we decompose trade in the two margins, we are able to find a positive effect of the WTO via both margins. The effect on the extensive margin turns out to be more robust. Our analysis shows that the overall insignificant result found by Rose is the result of defining the dependent variable in a way that does not follow the gravity theory and using a biased estimator. Moreover, this study uses Poisson Pseudo Maximum Likelihood proposed by Santos Silva and Tenreyro (2006) as a more appropriate method of estimating trade flows via a gravity specification. The results of the Poisson regressions are our preferred results and in Appendix A we present OLS results for comparison with the previous literature. Finally, we conduct an extensive heterogeneity analysis. The WTO effect is expected to differ by level of development and different types of products and sectors. This is because among the WTO country members the ones that have mostly undergone extensive tariff reductions were developed economies. Moreover, many countries still keep tariff protection on import competing sectors such as textiles and food. Subramanian and Wei (2007) were the first to undertake such an analysis, but they did not analyze the effect on average sales and number of products per sector. This is something carried out additionally in the current study.

Chaney (2008) provides theoretical grounds for the effects of trade liberalization, defined as a reduction in variable/fixed cost, on the extensive and the intensive margins of trade. The effects depend on the elasticity of substitution between varieties. The model predicts that higher elasticity of substitution will make the intensive margin more sensitive than the extensive margin to changes in the trade barriers. Many empirical studies have shown that trade barriers have a larger effect on the extensive margin of differentiated products (lower elasticity of substitution). In this paper we also separate products by degree of differentiation according to Rauch (1999) and try to see if the WTO effect is consistent with the predictions of Chaney (2008). This might indicate which product categories developing economies should focus on if they want to reap the majority of any potential benefits associated with their accession to the WTO.[2]

These results are relevant for policy makers. For policy makers, on the one hand, joining the WTO or other multilateral systems suggests that they should expect a trade boosting effect, as already exporting firms or new sectors will be in a position to export their final products since a reduction of trade barriers increases the number of products traded. On the other hand, the average sales of exporters might decrease (the intensive margin). Therefore, this suggests that there is a benefit by joining the WTO as more firms might export, but due to higher competition the demand and market share of some firms may be decreased. However, this could be a purely mechanical effect. After a reduction in trade barriers, new exporters enter the market and they sell a small quantity to test their performance as exporters. Then once their profits are realized they can either continue exporting or stop. After trade liberalization, the number of traded varieties can increase but because new exporters sell small quantities, the average sales are reduced. This argument is in line with the recent work by Albornoz et al. (2009).

Trade in more varieties is positively associated with welfare gains and economic growth. The welfare implications from an increase in the number of products or varieties traded is well documented in new trade theory (Krugman, 1979, 1980) as well as by more recent studies as in Romer (1994) and Broda and Weinstein (2006). Krugman develops a model of monopolistic competition with identical firms and shows that trade leads to an increase in the market size. This combined with increasing returns to scale leads firms to specialize in the production of particular varieties taking advantage of the returns to scale in production. The result is higher output (scale) and a larger number of products. Consumers are better off due to higher real wages and increased choice. Romer (1994) concludes that the GDP loss is much lower in a model with a constant number of products compared to a varying number of products (6.25% compared to 47%

[2]We need to acknowledge that the accession of a country to the WTO does not indicate trade liberalization in every case. The accession of each economy is dcided on a country by country basis. Moreover, given that sectors as agriculture and textiles remain still highly protected, many developing countries like Peru and India, remained highly inward until the 1990s. We do not have a way to directly control this difference between the point in time when a country accedes to the WTO and the point where actual trade liberalization in the country takes place. This is partially taken into account in the section were we split the WTO effect by sector and have a clearer view about the effect on countries that specialize in different sectors.

respectively for a tariff rate equal to 25% for the particular model considered). Broda and Weinstein (2006) estimate the welfare gains for the United States due to an increase in the number of available varieties and found that the US consumers would be willing to spend 2.6% of their income to consume the goods available in 2001 compared to those in 1972. These two studies indicate the welfare gains from trading more products could be substantial. Finally, studies like Funke and Ruhwedel (2001a, 2001b) show a positive link between export variety and productivity and economic growth. Revealing a trade enhancing WTO effect on the extensive margin would indicate an important impact on all the three above lines of research.

Finally, this paper considers potential bias in the WTO estimates by presenting results when the multilateral resistance terms, as outlined in Anderson and van Wincoop (2003), are considered. The results indicate that the WTO effect without considering the multilateral resistance term is inflated. The WTO effect becomes negative, but insignificant once multilateral resistance is considered in our analysis. On the other hand, the effect of RTA membership is positive for RTA members on the aggregate both for members, and for members and the outsiders. These results suggest that while member economies are benefiting by sharing free trade within a region, the result of the WTO is inflated, if we do not consider the multilateral resistance terms. This is analysed in Section 6.4.

The rest of this paper is organized as follows. In Section 3 we briefly describe the literature most closely related to this study. In Section 4 we describe the empirical model and the datasets used. Also the estimation method is outlined in Section 3. Section 5 presents the main results of the current study. Section 6 presents an extensive heterogeneity analysis and how the analysis changes when multilateral resistance is taken into account. The final section summarizes the main findings of this study and proposes future steps for research that could be undertaken.

2 Existing Literature

In this section we briefly analyze the strands of literature most closely related to the current study. The first strand of literature connected to the current study is the work on the effects of the WTO on trade flows. Rose (2004a) makes the first attempt to empirically assess the effects of the WTO on trade. The author uses aggregate trade data for 178 countries between the years 1948 and 1999. Also the role of RTA and Generalised System of Preferences (GSP) together with the WTO effect is examined. The GSP system is a system of preferential treatment that developed economies offer on imports from developing economies. The imports from developing economies under this scheme are subjected to lower tariffs compared to products imported from countries that are not part of this scheme. Many authors have studied the effect of this system on trade flows between the countries that grant the preferences and their beneficiaries. Rose uses a GSP dummy to obtain a clear cut effect of the WTO, clean of any potential GSP effect on trade flows. The author uses two dummy variables to capture the role of the WTO, the first equals 1 if both countries in a pair are members of the WTO in year t and the second equals 1 if only one of the two countries in a country pair is a member of the WTO. Rose uses a gravity model augmented with these two dummy variables and finds no statistically significant effect for either of the two dummies. This is the case for both the benchmark model (OLS) and all the sensitivity analyses performed in terms of model specification and sample perturbations.

Subramanian and Wei (2007) distinguish between three "asymmetries" that Rose overlooked. These were the distinction between industrial and developing economies, before and after the Uruguay round and between different product sectors. These authors also account for the multilateral resistance term to avoid any potential omitted variable bias as shown in Anderson and van Wincoop (2003). This term was not included in Rose (2004a). These authors find the WTO to have a positive effect on imports for industrialized countries, so they concluded that the WTO trade effect was uneven across countries and sectors.

Tomz et al. (2003) use Rose's dataset but define the WTO dummy in a different way. The authors argue that three categories of non-member participants like colonies, de facto members, and provisional members should be included among the countries that benefit from the rights and obligations of the WTO. Once they include these categories in the definition of the WTO dummy, their analysis leads them to find a positive effect of WTO membership on trade flows. This is the case for every sensitivity test performed along similar lines to those in Rose's work.

Chang and Lee (2007), use non parametric techniques to assess the effect of the WTO on trade flows. They use the same data as in Rose (2004a) and different matching estimators in their analysis to uncover the effect of WTO membership on trade flows. Their result is in contrast with Rose's findings. Their finding is a trade boosting effect of WTO membership regardless of the estimator used.

Herz and Wagner (2007) use aggregate data for 147 countries for the years 1962-1999. They define the WTO dummy as in Tomz et al. (2003) and they also use FE estimation. They find a positive and significant effect for joint WTO membership but also a positive effect if only the importer of the pair is a WTO member. They find that this effect is robust even when other institutions as RTA, currency unions and GSP system are considered.

Eicher and Henn (2008) use aggregate import data and try to bring together the studies of Rose (2004a), Subramanian and Wei (2007) and Tomz et al. (2003) to reconcile their conflicting results. The authors consider a gravity model as used in these studies. They control for individual RTA effects as in Rose and multilateral resistance as in Subramanian and Wei (2007) by introducing time varying importer and exporter fixed effects. They argue that unobserved heterogeneity should also be considered by including country pair fixed effects, otherwise any reported coefficients would be inflated. They consider different ways to code the WTO and RTA dummies. For all the different cases considered, the authors find that once unobserved heterogeneity is considered all the studies would lead to an insignificant effect of the WTO on imports.

The above studies are based on aggregate trade data to assess the WTO effects on trade. Recent literature has focused on the effects of trade liberalization on two trade margins: the extensive and the intensive margin. Hummels and Klenow (2002) is the first study to decompose trade growth in the two margins and study the nature of exports from large economies compared to those of smaller ones. There are recent studies that have indicated the important role of the extensive margin in trade growth (Felbermayr and Kohler, 2006, Hilberry, 2002, Amiti and Freund, 2008). Some studies examine the effect of trade barrier (tariff) reductions on the trade margins (Persson, 2008, Debaere and Mostabari, 2007, Camberoni et al., 2008, Manchin, 2004). Finally, there is empirical work on the effects of regional trade agreement or currency union participation on the trade margins (Kehoe and Ruhl, 2003, Baldwin and Di-Nino, 2006, Flam and Nordstrom, 2006, Romalis, 2005, De Nardis et al., 2008, Berthou and Fontagne, 2008, Amurgo Pacheco, 2006, Amurgo Pacheco and Pierola, 2007).

The current study is mostly related to this last group of studies in the sense that disaggregated data are used to study not only the effects of regional trade agreements, but also the effect of WTO membership. To the best of our knowledge, there are only two studies that have attempted to analyze the trade effects of WTO membership on both margins. But both of these studies rely on aggregated data and they take advantage of zero trade flows between country pairs that become positive at some point in the period of study. With aggregated data, the only way to capture changes in the extensive margin is in the cases where trade between a country A and a country B was zero and at some point in time becomes positive. But an increase in the extensive margin might be realized not only because there is a new destination with which one country trades. It can be the case that countries A and B trade in some product categories, whereas trade in some other categories is zero. Suppose there are n product categories in which countries A and B could potentially trade, but there is positive trade in a subset m of these categories. So n-m categories are inactive. If there is an increase in the number of product categories traded say m+1, then this extra product traded should be counted as well in the extensive margin. This could be captured only in the case that disaggregated data are used, whereas this seems not to be the case in the studies that rely on aggregate data.

The first of these studies is the one by Felbermayr and Kohler (2007). The authors try to correct the weaknesses of previous literature (Rose, 2004a) that finds no significant effect of WTO membership on trade flows among members. The authors mainly argue that previous estimates suffer from downward bias since these analyses ignore the zero trade flows present in the data. Therefore, the authors exploit the information in the zero trade through a Tobit estimation to uncover a positive effect of WTO membership mainly through the extensive margin of trade. The authors use annual data from the IMF DOTS for 104 countries for the years 1965-2004. The authors employ a gravity model using as explanatory variables, dummy variables for whether both countries or one of the countries in the country pair are members of the WTO, a dummy for FTA, distance, common language and adjacency. The authors also include importer and exporter time varying fixed effects. In that way they account for multilateral trade resistance as outlined in Anderson and van Wincoop (2003). They also account for country unobserved heterogeneity that might affect the decision to join the WTO (factors that might be correlated with the WTO dummy). The authors perform cross sectional OLS, probit and Tobit estimation and find no effect for WTO membership. Once they exploit the time series dimension of the data and time varying exporter and importer fixed effects, the authors find a positive and significant effect of WTO membership in all estimations i.e. OLS with strictly positive trade flows (intensive margin), probit (extensive margin) and the tobit (both margins).

The second study by Liu (2007) also examines the effects of WTO membership on both trade margins. The data are from the IMF DOTS, the World Trade Flows and the World export data for the period 1948-2003, for 210 countries. The estimation techniques used are a Tobit model and Poisson regression to account for the potential violation of normality and homoskedasticity under the Tobit estimation. The author estimates a gravity model including dummies for WTO membership, common border, landlocked, common language, common religion, colonial relationship, common colonizer, RTA membership, GSP status, CU membership. Moreover, GDP and GDP per capita for countries, distance, areas, remoteness, military conflict and formal alliance dummy, time effects and country pair effects are included in the estimated equation. The main findings are that WTO membership promotes both overall trade and the creation of new trading relationships through the extensive margins, after controlling for the zero trade flows (sample selection bias) and the presence of heteroskedasticity not captured by the log-linear gravity model (gravity model specification).

The theoretical grounds for the intensive and extensive margins of trade were set by Chaney (2008). In his model he includes heterogeneous firms in terms of productivity and a fixed cost for exporting. If trade barriers are lower, then new and less productive firms enter the market. If the elasticity of substitution between goods is high, low productivity firms have a disadvantage, they cannot set high prices and they capture only a small market share. The effect on aggregate trade is small and the intensive margin turns out to be more sensitive when compared to the extensive margin to trade barriers. If the elasticity of substitution is low (more differentiated goods), then new firms can charge a higher price and get a higher market share. The effect on aggregate trade is large and the extensive margin is now more sensitive to changes in the trade barriers compared to the intensive margin. Chaney also shows that while reductions in the variable cost increase the volume of trade in existing firms (intensive margin) and the number of new exporters (extensive margin). He also shows that reductions in fixed cost affect only the number of new exporters. In Section 6.2 we test the theoretical predictions of Chaney.

In the current study disaggregated data are used and measures for the intensive and extensive margins of trade are constructed. More specifically, the number of product categories traded between a pair of countries in a given year and the trade volume per product are used to define the extensive and intensive margins respectively. Moreover, more appropriate estimation methods recently proposed in the literature are used to assess the trade effect of WTO membership. These are the methods proposed by Santos Silva and Tenreyro (2006). Additionally, we include an extensive section of heterogeneity analysis, where the WTO effect is decomposed by country groups, by sectors and by degree of product differentiation. While the last one has already received some attention using disaggregated data, the first two parts of the heterogeneity analysis are conducted mainly by Subramanian and Wei (2007) and use aggregated data. Our purpose is to analyze these parts using disaggregated data and their effects on the extensive margin. Finally, we present how results change by including time varying exporter and importer fixed effects, to account for the multilateral resistance term, as in Subramanian and Wei(2007), Felbermayr and Kohler (2006) and Eicher and Henn (2008). The next section presents the data sources, the specification used and the reasons why we choose the proposed estimation method.

3 Empirical model, Data and Estimation Method

3.1 Empirical Model

In the current study we make use of the gravity model of trade flows to estimate the effects of the WTO and RTA membership as in Rose (2004a) and the other studies outlined in the previous section. Following, the literature on gravity models of trade unilateral trade flows are estimated as a function of economic mass and bilateral distance:

$$\mathbf{V} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} D_{ij}^{\alpha_3} \eta_{ij} \tag{1}$$

Rose (2004a) estimated in log linear form the following gravity model by OLS:

$$\begin{aligned} ln(T_{ijt}) = {} & \beta_0 + \beta_1 Onein_{ijt} + \beta_2 Bothin_{ijt} + \beta_3 GSP_{ijt} + \beta_4 RTA_{ijt} + \\ & \beta_5 CU_{ijt} + \beta_6 lnD_{ij} + \beta_7 ln(GDP_{it}GDP_{jt}) + \\ & \beta_8 ln(GDP_{it}GDP_{jt}/Pop_{it}Pop_{jt}) + \beta_9 Lang_{ij} + \beta_{10} Cont_{ij} + \\ & \beta_{11} Landl_{ij} + \beta_{12} Island_{ij} + \beta_{13} ln(Area_i Area_j) + \\ & \beta_{14} ComCol_{ij} + \beta_{15} CurCol_{ijt} + \beta_{16} Colony_{ij} + \\ & \beta_{17} ComNat_{ij} + \sum \theta_t TimeDummies + \epsilon_{ijt} \end{aligned} \tag{2}$$

where T_{ijt} is the average value of real bilateral trade between country i and country j at time t. The rest of the variables are as defined in Table 2 below. We use this benchmark model to replicate initially Rose's result, by using our data. Later on, T_{ijt} is constructed using only the export data from country i to country j at time t. Using this benchmark model time effects are included in the model and OLS estimation is performed by using the robust standard errors option.

Then we use export data to decompose trade in the two margins to study the effects of WTO membership. In that case we will have to estimate the following set of three equations, assuming the following specification for the mean:

$$\begin{aligned}\mathbf{V} \;=\; & exp(\beta_0 + \beta_1 Onein_{ijt} + \beta_2 Bothin_{ijt} + \beta_3 GSP_{ijt} + \beta_4 RTA_{ijt} + \\ & \beta_5 RTAonein_{ijt} + \beta_6 CU_{ijt} + \beta_7 ln(GDP_{it}) + \beta_8 ln(GDP_{jt}) + \\ & \beta_9 ln(GDP/cap.)_{it} + \beta_{10} ln(GDP/cap.)_{jt} + \beta_{11} CurCol_{ijt} + \\ & \sum \theta_t TimeDummies + \sum \phi_t CountryPairDummies + \epsilon_{ijt})\end{aligned} \qquad (3)$$

where $\mathbf{V}$=[X_{ijt}, X_{ijt}/N_{ijt}, N_{ijt}] is a 1 by 3 vector of our dependent variables used in the Poisson regressions. The log of these variables i.e. $\mathbf{V}$=[$ln(X_{ijt})$, $ln(X_{ijt}/N_{ijt})$, $ln(N_{ijt})$] is used in the OLS in the Appendix.

In the equation above, X_{ijt} is the aggregate bilateral exports (i.e. which is total export flows for all products at a given year for a given pair), X_{ijt}/N_{ijt} is the average export volume (intensive margin) and N_{ijt} is the number of products exported per year per country pair (extensive margin). This decomposition was adopted by Flam and Nordstrom (2004), Bernard et al. (2004), Nitsch and Pisu (2008) as well. Adding up the effects on the two margins should yield the total effect on aggregate exports (this is the case in the log linear model, Poisson is a non linear model so this will not be the case). This is because the dependent variable X_{ijt} is decomposed as follows:

$$X_{ijt} = N_{ijt} * (X_{ijt}/N_{ijt}) \qquad (4)$$

And in logs: [3]

$$ln(X_{ijt}) = ln(N_{ijt}) + ln(X_{ijt}/N_{ijt}) \tag{7}$$

Finally, some of the time invariant country pair specific variables like distance, common border etc., that appear in Equation (2) are not estimated in Equation (3). This is because in Equation (3) we have included country pair dummies that account for the effects of these variables and other country pair time invariant effects (unobserved heterogeneity). This is similar to the approach of Eicher and Henn (2008).

3.2 Data

The trade data used in this study are taken from the UN Comtrade. These are disaggregated data at the 4 and 5-digit level of the SITC revision 1 classification. The time span covers the years from 1962 to 2007. The choice was made to have the longest time series dimension and the finest disaggregation possible to capture as best as possible developments in the number of products traded between country pairs. The categories of products covered by this classification are shown in Table 1. These categories are more consistently represented in the case of the 4-digit data. The 5-digit data mainly represent categories 6 to 9. The sample of countries used is the same as in Rose (2004) with the exception of Reunion for which no disaggregated trade data were available.

[3]The OLS estimator is given by:

$$\hat{\beta} = (X'X)^{-1}(X'Y) \tag{5}$$

Y in our case is $ln(X_{ijt})$ which is the sum of $ln(N_{ijt})$ and $ln(X_{ijt}/N_{ijt})$. Setting $ln(N_{ijt})$ equal to Z and $ln(X_{ijt}/N_{ijt})$ equal to W, $\hat{\beta}$ is the sum of two other effects $\hat{\gamma_z}$ and $\hat{\gamma_w}$:

$$\hat{\beta} = (X'X)^{-1}(X'Y) = (X'X)^{-1}(X'(Z+W)) = (X'X)^{-1}(X'Z) + (X'X)^{-1}(X'W) = \hat{\gamma_z} + \hat{\gamma_w} \tag{6}$$

Table 1: SITC Revision 1 Product Categories

Product category	SITC Code
Food and Live Animals	0
Beverages and Tobacco	1
Crude Materials	2
Mineral, Fuels, Lubricants and Related Material	3
Animal and Vegetable Oils and Fats	4
Chemicals and Related Products	5
Manufacturing and Goods	6
Machinery and Transport Equipment	7
Miscellaneous Manufacturing Articles	8
Commodities and Transactions not classified elsewhere in SITC	9

These data are aggregated initially to construct the same dependent variable as in Rose (2004a) to compare our results on the aggregate level with his results using our data. Later we consider unilateral flows from country i to country j and we construct a dependent variable based only on exports. The problem with trade data is that reported exports from country i to country j are not usually equal to the imports reported by country j from country i. For each export flow we either have two reported values (one from the exporter and one from the importer) or either only one reported value (from the exporter). We treat the first case by taking a simple average of the two reported numbers of the same flow. We also take a weighted average of each reported flow using as weights the share of real GDP per capita over both countries' sum of GDP per capita. The rationale behind this weighting is that richer countries tend to have a higher quality in their reporting data compared to poorer countries. For the cases in which only one number is reported for the export flow we use this number to represent the export figure for that year between the two countries. Another issue is related to how we treat the flows that were zero between a country pair in a given year. UN Comtrade, that is the source of our trade data, does not report the zeros but omits the product lines for which there is no trade in one year. We create the zeros in a similar way as in Baldwin and Di Nino (2006), by recovering the zeros in a nation by nation fashion. So if one country of our 177 countries did not trade a product at all for any year with any of the other 176 partners, we exclude those types of zero trade flows from our database. It is like applying a comparative advantage argument: if some products were never traded between two countries it might be because of lack of factors of production or technology level for that product in the two countries. Zero flows account for more than 55% in our dataset.

We then decompose total exports in the two margins: the number of product categories per country pair in a given year (extensive margin) and the average export volume per product category in a given year. We follow the decomposition the way it was recently used in Bernard et al. (2004) and Nitsch and Pisu (2008). For the extensive margin we use the number of product categories between a country pair in a given year t. For the intensive margins we use the average sales per product between a country pair in a given year t. Changes in the number of products and average sales from year to year will indicate whether or not these changes are at all related to the WTO and RTAs membership. We are aware that these two measures of the extensive and the intensive margins can only capture the developments in each margin imperfectly. To be able to capture the exact change in the extensive margin we would need to have product level data at the firm level. Since such data are not currently available, the best we can do is to use the 4-digit and 5-digit data. Within each of these product categories exists a range of individual goods, so we can not isolate the full extensive margin. It is not possible to capture cases in which the WTO causes more products to be traded in a 4-digit or a 5-digit category if that category has positive trade flows. We are able to identify cases where a 4-digit or a 5-digit category had zero trade and in a year becomes positive, since all the sub categories within that category were all zero. Therefore, we cannot capture the full effect of the WTO on the extensive margin as we know that within a category with positive trade there are others for which we do not know if trade is really positive or zero. Because of this data limitation, some developments in the intensive margin are likely to capture some of the WTO effect on the extensive margin. This was also pointed out by Baldwin and Di Nino (2006) and Flam and Nordstrom (2006).

In the first set of regressions where we try to replicate Rose's result, we take data for the independent variables from Rose's website. We are actually using exactly the same data he used in his study for the years and countries common to our dataset and his. So the first set of regressions includes our dependent variable based on our data and Rose's independent variables for that part of his sample which overlaps with our sample.

Once we replicate Rose's main result, we construct our set of independent variables based on other sources. The reason is that Rose's dataset only goes up to 1999 and we needed to have a comprehensive dataset up to 2007. The regressors employed in this study are the same ones used in Rose and are listed in Table 2.

Table 2: List of Variables

Variable Name	Description
$Bothin_{ijt}$*	Dummy equal to 1 if i and j are members of the GATT/ WTO in year t.[4]
$Onein_{ijt}$*	Dummy equal 1 if i or j is a member of the GATT/ WTO in year t.
RTA_{ijt}*	Dummy equal to 1 if i and j are members of a regional trade agreement in year t.[5]
$RTAonein_{ijt}$	Dummy equal to 1 if i or j is a member of a regional trade agreement in year t.
$(CU)_{ijt}$*	Dummy equal to 1 if i and j are members of a currency union in year t.[6]
lnD_{ij}*	The natural log of bilateral distance.
$ln(GDP_i * GDP_j)$*	The natural log of the product of i's and j's real GDP in year t.
$ln(GDP_i)$	The natural log of i's real GDP in year t.
$ln(GDP_i)$	The natural log of j's real GDP in year t.
$ln(GDP_i * GDP_j/Pop_iPop_j)$*	The natural log of the product of i's and j's real GDP per capita in year t.
$ln(GDP/cap.)_i$	The natural log of i's real GDP per capita in year t.
$ln(GDP/cap.)_j$	The natural log of j's real GDP per capita in year t.
GSP_{ijt}*	Dummy equal to 1 if j is a GSP beneficiary of i in year t.
$Cont_{ij}$*	Dummy equal to 1 if i and j share a common border.
$Lang_{ij}$*	Dummy equal to 1 if i and j share a common language.
$Landl_{ij}$*	Indicator equal to 0, 1, 2 if none, one or both i and j are landlocked.
$Landlocked_{ij}$*	Dummy equal to 1, if at least one of the countries or both are landlocked.
$Island_{ij}$*	Indicator equal to 0, 1, 2 if none, one or both i and j are islands (in Equation 2). this variable is 1 if at least one of the countries or both are islands (in equation 3).
$ln(Area_i * Area_j)$*	The natural log of the product of i's and j's area.
$ComCol_{ij}$*	Dummy equal to 1 if i and j were ever colonies after 1945 with same colonizer.
$CurCol_{ijt}$*	Dummy equal to 1 if i is a colony of j in year t or vice versa.
$Colony_{ij}$*	Dummy equal to 1 if i was ever a colony of j or vice versa.
$ComNat_{ij}$*	Dummy equal to 1 if i and j remained part of the same nation during the sample.

* indicates that the data were taken from Rose's website refering to his 2004a paper.

Data on the variables lnD_{ij}, $Cont_{ij}$, $Lang_{ij}$, $Landl_{ij}$, $Island_{ij}$, $ln(Area_i * Area_j)$, $ComCol_{ij}$, $CurCol_{ij}$, $Colony_{ij}$, $ComNat_{ij}$ are provided from Rose for the replication regressions and the additional data are from CEPII for the rest of the regressions.

In the regression where only export data are used we consider the natural log of each country's GDP separately ($ln(GDP_i)$ and $ln(GDP_j)$ respectively) and we get data from the World Bank, the IMF and the UN. All GDP data are converted using the base year 1995 and when the datasets involve missing values we use the method of splining to fill in with comparable GDP values from the other datasets. The exchange rate series used in case we needed to convert data to US dollars were taken from the World Bank. To calculate ($ln(GDP/cap.)_i$) and $ln(GDP/cap.)_j$), we divided real GDP as described above with total population. Data on population were taken from the World Bank and in cases with missing values from the IMF and the UN. These data are also used in the construction of the weighted dependent variables described above.

[4] A list of the countries and year of accession in GATT/WTO is given in the Appendix.

[5] The data for the WTO dummies and the RTA dummies are taken as well from the WTO website. A do file with the way the RTA and RTAonein dummies are constructed is available upon request. A list with the countries and year of joining each RTA is given in the Appendix.

[6] We supplement Rose's data with information from Wikipedia. A do file with the way the CU dummy is constructed is available upon request.

The dummy (GSP_{ijt}) was constructed with information collected from the UNCTAD website and from TRAINS. To be in a position to construct this variable correctly we need the list of beneficiaries for each country that granted preferences for every year. Such a dataset to the best of our knowledge does not exist so we base the construction on the years found in the lists of UNCTAD and TRAINS. If a country appears to be a beneficiary in every year of the years that are available, we assume that it has been a beneficiary for all of those years from the beginning when the preferences started to be granted from the part of the preference giving country. We set the variable to zero for every case where we have evidence that it was not a beneficiary for a given year according to the sources above. This is an imperfect measure of GSP.[7]

3.3 Estimation Method

As already mentioned in the literature review, some authors consider two additional issues that could bias the WTO estimates. One is to control for the multilateral resistance term as outlined in Anderson and Wincoop (2003). This form of omitted variable bias has its theoretical foundation on the model by Anderson and Wincoop (2003). Usually authors use time varying importer and exporter fixed effects to capture the multilateral resistance term. This is the case in Subramanian and Wei (2007), Felbermayr and Kohler (2007) and Eicher and Henn (2008). In the regressions with time varying importer and exporter fixed effects a subsample of the years available is used, as these regressions are computationally infeasible with the full sample of years.[8] The second issue is that of

[7]A do file with the way the GSP dummy is constructed is available upon request.

[8]The number of observations in our dataset is around a million in the Poisson Regression. With time varying importer and exporter fixed effects we need an additional number of dummies equal to 177*45*2 (number of countries*number of years*2(for importer and exporter)). By keeping one year every four years in the dataset we reduce the number of observations to 271374 (see Table 8) and needing only an additional number of 177*14*2 dummies, computations seem more feasible.

unobserved heterogeneity. If the controls in the gravity models above cannot capture differences in trade patterns due to unobserved factors that affect both the WTO membership and trade flows then the coefficients will be biased as well. This is more an empirical observation, without any theoretical foundation like the multilateral resistance term discussed above. Eicher and Henn (2008) use country pair fixed effect to account for the effects of unobserved heterogeneity. We will introduce in the analysis, country pair fixed effects to account for unobserved heterogeneity and all our regressions, apart from the ones introducing the multilateral resistance terms, contain country pair FE.

Recent work by Santos Silva and Tenreyro (2006) stresses the drawbacks of log linearizing the gravity specification and then applying OLS estimation on the linearized model. The problem arises as the expected value of the error term in the log linearized gravity equation is a function of the higher moments of its distribution. These moments are likely to depend on the regressors of the gravity model, which creates a bias problem in the estimated elasticities in the log linearized model. The authors show that this is the case both for the traditional gravity equations and the one proposed by Anderson and Wincoop (2003), where the inclusion of fixed effects to account for multilateral resistance is not enough to overcome this bias. Moreover, the authors point out the problem one faces, related to missing trade or zero trade values, when trying to estimate a log linear model. A log linear model ignores all the observations for which trade is zero. In our dataset more than 55% of our observations are zero. This is one of the main reasons for assuming the particular specification for the mean in Equation (3) above. Therefore, the multiplicative not the linear version of the gravity model is more appropriate to use. The authors propose a Poisson Pseudo Maximum Likelihood (PPML) estimator and perform a simulation study which reveals that the proposed estimator should be used instead of the widely used OLS and Tobit, when different forms of heteroskedasticity are considered. Then they apply this estimator to the gravity model and find that the coefficients are smaller in magnitude and some of them lose the conventional significance when a traditional log-linearized model is estimated.

For the reasons outlined in the Santos Silva and Tenreyro (2006) study, we perform all the regressions using the proposed PPML estimator. The PPML estimator will be our preferred among all the results presented in the current study and will be presented in the main body of the paper. The OLS results are included in the Appendix for the interested reader to refer to.

4 Empirical Results

4.1 Replication Regressions

In this section we analyze the main results of this study and we compare them with those found in other studies. Table 3 shows the regression results that replicate the findings in Rose (2004a). Column 1 in Table 3 just represents the Benchmark model as in Rose (2004a). We are interested in the coefficients on the first two variables i.e. whether both countries or just one of the two are members in the WTO. In Column 1, the trade effect of WTO is insignificant. Column 2 shows the effects that Rose's data would indicate if we limit the sample of years and countries to that overlapping with our sample. Again the effects on both variables of interest remain insignificant. Column 3, is the same model as in the first two columns with the difference that the dependent variable is the one constructed in the same way as in Rose but using our 4-digit disaggregated data, aggregated for each country pair per year. The rest of the independent variables are the ones used in Rose and the estimation is performed for the overlapping sample as in Column 2. The coefficients on the two WTO dummies are positive but remain insignificant. This indicates that our aggregated data can replicate Rose's result. In Column 4 the dependent variable is constructed by using the weighted 4-digit disaggregated trade data, aggregated for each country pair per year. The weights used are shares of GDP per capita over the sum of the GDP per capita for each country pair, averaged over all the available years for each pair. The effects are again insignificant in line with Rose. The last three columns repeat the same exercise as in Columns 2, 3 and 4, but using the 5-digit disaggregated data for the dependent variable, aggregated for each country pair per year. The variables of interest i.e. the WTO membership and unilateral WTO membership remain insignificant. Therefore, on the aggregate there is no evidence of WTO trade boosting effect between members (Both Countries in GATT/WTO) or trade diversion between members and non members (One country in GATT/WTO). The rest of the gravity regressors have the expected signs and the gravity model explains two thirds of the variation in actual log trade flows in each case.

4.2 The WTO and the trade margins

After establishing the ability of our data to replicate Rose's result on the aggregate, we decompose trade in the two margins and perform the same kind of regression to uncover any potential effects of WTO membership through the two trade margins. The regressions from Table 4 and onwards differ in the following ways from those in Table 3. Firstly, now the aggregate trade is constructed using only export data. The reason for this is, first of all, that the theory of the gravity model was established for unidirectional trade flows. The other reason is that since we want to capture changes in the extensive margin, we need to consider the fact that the number and kind of products exported from country i to country j is in some cases different from that exported from country j to country i. Since the number of products is now one of the dependent variables we need to consider this factor. Secondly, since we consider unilateral trade, we split the variables like real GDP and real GDP per capita. In other words, now we have one variable for each of the two countries in each country pair distinguishing between exporter and importer. The reason is because of the way we define now the dependent variables and also to capture differential effects for the importer and the exporter. Finally, we use additional data from the CEPII to construct the gravity variables and make sure that we have the largest possible sample for these variables matching the trade observations. In the rest of the analysis we report results on Poisson with time fixed effects, country pair fixed effects and robust standard errors. Those results are the ones where the 5-digit weighted data were used. Poisson results and OLS using 4-digit data and 5-digit unweighted data are presented in Appendix A for the interested reader.

Table 4 shows the results for the 5-digit weighted data using Poisson. The first two rows show the effects of WTO on each margin between members and between members and non-members. On the aggregate, there is a positive and significant WTO effect. This is not in line with Rose, who found no significant WTO effect. There is a positive effect on average sales and a positive effect on the extensive margin, between the member countries. Considering the trade effects between members and non-members there is a trade creating effect (the coefficients on the One WTO members variable are positive and significant in total trade and the two margins in row 2).

Table 3: Replication Regressions

	Rose(2004a)	Rose (4digit)	Agg. Trade (4digit)	Agg. trade (4 digit weighted)	Rose (5digit)	Agg. Trade (5 digit)	Agg. trade (5 digit weighted)
One country in GATT/WTO	-0.058	-0.070	0.031	0.034	-0.025	0.043	0.040
Both countries in GATT/WTO	-0.042	-0.071	0.040	0.035	-0.058	-0.033	-0.043
GSP Dummy	0.859***	0.753***	0.716***	0.732***	0.710***	0.648***	0.659***
RTA Dummy	1.199***	1.165***	1.175***	1.187***	1.161***	1.127***	1.132***
Strict Currency Union	1.118***	1.058***	1.060***	1.013***	1.047***	1.233***	1.202***
Log of Distance	-1.119***	-1.088***	-1.083***	-1.086***	-1.068***	-1.123***	-1.127***
Log of Product of Real GDPs	0.916***	0.899***	0.885***	0.885***	0.898***	0.954***	0.956***
Log of Product of Real GDPs per capita	0.321***	0.312***	0.297***	0.297***	0.307***	0.364***	0.364***
1 for Common Language	0.313***	0.347***	0.354***	0.355***	0.341***	0.394***	0.400***
Land Border Dummy	0.526***	0.548***	0.513***	0.510***	0.549***	0.466***	0.464***
Landlocked	-0.271***	-0.283***	-0.271***	-0.271***	-0.286***	-0.178***	-0.180***
Islands	0.042	-0.004	0.022	0.006	0.004	-0.072*	-0.087**
Log of Product of Land Areas	-0.097***	-0.101***	-0.082***	-0.080***	-0.102***	-0.141***	-0.142***
Dummy for Common Colonizer post 1945	0.585***	0.587***	0.520***	0.524***	0.675***	0.698***	0.696***
Dummy for pairs currently in Colonial Relationship	1.075***	1.183***	1.128***	1.145***	1.233***	1.252***	1.266***
Dummy for pairs ever in Colonial Relationship	1.164***	1.278***	1.272***	1.278***	1.264***	1.363***	1.359***
Dummy for Same Nation/Perennial Colonies	-0.016	-0.326	-0.199	-1.279***	-0.354	-0.423	-1.841***
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	No	No	No	No	No	No	No
Time Varying FE	No	No	No	No	No	No	No
R-Square	0.648	0.671	0.680	0.680	0.681	0.664	0.665
Number of Obs	234597	191825	191825	191806	174876	174876	174850

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS results, Column 1: Rose (2004a) Benchmark Result, Column 2: Results based on Rose's data constrained on a smaller sample overlapping with the author's 4 digit data, Column 3: results based on dependent variable constructed by aggregating the 4 digit data and Rose's independent variables for the overlapping sample, Column 4: As in column 3 but the weighted 4 digit data are used, Column 5: Results based on Rose's data constrained to a smaller sample overlapping with the author's 5 digit data, Column 6: Results based on dependent variable constructed by aggregating the 5 digit data and Rose's independent variables for the overlapping sample, Column 7: As in column 6 but the weighted 5 digit data are used.

Considering the other trade arrangements like RTA and GSP, GSP seems to affect positively aggregate exports. The RTA membership seems to affect positively aggregate exports and average sales, while the number of products traded is affected only between members and non-members. In Table 4, the RESET test reveals that the specification seems to be valid for the aggregate exports and average sales (probability in Column 1 and 2 is 0.11 and 0.25 respectively). The test suggests that the model works better in the case of aggregate trade but it fails to do so for the extensive margin regressions.[9] These results are robust with those in Table 9 in the Appendix. Table 10 presents the OLS results. This positive effect is present even when we account for unobserved heterogeneity in Table 10 with simple OLS (in the case of the 4-digit data this is the case only for the extensive margin). The OLS results reveal that redefining the dependent variable as unilateral trade, as the gravity model theory suggests, is enough to uncover a positive WTO effect, following the same analysis as in Rose (2004a). There are no so robust evidence of trade creation or diversion as in Table 4. The OLS regressions fail to satisfy the RESET test (p-values are zero for these models).

The most robust results from the analysis carried out so far is that the WTO tends to foster trade through increasing the number of new products traded among members (extensive margin). This result is in line with Felbermayr and Kohler (2007) and Liu (2007). Felbermayr and Kohler (2007) found a positive effect also on the aggregate and

[9]While the model for aggregate exports passes the RESET test, it is not expected that this should be the case for the average exports and for the number of product categories. The number of product categories is an imperfect proxy for the true number of products traded. With the classification used in the current study, we can capture at most 918 product categories at the 5-digit level. This upper limit is likely to be achieved when trade takes place between developed economies. If this is the case the function that describes the model for the extensive margin should be s-shaped rather than the exponential. This could explain why this model for the number of product categories fails the RESET test. Also, there is no theoretical support for the average sales per category to be modelled as a gravity equation. Despite the potential misspecification of these models, and since more appropriate specifications are not currently available, we follow the previous literature (Flam and Nordstrom, 2004, Bernard et al., 2004, Nitsch and Pisu, 2008) and use gravity models both for the number of categories and for the average exports per category.

the intensive margin. The difference is that they used a Tobit Model for the estimation and use aggregate trade data. We create explicit measures for the margins and perform Poisson estimation that Santos Silva and Tenreyro (2006) provided evidence that works better than OLS and Tobit in the presence of heteroskedasticity. Liu uses again aggregate data and Tobit. Also Poisson is used in that analysis, but the author considers the zeros in the trade matrix and not an explicit measure for the extensive margin as we do. An additional difference with the current study is that by using disaggregated data allows us to capture the extensive margin not only in the case that trade between two countries becomes at some time from zero positive. This is feasible with aggregate data. With disaggregated data we can capture as the extensive margin cases where two countries already trade at some product lines but not at some others. If there is new trade in some of those inactive product lines, this will be captured by our measure of extensive margin, whereas this seems not to be the case in the above two studies that rely on aggregate data.

Table 4: WTO and the Trade Margins (5 digit data)-Poisson Regression

Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	0.731***	0.419*	0.292***
One WTO members	0.472***	0.511**	0.207***
RTA	0.315***	0.581***	-0.013
One in RTA	-0.059	-0.167	0.124***
GSP	0.190*	0.256	-0.093***
CU	-0.029	0.126	-0.136***
GDP exporter	0.334***	-0.823***	0.970***
GDP importer	0.348***	-0.420**	0.675***
GDP/cap. exporter	0.732***	1.181***	-0.393***
GDP/cap. importer	0.794***	1.261***	-0.434***
Current Colony	0.313***	-0.145	0.268**
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No
Number of Obs	964173	964173	964173
RESET test	0.11	0.25	0.00

* p<0.10, ** p<0.05, *** p<0.01, Poisson regression, robust standard errors clustered by country pair are included, Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data,Column 3: Dependent variable Extensive Margin (Total number of products) using 5 digit weighted data,Figures next to RESET test are the p-values for the test for the model in each column.

A second important finding is that the WTO effect on the intensive margin is positive and significant at the 5-digit, but is insignificant at the 4-digit data (Table 9). This result is in line with most of the results appearing in the empirical literature that find a positive effect or no effect for WTO membership. This evidence can be backed up by the observation that once trade costs are reduced through trade liberalization, then more firms start exporting. These could be (marginally) relatively less productive firms, that after a slight decrease in the costs of entry to a new market start exporting. However, they mainly export new products and the quantities sold might be so small that they are not able to affect overall and average trade volumes very much. On top of that, there are competition effects as more firms in the same market will drive the price, and possibly the market shares of the average firm, down. On the other hand, there is empirical evidence at the firm level that trade liberalization leads to a reallocation of resources from low to high productivity firms (Bernard et al. (2007)). Low productivity and inefficient firms exit the market and new more productive firms enter the market. Also there is evidence that the more productive firms have the ability to retain high profits, even if the mark ups fall due to an increase in competition (Melitz and Ottaviano (2003)). From all these arguments it is difficult to foresee which effect will dominate and explain the positive effect on average sales, but the explanation about more productive firms surviving and increasing their volume of trade over time seems to be the one supported partially by our data (in Table 4).

Perhaps a plausible explanation for the effect of the WTO on average sales is the one offered by Albornoz et al. (2009) about the fact that exporting firms start by selling small quantities to their neighbours because they are uncertain about their performance as exporters. Entering a foreign market involves incurring an entry sunk cost and since firms are uncertain about their future profitability, they prefer to export to near markets where the entry cost is small, and experiment by exporting small quantities. After their profitability is revealed then the exporters either exit the market or increase their volumes not only in the current but also in new destinations as now they have gained knowledge about their performance as exporters. Considering these arguments, after a trade liberalization episode (decrease of entry costs) many new firms enter new destinations (which has a positive effect on the extensive margin). However, if those new exporters are uncertain about their performance, they will start by selling small quantities, bringing down the average sales per product (which has a negative effect on the intensive margin). Albornoz et al.(2009) provide evidence that new exporters are more likely to enter a new market than experienced ones. These new exporters will more likely experiment as the experienced ones already have knowledge of their performance and will have entered all possible markets. Moreover, the behaviour of more productive exporters is such that they tend to make larger first period profits, they tend to sell larger volume abroad and they are less likely to exit a market. These arguments provide a possible explanation for the effects on the two margins as discussed above.

This mechanical effect that results from the behaviour of small new exporters can be supported by our data. Figures 1 and 2 below show the evolution of average sales for new versus old products. As old we define a product in two ways. Old is a product that was traded between a country pair the previous year or the previous five years. Once we separate the products in the above way we calculate the average trade on each product category for each year. The results are shown in the two graphs below. In both cases, average trade in old products is higher than average trade in new products. The figures confirm the scenario of new exporters' selling small quantities and old exporters selling large quantities.

Finally, the results also offer an explanation for the insignificant overall effect in Rose (2004a). We also found evidence of no aggregate trade effects when we use OLS as in Rose (Table 3). Table 10 in Appendix A shows the OLS results when we redefined the dependent variable using unilateral trade flows (exports) and uncovered a positive effect on aggregate trade and the extensive margin at the 5-digit level of data. Table 4 uses the new dependent variable (based on unilateral exports) and Poisson Regression (to include the zero trade flows and to account for the bias created by using OLS) to deliver a positive and significant effect both for aggregate trade and the trade margins. Therefore, one should be really careful when interpreting the aggregate results of the WTO studies conducted so far, in the sense that if we really do want to employ the gravity model, this has to be done using unilateral trade flows according to the theory. Table 9 shows as well that redefining the dependent variable using only export data, as the theory indicates, and using PPML reveal a positive WTO trade effect on the aggregate.

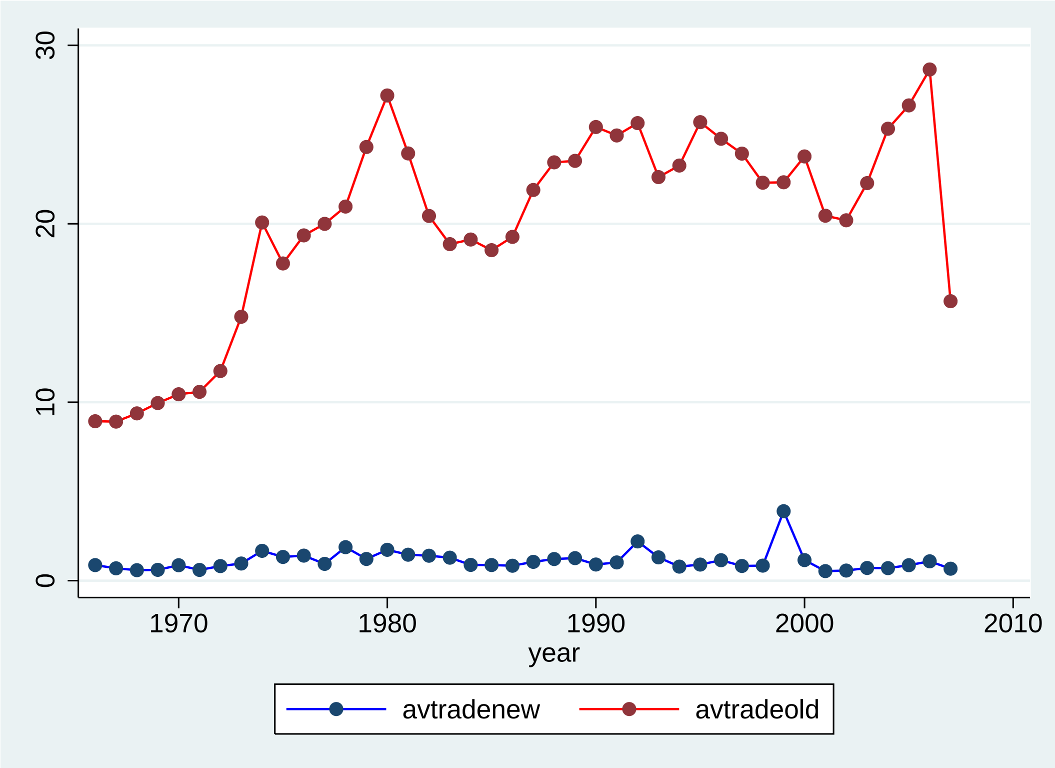

Figure 1: Average Trade in new versus old products (1 year)

5 Heterogeneity Analysis

After establishing the results from the basic regressions, we perform a series of checks to identify the WTO effect per country group, per degree of product differentiation and per sector.

5.1 The WTO effect and the level of development

It is well known that the liberalization requirements for WTO members are different between developed and developing economies. Developed economies have reduced tariffs from 15% to around 4% on average. On the other hand, developing economies have reduced tariffs to only one third of their export lines and the tariff rates imposed by the WTO were usually much higher than the applied ones (Subramanian and Wei, 2007). Does such a differential treatment play a role on trade?

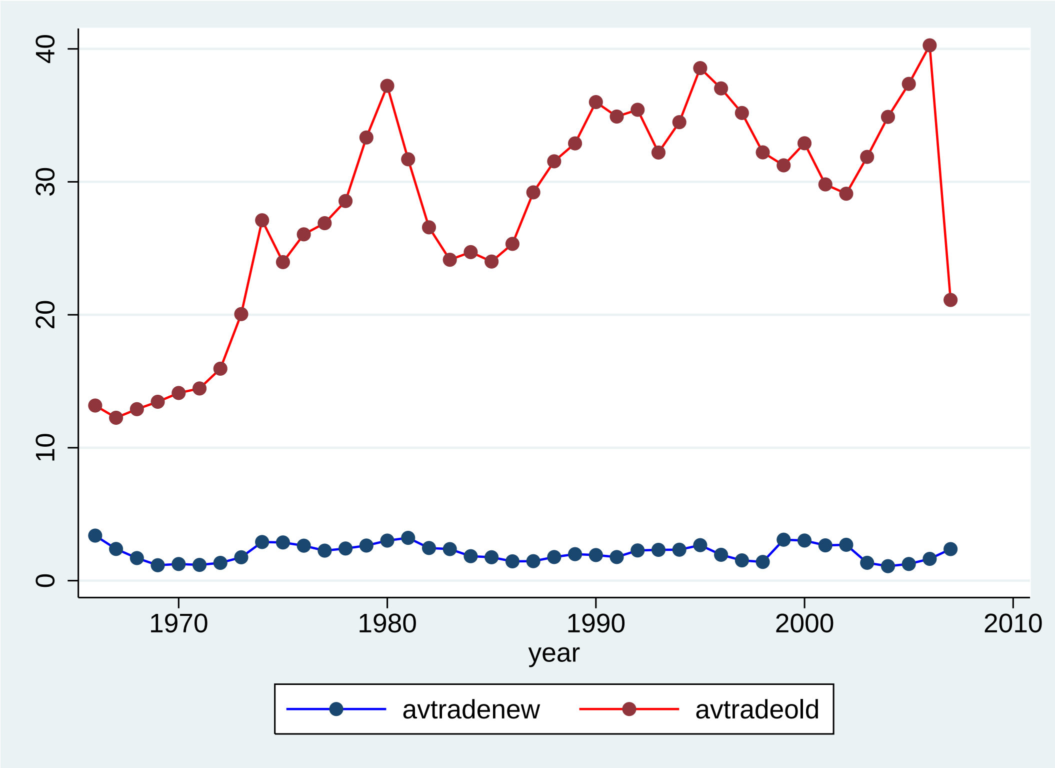

Figure 2: Average Trade in new versus old products (5 year)

To answer this question, Table 5 introduces dummies that split the WTO effect between industrial and developing countries. The distinction is based on the method used by Subramanian and Wei (2007).[10] The dummy variable taking value 1 if both countries were members in the WTO is replaced by four dummies: the first one is a dummy that takes value 1 if both countries are industrial countries and both members of the WTO in a given year. The second dummy takes value 1 if the importer is an industrial country and the exporter is a developing one and both are WTO members in a given year. The third dummy takes value 1 if the importer is a developing country, the exporter is industrial and both the importer and exporter are WTO members. Finally, the last dummy will be 1 if both WTO members are developing economies. Subramanian and Wei (2007) indicated that the WTO effect should be higher for the first of these dummies and then

[10]We separate the countries in developed and developing based on Table 2 in the Appendix of the NBER Working Paper version of the Subramanian and Wei paper (NBER Working Paper 10024). We understand that there are other ways to split the countries into developed and developing. We follow Subramanian and Wei to be able to compare our results with their results.

decline for the rest of the dummies. Moreover, we have split the unilateral WTO membership dummy into the four following dummies: firstly, a dummy that takes value 1 if the importer is industrial and a WTO member but the exporter is not in the WTO. Secondly, a dummy that takes value 1 if the importer is a developing WTO country member but the exporter is not in the WTO. A third dummy that is 1 if the exporter is industrial and a WTO member and the importer is not a WTO member. Finally, a dummy equal to 1 if the exporter is developing and a WTO member and the importer is not a WTO member.

Table 5 represents the Poisson results for the above analysis. Focusing on the first four rows, WTO seems to affect positively aggregate exports for every combination of exporter-importer country members. This effect is highest when both WTO members are industrial countries. This is in line with Subramanian and Wei (2007). When the importer country member is industrial and the exporter is developing, the effect is also high, implying that the WTO affects positively exports from developing economies to industrial importers. There is a positive and significant WTO effect on average sales for all the cases apart from the case of a developing WTO country pair. In this case, the effect on the extensive margin is positive and significant. The WTO extensive margin effect is negative and significant for industrial pairs and insignificant for the other two cases (Rows 2 and 3 Column 3 of Table 5). Regarding the trade creation/diversion dummies, WTO seems to promote trade with outsiders through total exports and average sales only in the case where the importer is industrial or a developing WTO member and the exporter is not a WTO member. The number of products traded between members and non-members tends to increase when the exporter member in the pair is a developing country. The RESET test seems to promote only the specification for total exports and average sales. In that case total exports mostly benefit predominantly when the two members are industrial countries followed by the case where the importer is an industrial country and the exporter is a developing country. Moreover, the largest trade creating effect appears in the case where the importer is an industrial WTO member.

This evidence supports only partially the evidence by Subramanian and Wei (2007) that the WTO effect is present mainly in the industrial country pairs. Our results indicate that membership can benefit trade between developing economies, at least through the extensive margin and aggregate trade. The positive effect on aggregate exports and average sales between members that are industrial-developing indicates that the WTO could benefit trade in the North-South trading case. Finally, the extensive margin is harmed in the case of industrial WTO members. The results in Table 11 are similar. The only difference is that in the 4-digit data case, there is no WTO effect on aggregate exports except in the case where both WTO members are developing countries. There is no trade creation effect between industrial and WTO importer members and a non-member WTO exporter. The OLS results in Table 12 confirm the Subramanian and Wei (2007) predictions on the aggregate only for the 5-digit level data, but those regressions fail the RESET test even if they include country pair FE. From those results the extensive margin is positively affected only in the case of two developing WTO members.

Table 5: The WTO Effect by Country group(5 digit data)

Variables	Total Trade	Int.Margin	Ext.Margin
Both Industrial and WTO	1.191***	3.209***	-0.265***
Importer Industrial, Exporter Developing and both WTO	0.952***	2.458***	-0.021
Importer Developing, Exporter Industrial and both WTO	0.561***	0.718**	-0.052
Both Developing and WTO	0.674***	0.293	0.535***
Importer Industrial and WTO, Exporter not in WTO	0.855***	2.991***	-0.304***
Importer Developing and WTO, Exporter not in WTO	0.799***	0.841***	0.024
Exporter Industrial and WTO, Importer not in WTO	-0.014	-0.471	0.072
Exporter Developing and WTO, Importer not in WTO	0.098	-1.014**	0.336***
RTA	0.311***	0.502**	-0.045
One in RTA	-0.045	-0.072	0.111***
GSP	-0.002	-0.471***	-0.056***
CU	-0.021	0.023	-0.144***
GDP exporter	0.370***	-0.833***	0.889***
GDP importer	0.340***	-0.742***	0.603***
GDP/cap. exporter	0.755***	1.300***	-0.345***
GDP/cap. importer	0.734***	1.317***	-0.375***
Current Colony	0.376***	-0.050	0.203*
Number of Obs	964173	964173	964173
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No
RESET test	0.42	0.59	0.00

* p<0.05, ** p<0.01, *** p<0.001, Poisson, time effects and robust standard errors clustered by country pair, Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data, Column 3: Dependent variable Extensive Margin (Total number of products), Figures next to RESET test are the p-values for the test for the model in each column.

The above results could be related to the literature on level of development and export diversification. Cadot et al. (2007) find that developing economies diversify at the extensive margin. This could be the case because export diversification tends to be connected with lower terms of trade volatility and higher growth. Moreover, the authors show that developed economies tend to reconcentrate on fewer products. If this is the case developed economies tend to concentrate on fewer products selling higher quantities per product thus affecting the intensive margin more. These patterns could be reinforced due to lower trade barriers through the WTO membership and our results for the two margins in Tables 5 and 11 seem to support the evidence by Cadot et al. (2007).

5.2 The WTO effect by degree of product differentiation

Existing literature has shown that lower trade barriers enhance the extensive margin especially in the case of differentiated products. Besedes and Prusa (2004) showed that trade relationships in differentiated products can be longer lived when compared with those involving homogeneous products, since each variety is desirable for the consumers. Combining those two effects, these studies suggest a potential group of products that the WTO can have the largest and longest lived impact. This has serious implications for policy makers and economic growth. Table 6 separates the WTO effect into product groups according to Rauch (1999). Rauch separates the goods in his study into differentiated products, products for which there is a reference price and products that are traded in organized markets (homogeneous products).

Table 6 contains the WTO effects for the three product categories using Poisson regression. Panel A contains the results for differentiated products. The positive effect on total exports and the extensive margin continues to be present (Columns 1 and 3). The effects on average sales are not significant. Trade creation is present only through aggregate exports and the extensive margin (the coefficients on one WTO members are 0.226 and 0.185 and are significant). The effects are similar for differentiated products in the Robustness Results of Panel A in Table 13. Panel B contains the results for reference priced products. There is a positive effect on the extensive margin, slightly higher than the one for differentiated products. The WTO effect remains positive and significant for total exports and for average sales. There are signs of trade creation between members and non members both on the aggregate level and the two trade margins. Checking Panel B in Table 13, the extensive margin remains significant, whereas the intensive margin and total export effects become insignificant in some cases. There is trade creation with non members mainly through the extensive margin. Finally, the results for homogeneous products are presented in Panel C of Table 6. The results indicate a positive effect on the extensive margin for the 5-digit weighted data. The effect is positive for total exports and average sales as well. There is a trade creating effect with non members in all the three cases. The robustness checks on Table 13 Panel C indicate that the results are robust for the extensive margin, while insignificant in the 4-digit case for aggregate exports and average sales. Comparing the extensive margin effects on the three product categories the smallest one is the one for differentiated products for the 5-digit data, while this effect is smallest for the homogeneous products at the 4 digit. The RESET test indicates that the models for total exports satisfy the selected specification only for differentiated and reference priced products (Columns 1 and 1, 4 and 7 of Panels A and B in Tables 6 and 13 respectively).

Table 6: The WTO Effect by degree of product differentiation

Panel A: Differentiated products			
Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	0.510***	0.141	0.270***
One WTO members	0.226**	-0.078	0.185***
RTA	0.242*	0.284***	-0.029
One in RTA	-0.064	-0.107**	0.127***
GSP	-0.161	-0.031	-0.053**
Number of Obs	951210	951210	951210
RESET test	0.85	0.00	0.00
Panel B: Reference Priced Products			
Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	0.411***	0.261**	0.384***
One WTO members	0.376***	0.394***	0.308***
RTA	0.230***	0.204**	0.036
One in RTA	-0.083	-0.087	0.102***
GSP	-0.113	0.092	-0.294***
Number of Obs	758454	758454	758454
RESET test	0.11	0.00	0.00
Panel C: Homogeneous Products			
Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	1.013***	0.702***	0.400***
One WTO members	0.852***	0.683***	0.286***
RTA	0.446*	-0.039	0.066
One in RTA	-0.096	-0.148	0.114***
GSP	.519***	0.574***	-0.126***
Number of Obs	482987	482987	482987
RESET test	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, Poisson, time dummies and robust standard errors clustered by country pair, Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data, Columns 3: Dependent variable Extensive Margin (Total number of products), Figures next to RESET test are the p-values for the test for the model in each column.

An interesting first result from the tables is that the overall insignificant WTO effect found in Rose (2004a) is valid only for the homogeneous products and reference priced product category at the 4-digit data. The effect on total exports is positive for differentiated products in all the cases. Therefore, the aggregate effect masks those three individual effects for each product category. Moreover, there are generally signs of trade creation for all product categories between members and non members.

The most robust result of Tables 6 and 13 is that the extensive margin is positively affected by the WTO membership for all product categories. Most important is that this effect is generally smaller for homogeneous products than for differentiated products only at the 4-digit level. This result even if it is present only at the 4 digit level is in line with much of the existing literature. Rauch (1999) suggests that search barriers to trade are higher for differentiated products than for homogeneous products. Theoretical and empirical research has illustrated the higher impact of trade liberalization on the extensive margin of differentiated products. Chaney (2006) develops a model of heterogeneous firms and a fixed market entry cost. The main results of this model are that the higher the elasticity of substitution between the products (i.e. the more homogeneous the products) the more the intensive margin is sensitive to trade barriers compared to the extensive margin. The reason for this is after a decrease in trade barriers new firms and less productive firms enter the market. If the elasticity of substitution is high, low productivity firms cannot charge high prices and they capture small market shares. The effect of these firms on aggregate trade is small. In this case the intensive margin is affected more than the extensive margin. Moreover, when the fixed trade costs are lower, this will affect the extensive margin and not the intensive margin.

These two implications (that the increase in trade volume through trade liberalization is realized via the extensive margin and that this result is strongest in the case of differentiated products) of Chaney's model and many of the heterogeneous firms models of trade were empirically tested by many authors. Andersson (2007) argues that a reason why fixed entry costs might be lower for some exporters is because these exporters are familiar with the destination market. More familiarity should affect the fixed entry costs and the extensive margin. Andersson (2007) finds this effect to be strongest for differentiated than homogeneous goods. Koenig (2005) finds that the distance elasticity of the intensive margin is higher for homogeneous products. The distance elasticity of the extensive margin for the same products is found to be lower. There seems to be no significant difference between the two categories of goods in terms of the distance elasticity of total exports.

Frensch (2009) considers the effect of trade liberalization on the trade margins by separating the products by use into intermediate, capital and consumer goods. He finds that the extensive margin impact of trade liberalization is stronger in the case of intermediate and capital goods that are more complementary goods than consumer goods. Other studies on the effects of immigrant networks (Peri and Requena, 2009) or trade facilitation (Persson, 2009, Martinez-Zarzoso and Marquez-Ramos, 2008) on the extensive margin, find that these effects are stronger for differentiated than homogeneous goods. The results of Tables 6 and 13 are partially in line with the effects on the extensive margins suggested by the studies mentioned above.

5.3 The WTO Effect by Sector

It is well known that certain sectors like agriculture, textiles and clothing were exempted from the tariff reductions, even in the case of developed economies. The implication is to test whether such an argument is supported by the data. Showing that the extensive margin was affected at least in the sectors that were faced with high tariff reductions (such as manufacturing), will mean that other sectors can benefit as well, resulting in numerous welfare and economic growth gains. One of the findings in Subramanian and Wei (2007) is that the WTO membership has a positive effect on trade in liberalized manufacturing for all member countries, and on non-liberalized manufacturing for developed member countries. The authors found no positive effect for textiles, footware and food. To examine whether such an effect exist in our study, we divided the products in our data in general categories similar to those defined in Subramanian and Wei (2007). Since we are interested in capturing changes in the extensive margin and the footware sector is narrow in terms of the total number of products in that category, we report the results of footware and textiles together.

Table 7 contains the Poisson results per sector. The effects for textiles and textiles-footware turn out to be significant for 5-digit weighted data. There is a positive and significant effect between members and non-members on total exports and on the extensive margin. Moreover, RTA membership and GSP arrangements seem to enhance the extensive margin as well. In Table 16, Panels A and B show robustness checks about the Poisson. Results on liberalized manufacturing indicate a positive effect on total exports and the two trade margins. There is also some trade creating effect with non-members. These positive effects are present in the robustness checks in Panel C of Table 16. RTA membership enhances trade between members through total exports and average sales and between members and non members through the extensive margin. GSP seems to harm trade through the extensive margin. Results on Table 16 are similar. Panel D illustrates the results for protected manufacturing. There are positive effects on average sales and the number of products, as well as on total exports. There are trade creating effects in all three cases. On the other hand, RTA membership affects positively total exports and average sales. The GSP effects are negative. Results on Table 16 are similar. Finally, for the food sector (Panel E) there seems to be no significant effect due to WTO membership on members as well between members and non-members on aggregate trade. This effect remains positive and significant for the extensive margin and average sales. GSP has a positive effect mainly through the extensive margin and the RTA through total and average exports. Results on Table 16 are similar. From all these models estimated, only the regressions for total exports satisfy the RESET test for the manufacturing sectors (Columns 1 and 1, 4 ,7, Panels C and D in Tables 7 and 16).

To sum up, the sectoral analysis confirms partially the findings of Subramanian and Wei (2007) only in the case where Poisson estimation has been employed for aggregate exports. WTO membership seems to be beneficial for all the product categories via the extensive margin, with additional trade creating effects with non-members in all the cases, at least for the extensive margin. Only the manufacturing sectors satisfy the RESET test but only for the regressions on total exports. The Subramanian and Wei results are confirmed on the aggregate, but our disaggregated analysis indicates that all product categories could benefit through the extensive margin. The extensive margin effect remains the highest in the case of the manufacturing sectors.

5.4 The WTO Effect and Multilateral Resistance

Anderson and van Wincoop (2003) outline the potential bias that could arise in the estimated parameters of a gravity model, if multilateral resistance is not taken into account. By multilateral resistance the authors consider that "trade between two regions is decreasing in their bilateral trade barrier relative to the average barrier of the two regions to trade with all their partners". This average trade barrier is multilateral resistance. Tables 8 and 19 in Appendix A account for multilateral resistance by introducing exporter and importer time varying FE. This is a common practice in the literature as in Subramanian and Wei (2007), Felbermayr and Kohler (2007) and Eicher and Henn (2008). We need to note at this point that the estimation was performed for only 12 years of data, due to the lack of computing power.[11]

[11]The years used are 1962, 1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002 and 2006.

Table 7: The WTO effect by sector

	Total Trade	Int.Margin	Ext.Margin
Panel A:WTO, RTA and the Trade Margins (5 digit data), Clothing/Textiles			
	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.560***	0.371**	0.296***
One in WTO	0.278*	0.109	0.170***
RTA	0.373	0.378	-0.001
One in RTA	-0.211**	-0.108	0.138***
GSP	0.687***	0.689***	0.133***
Number of Obs	776096	776096	776096
RESET test	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (5 digit data), Clothing/Textiles/Footware			
	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.546***	0.391**	0.296***
One in WTO	0.281*	0.135	0.172***
RTA	0.371	0.389*	-0.008
One in RTA	-0.207*	-0.100	0.137***
GSP	0.637***	0.655***	0.147***
Number of Obs	788457	788457	788457
RESET test	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (5 digit data), Liberalized Manufacturing			
	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.847***	0.463***	0.343***
One in WTO	0.449***	0.156	0.258***
RTA	0.384***	0.455***	0.007
One in RTA	0.014	0.037	0.153***
GSP	-0.246	0.066	-0.111***
Number of Obs	779757	779757	779757
RESET test	0.00	0.00	0.00
Panel D:WTO, RTA and the Trade Margins (5 digit data), Protected Manufacturing			
	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.588***	0.207**	0.296***
One in WTO	0.303***	0.226**	0.233***
RTA	0.208*	0.335***	-0.035
One in RTA	-0.001	-0.085	0.117***
GSP	-0.480***	-0.089	-0.222***
Number of Obs	824447	824447	824447
RESET test	0.23	0.17	0.00
Panel E:WTO, RTA and the Trade Margins (5 digit data), Food			
	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.196	0.309***	0.263***
One in WTO	0.018	0.152	0.159***
RTA	0.454***	0.343***	-0.052
One in RTA	-0.090	-0.112	0.008
GSP	-0.032	-0.387***	0.090***
Number of Obs	692194	692194	692194
RESET test	0.00	0.05	0.00
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, Poisson, time effects and robust standard errors clustered by country pair, Classification close to the one by Subramanian and Wei (2007),
Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data, Column 3 : Dependent variable Extensive Margin (Total number of products),
Figures next to RESET test are the p-values for the test for the model in each column.

Table 8 shows the results for the 5-digit weighted data. Panel A of Table 8 repeats the analysis of Table 4, but using only the aforementioned 12 years to run the models with the country pair FE. This is done to check whether the WTO effect changes once we restrict our sample to those 12 years and use country pair FE as before. The WTO effect remains positive and significant for the aggregate exports and the extensive margin. The effect on the intensive margin is insignificant (0.175). The WTO seems to affect positively aggregate exports with non-members (the coefficient for one WTO member is 0.555 and highly significant). This holds for the trade margins as well. Being an RTA member affects positively aggregate exports and the intensive margin among members. There are no signs of trade diversion between RTA members and non RTA members.

Panel B presents the results when time varying exporter and importer FE are added in the regression.[12] There is a negative effect of WTO on total exports and the extensive margin when both countries are WTO members, but it is insignificant. The effect on the intensive margin remains insignificant. The effects between members and non members are insignificant. RTA membership seems to foster trade between members at the aggregate level and intensive margin. The effect is negative and significant for the extensive margin. For the members and the non members the RTA membership tends to affect positively total exports, with no effect on the margins. Table 19 Appendix A shows the effects for the OLS regressions. In Panel A results resemble Panel A of Table 8. Panel B of Table 19 shows that any positive effect comes from the RTA membership and not the WTO membership. The insignificant WTO effect is in line with Eicher and Henn (2008) and Rose's (2004a) findings.

[12]The difference in total number of observations in Panels A and B is due to the fact that some country pairs are dropped in the estimation in Panel A. This is because these groups contain only zeros for the dependent variable in the subsample used for the estimation in Table 3.8, so they do not contribute in the estimation of the log likelihood function.

Table 8: WTO and the Trade Margins (5 digit data)-Poisson Regression

Panel A:WTO, RTA and the Trade Margins (5 digit data)			
Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	0.822***	0.175	0.351***
One WTO members	0.555***	0.532**	0.256***
RTA	0.320***	0.432*	0.031
One in RTA	-0.049	-0.193	0.151***
One in GSP	0.217*	0.140	-0.089***
Number of Obs	237518	237518	237518
RESET test	0.01	0.14	0.00
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No
Panel B :WTO, RTA and the Trade Margins (5 digit)			
Variables	Total Trade	Int.Margin	Ext.Margin
Both WTO members	-0.536	0.235	-0.125
One WTO members	-0.003	0.453	-0.123
RTA	0.615***	0.820***	-0.347***
One in RTA	0.278***	0.193	-0.040
One in GSP	0.141	-0.570***	0.492***
Number of Obs	271374	271374	271374
RESET test	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes
Country Pair FE	No	No	No
Time Varying FE	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01, Poisson Regression, time effects and time varying exporter and importer FE using the years 1962, 1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002 and 2006 and robust standard errors clustered by country pair, Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data, Column 3: Dependent variable Extensive Margin (Total number of products), Figures next to RESET test are the p-values for the test for the model in each column.

In the current section, most of the effect of WTO membership becomes negative and insignificant compared to the majority of the results in the previous sections. The effects of RTA membership remain positive, at least between members, with a negative effect on the extensive margin. The latter effect was usually insignificant for country members of an RTA. What could explain this difference in these results? Country pair FE control for omitted variables that are time invariant and unobserved. One of these variables could be multilateral resistance (access to third markets). The country pair FE could account only for the time invariant part of multilateral resistance. However, multilateral resistance varies over time (Anderson and van Wincoop, 2003). So country pair FE cannot capture entirely the omitted variability of multilateral resistance over time. Factors that can affect multilateral resistance over time are cases in which countries generally pursue more liberal trade policies or where transportation costs have fallen over time. This makes access to third markets easier. Easier access has affected trade flows positively, but the WTO membership might as well. If we do not consider the effect of easier access then the WTO coefficient, and even the RTA effects, captures these positive effects of easier access and is inflated in the regressions with only country pair FE. With the time varying exporter and importer FE, this easier market access effect (that has varied over time) is taken into account, and the WTO effect, free of the effect of easier market access, is lower and even negative (but insignificant).

6 Conclusions

The current study examined empirically the WTO effect on trade. Empirical facts and theoretical arguments suggest that the establishment of GATT / WTO at the post war era would be one of the reasons explaining the increase in world trade the same period. In his seminal paper Rose (2004a) challenges the conventional wisdom by presenting findings for an insignificant role of WTO on aggregate trade.

Using disaggregated data from UN Comtrade, we first aggregate our data and perform an analysis closely related to Rose (2004a). We are able to find the same insignificant effect of WTO on aggregate trade as Rose does. We then consider unilateral exports and decompose export growth on two margins: the number of products between a country pair in a given year (extensive margin) and the average value of exports per product (intensive margin). Following the work of Santos Silva and Tenreyro (2006), we perform PPML regression on all the models, which are also estimated by OLS (in Appendix C). The results turn out to be robust at the 4-digit and 5-digit level for the extensive and the intensive margin. The results are that the WTO effect on aggregate exports is positive and significant. But once we consider the decomposition on the two margins it turns out that WTO boosts average sales at the 5-digit data, but this result is less robust. On the other hand, WTO has a strong significant positive effect on the number of products traded, after WTO membership. Moreover, there is significant evidence of trade creation as a result of joining the WTO through the extensive margin. The OLS results are generally in line with those obtained from the Poisson analysis.

Our finding about the positive effect of WTO on the extensive margin is in line with many other studies that found a positive effect of trade liberalization episodes on the number of varieties traded. The results on the aggregate are in most cases positive and significant which is not in line with Rose's findings. The positive effects on average sales is one extra interesting finding, even though less robust than the positive effect on aggregate exports and the extensive margin. Average sales could potentially fall, partially due to the effect of competition after a trade liberalization episode. However, other studies from firm level data indicate that more productive firms are able to survive in the market and these firms are able to maintain higher profits even if prices decrease due to competition. A more plausible explanation might be that firms experiment by selling small quantities in neighbouring markets to assess their performance as exporters. So new exporters might be willing to bear the fixed entry cost and sell small quantities which therefore only has a slight effect on aggregate exports and drives down average sales. This mechanical effect is confirmed by our data in some cases. Albornoz et al. (2007) indicate that more productive firms make larger first period profits, and are more likely to sell larger volumes abroad and less likely to exit a new destination market.

The heterogeneity part of the analysis revealed that the effect on the extensive margin remains once we consider the unobserved heterogeneity through country pair fixed effects. When we test for the asymmetries tested in Subramanian and Wei (2007), the results indicated that the effect was stronger when both the WTO member economies were industrial and this effect on aggregate exports was positive in all the cases. The largest WTO trade creating effect is in the case of the WTO member importer being a developing or industrial economy and the exporter is a non member. The positive WTO effect on the extensive margin is present between developing WTO members only. These results only partially confirm the Subramanian and Wei (2007) findings. When we consider the effect by sector, the Poisson indicated that any effect on aggregate exports present appears in all the sectors apart from food, with the largest effect on liberalized and protected manufacturing. This result is in line with Subramanian and Wei (2007). But this analysis revealed a positive and significant extensive and intensive margin effect in all the sectors apart from food, with the manufacturing sectors reaping these benefit most. These results suggest potential benefits of deeper trade liberalization between developed and developing economies. Moreover, it suggests more welfare benefits once tariffs cuts are expanded to currently relatively highly protected sectors.

Separating the effect by Rauch classifications, the results are mixed in terms of which type of goods experiences the biggest impact. Only the 4-digit data indicated that the effect of WTO on the extensive margin is higher for differentiated products compared to homogeneous products. This result is in line with the existing literature. It also suggests that export growth could come through expanding trade in differentiated products, as these trade relationships are longer lived as suggested by Besedes and Prusa (2004).

These results are not robust once we consider multilateral resistance through exporter and importer time varying FE. The role of the WTO is insignificant. The RTA effects remain positive and significant for region members through total exports and the intensive margin. These results, even though they should be interpreted with caution as they are based on a subsample of our dataset, indicate that the estimated coefficients in a model without multilateral resistance are inflated. The WTO seems to benefit countries that would otherwise trade with each other anyway, regardless of their WTO membership, because of being more orientated towards free trade policies. This might be the factor that is affecting both the WTO membership and the trade flows. Maybe more generous reductions in tariffs and non tariff measures are required from the country members to truly benefit from the WTO system.

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7 Appendix A

7.1 Poisson Results-Robustness Checks

Beginning with Table 9, the first three columns are for the 4 digit unweighted trade data. Focusing on the first column of Table 9, we can observe that there is evidence of a positive significant WTO effect on aggregate exports. Furthermore, there is no evidence of trade creation or trade diversion on the aggregate level between members and non-members. Observing column 2 (intensive margin) and column 3 (extensive margin), we get a clearer picture. The effect on the intensive margin is insignificant. The effect on the extensive margin is positive and significant. In the models there is evidence of trade creating effects (coefficients on the variable One WTO member are highly significant). These findings are robust when the weighted 4-digit trade data are used in the next three columns of Table 9 and for the 5 digit unweighted data in the last 3 columns. On the aggregate, there is indication of WTO trade enhancing effect, whereas there is evidence that the effect of WTO on average sales is not robust, but boosts the number of products exported from one country member to the other. There is significant evidence of trade creation again in all the models. In Table 9 the RESET test reveals that the specification seems to be valid only for the aggregate exports in the 5 digit data and the intensive margin in some of the models.

Table 9: WTO and the Trade Margins-Poisson Regression-Robustness Checks

variables	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.356***	0.171	0.221***	0.350***	0.175	0.221***	0.715***	0.414*	0.292***
One WTO members	0.186**	0.252**	0.146***	0.188**	0.252**	0.146***	0.439***	0.511**	0.207***
RTA	0.417***	0.714**	-0.045	0.386***	0.693**	-0.045	0.350***	0.603***	-0.013
One in RTA	-0.025	-0.153	0.097***	-0.038	-0.164	0.097***	-0.038	-0.154	0.124***
One in GSP	0.022	0.209*	-0.082***	0.026	0.213*	-0.082***	0.165*	0.247	-0.093***
CU	0.036	0.189***	-0.118**	0.032	0.189	-0.118**	-0.025	0.131	-0.136***
GDP exporter	0.303***	-0.593***	0.829***	0.310***	-0.590	0.829***	0.316***	-0.820***	0.970***
GDP importer	0.316***	-0.310***	0.574***	0.730***	-0.308***	0.574***	0.331***	-0.416**	0.675***
GDP/cap. exporter	0.743***	1.048***	-0.348***	-0.084	1.048***	-0.348***	0.744***	1.172***	-0.393***
GDP/cap. importer	0.815***	1.134	-0.361***	0.840*	1.146***	-0.361***	0.789***	1.250***	-0.434***
Current Colony	0.480***	0.435	0.252**	0.473***	0.414	0.252**	0.300***	-0.164	0.268**
Number of Obs	1006522	1006522	1006522	1006522	1006522	1006522	964173	964173	964173
RESET test	0.00	0.30	0.00	0.00	0.29	0.00	0.10	0.25	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, Poisson regression, time effects and robust standard errors clustered by country pair included,
Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data,
Column 3: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports using 4 digit weighted data,
Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Column 6: Dependent variable Extensive Margin using 4 digit weighted data,
Column 7: Dependent variable Total Exports using 5 digit unweighted data, Column 8: Dependent variable Intensive Margin using 5 digit unweighted data,
Column 9: Dependent variable Extensive Margin (Total number of products) using 5 digit unweighted data,
Figures next to RESET test are the p-values for the test for the model in each column.

7.2 OLS-Accounting for Unobserved Heterogeneity

In Table 10, we have performed OLS with country pair fixed effects. This is to account for potential unobserved heterogeneity of the form discussed in Eicher and Henn (2008). Panel A of Table 10 contains the results for the 4-digit data and panel B for the 5-digit data. Columns 1-3 refer to the unweighted data and columns 4-6 to the weighted data. The effects on the extensive margin remain positive and significant. This is also the case for total trade, the effect on which remains positive and significant only for the 5-digit data. There is evidence of trade diversion on Panel A but not Panel B. All the models fail to satisfy the specification test (the RESET test p value is zero in all cases). From the other trade arrangements, RTAs seem to foster aggregate exports and average sales. RTAs seem to affect the extensive margin between members and non members (One in RTA has positive and significant effects on the extensive margin) compared to the case between members. GSP seems to harm the extensive margin.

Table 10: Basic Regressions with country pair FE

Panel A:WTO, RTA and the Trade Margins (4 digit data), ols						
	Variables	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin
Ext.margin						
Both WTO members	-0.071*	-0.136***	0.065***	-0.077*	-0.142***	0.065***
One WTO members	-0.109***	-0.073**	-0.036*	-0.113***	-0.077***	-0.036*
RTA	0.741***	0.756***	-0.016	0.733***	0.749***	-0.016
One in RTA	0.223***	0.059***	0.165***	0.223***	0.058***	0.165***
One in GSP	-0.102***	0.105***	-0.207***	-0.093***	0.114***	-0.207***
R-Square	0.773	0.584	0.822	0.773	0.584	0.822
Number of Obs	576809	576809	576809	576809	576809	576809
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (5 digit data),ols						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.134***	0.037	0.097***	0.137***	0.040	0.097***
One WTO members	-0.013	0.017	-0.030	-0.014	0.016	-0.030
RTA	0.686***	0.631***	0.055	0.671***	0.616***	0.055
One in RTA	0.270***	0.052***	0.219***	0.265***	0.046***	0.219***
One in GSP	-0.055	0.161***	-0.217***	-0.041	0.176***	-0.217***
R-Square	0.774	0.581	0.811	0.773	0.581	0.811
Number of Obs	498927	498927	498927	498927	498927	498927
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS, time effects and robust standard errors clustered by country pair, Column 1: Dependent variable Total Exports using unweighted data, Column 2: Dependent variable Intensive Margin using unweighted data, Column 3 and 6: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports weighted data, Column 5: Dependent variable Intensive Margin using weighted data.

Figures next to RESET test are the p-values for the test for the model in each column.

7.2.1 The WTO effect and the level of Development-Robustness checks

Table 11: The WTO Effect by country group

	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both Industrial and WTO	0.097	1.551***	-0.330***	0.104	1.549***	-0.330***	1.148***	3.217***	-0.265***
Importer Industrial, Exporter Developing and both WTO	0.118	1.148***	-0.100**	0.159	1.183***	-0.100**	0.895***	2.440***	-0.021
Importer Developing, Exporter Industrial and both WTO	-0.087	0.250	-0.147***	-0.073	0.234	-0.147***	0.536***	0.738**	-0.052
Both Developing and WTO	0.479***	0.089	0.453***	0.445**	0.085	0.453***	0.688***	0.293	0.535***
Importer Industrial and WTO, Exporter not in WTO	-0.003	1.487***	-0.328***	0.020	1.495***	-0.328***	0.806***	2.994***	-0.304***
Importer Developing and WTO, Exporter not in WTO	0.492***	0.588***	-0.023	0.512***	0.589***	-0.023	0.772***	0.840***	0.024
Exporter Industrial and WTO, Importer not in WTO	-0.525***	-0.772***	-0.014	-0.502***	-0.774***	-0.014	-0.049	-0.460	0.072
Exporter Developing and WTO, Importer not in WTO	-0.041	-0.638***	0.289***	-0.065	-0.639***	0.289***	0.013	-1.019**	0.336***
RTA	0.408***	0.668***	-0.074**	0.379***	0.647***	-0.074**	0.344***	0.524**	-0.045
One in RTA	-0.024	-0.097	0.087***	-0.034	-0.106	0.087***	-0.027	-0.059	0.111***
One in GSP	-0.086	-0.295***	-0.060***	-0.084	-0.294**	-0.060***	-0.022	-0.476***	-0.056***
Number of Obs	1006522	1006522	1006522	1006522	1006522	1006522	964173	964173	964173
RESET test	0.00	0.02	0.00	0.00	0.01	0.00	0.21	0.54	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No	No	No	No

* p<0.05, ** p<0.01, *** p<0.001, Poisson, time effects and robust standard errors clustered by country pair,
Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data,
Column 3: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports using 4 digit weighted data,
Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Column 6: Dependent variable Extensive Margin using 4 digit weighted data,
Column 7: Dependent variable Total Exports using 5 digit unweighted data, Column 8: Dependent variable Intensive Margin using 5 digit unweighted data,
Column 9: Dependent variable Extensive Margin (Total number of products) using 5 digit unweighted data,
Figures next to RESET test are the p-values for the test for the model in each column.

Table 12: The WTO effect by country group

	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Panel A:WTO, RTA and the Trade Margins (4 digit data)						
Both Industrial and WTO	-0.092	0.168*	-0.259***	-0.093	0.167*	-0.259***
Importer Industrial, Exporter Developing and both WTO	-0.109	0.208***	-0.318***	-0.089	0.228***	-0.318***
Importer Developing, Exporter Industrial and both WTO	-0.503***	-0.430***	-0.073	-0.517***	-0.444***	-0.073
Both Developing and WTO	-0.003	-0.166***	0.164***	-0.014	-0.177***	0.164***
Importer Industrial and WTO, Exporter not in WTO	-0.206**	0.192***	-0.399***	-0.205**	0.194***	-0.399***
Importer Developing and WTO, Exporter not in WTO	-0.194***	-0.054*	-0.141***	-0.200***	-0.059*	-0.141***
Exporter Industrial and WTO, Importer not in WTO	-0.403***	-0.484***	0.081*	-0.412***	-0.493***	0.081*
Exporter Developing and WTO, Importer not in WTO	0.023	-0.065**	0.088***	0.019	-0.069**	0.088***
RTA	0.725***	0.749***	-0.024	0.718***	0.742***	-0.024
One in RTA	0.239***	0.091***	0.148***	0.240***	0.091***	0.148***
One in GSP	-0.235***	-0.166***	-0.069***	-0.236***	-0.167***	-0.069***
R-Square	0.774	0.587	0.825	0.773	0.587	0.825
Number of Obs	576809	576809	576809	576809	576809	576809
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (5 digit data)						
Both Industrial and WTO	0.305**	0.567***	-0.261***	0.309**	0.571***	-0.261***
Importer Industrial,Exporter Developing and both WTO	0.135	0.494***	-0.359***	0.160*	0.518***	-0.359***
Importer Developing, Exporter Industrial and both WTO	-0.199**	-0.225***	0.027	-0.209**	-0.235***	0.027
Both Developing and WTO	0.197***	0.011	0.186***	0.197***	0.010	0.186***
Importer Industrial and WTO, Exporter not in WTO	-0.007	0.483***	-0.489***	-0.002	0.487***	-0.489***
Importer Developing and WTO, Exporter not in WTO	-0.063	0.086**	-0.149***	-0.067	0.082**	-0.149***
Exporter Industrial and WTO, Importer not in WTO	-0.227**	-0.349***	0.122**	-0.232**	-0.354***	0.122**
Exporter Developing and WTO, Importer not in WTO	0.053	-0.064*	0.117***	0.053	-0.064*	0.117***
RTA	0.667***	0.615***	0.052	0.652***	0.600***	0.052
One in RTA	0.283***	0.085***	0.198***	0.279***	0.081***	0.198***
One in GSP	-0.172***	-0.142***	-0.030	-0.168***	-0.138***	-0.030
R-Square	0.774	0.585	0.814	0.774	0.585	0.814
Number of Obs	498927	498927	498927	498927	498927	498927
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, OLS, time dummies and robust standard errors clustered by country pair, country pair FE included, Column 1: Dependent variable Total Exports using unweighted data, Column 2: Dependent variable Intensive Margin using unweighted data, Column 3: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports using weighted data, Column 5: Dependent variable Intensive Margin using weighted data, Column 6: Dependent variable Extensive Margin (Total number of products), Figures next to RESET test are the p-values for the test for the model in each column.

7.3 The WTO effect by degree of product differentiation-Robustness Checks.

Table 13 contains the rest of the Poisson results as described in the main text. Table 14 and 15 contain the OLS results for the 4-digit and 5-digit data. We also account for country pair FE in the OLS. The 3 panels of Table 14 contain the results for the 3 categories of goods according to Rauch, for the 4 digit data. Panel A presents the results for the differentiated products. The first 3 columns of this panel summarize the results for the 4 digit unweighted data and the last 3 for the weighted data. The first 3 columns indicate an insignificant effect of WTO on total exports, a significant negative effect on average sales and a positive significant effect on the number of products traded. There is also trade diversion in all the 3 cases. Focusing on the last 3 columns of Panel A the results are similar. To sum up, trade in differentiated products seems to be positively affected by WTO membership mainly through the extensive margin. In panel B, the results for reference priced products are shown. The effect on total exports is negative and significant as well as on average sales. The extensive margin seems to remain unaffected by the WTO membership. The effect on the extensive margin for reference price products turns out to be smaller than for differentiated products. There are also signs of trade diversion for this category of goods. Panel C, shows a negative and significant (columns 3 and 6) effect on the extensive margin. The effect on aggregate exports and average sales is negative and there are also signs of trade diversion. The effect of WTO on the extensive margin for homogeneous products is the smallest for all the 3 categories.

Panels A, B, C of Table 15 illustrate the effects for the 5 digit data. Panel A contains the results for differentiated products. These results are qualitatively the same as those in Panel A of Table 14. The positive effect on the extensive margin is the most robust result. Panel B shows the results for reference priced products. While the negative effect on total exports and average sales as well the trade diversion effect are absent, there is now a significant positive effect on the extensive margin. This effect remains smaller than the one for differentiated products. Finally, the positive effect of WTO on the extensive margin is now present for homogeneous products as well. The effect on the extensive margin on the three categories is now more comparable for the unweighted data (first 3 columns), but remains larger for the differentiated products case only in the 4-digit data (Column 6 of panels A, B and C of Table 14). Tables 14 and 15 represent the analysis for OLS and country pair fixed effects. All the models fail to pass the RESET test.

Table 13: The WTO Effect by degree of product differentiation

Panel A:WTO, RTA and the Trade Margins (4 digit data), Differentiated products									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.356***	0.032	0.223***	0.334***	0.022	0.223***	0.459***	0.094	0.270***
One WTO members	0.089	-0.174**	0.140***	0.092	-0.175*	0.140***	0.148*	-0.131	0.185***
RTA	0.435***	0.552***	-0.070**	0.387***	0.516***	-0.070**	0.294**	0.329***	-0.029
One in RTA	0.035	0.004	0.104***	0.014	-0.009	0.104***	-0.029	-0.090**	0.127***
One in GSP	-0.370***	-0.213***	-0.049***	-0.352**	-0.187**	-0.049***	-0.229	-0.076	-0.053**
Number of Obs	988101	988101	988101	988101	988101	988101	951210	951210	951210
RESET test	0.46	0.00	0.00	0.43	0.00	0.00	0.40	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (4 digit data), Reference Priced Products									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.180	0.077	0.226***	0.159	0.081	0.226***	0.367***	0.242**	0.384***
One WTO members	0.160	0.133	0.171***	0.144	0.143	0.171***	0.330***	0.385***	0.308***
RTA	0.202**	0.282***	0.001	0.186**	0.280***	0.001	0.250***	0.216**	0.036
One in RTA	-0.097**	-0.153**	0.081***	-0.101***	-0.149**	0.081***	-0.065	-0.085	0.102***
One in GSP	-0.113	0.067	-0.216***	-0.105	0.063	-0.216***	-0.149*	0.086	-0.294***
Number of Obs	861545	861545	861545	861545	861545	861545	758454	758454	758454
RESET test	0.05	0.56	0.00	0.04	0.64	0.00	0.32	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (4 digit data), Homogeneous Products									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.152	0.061	0.126***	0.168	0.075	0.126***	0.980***	0.693***	0.400***
One WTO members	0.304*	0.382***	0.102***	0.303*	0.385***	0.102***	0.828***	0.673***	0.286***
RTA	0.440**	0.012	0.041	0.438**	0.009	0.041	0.466**	0.004	0.066
One in RTA	-0.075	-0.122	0.035***	-0.077	-0.128	0.035***	-0.080	-0.135	0.114***
One in GSP	0.615***	0.536***	-0.021	0.613***	0.535***	-0.021	0.512***	0.553***	-0.126***
Number of Obs	778200	778200	778200	778200	778200	778200	482987	482987	482987
RESET test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, Poisson, time dummies and robust standard errors clustered by country pair,
Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data, Columns 3: Dependent variable Extensive Margin (Total number of products) using 4 digit unweighted data, Column 4: Dependent variable Total Exports using 4 digit weighted data, Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Column 6: Dependent variable Extensive Margin (Total number of products) using 4 digit weighted data, Column 7: Dependent variable Total Exports using 5 digit unweighted data, Column 8: Dependent variable Intensive Margin using 5 digit unweighted data, Column 9: Dependent variable Extensive Margin (Total number of products) using 5 digit unweighted data,
Figures next to RESET test are the p-values for the test for the model in each column.

Table 14: The WTO Effect by degree of product differentiation

Panel A:WTO, RTA and the Trade Margins (4 digit data), Differentiated products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.074	-0.138***	0.064**	-0.084*	-0.148***	0.064**
One WTO members	-0.222***	-0.180***	-0.042**	-0.230***	-0.188***	-0.042**
RTA	0.824***	0.882***	-0.058*	0.812***	0.871***	-0.058*
One in RTA	0.310***	0.141***	0.169***	0.308***	0.139***	0.169***
One in GSP	-0.265***	-0.090***	-0.176***	-0.253***	-0.077***	-0.176***
R-Square	0.778	0.620	0.800	0.777	0.619	0.800
Number of Obs	531108	531108	531108	531108	531108	531108
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (4 digit data), Reference Priced Products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.140***	-0.166***	0.025	-0.145***	-0.170***	0.025
One WTO members	-0.093**	-0.070**	-0.023	-0.098**	-0.075**	-0.023
RTA	0.794***	0.651***	0.143***	0.782***	0.639***	0.143***
One in RTA	0.282***	0.127***	0.155***	0.279***	0.124***	0.155***
One in GSP	-0.520***	-0.179***	-0.341***	-0.510***	-0.169***	-0.341***
R-Square	0.712	0.549	0.802	0.711	0.548	0.802
Number of Obs	423516	423516	423516	423516	423516	423516
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (4 digit data), Homogeneous Products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.276***	-0.235***	-0.041**	-0.268***	-0.227***	-0.041**
One WTO members	-0.064	-0.020	-0.044***	-0.061	-0.017	-0.044***
RTA	0.693***	0.473***	0.220***	0.690***	0.470***	0.220***
One in RTA	0.010	-0.056**	0.066***	0.009	-0.058**	0.066***
One in GSP	0.617***	0.640***	-0.023*	0.622***	0.644***	-0.023*
R-Square	0.591	0.496	0.757	0.590	0.496	0.757
Number of Obs	350833	350833	350833	350833	350833	350833
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS, time effects and robust standard errors clustered by country pair, country pair FE included, Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data, Columns 3 and 6: Dependent variable Extensive Margin (Total number of products) using 4 digit data, Column 4: Dependent variable Total Exports using 4 digit weighted data, Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Figures next to RESET test are the p-values for the test for the model in each column.

Table 15: The WTO Effect by degree of product differentiation

Panel A:WTO, RTA and the Trade Margins (5 digit data), Differentiated products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.023	-0.103***	0.080***	-0.013	-0.093***	0.080***
One WTO members	-0.227***	-0.184***	-0.043*	-0.218***	-0.176***	-0.043*
RTA	0.730***	0.701***	0.029	0.706***	0.676***	0.029
One in RTA	0.340***	0.125***	0.215***	0.329***	0.114***	0.215***
One in GSP	-0.246***	-0.071***	-0.175***	-0.225***	-0.050**	-0.175***
R-Square	0.774	0.606	0.797	0.772	0.602	0.797
Number of Obs	473790	473790	473790	473790	473790	473790
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (5 digit data), Reference Priced Products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.032	-0.048	0.080***	0.036	-0.044	0.080***
One WTO members	0.016	0.021	-0.005	0.016	0.021	-0.005
RTA	0.833***	0.597***	0.235***	0.813***	0.578***	0.235***
One in RTA	0.269***	0.094***	0.175***	0.261***	0.086***	0.175***
One in GSP	-0.443***	-0.016	-0.427***	-0.422***	0.006	-0.427***
R-Square	0.706	0.535	0.799	0.704	0.533	0.799
Number of Obs	335638	335638	335638	335638	335638	335638
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (5 digit data), Homogeneous Products						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.457***	0.362***	0.095***	0.470***	0.375***	0.095***
One WTO members	0.430***	0.402***	0.028	0.436***	0.408***	0.028
RTA	0.726***	0.531***	0.195***	0.702***	0.507***	0.195***
One in RTA	-0.056	-0.132***	0.077***	-0.064	-0.140***	0.077***
One in GSP	0.999***	1.157***	-0.158***	1.014***	1.171***	-0.158***
R-Square	0.590	0.557	0.711	0.590	0.558	0.711
Number of Obs	167147	167147	167147	167147	167147	167147
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS, time effects and robust standard errors clustered by country pair, country pair FE included, Column 1: Dependent variable Total Exports using 5 digit unweighted data, Column 2: Dependent variable Intensive Margin using 5 digit unweighted data, Columns 3 and 6: Dependent variable Extensive Margin (Total number of products) using 5 digit data, Column 4: Dependent variable Total Exports using 5 digit weighted data, Column 5: Dependent variable Intensive Margin using 5 digit weighted data, Figures next to RESET test are the p-values for the test for the model in each column.

7.4 The WTO effect by sector-Robustness Checks

Table 16 contains the rest of the Poisson results as described in the main text. Tables 17 and 18 contain results about the WTO effects per sector estimated by OLS with country pair fixed effects at the 4 and 5 digit respectively. Panel A in each table contains the results for textiles. Both panels indicate a positive effect on the extensive margin and in most cases on total exports. There is also trade diversion present in this sector. Panel B in both tables illustrate the results for textiles and footware. These results are similar to those for the textile sector. Panel C contains results for liberalized manufacturing. There is no effect on total exports and the extensive margin, whereas there is an adverse effect on average sales. There are also signs of trade diversion. Panel D shows similar results for protected manufacturing as for liberalized manufacturing. In this case the effect on aggregate exports is negative. Finally, panels E show the results for food sector. There is no effect on the extensive margin, whereas the effects on total exports and average sales are less robust in the two panels. All these models fail to satisfy the RESET test. The OLS results indicate positive effects on textiles and footware, in contrast to Subramanian and Wei (2007).

Table 16: The WTO effect by sector

Panel A:WTO, RTA and the Trade Margins (4 digit data), Clothing/Textiles									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.715***	0.630***	0.275***	0.646***	0.587***	0.275***	0.560***	0.352***	0.296***
One WTO members	0.382***	0.312**	0.149***	0.304**	0.248*	0.149***	0.277**	0.103	0.170***
RTA	0.402	0.510*	-0.051*	0.302	0.411	-0.051*	0.472*	0.474*	-0.001
One in RTA	-0.162	-0.060	0.120***	-0.191*	-0.092	0.120***	-0.170*	-0.070	0.138***
One in GSP	0.368***	0.360***	0.036*	0.362***	0.369***	0.036*	0.647***	0.651***	0.133***
Number of Obs	793470	793470	793470	793470	793470	793470	776096	776096	776096
RESET test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (4 digit data), Cloth/Textile/Footware									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.683***	0.607***	0.272***	0.611***	0.558***	0.272***	0.560***	0.382***	0.296***
One WTO members	0.395***	0.329***	0.149***	0.326**	0.271*	0.149***	0.277**	0.125	0.172***
RTA	0.381	0.504**	-0.053*	0.270	0.400*	-0.053*	0.472*	0.485**	-0.008
One in RTA	-0.144	-0.045	0.123***	-0.182	-0.081	0.123***	-0.161*	-0.060	0.137***
One in GSP	0.346**	0.343***	0.051***	0.332**	0.344***	0.051***	0.599***	0.618***	0.147***
Number of Obs	806556	806556	806556	806556	806556	806556	788457	788457	788457
RESET test	0.003	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (4 digit data), Liberalized Manufacturing									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.560***	0.400***	0.211***	0.533***	0.374***	0.211***	0.812***	0.455***	0.343***
One WTO members	0.169	0.058	0.127***	0.185	0.066	0.127***	0.359***	0.115	0.258***
RTA	0.541***	0.633***	-0.083***	0.472***	0.570***	-0.083***	0.445***	0.505***	0.007
One in RTA	0.129**	0.152***	0.111***	0.098	0.126**	0.111***	0.056	0.066	0.153***
One in GSP	-0.451***	-0.344**	-0.063***	-0.426**	-0.318**	-0.063***	-0.326*	0.022	-0.111***
Number of Obs	861429	861429	861429	861429	861429	861429	779757	779757	779757
RESET test	0.85	0.00	0.00	0.93	0.00	0.00	0.01	0.00	0.00
Panel D:WTO, RTA and the Trade Margins (4 digit data), Protected Manufacturing									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.525*	0.526***	0.332***	0.530*	0.534***	0.332***	0.574***	0.194*	0.296***
One WTO members	0.149	0.182	0.139***	0.166	0.195	0.139***	0.287***	0.213**	0.233***
RTA	0.695***	0.615***	-0.046	0.694***	0.608***	-0.046	0.233*	0.350**	-0.035
One in RTA	0.205**	-0.026	0.193***	0.214**	-0.026	0.193***	0.004	-0.091	0.117***
One in GSP	-0.524***	-0.170	0.108***	-0.504***	-0.161	0.108***	-0.535***	-0.104	-0.222***
Number of Obs	893695	893695	893695	893695	893695	893695	824447	824447	824447
RESET test	0.61	0.00	0.00	0.67	0.00	0.00	0.33	0.13	0.00
Panel E:WTO, RTA and the Trade Margins (4 digit data), Food									
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.373**	-0.099	0.166***	-0.363**	-0.091	0.166***	0.191	0.306***	0.263***
One WTO members	-0.153	0.065	0.112***	-0.144	0.071	0.112***	-0.004	0.143	0.159***
RTA	0.487***	0.546***	-0.002	0.465***	0.533***	-0.002	0.482***	0.353***	-0.052
One in RTA	-0.137***	-0.108**	0.034**	-0.141***	-0.111***	0.034**	-0.077	-0.110	0.008
One in GSP	-0.015	-0.015	-0.045**	0.015	0.006	-0.045**	-0.062	-0.393***	0.090***
Number of Obs	844374	844374	844374	844374	844374	844374	692194	692194	692194
RESET test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, Poisson, time dummies and robust standard errors clustered by country pair,
Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data
Columns 3: Dependent variable Extensive Margin (Total number of products) using 4 digit unweighted data, Column 4: Dependent variable Total Exports using 4 digit weighted data, Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Column 6: Dependent variable Extensive Margin (Total number of products) using 4 digit weighted data, Column 7: Dependent variable Total Exports using 5 digit unweighted data, Column 8: Dependent variable Intensive Margin using 5 digit unweighted data, Column 9: Dependent variable Extensive Margin (Total number of products) using 5 digit unweighted data,
Figures next to RESET test are the p-values for the test for the model in each column.

Table 17: The WTO effect by sector

	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Panel A:WTO, RTA and the Trade Margins (4 digit data), Clothing/Textiles						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.137*	0.067	0.069***	0.112	0.042	0.069***
One WTO members	-0.136**	-0.108**	-0.028	-0.161**	-0.132**	-0.028
RTA	1.015***	0.946***	0.069***	0.987***	0.917***	0.069***
One in RTA	0.209***	0.093***	0.116***	0.205***	0.089***	0.116***
One in GSP	0.312***	0.325***	-0.013	0.312***	0.325***	-0.013
R-Square	0.661	0.594	0.691	0.660	0.592	0.691
Number of Obs	311524	311524	311524	311524	311524	311524
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (4 digit data), Cloth/Textile/Foot ware						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.130*	0.053	0.077***	0.102	0.024	0.077***
One WTO members	-0.132**	-0.107**	-0.025	-0.157**	-0.132**	-0.025
RTA	1.059***	1.000***	0.059**	1.032***	0.972***	0.059**
One in RTA	0.237***	0.117***	0.120***	0.235***	0.115***	0.120***
One in GSP	0.347***	0.348***	-0.001	0.347***	0.348***	-0.001
R-Square	0.663	0.592	0.692	0.661	0.590	0.692
Number of Obs	322510	322510	322510	322510	322510	322510
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (4 digit data), Liberalized Manufacturing						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.087	-0.087*	0.001	-0.098	-0.099**	0.001
One WTO members	-0.297***	-0.213***	-0.083***	-0.303***	-0.220***	-0.083***
RTA	1.019***	1.038***	-0.019	1.015***	1.034***	-0.019
One in RTA	0.383***	0.227***	0.156***	0.385***	0.229***	0.156***
One in GSP	-0.662***	-0.408***	-0.254***	-0.656***	-0.402***	-0.254***
R-Square	0.752	0.658	0.757	0.750	0.655	0.757
Number of Obs	377588	377588	377588	377588	377588	377588
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel D:WTO, RTA and the Trade Margins (4 digit data), Protected Manufacturing						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.090	-0.107***	0.017	-0.101*	-0.118***	0.017
One WTO members	-0.187***	-0.124***	-0.064***	-0.193***	-0.129***	-0.064***
RTA	0.921***	0.924***	-0.002	0.913***	0.915***	-0.002
One in RTA	0.281***	0.115***	0.166***	0.282***	0.116***	0.166***
One in GSP	-0.631***	-0.355***	-0.276***	-0.632***	-0.355***	-0.276***
R-Square	0.759	0.637	0.775	0.758	0.636	0.775
Number of Obs	409425	409425	409425	409425	409425	409425
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel E:WTO, RTA and the Trade Margins (4 digit data), Food						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.178***	-0.205***	0.027	-0.177***	-0.204***	0.027
One WTO members	-0.141***	-0.116***	-0.024	-0.142***	-0.118***	-0.024
RTA	0.843***	0.663***	0.180***	0.832***	0.652***	0.180***
One in RTA	0.157***	0.083***	0.074***	0.150***	0.077***	0.074***
One in GSP	-0.328***	-0.256***	-0.072***	-0.309***	-0.238***	-0.072***
R-Square	0.617	0.484	0.736	0.616	0.484	0.736
Number of Obs	398083	398083	398083	398083	398083	398083
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* p<0.10, ** p<0.05, *** p<0.01, OLS, time effects and robust standard errors clustered by country pair, country pair FE included, Classification close to the one by Subramanian and Wei (2007), Column 1: Dependent variable Total Exports using 4 digit unweighted data, Column 2: Dependent variable Intensive Margin using 4 digit unweighted data, Column 3 and 6: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports using 4 digit weighted data, Column 5: Dependent variable Intensive Margin using 4 digit weighted data, Figures next to RESET test are the p-values for the test for the model in each column.

Table 18: The WTO effect by sector

Panel A:WTO, RTA and the Trade Margins (5 digit data), Clothing/Textiles						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.140*	0.031	0.108***	0.139*	0.031	0.108***
One WTO members	-0.181***	-0.163***	-0.019	-0.189***	-0.171***	-0.019
RTA	0.896***	0.763***	0.133***	0.862***	0.730***	0.133***
One in RTA	0.185***	0.050*	0.134***	0.173***	0.038	0.134***
One in GSP	0.606***	0.534***	0.072***	0.621***	0.549***	0.072***
R-Square	0.664	0.592	0.680	0.663	0.591	0.680
Number of Obs	296737	296737	296737	296737	296737	296737
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel B:WTO, RTA and the Trade Margins (5 digit data), Clothing/Textiles/Foot ware						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.166**	0.056	0.110***	0.165**	0.055	0.110***
One WTO members	-0.145**	-0.131***	-0.014	-0.153**	-0.139***	-0.014
RTA	0.937***	0.816***	0.121***	0.904***	0.783***	0.121***
One in RTA	0.205***	0.068**	0.137***	0.194***	0.057**	0.137***
One in GSP	0.644***	0.560***	0.084***	0.659***	0.575***	0.084***
R-Square	0.664	0.592	0.679	0.663	0.590	0.679
Number of Obs	306066	306066	306066	306066	306066	306066
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel C:WTO, RTA and the Trade Margins (5 digit data), Liberalized Manufacturing						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.051	-0.096**	0.045	-0.043	-0.087*	0.045
One WTO members	-0.242***	-0.199***	-0.044*	-0.237***	-0.193***	-0.044*
RTA	1.050***	0.920***	0.130***	1.046***	0.916***	0.130***
One in RTA	0.424***	0.212***	0.212***	0.422***	0.210***	0.212***
One in GSP	-0.521***	-0.181***	-0.340***	-0.510***	-0.170***	-0.340***
R-Square	0.756	0.637	0.774	0.755	0.636	0.774
Number of Obs	322271	322271	322271	322271	322271	322271
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel D:WTO, RTA and the Trade Margins (5 digit data), Protected Manufacturing						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	-0.118**	-0.130***	0.012	-0.118**	-0.130***	0.012
One WTO members	-0.212***	-0.143***	-0.069***	-0.211***	-0.143***	-0.069***
RTA	0.807***	0.721***	0.086**	0.794***	0.708***	0.086**
One in RTA	0.335***	0.138***	0.197***	0.331***	0.134***	0.197***
One in GSP	-0.812***	-0.388***	-0.424***	-0.807***	-0.383***	-0.424***
R-Square	0.752	0.612	0.785	0.751	0.611	0.785
Number of Obs	350123	350123	350123	350123	350123	350123
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Panel E:WTO, RTA and the Trade Margins (5 digit data), Food						
	Total Trade	Int.Margin	Ext.Margin	Total Trade	Int.Margin	Ext.margin
Both WTO members	0.120*	0.090*	0.029	0.120*	0.090*	0.029
One WTO members	-0.054	-0.030	-0.024	-0.056	-0.032	-0.024
RTA	0.809***	0.639***	0.170***	0.790***	0.620***	0.170***
One in RTA	0.094***	0.069***	0.025**	0.086***	0.061**	0.025**
One in GSP	-0.297***	-0.332***	0.034*	-0.278***	-0.312***	0.034*
R-Square	0.641	0.526	0.705	0.639	0.525	0.705
Number of Obs	279262	279262	279262	279262	279262	279262
RESET test	0.00	0.00	0.00	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Varying FE	No	No	No	No	No	No

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS, time effects and robust standard errors clustered by country pair, country pair FE included, Classification close to the one by Subramanian and Wei (2007), Column 1: Dependent variable Total Exports using 5 digit unweighted data, Column 2: Dependent variable Intensive Margin using 5 digit unweighted data, Column 3 and 6: Dependent variable Extensive Margin (Total number of products), Column 4: Dependent variable Total Exports using 5 digit weighted data, Column 5: Dependent variable Intensive Margin using 5 digit weighted data, Figures next to RESET test are the p-values for the test for the model in each column.

7.5 The WTO effect and Multilateral Resistance-Robustness Checks

Table 19: The WTO Effect and Multilateral Resistance

Panel A:WTO, RTA and the Trade Margins (5 digit data), ols			
Variables	Total Trade	Int.Margin	Ext.Margin
Both in WTO	0.091*	-0.005	0.096***
One in WTO	-0.028	0.048	-0.076***
RTA	0.545***	0.372***	0.173***
One in RTA	0.221***	-0.047**	0.268***
GSP	-0.037	0.143***	-0.180***
R-Square	0.784	0.601	0.816
Number of Obs	130946	130946	130946
RESET test	0.00	0.00	0.00
Time dummies	Yes	Yes	Yes
Country Pair FE	Yes	Yes	Yes
Time Varying FE	No	No	No
Panel B:WTO, RTA and the Trade Margins (5 digit data),ols			
Variables	Total Trade	Int.Margin	Ext.Margin
Both in WTO	-0.484**	-0.094	-0.390***
One in WTO	-0.351***	-0.049	-0.302***
RTA	0.324**	0.538***	-0.214**
One in RTA	-0.059	0.033	-0.092***
One in GSP	0.487***	0.051	0.436***
R-Square	0.738	0.548	0.815
Number of Obs	133607	133607	133607
RESET test 0.00	0.00	0.00	
Time dummies	Yes	Yes	Yes
Country Pair FE	No	No	No
Time Varying FE	Yes	Yes	Yes

* $p<0.10$, ** $p<0.05$, *** $p<0.01$, OLS Regression, time effects and time varying exporter and importer FE using the years 1962, 1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002 and 2006 and robust standard errors clustered by country pair, Column 1: Dependent variable Total Exports using 5 digit weighted data, Column 2: Dependent variable Intensive Margin using 5 digit weighted data, Column 3: Dependent variable Extensive Margin (Total number of products), Figures next to RESET test are the p-values for the test for the model in each column.

8 Appendix B

Table 20: List of countries and year of accession in GATT/WTO

Albania (2000)	Ghana (1957)	Panama (1997)
Algeria	Greece (1950)*	Papua N. Guinea (1994)
Angola (1994)	Grenada (1994)	Paraguay (1994)
Antigua and Barbuda (1987)	Guatemala (1991)	Peru (1951)
Argentina (1967)	Guinea (1994)	Philippines (1979)
Armenia(2003)	Guinea-Bissau (1994)	Poland (1967)
Australia (1948)*	Guyana (1966)	Portugal (1962)*
Austria (1951)*	Haiti (1950)	Qatar (1994)
Azerbaijan	Honduras (1994)	Romania (1971)
Bahamas	Hong Kong (1986)	Russia
Bahrain (1993)	Hungary (1973)	Rwanda (1966)
Bangladesh (1972)	Iceland (1968)*	Samoa
Barbados (1967)	India (1948)	Sao Tome and Principe
Belarus	Indonesia (1950)	Saudi Arabia (2005)
Belgium (1948)*	Iran	Senegal (1963)
Belize (1983)	Iraq	Seychelles
Benin (1963)	Ireland (1967)*	Sierra Leone (1961)
Bermuda	Israel (1962)	Singapore (1973)
Bhutan	Italy (1950)*	Slovak Republic (1993)
Bolivia (1990)	Jamaica (1963)	Slovenia (1994)
Botswana (1987)	Japan (1955)*	Solomon Islands (1994)
Brazil (1948)	Jordan(2000)	Somalia
Bulgaria (1996)	Kazakhstan	South Africa (1948)
Burkina Faso (1963)	Kenya (1964)	Spain (1963)*
Burma(Myanmar) (1948)	Kiribati	Sri Lanka (1948)
Burundi (1965)	Korea, South (R)(1967)	St. Kitts and Nevis (1994)
Cambodia(2004)	Kuwait (1963)	St. Lucia (1993)
Cameroon (1963)	Kyrgyz Republic (1998)	St. Vincent and Gren.(1993)
Canada (1948)*	Lao People's Dem. Rep.	Sudan
Cape Verde (2008)	Latvia (1999)	Suriname (1978)
Central African Rep. (1963)	Lebanon	Swaziland (1993)
Chad (1963)	Lesotho (1988)	Sweden (1950)*
Chile (1949)	Liberia	Switzerland (1966)*
China(2001)	Libya	Syria
Colombia (1981)	Lithuania(2001)	Tajikistan
Comoros	Luxembourg (1948)*	Tanzania (1961)
Congo, Dem. Rep. of (Zaire) (1971)	Macedonia	Thailand (1982)
Congo, Rep. (1963)	Madagascar (1963)	Togo (1964)
Costa Rica (1990)	Malawi (1964)	Tonga(2007)
Cote D'Ivoire (Ivory Coast) (1963)	Malaysia (1957)	Trinidad and Tobago (1962)
Croatia(2000)	Maldives (1983)	Tunisia (1990)
Cyprus (1963)	Mali (1993)	Turkey (1951)
Czech Republic (1993)	Malta (1964)	Turkmenistan
Denmark (1950)*	Mauritania (1963)	Uganda (1962)
Djibouti (1994)	Mauritius (1970)	Ukraine (2008)
Dominica (1993)	Mexico (1986)	United Arab Emirates (1994)
Dominican Rep. (1950)	Moldova (2001)	United Kingdom (1948)*
Ecuador (1996)	Mongolia (1997)	United States (1948)*
Egypt (1970)	Morocco (1987)	Uruguay (1953)
El Salvador (1991)	Mozambique (1992)	Uzbekistan
Equatorial Guinea	Namibia (1992)	Vanuatu
Estonia (1999)	Nepal(2004)	Venezuela (1990)
Ethiopia	Netherlands (1948)*	Vietnam (2007)
Fiji (1993)	New Zealand (1948)*	Yemen, Republic of
Finland (1950)*	Nicaragua (1950)	Yugoslavia, Socialist Fed. R. (1966)
France (1948)*	Niger (1963)	Zambia (1982)
Gabon (1963)	Nigeria (1960)	Zimbabwe (1948)
Gambia (1965)	Norway (1948)*	
Georgia(2000)	Oman(2000)	
Germany (1951)*	Pakistan (1948)	

Dates in parentheses are years of accession in GATT/WTO, * indicates developed economy according to Subramanian and Wei (2007)

Table 21: List of Regional Trade Agreements

ASEAN			
Cambodia(1998)	China(2003)	Lao(1997)	Indonesia(1993)
Malaysia(1993)	Myanmar(1997)	Philippines(1993)	Singapore(1993)
Thailand(1993)	Vietnam(1998)		
ANCERTA			
Australia (1983)	New Zealand (1983)		
PATCRA			
Australia(1977-1980)	Papua New Guinea(1977-1980)		
CARICOM			
Antigua and Barbuda (1976)	Bahamas (1983)	Barbados(1973)	Belize(1973)
Dominica(1976)	Guyana(1973)	Grenada(1973)	Haiti(1997)
Jamaica(1973)	St. Kittis and Nevis (1975)	St. Lucia(1975)	
St. Vincent and Grenadines(1976)	Suriname (1995)	Trinidad and Tobago (1973)	
CACM			
Costa Rica(1962)	El Salvador (1961)	Guatemala(1961)	Honduras(1961)
Nicaragua (1961)			
US-Israel			
USA (1985)	Israel(1985)		
NAFTA			
Canada(1989)	Mexixo(1994)	USA(1989)	
MERCOSUR			
Argentina(1991)	Bolivia(1997)	Brazil(1991)	Chile(1996)
Paraguay(1991)	Uruguay(1991)		
SPARTECA			
Australia(1981)	New Zealand(1981)		
Fiji(1981)	Kiribati(1981)	Papua new Guinea(1981)	Samoa(1981)
Solomon Islands(1981)	Tonga(1981)	Vanuatu(1981)	
ECU/EU			
Belgium(1962)	Luxembourg(1962)	France(1962)	Germany(1962)
Italy(1962)	Netherlands(1962)	Denmark(1973)	Ireland(1973)
United Kingdom(1973)	Greece(1981)	Spain(1986)	Portugal(1986)
Austria(1995)	Finland(1995)	Sweden(1995)	Cyprus(2004)
Czech Republic(2004)	Estonia(2004)	Hungary(2004)	Latvia(2004)
Lithuania(2004)	Malta(2004)	Poland(2004)	Slovak Republic(2004)
Slovenia(2004)	Bulgaria(2007)	Romania(2007)	

Dates in parentheses are years of joining the various Regional Trade Agreements

List of product codes by sector

Textiles-Clothing-Footware

2640, 2654, 2655, 2658, 2670, 6123, 6515, 6519, 6521, 6522, 6532, 6533, 6534, 6535, 6536, 6537, 6539, 6540, 6557, 8411, 8412, 8413, 8414, 8415, 8416, 8420, 8510.

Food

0111, 0112, 0113, 0114, 0115, 0116, 0118, 0121, 0129, 0133, 0134, 0138, 0221, 0222, 0223, 0230, 0240, 0250, 0311, 0312, 0313, 0320, 0421, 0422, 0460, 0470, 0481, 0483, 0484, 0488, 0511, 0512, 0513, 0514, 0515, 0517, 0519, 0520, 0532, 0533, 0535, 0536, 0539, 0541, 0542, 0544, 0545, 0546, 0548, 0551, 0546, 0548, 0554, 0555, 0611, 0612, 0615, 0616, 0619, 0620, 0711, 0713, 0722, 0730, 0741, 0742, 0751, 0752, 0914, 0990, 1210, 1221, 1222, 1223, 2214, 2211, 2212, 2213, 2219, 2929, 4113, 4215, 5129.

Liberalized Manufacturing

3325, 5121, 5122, 5123, 5124, 5125, 5126, 5127, 5128, 5129, 5411, 5413, 5414, 5415, 5416, 5417, 5419, 5541, 5542, 5543, 5997, 5999, 6642, 7221, 7222, 7231, 7232, 7241, 7242, 7249, 7250, 7261, 7262, 7291, 7292, 7293, 7294, 7295, 7296, 7297, 7299, 8124, 8210, 8611, 8612, 8613, 8614, 8615, 8616, 8617, 8618, 8619, 8911, 8912, 8993, 8996

Protected Manufacturing

2840, 5131, 5132, 5133, 5134, 5135, 5136, 5141, 5142, 5143, 5149, 5151, 5152, 5153, 5310, 5321, 5323, 5324, 5331, 5332, 5333, 5713, 5711, 5712, 5811, 5812, 5813, 5819, 5992, 5996, 5997, 5999, 6518, 6538, 6623, 6624, 6637, 6639, 6641, 6642, 6643, 6644, 6645, 6647, 6648, 6649, 6651, 6652, 6658, 6664, 6665, 6666, 6793, 6841, 6842, 6921, 6922, 6923, 6931, 6972, 6989, 6880, 6893, 6894, 6895, 6912, 7111, 7112, 7113, 7114, 7115, 7116, 7117, 7118, 7121, 7122, 7123, 7125, 7129, 7141, 7142, 7143, 7149, 7151, 7152, 7171, 7172, 7173, 7181, 7182, 7183, 7184, 7185, 7191, 7192, 7193, 7195, 7196, 7197, 7198, 7199, 7250, 7321, 7322, 7323, 7324, 7325, 7327, 7328, 7329, 7331, 7333, 7334, 8121, 8122, 8930, 8941, 8959, 8993, 9510.

These are the codes according to SITC classification, Revision 1 at the 4 digit disaggregation. The codes used at the 5 digit are the ones corresponding to the 4 digit ones shown above. The sectors are after Subramanian and Wei (2007). In Subramanian and Wei (2007) the classification is done following the HS 88/92 classification. In this paper, we use the HS 88/92 - SITC 1 correspondence to extract the corresponding codes and divide our data in more general subsamples to perform the analysis in Tables 11 and 12 above. The Data are extracted from UN Comtrade.

List of product codes according to Rauch Classification.

Differentiated Products

0015, 0115, 0118, 0133, 0138, 0250, 0311, 0320, 0460, 0483, 0484, 0488, 0519, 0520, 0532, 0533, 0539, 0555, 0619, 0713, 0730, 0742, 0014, 0990, 1110, 1122, 1210, 2112, 2114, 2116, 2117, 2120, 2217, 2218, 2312, 2313, 2314, 2411, 2412, 2431, 2432, 2433, 2440, 2623, 2625, 2626, 2629, 2664, 2670, 2711, 2731, 2751, 2752, 2761, 2764, 2769, 2911, 2919, 2921, 2922, 2923, 2924, 2926, 2927, 2929, 3214, 3215, 3216, 3217, 3329, 4113, 4313, 4314, 5151, 5213, 5332, 5333, 5413, 5414, 5415, 5416, 5417, 5419, 5511, 5512, 5530, 5541, 5542, 5543, 5711, 5712, 5713, 5714, 5812, 5813, 5819, 5992, 5995, 5997, 5999, 6112, 6114, 6119, 6130, 6210, 6291, 6294, 6299, 6312, 6318, 6321, 6324, 6328, 6330, 6419, 6429, 6511, 6515, 6517, 6518, 6519, 6522, 6531, 6532, 6533, 6535, 6536, 6537, 6539, 6540, 6551, 6554, 6555, 6556, 6557, 6558, 6559, 6561, 6562, 6566, 6569, 6574, 6575, 6576, 6577, 6578, 6613, 6618, 6623, 6624, 6631, 6632, 6634, 6636, 6638, 6641, 6642, 6643, 6644, 6645, 6646, 6647, 6648, 6649, 6651, 6658, 6664, 6665, 6666, 6674, 6721, 6723, 6725, 6734, 6735, 6781, 6782, 6783, 6785, 6791, 6792, 6793, 6893, 6894, 6895, 6913, 6921, 6931, 6933, 6934, 6941, 6942, 6951, 6952, 6960, 6971, 6972, 6979, 6981, 6982, 6983, 6984, 6985, 6988, 6989, 7111, 7112, 7114, 7115, 7116, 7118, 7121, 7122, 7123, 7125, 7129, 7141, 7142, 7143, 7149, 7151, 7152, 7171, 7172, 7173, 7181, 7182, 7183, 7184, 7185, 7191, 7192, 7193, 7194, 7195, 7196, 7197, 7198, 7199, 7221, 7222, 7231, 7232, 7241, 7242, 7249, 7250, 7261, 7262, 7291, 7292, 7293, 7294, 7295, 7296, 7297, 7299, 7311, 7313, 7316, 7321, 7322, 7323, 7324, 7325, 7328, 7329, 7331, 7333, 7334, 7341, 7349, 7351, 7353, 7359, 8121, 8122, 8123, 8124, 8210, 8310, 8411, 8412, 8413, 8414, 8415, 8416, 8420, 8510, 8611, 8612, 8613, 8614, 8615, 8616, 8617, 8618, 8619, 8624, 8630, 8641, 8642, 8911, 8912, 8914, 8918, 8921, 8922, 8923, 8929, 8930, 8941, 8942, 8943, 8944, 8945, 8951, 8952, 8959, 8960, 8972, 8991, 8992, 8993, 8994, 8995, 8996, 8999, 9110, 9310, 9410, 9510.

Referenced Priced Products

0019, 0112, 0114, 0129, 0134, 0221, 0222, 0223, 0230, 0240, 0313, 0470, 0481, 0511, 0512, 0514, 0515, 0536, 0542, 0544, 0545, 0546, 0548, 0554, 0561, 0616, 0620, 0722, 0723, 0752, 0811, 0812, 0814, 0819, 1121, 1123, 1124, 1222, 1223, 2111, 2118, 2119, 2211, 2213, 2215, 2216, 2421, 2422, 2423, 2424, 2429, 2511, 2512, 2515, 2516, 2517, 2518, 2519, 2627, 2632, 2633, 2658, 2662, 2663, 2712, 2732, 2733, 2734, 2741, 2762, 2763, 2765, 2766, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2839, 2840, 2850, 2860, 2925, 3218, 3325, 3326, 3411, 3510, 4111, 4311, 4312, 5121, 5122, 5123, 5124, 5125, 5126, 5127, 5128, 5129, 5131, 5132, 5134, 5135, 5136, 5141, 5142, 5143, 5149, 5152, 5153, 5211, 5214, 5310, 5321, 5323, 5324, 5331, 5411, 5611, 5612, 5613, 5619, 5811, 5996, 6113, 6311, 6314, 6411, 6412, 6413, 6414, 6415, 6416, 6417, 6421, 6516, 6521, 6534, 6611, 6612, 6672, 6711, 6712, 6713, 6714, 6715, 6731, 6732, 6741, 6742, 6743, 6747, 6748, 6750, 6761, 6762, 6770, 6821, 6822, 6832, 6842, 6852, 6862, 6880, 6932.

Homogeneous Products

0011, 0012, 0013, 0014, 0111, 0113, 0116, 0121, 0312, 0410, 0421, 0422, 0430, 0440, 0451, 0452, 0459, 0513, 0517, 0535, 0541, 0611, 0612, 0615, 0711, 0721, 0741, 0751, 0813, 0913, 2214, 2311, 2611, 2612, 2613, 2621, 2622, 2628, 2631, 2640, 2651, 2653, 2654, 2813, 2814, 2820, 3310, 3321, 3322, 3323, 3324, 4212, 4214, 4217, 4221, 4222, 4223, 4225, 4229, 5133, 6512, 6513, 6514, 6811, 6812, 6831, 6841, 6851, 6861, 6871, 6872, 9610.

The classification is according to Rauch (1999) as found in Jon Haveman's Website. There are two classifications the conservative and the liberal. We have chosen the conservative Classification. Moreover, the classification refers to SITC Revision 2 at the 4 digit. We obtain the correspondence between SITC Revision 2 and the classification used in this paper, SITC Revision 1 and we matched the corresponding codes. Then following the information about the Rauch classification we splitted the SITC Revision 1 codes into the 3 categories shown above.

Table 22: Descriptive Stastics-4 digit data

Variable	Mean	Standard Deviation	Min	Max
	4 digit unweighted data			
Real Aggregate Exports	1917.03	19780.72	0	2090517
Log Real Aggregate Exports	2.85732	3.601741	-11.77593	14.55292
Intensive Margin	16.98378	214.2926	0	40595.32
Log Intensive Margin	0.0934957	2.309946	-15.11879	10.61141
Extensive Margin	67.90422	111.2422	1	609
Log Extensive Margin	2.749157	1.894087	0	6.411819
	4 digit weighted data			
Real Aggregate Exports	1932.327	20104.58	0	2285269
Log Real Aggregate Exports	2.855788	3.605703	-11.77593	14.64199
Intensive Margin	17.11357	217.6923	0	40595.32
Log Intensive Margin	0.0916773	2.317568	-15.11879	10.61141
Extensive Margin	67.90422	111.2422	1	609
Log Extensive Margin	2.749157	1.894087	0	6.411819
	Gravity variables			
One in WTO	0.4011438	0.4901305	0	1
Both in WTO	0.5148031	0.4997812	0	1
RTA	0.0436358	0.2042837	0	1
One in RTA	0.4195297	0.4934825	0	1
CU	0.0138618	0.1169175	0	1
Log Distance	8.633612	0.8088826	4.546198	9.885839
Log GDP Exporter	19.4186	2.313779	12.66205	25.39133
Log GDP Importer	19.20937	2.41991	12.66205	25.39133
Log GDP per Capita Exporter	3.366452	1.597665	-0.4637909	6.361107
Log GDP per Capita Importer	3.332576	1.597416	-0.4637909	6.361107
Common Language	0.1825056	0.386261	0	1
Common Border	0.0263238	0.1600965	0	1
Landlocked Exporter	0.1262378	0.3321174	0	1
Landlocked Importer	0.1309699	0.3373677	0	1
Island Exporter	0.1640814	0.3703498	0	1
Island Importer	0.1793031	0.3836063	0	1
Log Area Exporter	12.04432	2.307353	3.970292	16.65315
Log Area Importer	11.89706	2.411583	3.970292	16.65315
Common Colonizer	0.1032862	0.3043326	0	1
Current Colony	0.0005526	0.0235011	0	1
Ever Colony	0.0221609	0.1472069	0	1
Same Country	0.0124087	0.1107013	0	1

Table 23: Descriptive Stastics-5 digit data

Variable	Mean	Standard Deviation	Min	Max
	5 digit unweighted data			
Real Aggregate Exports	1330.231	12323.51	0	1311632
Log Real Aggregate Exports	2.225761	3.651161	-11.77593	14.08678
Intensive Margin	19.19378	316.2417	0	43431.09
Log Intensive Margin	-0.5356093	2.257228	-11.77593	10.67893
Extensive Margin	81.46712	147.2512	1	918
Log Extensive Margin	2.761365	1.979976	0	6.822197
	5 digit weighted data			
Real Aggregate Exports	1349.887	12805.01	0	1580579
Log Real Aggregate Exports	2.227214	3.655494	-11.77593	14.2733
Intensive Margin	19.2822	318.5162	0	43431.09
Log Intensive Margin	-0.5344612	2.262502	-11.77593	10.67893
Extensive Margin	81.46712	147.2512	1	918
Log Extensive Margin	2.761365	1.979976	0	6.822197
	Gravity Variables			
One in WTO	0.9247459	0.2638011	0	1
Both in WTO	0.5336093	0.4988696	0	1
RTA	0.0491332	0.2161463	0	1
One in RTA	0.4410022	0.4965075	0	1
CU	0.0147788	0.1206666	0	1
Log Distance	8.603989	0.8285542	4.546198	9.885839
Log GDP Exporter	19.62579	2.294536	12.66205	25.39133
Log GDP Importer	19.30668	2.443062	12.66205	25.39133
Log GDP per Capita Exporter	3.480504	1.590173	-0.4637909	6.361107
Log GDP per Capita Importer	3.388688	1.610008	-0.4637909	6.361107
Common Language	0.181078	0.3850831	0	1
Common Border	0.0291866	0.1683294	0	1
Landlocked Exporter	0.1199053	0.324851	0	1
Landlocked Importer	0.1333708	0.3399753	0	1
Island Exporter	0.1609953	0.367527	0	1
Island Importer	0.1765474	0.3812856	0	1
Log Area Exporter	12.06573	2.307944	3.970292	16.65315
Log Area Importer	11.91956	2.392614	3.970292	16.65315
Common Colonizer	0.0965121	0.2952925	0	1
Current Colony	0.0006334	0.0251585	0	1
Ever Colony	0.0250465	0.1562664	0	1
Same Country	0.0134713	0.1152817	0	1