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IMPACT OF THE WTO ACCESSION ON THE COMPOSITION OF EXPORTS AND IMPORTS: PANEL STUDY

by

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Abstract

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While the majority of the countries of the world has already joined the WTO or aspires to do so in the near future, there is still no conclusive prediction about the impact of the WTO accession on the stability and the volume of trade of the new member country. Much less is known about the effect of the accession has on the composition of trade, which can be both positive (e.g. benefits to consumers through a more varied composition of imports) and negative (e.g. lack of export diversification). The current study attempts to quantify the impact of the WTO on the composition of exports and imports for agricultural, textile, metallurgical and electronics sectors on the panel of world countries for the period 1993-2006 employing the gravity model. The main focus is on the poor countries, which primary exports are agriculture and textiles, and those that have acceded more recently and are expected to be more liberalized than the original WTO members. As the result of Poisson PML estimation it can be seen that the change in the composition of trade in these sectors is tremendous, though more pronounced for exports. For instance, in total least developed countries and recent members increase their shares of these sectors in the total exports by roughly 40 percent, which indicates that these countries are more prone to shocks, which affect their primary exports, after they join the WTO.

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Chapter 1

INTRODUCTION

The World Trade Organization (WTO) has gradually ceased to be a highly selective club for "privileged" countries as its predecessor GATT (General Agreement on Tariffs and Trade) was at the beginning. To this day there are195 countries in the world, 153 of which are members of the WTO, with 123 countries being the founding members. There are also another 31 countries seeking accession to the WTO (they are granted the status of observer governments) including such large economies as Russia and Iran. However, according to the previous research the effect of the WTO membership (henceforth, membership) on the countries' economic well-being is not unambiguously positive, with some authors finding no effect of the accession to the WTO (Rose, 2004 a,b).

One should also consider that in the majority of studies the WTO's impact on trade is measured through the increase in its volume after a country enters the Organization. However, there are other virtually ignored channels, through which the influence of the membership can be examined. The present research is intended to fill the gap in this area of International Trade by focusing on the change in the commodity composition of imports and exports due to the accession to the WTO (henceforth, accession), which no other work has addressed before. It can be expected that as the new markets open up for the new members, they would start specializing in goods in which they have comparative advantage (for example, developing countries are likely to export mostly raw materials). However, this is where the problems might arise. According to the sector-specific estimations performed by Subramanian and Wei (2007), the effect

of the membership is different for countries with different characteristics, being larger for the developed countries and smaller for the developing countries. This irregularity stems from the fact that developed countries did not liberalize all the sectors evenly as it is supposed to be under the WTO standards, preferring to protect such industries as agriculture, textile and footwear manufacturing, which are among the major exports of the developing countries. This came about because developed countries started liberalization as members of GATT focusing solely on industrial sectors (only few developing countries were GATT members as well and, consequently, not enough attention was paid to their needs). As a result, the actual benefit of the accession for the developing countries is far lower than it could have been.

In addition, excessive specialization in just a handful of sectors might lead to disastrous results for the economy in case of a crisis (for example, the situation in Iceland after the recent financial crisis due to the country's overspecialization in exporting its financial services). It has become a common knowledge that exports diversification makes the economy of any country less likely to suffer from shocks.

Lastly, after the accession countries restrict their trade with non-WTO members and buildup trade with the members. Such a shift might be attributed to the so-called trade diversion, when "goods previously imported from a third country to be diverted to a partner country" (as defined by Datta and Kouliavtsev, 2009, 175). Nevertheless, this might also affect the commodity composition of exports as some of the exports intended for the outsider countries would not be demanded by the members, which in turn could potentially lead to the overspecialization addressed previously.

Following from the latter finding, I address the impact of the accession on the composition of exports and imports for a panel of countries of the world, stressing the effect of the accession on the countries, which joined the WTO after 1995 for a period of 14 years from 1993-2006 (2007-2009 were omitted due to a possible bias from the global financial crisis). These countries were chosen because they acceded the organization later than the original members. According to the WTO guidelines every new member is supposed to fulfill all the requirements set forth by the member-states, which caused these countries to be much more liberalized than some of the founding ones (e.g. developed countries with highly protected agricultural sectors). In addition, most of the countries that acceded later can be described as developing (which also indicates that the majority of them typically export raw materials rather than manufactured goods), which means that the composition of exports and imports is likely to change after the accession due to the reasons mentioned above.

I hypothesize that the liberalization of the economy of these states along with the accession might not lead to a necessarily positive, but rather a mixed outcome through such channels as over-specialization of some sectors, crowding-out of other sectors, because the countries strive to take advantage of the free-trade provided by the membership and also, because other countries gain virtually unlimited access to the markets of the new member-states, which might cause subsequent overdevelopment of some sectors and decline of the others. In the light of the reasons listed above it can be expected that while some sectors would benefit, other sectors (and also essential ones) might be negatively affected and even virtually cease to exist. For example, it concerns electronics and other advanced manufacturing sectors in the developing countries.

All things considered, the purpose of the current research is to establish whether there is any effect of the accession to the WTO on the panel of the world countries controlling for their accession date (if any). In order to do that two sets of sector-specific gravity equations for the composition of imports and exports as dependent variables would be specified. The sectors taken into consideration are the textile and apparel manufacturing (henceforth, textiles), metalworking, agriculture and electronics. Such a choice is due to the fact that the first three sectors are typically classified as developing countries exports and the latter is more likely to be exported by the developed countries. From the econometrics side the approach used is the average treatment effects where the treatment group consists of the member-countries and in the control group are the non-member states. The best method as shown by Baier and Bergstrand (2006) is to apply country and time fixed effects on the panel data.

The data used for the estimation are obtained from the WITS UN COMTRADE (for the disaggregated volumes of imports and exports) and CEPII (for the control variables such as the GDP of the countries, distance and the length of the border between countries, common language etc.).

Due to the reasons listed above in the estimation of the composition of exports the expected coefficient for the WTO accession dummy variable for developing countries is negative for such sectors as electronics and other types of advanced manufacturing, and positive for sectors specializing in raw materials' extraction. In the case of composition of imports, a positive coefficient for the WTO accession dummy is expected for electronics sector in developing countries, whereas in developed countries it should be positive for agricultural, textiles and metallurgical sectors.

The work is divided into the following parts. The first section presents the literature review. It is followed by the theoretical and econometric specifications, data description, the discussion of the empirical results and possible extension and the concluding remarks. All the tables described in the text can be found in the Appendixes A-D.

Chapter 2

LITERATURE REVIEW

The literature review is divided into two main parts where the first one considers the two opposing strands of literature concerning the impact of membership on different aspects of trade, while the second part discusses various approaches towards the theoretical modeling of the issue and its empirical estimation techniques.

It comes as no surprise that there is a considerable body of literature on the effects of accession to the WTO and the aspects of organization's policies. However, it can be summarized by presenting only two papers, which represent opposite points of view; namely, a paper by Rose (2004a), which shows no effect of the accession on net exports, and a paper by Subramanian and Wei (2007) that does indicate a positive impact of the accession on the trade flows.

First of all, one should recall that according to the mission statement of the WTO its purpose is to stabilize the trade and increase it through the extensive (creation of trade through the introduction of new exports) and intensive (increase of the volume traded of the previously exported goods) margins. The seminal paper by Rose (2004a) addresses the issue of stability of trade flows in relation to the accession to the GATT/WTO and finds little to no evidence that the GATT/WTO promotes such stability as it is maintained in the organization's mission statement. The author uses a panel of 175 countries over the period of 50 years (1950-1999) and estimates a gravity model where the coefficient of variation of the log of real exports between two countries is the dependent variable and the explanatory variables include various dummy variables as well as the usual

variables included in the gravity equation (GDP, distance between two countries, population, area of the country, time fixed effects). Rose (2004a) estimates several regressions for samples with periods of 25 years, 10 years and 5 years using pooled OLS, country fixed effects and country pair fixed effects. In order to check for sensitivity the author also implements country pair random effects and in addition estimates a multilateral gravity equation rather than a bilateral one as before. However, none of these estimations has shown any considerable effect of the WTO or the GATT on the promotion of stable and predictable trade in the world, which is one of the reasons for creating the GATT/WTO in the first place.

In a recent paper Felbermayr and Kohler (2009) find that there is no strong extensive margin effect of the accession. In his another study Rose (2004b) also finds that the accession does not have any effect on the level of trade (intensive margin). These results are disputed by Subramanian and Wei (2007), who claim that the establishment of the WTO increased the world trade by 120% compared to the projection of the world without the WTO. The two main differences of Subramanian and Wei (2007) from Rose (2004b) is that the former included the multilateral resistance variables pioneered by Anderson and van Wincoop (2003), which were ignored by the latter, and that a logarithm of bilateral imports is used as a dependent variable rather than total trade flow (this is justified by theoretical foundations of the gravity model). It seems that these differences make the results obtained by the authors diverge so much from those by Rose, as they show a general positive effect of the accession on the volume of trade. However, the authors admit that the effect of the membership differs for countries with different levels of industrialization (developing and developed countries) due to the different corresponding degrees of liberalization (historically such sectors as agriculture, textiles etc. are less liberalized than manufacturing). They estimate

these effects through a set of sector-specific gravity equations, which serves as a basis for this study that also utilizes separate regressions for different sectors of the economy.

As for the majority of works dealing with international trade the model used in this study is a variation of the gravity model, which was first introduced by Tinbergen (1962). The major challenge is to discern between the methodological approaches to the estimation of the gravity equation in order to be able to evaluate the impact of the accession to the WTO on the commodity composition of trade.

The specific form of the model to be used in this research is derived from the paper presented by Anderson and van Wincoop (2003), which includes time-varying exporter and importer dummies among the explanatory variables. However, the main input of their study into the theoretical base is that it derives the gravity model according to the theory of international trade, which shows that the previous empirical specifications of the gravity equation are not correct as they omitted the "two price index terms", referred to as the multilateral trade resistance variables. These variables are positively related to the trade barriers of one country relative to all other countries. To support their claim about the corrected gravity model, the authors present a range of successful sensitivity analysis reports, which are based on the changes in such variables as distance and income.

Once the theoretical foundation of the gravity model was resolved, the debate arose around the methods of empirical estimation. Most authors before (and including) Anderson and van Wincoop (2003) made use of the country fixed effects estimations. However, Baier and Bergstrand (2006) showed that due to the

potential endogeneity in the model such an approach yields both biased and inconsistent estimates. The endogeneity is believed to stem from the fact that the dummy variables representing free trade agreements (in our case the membership in the WTO) are endogenous to the model, which in turn can come from three different sources, namely simultaneity, measurement error and omitted variable biases. To correct for these issues the authors estimate the so-called average treatment effects. They come to the conclusion that the preferential estimation technique is to use the first-differenced panel data with both country and time fixed effects.

There is yet another way to approach the issue of estimation recently proposed by Chang and Lee (2009). These authors use non-parametric methods such as permutation tests and pair-matching to estimate the effects of the WTO on trade. They claim that such an approach not only eliminates all the issues that motivated the paper of Baier and Bergstrand (2006) but also tackles the problem of selection biases. However, this approach has not been verified yet and this study would utilize the conventional estimation techniques proposed by Baier and Bergstrand (2006) and others.

Taking into account all the sources mentioned above, I would chiefly focus my attention on the two works by Anderson and van Wincoop (2003) and Subramanian and Wei (2007), which constitute the basis for the theory this research is concerned with. However, no other work has examined the impact of the accession on the composition of imports and exports and, therefore, these articles can only be used to provide foundation for the methodology rather than a complete guide to estimation.

Chapter 3

METHODOLOGY

As it was mentioned before, the theoretical foundation for this research is lent by the gravity model. Its recognized standard form, first introduced by Tinberben (1962), is presented by Silva and Tenreyro (2006) as follows:

$$T_{ij} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} D_{ij}^{\alpha_3}, \quad (1)$$

where T_{ij} is the trade flow from country i to country j, Y_i and Y_j are their respective GDPs and D_{ij} is the distance between the two trading partners. This model and its further evolution is supported by sound theoretical background, which is the reason it is used in the present research to estimate the impact of the WTO on the volume of trade flows first and only then to proceed to calculating the change in the composition of trade flows from the obtained coefficients. The usage of shares of trade for the specific sector in the entire trade of the country is certain to create unpredictable results due to lack of theoretical support for such a specification.

While the empirical form of the gravity equation has significantly evolved since its introduction by Tinbergen (1962), the version used here would be a synergy between the augmented gravity equation presented by Anderson and van Wincoop (2003) and its sector-specific derivation by Subramanian and Wei (2007) (equation (1)):[1]

[1] Please note that the actual theoretical derivation of the gravity model is left out and can be found in other sources as it is beyond the scope of the current research and would not add any supplementary meaning to the estimation if it was presented.

$$LnImp_{ijcs} = Z_{jc}\gamma_1 + \sum \alpha_i M_{ic} + \sum \theta_h X_{hc} + \beta_{11} FTA_{ijc} + \beta_{21} GSP_{ijc} + \beta_{31} WTO_{DVED\,ijc} + \beta_{41} WTO_{DI}$$

, (2)

The dependent variable is a log of sector-specific (sectors are denoted by S) imports from country i to country j. The explanatory variables consist mostly of fundamental gravity model variables such as a log of distance between two countries/regions, length of border and such, which are presented by a vector of variables Z_{jc}. The lists of time-varying importer and exporter dummy variables, $\sum \alpha_i M_{ic} + \sum \theta_h X_{hc}$ correspond to multilateral resistance terms (MRTs), which were proxied by CPI levels in countries i and j in Anderson and van Wincoop (2003). These terms arise due to the authors' claim that "trade between two countries depends not just on the policy and physical barriers between them but also on the barriers between these countries and the rest of the world." The last four terms are all dummy variables capturing different effects of the trade agreements between countries: FTA stands for Free Trade Agreement, GSP – for Generalized System of Preferences (countries subject to GSP are exempt from some of the WTO rules, which apply to other members), WTO_DVED is a dummy variable for developed WTO member-countries and WTO_DING is a respective measure for developing countries, which are in the WTO.

There has been a long-lasting debate among different researchers as to which data to use as a dependent variable: imports or exports. However, in the current paper this issue is redundant, given that the focus of the research calls for two sets of equations: one with a log of imports and another with a log of exports as dependent variables. Such a set up is due to the theoretical reasoning that the accession would affect the composition of imports and exports in the same sector

differently. For example, it may decrease the share of manufacturing imports, but increase the share of exports in manufacturing or vice versa.

These sets of equations would be specified for several particular sectors: agriculture, textiles (including apparel manufacturing), metalworking and electronics. The first three are mostly exported by developing countries and the first two are also highly protected by the developed ones, while the latter is a major export in developed countries, which allows for clear estimation results concerning different types of economies among WTO members. The countries considered for the estimation would include both WTO members and non-members and various types of economies ranging from G-8 group to the so-called 3rd world countries. The model is constructed in such a way in order to anticipate the occurrence of the selection bias. In order to control for the effect of membership on different groups of countries depending on their time of accession and economic status, various dummy variables would be introduced, as it was done in Subramanian and Wei (2007).

Considering the above the gravity equations estimated in this research are:

$$LnIMP_{ijts} = \alpha_0 + \alpha_1 W_{jit} + \alpha_2 MRT_{ij} + \alpha_3 WTO_{Membership_i} + \alpha_4 Time + \varepsilon_{ijt}, \quad (3)$$

$$LnEXP_{ijts} = \beta_0 + \beta_1 W_{jit} + \beta_2 MRT_{ij} + \beta_3 WTO_{Membership_i} + \beta_4 Time + \varepsilon_{ijt}, \quad (4)$$

where the dependent variable is the log of volume of exports (imports) of a specific sector of country i to country j, W stands for the vector of standard gravity model variables such as log of GDP of countries i and j, log of distance between the countries, dummy variable for the existence of common border if

any etc., MRT is a vector of similar variables that capture the unobservable trade costs. They are calculated as follows from Baier and Bergstrand (2009):

$$MRT_{tf} = \begin{pmatrix} (\sum_{k=1}^{N} \theta_k lnDis_{tk}) + (\sum_{m=1}^{N} \theta_m lnDis_{mf}) \\ -(\sum_{k=1}^{N} \sum_{m=1}^{N} \theta_k \theta_m lnDis_{km}) \end{pmatrix} \qquad (5)$$

where θ_k and θ_m stand for the GDP shares of reporting and partner countries respectively in the total world GDP, and lnDis is the log of distance between two countries. This MRT shows the trend in the log of distance that is correlated with the unobserved trade costs. The similar terms are calculated for other dummy variables such as RTA, common currency, common official language etc.

The vector of variables $WTO\_Membership_i$ is different for different specifications of the model. Four different specifications are considered: 1) WTO membership at large (dummy WTO), 2) impact of membership on developed countries (dummies WTO and WTO_DVED), 3) impact of membership on developing and least developed countries (dummy variables WTO, WTO_DING, WTO_LDC), 4) impact of the membership on the developing members that have acceded after 1995 (dummies WTO, Acc95, Acc95_DING). The respective dummy variables used are WTO_DING, WTO_DVED, WTO_LDC, WTO, Acc95, Acc95_DING.[2] The explanation behind used dummy variables is straightforward. The first four dummy variables concern the membership in the WTO. The first three differentiate between the type of the economy of the reporter country, which is a member, receiving the value of 1 if the country corresponds to the label of "Developing," "Developed" (Industrial) or a so-called "Least developed"[3] WTO member-country and the value of 0 otherwise. As for the time of accession dummy variables, Acc95 is the dummy

[2] All dummy variables relate to country i, which is the reporter country.

[3] Here in the notion of LDCs are included the countries which qualify as Low Income and Lower Middle Income under the World Bank classification. The full list can accessed at: http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS

variable for the countries which have acceded after 1995 and Acc95_DING stands for the developing countries in that sample. These dummies capture the effect of the accession for the most liberalized countries on average and developing countries specifically. A possible issue here is that the effect of trade liberalization might appear well before accession. For example, China began preparing for the accession 13 years prior to 2001, when it finally became a member (Subramanian and Wei, 2007). This is due to the fact that every new member has more restrictions to comply with as every member has a right to impose restrictions on the prospective members and as the number of members grows so does the number of restrictions. Notably, the developed countries have been members of the GATT/WTO for the longest and, as a result, new members (after 1995) are mostly developing countries.

Lastly, variable Time is a set of dummy variables for years starting with 1994 till 2006 (1993 is a base year). These dummies were not considered in the previous works as most of the authors used cross-section data, which was averaged for a specific time periods (e.g. 25-year periods in Rose (2004a) and 5-year periods in Subramanian and Wei (2007)). However, I find that variation in trade flows due to various shocks can have a significant impact on the estimation. These variables are intended to capture the general time trend so that the dummy variables concerning the WTO specifically would only show the impact of the accession and membership on the volatility of trade flows.

After the estimation of the necessary coefficients for the six abovementioned dummy variables, the received values would be transformed from the volume of trade into the change in its composition by calculating the following:

$$\Delta Composition_{st} = \frac{Trade\ with\ WTO_{st}}{Total\ Trade\ with\ WTO_{t}} - \frac{Trade\ without\ WTO_{st}}{Total\ Trade\ without\ WTO_{t}}, \quad (6)$$

where the difference is taken between the composition of trade in the world with the WTO (utilizing the actual existing data) and the composition of trade in the world without the WTO, which is obtained from the actual trade flows and the estimated coefficients for one or the other aspect of WTO membership that show the impact of the WTO membership on its members relative to the non-members and can be used as a valid approximation of the world without the WTO. The goal of this research is to determine the potential change in the composition of trade flows in connection with the accession and membership.

Concerning the econometric approach, again referring to Baier and Bergstrand (2006), given that the dataset is a panel, the superior approach seems to be to use country and time fixed effects. According to Egger (2000) the random effects model (REM) that is frequently used instead of the fixed effects model (FEM) is not applicable here, as the gravity model may suffer from omitted variable bias. Given that REM holds upon the assumption that there is no correlation between the country and time effects with the rest of the explanatory variables this approach may not be valid for the present estimation. On the other hand, FEM may not yield convincing results due to the fact that it ignores the presence of time-invariant variables (for example, distance). In order to check which method yields superior estimates Hausman test is used. The null hypothesis of this test is that the results from FEM and REM do not differ consistently in which case it is advised to use REM; FEM is used if the null hypothesis is rejected and REM estimation is inconsistent.

In addition, as accessed in Silva and Tenreyro (2006) it is likely that log-linearized models, such as the gravity equation, suffer from the heteroskedasticity when estimated with the OLS. Apart from resolving the possible issue of heteroskedasticity the approach the authors propose would also take care of the zero trade flows, which appear in the dependent variables, and might result in not consistent results if estimated with inappropriate method. They also show that for gravity equation the estimated coefficients from OLS and Poisson pseudo-maximum-likelihood (henceforth, Poisson) regressions differ considerably, which indicates that heteroskedasticity is indeed present in the trade data used by Silva and Tenreyro (2006).Therefore, Poisson estimation technique with country-pair and time fixed effects is applied as suggested by the authors.

In order to check the results for robustness all three abovementioned methods are employed.

Chapter 4

DATA DESCRIPTION

The data for the countries of the world used in the estimation come from UN COMTRADE and CEPII databases.

CEPII database provides the standard gravity model variables including the distance between countries, GDP, population, contingency, etc. The data for the WTO dummy variable is again taken from CEPII dataset. The rest of the dummy variables are constructed using the information on the accession dates from the WTO web site and the classification of the economies according to the World Bank nomenclature.

The dependent variable, which is a share of a particular sector's export (import) in the combined export (import) for a given country, is obtained from disaggregated data from UN COMTRADE. The coding used is HS 2-digit 1988/92 and various sections are compiled together into four specified sectors.

The descriptive statistics are presented in Tables A1 and A2 in the Appendix, where Table A1 focuses on the dependent variables and Table A2 on the explanatory ones. The summary values of trade flows for different sectors do not deviate from the average significantly and there means range from 5.207 to 6.430 (note, the dependent variables are presented in logs). The most volatile appears to be the imports of electronic equipment, which has both the highest standard deviation of 4.108 and the higher maximum value of 18.779 among all other sectors. This can be explained by the peculiarities of its particular market.

Chapter 5

RESULTS

As mentioned in the chapter 3 there are four different specifications of the model which are performed for every sector for both imports and exports. However, apart from the difference in dummy variables, which test different hypotheses, the remaining variables are standard for gravity equation and do not change from one estimation to another. Three estimation approaches were considered initially, but REM was rejected by the Hausman test. It is worth noting that the both estimation approaches applied utilize fixed effects, which omit time invariant variables such as the log of distance between two countries, common language etc.

Based on the theory behind the gravity model and the works of other researchers one should expect the coefficients for logs of GDP of origin and destination countries to be positive (although, a negative sign is also possible, but less likely). Dummy variable for RTA (regional trade agreement) should have positively signed coefficients in all the regressions as signing such agreements simplifies the procedures relating to trade and, therefore, lowers trade costs to some extent.

5.1 Agriculture

Table C1 presents the results for the exports of agricultural goods for all four specifications, which were estimated using FEM and Poisson estimation techniques. The regular variables all have expected signs. The magnitudes of the coefficients fluctuate somewhat across the specifications for each methodology; however, there are no major changes. There is greater volatility when the year dummies are considered, but again the overall trend is intact. On the other hand,

if one compares the estimates from FEM and those from Poisson regressions they differ throughout by a significant amount. This supports the results received by Silva and Tenreyro (2006) and it can, therefore, be concluded that there indeed exists heteroskedasticity in the data, which is alleviated by Poisson estimation. This is true not only for exports in agriculture, but the remaining seven regression sets as well, which is why only coefficients estimated by Poisson PML would be considered from this point on.

In addition, in the case of agricultural sector only the GDP of the country of origin is not statistically significant for exports and the GDP of the destination country – for imports. This can be explained by the fact that the increase in the wealth of the receiving country is more important for the change in the volume of exports and the similar relationship is true for imports. Most importantly, agriculture is a strategic sector, which is more likely to be driven by the demand for the goods, rather than the supply.

According to specification 1 WTO member countries export 22.2 percent more agricultural goods than a non-member country. From specification 3the impact on its developing members' export is not statistically significant, but the magnitude of the coefficient indicates a 10 percent increase in the volume. However, the difference is very slight in comparison to the exports of LDCs (Least Developed Countries), which is 30.5 percent more relative to the developed WTO country. There is, however, no indication that developing countries (here term 'developing countries' also include the LDCs) that have acceded after 1995 export more agricultural goods relative to the entire WTO membership base. In case of agricultural exports, the latter finding does not confirm the hypothesis of this study. On the other hand a much greater share of exports of the LDCs is a result that supports the hypothesis of this study.

The respective results for agricultural imports are found in Table C2. For the overall WTO membership base in specification 1 there is an increase of agricultural imports of roughly 12.3 percent relative to the outsider countries. On the other hand, such effect is mostly due to the imports of the LDCs, which are 18 percent higher than those of developed member-countries. Again as with exports, there is no significant difference in the coefficients, when countries that acceded after 1995 are considered.

Note that in the case of imports the dummy variables for LDC and late-acceded members are not statistically significant. Jumping ahead the similar situation is true for imports in textiles and metallurgy as well. Such a behavior of imports relative to exports can be explained by assuming that in the chosen sectors the impact of the WTO does not affect imports as much as it does exports, especially if one considers that mostly poor countries are considered and it seems unlikely that a country would both import and export the same good. For instance, with joining the WTO an LDC would increase its exports in agriculture and its imports in chemical industry. In addition, the dummy variable for developing WTO members is statistically significant only in one case. This can be explained by the construction of specification 3: the impact of the WTO on a developing country is considered against its developed members simultaneously accounting for the LDCs. It can be conjectured that relative to the developed members, developing countries (the way they are specified in the current study) do not fare any different with respect to the chosen sectors.[4]

[4] Henceforth, the statistical insignificance of particular coefficients is not discussed. However, one should bear in mind that some of the coefficients mentioned are statistically insignificant. For particular values, please, refer to the Appendix C.

5.2 Textiles

In the case of exports of textiles (see Table C3) the coefficients are again as expected initially. In specification 1 the membership on the whole yields 32.1 percent higher volume of exports for member countries. Inside the WTO, relative to the developed members, developing members export 17 percent more. The effect is exacerbated for the LDCs – the exports are higher by 73 percent. This is due to the fact that developing and least developed countries are more likely to specialize in low skill textile industry than their developed counterparts. However, if we consider the impact of the WTO on the developing countries with respect to the non-members, it appears that WTO developing members actually export 11 percent less textiles than the average country in the rest of the world. The same is true for developed members, which export 31 percent less compared to all the other countries. The overall positive effect of WTO membership in the case of textiles seems to come from exports of LDCs, which are 45 percent above those of non-member states and more developed member states together. In addition, developing countries that have acceded after 1995 on average export almost 72 percent more relative to respective developed countries. This means that highly liberalized developing countries tend to export more in textiles relative to other countries, where this sector is under protection, due to the fact that their goods are more competitive in the global market.

In case of the imports (see Table C4), however, the situation is different. The WTO members on average across all the specifications import less textiles than the rest of the world. Also the magnitudes of the coefficients of interest are the lowest among all the regressions, which indicates the lowest impact of WTO membership (among the four sectors) through any channel is on textile imports. Here the usual trend is reversed; namely, developing and least developed countries import less relative to the developed ones and not more, as it was the

case previously. This is likely to be due to the fact that developed countries do not produce enough textile goods in order to satisfy the demand and as a result import them heavily from abroad, while poorer countries produce a large volume of textiles and do not need to import them from other countries.

5.3 Metallurgy

The results for exports in metalworking are displayed in Table C5. Again the usual gravity model variables' coefficients are consistent with the theory. As for the WTO members they export almost 47 percent more metallurgical goods than an average country of the rest of the world (specification 1). The effect is even greater for the LDC members relative to the developed members - roughly 68 percent (specification 3). The coefficient for developing members is rather small – only 4.1 percent above the average metallurgical exports of developed members; however, it was expected to be a small positive number, given the magnitudes of other coefficients. As for the members that acceded after 1995, they tend to export 65.5 percent more relative to the developed countries, if this member is a developing member. This serves as an indicator that more liberalized developing countries on average tend not to suffer from free trade relative to less liberalized economies, contrary to what was conjectured in the introductory chapter.

In the case of imports (see Table C6) the overall membership impact is a 26.5 percent increase in the volume of trade. Again as with textile sector, the impact of the WTO is rather low considering other regressions. For instance, relative to the developed members LDCs import only 16 percent more goods compared to 68 percent in exports. From this one can conclude that the impact of WTO on exports is considerably larger than that on imports, which is a somewhat surprising finding, given that under the WTO requirements new

members have to relax their import quotas, i.e. more imports should start coming into the country.

5.4 Electronics

The last sector considered is electronics. Compared to the previously assessed sectors estimations for both exports (see Table C7) and imports (see Table C8) yield the largest coefficients. Regarding the coefficients of the dummy variable of interest in specification 1the WTO members export 68.7 percent more and import 43.2 percent more of electronics than an average country, which might be an indicator that a part of these exports are intended for the non-member countries. For exports the results are surprising as it was expected that developed countries would export more than developing; however, this does not seem to occur according to the data. Developing and LDCs export 21 (17) and 108 (104) percent more than the WTO developed member (average country of the rest of the world) does. This might be due to the fact that many companies that produce electronics move to poorer countries in order to find cheap labor. For imports the situation is slightly different as developing members import less electronics than their developed counterparts by 7.3 percent.

The coefficients for the dummy variables for late acceded countries are also consistent with the premise of the study when comparing exports and imports as electronics is not one of the protected sectors under GATT and was liberalized in all the member countries. Namely, more liberalized developing member countries export 103.2 percent more and import 63.7 percent more than the rest of the world including earlier WTO members, which is consistent with the outsourcing idea stated in the previous paragraph.

5.5 Composition of trade

One should be careful to note that the previously described results from tables C1-8 are presented in terms of the volume of exports and imports. However, the main idea of this paper is to estimate the effect of WTO accession and membership on the composition of exports and imports, which is not a volume but a percentage share of a specific sector trade flow in the total respective trade flow. The values for the change in composition for different trade flows and sectors are presented in Table D1. They were computed from the initial estimations given the coefficients for the dummies of interest. The change in composition of a trade flow was regarded as a difference between the composition of trade under the current conditions (i.e. in the presence of the WTO) and the composition of trade in the world without the WTO, where the trade flows would have differed proportional to the coefficients of the respective dummy variables. For example, the volume of imports in electronics has increased by 43.2 percent for the WTO member countries on average compared to the non-members.

After the necessary computations, it was found that the membership in the WTO leads to a 4.6 percent increase in the share of exports of agriculture in the total, a 12 percent increase in the case of electronics, an 8.9 percent increase for metallurgy and 6.4 percent – for textiles. For imports the respective estimates are 2.6, 7.9, 5.3 percent increases and a 3 percent decrease in the share of textile imports. For developed members the most significant impact of WTO relative to the rest of the world occurs for electronics and textiles exports: a 14 and 15 percent decreases in the share of the trade flow in the total respectively. In case of the developing members the magnitudes of the change in compositions for all four sectors vacillate between the marks of –0.2 and 3.4 percent, although the coefficients underlying the calculations of the composition of trade were

statistically insignificant everywhere except for the imports in electronics. One can conclude that the impact of the WTO on the change in the composition of trade in the developing countries is not sizeable enough. However, the impact of WTO membership on the composition of trade in the least developed countries is strong, for example: electronics exports – 16 percent, electronics imports – 12.1 percent, metallurgy exports – 12.5percent increases. Such results both support and negate the main hypothesis of the paper. First of all, the shares of sectors, which can be classified as raw materials production, increase after the accession as least developed countries are more likely to specialize in such sectors. However, the results for electronics sector are contrary to the premise of the paper. Although, if one considers the phenomenon of outsourcing, the results do not seem surprising any longer as increasingly companies move large parts of their production to the so-called third world countries, where labor and other inputs can be purchased for low prices. In addition, the data under the HS 2-digit specification does not distinguish between intermediate and finished goods, which might affect the results.

Lastly, the sample of countries that acceded after 1995 is considered. The composition of trade in such developing countries is consistently higher than the change in composition for an average developing WTO member, with the exception of textiles imports. Although the magnitude of the difference between these two pairs of indicators fluctuates between the sectors and ranges from 0.4 to 11.6 percent, it is consistently positive in favor of the more liberalized countries. This difference is likely to be due to the fact that in the sample of countries that acceded later the term 'developing' includes also LDCs, while for the entire WTO sample these groups of countries are considered separately. While this is likely to be affecting the magnitude of the

coefficients the number of members that have joined WTO after 1995 is rather limited to yield meaningful results for more specialized groups of economies.

Lastly, if one considers the total average impact of the WTO on the composition of trade for four sectors jointly there is an increase of 31.9 percent allocated to exports in these sectors and 12.8 percent increase for imports. Similarly, on the whole for developed countries there is an extensive decrease in the shares and an increase for LDCs and developing countries that joined after 1995.

From this estimation it can be concluded that more liberalized countries are more affected by the accession and membership than the original WTO members, which continue supporting protected sectors like agriculture. However, there does not seem to be any decrease in exports (or at lease a less pronounced increase relative to the imports) in the protected sectors (namely, agriculture and textiles) as the result of accession. On the contrary, the poorer the country the larger the increase in the share of a particular sector in the total volume of trade, which means that the fact that agricultural and textile sectors are protected in many member-countries and that these are the primary exports of many developing and low income countries does not visibly harm the trade. It might be conjectured that with no protection, the increase of the shares of exports of these two sectors would increase much more; however, then the exporting countries might suffer from the lack of diversification of trade (briefly discussed in the Introduction).

Even considering the present results the diversification of trade is an important factor to contemplate. For example, an LDC had initially allocated 20 percent of its exports to the four sectors considered in this study and after the accession

this share becomes 58.1 percent, which is an enormous shift that can potentially cause some trouble to the country in case of a negative shock to one or several of its primary exports. Such an even should be kept in mind, when a country is considering joining the WTO.

Chapter 6

CONCLUSIONS

6.1 Extensions and Alternative Explanations

From Table D1 one can see that in the case of exports the shares of sectors increase uniformly in most of the cases with the exceptions of textile imports and developed countries. This can only mean that for some other sectors the shares decrease, which would be an interesting direction for further research. For instance, an increase of 9.9 percent in the share of exports of electronics sector in the least developed countries is likely to mean that some other sector(s) stops producing goods on export at all and possibly shrinks its domestic production as well due to the influx of cheaper foreign imports.

Another way to extend this paper would be to implement a different methodology as here only REM, FEM and PPML were considered. Chang and Lee (2009) present an interesting methodology, which might yield superior results to those estimated with Poisson methodology.

What concerns alternative explanations of the acquired results, one may conjecture that those developing countries that entered the WTO after 1995 behave differently not because they were extensively liberalized (or at least not only due to this reason), but because they were mostly poor countries (on the lowest income level to be identified as developing countries) with substantial raw resources readily available, notably large areas rich with various ores of ferrous and non-ferrous metals, but also cheap labor and good agricultural conditions. This can be translated to a presence of selection bias for those countries which constitute the sample of late-accession members.

On the related not of selection bias, it is possible to assume that the countries that have acceded later have only done so because they have realized that by joining the Organization they will acquire certain benefits, while this benefits were not apparent earlier. However, such an assumption can be negated by the example of China, which has already been mentioned before. It has joined the WTO in 2001, but has applied to membership 13 years prior to that date (note that at that time the WTO did not exist, but its predecessor GATT had similar rules). This can mean that it is not exactly that countries chose not to join the WTO because they did not see benefits, but more because they could not fulfill the certain requirements of the organization right away, and had to go through the lengthy process, which precluded them from joining the WTO in 1995.

6.2 Concluding Remarks

Current paper is aimed at estimating the impact of the WTO accession and subsequent membership on the composition of exports and imports in four sectors on the panel of the world countries for a period of 1993-2006. The impact is estimated for different groups of countries relative to the economic level with a specific focus on the countries, which joined the WTO after 1995. The results are obtained by firstly estimating the regular gravity equation with the addition of dummy variables that test different hypotheses and then transforming the estimated coefficients from the volume terms into the percentage which corresponds to the change in the composition of a particular trade flow as a result of accession.

The results are mostly consistent; however, there are some inconsistencies with regard to insignificant coefficients which yield values of change in composition with unexpected signs, especially with the case of textiles and metallurgical

imports. The overall trend is that there is a quantifiable impact of the WTO accession on the composition of exports and imports, being positive in the four chosen sectors, with the exception of imports in textile sector. It is worth noting that the impact of the WTO on the composition of exports is more extensive than that on the imports in the majority of the cases. This is a somewhat counterintuitive finding as the impact of WTO on exports and imports would be expected to sum up to unity. However, it can be explained by the fact that only four sectors were considered in this study, and the missing changes in imports are likely to become apparent in other sectors, omitted in the current research.

When the developing and least developed country-members of WTO are considered, the impact is amplified for the latter and decreased for the former as the chosen sectors are mostly classified as raw material production and are labor-intensive, which makes these sectors be 'popular' exports with the poorer countries, i.e. such countries are more likely to specialize in such areas as agriculture, textiles and metallurgy. The similar trend with regard to electronics can be explained by the recent trend of massive outsourcing of production from developed to developing countries in pursuit of cheap inputs. The trend for developing countries can be explained by the premise of the paper: namely, due to protection of these sectors (except, electronics) in the developed countries, the goods of the developing ones cannot compete successfully on the market and as a result, developing countries once they enter the WTO choose to trade in other sectors, where they would not incur a loss. On the other hand, the LDCs do not have a large variety of sectors, which are developed enough for foreign trade and as a result, even though trading, for example, in agricultural sector can only be done at a loss relative to the potential benefit a country could have incurred in the case when these sectors were not protected by other countries.

As for the countries that acceded after 1995 and are expected to have more liberalized trade policies than the original members of the Organization due to an increasingly extensive set of requirements for every new joining country, the impact of the accession on them is uniformly larger than on the average member. These results are somewhat contrary to the assumptions stated in the beginning of the paper as it was conjectured that due to the excessive protection of such sectors as textiles and agriculture by the developed countries, the new members would not be able to successfully compete at the bigger market. However, the increase in the shares of these sectors indicate that an opposite effect is present and that after the accession the countries start exporting more in these protected sectors rather than less. This can be due to the fact that in specification 4 both developing and least developed countries are considered as a group, which amplifies the results.

Nevertheless, this supports the assumption that the developing countries (both on average in the WTO and those that acceded after 1995) start relying on the exports of these four sectors more heavily, which would indicate that other sectors would stop exporting altogether and are likely in addition to shrink their home production due to the influx of cheaper imports from other WTO members. However, the latter assertion has to be tested separately and would be an interesting extension of the current study. In addition, there is a visible threat of the lack of trade diversification, which is one of the channels through which the accession to the WTO might harm the economies of the new members in the event of a negative shock to one or several major exports or imports. However, in order to draw definite conclusions with regard to this issue the current study has to be expanded to include all the traded sectors.

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APPENDIX A

Table A1. Descriptive statistics: Imports and Exports

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Log X Agriculture	144,084	5.441	3.512	-6.907	16.602
Log X Textiles	130,741	5.371	3.660	-6.907	17.150
Log X Metallurgy	122,969	5.359	3.597	-6.907	17.097
Log X Electronics	146,087	6.112	3.781	-6.907	18.664
Log IM Agriculture	160,031	6.430	3.436	-6.907	16.605
Log IM Textiles	148,555	5.207	3.730	-6.907	17.593
Log IM Metallurgy	131,593	5.950	3.823	-6.907	17.098
Log IM Electronics	168,502	6.022	4.108	-6.907	18.779
Log Total X	1,966	14.907	2.965	0.243	20.836
Log Total IM	1,971	15.447	2.319	8.163	21.375

Note: This table includes descriptive statistics on both disaggregated and aggregate levels. X – Exports, IM – imports.

Table A2. Descriptive Statistics: CEPII Database

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
LnDist	702,464	8.815	0.814	-0.005	9.898
LnGDPi	575,680	9.323	2.405	3.498	16.40
LnGDPj	575,680	9.323	2.405	3.498	16.40
ComCur	702,464	0.014	0.120	0	1
Colony	702,464	0.010	0.099	0	1
RTA	699,328	0.036	0.186	0	1
GATT/WTO	702,464	0.599	0.490	0	1
Contig	702,464	0.012	0.110	0	1
Comlang_off	702,464	0.174	0.379	0	1

This table includes various variables common to gravity model. Their short description is presented in Table A3.

Table A3. Description of CEPII database variables

VARIABLES	VARIABLE LABEL
LnDist	Log of weighted distance (pop-wt, km)
LnGDPi	Log of GDP for the country of origin(current mn US$)
LnGDPj	Log of GDP for the destination country(current mn US$)
ComCur	1 for common currency in both countries
Colony	1 for pair ever in colonial relationship
RTA	1 for regional trade agreement in force
GATT/WTO	1 if origin is GATT/WTO member
Contig	1 for contiguity
Comlang_off	1 for common official of primary language

APPENDIX B

Table B1. List of countries.

Albania***	Ecuador**,***	Malawi**	St. Kitts and Nevis***
Algeria	Egypt, Arab Rep.**	Maldives**	St.Vincent & the Gren.
Andorra*	Estonia*,***	Mali**	Sudan**
Anguilla	Fiji***	Malta*	Suriname
Antigua and Barbuda	Finland*	Mauritania**	Swaziland**
Argentina	France*	Mauritius	Sweden*
Armenia**,***	French Polynesia*	Mexico	Switzerland*
Aruba*	Gabon	Moldova**,***	Syrian Arab Republic**
Australia*	Gambia, The**,***	Mongolia**,***	Tajikistan**
Austria*	Georgia**,***	Montserrat	Tanzania**
Azerbaijan	Germany*	Morocco**	Thailand**
Bahamas, The*	Ghana**	Mozambique**	Togo**
Bahrain*	Greece*	Namibia	Tonga**
Bangladesh**	Greenland	Nepal**,***	Trinidad &Tobago*
Barbados*	Grenada***	Netherlands*	Tunisia**
Belgium*	Guatemala**	New Zealand*	Turkey
Belize**	Guinea**	Nicaragua**	Turkmenistan**
Benin**,***	Guinea-Bissau**	Niger**,***	Tuvalu**
Bhutan**	Guyana**	Nigeria**	Uganda**
Bolivia**	Haiti**,***	Norway*	Ukraine**
Bosnia and Herzegovina	Honduras**	Oman*,***	UAE*,***
Botswana	Hong Kong, China*	Pakistan**	United Kingdom*
Brazil	Hungary*	Panama***	United States*
Brunei*	Iceland*	Papua N.G.**,***	Uruguay
Bulgaria***	India**	Paraguay**	Vanuatu**
Burkina Faso**	Indonesia**	Peru	Venezuela
Burundi**	Iran, Islamic Rep.	Philippines**	Vietnam**
Cambodia***	Ireland*	Poland*	Yemen**
Canada*	Israel*	Portugal*	Zambia**
Cape Verde**	Italy	Qatar*,***	Zimbabwe**
Central African Republic**	Jamaica	Romania	
Chile	Japan*	Russian Federation	
China**,***	Jordan**,***	Rwanda**,***	
Colombia	Kazakhstan	Salvador**	
Comoros**	Kenya**	Samoa**	
Congo, Rep.**,***	Kiribati**	Sao Tome &Principe**	
Costa Rica	Korea, Rep.*	Saudi Arabia*,***	
Cote d'Ivoire**	Kyrgyz Republic**,***	Senegal**	
Croatia*,***	Latvia*,***	Seychelles	
Cuba	Lebanon	Sierra Leone**	
Cyprus*	Lesotho**	Singapore*	
Czech Republic*	Lithuania***	Slovak Republic*	
Denmark*	Luxembourg*	Slovenia*	
Dominica	Macao*	South Africa	
Dominican Republic	Macedonia, FYR***	Spain*	
East Timor	Madagascar**	Sri Lanka**	

Note: * Developed countries, ** LDCs and Lower Income countries, *** Countries that have acceded after 1995

APPENDIX C

Table C1. Exports: Agriculture

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.155***	0.157***	0.151***	0.152***	0.051	0.049	0.044	0.042
	(0.036)	(0.036)	(0.036)	(0.036)	(0.043)	(0.043)	(0.043)	(0.043)
LnGDP, destination	0.643***	0.643***	0.642***	0.643***	0.676***	0.679***	0.680***	0.679***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.048)	(0.048)	(0.048)	(0.048)
RTA	0.071**	0.073**	0.080***	0.073**	0.062**	0.067**	0.069**	0.067**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.028)	(0.027)	(0.027)	(0.027)
GATT/WTO	0.172***	0.204***	0.093	0.101	0.222***	0.242***	-0.037	-0.031
	(0.041)	(0.046)	(0.084)	(0.103)	(0.067)	(0.069)	(0.116)	(0.066)
WTO_DING			-0.069				0.103	
			(0.109)				(0.133)	
WTO_LDC			0.212**				0.305**	
			(0.103)				(0.138)	
WTO_DVED		-0.112				-0.280**		
		(0.096)				(0.134)		
Acc95				-0.008				-0.005
				(0.133)				(0.133)
Acc95_DING				0.129				0.303**
				(0.098)				(0.136)
Constant	5.000***	5.001***	5.078***	5.085***				
	(0.489)	(0.489)	(0.489)	(0.502)				
Observations	144,084	144,084	144,084	144,084	142,974	142,974	142,974	142,974
R-squared	0.054	0.054	0.054	0.054				
Number of id	18,109	18,109	18,109	18,109	15,825	15,825	15,825	15,825

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C2. Imports: Agriculture.

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.798***	0.801***	0.800***	0.798***	0.755***	0.755***	0.744***	0.745***
	(0.035)	(0.036)	(0.036)	(0.036)	(0.052)	(0.052)	(0.052)	(0.053)
LnGDP, destination	0.023	0.023	0.023	0.023	0.068	0.069	0.071	0.070
	(0.033)	(0.033)	(0.033)	(0.033)	(0.048)	(0.048)	(0.047)	(0.047)
RTA	0.162***	0.163***	0.166***	0.162***	0.058**	0.060**	0.063**	0.060**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.026)	(0.026)	(0.026)	(0.026)
GATT/WTO	0.125***	0.159***	0.061	0.063	0.123*	0.149*	0.036	0.004
	(0.034)	(0.041)	(0.055)	(0.082)	(0.064)	(0.080)	(0.048)	(0.044)
WTO_DING			0.017				-0.045	
			(0.081)				(0.059)	
WTO_LDC			0.157**				0.179	
			(0.076)				(0.114)	
WTO_DVED		-0.099				-0.116		
		(0.068)				(0.093)		
Acc95				-0.002				0.032
				(0.099)				(0.067)
Acc95_DING				0.111				0.155
				(0.070)				(0.108)
Constant	4.329***	4.311***	4.328***	4.379***				
	(0.491)	(0.491)	(0.491)	(0.501)				
Observations	160,031	160,031	160,031	160,031	157,093	157,093	157,093	157,093
R-squared	0.036	0.036	0.036	0.036				
Number of id	20,975	20,975	20,975	20,975	18,031	18,031	18,031	18,031

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C3. Exports: Textiles.

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.295***	0.299***	0.272***	0.263***	0.673***	0.671***	0.566***	0.564***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.078)	(0.078)	(0.062)	(0.063)
LnGDP, destination	0.667***	0.667***	0.668***	0.666***	0.819***	0.820***	0.825***	0.823***
	(0.033)	(0.033)	(0.033)	(0.033)	(0.066)	(0.066)	(0.066)	(0.066)
RTA	0.298***	0.304***	0.321***	0.299***	0.226***	0.246***	0.257***	0.246***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.052)	(0.050)	(0.050)	(0.050)
GATT/WTO	0.148***	0.210***	-0.028	-0.329***	0.321***	0.336***	-0.280*	-0.135
	(0.044)	(0.049)	(0.092)	(0.069)	(0.070)	(0.073)	(0.146)	(0.101)
WTO_DING			-0.219*				0.169	
			(0.112)				(0.171)	
WTO_LDC			0.549***				0.731***	
			(0.111)				(0.175)	
WTO_DVED		-0.244**				-0.644***		
		(0.103)				(0.164)		
Acc95				0.307***				-0.138
				(0.115)				(0.178)
Acc95_DING				0.370***				0.719***
				(0.107)				(0.173)
Constant	2.617***	2.627***	2.925***	3.348***				
	(0.553)	(0.552)	(0.553)	(0.568)				
Observations	130,741	130,741	130,741	130,741	130,744	130,744	130,744	130,744
R-squared	0.021	0.021	0.022	0.021				
Number of id	17,070	17,070	17,070	17,070	14,809	14,809	14,809	14,809

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C4. Imports: Textiles

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.857***	0.855***	0.849***	0.852***	0.811***	0.812***	0.814***	0.813***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.077)	(0.077)	(0.078)	(0.078)
LnGDP, destination	0.247***	0.247***	0.246***	0.247***	0.761***	0.760***	0.760***	0.760***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.098)	(0.098)	(0.098)	(0.098)
RTA	0.259***	0.258***	0.264***	0.257***	0.233***	0.232***	0.231***	0.232***
	(0.033)	(0.033)	(0.033)	(0.033)	(0.056)	(0.056)	(0.056)	(0.056)
GATT/WTO	0.194***	0.172***	0.242***	0.091	-0.122*	-0.129*	-0.075	-0.109
	(0.041)	(0.050)	(0.072)	(0.092)	(0.067)	(0.074)	(0.096)	(0.098)
WTO_DING			-0.263**				-0.014	
			(0.103)				(0.118)	
WTO_LDC			0.079				-0.062	
			(0.097)				(0.126)	
WTO_DVED		0.068				0.055		
		(0.087)				(0.119)		
Acc95				0.150				0.034
				(0.117)				(0.138)
Acc95_DING				-0.055				-0.057
				(0.090)				(0.124)
Constant	0.575	0.582	0.650	0.708				
	(0.547)	(0.547)	(0.548)	(0.557)				
Observations	148,555	148,555	148,555	148,555	145,373	145,373	145,373	145,373
R-squared	0.024	0.024	0.024	0.024				
Number of id	20,474	20,474	20,474	20,474	17,286	17,286	17,286	17,286

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C5. Exports: Metallurgy

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.261***	0.266***	0.237***	0.243***	0.382***	0.383***	0.309***	0.314***
	(0.047)	(0.047)	(0.047)	(0.048)	(0.065)	(0.065)	(0.058)	(0.058)
LnGDP, destination	0.942***	0.943***	0.942***	0.942***	0.714***	0.717***	0.722***	0.720***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.052)	(0.052)	(0.051)	(0.051)
RTA	0.313***	0.319***	0.334***	0.316***	0.187***	0.193***	0.203***	0.196***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.053)	(0.053)	(0.054)	(0.054)
GATT/WTO	0.325***	0.409***	0.120	0.083	0.468***	0.487***	0.033	0.086
	(0.047)	(0.053)	(0.090)	(0.066)	(0.093)	(0.097)	(0.078)	(0.174)
WTO_DING			-0.081				0.041	
			(0.115)				(0.181)	
WTO_LDC			0.573***				0.680***	
			(0.112)				(0.105)	
WTO_DVED		-0.297***				-0.479***		
		(0.103)				(0.118)		
Acc95				0.037				-0.052
				(0.112)				(0.192)
Acc95_DING				0.380***				0.655***
				(0.109)				(0.104)
Constant	0.219	0.240	0.591	0.622				
	(0.619)	(0.619)	(0.621)	(0.640)				
Observations	122,969	122,969	122,969	122,969	123,111	123,111	123,111	123,111
R-squared	0.067	0.067	0.068	0.068				
Number of id	15,761	15,761	15,761	15,761	13,578	13,578	13,578	13,578

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C6. Imports: Metallurgy

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	1.064***	1.062***	1.058***	1.069***	0.618***	0.618***	0.594***	0.593***
	(0.040)	(0.040)	(0.040)	(0.041)	(0.057)	(0.057)	(0.055)	(0.056)
LnGDP, destination	0.146***	0.146***	0.146***	0.146***	0.466***	0.467***	0.471***	0.470***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.077)	(0.077)	(0.078)	(0.078)
RTA	0.311***	0.309***	0.313***	0.311***	0.172***	0.175***	0.177***	0.175***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.047)	(0.047)	(0.047)	(0.047)
GATT/WTO	0.303***	0.268***	0.389***	0.442***	0.265***	0.276***	0.177***	0.138***
	(0.042)	(0.049)	(0.076)	(0.094)	(0.061)	(0.067)	(0.056)	(0.052)
WTO_DING			-0.231**				-0.035	
			(0.105)				(0.073)	
WTO_LDC			-0.043				0.158	
			(0.098)				(0.108)	
WTO_DVED		0.121				-0.106		
		(0.089)				(0.089)		
Acc95				-0.055				0.040
				(0.121)				(0.076)
Acc95_DING				-0.148				0.154
				(0.092)				(0.106)
Constant	-0.566	-0.558	-0.520	-0.723				
	(0.585)	(0.585)	(0.586)	(0.594)				
Observations	131,593	131,593	131,593	131,593	128,344	128,344	128,344	128,344
R-squared	0.058	0.058	0.058	0.058				
Number of id	18,823	18,823	18,823	18,823	15,572	15,572	15,572	15,572

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C7. Exports: Electronics

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.434***	0.439***	0.419***	0.427***	0.746***	0.746***	0.634***	0.633***
	(0.035)	(0.035)	(0.035)	(0.035)	(0.090)	(0.090)	(0.088)	(0.088)
LnGDP, destination	0.743***	0.742***	0.742***	0.742***	0.658***	0.660***	0.671***	0.670***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.077)	(0.077)	(0.074)	(0.074)
RTA	0.212***	0.216***	0.229***	0.214***	0.086	0.092	0.096	0.094
	(0.029)	(0.030)	(0.029)	(0.030)	(0.064)	(0.064)	(0.066)	(0.066)
GATT/WTO	0.165***	0.237***	0.035	0.046	0.687***	0.701***	-0.039	0.167
	(0.040)	(0.048)	(0.068)	(0.058)	(0.112)	(0.114)	(0.128)	(0.166)
WTO_DING			-0.117				0.209	
			(0.095)				(0.207)	
WTO_LDC			0.462***				1.082***	
			(0.093)				(0.130)	
WTO_DVED		-0.207**				-0.778***		
		(0.083)				(0.161)		
Acc95				-0.012				-0.205
				(0.090)				(0.210)
Acc95_DING				0.252***				1.074***
				(0.088)				(0.130)
Constant	0.973**	0.967**	1.205**	1.156**				
	(0.469)	(0.469)	(0.469)	(0.482)				
Observations	146,087	146,087	146,087	146,087	147,970	147,970	147,970	147,970
R-squared	0.104	0.104	0.104	0.104				
Number of id	17,940	17,940	17,940	17,940	15,905	15,905	15,905	15,905

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table C8. Imports: Electronics

	Fixed Effects Estimation				Poisson Estimation			
Specifications	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
VARIABLES	LnTrade	LnTrade	LnTrade	LnTrade	Trade	Trade	Trade	Trade
LnGDP, origin	0.902***	0.902***	0.902***	0.899***	0.659***	0.659***	0.595***	0.593***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.074)	(0.074)	(0.073)	(0.073)
LnGDP, destination	0.331***	0.331***	0.331***	0.331***	0.925***	0.927***	0.931***	0.930***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.100)	(0.099)	(0.098)	(0.098)
RTA	0.321***	0.321***	0.321***	0.320***	0.015	0.020	0.025	0.021
	(0.031)	(0.031)	(0.031)	(0.031)	(0.070)	(0.070)	(0.071)	(0.071)
GATT/WTO	0.041	0.051	0.019	-0.062	0.432***	0.463***	0.150**	0.064
	(0.039)	(0.046)	(0.071)	(0.107)	(0.095)	(0.103)	(0.060)	(0.098)
WTO_DING			0.040				-0.073	
			(0.095)				(0.107)	
WTO_LDC			0.027				0.495***	
			(0.094)				(0.126)	
WTO_DVED		-0.032				-0.330***		
		(0.084)				(0.115)		
Acc95				0.082				0.087
				(0.129)				(0.114)
Acc95_DING				0.046				0.486***
				(0.086)				(0.124)
Constant	-0.408	-0.411	-0.412	-0.300				
	(0.481)	(0.481)	(0.481)	(0.490)				
Observations	168,502	168,502	168,502	168,502	165,418	165,418	165,418	165,418
R-squared	0.073	0.073	0.073	0.073				
Number of id	22,881	22,881	22,881	22,881	19,797	19,797	19,797	19,797

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Note: Tables C1-C8 represent only a part of regressions. Year Dummy variables as well as MRT for RTA were omitted as the sizes of their coefficients are not important in the current study. The full output tables are available upon request.

APPENDIX D

Table D1. Change in Composition of Exports and Imports for four sectors

	Agriculture		Electronics		Metallurgy		Textiles		Total change	
Variables	X	IM	X	IM	X	IM	X	IM	X	IM
WTO	4.6*	2.6*	12*	7.9*	8.9*	5.3*	6.4*	-3*	31.9	12.8
WTO Developed	-2.3*	0.4*	-14*	-0.3*	-5.1*	3*	-15*	-1.9*	-36.4	1.2
WTO Developing	1.3	-0.2	3.4	2.3*	1.6	2.9	-3.8	-2.8	2.5	2.2
WTO LDCs	5.2*	4.5	16*	12.1*	12.5*	7	5.2*	-3.2	38.9	20.4
WTO D-ing after 1995	5.2*	4.1	15*	12*	12.2*	7	5.7*	-3.2	38.1	19.9

Note: X – exports, IM – imports. The numbers have been converted to percentage change in composition. * shows whether the coefficients, which served as a basis for calculating respective changes in composition were statistically significant at any level (1, 5 or 10 percent) in the Poisson estimation, does not apply to 'Total Change' column. In the last row 'WTO Developing' stands for both developing and least developed countries