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Trade Effects of the Europe Agreements

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TRADE EFFECTS OF THE EUROPE AGREEMENTS

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Abstract

The eastern enlargement of the European Union (EU) brought and will bring full membership to countries whose trade barriers with the EU had to a large extent already been removed under Free Trade Agreements (FTAs) during the 1990s. We employ a theory-based new version of a gravity equation, whose specification allows for an assessment of the impact of the arrangements on extra- and intra-group imports. We find robust evidence that the agreements have substantially increased intra-group trade, in the case of the Czech and Slovak Republic at the expense of the Rest of the World (ROW).[*]

JEL classification: F15, C23

Keywords: Free Trade Agreements; Gravity equation; Central and Eastern Europe; Panel data

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1. Introduction

Since 1989 Europe has been the stage of an ongoing process of regional integration involving the EU15 and ten Central and Eastern European Countries (CEECs).[1] The admission of eight CEECs to the European Union (EU) on 1st May 2004 represented a temporary peak in the integration process, but it was not the end of it. Bulgaria and Romania will join the EU from January 2007 after almost 15 years of preferential trade relations guided by Free Trade Agreements (FTAs). The bilateral elimination of trade barriers and the subsequent increase in these countries' total exports to the EU raised the question if the EU integration process has caused and will in the future cause negative effects for third countries.

Theoretically, the issue is closely related to Jacob Viner's influential work *The Customs Union Issue*, in which it was first pointed out that the preferential nature of trade deals generates both trade creation and trade diversion (Viner 1950). However, the second-best nature of FTAs renders the empirical work on this subject so challenging that for most arrangements it is hard to say "whether trade creation outweighs trade diversion" (Clausing 2001).

While most studies assessing the impact of bilateral arrangements on trade flows make use of the gravity equation, only few specifically point to the geographical restructuring of trade flows arising from the implementation of FTAs between the EU and the CEECs. In this paper, we will employ a new version of a theory-based gravity equation to reveal to which extent factors like transport costs or exchange rates have influenced the geographical shift of trade flows. The specification allows for an assessment of the impact of the FTAs on trade creation

[1] In this paper, the CEECs are the group formed by the Baltic States (Estonia, Latvia and Lithuania), Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia.

and trade diversion. Employing panel data estimation techniques, we find that the FTAs with the CEECs have boosted EU imports from these two countries by up to 63%.

In section 2, we present some stylised facts, which emphasise the need for investigating the trade effects of the FTAs with the CEECs. Section 3 briefly lays out the concept of trade creation and trade diversion. Section 4 expounds the theoretical model, which builds the basis for the estimated equation. Sections 5 deals with econometric and data issues. We present the estimation results in section 6. Section 7 concludes.

2. Development of trade flows: Stylised facts

The first formal instruments of integration were bilateral FTAs signed between the EU15 and each CEEC, which became known as the Europe Agreements (EAs). Since the EAs had to go through a longsome process of ratification by each individual member state, the European Community (EC) gave provisions on trade and trade-related measures effective by the means of Interim Agreements already at an earlier stage.[2] Nevertheless, tariff reductions under both type of agreements have been carried out gradually. Therefore, one needs to look at the entire timeframe from 1991 to 2003 to make statements about the agreements' effects on international trade.

A simple calculation helps to depict the relative change in the aggregate imports of EU15 countries from the CEECs and from the Rest of the World (ROW) during the EU integration process of the candidate countries. To render the sizes of the two geographical regions

[2] As being subject to Art. 133 of the EU treaty (Common Trade Policy), the Interim Agreements fell under the Community's Competence. Details on the exact dates of entry into force of the agreements are provided in table A.1 in the appendix.

comparable, the yearly import values have been normalised with respect to the base year (1991). Taking the quotient allows then to assess relative changes. To be precise, the development of imports from the CEECs (M_{CEECs}) and from the ROW (M_{ROW}) since 1991 has been calculated as follows:

$$\frac{M_{CEECst} / M_{CEECs91}}{M_{ROWt} / M_{ROW91}} \qquad (1)$$

- Figure 1 about here -

Looking at figure 1 it can be readily seen that in 2003 the growth rate of EU imports from the CEECs is over three times higher than the growth rate of imports originating from the ROW. Moreover, the relative boost seems to have taken place steadily and continuously since the fall of the iron curtain until the accession of eight CEECs to the EU in 2004.

These stylised facts match our *a priori* expectations surprisingly well. Indeed, during the time trade liberalisation guided by the FTAs deepened, EU15 countries' imports from the CEECs increased substantially relative to the imports originating in the ROW. However, a detailed econometric analysis of the import flows is necessary to separate the individual agreements' effects from the various other factors that may have influenced the imports of the EU15's individual member states during the observed time span.

3. On the concepts of trade creation and trade diversion

Theoretical insights in allocation effects of FTAs were first given by Viner (1950) and Byé (1950) arguing that a fractional reduction of trade barriers leads only to a shift, but not to an elimination of the discrimination of different sources of supply. Viner named the resulting effects trade creation and trade diversion.

Trade creation is then associated with the portion of the new trade between member countries that is wholly new resulting in an improvement in the international resource allocation. It occurs when subsequent to the formation of a customs union, domestic production at high costs is replaced by lower-cost sources from the new partner country. Trade diversion refers to the part of the new trade between member countries that is only a substitute for trade with third countries. It describes a situation in which the preferential trade liberalisation causes higher-cost production from the new partner country to replace imports from low-cost sources in the ROW. In this case, the resource allocation is worsened. The concepts of trade diversion and trade creation in their original version refer only to producers and consumers inside the FTA area. Trade diversion can, however, seriously harm excluded countries, in particular, when they are confronted with such a large trade bloc as the EU.

Attempts to find general circumstances under which the positive effects from trade creation surpass the negative consequences from trade diversion following the implementation of an FTA have been subject to much controversy. One of the few surviving criteria is the natural trading partner hypothesis, stating that an FTA among prospective members of a regional grouping that are already major trading partners would reinforce natural trading patterns instead of diverting them (Wonnacott and Lutz 1989). Thus, trade creation should dominate for the FTAs with those countries that were at the time of the implementation of the

agreement already well integrated into the EU (figure 2). A quick look at the EU imports over GDP ratios for the CEECs suggests that the FTAs with Slovenia and the Baltic countries (except for Lithuania) to be less harmful to the ROW than the FTAs with Hungary, Poland, the Czech Republic, Slovakia, Romania and Bulgaria.

- Figure 2 about here -

On the other hand, one could argue that countries that were less integrated before the FTAs have benefited the most from signing them. Figure 2 reveals the biggest growth of imports over GDP ratios for those countries that signed the FTAs in the early 1990s (particularly Slovakia, Hungary and the Czech Republic) and virtually no or even negative growth for the Baltic countries and Slovenia, who entered into the FTAs some years later (compare table A.1). Again, whether these gains can be attributed to the FTAs must be subject to a more formal econometric analysis.

4. Theoretical foundation of the gravity equation

Researchers use the Vinerian terms frequently when examining empirically the consequences of preferential liberalisation for third countries. Most studies formally assessing the impact of any kind of integration arrangement make use of the gravity equation (see e.g. Bayoumi and Eichengreen 1995, Frankel and Wei 1998, Soloaga and Winters 2001 or for a more recent study Carrère 2006). Even though the gravity equation's initial success stemmed from its good empirical properties, it possesses nowadays "more theoretical foundations than any other trade model" (Baldwin 2006). The repeated ignorance of which has, however, produced

a number of commonly-accepted mistakes in gravity model estimation, so that we attach importance to laying out briefly the derivation of the equation we are going to test.

Assuming identical, homothetic Constant Elasticity of Substitution (CES) preferences and "iceberg" type transport costs, country i's aggregate total value of imports from country j can be expressed as

$$M_{ij} = N_j Y_i \left(\frac{p_{ij}}{P_i} \right)^{1-\sigma} \qquad \text{with} \qquad s_{ij} = \left(\frac{p_{ij}}{P_i} \right)^{1-\sigma} \tag{2}$$

with N_j representing the variety of products sold by country j and Y_i being country i's nominal expenditure. $\frac{p_{ij}}{P_i}$ is the relative price determining the share of country i's expenditure spent on country j's goods s_{ij} with P_i being country i's price index for all import-competing goods and p_{ij} standing for the 'landed' price. σ is the above-unity elasticity of substitution between goods originating from country i and country j.[3] Since prices on individual goods are hardly available, we define the landed price

$$p_{ij} = t_{ij} P_j e_{ij} \tag{3}$$

as a function of bilateral trade costs t_{ij}, country j's producer price index P_j and the nominal exchange rate e_{ij}.[4] Substituting (3) into (2) yields

[3] Usual estimates of σ range from 5 to 8. Consequently a rise in the relative prices by 1% would cause the total import value to fall by 4 to 7%.
[4] An exchange rate variable has first been formally introduced into the gravity equation by Bergstrand (1985).

$$M_{ij} = N_j Y_i (t_{ij} re_{ij})^{1-\sigma} \qquad \text{with} \qquad re_{ij} = \frac{e_{ij} P_j}{P_i} \tag{4}$$

as the real exchange rate. Equation (4) already looks close to commonly estimated gravity equations. However, as stated by Anderson and van Wincoop (2003), bilateral trade does not solely depend on bilateral trade costs, but also on the average resistance to trade with the rest of the world. Only by considering these multilateral terms, it can be explained why a certain region is pushed towards trade with a given partner when barriers towards all trade partners increase. Employing general equilibrium conditions has the convenient side effect of eliminating the number of varieties N_j, for which data is not on-hand.[5] Producer prices in country j must then adjust, such that

$$Y_j = N_j \sum_{i=1}^{I} s_{ij} Y_i \tag{5}$$

Recalling equations (2) and (3), we can solve for N_j as follows:

$$N_j = \frac{Y_j}{\sum_{i=1}^{I} \left(re_{ij} t_{ij}\right)^{1-\sigma} Y_i} \tag{6}$$

Plugging (6) into (4) and defining $Y_W = \sum_{i=1}^{I} Y_i$, we obtain our testable gravity equation

[5] Annex A.2 describes the case for a restricted country sample.

$$M_{ij} = \frac{Y_i Y_j}{Y_W} \left(\frac{re_{ij} t_{ij}}{\sum_{i=1}^{I} re_{ij} t_{ij}} \right)^{1-\sigma} \tag{7}$$

where country i's total imports from country j are not only dependent on the relative incomes of the two countries but also on their bilateral exchange rate and trade costs relative to country i's average trade costs and exchange rate with respect to all trading partners.

In line with the basic idea behind gravity models that the intensity with which a pair of countries trades is subject to pull and push factors, we adopt a broad interpretation of the bilateral and multilateral trade resistance terms and assume the unobservable t_{ij} to be a log-linear function of a set of observable variables,[6]

$$t_{ij} = (D_{ij})^{\delta_1} [e^{\delta_2 LL_i + \delta_3 LL_j + \delta_4 B_{ij} + \delta_5 CL_{ij} + \delta_6 DEP_{ij} + \delta_7 FTA_{ij} + \delta_8 FTA_i}] \tag{8}$$

where D_{ij} as the great-circle distance between the importing and the exporting country, $LL_{i(j)}$ as dummy variables being equal to 1 if country i (j) is landlocked and 0 otherwise and B_{ij} as a dummy variable being equal to 1 if country i and j share a common border and 0 otherwise influence trade costs by serving as proxies for a transport cost variable. Supposing that cultural proximity beats down the landed price through transaction cost savings, the dummy variable CL_{ij} equals 1 when the importer and the exporter have the same official language and

[6] Compare Mélitz (2005) for a similar interpretation of the bilateral trade cost variable.

0 otherwise. Finally, DEP_{ij} is a dummy taking the value of 1 whenever country j is a non-independent entity being legally associated with an independent state and 0 otherwise.[7]

In contrast to the work by Anderson and van Wincoop (2003), equation (7) does not describe multilateral resistance through relative price terms, but through all variables that also influence the bilateral resistance to trade. Their partially time-varying character overcomes the bias present in earlier estimations that solely rely on country pair fixed effects to resemble the multilateral resistance terms.[8] Following Baier and Bergstrand (2006), we define multilateral and world resistance as

$$\sum_{\rho=1}^{T} MWR_{ij} = \frac{1}{I}\sum_{i=1}^{I} t_{ij} + \frac{1}{J}\sum_{j=1}^{J} t_{ij} - \frac{1}{IJ}\sum_{i=1}^{I}\sum_{j=1}^{J} t_{ij} \qquad (9)$$

where t_{ij} includes all elements as defined in equation (8) except for the landlocked dummies.[9] The first two terms on the RHS represent the multilateral trade resistances of the respective trading partners. Holding bilateral trade costs constant, a rise in these terms implies a lower ratio of bilateral to multilateral trade costs and thus a boost of bilateral trade. The last term, however, resembles the world resistance to trade and as such, lowers the trade value between every pair of countries.[10] The opposite interpretation of the multilateral and world resistance terms holds, of course, true for trade stimulating factors, like cultural proximity or trade arrangements.

[7] This includes French Polynesia and New Caledonia for France, Aruba and the Netherlands Antilles for the Netherlands and Bermuda and the Cayman Islands for the United Kingdom.
[8] Baldwin (2006) provides an exhaustive discussion of this problem.
[9] The FTA dummies are summarized to one variable.
[10] To give an example, for the distance variable this means that a higher distance of the trading partners i and j towards all other countries in the sample increases country i's imports from j, whilst a high world distance (everyone is far away from everyone) lowers trade between every country pair.

To separate the ex-post effects of the FTAs with the individual CEECs, a set of stepwise dummy variables has to be included into the theoretically derived gravity equation.

FTA_{ij} = 1 for the contracting parties for the years following the entry into force of the Interim Agreements and
= 2 for the years following the entry into force of the EAs (intra-bloc bias)

to capture the impact of the FTAs on intra-group trade and

FTA_i = 1 for non-contracting parties for the years following the entry into force of the Interim Agreements
and
= 2 for the years following the entry into force of the EAs (extra-bloc openness)

to capture the impact of the FTAs on trade of group members with non-members.[11]

Following this specification, we will be able to examine whether the FTAs were only trade creating (they caused trade between the EU and the associated countries to increase above the normal levels without changes in trade with third countries) or trade diverting (they increased intra-group trade at the expense of lower trade with third countries).

Taking into account the modifications of the theoretically derived equation discussed above, the log-linearised[12] reduced-form gravity equation boils down to

[11] The countries are grouped by dates of entry into force of the Interim and the Europe Agreements. See table A.1 for details.

$$\ln M_{ijt} = \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln re_{ijt} + \beta_4 (\ln) \sum_{\delta=1}^{T} t_{ij(t)} + \beta_5 \ln avre_{ijt} +$$

$$\beta_6 (\ln) \sum_{\rho=1}^{T} MWR_{ij(t)} + \varepsilon_{ijt} \qquad (10)$$

where $\frac{1}{Y_W}$ is absorbed into the constant term α [13], common to all years and all country pairs, ε_{ijt} is the i.i.d. error term and the expected coefficient signs are

$$\beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 = \sum_{\delta=1}^{T} (1-\sigma)\delta_1 < 0, (1-\sigma)\delta_2 < 0, (1-\sigma)\delta_3 < 0, (1-\sigma)\delta_4 > 0, (1-\sigma)\delta_5 > 0, (1-\sigma)\delta_6 > 0,$$

$$(1-\sigma)\delta_7 > 0, (1-\sigma)\delta_8 < 0, \beta_5 > 0, \beta_6 = \sum_{\rho=1}^{T} (1-\sigma)\rho_1 > 0, (1-\sigma)\rho_2 < 0, (1-\sigma)\rho_3 < 0, (1-\sigma)\rho_4 < 0, (1-\sigma)\rho_5 < 0.$$

5. Econometric issues and data

In accordance to the findings of Egger (2002), panel data methodology is applied. First, and in contrast to cross-section analysis, panels enable us to capture relevant relationships between variables over time. Second, they allow monitoring unobservable country-pairs individual effects. Cheng and Wall (2004) further demonstrate that not controlling for country heterogeneity yields biased estimates. The country-pair effects will be treated as fixed, since the random effects model only yields consistent estimates when the unobservable bilateral effects are not correlated with the error term. The conducted Hausman test, however, clearly rejected null-hypothesis of no correlation. The relevant fixed effects (FE) regression thus

[12] The brackets after β_4 and β_6 indicate that the dummy variables included in t_{ij} and MWR_{ij} will not be log-linearised whereas distance of course, will.

[13] Since Y_w is constant we implicitly assume no world growth, although countries i and j may grow. As a consequence, we assume that the positive growth of some countries is cancelled by the negative growth of others so that the world as a whole does not grow.

gives unbiased estimates of the time-varying variables (reported in column 1 and 2 of table 1 and 2), nevertheless, to provide comparability, we also present the estimated parameters of the random effects (RE) and the fixed effects vector decomposition (FEVD) regressions. The latter has been developed by Plümper and Troeger (2004) and equals a stepwise fixed effects estimation technique, rendering the estimation of the time-invariant variables possible. We further detected heteroskedasticity and serial correlation of the error terms and corrected for it in all regressions. Finally, we controlled for a possible selection bias by including three variables that approximate the Heckman correction term: HC1 is a variable containing the number of years of a trading pair in the sample; HC2 and HC3 are dummies, taking the value of 1 if the trading pair is observed over the entire period 1991 to 2003 and if the trading pair is present in the sample in t-1, respectively (and 0 otherwise).[14]

As for the data, we consider EU15 countries' imports from a worldwide sample of 204 countries[15] over the period 1991-2003, forming an unbalanced panel data set with roughly 32245 observations. The data sources and definitions of all variables entering the tested gravity equation are listed in table A.4 in the appendix.

6. Results

The results of the regressions with and without the multilateral and world resistance terms are presented in table 1. The respective first columns show the regression results omitting the multilateral terms. Except for some FTA dummies, all parameter estimates of the relevant fixed effects model show the expected sign and are highly significant. As for the traditional

[14] The empirical estimation also contains an EU dummy, controlling for the accession of Austria, Sweden and Finland in 1995 only.
[15] For the complete country list see table A.3 in the appendix.

gravity variables, the positive parameter estimates for GDP indicate that the import value increases with the importer's GDP due to a higher import demand and with the exporter's GDP raising due to a higher export supply. The coefficients are, however, somewhat away from the theoretically predicted unitary elasticity. Note that the theoretically justified inclusion of the real exchange rate exhibits empirical importance as well. A 10% depreciation (e.g. a rise in the exchange rate) of the importing country's currency against its trading partner's currency reduces the import value from the latter by 2.8%. Moving to the fixed effects vector decomposition regression, we find that our distance coefficient of -1.34 lies within the usual range.[16] Being landlocked reduces the bilateral imports by 52% for country i and 77% for country j not having access to the sea. Being legally dependant on the importing country and sharing a common language significantly boost the propensity to trade.

Looking at the results of the regressions including the multilateral terms, we find a positive coefficient on the average exchange rate variable, indicating that imports from a certain trading partner increase nearly proportionally to a depreciation of the importing country's currency against all other currencies. A 10% rise in country i's geographical distance (remoteness) from all other trading partners pushes it to trade 13% more with country j. Dependency does not seem to matter on a multilateral basis and border effects also play quantitatively a minor role in this sample. The coefficient on the multilateral language variable, however, does not show the expected opposite sign of its bilateral counterpart. This is due to the last term on the RHS of equation (9), the world resistance term, dominating the multilateral terms. Thus, in the world as a whole, there are many common languages facilitating trade between every pair of countries and outweighing possible negative consequences for bilateral trade of the multilateral language variables.

[16] The elasticity of transport costs to distance is usually associated with an estimate in the range of $0.2 < \delta_1 < 0.4$ (Limao / Venables 2001). Combined with an average estimate of $\sigma = 7$, a distance coefficient between -1.2 and -2.4 would be suggested.

- Table 1 about here -

Turning to the interpretation of the FTA coefficients, the results display the meaningfulness of the agreements for the CEECs' integration into the EU. In the fixed effects regression without the MWR terms, four out of five dummy variables argue for a significant boost of the EU15 countries' imports brought about by the agreements. Most trade has been created by the FTAs signed with the Baltic countries (63% above the normal level). The arrangement is also the only one featuring extra-bloc openness. It increased EU imports from the ROW by 15%. The result for the Czech and Slovak Republic agreement is somewhat mixed. While it led to 40% more imports than what would have been predicted by the baseline-scenario gravity model, it has reduced imports from third countries by 8%. For none of the other agreements, effects on third countries could be detected.

In general, the results keep holding true when the multilateral resistance terms are included. Nevertheless, it has to be noted that the coefficients of the FTA dummies (as well as the GDP and distance measures) move up in the second set of regressions. As laid out by Baldwin and Taglioni (2006), estimates of currency union dummies are likely to be biased if the relative price terms are omitted. Since we rely on a fixed effects model, even in our first regression, only the time-variant part of the Anderson and van Wincoop (2003) terms is ignored. The two time-varying multilateral terms we include in our second regression are negatively correlated with bilateral trade and also with the other variables included in t_{ij}. Thus, omitting the average exchange rate ant the multilateral FTA dummy biases our estimates of the bilateral FTAs downwards. So, moving to the estimation results of the true model in columns 2, 4 and 6 of table 1, we find that the agreements with the CEECs actually have created between 11%

and 25% more trade than suggested by the regression ignoring the time-varying component of the relative price terms.

The trade creation and trade diversion elasticities seem to roughly confirm the natural trading partner hypothesis introduced in section 3. The implementation of the FTAs with previously little integrated countries like the Czech and Slovak Republic was not without costs for third countries. On the contrary, the Baltic countries were relatively well integrated into the EU by the time of the entry into force of the agreements (compare figure 2). As shown in table 1, the FTAs with them exhibit the best performance concerning intra- and extra-bloc trade creation. However, the estimation results for the other FTAs do not further strengthen this suggestion. The intuition that less integrated countries profited most themselves from the establishment of FTAs cannot be confirmed by the regression results. Consequently, the imports over GDP ratios rather support the natural trading partner hypothesis, although the data is not very clear cut here either.

Table A.5 shows the results for different country groupings, allowing thereby for a better comparison to previous studies. The parameter estimates underline the robustness of the previous estimation. The FTA coefficients on an aggregate level confirm the results obtained on an individual basis. All CEECs taken together, the Interim and Europe Agreements boosted EU imports from that region 65% above the otherwise predicted level without affecting third countries.

Evaluating our results in the context of other East-West trade studies, we find that our FTA coefficient for all CEECs of 0.5 (thus, indicating a trade creation elasticity of 65%) lies just amidst the wide range of previous parameter estimates (table 2).

- Table 2 about here -

The huge differences stem from different specifications of the gravity equation, varying estimation techniques, country samples and time spans. Closest to our procedure appear the approaches of Adam, Kosma and McHugh (2003) and De Benedictis, de Santis and Vicarelli (2005). The smaller elasticity of the former may stem from the fact that the authors used exports instead of imports and also from distinct time spans. They include only five years from 1996 to 2000 into their regression and are, thus, not able to capture the entire effect of the Interim Agreements. While using a similar time span to ours, De Benedictis, de Santis and Vicarelli (2005) leave Romania and Bulgaria out of their focus. The estimate they provide does therefore not contain, the trade created by the EA with these two countries. Finally, both studies rely on time-invariant country (pair)-specific fixed effects to account for the multilateral resistance terms. Since part of the resistance, namely the average exchange rate and the multilateral FTA variable, are time varying and negatively correlated with the dependent variable, however, the results are very likely to be downward biased.

7. Conclusions

This paper has paid particular importance to theoretically deriving a new version of a correctly specified gravity equation to avoid biases present in previous studies. We were able to show that the frequently employed exchange rate variables do stand on a sound theoretical ground and exhibit econometric importance. In addition, new measures for multilateral trade resistance were introduced and mostly showed the expected coefficient signs in the empirical estimation.

Looking at the agreements on an individual country basis gives additional important insights: the FTAs have supported and accelerated the CEECs' integration into the EU. The process has not been free of charge, however. We find evidence that although each FTA created new trade within the trade bloc, the increase has in the case of the Czech and Slovak Republic been at the expense of imports from the ROW. The fact that these countries were not well integrated with the EU at the time of the entry into force of the agreements gives some support to the natural trading partner hypothesis. As for the aggregate trade effects of the Interim and Europe Agreements, our result is in line with previous estimates by Adam, Kosma and McHugh (2003). However, we believe that the authors underestimate the agreement's effect since they only partly eliminate the omitted variable biases.

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Appendix

Table A.1: Dates of entry into force of the Interim and the Europe Agreements

Dummy			Country	Interim Agreement	Europe Agreement
FTA_{CEECs}	$FTA_{visegrad}$	FTA_{hupo}	Hungary	March 1992	February 1994
			Poland	March 1992	February 1994
		FTA_{czsl}	Czech Republic	March 1992	February 1995
			Slovakia	March 1992	February 1995
	FTA_{balkan}	FTA_{robu}	Romania	December 1993	February 1995
			Bulgaria	May 1993	February 1995
		FTA_{sv}	Slovenia	July 1997	February 1999
	$FTA_{baltics}$	$FTA_{baltics}$	Estonia	January 1995	February 1998
			Lithuania	January 1995	February 1998
			Latvia	January 1995	February 1998

Source: Council of the European Union (2006).

A.2: Adjusting the model to a limited number of importing countries

In this study, we have to adjust our theoretical framework to the case of EU15 countries' imports (countries i) from a worldwide sample of countries (countries j). Say, that there exist r other importing countries $\sum_{r=1}^{R} country_r = \sum_{j=1}^{J} country_j - \sum_{i=1}^{I} country_i$, whose import prices can be described analogously to country i as

$$p_{rj} = t_{rj} P_j e_{rj} \tag{A.1}$$

Under general equilibrium conditions, output in country j must then equal the aggregate expenditure spent by countries i and r on varieties produced in j,

$$Y_j = N_j(\sum_{i=1}^{I} s_{ij} Y_i + \sum_{r=1}^{R} s_{rj} Y_r) \tag{A.2}$$

Making a few mathematical transformations, we can solve for N_j

$$N_j = \frac{Y_j}{\sum_{i=1}^{I} (re_{ij} t_{ij})^{1-\sigma} Y_i + \sum_{r=1}^{R} (re_{rj} t_{rj})^{1-\sigma} Y_r} \tag{A.3}$$

Plugging (A.3) into (1), country i's imports arise as

$$M_{ij} = \frac{Y_i Y_j}{\frac{\sum_{r=1}^{R} (re_{rj} t_{rj})^{1-\sigma}}{\sum_{i=1}^{I} (re_{ij} t_{ij})^{1-\sigma}} Y_r + \sum_{i=1}^{I} Y_i} \left(\frac{t_{ij} re_{ij}}{\sum_{i=1}^{I} re_{ij} t_{ij}} \right)^{1-\sigma}$$

For our empirical estimation this means that $\frac{1}{\frac{\sum_{r=1}^{R} (re_{rj} t_{rj})^{1-\sigma}}{\sum_{i=1}^{I} (re_{ij} t_{ij})^{1-\sigma}} Y_r + \sum_{i=1}^{I} Y_i}$ will be absorbed in the constant. E.g., we assume a co-movement of the average exchange rate and trade costs of country r against j and the average exchange rate and trade costs of country i against j as well as a constant world GDP.

Table A.3: Country list

Afghanistan
Albania
Algeria
American Samoa
Andorra
Angola
Antigua and Barbuda
Argentina
Armenia
Aruba
Australia
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bermuda
Bhutan
Bolivia
Bosnia-Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Canada
Cape Verde
Cayman Islands
Central African Rep.
Chad
Chile
China
Colombia
Comoros
Congo Dem. Rep.
Congo Rep.
Costa Rica
Côte d'Ivoire
Croatia
Cuba
Cyprus
Czech Republic
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Estonia
Ethiopia
Faeroe Islands
Fiji
Finland
France
French Polynesia
Gabon
Gambia
Georgia
Germany
Ghana
Greece
Greenland
Grenada
Guam
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran Islamic Rep.
Iraq
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Korea Dem. Rep.
Korea Rep.
Kuwait
Kyrgyz Republic
Lao PDR
Latvia
Lebanon
Lesotho
Liberia
Libya
Liechtenstein
Lithuania
Luxembourg
Macao
Macedonia FYR
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Marshall Islands
Mauritania
Mauritius
Mayotte
Mexico
Micronesia Fed. Sts.
Moldova
Mongolia
Morocco
Mozambique
Myanmar
Namibia
Nepal
Netherlands
Netherlands Antilles
New Caledonia
New Zealand
Nicaragua
Niger
Nigeria
N. Mariana Islands
Norway
Oman
Pakistan
Palau
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russian Federation
Rwanda
Samoa
San Marino
S. Tome and Principe
Saudi Arabia
Senegal
Serbia-Montenegro
Seychelles
Sierra Leone
Singapore
Slovak Republic
Slovenia
Solomon Islands
Somalia
South Africa
Spain
Sri Lanka
St. Kitts and Nevis
St. Lucia
St. Vincent
Sudan
Suriname
Swaziland
Sweden
Switzerland
Syrian Arab Rep.
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Arab Em.
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Virgin Islands (U.S.)
West Bank and Gaza
Yemen Rep.
Zambia
Zimbabwe

Table A.4: List of variables

Variable	Definition	Source
M_{ijt}	Yearly imports of country i from country j	OECD ITCS
$Y_{i(j)t}$	Importer and exporter GDP (in current US$)	UN NAMAD
re_{ijt}	Bilateral real exchange rate	UN NAMAD (nom. exchange rates), IMF IFS (price indices and GDP deflators), own calculations[18]
D_{ij}	Great circle distances between the respective trading pairs	CIA World Factbook, own calculations based on the harvesine formula
$LL_{i(j)}$	Dummy = 1 if the country is landlocked	CIA World Factbook
B_{ij}	Dummy = 1 if the county shares a common border with the EU	Wikipedia
DEP_{ij}	Dummy = 1 if country j legally depends on country i	CIA World Factbook
CL_{ij}	Dummy = 1 if the trading partners share a common official language	Wikipedia
FTA_{ijt}	Dummy = 1 for contracting parties for the years following the entry into force of the Interim and = 2 for the years following the entry into force of the Europe Agreements	Council of the European Union
FTA_{it}	Dummy = 1 for non-contracting parties for the years following the entry into force of the Interim and = 2 for the years following the entry into force of the Europe Agreements	Council of the European Union

[18] When available the producer or consumer price index has been used for the calculation of the real exchange rate, in all other cases we reverted to the GDP deflator.

Table A.5: Robustness checks

	FE		FEVD	
	(1)	(2)	(1)	(2)
$\ln Y_{it}$	0.44***	0.41***	0.44***	0.41***
	(0.11)	(0.12)	(0.01)	(0.01)
$\ln Y_{jt}$	0.70***	0.69***	0.70***	0.69***
	(0.07)	(0.07)	(0.01)	(0.01)
$\ln re_{ijt}$	-0.37***	-0.36***	-0.37***	-0.36***
	(0.07)	(0.07)	(0.00)	(0.00)
$\ln D_{ij}$			-2.20***	-2.19***
			(0.03)	(0.03)
B_{ij}			-0.00***	-0.00***
			(0.00)	(0.00)
LL_i			-0.81***	-0.87***
			(0.03)	(0.03)
LL_j			-1.44***	-1.45***
			(0.02)	(0.02)
DEP_{ij}			1.23***	1.24***
			(0.14)	(0.14)
CL_{ij}			0.95***	0.94***
			(0.03)	(0.03)
EU_i	0.27***	0.24***	0.27***	0.24***
	(0.07)	(0.07)	(0.05)	(0.05)
$FTA_{iCEECst}$	0.50***		0.50***	
	(0.05)		(0.03)	
FTA_{it} (CEECs)[19]	0.02		0.02**	
	(0.02)		(0.01)	
$FTA_{ivisegradt}$		0.49***		0.49***
		(0.08)		(0.05)
$FTA_{ibalkant}$		0.45***		0.45***
		(0.06)		(0.04)
$FTA_{ibalticst}$		0.49***		0.49***
		(0.07)		(0.04)
FTA_{it} (Visegrad)		-0.05		-0.05
		(0.05)		(0.04)
FTA_{it} (Balkan)		0.06**		0.06**
		(0.03)		(0.03)
FTA_{it} (Baltics)		-0.00		-0.00
		(0.03)		(0.03)
$avre_{ijt}$	0.76***	0.63***	0.76***	0.63***
	(0.19)	(0.20)	(0.02)	(0.02)
MWD_{ij}			1.29***	1.30***
			(0.04)	(0.04)

[19] Since the dates of entry into force of the agreements differ for the countries in the aggregate, we had to take the "mean" years in assigning the values of 1 and 2 to the dummies measuring the extra-bloc openness.

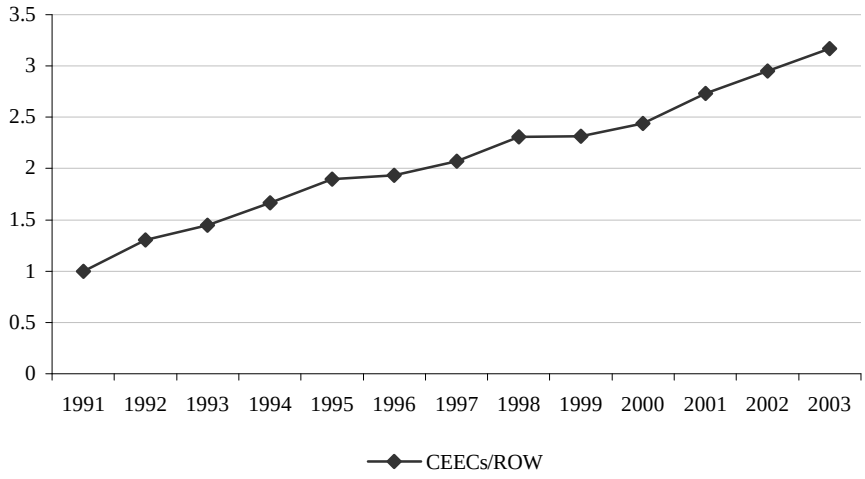
MWB_{ij}			0.03***	0.03***
			(0.00)	(0.00)
$MWCL_{ij}$			1.63***	1.41***
			(0.08)	(0.08)
$MWDEP_{ij}$			-1.13	-1.87
			(1.26)	(1.26)
$MWFTA_{ijt}$	-0.37***	-0.33***	-0.37***	-0.33***
	(0.08)	(0.08)	(0.05)	(0.05)
HC1			0.60***	0.60***
			(0.01)	(0.01)
HC2			-1.87***	-1.86***
			(0.05)	(0.05)
HC3	-0.08**	-0.02	-0.08*	-0.02
	(0.03)	(0.05)	(0.04)	(0.06)
Observations	32245	32245	32245	32245
R-squared	0.91	0.91	0.91	0.91

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: Own calculations.

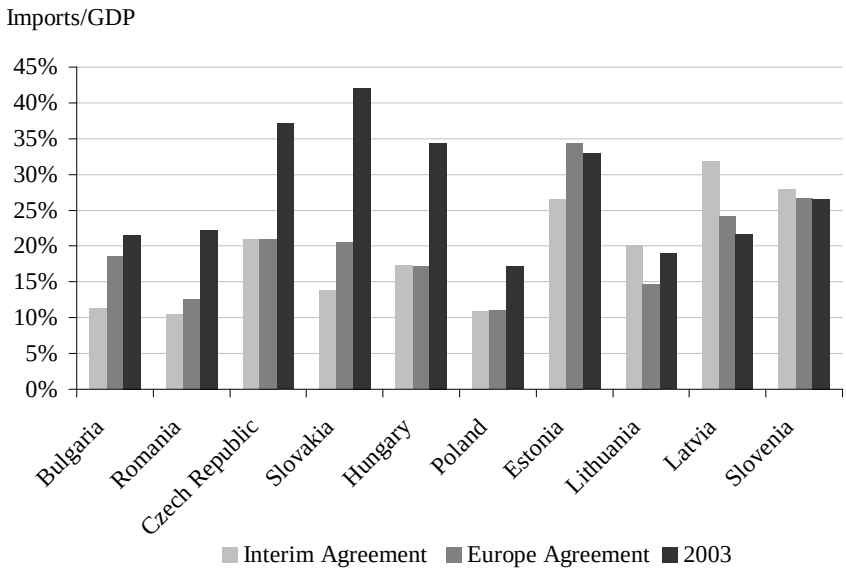
Set of figures and tables

Figure 1: Relative changes in EU imports



Source: Own calculations, data from OECD (2006).

Figure 2: EU integration in the years of the entry into force of the Interim and the Europe Agreements



Source: Own calculations, data from OECD (2006) and UN (2006).

Table 1: Estimation results

	FE		RE		FEVD	
	w/o MWR	with MWR	w/o MWR	with MWR	w/o MWR	with MWR
$\ln Y_{it}$	0.25**	0.46***	1.02***	0.99***	0.25***	0.46***
$\ln Y_{jt}$	0.67***	0.71***	1.14***	1.14***	0.67***	0.71***
$\ln re_{ijt}$	-0.28***	-0.38***	-0.08***	-0.06***	-0.28***	-0.38***
$\ln D_{ij}$			-0.86***	-1.86***	-1.34***	-2.21***
B_{ij}			0.00	-0.00**	0.00***	-0.00***
LL_i			-0.43***	-0.56***	-1.04***	-0.74***
LL_j			-0.59***	-0.57***	-1.44***	-1.47***
DEP_{ij}			0.74	1.68***	0.96***	1.22***
CL_{ij}			1.39***	0.77***	1.07***	0.96***
EU_i	0.05	0.22***	0.40***	0.14**	0.05**	0.22***
FTA_{irobut}	0.45***	0.60***	0.25***	0.20***	0.45***	0.60***
FTA_{ihupot}	0.27**	0.35***	0.26***	0.23***	0.27***	0.35***
FTA_{iczslt}	0.34***	0.44***	0.13*	0.08	0.34***	0.44***
FTA_{isvt}	0.04	0.14**	0.04	-0.03	0.04	0.14***
$FTA_{ibalticst}$	0.49***	0.62***	0.55***	0.50***	0.49***	0.62***
FTA_{it} (Ro, Bu)	0.09	0.10*	0.02	0.02	0.09	0.10
FTA_{it} (Hu, Po)	-0.06	-0.09	-0.01	-0.01	-0.06	-0.09
FTA_{it} (Cz, Sl)	-0.19***	-0.19***	-0.30***	-0.31***	-0.19**	-0.19***
FTA_{it} (Sv)	-0.03	-0.08***	-0.07***	-0.07***	-0.03	-0.08***
FTA_{it} (Baltics)	0.14***	0.14***	0.12***	0.12***	0.14**	0.14**
$avre_{ijt}$		0.91***		-0.20***		0.91***
MWD_{ij}				1.21***		1.30***
MWB_{ij}				0.00***		0.03***
$MWCL_{ij}$				2.06***		1.88***
$MWDEP_{ij}$				-11.91***		-0.39
$MWFTA_{ijt}$		-0.31***		0.21***		-0.31***
HC1			0.49***	0.47***	0.65***	0.60***
HC2			-1.89***	-1.59***	-1.91***	-1.91***
HC3	0.15	0.15	0.15	0.15	0.15	0.15
Observations	32245	32245	32245	32245	32245	32245
R-squared	0.91	0.91	0.71	0.72	0.91	0.91

* significant at 10%; ** significant at 5%; *** significant at 1%

Source: Own calculations.

Table 2: Trade creation elasticities in previous studies

	TC elasticity	Estimation technique
Adam, Kosma and McHugh (2003)	32%	Panel two-step FE
De Benedictis, de Santis and Vicarelli (2005)	11%	Panel two-step GMM
Martin and Turrion (2001)	129%	Panel FE
Paas (2003)	-70%	Cross-section
Lasser and Schrader (2002)*	266%	Cross-section

* Baltic states' imports from Belgium, Germany and the Netherlands

Source: Own illustration.

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