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 the Europe Agreements (EAs). 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 EAs have substantially increased intra-group trade, in some cases at the expense of the Rest of the World (ROW).

JEL classification: F15, C23

Keywords: Europe Agreements; Gravity equation; Trade creation; Trade Diversion

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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 first formal instruments of integration were bilateral free trade agreements signed between the EU15 and each CEEC, which became known as the Europe Agreements (EAs).[2] 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 the EAs. 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 Regional Trade Agreements (RTAs) 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 RTAs 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

[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.
[2] Details are provided in Table A1 in the Appendix.

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 EAs on trade creation and trade diversion. Employing panel data estimation techniques, we find that the EAs with Bulgaria and Romania have boosted EU imports from these two countries by 28% while extra-group trade has been reduced by 11%.

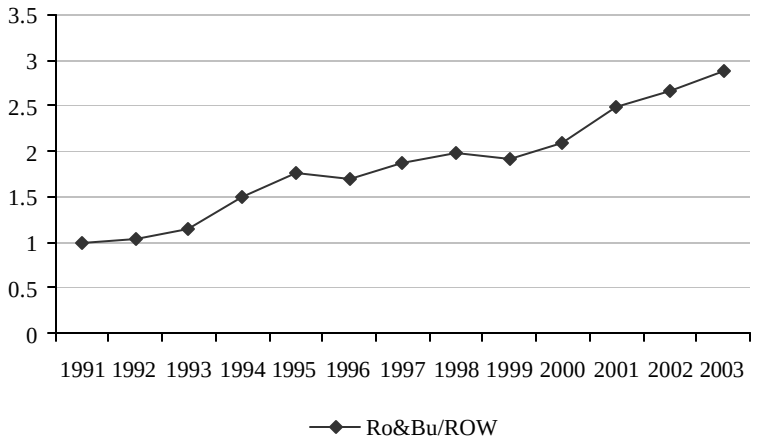
In section 2, we present some stylised facts, which emphasise the need for investigating the trade effects of the EAs with Romania and Bulgaria. Section 3 briefly lays out the concept of trade creation and trade diversion. Section 4 expounds the theoretical model, which builds the basis for the estimated 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

A simple calculation helps to depict the relative change in the aggregate imports of EU15 countries from Romania and Bulgaria and from the Rest of the World (ROW) during the EU integration process of the candidate countries. To render the size of the two geographical regions comparable, the respective 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 Romania and Bulgaria (M_{RB}) and from ROW (M_{ROW}) since 1991 has been calculated as follows:

$$\frac{M_{RBt} / M_{RB91}}{M_{ROWt} / M_{ROW91}} \qquad (1)$$

Figure 1: Relative changes in EU imports



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

Looking at figure 1 it can be readily seen that in 2003 the growth rate of EU imports from the two candidates is three times higher than the growth rate of imports originating from the ROW. Crucial are especially the years around the signature (1993) and the entry into force (1995) of the agreements. It has to be noted that although the signature appears to have had a significant impact on EU imports, one cannot infer any additional boost in 1995.

These stylised facts match our *a priori* expectations surprisingly well. Indeed, during the time trade liberalisation guided by the EAs deepened, EU15 countries' imports from Romania and Bulgaria increased substantially relative to the imports originating in the ROW. However, a detailed econometric analysis of the import flows is necessary to separate the 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

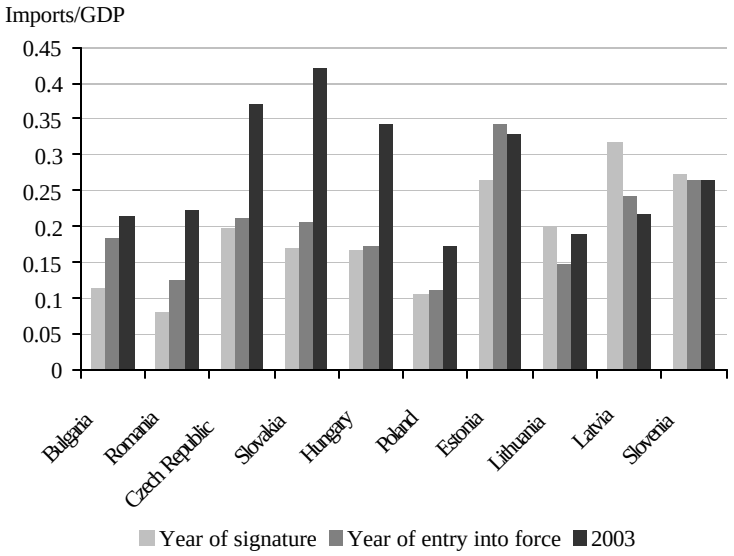
Theoretical insights in allocation effects of RTAs were first given by Viner (1950) and Byé (1950) arguing that a fractional reduction of trade barriers leads only to a shift, but not to an elimination of the discrimination of different sources of supply. Viner named the resulting effects trade-creation 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 RTA 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 RTA have been subject to much controversy. One of the few surviving criteria is the natural trading partner hypothesis, stating that an RTA 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). A quick look at the EU imports over GDP ratios for the CEECs suggests that trade creation should dominate for the EAs with those

countries that were at the time of the implementation of the agreement already well integrated into the EU (figure 2). Thus, one should expect the EAs with Slovenia, the Baltic countries and Slovakia and the Czech Republic to be less harmful to the ROW than the EAs with Hungary and Poland and with Romania and Bulgaria.

Figure 2: EU integration in the years of signature and entry into force of the EAs



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

On the other hand, one could argue that countries that were less integrated before the EAs have benefited the most from signing them. Figure 2 reveals the biggest growth of imports over GDP ratios for those countries that signed the EAs 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 EAs some years later (compare table A.1). Again, whether these gains can be attributed to the EAs 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

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

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. s 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

$$M_{ij} = N_j Y_i (t_{ij} re_{ij})^{1-s} \tag{4}$$

with $re_{ij} = \frac{e_{ij} P_j}{P_i}$ 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. 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:

[3] Usual estimates of s 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).
[5] Annex A.2 describes the case for a restricted country sample.

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

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

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

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

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]

$$t_{ij} = (D_{ij})^{d_1} [e^{d_2 LL_i + d_3 LL_j + d_4 B_{ij} + d_5 CL_{ij} + d_6 DEP_{ij} + d_7 EA_{ij} + d_8 EA_i}] \tag{8}$$

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

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 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]

To separate the ex-post effects of the EAs with Romania and Bulgaria from those signed with the other CEECs, a set of stepwise dummy variables has to be included into the theoretically derived gravity equation.

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

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

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

[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.

to capture the impact of the EAs on trade of group members with non-members.[8]

Following this specification, we will be able to examine whether the EAs 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).

While the theoretical equation (7) is remarkably close to an empirically testable gravity equation, its estimation is problematic due to the non-linear functional form of the multilateral trade resistance terms. Several authors therefore proposed different remoteness measures as proxies that usually weight the average distance of a country i from the ROW with the share of country j's output in world output. Since there is no theoretical justification to do so, we abstract from the inclusion of any GDP weights in constructing the multilateral resistance variable and define

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

The first two terms on the RHS represent the multilateral trade resistances of the respective trading partners, and thus, boost bilateral trade between them. The last term, however, resembles the world resistance to trade and as such, lowers the trade volume between every pair of countries.[9]

[8] The countries are grouped by dates of signature and entry into force of the EAs. See table A.1 for details.
[9] See Baier and Bergstrand (2006) for the theoretical derivation of multilateral and world resistance terms.

Taking into account the modifications of the theoretically derived equation discussed above, the log-linearised[10] reduced-form gravity equation boils down to

$$\ln M_{ijt} = a + b_1 \ln Y_{it} + b_2 \ln Y_{jt} + b_3 \ln re_{ijt} + b_4 (\ln) \sum_{d=1}^{T} t_{ij(t)} + b_5 \ln \frac{1}{C} \sum_{i=1}^{C} re_{ijt} + b_6 \ln \sum_{i=1}^{C} t_{ij} + e_{ijt} \quad (10)$$

where $\frac{1}{Y_W}$ is absorbed into the constant term a [11], common to all years and all country pairs, e_{ijt} is the i.i.d. error term and the expected coefficient signs are

$$b_1 > 0, b_2 > 0, b_3 < 0, b_4 = \sum_{d=1}^{T} (1-s) d_1 < 0, (1-s) d_2 < 0, (1-s) d_3 < 0, (1-s) d_4 > 0, (1-s) d_5 > 0, (1-s) d_6 > 0,$$
$$(1-s) d_7 > 0, (1-s) d_8 < 0, b_5 > 0, b_6 > 0.$$

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, rejected null-hypothesis of no correlation. The relevant fixed effects (FE) regression thus gives

[10] The brackets after b_4 indicate that the dummy variables included in t_{ij} will not be log-linearised whereas distance of course, will.

[11] 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.

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). [12]

As for the data, we consider EU15 countries' imports from a worldwide sample of 204 countries over the period 1991-2003, forming an unbalanced panel data set with roughly 32194 observations. The data sources and definitions of all variables entering the tested gravity equation are listed in table A.3 in the appendix.

6. Results

The results of the regressions with and without the multilateral resistance terms are presented in table 1. Except for two EA dummies, all parameter estimates of the relevant fixed effects model show the expected sign and are highly significant. This also holds true for the multilateral resistance terms. Imports from a certain trading partner increase nearly proportionally to a depreciation of the importing country's currency against all other

[12] The empirical estimation also contains an EU dummy, controlling for the accession of Austria, Sweden and Finland in 1995 only.

currencies. A rise in country i's geographical distance (remoteness) from all other trading partners pushes it to trade 44% more with country j. As for the traditional gravity variables, the positive parameter estimates for GDP indicate that the import value increases with the importer's GDP raising 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.

Moving to the fixed effects vector decomposition regression, we find that our distance coefficient of -1.33 lies within the usual range.[13] With the inclusion of the multilateral terms, the elasticity of the import volume with respect to the GDP measures (and with respect to distance as well) increases, endowing them with an additional justification. 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 3.7%. Being landlocked reduces the imports by 51% for country i and 78% for country j not having access to the sea. Being legally dependant on the importing country more than doubles and sharing a common language more than triples the propensity to trade.

[13] The elasticity of transport costs to distance is usually associated with an estimate in the range of $0.2 < d_1 < 0.4$ (Limao / Venables 2001). Combined with an average estimate of $s = 7$, a distance coefficient between -1.2 and -2.4 would be suggested.

Table 1: Estimation results

	FE		RE		FEVD	
	w/o MR	with MR	w/o MR	with MR	w/o MR	with MR
$\ln Y_{it}$	0.20**	0.44***	1.02***	0.96***	0.20***	0.44***
$\ln Y_{jt}$	0.67***	0.71***	1.14***	1.15***	0.67***	0.71***
$\ln re_{ijt}$	-0.28***	-0.37***	-0.08***	-0.06***	-0.28***	-0.37***
$\ln D_{ij}$			-0.86***	-1.70***	-1.33***	-1.77***
B_{ij}			0.00	-0.00	0.00***	0.00***
LL_i			-0.47***	-0.65***	-1.11***	-0.71***
LL_j			-0.58***	-0.52***	-1.43***	-1.52***
DEP_{ij}			0.74*	0.75*	0.99***	1.12***
CL_{ij}			1.39***	1.19***	1.07***	1.46***
EU_i	0.14**	0.13**	0.43***	0.49***	0.14***	0.13***
EA_{irobut}	0.25***	0.25***	0.12***	0.14***	0.25***	0.25***
EA_{ihupot}	0.10	0.07	0.12**	0.15**	0.10**	0.07
EA_{iczslt}	0.71***	0.76***	0.50***	0.51***	0.71***	0.76***
EA_{isvt}	0.10**	0.03	0.10*	0.13***	0.10***	0.03
$EA_{ibaltics}$	0.40***	0.37***	0.44***	0.46***	0.40***	0.37***
EA_{it} (Ro, Bu)	-0.11***	-0.12***	-0.11***	-0.11***	-0.11**	-0.12***
EA_{it} (Hu, Po)	-0.20***	-0.23***	-0.13***	-0.13***	-0.20***	-0.23***
EA_{it} (Cz, Sl)	0.21***	0.26***	0.08***	0.08**	0.21***	0.26***
EA_{it} (Sv)	0.02	-0.04*	-0.03**	-0.02	0.02	-0.04*
EA_{it} (Baltics)	0.05**	0.02	0.01	0.01	0.05	0.02
$\frac{1}{C}\sum_{i=1}^{C} re_{ijt}$		1.01***		-0.26***		1.01***
$\sum_{i=1}^{C} t_{ij}$				0.99***		0.44***
HC1			0.49***	0.49***	0.66***	0.64***
HC2			-1.89***	-1.80***	-1.94***	-2.15***
HC3	0.11**	0.10**	0.03	0.03	0.11**	0.10*
Observations	32194	32194	32194	32194	32194	32194
R-squared	0.91	0.91	0.70	0.71	0.91	0.91

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

Source: Own calculations.

The results for the EAs are very robust to the inclusion of the multilateral trade resistance variables. The regressions display the meaningfulness of the EAs for the CEECs' integration

into the EU. Three 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 EAs signed with the Czech Republic and Slovakia (114% above the normal level). The arrangement also features the highest extra-bloc openness. The EAs with Hungary and Poland exhibit the worst performance: First, the arrangements did not significantly create new trade between the EU15 countries and Hungary and Poland. Second, the import diversion brought about by their implementation is with 21% the highest of all EAs. The result for the Romanian and Bulgarian agreement is somewhat mixed. While it led to 28% more imports than what would have been predicted by the baseline-scenario gravity model, it has reduced imports from third countries by 11%.

The trade creation and trade diversion elasticities seem to roughly confirm the natural trading partner hypothesis introduced in section 3 The implementation of the EAs with previously little integrated countries like Hungary and Poland as well as like Romania and Bulgaria was not without costs for third countries. On the contrary, the Baltic countries and Slovenia (and to a lesser extent the Czech Republic and Slovakia) were relatively well integrated into the EU by the time of the entry into force of the agreements (compare figure 2). The estimation results do not show any trade diversion effects for the EAs signed with these countries. The intuition that less integrated countries profited most themselves from the EAs seems to hold true for Romania, Bulgaria, the Czech Republic and Slovakia but not for Hungary and Poland or the Baltic countries. The imports over GDP ratios rather support the natural trading partner hypothesis, although the data is not very clear cut here either.

Table A.4 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. Taking the mean import creation generated by all individual EAs argues

for an import elasticity of 39% which is very close to the joint EA estimate of 40%. The same holds for the coefficients of the other gravity variables.

Evaluating our results in the context of other East-West trade studies, we find that our EA coefficient of 0.34 (thus, indicating a trade creation elasticity of 40%) lies just amidst the wide range of previous parameter estimates (table 2).

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.

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 also include only 5 years from 1996 to 2000 into their regression and are, thus, not able to capture the entire signature effect of the 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, is time varying, however, the results are likely to be 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 showed the expected coefficient signs in the empirical estimation.

As for the trade effects of the EAs, our result for the aggregate EA dummy is well in line with previous estimates by Adam, Kosma and McHugh (2003). Looking at the agreements on an individual country basis gives additional important insights: The EAs 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 EA created new trade within the trade bloc, the increase has in the case of Romania and Bulgaria (as well as Hungary and Poland) 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.

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Appendix

Table A.1: Dates of signature and entry into force of the EAs

Dummy	Country	Signature	Entry into force
EA_{hupo}	Hungary	December 1991	February 1994
	Poland	December 1991	February 1994
EA_{czsl}	Czech Republic	October 1993	February 1995
	Slovakia	October 1993	February 1995
EA_{robu}	Romania	February 1993	February 1995
	Bulgaria	March 1993	February 1995
$EA_{baltics}$	Estonia	June 1995	February 1998
	Lithuania	June 1995	February 1998
	Latvia	June 1995	February 1998
EA_{sv}	Slovenia	June 1996	February 1999

Source: Böcker (2002).

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

$$p_{rj} = t_{rj} P_j e_{rj} \qquad \text{(A.1)}$$

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

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

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

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

For our empirical estimation this means that $\frac{1}{\frac{\sum_{r=1}^{R}(re_{rj}t_{rj})^{1-s}}{\sum_{i=1}^{I}(re_{ij}t_{ij})^{1-s}}Y_r + \sum_{i=1}^{I}Y_i}$ 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: 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 [14]
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
EA_{ijt}	Dummy = 1 for contracting parties for the years following the signature and = 2 for the years following the implementation of the EAs	ZERP
EA_{it}	Dummy = 1 for non-contracting parties for the years following the signature and = 2 for the years following the implementation of the EAs	ZERP

[14] 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.4: Robustness checks

	FE		FEVD	
	(1)	(2)	(1)	(2)
$\ln Y_{it}$	0.47***	0.41***	0.47***	0.41***
	(0.11)	(0.12)	(0.01)	(0.01)
$\ln Y_{jt}$	0.71***	0.70***	0.71***	0.70***
	(0.07)	(0.07)	(0.00)	(0.00)
$\ln re_{ijt}$	-0.37***	-0.35***	-0.37***	-0.35***
	(0.07)	(0.07)	(0.00)	(0.00)
$\ln D_{ij}$			-1.73***	-1.74***
			(0.03)	(0.03)
B_{ij}			0.00***	0.00***
			(0.00)	(0.00)
LL_i			-0.69***	-0.80***
			(0.03)	(0.03)
LL_j			-1.50***	-1.51***
			(0.02)	(0.02)
DEP_{ij}			1.07***	1.04***
			(0.12)	(0.12)
CL_{ij}			1.40***	1.30***
			(0.03)	(0.03)
EU_i	0.06	0.08*	0.06**	0.08***
	(0.04)	(0.05)	(0.02)	(0.02)
$EA_{iceecst}$	0.34***		0.34***	
	(0.04)		(0.02)	
EA_{it} (CEECs)[15]	0.01		0.01	
	(0.02)		(0.01)	
$EA_{ivisegradt}$		0.33***		0.33***
		(0.08)		(0.03)
$EA_{ibalkant}$		0.28***		0.28***
		(0.05)		(0.03)
$EA_{ibaltics}$		0.40***		0.40***
		(0.07)		(0.03)
EA_{it} (Visegrad)		-0.07***		-0.07***
		(0.03)		(0.02)
EA_{it} (Balkan)		0.02		0.02
		(0.02)		(0.03)
EA_{it} (Baltics)		0.05**		0.05**
		(0.02)		(0.02)
$\frac{1}{C}\sum_{i=1}^{C} re_{ijt}$	0.85***	0.63***	0.85***	0.63***
	(0.19)	(0.20)	(0.02)	(0.02)

[15] Since the dates of signature and entry into force differ for the countries in the aggregate, we assigned a value of 1 to the dummies measuring the extra-bloc openness from 1994 (signature) and a value of 2 from 1996 (entry into force) for the CEECs and Balkan aggregate. For the Visegrad aggregate we took 1993 as the "mean" year of signature and 1994 as the "mean" year of entry into force of the EA.

$\sum_{i=1}^{C} t_{ij}$			0.39***	0.41***
			(0.04)	(0.04)
HC1			0.62***	0.63***
			(0.01)	(0.01)
HC2			-2.07***	-2.03***
			(0.05)	(0.05)
HC3	-0.07**	-0.03	-0.07*	-0.03
	(0.03)	(0.03)	(0.04)	(0.05)
Observations	32194	32194	32194	32194
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.