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PATTERNS OF TRANSITION AND NEW AGENDA FOR COMPARATIVE ECONOMICS

Theme: patterns of transition (transition and EU integration)

EU-27: IS TRADE INTEGRATION COMPLETED?

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Abstract

During some thirty years, European construction occurred in a Europe divided into two sides: on the one hand, the "Western Europe" with capitalism, and on the other hand, the "Eastern Europe" with socialism. Trade between these two sides was reduced to the minimum. The breakdown of socialism in Eastern Europe at the end of the 80s led to immediate negotiations between these two sides, and ended in with the European Union (EU) enlargement to 8 Central and Eastern European Countries (CEECs: Estonia, Hungary, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Slovenia) in May 2004, followed by the membership of two new countries (Bulgaria and Romania) in January 2007. The strong reorientation of trade from East to West, together with a rapid growth of trade between the EU and the CEECs, led to a strong integration between Eastern and Western Europe. It then seems relevant to ask whether this integration process is completed, at least for some countries.

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This paper uses a gravity model to assess by an out-sample approach the “theoretical” trade, or “potential trade” between the EU-15 and the CEECs. The gravity equation is estimated on a panel data of EU-15 countries over the period 1990-2005, using the Hausman-Taylor (1981) instrumental variable method.

Main results are: i) some EU countries have already reached their trade potential with CEECs in 2005 (Germany, Spain and France); ii) as far as Eastern European countries are concerned, some of them (mainly Central European Countries) should expect a limited increase of their exports to the EU, whereas iii) some others (at the periphery) still have a great trade potential with the EU.

Keywords: Gravity models, Trade potential, Central and Eastern Europe

Introduction

During some thirty years, European construction occurred in a Europe divided into two sides: on the one hand, the "Western Europe" with capitalism, and on the other hand, the "Eastern Europe" with socialism. Trade between these two sides was reduced to the minimum. The breakdown of socialism in Eastern Europe at the end of the 80s led to immediate negotiations between these two sides, and ended in with the European Union (EU) enlargement to 8 Central and Eastern European Countries (CEECs: Estonia, Hungary, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Slovenia) in May 2004, followed by the membership of two new countries (Bulgaria and Romania) in January 2007. The strong reorientation of trade from East to West, together with a rapid growth of trade between the EU and the CEECs, which will be pointed out in the first part of this article, led to a strong integration between Eastern and Western Europe. It then seems relevant to ask whether this integration process is completed, at least for some countries.

Many studies have already tried to assess potential trade between the EU and the CEECs, from the beginning of their transition. A first wave of estimations (Wang and Winters, 1991, Collins and Rodrik, 1991, Havrylyshyn and Pritchett, 1991, Baldwin, 1993) led to the conclusion that there was a strong trade potential between Eastern and Western Europe, but those studies were based on data prior to the beginning of the transition. Subsequently, Gros and Gonciarz (1995), Schumacher (1995-1996), and Festoc (1997) took the transition period as reference, and their results showed the first signs of trade potential exhaustion between those partners.

At the same time, econometric methodology has significantly improved for the past ten years. On the one hand, it is now generally admitted that panel data have to be used for the estimations. On the other hand, as explain by Peridy (2006), Carrere (2006) or Serlenga and Shin (2004), the Hausman Taylor instrumental variables method should be used to estimate gravity equations, in order to take into account time invariant variables, such as geographic distance between partners.

This is why we propose in this article a new estimation of trade potential between Eastern and Western Europe, taking into account recent econometric developments, in order to conclude on the degree of integration between the EU-15 and the CEECs. We hence use a gravity model, as described in the second part of this article, to assess the "theoretical" trade, or "potential trade", by an out-sample approach, between the EU-15 and the CEECs. The gravity equation is estimated on a panel data of EU-15 countries over the period 1990-2005, using the

Hausman-Taylor (1981) instrumental variable method. Results, presented in the third part, indicate that i) some EU countries have already reached their trade potential with CEECs in 2005 (Germany, Spain and France); ii) as far as Eastern European countries are concerned, some of them (mainly Central European Countries) should expect a limited increase of their exports to the EU, whereas iii) some others (at the periphery) still have a great trade potential with the EU.

1. Evolution of East – West trade relations

a. From the 50s to the 80s : strained relations

From the Second World War to the beginning of the 80s, relations between Eastern Europe and the European Union, or even between Eastern Europe and the rest of the world, were very limited. The communist ideology imposed a particular sight of the world: priority was given to trade between socialist countries, and in particular between members of the Council for Mutual Economic Assistance (CMEA, also called Comecon)[3]. Then trade was directed to the third world, and among them countries engaged on a socialist way of development. Finally, trade took place with capitalist countries. Progressively, Eastern European countries cut themselves off the rest of the world and concentrated arbitrarily their trade on the soviet market.

More precisely, relations between Eastern Europe and the European Union until the end of the 80s can be split up into three sub periods. Until 1964, these relations amounted to confrontations and deep ideological discrepancies, and thus trade was very limited. Then, Khroutchev showed its intention to negotiate: between 1965 and 1975, one can observe an acceleration of trade between East and West. However, as early as 1980, trade is one more time reduced, for several reasons, mainly: enlargement of the EU to Greece, and later of Spain and Portugal, which led to trade diversion, in the Eastern European countries there was a will to reduce the external debt, and also eastern European products did not fit world demand.

b. The 90s and the bringing together

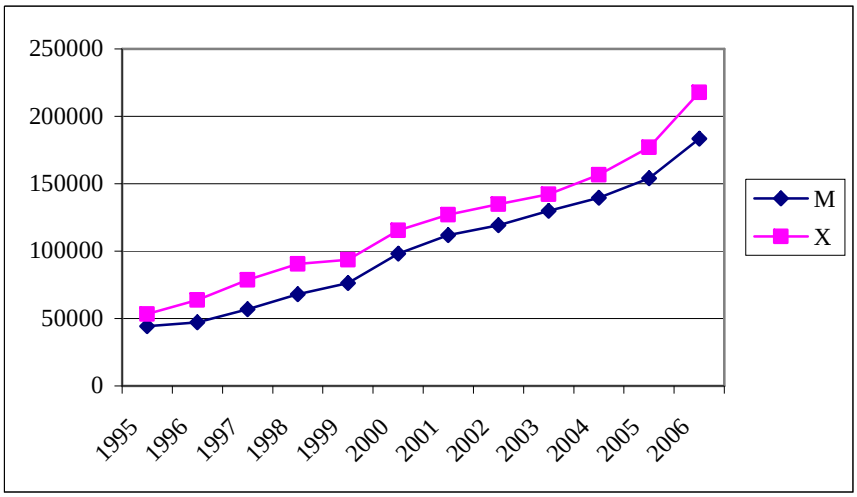
Since the fall of the Berlin wall in November 1989, changes occurred very rapidly: the German reunification, the collapse of the USSR, the Europe Agreements and then the

[3] Created in January 1949 by Bulgaria, Hungary, Poland, Romania, Czechoslovakia and the USSR and dissolved in June 1991.

enlargement of the European Union to 8 Central and Eastern European Countries (CEECs: Estonia, Hungary, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Slovenia) in May 2004, followed by the membership of two new countries (Bulgaria and Romania) in January 2007.

From the beginning of the transition towards market economy, Eastern European countries have tried to reinsert in the world economy, by breaking up the CMEA and by submitting very early application to join the EU. The Europe Agreements signed between each country and the EU at the beginning of the 90s, were a first important step in the bringing together of the two sides of Europe, as they liberalized western market access for eastern European products. Immediately after, trade between the CEECs and the European Union increased very rapidly, as shown by figure 1 below.

Figure 1: evolution of trade between EU-15 and the 10 CEECs,
Million euros, 1995 to 2006



Source: Eurostat

M: imports of EU-15 from the 10 CEECs

X: exports of EU-15 to the 10 CEECs

Whereas extra-EU trade has been multiplied by less than 2.5 between 1995 and 2006, trade between the CEECs and the EU has been much more dynamic, since it has been multiplied by more than 4 over the same period.

c. The state of relations today

In 2005, about 60% of the CEECs exports were directed to western markets, and 57% of their imports came from the EU-15, which confirms the strong trade integration between these two sides, started in the 90s. It is however worth underlining that, if the share of the EU-15 in CEECs trade is very high, it has started to reduce for the past ten years (table 1), which raises a question already asked in Festoc (1997) : has trade reorientation of the CEECs towards the EU-15 gone too far at the beginning of the 90s ?

Table 1: share of the EU-15 in CEECs exports, 1995 and 2005, in %

	Slovenia	Estonia	Hungary	Latvia	Lithuania	Czech Rep.	Slovakia	Poland	Romania	Bulgaria
1995	70.4	68.9	70.4	70.7	58.3	61.5	43.8	72.5	58.5	64.0
2005	55.4	58.8	63.8	53.2	40.4	63.5	55.9	62.0	58.1	50.0

Source: CHELEM

Trade relations between Eastern and Western Europe have always been asymmetric, and it is still the case today: EU is by far the first trading partner of the CEECs, whereas these ten countries still account for less than 6% of the western European exports in 2005. At last, one can also point out that trade with the EU is concentrated on a small number of countries: Poland, the Czech Republic and Hungary, which represent 67% of total trade between the CEECs and the EU. On the western side, Germany has rapidly substituted to Russia as first trading partner of the CEECs.

d. Is trade integration completed?

As previously argued, the share of the EU-15 in the CEECs trade has declined. Hence, one can raise the following question: is trade integration between Eastern and Western Europe at the beginning of the years 2000 completed? After a strong trade reorientation towards the European Union, Eastern European countries seem to start on a second adjustment stage: a new trade reorientation, but towards other partners, which had been neglected in the 90s. In particular, one can observe a strong growth of trade between eastern European countries.

To deal with this question, we find it useful to assess the "theoretical" trade, or "potential" trade, between the EU-15 and the CEECs, and to compare it with the observed trade flows: this method is based on gravity models, frequently used to study trade patterns.

2. The model and its estimation

a. The gravity equation

To estimate potential trade flows, we use a gravity equation. In its simplest form, this equation expresses bilateral trade flows across pairs of countries and has, as explanatory variables, the income and population of both trading partners and the distance of their economic centres. Additional explanatory variables are included depending on the assumptions that are made concerning market structures. Gravity equations perform well in analyzing international trade flows, and their theoretical foundations are due to Bergstrand (1985 and 1989), Baier and Bergstrand (2001), Evenett and Keller (2002).

The model that we use combines the new trade theory (initiated by Helpman and Krugman, 1985) and recent theoretical developments related to trade costs, as described in Anderson and van Wincoop (2003, 2004).

The standard gravity model is derived from a framework where firms in monopolistic competition (product differentiation at the firm level) maximize profits and consumers maximize utility with CES preferences[4]. Equilibrium trade flows can be described by the following equation:

$$X_{ij} = \frac{Y_i Y_j}{Y_w}\left(\frac{T_{ij}}{P_i P_j}\right)^{1-\sigma}, \text{ with: } \begin{cases} P_j^{1-\sigma} = \sum_i P_i^{\sigma-1}\theta_i T_{ij}^{1-\sigma} \\ P_i^{1-\sigma} = \sum_j P_j^{\sigma-1}\theta_j T_{ij}^{1-\sigma} \end{cases}$$

X_{ij} : Exports of country i to country j

$Y_{i(j)}$: GDP of country i (j)

Y_W : World GDP

T_{ij} : Trade costs between i and j

$P_{i(j)}$: Aggregated implicit equilibrium prices in country i (j)

σ : Consumer elasticity of substitution

$\theta_{i(j)}$: GDP shares of i (j) in the World GDP

[4] See Anderson and Van Wincoop (2003), Baier and Bergstrand (2002), Brun, Carrere, Guillaumont and de Melo (2002) for a complete description of the model.

It is necessary to specify correctly the trade costs function between i and j. Classical variables used in most articles to define the barrier-to-trade function T_{ij} are the following: the geographical distance between the two partners (D_{ij}), the existence of a common border (A_{ij}) and of a common language (L_{ij}). Most authors add also a variable which indicates if the country is landlocked ($E_{i(j)}$); others, like Carrere (2006), introduce indicators of infrastructure levels ($INF_{i(j)}$)[5]. The barrier-to-trade function between countries i and j can be expressed as:

$$T_{ij} = D_{ij}^{\delta_1} INF_i^{\delta_2} INF_j^{\delta_3} L_{ij}^{\delta_4} E_i^{\delta_5} E_j^{\delta_6} A_{ij}^{\delta_7}$$

Expected signs are : $\delta_1>0$, $\delta_2<0$, $\delta_3<0$, $\delta_4<0$, $\delta_5<0$, $\delta_6<0$, $\delta_7<0$.

In order to estimate implicit prices, which are unobservable, some authors (Peridy, 2006, Rose and Van Wincoop, 2001, Feenstra, 2003) propose to introduce country effects. A temporal dimension is most often introduced.

Finally, the following gravity equation is estimated for the EU-15 countries, over the time period 1990-2005:

$$\begin{aligned}\ln X_{ijt} = {} & \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \beta_4 A_{ij} + \beta_5 E_i + \beta_6 E_j + \beta_7 L_{ij} + \beta_8 UE_{it} + \beta_9 UE_{jt} \\ & + \beta_{10} EURO_{it} + \beta_{11} EURO_{jt} + \beta_{12} \ln INF1_{it} + \beta_{13} \ln INF1_{jt} + \beta_{14} \ln INF3_{it} + \beta_{15} \ln INF3_{jt} \\ & + \beta_{16} \ln POP_{it} + \beta_{17} \ln POP_{jt} + \eta_{ij} + \omega_t + \upsilon_{ijt}\end{aligned}$$

Where $UE_{i(j)t}$ and $EURO_{i(j)t}$ stand for the belonging of country $i(j)$ respectively to the European Union and to the Euro zone in year t. The country size is introduced via the population variable $POP_{i(j)t}$. Two levels of infrastructures, $INF1_{i(j)t}$ and $INF3_{i(j)t}$, are considered. A detailed description of the variables can be found in Appendix 1.

[5] In Carrere (2006), the level of infrastructure is evaluated as the average of the density of roads, railways and the number of telephone lines per capita.

The error term has three components. The bilateral term η_{ij} is specific to each pairs of countries[6] and is supposed to be constant over time, ω_t captures any temporal effect and υ_{ijt} is the classical error term, supposed to be normally distributed.
Heterogeneity is introduced in the gravity equation via the η_{ij} term. Because of cultural, political, historical factors, etc, a specific country will export at different levels to two partners, even if these two partners have exactly the same characteristics (GDP, POP, Distance, etc). Then omitting η_{ij} in the model may introduce a heterogeneity bias.

b. Econometric method

As noted previously, estimation on cross section data, largely used in the past, did not allow to take into account the unobservable heterogeneity between country pairs. This heterogeneity is introduced in panel data models. Our equation is then estimated for the EU-15 countries, over the time period 1990-2005.

Potential trade levels are evaluated by an out-sample procedure. First the gravity model is estimated on UE-15 data. Then the estimated values of the parameters are used to evaluate trade relations between countries on or/and out of the sample. The difference between the observed and predicted trade flows is interpreted as unrealized trade potential.

Potential trade can also be estimated by an *in-sample* procedure. In this case, the gravity equation is estimated on all the countries, the difference between realized trade and potential trade is defined by the residuals of this equation. The drawback of this approach is that any misspecification of the model is reflected in the error term, and then in the potential trade. Moreover the choice of the *out-sample* procedure is reinforced by the fact that trade relations between UE-15 countries can be considered as a steady-state to which CEEC countries should theoretically converge.

The two classical estimation techniques for panel data models are the Within method and the Random method. In our case these two methods differ on the hypothesis made on the

[6] It can be shown that introducing an exporter effect and an importer effect, in addition to the bilateral effect, is a special case of the model with bilateral effects only (Egger and Pfaffermayr, 2003).

specification of the bilateral effects[7] η_{ij}. In the absence of endogenous explanatory variables, the Random method provides the most efficient estimators. However as bilateral effects can be interpreted as a time invariant propensity to exchange between two countries, a possible correlation of this effect with some regressors, distance for example, is more than likely. Ignoring this will lead to biased estimates. Then the Within estimator, less efficient but unbiased, is preferred[8]. However by construction the inclusion of fixed bilateral effects makes it impossible to estimate the coefficients of time invariant variables in the Within model. The instrumental variable method proposed by Hausman-Taylor (1981) allows to solve these problems[9] : all parameters are identified and estimators are unbiased even if some explanatory variables are endogenous. This estimation procedure is based on the construction of an instrument matrix from the exogeneity conditions assumed on the explanatory variables of the model.

Estimations results are presented in Appendix 2. In a first step, a Within model is estimated. In a second one a Random estimation is performed. An Hausman test performed between the two estimators indicates that the hypothesis that there is no endogenous variables in the model is rejected. The use in a third step of the Hausman-Taylor method (HTIV) is then justified. Another Hausman test between the Within and the HTIV estimators allows to test the validity of the exogeneity conditions (Overidentification test). The non rejection of the null hypothesis indicates that the instruments used to calculate the HTIV estimator can be considered as exogeneous. Endogeneous variables are distance, GDP levels and infrastructure levels.

3. Results

The equation described in section 2 has been estimated over the period 1990-2005 for the 15 old members of the European Union. As previously explained, the method is out sample, which enables us to assess the main determinants of western European countries trade. The "potential" (also called "theoretical") volume of trade between the CEECs and the EU is then

[7] Time effects are supposed to be fixed. These fixed effects allow to control for any « business cycle » effect, or change in prices (fuel, by example).

[8] Presence of endogenous explanatory variables will be checked by an Hausman test.

[9] This method is used by Peridy (2006), Carrere (2006), Serlenga and Shin (2004), Brun and al. (2002), among others.

defined as the volume of trade that would prevail if trade was explained by the same factors determining trade between the EU-15 in the model. It is obtained by taking the coefficients of the variables in the model and plugging in CEECs actual values of the variables.

The ratio of actual to potential trade enables us to assess the trade integration between the CEECs and the EU. High ratio of actual to potential Eastern European exports to the EU indicates high level of trade integration, and implies that the CEECS have managed to compete successfully on the EU markets. These ratios show us to what extent we can anticipate increased trade between the CEECs and their trading partners within the EU: a low (high) ratio means a weak (strong) use of the trade potential, and hence a low (strong) trade integration. The results are given for two years (1995 and 2005) in order to compare the evolution. Results are given in appendix 3 and 4.

a. Export potential of the EU-15 to the CEECs

Table 2: export potential of EU-15 members to the CEECs, in %

Country i	1995	2005
Germany	121.2	198.3
Austria	5.3	7.2
Denmark	7.2	11.9
Spain	32.4	81.4
Finland	1.3	1.7
France	38.3	79.7
Greece	7.2	7.4
Ireland	13.2	16.2
Italy	45.1	65.7
Netherlands	26.1	63.7
Portugal	5.4	17.3
United Kingdom	39.7	54.8
Sweden	8.4	14.2
UEBL	24.1	53.1

Source: authors' calculations

Table 2 above indicates actual to potential trade ratios for exports from the member countries of the EU-15 to the CEECs in 1995 and 2005. We first can observe that trade integration between Germany and the CEECs is the most important as potential level of exports was already reached in 1995, and largely exceeded in 2005. This result has already been observed

in many studies carried on in the 90s. Then, France and Spain have the greatest ratios in 2005, reflecting a strong integration between these partners and the CEECs: it is worth pointing out that these ratios have strongly increased between 1995 and 2005, from less than 40% to about 80%.

Italy, the Netherlands, the United Kingdom and the UEBL achieve more than half of their potential exports towards the CEECs. On the other hand, the most important sources of eastern European trade expansion with the EU-15 have to be found in trade with Finland, Austria and Greece. These results can be explained by geographical reasons: proximity of Baltic countries for Finland, central position for Austria (several common frontiers and weak distance with many CEECs), and proximity of south east Europe for Greece. At last, one can observe from appendix 3 that EU-15 countries are mostly integrated with Central European countries (Hungary, Poland and the Czech Republic).

b. Export potential of the CEECs to the EU-15

As in the previous section, some striking facts can be highlighted. Let's start again with the export potential to the whole region (table 3). Two groups of countries can be observed. On the one hand, some countries were already quite well integrated with the EU-15 in 1995, and this integration has become even more pronounced in 2005: this is the case of Hungary Poland and the Czech Republic, and in a lesser extent Romania. On the other hand, there is still an important export potential for the Baltic countries, Bulgaria, Slovenia and Slovakia.

Table 3: export potential of the CEECs to EU-15 countries, in %

Country i	1995	2005
Bulgaria	17.2	25.7
Estonia	0.8	1.8
Hungary	44.9	89.3
Latvia	7.0	9.0
Lithuania	9.8	15.8
Poland	48.7	75.0
Romania	33.3	57.6
Czech republic	43.9	85.3
Slovakia	4.2	9.9
Slovenia	14.4	13.5

Source: authors' calculations

Appendix 4 also indicates that EU-15 countries that are most integrated with the CEECs, that is Germany, France and Spain, are also those countries with which potential to actual export ratios of the CEECs are the highest. We can hence conclude that trade integration between Germany, France and Spain on the one side, and Poland, Hungary and the Czech Republic on the other side, is a bilateral integration.

c. The leading position of Germany in trade between the EU-15 and the CEECs

As mentioned before, Germany rapidly substituted to Russia as first trading partner of the CEECs, and it is today, and by far, their first trading partner within the EU. We were interested in checking whether this trade concentration on Germany is to be expected in the future: therefore we have calculated the "potential" share of Germany in CEECs imports and exports and then compared this result with the actual share (table 4). Results point out that between 1995 and 2005, the observed share of Germany in east European exports has been reduces, whereas the "theoretical" has increased: the weight of Germany in the CEECs trade seems thus to decrease to converge to its theoretical value.

Table 4: share of Germany in CEECs exports to the EU-15, in %

	Actual share		"Theoretical" share	
	1995	2005	1995	2005
Bulgaria	23.8	21.4	8.5	10.5
Estonia	13.4	8.4	0.9	1.4
Hungary	48.9	47.5	9.4	12.2
Latvia	25.0	13.5	7.2	9.8
Lithuania	30.8	17.9	11.4	14.9
Poland	54.5	41.9	17.2	21.8
Czech republic	63.2	49.6	23.6	29.2
Romania	34.1	25.9	10.9	13.6
Slovakia	54.7	51.9	2.2	2.9
Slovenia	44.9	34.7	11.8	15.1

Source: authors' calculations

4. Conclusion

Integration between Eastern Europe and the European Union is under way, but not completed yet for all countries. On the West side, Germany often exceeds its potential, and its weight in CEECs exports should be reduced. France and Spain are also near to their trade potential with the CEECs in 2005. On the East side, Central European Countries are more integrated in the European economy than the other CEECs.

Appendix 1: sources and definitions of the data

X_{ij}	Exports of country i to country j, m US $ Source: CEPII – Chelem
$Y_{i\,(j)}$	GDP of country i (j), m US $ Source: CEPII – Chelem
D_{ij}	Geographic distance between countries i and j Source: CEPII
A_{ij}	A_{ij} = 1 if the countries i and j share a common border, 0 otherwise
$E_{i\,(j)}$	$E_{i\,(j)}$ = 1 if the country i (j) does not have a direct access to the sea, 0 otherwise
L_{ij}	L_{ij} = 1 if the countries i and j share a common language, 0 otherwise
$UE_{i\,(j)}$	$UE_{i\,(j)}$ = 1 if country i (j) is a member of the EU, 0 otherwise
$EURO_{i\,(j)}$	$EURO_{i\,(j)}$ = 1 if country i (j) is a member of the euro area, 0 otherwise
$INF_{1i\,(j)}$	Density of paved roads in country i (j) Source : Euromonitor
$INF_{2i\,(j)}$	Number of telephone lines per capita in country i (j) Source : Euromonitor
$POP_{i\,(j)}$	Population of country i (j) Source : Euromonitor
$INF_{3i\,(j)}$	= INF_2 / POP

Appendix 2: estimate results of the gravity equation

	Within	***Random***	***HTIV***
GDP *(lnY_i)*	0.242 (5.77)***	0.372 (8.90)***	0.247 (6.06)***
GDP *(lnY_j)*	0.116 (4.34)***	0.106 (3.89)***	0.114 (4.38)***
Border effect *(A_{ij})*		0.293 (2.19)**	0.106 (0.16)
Distance *(lnD_{ij})*		-1.095 (16.35)***	-1.872 (4.48)***
i is landlocked *(E_i)*		-0.532 (3.94)***	-0.723 (1.18)
j is landlocked *(E_j)*		-0.252 (1.87)*	-0.430 (0.70)
Common language *(L_{ij})*		0.254 (1.55)	-0.525 (0.68)
EU *(EU_i)*	0.050 (2.38)**	0.101 (4.87)***	0.057 (2.78)***
EU *(EU_j)*	0.048 (2.28)**	0.094 (4.52)***	0.054 (2.62)***
EURO zone *($EURO_i$)*	0.093 (5.67)***	0.087 (5.18)***	0.092 (5.78)***
EURO zone *($EURO_j$)*	0.045 (2.77)***	0.040 (2.39)**	0.045 (2.81)***
Infrastructures (roads) *($lnINF1_i$)*	-0.188 (1.07)	-0.269 (1.70)*	-0.192 (1.13)
Infrastructures (roads) *($lnINF1_j$)*	-0.367 (2.10)**	-0.365 (2.32)**	-0.368 (2.18)**
Infrastructures (telephone) *($lnINF3_i$)*	0.046 (0.73)	0.253 (5.01)***	0.081 (1.36)
Infrastructures (telephone) *($lnINF3_j$)*	0.261 (4.34)***	0.548 (12.50)***	0.296 (5.23)***
Population *($lnPOP_i$)*	-0.071 (1.02)	0.199 (3.96)***	-0.027 (0.42)
Population *($lnPOP_j$)*	0.201 (3.06)***	0.552 (13.23)***	0.243 (3.99)***
Constant	3.340 (2.19)**	1.767 (1.39)	15.545 (4.47)***
Number of observations	2912	2912	2912
Number of bilateral relations	182	182	182
R-squared	0.69		
Test bilateral effects ($\eta_{ij} = 0$)	F(181.2703)=89.24 Prob > F = 0.0		
Test time effects ($\omega_t = 0$)	F(15. 703) =18.40 Prob > F = 0.0	χ^2 (15) = 166.07 Prob > χ^2 = 0.0	χ^2 (15) = 279.77 Prob > χ^2 = 0.0
Hausman test (Within versus Random)		χ^2 (27) = 3522.70 Prob> χ^2 = 0.0	
Hausman test (Within versus HTIV) "Overidentification test"			χ^2 (27) = 8.14 Prob> χ^2 = 0.99

***: Significant at the 1% level ** : Significant at the 5% level * : Significant at the 10% level.
Standard errors are in parenthesis.

Time dummies are not reported in order to save space.

Hausman-Taylor endogenous variables = *lnY_i ; lnY_j ; $lnINF1_i$; $lnINF1_j$; $lnINF3_i$; $lnINF3_j$; lnD_{ij}*

Appendix 3: actual to theoretical trade ratios for EU-15 exports to the CEECs, 1995 and 2005, in %

Country i	Exports to :									
	BGR	EST	HUN	LVA	LTU	POL	ROM	CZE	SVK	SVN
DEU										
1995	86.3	20.5	205.0	28.6	45.2	171.9	127.9	131.5	111.1	77.0
2005	136.9	55.4	356.7	62.4	92.8	252.3	209.0	201.5	207.7	77.0
AUT										
1995	13.7	3.5	15.7	4.1	3.7	19.8	17.7	20.0	0.7	13.7
2005	32.4	23.4	14.7	20.0	14.8	28.9	52.5	23.9	1.1	17.8
DNK										
1995	7.1	3.1	8.2	2.5	7.8	12.0	6.4	7.0	4.0	3.9
2005	9.3	6.4	16.6	10.7	11.4	15.1	6.5	13.4	7.1	4.9
ESP										
1995	7.9	4.8	37.2	3.5	8.7	67.9	16.8	57.7	23.6	34.9
2005	40.8	25.7	98.6	25.9	41.2	129.8	65.1	138.8	77.6	48.6
FIN										
1995	12.1	0.6	27.1	2.5	4.2	17.1	2.5	27.9	12.7	8.2
2005	5.9	0.6	32.8	4.8	8.3	20.3	7.2	23.0	10.6	10.7
FRA										
1995	22.2	4.3	47.9	4.5	8.9	63.2	49.2	46.1	24.3	38.5
2005	50.5	18.9	103.2	20.1	37.3	124.2	110.7	82.3	53.8	51.4
GRC										
1995	9.4	0.4	5.0	0.6	1.4	9.4	5.9	13.0	2.2	6.2
2005	11.7	1.5	3.3	2.6	2.2	7.5	6.2	8.1	2.1	3.1
IRL										
1995	5.8	3.2	23.2	4.2	1.6	22.2	7.2	27.9	8.6	5.3
2005	10.1	3.0	20.3	1.8	3.6	21.8	21.5	35.7	10.2	3.9
ITA										
1995	16.8	11.4	50.7	9.6	17.2	119.0	58.0	77.7	30.3	29.0
2005	37.2	30.9	60.9	40.5	44.6	145.0	110.3	104.5	45.5	27.0
NLD										
1995	17.6	7.9	37.2	13.8	13.0	49.0	26.9	23.3	16.2	14.9
2005	39.2	24.0	112.2	23.6	33.9	81.9	56.4	88.1	33.2	22.3
PRT										
1995	4.7	1.3	14.2	0.5	14.5	5.5	1.6	6.0	7.3	0.9
2005	6.4	4.1	29.4	11.2	7.5	27.6	12.6	27.0	15.1	8.0
GBR										
1995	27.4	6.5	47.3	8.5	13.7	79.6	35.9	62.0	17.2	15.9
2005	45.4	17.5	77.5	20.2	30.6	77.2	70.7	72.5	35.9	16.3
SWE										
1995	9.5	2.4	35.7	2.7	4.7	22.1	8.4	27.6	10.0	13.5
2005	21.0	4.9	40.7	5.2	10.7	28.7	19.4	39.1	22.9	13.3
UEBL										
1995	16.3	7.0	36.9	7.7	9.1	45.3	19.7	26.4	18.3	10.1
2005	29.6	19.2	71.4	19.4	32.1	91.5	45.2	55.2	42.3	19.8

Source: authors' calculations

Appendix 4: actual to theoretical trade ratios for CEECs exports to the EU, 1995 and 2005, in %

Country i	Exports to :													
	DEU	AUT	DNK	ESP	FIN	FRA	GRC	IRL	ITA	NLD	PRT	GBR	SWE	UEBL
BGR														
1995	48.4	5.6	6.2	35.4	4.7	20.7	10.6	2.8	18.5	21.2	17.9	27.7	3.8	19.3
2005	52.5	13.5	6.3	63.8	4.3	45.3	8.8	5.5	34.3	16.7	10.5	28.1	8.3	90.6
EST														
1995	11.7	1.1	3.9	4.7	0.3	3.4	0.5	1.2	3.3	16.2	3.0	20.6	3.1	6.5
2005	11.2	3.6	6.9	16.3	0.8	11.9	2.9	4.2	4.7	21.4	13.2	40.8	5.3	18.3
HUN														
1995	232.6	11.5	7.4	104.8	18.0	40.5	9.2	11.6	52.5	45.1	8.3	67.1	23.5	53.7
2005	347.3	13.5	28.6	246.4	130.2	132.6	20.6	60.7	77.6	99.6	29.4	205.5	75.3	87.0
LVA														
1995	24.2	0.9	2.7	1.7	0.7	4.4	0.2	4.2	4.0	37.4	2.9	28.6	6.3	10.2
2005	12.8	2.7	8.3	19.6	1.4	28.5	0.9	13.7	5.2	8.8	45.3	86.3	4.7	3.1
LTU														
1995	26.6	2.4	6.6	23.0	1.2	9.2	0.4	1.0	10.8	22.1	18.5	36.2	2.7	7.9
2005	19.0	3.0	12.3	44.9	2.1	52.8	1.2	5.9	13.2	15.4	22.3	30.0	16.6	14.4
POL														
1995	153.8	16.2	14.6	49.0	12.5	41.4	7.5	15.8	53.7	40.0	13.4	48.1	15.6	33.7
2005	144.0	24.6	20.1	134.0	16.0	106.9	10.8	15.2	122.3	54.2	53.6	102.4	41.9	79.2
ROM														
1995	104.9	11.0	2.6	28.0	1.9	44.4	4.8	4.4	61.0	38.5	4.6	31.8	5.9	26.0
2005	110.3	32.7	4.6	78.2	5.9	102.4	8.7	13.5	111.5	40.6	13.2	88.1	11.3	54.5
CZE														
1995	117.3	16.5	7.7	42.1	21.7	22.1	24.3	12.9	47.4	17.7	16.8	33.7	18.3	18.5
2005	144.9	27.4	19.1	213.9	57.8	105.9	32.9	40.4	96.9	55.0	87.4	123.3	68.7	67.6
SVK														
1995	105.1	0.6	4.4	20.9	13.9	16.4	6.9	4.0	31.0	17.0	8.4	13.9	12.6	11.2
2005	175.0	1.2	15.3	96.9	62.4	52.6	10.1	4.6	61.0	53.3	16.7	44.6	24.8	31.9
SVN														
1995	54.5	4.8	3.1	6.2	4.6	25.6	2.9	2.4	11.3	6.6	4.1	9.8	8.1	4.8
2005	31.0	6.0	8.9	17.1	9.2	26.7	3.5	2.9	12.2	4.4	4.6	11.2	13.2	5.3

Source: authors' calculations

Appendix 5: country codes

DEU: Germany AUT: Austria DNK: Denmark ESP: Spain

FIN: Finland FRA: France GRC: Greece IRL: Ireland

ITA: Italy NLD: Netherlands PRT: Portugal GBR: Great Britain

SWE: Sweden UEBL: Belgium Luxembourg BGR: Bulgaria

EST: Estonia HUN: Hungary LVA: Latvia LTU: Lithuania

POL: Poland ROM: Romania CZE: Czech Republic

SVK: Slovakia SVN: Slovenia

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