

How important regional arrangements actually have been for the pattern of trade flows in the enlarged EU? A gravity model estimate for the Central Eastern European Countries.

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Abstract

The object of this paper is to estimate the effect of European Union eastwards enlargement process on trade patterns in the Union. In particular, we intend to investigate whether and how the EU Free Trade agreements with CEECs have exerted a different impact on centre-periphery and intra-periphery trade relationships. We also intend to evaluate if the “EU membership factor” has had anticipated additional positive effects for CEECs exports.

This paper analyses bilateral trade flows between eight CEECs and EU-23. We estimate a gravity equation using a system GMM dynamic panel data approach. Results support the assumptions that gravity forces and “persistence effects” matter. With respect to the effect of free trade agreements, evidence is found that Free trade agreements between EU countries and CEECs and among CEECs have a positive impact on trade flows. For the “EU membership” factor mixed evidence is found.

Keywords: trade flows, regional integration, EU eastward enlargement, gravity model, dynamic panel data

JEL: F13, F15; C13, C23

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Introduction

The object of this paper is to estimate the effect of European Union eastwards enlargement process on trade patterns in the Union. In particular, we intend to investigate whether and how the Free Trade agreements signed by CEECs¹ have exerted a different impact on centre-periphery and intra-periphery trade relationships. We also intend to evaluate if the perspective to join the EU has had anticipated, additional positive effects on exports flows coming from the eight CEE countries which joined the EU in May 2004.

Although the formal beginning of negotiations for eastward EU enlargement is more recent, the CEEC accession process somehow began in the early 90s, therefore shortly after the free market system got under way. In fact, since then the acceding countries have been signing bilateral agreements with EU (i.e. the European Association Agreements) which have represented an advance in the path towards integration through stipulating a progressive liberalisation of trade.

It is worth noticing that starting from 1992, Czech and Slovak Republic, Hungary and Poland have created the Central European Free Trade Agreement (CEFTA) and in 1996 Slovenia joined CEFTA as a full member. In 1994 also the Baltic Free Trade Agreement (BAFTA) entered into force. Furthermore, CEECs signed several bilateral trade agreements among themselves.

We also intend to investigate if the progressive accession and integration of the CEECs with the EU and among themselves have involved non only increased trading with the former EU member countries but also a geographical restructuring of the trade flows across the European Union members (centre and periphery).

The literature on trading bloc effects typically focuses on the Vinerian trade creation and trade diversion effects while the impact of economic integration and the creation of trading blocs on intra-bloc typically received minor attention.

This paper analyses bilateral trade flows between eight CEECs and EU-23 (EU-15 + CEECs, partner countries). We estimate a gravity equation using a system GMM dynamic panel data approach. using a gravity approach.

The paper is organised as follows. The first section surveys theory and empirics. The path towards integration through stipulating a progressive liberalisation of trade for CEECs is briefly analysed in section II. Section III describes the estimated equation, the empirical strategy and the data. Results are presented in section IV, conclusions follows.

¹ Note that both here and in the rest of the paper, the acronym CEECs is used to refer to the eight Central and Eastern European countries which joined the EU in May 2004: Hungary, Poland, Czech and Slovak Republic, Slovenia, Lithuania, Latvia and Estonia

I. A review of the literature on regional integration in Eastern Europe

In the last ten years, gravity models have also been broadly used in empirical studies of integration processes, in order to explore main changes in geographical trade pattern and to analyse the effects of regional and free trade agreements (RTA, FTA) and currency unions (CU) on trade flows.

After the 1991, special attention in the gravity models literature has been given to estimate potential trade flows between EFTA, EU, CEECs and Baltic countries (Baldwin 1997; Gros and Gonciarz 1996, Brenton and Di Mauro 1999; Nilsson 2000, Lasser and Schrader 2002, Brenton and Manzocchi 2002).

The most of the above mentioned papers find out that RTAs (European Agreements), that have been put in place to prepare transition countries for accession to EU, have prompted substantial growth in EU-CEEC trade flows (i.e. regional dummies have positive and significant coefficients). Therefore most adjustment on trade flows has already occurred and the expected further effects of the completion of EU enlargement will be modest.

In the empirical literature on EU Eastern enlargement, however, the study of geographical restructuring of the trade flows, due to the entry into force of RTAs and FTAs, among the former and the new members received a minor attention.

Paas (2003) find that behaviour of bilateral trade flows within the countries involved in EU eastward enlargement accords to the normal rules of gravitation. He also finds that there are statistically significant spatial biases caused by the trade relationship between the Baltic Sea Region countries, the border countries and the EU member candidates countries. The East West trade relationships are still rather weakly developed and there is a statistically significant difference in international trade patterns between the two groups: Bilateral trade relations between the EU member and the CEECs are still less developed than trade relations between the former EU member.

Martin and Turrion (2001) analyse the determinants of trade patterns between the CEECs and the OECD countries since the former began the processes of transition and opening up within the framework of the Association Agreements with the EU (EAs). To anticipate the trade impacts of their accession to the EU they estimate a gravity model for a set of countries formed by the EU members, the CEECs and the other members of the OECD (by way of a control area). The results confirm that the EAs have led to a preferential expansion of exchanges between the EU and CEECs. In fact, as regards regional dummies, they find that the increase in the export shares of CEECs in EU is sharper than the increase in those of third countries (the coefficient of dummies are 2.38 and 1.35 respectively).

Laaser and Schrader (2002)'s gravity model estimates suggest in the specific case of Estonia, Latvia and Lithuania that regional integration is much more intense than it is normally observed. According to the authors the role of distance

(transport cost saving) for the Baltic countries is much more important in shaping their regional trade pattern than the institutional integration into the EU via the EAs. Laaser and Schrader estimates show that the process of EU association was not determinant, despite the expectation that the trade agreements with EU would have fostered Baltic-EU trade flows while regional determinants dominated. Hence they conclude that the process of European integration mainly runs via Baltic countries neighbours and that the transport system dominates the trade regime by shaping trade flows in this region (the coefficient of distance is close to one in all the estimates).

Damijan and Masten (2002) explores the time-dependent efficiency of free trade agreements (FTAs) in a panel framework using static and dynamic model specifications. It shows that trade liberalisation per se need time to become efficient. Using an illustrative case of rapid expansion of Slovenian imports from other CEECs being part of CEFTA in the period 1993-98 the paper demonstrates that tariff reductions become effective in the second to third year after enforcement of the FTA. Regarding the effect of CEFTA agreement the analysis revealed that to be part of CEFTA increased the exports of other CEECs towards Slovenia by 18.5%.

II. EU enlargement and CEECs: The “pure trade” effects and the “EU membership factor” effects.

At the end of the EU enlargement process, the new members will enter into the highest stage of economic integration in the EU: They will join Economic and Monetary Union, as “no opt out” clause is allowed for new entrants. In May 2004, the new members entered the EU on the level of the Single Market. A participation also in EMU since the beginning has been considered not possible giving that most of the acceding countries did not yet fulfil the convergence criteria provided by the Maastricht Treaty².

In the case of EU enlargement we have to deal with the standard effects of regional integration³, “pure trade” effects, plus a specific aspect: “EU membership factor” effects.

“Pure trade” effects are the traditional trade effects of economic integration that occur through trade creation and trade diversion. Trade creation refers to increased trade generating new economic activity, whereas trade diversion refers to redirection of existing trade as result of changes in tariffs and other barriers due

2 The ECOFIN Council of November 7, 2000 in its statement on the implications of the accession process upon exchange rate arrangements in the acceding countries identified three distinct stages for the full monetary integration of candidate countries (i) the pre-accession stage (free choice of an exchange rate regime; (ii) the accession stage (new member states shall treat their exchange rate policy as “a matter of common interest” (EC treaty Art. 124); (iii) after accession the new member countries are expected to join the ERM II.

3 Baldwin and Venables (1995).

to regional custom union. “EU membership” effects are the positive effects exerted on trade and economic activity by the participation in European Single Market.

II.1 The “pure trade” effects: the RTAs and the FTAs

With respect to the “pure trade” effects it has to be noted that EU has concluded European Agreements (EAs) with CEECs during the 1990s. That implies that an asymmetric tariff reduction has taken place in trade between the EU and the CEECs. Since 1997, the EU has eliminated practically all tariffs (exceptions are agricultural and sensitive products) on imports from the CEECs. Having joined the EU in 2004, the CEECs entered into the customs union of the EU (Common External Tariff and Common Commercial Policy) and participated in the Single Market of the EU and border controls has been abolished.

Tab.1 Free Trade Agreements

	Date of entry into force						
	CMEA	EU GSP	CEFTA	BAFTA	OECD	WTO	EA
C R.	1-Jan-49	1991	1-Mar-93		21-Dec-95	1-Jan-95	1-Mar-92
E	1-Jan-49	1992		1-Apr-94		13-Nov-99	1-Jan-95
H	1-Jan-49	1990	1-Mar-93		7-May-96	1-July-95	1-Mar-92
LV	1-Jan-49	1992		1-Apr-94		10-Feb-99	1-Jan-95
L	1-Jan-49	1992		1-Apr-94		31-May-01	1-Jan-95
P	1-Jan-49	1990	1-Mar-93		22-Nov-96	1-Jul-95	1-Mar-92
SR.	1-Jan-49	1991	1-Mar-93		14-Dec-00	1-Jan-95	1-Mar-92
S		1980*	1-Jan-96			30-Jul-95	1-Jan-97

CMEA: Council for Mutual Economic Assistance, CEFTA: Central European Free Trade Area, BAFTA: Baltic Free Trade Agreement, EA: European Agreement. GSP: Generalised System of Preferences

*Slovenia retained preferential status for its exports under the so-called autonomous trade preferences granted by the EU to Yugoslavia in the 1980 Cooperation Agreement

Source: http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm1_e.htm

Although trade components of EAs with some CEECs went into effect on different dates ranging from 1992 (former Czechoslovakia, Hungary and Poland) to 1996 (Slovenia), schedules of elimination of duties and non tariffs barriers on industrial products had one important component in common. They all had January 1, 2002 as the date to complete the process of liberalization.

EAs are bilateral agreements between EU and individual applicant countries (table 1). It should be emphasized that these agreements do not exist between applicant countries. The EAs thus could have led to the emergence of the so called “hub-and-spoke” pattern, creating trade between the EU and each applicant country separately, while discouraging trade among applicant countries.

Several CEECS have also signed free trade agreements among themselves (tables 1 and 2). The first preferential agreement among CEECs was CEFTA⁴, which entered into force in 1993. Its membership gradually expanded over time. Baltic states signed FTA among themselves in 1995 (BAFTA).

Tab.2 Intra-Periphery Free Trade bilateral Agreement

	Date of entry into force					
	E	H	LV-	L	P	S R
Czech Rep.	12-Feb-98		1-Jul-97	1-Jul-97		1-Jan-93
Estonia		1-Mar-01				
Hungary			1-Jan-00	1-Mar-00		
Latvia						
Lithuania						
Poland			1-Jun-99	1-Jan-97		
Slovak Rep.	12-Feb-98		1-Jul-97	1-Jul-97		
Slovenia	1-Jul-97		1-Aug-96	1-Mar-97		

Source: http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm1_e.htm

II.2 CEECs trade opening: Some stylised facts

To examine some features of the process of trade opening up of CEECs, table 3 and 4 follow. They contain information on bilateral trade flows coming from CEECs directed towards the Centre (EU15) and the Periphery (CEECs).

In short, the features found in the trading pattern of CEECs suggest that export share towards EU-15 was, in the first half of the 1990s, relatively high partly because reduction in trade barriers have already taken place.

After the 1989, in fact, the EU granted GSP (Generalised System of Preference) status first to Hungary and Poland (1990), then to Bulgaria and former Czechoslovakia (1991), and subsequently to Estonia, Latvia and Lithuania (1992). Slovenia retained preferential status for its exports under the so-called autonomous trade preferences granted by the EU to Yugoslavia in the 1980 Cooperation Agreement (table 1). The GSP status significantly improved access of exporters from CEECs to EU markets, especially, for industrial products⁵.

Following the demise of central planning and the associated collapse of the CMEA, trade linkages among CEECs contracted dramatically and still remain

4 The CEFTA provides a framework for bilateral agreements among seven states. More precisely, the CEFTA system has two components: multilateral and bilateral. A multilateral component comprises commonly agreed preferences, whereas a bilateral one those negotiated bilaterally and not extended to all CEFTA members.

5 GSP preferential rates embraced 63 percent of all CN tariff lines in EU imports with most of them (94 percent of GSP items) subject to zero rates. The interim trade component of EA overshadowed GSP arrangements by retaining preferential tariffs and making them permanent rather than subject to annual reviews (Kaminsky 2001).

very weak. The share of this trade increased between 1989 and 1993 but mainly because of the dissolution of Czechoslovakia.

Table 3 Share of export to Former CPE** and EU

	CPE**		EU	
	1988	1992	1988	1992
Czechoslovakia*	47.7	19.7	38.4	61.8
Hungary	43.6	7.7	39.1	75.1
Poland	35.7	15.7	49.2	62.3
Estonia	n.a.	29.2	n.a.	68.5
Latvia	n.a.	58	n.a.	38.5
Lithuania	n.a.	57.8	n.a.	39.1

*Excludes intra Czech-Slovak trade,

** CPE is defined as Federal Soviet Union (including Baltics), Bulgaria, Czechoslovakia, Hungary, Poland and Romania

Source: Hoekman B., Djankov S. (1996)

The bulk of intra-CEECs trade takes place between the Czech Republic and Slovakia, which until 1992 had been part of the same national economy. Combined exports from Czech Republic and Slovakia to CEECs (table 4b) account for around two thirds of intra-CEECs exports⁶.

The geographical redistribution of trade flows in the period 1993-2003, into the EU-23 seems to have been generally in favour of the Centre (EU-15). The only relative exceptions are Hungary, Poland and Slovenia (tab.4b). With respect to the world total, data show an increase in intra-periphery trade flows for all CEECs with the exception of Czech and Slovak Republic (tab.4a).

It is a very difficult task to identify with any precision the extent to which preferential access to EU markets was responsible for reorientation in geographic patterns of trade of CEEC. Under central planning regime they undertraded with the EU and overtraded with each other and other members of the former CMEA⁷. A sizable portion of the adjustment can be attributable to the correction in earlier trends.

While the shift from a supply-constrained economic regime to a demand-constrained regime, combined with the collapse of import demand in CMEA, could have been the major force behind the expansion of CEECs-EU trade. We assume that also the measures introduced by the EU to support transition and

⁶ Kaminsky 2001.

⁷ Council for Mutual Economic Assistance, (COMECON or MEA), international organization active between 1956 and 1991 for the coordination of economic policy among certain nations then under Communist domination, including Albania (after 1961), Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, Mongolia, Poland, Romania, and the Soviet Union. Yugoslavia participated in matters of mutual interest. Although it was formed in 1949, a formal charter was not ratified until 1959. The charter gave COMECON the same international status as the European Economic Community (Common Market), but the structure was controlled by heads of state.

accelerate re-integration of CEECs into EU markets have also contributed to trade expansion.

Table 4 Trade integration vs EU(% of World total)

Table 4a	1993			2003		
	EU/W	C/W	P/W	EU/W	C/W	P/W
Czech Rep.	73	48	25	63	51	12
Estonia*	39	30	09	81	67	14
Hungary	35	34	1	66	60	6
Latvia	43	33	10	83	67	16
Lithuania	47	36	11	53	39	14
Poland	71	67	4	77	66	11
Slovak Rep.	79	28	51	65	46	19
Slovenia	55	54	1	63	56	7
Trade integration vs EU(% of EU15+ CEECs)						
Table 4b	1993		2003			
	C/EU	P/EU	C/EU	P/EU		
Czech Rep.	66	34	81	19		
Estonia*	64	36	83	17		
Hungary	97	3	92	8		
Latvia	76	24	81	19		
Lithuania	62	38	73	27		
Poland	94	6	86	14		
Slovak Rep.	36	64	71	29		
Slovenia	99	1	89	11		

*1994, EU= EU-15 + CEECs, C= Eu-15, P= CEECs

Source: IMF DOTs

II.3 The “EU membership factor”

Concerning the “EU membership factor” effects, we refer to the boost that trade receives through movements of factors of production and other dynamic effects such as capital accumulation, technology transfer, increased competition and exploitation of economies of scale.

The EU membership, which also implies for these countries a commitment to a peg exchange rate (ERM II) and eventually to a single currency will likely change the international assessment of risk in these countries. The exchange rate stabilisation, the EU “seal of approval” and the macroeconomic stabilisation programmes that accompany accession are the source of standard returns from Centre-Periphery type integration to the Periphery. These usually included increased flows of trade as well as of direct and portfolio investment as investor face lower institutional and policy risks.

Although it is too early to account for the post accession effects of the EU membership factor, it seems in some way reasonable to measure the “anticipated” effect of the “EU factor” on bilateral trade.

In fact, although the formal accession was in May 2004 the process began in the early 1990s. At the European Council summit in Copenhagen (June 1993), the EU invited the CEECs to enter the EU and formulated the three accession criteria (democracy, market economy and *acquis communautaire*). In late 1997, Hungary, Poland, Czech Republic, Slovenia and Estonia started negotiation (the “Luxembourg group”); whereas the other CEECs started in 1999 (the “Helsinki group”). Eventually, at the European Council of Laeken (December 2001) the Council agreed with the European Commission Report that all candidates, with the exception of Romania, Bulgaria and Turkey, were suitable to join the European Union.

We intend to test which role, if there is any, had the pure trade and EU membership effects on bilateral flows between CEECs and former EU countries.

III Equation, empirical strategy and data description

We introduce three sets of variables: i) gravity variables, ii) controls for heterogeneity iii) controls for dynamics. Dummy variables to test the effects of FTAs on bilateral trade flows between CEECs and EU 22 (the importer countries) are also introduced in the estimates.

i) Standard gravity variables. Bilateral distance as a proxy of transport costs and importer and exporter’s GDP as proxies respectively of demand and production factors. We add to this standard specification an index of relative country size, an index of absolute difference in relative factor endowments⁸ between trading partners and an exchange rate volatility index.

ii) Controls for heterogeneity. Following Baltagi Egger and Pfaffermayr, (2003) we introduce fixed effects for importer and exporter countries. Differently from these authors, we don’t control also for country-pair effects (i.e. the interaction effect between exporter and importer country picking up unobserved characteristics of country-pair) because this kind of variables would include the impact of bilateral trade agreements that we want to control by specific dummies.

Again, differently from Baltagi et al. (2003), we do not introduce interaction terms between exporter and importer countries and time(i_t and j_t)⁹. Following Bun and Klaassen (2004), we introduce instead a set of country-pair specific time trend the reason being that trade flows tend to grow over time.

Although using panel data allows for time effect to correct for any residual trend common to all bilateral trade flows, trends may vary across country-pairs. For

⁸ See Helpman and Krugman (1985)

⁹ This approach, allowing for each country to have a separate parameter for each time period when it is an exporter and another one when it is an importer, leads to a maximum flexibility in it and jt dimension of the panel: all possible nation-specific variables can move unrestrictedly over time.

instance, transportation costs depend on country-pair distance and the structure of trade; these elements varies between country-pairs. Transportation costs have decreased over time and this could have been increased bilateral trade flows; it is unlikely that standard (common) trend correction could completely avoid omitted trend variables bias.

As Bun and Klaassen (2004) underline, this approach is more flexible in the cross-sectional dimension (ij) with respect to Baltagi, Egger and Pfaffermayr formulation: It allows the trade development over time to be driven by other than national factors (i.e. transportation costs). We impose linearity for trends (at the cost of restricting it and jt dimension) instead of allowing for unrestricted time variation (at the cost of restricting the ij dimension). Linear trends usually capture the most part of trending variables. The estimates are robust also when we generalized the linearity hypothesis by allowing for quadratic trends.

Controlling for exporter, importer and bilateral time trend effect is possible to proxy the multilateral “trade resistance index” (see Anderson and van Wincoop (2003)), obtaining a specification of gravity equation that can be interpreted as a reduced form of a model of trade with micro foundations¹⁰.

iii) Controls for dynamics. It is worth to underline that when considering the time dimension, one should not forget that accession is a very recent phenomenon.

Given the novelty of the phenomenon, traditional static gravity models, that generally deal with long-run relationships, are not well suited to interpreting the repercussions of the accession. For this purpose, we need to make the gravity equation more short-run oriented, by explicitly introducing dynamics, controlling for the lagged effects of the dependent variable and detecting the short term influences of the “forthcoming accession” and of all other variables affecting bilateral trade in EU enlarged.

Indeed, the “short run” can generally be highly relevant in trade analyses, since countries that trade a lot with each other tend to keep on doing so. Such *inertia* mainly derives from the sunk costs exporters have to bear to set up distribution and service networks in the partner country, leading to the emergence of substantial entrance and exit barriers (see Eichengreen and Irwin, 1996). This sticky behaviour seems all the more important in the case of CEECs –EU 15, where trade relationships are affected not only by past investment in export-oriented infrastructures, but also by the accumulation of invisible assets such as political, cultural and geographical factors characterising the area and influencing the commercial transactions taking place within it.

¹⁰ Anderson and van Wincoop (2003) pointed out that trade between a pair of countries depends on their bilateral trade barriers with all trading partners: trade will be stronger for those countries with a relatively low trade barriers. Rose and van Wincoop (2001) approximate the multilateral trade resistance index using country-pair fixed effects. Ritschl and Wolf (2003) and Estevadeordal et al. (2003) propose using country-group dummies; our approach follow this suggestion.

It is worth noticing that, notwithstanding the general importance of the “persistence effects”, quite a few studies, based on a panel estimation of gravity equations, have considered the possibility of controlling for them (Egger 2000, De Grauwe and Skudelny 2000, Bun and Klaassen 2002, De Nardis and Vicarelli 2003).

The introduction of dynamics into a panel data model raises an econometric problem. If trade is a static process, the “*within*” estimator (fixed-effect estimator) is consistent for a finite time dimension T and a infinite number of country-pairs N . But if trade is a dynamic process, the estimate of a dynamic panel like our model (a static one with the lagged dependent variable) is more difficult. The reason is that the transformation needed to eliminate the country-pair fixed effects produces a correlation between the lagged dependent variable and the transformed error term that (for a finite T and an infinite N) renders the least square estimator biased and inconsistent.

There are alternative estimators with which to bypass this inconsistency problem. Arellano and Bond (1991), suggested to transform the model into first differences and run using the Hansen two-step GMM estimator. First differencing the equation removes the random effects that are independent and identically distributed among individuals, and produces an equation estimable by instrumental variables.

As far as the gravity model, the proposed strategy is however not costless. On the one hand, first-differencing the equation removes fixed effects but also time invariant regressors that are in the specification. If those regressors are of interest, the loss of information implied can be of no second order. On the other hand, first-differenced GMM estimator performs poorly in terms of precision if it is applied to short panels (along the T dimension) including highly persistent time series (Blundell and Bond, 1998). Lagged levels of time series that have near unit root properties are in fact weak instruments for subsequent first-differences. Since bilateral exports between (old and new) industrialized countries are expected to change sluggishly, one might suspect that this would affect our estimates.

Arellano and Bover (1995) describe how, if the original equations in levels were added to the system of first-differenced equations, additional moment conditions could be brought to bear to increase efficiency. They show how the two key properties of the first differencing transformation - eliminating the time-invariant individual effects while not introducing disturbances for periods earlier than period $t-1$ into the transformed error term – can be obtained using any alternative transformation (i.e. forward orthogonal deviations).

Blundell and Bond (1998) articulated the necessary assumptions for this “system GMM” estimator more precisely and tested it with Monte Carlo simulations¹¹.

11 Bond (2002) is good introduction to these estimators and their use.

As far as we know, very few studies adopted this methodology in the context of a gravity approach¹².

The estimated equation is:

$$\ln(\text{Exp}_{ijt}) = b1\ln(\text{Exp}_{ijt-n}) + b2\ln(\text{GDP}_{it}) + b3\ln(\text{GDP}_{jt}) + b4(\text{SIMIL}_{ijt}) + b5(\text{ENDOW}_{ijt}) + b6\ln(\text{Dist}_{ij}) + b7\text{VOL}_{ijt} + b8 \text{FTAP}_{ijt} + b9 \text{FTAEU}_{ijt} + b10 \text{Entr}_{ijt} + b11 \text{Lux}_{ijt} + b12 \text{Helsinki}_{ijt} + b13 \alpha_i + b14 \beta_j + b15(\tau_{ijt})$$

where:

\ln = the natural logarithm, i is the exporter country, j is the importer country and t is the year, n is a lag structure for the dependent variable;

Exp_{ijt} = the exports in value from country i to country j ;

GDP_{it} = the gross domestic product of the exporter country.

GDP_{jt} = the gross domestic product of the importer country;

SIMIL_{ijt} = similarity index of two's trading partners GDP as measure of relative country size; it is build as:

$$\ln \left[1 - \left(\frac{\text{GDP}_{it}}{\text{GDP}_{it} + \text{GDP}_{jt}} \right)^2 - \left(\frac{\text{GDP}_{jt}}{\text{GDP}_{it} + \text{GDP}_{jt}} \right)^2 \right]$$

ENDOW_{ijt} = the absolute difference in relative factor endowments between country-pairs; it is build as:

$$\left| \ln \left(\frac{\text{GDP}_{it}}{\text{POP}_{it}} \right) - \ln \left(\frac{\text{GDP}_{jt}}{\text{POP}_{jt}} \right) \right|$$

where POP is the population.

VOL_{ijt} = is the exchange rate volatility between counties i and j at time t ; it has been measured by the standard deviation of the first difference of monthly natural logarithm of the bilateral nominal exchange rate at the current year y .

Dist_{ij} = is the distance between country pairs.

FTAP_{ijt} = is a dummy variable that assumes value 0 for the absence of free trade agreements or customs unions among Periphery countries, 1 (year of entry into force) if these agreements are present;

FTAEU_{ijt} = is a dummy variable that assumes value 0 for the absence of free trade agreements or customs unions among Periphery and EU –15 countries, 1 (year of entry into force) if these agreements are present;

Entr_{ijt} = is a dummy variable embodying the “announcement effect” of the entrance of the eight new member countries in EU. This announcement is dated at

¹² See for example De Benedictis and Vicarelli (2005).

the European Council of Laeken in December 2001. The dummy assumes value 1 since 2002 for all country pairs in the sample.

Lux_{ijt} = is a dummy variable embodying the “announcement of negotiations effect” for Hungary, Poland, Czech Republic, Slovenia and Estonia. The dummy assumes value 1 for exports coming from each of these countries 0 otherwise.

$Helsinki_{ijt}$ = is a dummy variable embodying the “announcement of negotiations effect” for Latvia, Lithuania and Slovak Republic. The dummy assumes value 1 for export coming from each of these countries, 0 otherwise.

α_i = exporter country dummy; it is a dummy that assumes value 1 if export flows come from exporter country i to each one of importer countries j, 0 otherwise;

β_j = importer country dummy; it is a dummy that assumes value 1 if export flows come from each one of exporter countries i to importer country j, 0 otherwise;

τ_{ij} t = bilateral trend variables.

The sources of these variables are shown in table 5.

Table.5 Source and definitions of variables

variables	source	sample period
Bilateral export flows (current price, US \$ millions)	Direction of trade statistics, International Monetary Fund	1990-2003
Free Trade Agreement	European Commission and World Trade Organisation	1990-2003
GDP (current price millions US \$)	World Economic Outlook database, International Monetary Fund	1990-2003
Distance	Paul Brenton and Francesca Di Mauro http://www.ceps.be	1990-2003
Population	Queen database, Eurostat	1992-2003
GDP per capita	Queen database, Eurostat	1992-2003
Exchange rate	IFS FMI, and BCE	1992-2003

We expect that bilateral export flows are positively influenced by:

- i) the lagged endogenous variable. We expect that countries trading a great deal each other would continue to do so, thus reflecting entrance and exit barriers due to sunk costs.
- ii) the real GDP of importer and exporter countries. In gravity models trade flows are positively influenced by the dimension of origin and destination countries proxied by GDP.
- iii) The presence of bilateral and multilateral free trade agreements. These dummies proxied the pure trade effects and are expected to have a positive impact on trade flows.
- iv) The announcements of entry into the EU. These dummies proxied the “EU membership factor effects” and are expected to have a positive effect on trade flows.

We also expect that bilateral export flows are negatively influenced by:

- i) distance. It is used as proxy for the transport costs and cultural proximity between two countries;
- ii) exchange rate volatility

We have no a priori on the signs of:

- i) relative country size index and ii) differences of factor endowments index. A positive (negative) sign of the first index and a negative (positive) sign of the latter could support the hypothesis that bilateral flows are higher (lower) the more similar two countries are (in terms of size) and the more dissimilar they are in terms of relative factor endowments.

IV Estimates results

The equation has been estimated for the group of the eight CEECs as reporting countries and the EU 15 plus the 8 CEECs as trading partners.

Table 6 reports results of the test¹³ and the estimates. AR(1) and AR(2) test show the consistency of the GMM estimator and the inconsistency of the OLS procedure. Hence, by introducing dynamics, the proper estimation method is the former one. Sargan test of over-identifying restrictions shows that the hypothesis that all moment restrictions are satisfied for dynamic specification is not rejected.

Not all the regressors are statistically significant and show the expected sign; between coefficients of major interest, agreement dummy between intra-Periphery, Centre and Periphery, and Luxembourg dummy coefficients are statistically significant. Also the “announcement effect” dummy seem to play a role in explaining bilateral trade flows.

More in details:

- i) “Gravity standard” variables. It is confirmed an inverse relationship between exports and distance. Sign of exporter countries GDP is negative; big differences between CEEC8 countries GDP (that are all exporters in our estimate) and the group of importer countries has had a detrimental role in explaining trade bilateral flows. The positive sign of relative country size index and the negative one of relative factor endowment index, although the latter is statistically not significant, confirms that trade relationships are higher the more similar two countries are in terms of country size and smaller the more dissimilar two

13 Arellano and Bond (1991) propose a test of the hypothesis of no second-order serial correlation in the disturbances of the first differenced equation. This is a necessary condition for the valid instrumentation. The Arellano-Bond test performed for our estimate confirms that the GMM estimator is consistent. A test for the hypothesis of no first order-order serial correlation is also reported: the rejection of the null hypothesis (i.e. the presence of first-order serial correlation) indicates the inconsistency of the OLS estimator.

countries are in terms of relative factor endowments. This latter result seems to support Linder's hypothesis, like in Baltagi et al. (2003). On the other hand, the positive sign of importer countries GDP is statistically significant.

Tab.6 Estimate of bilateral exports coming from CEECs-8, (1993-2003)

Num.obs= 1712	Num group=176	F (216,1495) = 441.46	Prob>F=0.000	sample period 1990-2003
	Coeff.	Std. Err.	t	P> t
Ln(exp _{ij}) t-1	0.4455	0.088	5.03	0.000
Ln(GDP _{it})	-0.355	0.142	-2.50	0.013
Ln(GDP _{jt})	0.195	0.087	2.23	0.026
Ln(DIST _{ij})	-1.08	0.172	-6.30	0.000
Ln(SIMIL _{ij})	0.149	0.054	2.75	0.006
ENDOW _{ij}	-0.047	0.063	-0.75	0.455
VOL _{ij}	-0.06	0.075	-0.84	0.402
FTAEU _{ij}	0.105	0.064	1.63	0.103
FTAP _{ij}	0.135	0.062	2.16	0.031
Entr _{ij}	0.095	0.036	2.60	0.010
Lux _{ij}	0.095	0.052	1.84	0.066
Hels _{ij}	0.008	0.063	0.13	0.894
α_t	Yes			
β_j	Yes			
τ_{ij} t	Yes			

Arellano-Bond test for AR (1) in first differences: $z = -5.71$ $Pr>z = 0.000$

Arellano-Bond test for AR (2) in first differences: $z = 0.08$ $Pr>z = 0.934$

Sargan test of over-identifying restrictions: $\chi^2(63) = 62.38$ $Prob>\chi^2 = 0.498$

ii) The lagged dependent variable is statistically significant until a 1-period lag; the magnitude of the “persistence effect” seems a little bit lower respect other findings based on more integrated and developed group of countries (see De Nardis and Vicarelli (2003), Bun and Klassen (2002)). This gap can be explained by the fact that CEEC8 are less integrated than i.e. EU15 and by the inclusion of bilateral time trend in the regression, capturing part of “persistence effect”.

iii) “Pure trade” variables: FTA-Per, FTA-EU. Both these free trade agreements dummies are positive and statistically significant ($t=2.2$, $t=1.6$). The coefficient shows that being part of a free trade agreement with respect to the case of not being part increases bilateral trade by more than 14% with respect to intra-periphery agreements and by more than 11% with respect to EA's on average¹⁴.

14 Since the parameter of the dummy FTA are respectively 0.135 and 0.105, the variation of trade induced by being part of a trade agreement (FTA=1) with respect to the case of not being part of any agreement (FTA=0), i.e. [(EXP being part of a trade agreement /EXP not being part of ay

iv) “EU membership” variables: EU membership, Luxembourg and Helsinki. Both Entrance and Luxemburg results positive and significant supporting the assumption of the existence of an anticipated effect on trade of participation in European Single Market. The magnitude of this effect seems to be relatively high. Differently the dummy Helsinki is not significant.

Concluding remarks

According to the findings of the previous paragraph the following results can be highlighted.

For what concern the “pure trade effect”, Free Trade Agreements (FTA) matter in explaining bilateral export flows coming from CEECs: trade agreements dummies are positive and statistically significant.

Being part of a FTA with EU15 countries (Eas) increased CEECs bilateral trade by more than 11%; intra-periphery agreements increased trade around 14.% on average. The relatively lower impact on export flows of EAs than intra periphery FTA could be explained by the fact that, starting from the end of the eighties, trade between CEECs and EU 15 was already intense because reduction of trade barriers have already taken place.

Moreover, the CMEA (and for a while after its collapse in 1991) the trade relations between the CEECs have been driven by no economic factors and underdeveloped. Therefore, it is reasonable that the introduction of FTAs and RTAs were able to restore and develop them also within a broader EU framework.

It is worth to notice that estimates results seem to support the evidence coming from the data (see paragraph II). Starting from a very low level, the rate of growth of intra-periphery trade has been higher than core-periphery trade, ceteris paribus, because of an higher FTA impact. From this perspective, trade agreements between centre and periphery did not hamper trade relationship among periphery countries (no “hub and spoke” effect).

For what concern the “EU membership factor”, the dummies Luxembourg and entrance are positive and significant suggesting that the trade flows coming from CEECs “embodied” in both cases the news of the future EU membership. However the attempt to estimate further the effect of the accession by mean of the introduction of exchange rate volatility in the estimates did not give any significant results.

trade. agreement) -1×100 is given, other things being equal, by $[(e^{0.135 \times 1} / e^{0.135 \times 0}) - 1] \times 100 = 14.4\%$ and $[(e^{0.105 \times 1} / e^{0.105 \times 0}) - 1] \times 100 = 11.1\%$

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