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**Maryla Maliszewska**

**New Member States' Trading Potential Following EMU  
Accession: A Gravity Approach**

*Warsaw, October 2004*

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## **Abstract**

The purpose of this paper is to look at implications of the EMU accession on international trade flows of the new member states with members of the enlarged EU. I begin with the evaluation of an early impact of the EMU on trade based on a gravity model. The results are then employed in the calculation of potential levels of trade of the Central and East European countries. The results show a high degree of trade integration between most of the new member states and the EU except for Latvia, Lithuania and Poland. In trade among the new member states, potential trade flows by far exceed actual levels for all countries except the Czech Republic and Slovakia.

## **1. Introduction**

The aim of this paper is to look at the potential impact of the adoption of the euro by Central and Eastern European countries (CEECs), which recently became members of the European Union (EU). The paper begins with a discussion on the theoretical foundations and empirical evidence behind the argument that adoption of a common currency increases trade flows between members of a monetary union. The seminal paper by Rose (2000) who found that common currency triples trade led to ongoing debate on the topic and a series of new empirical studies. It seems that even though the estimated impact of a common currency on trade has been slightly reduced in later studies, the evidence for causal relationship between monetary union and trade is very strong. This is also the case in early estimates of the impact of the EMU. It seems therefore that if the CEECs were to adopt the euro the trade flows between the EU15 and the new member states would increase as well.

The aim of the following sections of the paper is to estimate the potential increases in trade following the accession to the EMU. First, the gravity equation similar to the original Rose's specification is estimated for the EU countries. The results of this study confirm that the euro has already contributed to greater trade flows between the EMU members. Further, assuming that the same relationship between income, distance, common borders and other country characteristics and bilateral trade will hold in the future for the EU-CEECs trade, we estimate the potential trade increases following the accession of the CEECs to the EMU.

## **2. How currency unions affect trade between members**

Initially, academic economists were skeptical about the argument that creation of a common currency leads to greater market integration and increased trade linkages. First, in theory importers and exporters could hedge exchange rate uncertainty. Secondly, empirical studies found little evidence that exchange rate variability had any adverse effect on trade. However, forward and futures markets are not available for most trading partners and they entail transaction costs. The problem with the empirical argument is that it was mostly based on time series evidence, where other influences on trade could not have been fully accounted for. In addition the evidence was based on large industrialized countries<sup>1</sup>. When small countries were included into the analysis some effects started to show up, especially in studies of bilateral trade.

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<sup>1</sup> For surveys of the literature, see Edison and Melvin (1990) and Goldstein (1995).

The seminal contribution to the research on the impact of currency union on trade was provided by Rose (2000) and subsequent papers e.g. Glick and Rose (2002) and Rose (2002). Rose (2000) included several small countries and dependencies that adopted currencies of larger countries to form a large sample of countries with monetary unions. He found a statistically significant negative effect of exchange rate variability on bilateral trade flows. Rose also finds that countries, which share currency, trade three times as much as otherwise similar countries with different currencies.

Rose's result provoked an ongoing debate and has raised many questions. First, the statistical link between monetary unions and trade may not represent the impact of a common currency on trade, but rather the impact of some third factor such as colonial history or others. Therefore countries with previous strong links and high trade might have decided to form a currency union. It is then inappropriate to infer that forming a monetary union would triple trade. Secondly, the cross-section evidence does not allow us to evaluate the time pattern of the effect of currency union on trade. Thirdly, the effect simply seems to be too big to be believable. Forth, the estimates came from very small and poor countries. Therefore several economists doubted as to whether his results are relevant for larger and developed countries.

On the other hand it is possible to defend Rose's results on several grounds and to reduce the force of his critics' arguments. First, regarding the endogeneity of the exchange rate regime choice, Rose has done a thorough job of controlling for common language, colonial history and political links and the large impact remains.

Secondly, regarding the dynamics of the effects of currency union on trade, Rose and Glick (2001) aim to answer these questions by looking at the panel of countries over 1948-1978 period including countries in periods when they formed part of the currency union and periods when they did not. The results indicate that joining the currency union almost doubles bilateral trade among its members. This suggests that roughly two thirds of the tripling effect may be reached within three decades of the adoption of the common currency. Here again the analysis is focused on small and poor countries and is limited in most cases to countries, which exited currency unions as opposed to countries joining them.

Third, regarding the large magnitude of the estimates it is important to take into account home country bias. People trade far more easily with their fellow citizens than with people from different countries. Even when one controls for the effects of distance, trade barriers, linguistic, social and cultural differences the strong tendency to trade within the country and the lack of ability of arbitrage to keep prices in line across different spaces remain. Canadian provinces have been found to trade twenty times as much with each other than with US states (McCallum, 1995). This number reduces to three times after introduction of the NAFTA and controlling for other factors. One of the most likely candidates for the explanation of the home country bias is different currencies (Parsley and Wei, 2001).

The last point as to whether Rose's result holds for larger countries has been better understood by now as there is more empirical evidence for developed countries. But even before one needs to note that Rose (2000) and Frankel and Rose (2002) found no significant differences between the results for small and very small countries. In addition empirical studies established that although home bias is smaller, it also operates in the case of larger countries. To the extent that different currencies explain this, the effect is not limited to small countries.

There have been also a few studies, which focused on larger countries. Estevadeordal, Frantz and Taylor (2002) looking at the set of developed and few large developing countries find that a participation in the gold standard increased trade by 34-72% depending on specification. Also López-Cordova and Meissner (2000) estimate the impact of common participation in the gold standard to amount to 60%. They also found that participation in the currency union doubles trade.

Finally, at least three years of available data since the formulation of the EMU in January 1999 allows for testing of the impact of common currencies on developed countries. Barr, Breedon and Miles (BBM, 2003) estimate a gravity model<sup>2</sup> for the EU and EFTA countries except for Luxembourg and Liechtenstein over the period of 1978-2001. The authors deal with the endogeneity problem by estimating the model by instrumental variables, treating EMU membership as endogenous and using past output and price co-movements across countries as instruments. All variables are statistically significant and have the expected signs (see Table 1). Output and output per capita are positively related to bilateral trade flows, distance affects trade negatively, while the existence of common borders and common language enhance trade. The results of BBM (2003) indicate that the EMU has already added 24%<sup>3</sup> to the level of trade among members. The reduction in exchange rate volatility also contributed to the rise of trade, but to a much smaller extent. The study is only based on the first three years after formulation of the EMU, so it is likely that the long-run effect will be much larger.

**Table 1. Trade effects of EMU –BBM(2003)**

	COEFFICIENT	STANDARD ERROR
Currency Union	0.21	0.04
Exchange Rate Volatility	-0.15	0.01
Log(Output)	1.23	0.01
Log(Output per capita)	0.23	0.04
Log(Distance)	-1.24	0.02
Contiguity	0.18	0.02
Language	0.26	0.02
EU Membership	0.45	0.02

Note: Dependent variable: log of bilateral trade.

Source: BBM (2003), IV estimation, Table 3, p. 582.

<sup>2</sup> The discussion of gravity models is relegated to the methodological section.

<sup>3</sup> 24% is  $\exp(0.21)$  in the IV estimation.

Micco, Stein and Ordenez (MSO, 2002) estimate the impact of the EMU based on 1980-2001 data on bilateral trade. The authors use two data sets: first set including 22 industrial countries and second set limited to EU members only. They estimate the bilateral gravity trade equations introducing dummies for a membership of a free trade area, the EU and for the EMU. The estimated coefficient on the EMU dummy is always positive and statistically significant. Table 2 displays a range of estimates based on developed countries' and EU samples.

In addition, in order to avoid the problem of endogeneity of the decision to form a monetary union, MSO (2003) run regressions with country-pair fixed effects. The previous regressions showed that countries that adopt common currency trade more than otherwise identical countries. However, previous specifications do not allow for the isolation of the impact of the EMU itself. Inclusion of country-pair dummies allows us to estimate the impact of the euro and leave out all cross-country variation. The country-pair fixed effects replace all country-specific characteristics such as distance, common language etc. and also unobservable characteristics. In this way if for any reason two countries traded a lot before the formation of the currency union this effect is captured by the country-pair dummies and does not affect the estimate of the impact of the EMU.

MSO (2003) results show that the impact of the euro is much smaller (6%) when country-pair dummies are included indicating that there is a reverse causality between intensity of trade and adoption of the common currency. Since common currency reduces transaction costs in trade, countries that trade a lot are likely to gain more from the adoption of the euro. MSO (2003) results indicate that indeed high trade flows were likely to be used as a criterion for membership in the EMU.

**Table 2. Trade effects of EMU – MSO (2003)**

	Developed countries		EU members		EU WITH COUNTRY PAIR DUMMIES	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
EMU	0.198	0.4	0.25	0.043	0.060	0.013
Log(Real GDP)	0.793	0.009	0.828	0.013	0.996	0.074
Log(Real GDP per capita)	0.218	0.033	0.068	0.039		
Free Trade Agreement	0.101	0.05	0.048	0.095	0.042	0.029
EU	0.148	0.055	-0.194	0.165	-0.073	0.053
EU Trend	-0.003	0.004	-0.002	0.012	-0.003	0.004
Landlocked	-0.495	0.032	-0.712	0.032		
Island	0.136	0.045				
Log(Distance)	-0.752	0.024	-0.733	0.037		
Log(Area)	-0.012	0.008	-0.7	0.013		
Contiguity	0.248	0.044	0.275	0.049		
Common Language	0.816	0.042	0.652	0.073		
No. of observations		2541		1001		1001
R <sup>2</sup>		0.93		0.94		0.64

Note: Dependent variable: log of bilateral trade.

Source: MSO(2003), Table 1 p.328, Table B2 p.351.

Further estimations of MSO(2003) show that value of the coefficient of the EMU dummy is increasing over time indicating that trade among EMU members increased in anticipation of the formation of currency union. The future EMU members traded by 3.6% more in 1996 than otherwise similar countries already before the creation of the EMU. In 1999 EMU members traded 12.4% more than otherwise similar countries. Therefore creation of the EMU increased trade among its members by 8.4% between 1996 and 1999 and a further 3.7% between 1999-2002<sup>4</sup>.

The estimates of BBM (2003) and MSO (2003) are much lower than the original estimates of Rose which relied on data on small developing countries. The effects of the EMU may indeed be smaller than those estimated for small countries or its effects might be bigger in the long run. Bun and Klassen (2002) update gravity estimates and make dynamic projections regarding the impact of the EMU. They conclude that the euro has increased trade by 4% in the first year, and its long-run effect is estimated to reach 40%.

Overall, the existing evidence suggests that formation of a monetary union stimulates trade between its member states. The original estimate of Rose, that common currency triples trade, seems to be a reasonable upper limit. Even controlling for the endogeneity of the decision to form a monetary union and looking at the sample of developed countries and post-1999 EU a statistically significant relationship between common currency and trade can be established.

## **2.1. Methodology**

The gravity model of trade comes from the application of the law of gravity from physics to trade. Bilateral trade between any two countries depends on their market sizes measured by GDP (the equivalent of mass) and distance between them. Due to their empirical robustness the gravity models have been extensively used to explain bilateral trade between countries and to estimate the impact of preferential trade agreements. Although early applications of gravity models have been criticized for the lack of theoretical foundations, later studies showed that with special assumptions a simpler version of the gravity model can be derived from the factor proportions model (Deardorff, 1988), or from increasing returns to scale and product differentiation models or a combination of both (Evenett and Keller (2002), Shelburne (2000)).

This study applies the original Rose's specification to the data on EU countries. The aim is to establish the baseline against which to compare current trade between new and old EU member states and to formulate predictions about the likely impact of the EMU membership on the Central and East European countries. The focus of the study is on the CEECs, which became members of the EU on May 1<sup>st</sup> 2004<sup>5</sup>.

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<sup>4</sup> The calculations of percentage increases in trade are based on the coefficients of EMU dummies as displayed in Table 2, p. 332.

<sup>5</sup> Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia.

The bilateral gravity equations of trade to be estimated are as follows:

$$\ln T_{ij} = \alpha_0 + \alpha_1 \ln Y_i Y_j + \alpha_2 \ln y_i y_j + \alpha_3 Cont + \alpha_4 Lang + \alpha_5 D_{ij} + \alpha_6 Area + \alpha_7 Landlocked + \alpha_8 EU + \alpha_9 EMU + \varepsilon_{ij} \quad (1)$$

where T represents bilateral trade (value of exports and imports in constant 1995 dollars), Y represents GDP (in constant 1995 US dollars), y – GDP per capita (in constant 1995 US dollars), Cont – Contiguity i.e. when two countries share a border, Lang – common language dummy, D – distance between capital cities (in miles), Area – product of two geographical areas, EU – common membership in the EU, EMU - dummy takes value of 1 for the pairs of the EMU members even before the formation of the EMU.

GDP captures the economic size of countries and represents the potential for export supply and import demand. The product of countries' GDPs is expected to affect trade positively. The product of GDPs per capita captures the notion that rich countries tend to trade more intensively than poor countries. The geographical distance represents transport costs. Distance increases the costs of trade and is therefore expected to be negatively related to trade. Countries with a common border usually share some historic ties and cultural similarities, and also tend to have better knowledge of the neighboring markets. Common language reduces transaction costs. These two variables are expected to affect trade positively. Landlocked countries tend to trade less as they face higher transport costs (water transport tends to be cheaper than other ways of transport). Finally, preferential trading agreements reduce transaction costs due to lower barriers to trade and simpler border requirements, while the EU membership due to existence of the Single Market is also expected to enhance trade.

The specification applied in this study is very close to one of the specifications of MSO(2003). I also use the same data<sup>6</sup>. However, I drop the insignificant dummy variables. I limit the estimation to EU members over the period of 1992-2002.

## 2.2. Results

Table 3 presents the results of the estimation of equation 1. The model fits the data very well and all variables have statistically significant coefficients with expected signs. Larger, richer countries, which share a common border or language, tend to trade more. Distant and landlocked countries tend to trade less. Naturally the results are very close to those obtained by MSO (2003) presented in Table 2. The negative coefficient of the EU dummy indicates that the only non-EU countries in the sample i.e. Austria, Finland and Sweden over 1992-1994 period traded on average

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<sup>6</sup> I am very grateful to the authors and to Danielken Molina for making their data available to me.

more with the remaining EU countries before accession than EU members with similar characteristics. The effect of a common currency on trade is estimated to amount to 26.5%.

**Table 3. Results of the estimation of equation 1**

	Coefficient	Standard Error	Coefficient	Standard Error
EMU	0.235*	0.044	0.062*	0.013
Log(GDP)	0.827*	0.014	0.871*	0.047
Log(GDP per capita)	0.035	0.035		
Free Trade Area			-0.005	0.003
EU	-0.123*	0.056	0.023	0.030
EUTrend			-0.085	0.047
Landlocked	-0.698*	0.039		
Log(Distance)	-0.779*	0.036		
Log(Area)	-0.057*	0.015		
Contiguity	0.261*	0.052		
Common Language	0.765*	0.084		
R <sup>2</sup>	0.94		0.99	
No. of observations	857		857	
Country Pair Dummies	No		Yes	
Time Dummies	Yes		Yes	

Source: own results. \* - significant at the 5% confidence level.

### 3. Potential trade flows

Assuming that the same relationship between trade, GDP and other explanatory variables will hold for trade between the new and old EU member states once they become as integrated as the EU15 we can calculate potential trade flows between the CEECs and the EU using the estimated coefficients presented in Table 3. Further, assuming that the impact of the EMU is going to be the same as for the current EMU members we can also calculate the potential impact of the EMU membership on EU15-CEECs trade.

**Table 4. Estimated potential trade flows between the new and old member states**

	2002 TRADE	EU TRADE	EMU TRADE	EU/ 2002 TRADE	EMU/ 2002 TRADE
	(million USD)			(percentage growth)	
CZECH REPUBLIC	26771	18724	23321	-40.7	-26.2
ESTONIA	3067	3145	3979	-13.2	9.9
HUNGARY	23717	11494	14545	-58.9	-48.0
LATVIA	2139	3394	4295	34.4	70.1
LITHUANIA	3176	4460	5644	19.0	50.5
POLAND	30941	50470	63866	38.2	74.9
SLOVAK REPUBLIC	8713	7457	9436	-27.5	-8.3
SLOVENIA	7311	14777	18699	71.2	116.7

Source: own calculations - see text.

Table 5 displays the share of trade with the EU in GDP in 2002 in selected CEECs. It shows that Estonia, the Czech and Slovak Republics, Hungary and Slovenia are the most open economies among the new member states. On the other end Poland's share of trade with the EU in GDP is much lower than in the other countries. We might therefore expect that Poland will be among countries which would be likely to expand their trade with the EU by significant amounts, while the most open countries are likely to gain relatively less.

Potential trade flows between the CEECs and the EU15 are obtained by taking the coefficients displayed in Table 3 and plugging in the values of explanatory variables for the CEECs (see Table 4 for results). If we do not include the EMU dummy, the resulting trade potential can be interpreted as the level of trade typical for the EU members before formation of the monetary union. In several countries the level of trade with the EU in 2002 was already higher than trade between old member states would have been if they shared similar level of income, location and other characteristics. However, Slovenia, Poland, Latvia and Lithuania would record increases in trade if they were to reach the levels of integration typical for the EU15.

The above mentioned trade expansion could be mainly attributed to the Single Market impact on trade. Access to the common market is associated with a reduction in real transaction costs following the elimination of border formalities, harmonization of product and safety standards and regulations, greater similarity of business environment and others. Remaining policy changes related to the EU accession include integration into the customs union, which involves elimination of all remaining tariff and non-tariff barriers to trade and adoption of the Common External Tariff by the CEECs, free movement of labor and incorporation of the CEECs into the CAP. Out of these policy changes the impact of the Single Market access on trade seems to be the largest (see Lejour, de Mooij and Nahuis (2001), Maliszewska (2004)).

The potential trade flows exceed the 2002 trade flows by more than 70% in Slovenia. Lithuania, Latvia and Poland would need to increase their trade with the EU15 by 20-40% to bring it in line with the level of integration of the EU15 in 2002. The Czech and Slovak Republics, Estonia and Hungary trade already more than an average EU country given their location and income levels.

Another way to look at level of trade integration between old and new member states is to analyze the level of trade with the EU15 as a share of GDP. This is a rather crude method, as trade depends on many other characteristics apart from GDP but this illustrates that intensity of trade with the EU15 is high in the CEECs and higher than in several old member states (see Table 5). The result that trade between EU15 and new members states is already close to potential or above this level is also consistent with the findings of previous studies (see Nilsson (2000) or Gros and Gonciarz (1996)).

**Table 5. Trade with the EU15 as a share of GDP at current prices in 2002**

	Trade with EU15/GDP		Trade with EU15/GDP
Austria	22.7	Czech Republic	38.5
Belgium	54.2	Estonia	47.1
Denmark	18.3	Hungary	36.0
Finland	17.2	Latvia	25.5
France	14.5	Lithuania	23.0
Germany	15.7	Poland	16.4
Greece	10.0	Slovak Republic	36.8
Ireland	36.9	Slovenia	33.3
Italy	11.2		
Luxembourg	44.7		
Netherlands	35.3		
Portugal	22.8		
Spain	15.4		
Sweden	19.4		
United Kingdom	11.3		
AVERAGE	16.8		26.5

Source: see text.

Finally, our calculations indicate that Hungary, the Czech and Slovak Republics have already reached the level of trade integration with the EU15 that would have been enjoyed by the members of the EMU with similar characteristics. Since the increase in trade following the adoption of the EURO is proportionate to the impact of the EU membership the distribution of gains in trade among the CEECs remains similar. The potential for trade increases between the EU15 and Slovenia is the highest, followed by Poland, Latvia, Lithuania and Estonia.

The results of our calculations do not indicate that trade of Hungary, the Czech and Slovak Republics with the EU will drop following the introduction of the euro. On the contrary, the impact of joining the currency union is expected to be positive for all countries and is determined by the size

of the EMU dummy. Our calculations only indicate that these countries have already reached the level of integration with the EU typical for the EMU member with similar characteristics, while other countries still trade below these levels. If the impact of common currency is indeed the same for all countries once the above countries adopt the euro their trade with the EU15 could expand by 26%. On the other hand the remaining four countries, which still trade below potential, could expect greater trade increases overall as they first need to take full advantage of the Single Market access and then adoption of the common currency.

## 4. Trade among the new member states

Are the CEECs trading as much with each other as the EU15 member states do? To find out we apply the coefficients discussed above to assess the current and potential trade between the CEECs. The results are displayed in Table 6.

**Table 6. Estimated potential trade flows between the new member states**

	2002 TRADE	EU TRADE	EMU TRADE	EU/ 2002 TRADE	EMU/ 2002 TRADE
	(million USD)			(percentage growth)	
CZECH REPUBLIC	4470	2358	3113	-47.2	-30.4
ESTONIA	413	323	427	-21.7	3.3
HUNGARY	2413	2314	3055	-4.1	26.6
LATVIA	497	508	671	2.2	34.9
LITHUANIA	760	1046	1381	37.6	81.7
POLAND	3664	5869	7748	60.2	111.4
SLOVAK REPUBLIC	3280	1386	1830	-57.7	-44.2
SLOVENIA	822	1892	2498	130.3	204.0

Source: own calculations - see text.

Again the four most open countries i.e. Estonia, Hungary, the Czech Republic and the Slovak Republic traded in 2002 more with each other than two EU countries with similar income, geographical location and other characteristics would have traded.

Once the CEECs join the EMU and reach the same level of integration as current EU members trade among them is expected to increase significantly. Slovenia would need to triple, while Poland would need to double its trade with remaining new members to bring it in line with the relationship between income and trade typical for the EMU members. Only the Slovak and the Czech Republics trade even more than two EMU countries with similar characteristics. This is most likely due to the fact that despite splitting in 1993 the two countries are still very much integrated. The wedge between actual and potential trade flows is driven mainly by high levels of trade between

the two countries and not by the level of exchange with the remaining CEECs. The model in this basic specification is not able to capture this kind of historical ties between countries.

This exercise as any gravity equation based estimates of potential trade should be treated with caution. The assumption that the relationship between explanatory variables will hold for every country is very problematic. It is clear from the estimations of the equation with country pair fixed effects that there are other factors influencing trade which we do not take into account. As a result the potential trade flows following the introduction of common currency might be greatly overestimated.

## **5. Conclusions**

The empirical evidence presented in this paper confirms the existence of a significant causal relationship between common currency and trade expansion. The original estimate of Rose, that common currency triples trade, seems to be a reasonable upper limit. Even controlling for the endogeneity of the decision to form a monetary union and looking at the sample of developed countries and post-1999 EU a statistically significant relationship between common currency and trade can be established. The early estimates for the EMU indicate that its members trade on average between 6% and 26% more than otherwise identical countries.

The coefficients of the gravity model are employed to study the potential trade between old and new member states and between the CEECs themselves. Our calculations indicate that four countries (Estonia, Hungary, the Czech Republic and the Slovak Republic) have already reached the level of integration that would have been enjoyed by EU15 members if they shared similar income levels and other characteristics with the CEECs. In addition all of them except Estonia record the levels of trade typical for EMU members with similar characteristics. In the remaining countries i.e. Latvia, Lithuania and Poland the potential trade flows exceed the 2002 trade levels by 50-70%. Although following the introduction of euro international trade is expected to expand in all new member states in accordance with estimates of gravity models discussed in section 1, the levels of trade of Latvia, Lithuania and Poland are expected to rise even further as countries have not yet reached the level of trade integration typical for members of the EU.

Potential trade flows between new member states following the adoption of the euro by far exceed the 2002 trade flows for all countries except the Czech Republic and Slovakia. Although the potential trade flows between those two countries and other CEECs are higher than actual this result is dominated by the high level of trade between the Czech and Slovak Republics. Slovenia's trade flows could triple, while Polish trade flows with the new members could double once the countries reach the level of integration typical for members of the EMU.



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