....

The Effect of Membership in the European Monetary Union on Trade Between Member Countries (An Empirical Study)

Ihor Soroka[*][°]

Abstract

The question of whether or not to adopt the euro is a very important one, not only for the 13 European Union members that do not share the same currency, but also for future EU candidates. Current literature on the effect of the euro on trade is scarce since the European Monetary Union (EMU) was officially created in 1999, and up until recently there has not been enough data to analyze this issue. This paper aims to estimate the effect of the euro on trade between member countries using the standard gravity model of trade. Using data from current 25 EU members over the period from 1997 to 2004, I show that higher trade volumes between EMU members cannot be attributed to the adoption of the euro. I find evidence that the euro adoption has had a short-run effect on bilateral trade and that this effect is eliminated over a short period of time. My findings suggest that members of the EMU trade on average from 8.8% to 47% more compared to non-members depending on the type of regression used, while members of the Free Trade Agreement trade 61.3% more. The effect of the euro on trade is eliminated as soon as I control for country-pair specific effects that include the FTA effect as well as history of trade relations between two countries. I conclude that the adoption of the euro should be seen as a final step in the European economic and monetary integration for countries that already benefit from relatively high volumes of bilateral trade.

"The critics questioned whether the research had allowed sufficiently for other factors likely to be associated with currency unions that would also generate higher trade volumes. These might simply reflect historical ties between countries. Leaving them out would exaggerate the estimates of the effect on trade of currency-union membership."

The Economist. *The Euro, trade and growth,* July 10th, 2003.

Introduction

In recent years there has been growing interest in estimating the effect of membership in a Currency Union (CU) on trade among its members. Rose (2000) estimated this effect using trade data for 186 countries over the period from 1970 till 1990. His estimated coefficient on membership in CU came up to be statistically significant, suggesting that countries sharing the same currency trade three times more compared to the ones that are not (Rose, 2000). Micco et al. (2003) estimated that the effect of the European Monetary Union (EMU) on trade ranges between 4 and 16 percent depending on the sample. If sharing the euro does have a significant positive effect on trade leading to gains in the social welfare, this will encourage new members of the European Union to the early adoption of the euro in order to benefit from its trade effect. The adoption of the euro can also be seen as a culmination in the history of economic and monetary integration in Europe, the final step for countries that already trade significantly with each other. The question as to whether the euro boosts trade between the members of the EMU is, therefore, of great interest from the policy perspective.

This paper aims to estimate the effect of EMU on trade using bilateral trade data from 25 current EU members over the period from 1997 till 2004. I conduct both cross-section and panel data analyses using the standard gravity model of trade. I show that

although members of the European Monetary Union trade more with each other compared to non-members, the effect of using the common currency is eliminated as soon as I control for country-pair specific effects such as the history of the bilateral trade between countries. This evidence supports the Economist's point of view on the effect of membership in the EMU on trade, and contradicts the findings of Rose that sharing the same currency itself has large effect on trade.

In the next section of this paper the literature review on the effect of membership in a Currency Union on trade is presented. In the third section I show how European economic and monetary integration affected trade between member countries. In the following two sections I introduce the methodology and describe the data for my empirical study. The empirical results are presented in the sixth section. In the final section of the paper I derive my conclusions.

Literature Review

The idea that a common currency may increase trade came from McCallum (1995) and Helliwell (1998) who found a large home market bias when studying trade between Canadian provinces and the United States[1]. Rose (2000) for the first time attempted to directly estimate the common currency effect using the UN trade data for 186 countries over the period from 1970 till 1990. His estimated coefficient on membership in CU came up to be statistically significant suggesting that countries that have the same currency trade three times more compared to the ones that do not (Rose, 2000). Numerous scholars (Persson (2001), Nitsch (2002), Tenreyro(2001) among the

---

[1] The authors argued that, ceteris paribus, trade between two Canadian provinces was 10-20 times greater than trade between a Canadian province and a US state.

others) criticized the Rose's original work on methodological grounds and showed that the effect of CU on trade can be reduced by using different econometric techniques as well as data sets. These critiques didn't prevent but rather encouraged Rose to further investigate the issue. Rose (2001) estimated the effect of a currency union on trade using IMF data set which is larger than the UN data set used in the original work. The author experimented with three different econometric techniques: usual cross-sectional OLS, matching technique proposed by Persson (2001) as well as panel data fixed effect estimation, which "exploits variation over time and answers an interesting policy question, namely 'What is the trade effect of a country joining (or leaving) a currency union?' (as opposed to the cross-sectional question of 'How much more do countries within currency unions trade than non-members?')" (Rose, 2001, p.455). He found the effect of a CU on trade to vary from 21% to over 200% depending on the exact estimation technique and concluded that in general it is still very large and statistically significant.

Glick and Rose (2002) exploited the panel nature of the data by estimating both fixed and random effects on the extended data set that covers over 200 countries over the period from 1948 to 1997. By controlling for a set of variables that affect trade, the authors concluded that joining a currency union nearly doubles bilateral trade. This result is statistically significant and insensitive to the exact econometric specification (Glick and Rose, 2002). Other studies that focused on the discussed issue are Frankel and Rose (2001), Rose (2002b), Rose and Engel (2002).

In order to summarize findings of twenty-four studies on the effect of common currencies on trade at the time, Rose and Stanley (2005) conducted a meta-analysis[2] of the effect of common currencies on trade. The authors concluded that a currency union increases bilateral trade by between 30% and 90%.

Thus far I have not discussed the literature that directly addresses the question about the effect of the European Monetary Union (EMU) on trade, which I will do in the following part of this section. The important point mentioned by Rose (2000), among others is that most of the countries that share the same currency in Rose's sample are either very small or poor and, therefore the results might not be applicable to richer European Monetary Union countries. Micco et al. (2003) made the first attempt to estimate the effect of EMU on trade using bilateral trade data from two different data sets (the first one– on 22 developed countries including 15 EU countries with Belgium-Luxembourg considered as one 'country' observation along with Australia, Canada, Japan, Iceland, New Zealand, Norway, Switzerland and the USA, and the second one – exclusively on the EU-15 countries) over the period from 1992 to 2002. The authors employed a modified version of the gravity model using panel data and country-pair fixed effects. They concluded that the effect of EMU on Intra-Union trade is positive and statistically significant. It also ranges between 4 and 16 percent (it is much smaller than the one estimated by Rose (2000) and Glick & Rose (2001)).

Barr et al. (2003) addressed the endogeneity issue by estimating the standard gravity model using the instrumental variable method. The results turned out to be very similar to the ones obtained using standard OLS, indicating that the endogeneity effect is

---

[2] Meta analysis is a set of quantitative techniques for evaluating and combining empirical results from different studies (Rose and Stanley, 2005, p.4)

minor in case of the EMU. The authors estimated the effect of the EMU on trade using the data on 17 European countries over the period from 1978 to 2002. They found an effect of 29% using OLS and 27% using a fixed effect approach.

As opposed to Micco et al. (2003) and Barr et al. (2003), Berger and Nitsch (2005) analyzed the trade between European countries over the last fifty years. They examined a data set for the same 22 countries as in Micco's et al. (2003) for the period from as early as 1948 until 2003. The authors put creation of the EMU in a historical perspective and argued that increase in trade between the members of the EMU was a result of gradual trade integration between European countries: "… once we control for the historical trend in trade integration, the effect of the euro weakens considerably or even disappears completely" (Berger and Nitsch, 2005, p.3).

To sum up, different authors came up with different estimates of the currency union effect on trade. The multitude of the results is shown in the Attachment 1. Although most authors found this effect to be positive and statistically significant, some (Tenreyro (2001) for instance) found it positive but statistically not different from zero or even negative (Pakko and Wall (2001)). The literature on the effect of membership in the European Monetary Union on trade is still very limited since up until now there has not been enough data to study this issue. In this paper I will analyze the most updated trade data for all current 25 European Union members, which, to my knowledge, has not been done by scholars.

Trade and Economic Integration in Europe

The important question I would like to address is how the economic and monetary integration in Europe affected the trade between EMU members. Berger and Nitsch (2005) used the data for 22 industrial countries including the 15 EU members over the period from 1948 till 2003 to show that trade between countries that will later form EMU was gradually increasing long time before the creation of the EMU. The authors also showed that once controlling for this trend in trade integration, the effect of the EMU on trade is eliminated. These findings are consistent with the idea that historical integration in Europe from the formation of the Customs Union, European Monetary System to the Economic and Monetary Union led to higher trade volumes between member countries and contradict the so-called *Rose effect* (i.e., the effect of a common currency on trade). In other words, the euro itself didn't lead to the high trade volumes between EMU members; the adoption of the euro must be seen as a culmination of a long history of economic and monetary integration in Europe.

Let us now look at the trade data for members and non-members of the EMU used in our analysis (see Figure1).

Figure1. The pattern of trade for members and non-members of the EMU
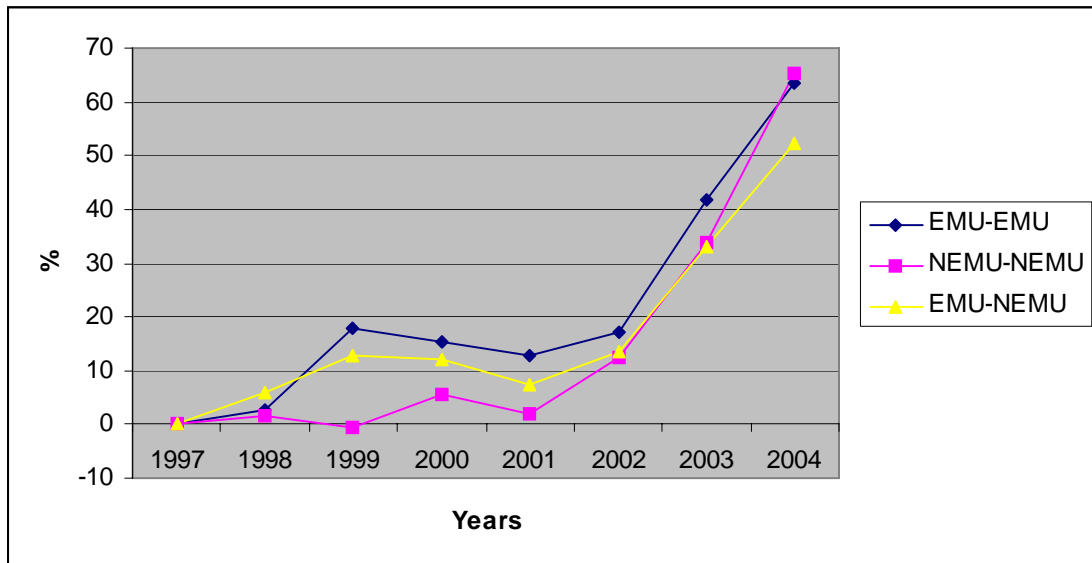
Note:
- Aggregate bilateral trade volume is deflated by the US CPI (base year – 1997)
- EMU stands for 12 European Monetary Union members (11 countries because of the Belgium-Luxembourg customs union) for the entire period (even before the existence of the EMU since we are interested in tracing changes in the trade volumes for those countries)
- NEMU represents the rest of the European Union countries that are not members of the EMU (13 countries)
- Each line represents percentage change of bilateral trade volume (1997 being 0) between EMU members (EMU-EMU), non-members of the EMU (NEMU-NEMU) and between members and non-members (EMU-NEMU).

Source: Author's calculations from the IMF Trade Statistics and the IMF International Financial Statistics

As one can see from Figure1, members of the European Monetary Union did see a relatively high increase in the aggregate bilateral trade volume in 1999 when the EMU was officially created. However, over the following two years these countries experienced a decrease in the trade volume in real terms by around 5%, which may be partially attributed to the global economic slowdown. The next three years are characterized by the rapid increase in the aggregate trade volumes for both members and non-members of the EMU. Interestingly, non-members experienced even higher increase in the aggregate trade volume than members. Overall, the aggregate trade volume

between EMU members increased by 63.5% in real terms from 1997 till 2004 while non-members increased its trade by 65.2%. This may lead to the conclusion that countries that share the euro experienced relatively lower percentage increase in the trade volume compared to the ones that do not. In what follows, I will explain why this conclusion can be misleading.

Figure1 clearly displays that up until 2004 EMU members traded relatively more than non-members (keeping in mind that the base year is 1997). It seems like in 2004 non-members experienced some kind of boost that led to a drastic increase in the trade volume (so drastic that while in 2003 the difference in relative trade volumes between members and non-members was +7.9%, in 2004 it was −1.7%). The question is: what could possibly lead to such a boost in trade for non-members in 2004? My answer is: it was the effect of the European Union enlargement. In 2004 10 countries joined the European Union. These countries form the majority of my non-members sub-sample (13 countries in this sub-sample include 10 new members plus countries that have not adopted the euro such as the U.K., Denmark and Sweden). Becoming a part of the single market such as the European Union can lead to greater increases in trade volume between the EU members. Therefore, I may conclude that the euro did affect trade between members in 1999 leading to a gap in relative trade volumes. However, this gap had been diminishing and finally disappeared in 2004, which could be partially attributed to the fact that 10 non-members joined the European Union. The above-presented arguments suggest that the effect of the membership in the European Monetary Union on trade may be of a short-run nature and can be eliminated over time.

Methodology

In order to analyze the effect of membership in the European Monetary Union on trade I will use the standard gravity model approach. Both the cross-section and the panel data analyses will be performed.

The gravity model approach

Introduced by Tinbergen (1962), the gravity model has been extensively used by empirical trade economists ((Rose (2000), Glick and Rose (2001), Micco et al. (2003) and others) as it performs quite well empirically. The idea behind the gravity model, taken from the Newtonian physics, is that trade flows between two countries depend positively on the product of the GDPs of both countries and negatively on the distance between them. Distance between corresponding capitals is used as a proxy for the distance between two countries. Other independent variables often included in the gravity model are product of the GDPs per capita, product of surface areas, the number of landlocked countries in a pair (0,1 or 2), a dummy variable that indicates whether two countries share a common border, a common language, as well as common membership in a Free Trade Area (FTA). Following Rose (2000), in addition to the independent variables described above, a dummy variable that indicates a common membership in the European Monetary Union will be included.

Cross-section data analysis

The cross-section data analysis of the effect of a single currency on trade answers the following question: Do countries that share the same currency trade more than the ones that do not?

The following specification of the gravity model is used for the cross-sectional analysis:

$$LnT_{ij} = \beta_0 + \beta_1 lnY_iY_j + \beta_2 lny_iy_j + \beta_3 Border_{ij} + \beta_4 Lang_{ij} + \beta_5 lnD_{ij} + \beta_6 lnSurf_{ij} +$$

$$+\beta_7 LandLock_{ij} + \beta_8 FTA_{ij} + \beta_9 EU_{ij} + \beta_{10} EMU_{ij} + \varepsilon_{ij}, \qquad (1)$$

where lnT_{ij} represents log of the bilateral trade volume between countries i and j (the simple average of the bilateral imports and exports declared by both countries[3]), lnY_iY_j is the log of the product of nominal GDPs (in constant US$), lny_iy_j is the log of the product of nominal GDPs per capita, $Border_{ij}$ is a dummy variable that takes the value of 1 if two countries share the same border and 0 otherwise, $Lang_{ij}$ is a dummy which takes the value of 1 if two countries share the same language and 0 otherwise, lnD_{ij} is the log of the distance between two capitals of corresponding countries, $lnSurf_{ij}$ is the log of the surface product (surface area of country i times surface area of country j), $LandLock_{ij}$ is the number of landlocked countries in the pair (0,1 or 2), FTA_{ij} is a dummy variable for common membership in a Free Trade Area[4] ("1" if both countries belong to the same Free Trade Area and "0" otherwise), EU_{ij} is the same for membership in the EU, and, finally, the variable of interest, EMU_{ij}, represents membership in EMU.

---

[3] Imports from country i to country j declared by country i do not necessarily equal exports from country j to country i declared by country j. This is why I use the average of these values.

[4] My sample comprises of countries that belong to 3 Free Trade Agreements: European Union, Central European Free Trade Agreement (CEFTA) and Baltic Free Trade Area (BAFTA) (see Attachment 2 for the list of members). In order to avoid double counting the FTA dummy comprises of 2 Free Trade Agreements: CEFTA and BAFTA. Also note that although some countries ceased their memberships in either CEFTA or BAFTA in 2004 because of entering the EU, I will still treat them as non-EU members in 2004 as that year was a transitional one and cannot be treated as a full year of membership in the EU.

Panel data analysis

Glick and Rose (2001) argued that the cross-section analysis might not be the most efficient way to analyze the effect of a Monetary Union on Trade. The authors argued that fixed effect estimation answers the more important policy perspective question of whether joining a Currency Union has an impact on trade for new members. It estimates the coefficient on the membership in a Currency Union by comparing trade for a pair of countries before CU creation to trade for the same pair of countries after CU creation as opposed to the cross-section OLS estimation where trade between CU members is compared to trade between CU non-members (Glick and Rose, 2001). The only weaknesses of the fixed effect ("Within") estimator are the impossibility of measuring time-invariant variables as well as lack of efficiency. The latter can be ignored, as my data set is fairly large.

I begin my panel data analysis by estimating the following model:

$$LnT_{ij} = \beta_0 + \beta_1 lnY_i Y_j + \beta_2 lny_i y_j + \beta_3 Border_{ij} + \beta_4 Lang_{ij} + \beta_5 lnD_{ij} + \beta_6 lnSurf_{ij} +$$
$$+\beta_7 LandLock_{ij} + \beta_8 FTA_{ij} + \beta_9 EU_{ij} + \beta_{10} I_{98} + \beta_{11} I_{99} + \beta_{12} I_{00} \varepsilon_{ij} + \beta_{13} I_{01} + \beta_{14} I_{02} + \beta_{15} I_{03} +$$
$$\beta_{16} I_{04} + \varepsilon_{ij}, \tag{1*}$$

where all the variables are as described in the *Section 4.2* plus year-specific dummies ($I_{98} - I_{04}$). Inclusion of the year-specific dummies allows me to control for the year-specific effect on trade (for instance, global change in the oil price that affected all countries in the sample). Note that equation (1*) does not include the EMU variable, which is added in the next model specification. As will be shown later, exclusion of the EMU variable, an important variable that belongs to the model, leads to biased estimates.

Some changes in the model specification will be made in order to better estimate the effects of the EMU as well as the FTAs. In total five separate regressions with different model specifications will be run:

1)   I run pooled OLS using the equation (1*);

2)   I add EMU variable to the equation (1*);

3)   I combine the FTA dummy with the EU dummy into the single FTA2 dummy since the FTA dummy only represents the combined effect of CEFTA and BAFTA. I believe that FTA2 dummy is more appropriate in order to show the effect of the Free Trade Agreements in Europe on trade between members.

4)   I split the FTA2 dummy into three dummies: EU, CEFTA and BAFTA. This will enable to show the trade effect of each Free Trade Agreement.

5)   I will include country-pair specific dummies and exclude all time-invariant variables (Least Squares Dummy Variable estimation).

A country-pair specific dummy, which takes value of one whenever the specific country-pair is observed in the panel data, captures all observable and unobservable characteristics of the country-pair that are invariant over time and impact bilateral trade. Therefore, the last model specification excludes all time-invariant variables since they are captured by the country-pair fixed effects. This model specification allows us to estimate the effect of membership in the EMU while controlling not only for observed time-invariant explanatory variables such as distance or common border, but also for omitted time-invariant unobserved explanatory variables that can affect bilateral trade. For instance, if Poland historically traded more with Germany than what is due to the explanatory variables, then the Germany-Poland country-pair dummy will capture this

openness to trade. Therefore, if Poland were to adopt the euro in 2004, the country-pair dummy would capture historically high trade volume between Poland and Germany and the EMU dummy would supposedly capture only the effect of the euro adoption (Micco et al., 2003). The estimator that includes country-pair specific dummies, called the Least Squares Dummy Variable (LSDV) estimator, is equivalent to the fixed effect ("Within") estimator (Wooldridge, 2002, p.273). As argued by Glick and Rose (2001), the last model specification is the most appropriate for the estimation of the effect of entering the Monetary Union on trade between members.

Data

The data for this study has been obtained from different sources such as the IMF, the World Bank, the CIA, and the University of Michigan geographic name server. Trade data (exports and imports) for 25 European Union members for the period from 1997 until 2004 inclusive has been taken from the IMF Direction of Trade Statistics (DOTS). The year 1997 was chosen as a starting point for the analysis because prior to this year we observed many missing values in the data. The data for the years 1997 to 2004 have no missing values, allowing me to work with the balanced panel data. There are in total 276 country-pair observations for each year[5]. In the panel data estimation, the trade data has been deflated by the US CPI, taken from the IMF International Financial Statistics.

The data on GDP and per capita GDP have been obtained from the World Development Indicators (WDI) of the World Bank. In the cross-section data analysis I

---

[5] Belgium and Luxembourg are considered as one "country" because of the Belgium-Luxembourg customs union. Therefore, the number of country-pair observations can be computed as (24x23)/2=276.

use the nominal GDPs while in the panel data regressions, real GDPs with the base year of 1997 have been used. Data on common borders, common language, surface area and landlocked condition were obtained from the CIA World Factbook. The data on distances between capitals were obtained from the University of Michigan geographic name server. Data on Free Trade Agreements were taken from Frankel (1997).

Empirical Results

Cross-section data analysis

I run OLS regressions using equation (1) for each year starting with 1997 until 2004[6] inclusive. Table 1 displays estimated coefficients for the EMU, EU and FTA dummy variables. The complete results for all the variables in the regressions are presented in the Attachment 3.

I define the EMU dummy as the one that takes a value of one for all EMU country-pairs even before the creation of the European Monetary Union. The purpose of this exercise is to see whether there is a jump in the coefficient at the time when the Monetary Union was created. In other words, I want to trace the changes in trade volumes between EMU members throughout the whole period (1997 – 2004). Scholars such as Micco et al. (2002), Berger and Nitsch (2005) also use this technique to analyze the effect of a Monetary Union on trade using the cross-section data.

The model fits the data quite well: R-squared in all eight regressions is quite high (approximately 0.94), which tells us that around 94% of variation in the bilateral trade is

---

[6] I chose this sample period (1997-2004) because it allowed me to work with the balanced panel data. Other authors such as Micco et al. (2003) use the short sample period (1992-2002) and the longer one (1980-2002) in the similar regression analysis. The results they obtained from both samples do not significantly differ from each other. Therefore, I believe that extending my sample period will not drastically change the general conclusion.

explained by the variation in our explanatory variables. The EMU coefficient becomes statistically significant in 1998 and following years. It is consistent with the findings of Micco et al. (2003) who argued that although the Monetary Union was officially created in 1999, "the year 1998 was a pivotal year in the process of monetary unification" (Micco et al., 2003, p.331). The value of the EMU coefficient varies from 0.334 in 2002 to 0.385 in 2000, which implies that countries that share the euro trade 39.7% to 47%[7] more compared to the ones that do not. The value of the coefficient is comparable but slightly lower than the one estimated by Micco et al. (2002) (0.462 to 0.467), who used the similar regression but different than mine data set. The authors analyzed the data for 22 developed countries (including 15 EU members) over the period from 1992 till 2001.

Table1. OLS gravity estimates

Year	EMU	EU	FTA
1997	0.229 (1.634)	0.061 (0.374)	1.316 (6.173)***
1998	0.252 (1.79)*	0.006 (0.030)	1.254 (5.87)***
1999	0.369 (2.722)***	-0.064 (-0.402)	1.361 (6.603)***
2000	0.385 (2.721)***	-0.135 (-0.813)	1.335 (6.198)***
2001	0.344 (2.616)***	0.011 (0.070)	1.084 (5.419)***
2002	0.334 (2.566)**	-0.061 (-0.398)	1.099 (5.560)***
2003	0.358 (2.771)***	-0.056 (-0.373)	1.108 (5.637)***
2004	0.371 (2.801)***	-0.105 (-0.674)	1.237 (6.138)***

Note: t-statistics in parentheses. *** - significance at 1%; ** - 5%; * - 10%.

Number of observations in each regression: 276

According to my estimates of the EU dummy, the effect of membership in the European Union has no statistically significant effect on bilateral trade. However, one

---

[7] Since the value of the EMU coefficient represents the effect of membership in the EMU on the logarithm of trade, the following formula is used to calculate the effect of the euro on trade: $e^{\beta}-1$, where β - is the EMU coefficient

should not conclude that membership in the European Union has no effect on trade. The data suggests that relatively to the GDP level, members of the European Union trade more than non-members. It is possible that higher trade volumes between EU members are well explained by their high GDPs, proximity to each other as well as other gravity equation variables. If this is the case then the marginal effect of the EU may be insignificant even though the EU members do trade more with each other than non-EU members.

The most interesting finding so far is a relatively high and statistically significant value of the coefficient for Free Trade Agreement dummy. In fact, the value of the coefficient implies that membership in either CEFTA or BAFTA has, on average, much stronger effects on bilateral trade (195.6% to 290%) compared to the membership in the Monetary Union (recall, 39.7% to 47%). Membership in the Free Trade Agreement such as CEFTA or BAFTA nearly doubles or even triples the trade between members. In the panel data analysis I introduce FTA2 dummy that would capture the effect of all 3 FTAs that are present in my data: EU, CEFTA and BAFTA. It will allow me to better estimate the effect of the Free Trade Agreement on trade.

Other explanatory variables in my OLS regressions have the expected signs and magnitudes. Both distance and landlocked condition have negative and statistically significant effects on trade. Product of GDPs has positive and statistically significant effect on trade as predicted by the standard gravity model. Product of GDPs per capita has positive but, with the exception of years 1999 and 2000, not statistically significant effects on trade. The rest of explanatory variables such as the product of surface areas,

common border and common language have positive but not statistically significant effects on trade.

To sum up, the results on cross-section data showed that countries that share the same currency trade on average 39.7% to 47% more compared to the ones that do not. Furthermore, countries that belong to either CEFTA or BAFTA trade even more. It is evident that there was a jump in the EMU coefficient from 0.252 in 1998 to 0.369 in 1999. It is consistent with the Figure1 that clearly displays a sharp increase in trade volumes between EMU members in 1999.

Panel data analysis

First, I redefine the EMU dummy variable. In the cross-section data analysis the EMU dummy takes the value of one for all 12 members for the entire period (1997 till 2004), as I was interested in tracing the changes in the trade volumes for the same countries before and after EMU membership. Now, as I run regressions on the pooled data that consists of 2208 observations (276 observations per year times 8 years), I want my EMU dummy to display the membership in the EMU only in the years in which countries were EMU members. Therefore, EMU dummy takes a value of one if both countries in the country-pair belong to the EMU as of 1999 (with the exception of Greece that joined the EMU in 2001).

As was described in the Section 4.3, I run five separate regressions using different model specifications. Each column in the Table2 corresponds to the appropriate model specification described in Section 4.3. As I described earlier, Model (1) excludes the EMU variable. The coefficients from Model (1) have the expected signs and magnitudes.

However, inclusion of the EMU dummy in Model (2) drastically changes the magnitude as well as significance of the EU variable. While EMU coefficient is large (0.237) and significant at 1% level of significance, EU coefficient drops to 0.087 and is only significant at 10% level. It is evident that Model (1) suffers from the omitted variable bias. The positive bias in the EU coefficient is removed as soon as I add the EMU variable, a significant variable that belongs to the model.

Models (2) – (4) are similar in the sense that they tell us whether countries belonging to a Free Trade Area or Monetary Union trade more compared to the ones that do not. Therefore, I can conclude that EMU members trade on average from 8.8% to 26.7% more compared to non-members (EMU coefficient ranges from 0.084 to 0.237 depending on the model specification). Members of the CEFTA or BAFTA trade on average 232% more than non-members. FTA coefficient from model (2), which show the combined effect of CEFTA and BAFTA, equal 1.20. The only reasonable explanation for these enormous trade effects is the fact that CEFTA and BAFTA were established with the intention of joining the European Union.

Hence, members of the CEFTA and BAFTA were getting ready to join the European Union by removing existing trade barriers, which led to higher trade volumes between members. The combined effect of all 3 FTAs as captured by the FTA2 dummy is 61.28% (the value of the FTA2 coefficient from model (3) is 0.478). This means that countries belonging to a Free Trade Area trade on average 61.28% more with each other than the ones that do not.

It is important to note that the fact that EMU members trade more compared to non-members may not imply that this is because they all share the same currency. It is

possible that models (2) – (4) do not include some important variables, which could lead to biased estimates. Recall the Germany-Poland example, in which the high trade volume between these countries is partially attributed to their close historical ties. If this is the case then this 'history of trade' effect could be picked up by the EMU variable, which makes the EMU coefficient biased. This problem is addressed by estimating the EMU coefficient using model (5), which is designed to estimate the effect of time-variant variables such as the EMU controlling for all observed and unobserved time-invariant variables, which, in my case, include EU, CEFTA and BAFTA. The country-pair dummies included in Model (5) capture all time-invariant variables that affect trade focusing on estimating the effect of time-variant variables such as the EMU membership. If countries that joined the EMU really experienced a persistent increase in trade after joining the Monetary Union, the EMU dummy from Model (5) must come up large and statistically significant. Otherwise, I will conclude that higher trade volumes of the EMU members cannot be attributed to the adoption of the euro. Scholars, such as Glick and Rose (2001), Micco et al. (2003) among the others also argue that the inclusion of the country-pair dummies is the best way to estimate the effect of entry into a Monetary Union.

Table2. Pooled panel OLS gravity estimates

Variable:	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Constant	-27.843 (-55.35)***	-27.847 (-55.64)***	-24.372 (-59.53)***	-29.166 (-58.32)***	-44.327 (-7.81)***
Log of distance	-1.132 (-43.98)***	-1.145 (-44.46)***	-1.198 (-45.94)***	-1.115 (-44.33)***	-
Log of product of surface areas	0.009 (0.85)	0.012 (1.17)	0.002 (0.16)	-0.0005 (-0.05)	-
Log of product of GDPs	0.814 (65.97)***	0.811 (65.92)***	0.798 (63.32)***	0.835 (68.76)***	0.98 (9.42)***
Log of product of GDPs per capita	0.007 (0.28)	0.017 (0.67)	-0.104 (-4.51)***	0.023 (0.95)	-
Common border	0.218 (3.88)***	0.179 (3.17)***	0.262 (4.54)***	0.142 (2.58)***	-
Common language	0.183 (3.25)***	0.207 (3.68)***	0.164 (2.85)***	0.213 (3.90)***	-
Landlock condition	-0.233 (-8.28)***	-0.240 (-8.54)***	-0.199 (-6.94)***	-0.160 (-5.67)***	-
FTA= (CEFTA + BAFTA)	1.184 (15.98)***	1.20 (16.27)***	-	-	-
FTA2= (CEFTA+BAFTA +EU)	-	-	0.478 (12.16)***	-	-
CEFTA	-	-	-	0.871 (11.26)***	-
BAFTA	-	-	-	2.539 (18.40)***	-
EU	0.199 (4.35)***	0.087 (1.69)*	-	0.038 (0.75)	-
EMU	-	**0.237 (4.84)***	**0.084 (1.73)*	**0.233 (4.89)***	**-0.047 (-1.57)**
R-squared	0.939	0.939	0.936	0.943	0.991
Number of observations	2208	2208	2208	2208	2208
Year dummies	Yes	Yes	Yes	Yes	Yes
Country-pair dummies	No	No	No	No	Yes

Note: t-statistics in parentheses; *** - significance at 1%; ** - 5%; * - 10%;
The log of product of GDPs per capita is excluded from the last model specification because of its high correlation with the country-pair dummies

As one can see from the empirical results using the fifth model specification, the inclusion of the country-pair dummies drastically changed the previous findings. The EMU coefficient suddenly became negative and no longer statistically different from zero. This causes serious concerns regarding the effect of membership in the European

Monetary Union on trade. Micco et al. (2003) observed that "the currency union effect is systematically smaller when pair dummies (country-pair dummies – author) are included" (Micco et al., 2003, p.329). The authors stated that one possible explanation for this relates to the possibility of reverse causality or, in other words, the 'endogeneity bias'. The idea behind the reverse causality is that countries may be joining the Currency Union because they already trade a lot and not vice versa. The inclusion of country-pair dummies reduces the endogeneity bias and allows us to better estimate the time-variant effects such as the effect of entry into the EMU (Micco et al., 2003, pp.329-330).

So, does it mean that when we control for the country-pair specific effects such as the intensity of trade between two countries, the effect of joining the Monetary Union is eliminated? According to my estimates – yes. In other words, it's not the euro that boosts the trade between the EMU members, it's the high volume of trade that leads to sharing the same currency (reverse causality issue). It is important to note that the country-pair dummies in our case capture the effect of a Free Trade Agreement. As I described in Section3, European countries had over 50 years of history of economic integration that gradually led to the removal of trade barriers and thus increased bilateral trade between countries. No wonder then that the effect of the euro is eliminated as soon as we control for country-pair specific effects that include the FTA effect as well as history of trade between two countries.

Conclusions

Monetary integration in Europe has raised many questions. The most important one is: Do countries benefit from sharing the common currency? Politicians see the

adoption of the euro as a necessary step in the European economic and political integration while economists have different perspective on this issue. Some argue that joining the Euroland has potentially large trade benefits while others see it as an unnecessary step that makes a country give up its important macroeconomic tool such as the ability to conduct its own monetary policy.

In this paper I analyzed the effect of membership in the European Monetary Union on trade. Using the data for 25 European countries over the period from 1997 till 2004, I showed that although members of the European Monetary Union do trade more with each other (the effect ranges from 39.7% to 47% in the cross-section data analysis and from 8.8% to 26.7% in the panel data analysis), the effect of entering the Monetary Union is eliminated as soon as we control for country-pair specific effects that capture all observed and unobserved effects that are specific to each country-pair including the FTA effect as well as historically intense trade relations between two countries. It leads to the conclusion that the fact that countries that joined EMU trade more with each other cannot be attributed to the adoption of the euro. Joining the Monetary Union seems to be a culmination point for well-integrated countries with long history of trade relations. Nevertheless, the data suggest that joining the Euroland did boost trade between member countries in 1999. However, it didn't lead to the gradual and consistent increase in trade, but rather to a sharp jump in 1999 that was quickly exhausted over the next five years. Another important finding of this paper is that members of the Free Trade Agreement in Europe traded on average 61.28% more compared to non-members, the effect much higher than the one of the EMU members. Moreover, members of Free Trade Agreements such as CEFTA and BAFTA, designed to prepare countries to the integration

to the EU, experienced significantly high trade intensities. It has important policy implications as it suggests that it is the Free Trade Agreements that lead to high trade volumes and not the euro. Countries that joined CEFTA and BAFTA with the intention of joining the European Union in the future already achieved high trade volumes by removing trade barriers and thus preparing themselves for the European Single Market. While they still should expect increase in their bilateral trade after joining the EU, the effect of sharing the euro would be negligible. My results suggest that countries that are eager to join the European Union and eventually the European Monetary Union such as the Ukraine should put the question of joining the Free Trade Area such as CEFTA as a number one on their foreign policy agenda. It will allow them to benefit from the increase in trade while waiting for the full EU membership.

The findings of this paper are in certain aspects contradictory to the ones of Rose(2000), Micco et al.(2003), among others, and support the position of Berger and Nitsch (2005) and others. Further research and time will allow to re-evaluate whether there is actually a trade effect of membership in the European Monetary Union.

Bibliography

Anderson J. and van Wincoop E. (2001) "Gravity with Gravitas: A Solution to the Border Puzzle" *National Bureau of Economic Research (Cambridge, MA) Working paper No.8079.*

Barr D., Breedon F. and Miles D. (2003) "Life on the outside: economic conditions and prospects outside euroland" *Economic Policy 37, 573-613.*

Berger H. and Nitsch V. (2005) "The Euro and Trade: A Historical Perspective" *CESifo working paper #1435 presented at CESifo area conference on global economy.*

Frankel, J. (1997). *Regional Trading Blocs in the World Economic System*, Institute for International Economics. Washington, DC, October.

Frankel J. and Rose A. (2001) "An estimate of the effect of common currencies on trade and income" *Quarterly Journal of Economics, May.*

Gerber, J. (2005) *International Economics.* 3rd Edition*, San Diego State University.*

Glick, R. and Rose, A. (2002) "Does a Currency Union affect Trade? The Time Series Evidence" *European Economic Review 46, 1125-1151.*

Helliwell, J. (1998) *How Much Do National Borders Matter?*, Brookings Institution Press, Washington, DC.

International Monetary Fund (2005). Direction of Trade Statistics Database.

Kenen P. (2002) "Currency Unions and Trade: Variations on Themes by Rose and Persson" *Reserve Bank of New Zealand Discussion Paper # DP2002/08.*

Krugman, P. and Obstfeld M. (2006) *International Economics: Theory and Policy.* 7th Edition, Pearson-Addison and Wesley.

McCallum, J. (1995) "National borders matter: Canada-US regional trade patterns" *American Economic Review.*

Micco A., Stein E. and Ordoñez G. (2002) "The Currency Union Effect on Trade: Early Evidence from the European Union" *Inter-American Development Bank, April.*

Micco A., Stein E. and Ordoñez G. (2003) "The Currency Union Effect on Trade: Early Evidence from the European Union" *Economic Policy 37, 315-356.*

Nitsch, V. (2002) "Honey, I Shrunk the Currency Union Effect on Trade" *The World Economy 25(4), 457-474.*

Pakko, M. R. and Wall H. J. (2001) "Reconsidering the trade-creating effects of a currency union" *FRB St. Louis Review 83(5), 37-45.*

Persson, T. (2001) "Currency Union and Trade: How Large is the Treatment Effect" *Economic Policy 33, 433-448.*

Rose, A. (2000) "One Money, One Market: Estimating the Effect of Common Currencies on Trade" *Economic Policy 30. 7-45.*

Rose, A. (2001) "Currency Unions and Trade: The Effect is Large" *Economic Policy 33, 449-461.*

Rose, A. (2002a) "Honey, The Currency Union Effect on Trade Hasn't Blown Up" *The World Economy 25(4), 475-479.*

Rose, A. (2002b) "The effect of Common Currencies on International Trade: Where do we Stand?" *MAS Occasional Paper No. 22, August.*

Rose, A. and van Wincoop, E. (2001) "National Money as a Barrier to International Trade: The Real Case for Currency Union" *American Economic Review 91(2), 386-90.*

Rose, A. and Engel C. (2002) "Currency Unions and International Integration" *Journal of Money, Credit and Banking 34(4), 1067-1089.*

Rose, A. and Stanley T.D. (2005) "A Meta-Analysis of the Effect of Common Currencies on International Trade", *Journal of Economic Surveys 19(3), 347-366.*

Tenreyro, S. (2001) "On the Causes and Consequences of Currency Union" *Cambridge, United States: Harvard University. Mimeographed document.*

Thom, R. and Walsh, B. (2002) "The effect of a currency union on trade: Lessons from the Irish experience" *European Economic Review 46, 1111-1123.*

Tinbergen, J. (1962) "*Shaping the World Economy: Suggestions for an International Economic Policy"* New York: Twentieth Century Fund.

Wooldridge, J.M. (2002) *Econometric analysis of Cross Section and Panel Data,* The MIT Press: Cambridge, MA; London, England.

World Bank (2005) World Development Indicators. *Washington, DC, United States: World Bank. CD ROM.*

Attachment1

34 Estimates of Effect of Currency Union on Trade

Author	Year	γ	s.e. of γ	Author	Year	γ	s.e. of γ
Rose	2000	1.21	0.14***	Klein	2002	0.50	0.27*
Engel-Rose	2002	1.21	0.37***	Estevadeoral, et al	2003	0.293	0.145**
Frankel-Rose	2002	1.36	0.18***	Alesina, Barro, Tenreyro	2003	1.56	0.44***
Rose-van Wincoop	2001	0.91	0.18***	Smith	2002	0.38	0.1***
Glick-Rose	2002	0.65	0.05***	Bomberger	2002	0.08	0.05
Persson	2001	0.506	0.257**	Melitz	2002	1.38	0.16***
Rose	2001	0.74	0.05***	Saiki	2002	0.56	0.16***
Honohan	2001	0.921	0.4**	Micco, Stein, Ordonez	2003	0.089	0.025***
Nitsch	2002b	0.82	0.27***	Kenen	2002	1.222	0.305***
Pakko and Wall	2001	-0.38	0.529	Bun and Klaassen	2002	0.33	0.1***
Walsh and Thom	2002	0.098	0.2	de Souza	2002	0.17	0.24
Melitz	2001	0.7	0.23***	de Souza and Lochard	2003	1.21	0.12***
Lopez-Cordova, Meissner	2003	0.716	0.186***	Flam and Nordstrom	2003	0.139	0.02***
Tenreyro	2001	0.471	0.316	Barr, Breedon and Miles	2003	0.25	0.033***
Levy Yeyati	2003	0.5	0.25**	de Nardis and Vicarelli	2003	0.061	0.027**
Nitsch	2002a	0.62	0.17***	Rose	2004	1.12	0.12***
Flandreau and Maurel	2001	1.16	0.07***	Subramanian-Wei	2003	0.732	0.08***

Note: *** - significance at 1%, ** - 5%, * - 10%;
    γ - Monetary Union effect;
    s.e. of γ - standard error of γ.

Source: Rose, A. *Recent Developments in Optimum Currency Areas* (PowerPoint presentation). UC Berkeley, CEPR and NBER.
http://faculty.haas.berkeley.edu/arose/OCABoJ.pdf

Attachment 2

Free Trade Agreements in Europe

The European Free Trade Association (EFTA) was established in 1960 as an alternative for European countries that were not allowed or did not wish to join the European Community (former EU). The United Kingdom, Denmark, Norway, Sweden, Austria, Switzerland and Portugal were the original members of the EFTA. Iceland joined the EFTA in 1970, Finland in 1986 and Liechtenstein in 1991. In 1973 the United Kingdom and Denmark joined the European Community and thus ceased to be EFTA members. Portugal left EFTA for the European Community in 1986 and Austria, Finland and Sweden in 1995. Norway, Switzerland, Iceland and Liechtenstein are current members of the EFTA.

The European Union (EU) was established in 1992 by the Maastricht Treaty and originally included 12 members (Belgium, France, Germany, Italy, Luxembourg, Netherlands, Denmark, Ireland, United Kingdom, Greece, Portugal and Spain). Austria, Finland and Sweden joined the EU in 1995. Ten new members (Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta) joined the EU in 2004.

The European Economic Area (EEA) was established in 1994 to allow EFTA members to participate in the European Common Market without having to join the EU. Switzerland decided not to become a member of the EEA. Current members of the EEA are 25 EU members plus three out of four EFTA members (Norway, Iceland and Liechtenstein).

The Central European Free Trade Agreement (CEFTA) was established in 1992 by Poland, Hungary and former Czechoslovakia. Slovenia joined CEFTA in 1996, Romania in 1997, Bulgaria in 1998, Croatia in 2002 and the Republic of Macedonia in 2006. CEFTA served as a preparation for full EU membership and therefore upon accession to the EU countries are expected to leave CEFTA. Therefore, Poland, Hungary, Czech republic, Slovakia and Slovenia left CEFTA in 2004 when they entered the EU.

In analogy to the CEFTA, **The Baltic Free Trade Agreement (BAFTA)** was established in 1994 by three Baltic States (Estonia, Latvia and Lithuania) interested in the EU membership. It ceased to exist when its members joined the European Union in 2004.

Sources:

1. Frankel, J. (1997). *Regional Trading Blocs in the World Economic System*, Institute for International Economics. Washington, DC, October.

2. http://en.wikipedia.org/wiki/European_Union

Attachment3

OLS results for cross-section analysis

Variable:	1997	1998	1999	2000	2001	2002	2003	2004
<u>Constant</u>	-28.671	-28.976	-30.676	-30.908	-28.144	-28.762	-28.705	-28.882
	(-20.7)***	(-20.5)***	(-22.3)***	(-20.8)***	(-19.9)***	(-20.2)***	(-19.7)***	(-18.8)***
Log of distance	-1.190	-1.142	-1.177	-1.155	-1.155	-1.137	-1.166	-1.187
	(-15.9)***	(-15.2)***	(-16.3)***	(-15.3)***	(-16.4)***	(-16.3)***	(-16.9)***	(-16.8)***
Product of surface areas	0.039	0.050	0.027	0.041	-0.036	0.015	0.032	0.016
	(1.27)	(1.64)	(0.93)	(1.33)	(-1.26)	(0.53)	(1.15)	(0.58)
Log of product of GDPs	0.786	0.769	0.802	0.800	0.831	0.806	0.815	0.822
	(21.86)***	(21.41)***	(23.23)***	(22.29)***	(24.82)***	(24.43)***	(25.00)***	(24.65)***
Log of product of GDPs per capita	0.098	0.130	0.174	0.175	0.038	0.068	0.023	0.035
	(1.36)	(1.77)*	(2.48)**	(2.31)**	(0.52)	(0.93)	(0.33)	(0.48)
Common border	0.126	0.162	0.121	0.144	0.170	0.198	0.181	0.198
	(0.77)	(0.98)	(0.76)	(0.87)	(1.10)	(1.30)	(1.20)	(1.27)
Common language	0.265	0.161	0.238	0.248	0.176	0.172	0.204	0.177
	(1.63)	(0.99)	(1.51)	(1.51)	(1.15)	(1.14)	(1.36)	(1.15)
Landlock condition	-0.297	-0.259	-0.243	-0.210	-0.190	-0.238	-0.250	-0.251
	(-3.67)***	(-3.18)**	(-3.09)***	(-2.55)**	(-2.48)**	(-3.15)***	(-3.35)***	(-3.28)***
FTA	1.316	1.254	1.361	1.335	1.084	1.099	1.108	1.237
	(6.17)***	(5.87)***	(6.60)***	(6.20)***	(5.42)***	(5.56)***	(5.64)***	(6.14)***
EU	0.061	0.006	-0.064	-0.135	0.011	-0.061	-0.056	-0.105
	(0.37)	(0.03)	(-0.40)	(-0.81)	(0.07)	(-0.40)	(-0.37)	(-0.67)
EMU	0.229	0.252	0.369	0.385	0.344	0.334	0.358	0.371
	(1.63)	(1.79)*	(2.72)***	(2.72)***	(2.62)***	(2.57)**	(2.77)***	(2.80)***
R-squared	0.942	0.939	0.947	0.940	0.943	0.944	0.945	0.942
Observations	276	276	276	276	276	276	276	276

Note: t-statistics in parenthesis; *** means significance at 1%, ** - 5%, * - 10%;

Attachment 4

List of countries used in regressions

Belgium-Luxembourg**
France**
Germany**
Italy**
Netherlands**
Denmark*
Ireland**
United Kingdom*
Greece**
Portugal**
Spain**
Austria**

Finland**
Sweden*
Poland***
Hungary***
Czech Republic***
Slovakia***
Slovenia***
Estonia****
Latvia ****
Lithuania****
Malta
Cyprus

Note: * denotes members of the EU (excluding 10 new members that joined in 2004) that are not members of the EMU; ** - EMU members; *** - former members of CEFTA; **** - former BAFTA members.