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Consequences of the euro adoption by Central and Eastern European countries for their trade flows

Key words: *Central and Eastern Europe, exports, euro*

Abstract: In this paper we estimate the trade effects of the euro adoption in Central European countries using a modified gravity model. In particular, we analyze the ex post implications of accession of Slovenia and Slovakia to the Eurozone. We employ a gravity model that controls for an extended set of trade theory and policy variables. Trade theory variables include both the country size and factor proportion variables. Trade policy variables include the membership in GATT/WTO, CEFTA, OECD, EU and Europe Agreements. The gravity model is estimated using the panel data approach on a sample of CEE countries trading with the rest of the world during the period 1992-2010 using the fixed effects, random effects and Hausman-Taylor estimators. It seems that elimination of exchange rate volatility resulted in trade expansion for the CEE countries but the accession to the Eurozone did not have any significant effects on exports of Slovakia and Slovenia.

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INTRODUCTION

The impact of the adoption of a common currency on international trade flows has been one of the most hotly debated issues in international economics. It has been frequently argued that the elimination of the exchange rate risk will stimulate exports of existing firms and encourage non-exporters that previously limited their operations to their domestic markets only to start exporting (Baldwin *et al.*, 2005). This effect is perceived to be especially important for countries where forward foreign exchange markets are not very well developed and there are no markets for hedging. Moreover, a reduction of the transaction cost associated with elimination of the exchange rate risk is argued to be important for countries that are characterized by the strong concentration of their trade with one large trading partner or a group of countries that share a common currency. This is the case for many Central and Eastern European (CEE) countries for which Germany is the main trading partner, and more than 50 per cent of their trade takes place with the members of the Eurozone. This issue has become even more important after the Eastern enlargement of the EU in 2004 and 2007. The new EU member states are obliged to eventually join the Eurozone, however the final date has not been set. The accession to the Eurozone requires satisfaction of the Maastricht convergence criteria. One of them is related to the accession to the exchange rate mechanism (ERM II) with the aim of reducing the exchange rate variability.

Following the first wave of the EU enlargement to the East, Estonia, Lithuania and Slovenia joined the ERM II already in June 2004, Cyprus, Latvia and Malta in May 2005, while Slovakia in November 2005. Slovenia was the first country to join the Eurozone in January 2007. Cyprus and Malta joined the Eurozone in January 2008, Slovakia in January 2009, and Estonia in January 2011. Other countries from Central and Eastern Europe such as Bulgaria, the Czech Republic, Hungary, Poland and Romania, that joined the EU despite their declarations to adopt the euro have not joined the ERM II so far.¹ Therefore, it is not possible to analyze ex post direct effects of the euro adoption for trade flows of these countries.

In our study we focus mainly on two Central European countries: Slovakia and Slovenia which are the largest of the new EU member countries that have so far adopted the euro.² Unfortunately, we cannot extend our analysis to include Estonia due to the lack of data covering the period after the Eurozone accession. Before joining the ERM II in 2004 the Slovenian tolar showed a gradual depreciation trend against the euro in the early 2000s and exchange rate stability afterwards with the relatively low level of volatility. In contrast, the Slovak koruna has experienced

¹ Bulgaria, although it did not officially enter the ERM II, pegged its currency to the euro since its creation in 1999 (before the Bulgarian lev was pegged to the German mark).

² In addition to two Central European countries: Slovenia and Slovakia we also study the trade effects of the euro adoption for two Mediterranean countries: Cyprus and Malta.

a gradual appreciation trend before and after the ERM II accession with the relatively higher level of exchange rate volatility compared to Slovenia (see Figures in Appendix II).

According to the recent empirical studies the trade flows among the old members of the EMU have grown on average by 10–15 % due to the use of a common currency and there was also an increase in trade with the non-member states. A number of empirical studies forecast a similar trade expansion in the case of the Eurozone member states. However, these studies did not take into account the latest EMU enlargements and the impact of 2008-2009 world economic crisis. Moreover, the formal empirical evidence on the trade consequences of the euro adoption in the new EU members states is still missing.

Therefore, the main aim of this paper is to evaluate the *ex post* effects of new EU member countries' accession to the European Economic and Monetary Union (EMU) on their trade flows. To evaluate these effects we will estimate a generalized gravity model. This study will help in understanding whether and by how much the adoption of the euro will contribute to the development of trade between other Central European countries and the members of the EMU.

In contrast to the previous studies, that were devoted to the evaluation of the effects of the creation of the Eurozone, we study the implications of accession of new Central European countries to the already existing and functioning EMU. We take into account the specificity of these countries that still have lower incomes per capita, are less developed and more agricultural than the founding members of the Eurozone. Moreover, the trade structure of Central European countries is different from that of the old Eurozone members. In particular, the Slovakia and Slovenia still trade more homogeneous and less differentiated goods than the Eurozone members which is reflected in much lower share of intra-industry trade in their trade flows despite their rapid increase in the recent years. In contrast to the case of the founding members of the Eurozone we should not expect that the assumption of complete specialization in production to hold in the case of the Central European countries. Therefore, to underpin our analytical framework we use the extended gravity model that assumes incomplete specialization in production and takes into account the role of factor proportions and technology differences.

Moreover, we control for the trade policy changes in Central European countries that may affect bilateral trade. Slovakia and Slovenia since the beginning of their economic transformation in the early 1990s have drastically liberalized their trade regimes and became the members of the multilateral as well as various regional trading agreements. These include CEFTA, EFTA and above all the Europe Agreements that served as an intermediate step towards the full EU membership. The subsequent steps in trade liberalization were often argued to have an important impact on the development of trade in the Central European countries in many previous studies and therefore will be taken into account in this study.

The structure of this paper is as follows. In the next section we survey the literature on the impact of the euro adoption in the Central European countries. Then, we describe the analytical framework and discuss data sources. Finally, we first present estimation results on the *ex post* impact of the euro on trade in Slovakia and Slovenia that have already adopted the common currency and then the estimation results for trade flows of all countries for which data was available. The last section summarizes and concludes.

LITERATURE REVIEW

The first widely cited attempts to estimate the trade effects of the monetary union were made by Rose (2000, 2001) who identified two main effects of the adoption of a common currency: the effects associated with the elimination of the exchange rate volatility and the pure monetary effect associated with the use of a single currency. His early studies yielded very surprising results, suggesting that the participation in the monetary union may increase trade between its member countries even threefold. Since then a number of studies on the potential trade effects of the participation in the monetary union have emerged. Many authors have suggested various reasons for overestimation of trade effects associated with the adoption of a common currency such as a sample selection bias or the endogeneity of the monetary union.³

For example, Barr *et al.* (2003) who studied the potential effects of the EMU for the EU and EFTA countries tried to solve the endogeneity problem by using instrumental variables. A similar study was done by Micco *et al.* (2003) who focused on the OECD countries. In these studies the predicted trade effects of joining the monetary union were much lower, and especially in the latter amounted only to a 6 per cent increase. An interesting study was done also by Flam and Nordstrom (2002) who studied the trade effects of a monetary union separately for various SITC product groups. It turned out that the strongest effects of the monetary union were reported for trade in processed manufactured products, and in particular SITC groups 6-8. More recently, Berger and Nitsch (2008) argue that the euro's impact on trade disappears if the positive trend in the institutional integration is controlled for. The comprehensive survey of the early literature on the trade consequences of joining the monetary union has been compiled by Baldwin (2006) who suggested the need of controlling for individual country effects (as well as multilateral resistance terms).

³ For example, endogeneity can be associated with central bank policies and colonial ties. In particular, exchange rate volatility may not be exogenous if central banks want to decrease the range of exchange rate fluctuations with respect to the currencies of their main trading partners. The main trading partners for developing countries are often former colonizers with respect to which former colonies stabilize their exchange rates.

More recent approach to studying the trade effects of the euro is based on the new strand in the trade theory literature that stresses the role of firm heterogeneity. For example, Di Mauro et al. (2009) take a firm perspective in assessing the impact of a single currency on trade volumes. According to this view lower trade costs force less productive firms out of business by the tougher competitive conditions of international markets. They argued that the impact on trade flows is at best only a first approximation of the possible gains arising from the euro. The reason is that trade creation is not a welfare gain in itself, but rather a channel through which different types of microeconomic gains can materialize. Thus, the economic integration fosters lower prices and higher average productivity. To assess the quantitative relevance of these effects they calibrate a general equilibrium model, using country, sector and firm-level empirical observations. They demonstrate that the euro has increased the overall competitiveness of Eurozone firms. The effects differ along the countries they tend to be stronger for countries which are smaller or with better access to foreign markets, and for firms which specialize in sectors where international competition is fiercer and barriers to entry lower. Therefore, the costs of non-participation in the Eurozone can be significantly higher for countries with smaller internal markets and smaller firms.

The trading potential of the Central European countries has been studied by many authors, including Fidrmuc *et al.* (2001). Very few attempts were made to estimate *ex ante* trade effects of the euro adoption by these countries. The first such attempt was made by Maliszewska (2004) who studied bilateral trade flows between the EU and the Central European countries during the period 1992-2002. She estimated a simple gravity model by OLS to find that the parameter estimate on the EMU dummy variable was positive and statistically significant. In particular, she found that as a result of the euro adoption trade would increase on average by 23 per cent. Then she used this estimate to make a forecast for the CEE countries assuming that these countries will reach the same level of trade openness as the EMU members. According to her forecast as the result of the euro adoption the less open countries such as Poland, Latvia and Lithuania will experience a significant increase in trade, while already open countries such as the Czech Republic, Estonia and Slovakia will experience a decrease in trade.

However, another study by Belke and Spies (2008) leads to a completely different conclusion. The authors included in their analysis all the OECD and the CEE countries during the period 1992-2004. They estimated a gravity model based on the assumption of the complete specialization using the Hausman-Taylor approach that allowed them to endogenize the EMU variable. In their study the estimated parameter on the EMU variable also turned out to be positive and statistically significant. However, in contrast to Maliszewska (2004) their forecast showed that relatively closed economies such as Poland, Latvia and Lithuania would experience a decrease in

their exports while more open economies such as the Czech Republic, Estonia and Slovakia would experience an increase in their exports.

In a more recent study by Cieřlik, Michałek and Mycielski (2009) analyzed the *ex ante* trade effects of Poland joining the Eurozone using a generalized gravity model. They employed panel data for the present members of the Eurozone and almost 100 other countries trading with the Eurozone countries during the period of 1993–2006. Their forecast consisted of two elements. First, the authors estimated the effect of exchange rate stabilization against the euro, making use of data for the group of Central and Eastern European countries which pegged their currency to the euro. The second component of the forecast was based on the analysis of the impact of joining the Eurozone. It involved the elimination of exchange rate fluctuations effect and the impact of trade policy changes related to joining the Eurozone. Their results suggested that just after joining the Eurozone, Polish exports will increase by ca. 12 per cent, but the positive effect will gradually disappear over time.

Finally, in a related contribution on the effects of the EMU enlargement by Brouwer, Paap and Viaene (2008), the authors studied the impact of the exchange rate volatility on trade and FDI using the fixed effects estimator and unbalanced panel data for 29 countries (the EMU members, the new EU countries, the rest of EU and the four other OECD countries: Canada, Japan, Switzerland and the US) during the period 1980-2005. Although their main results focused on FDI they report that the direct export effect of joining the EMU for all countries is positive and varied depending on the level of volatility and trade balance from 0.84 per cent for Lithuania to 13.3 per cent for Malta.

The *ex post* evaluation of trade effects of euro adoption in the Central European countries is virtually non-existent. The existing literature for the new EMU members concentrated so far on the fulfillment of the Maastricht criteria for the euro adoption, growth and business cycle synchronization. The examples include studies by Fidrmuc and Korhonen (2006), De Grauwe and Schnabl (2008), Frankel (2008), Feuerstein and Grimm (2007), and Sivak R. (2011). There are also empirical studies devoted to evaluation of *ex ante* effects of the accession to the Eurozone on trade flows based on the perception of firms. According to the study by Klučka et al. (2009), the accession to the Eurozone will eliminate the transaction costs, the exchange rate risk and will lead to the simplification of doing business with partners in the Eurozone which should result in trade expansion. This perception was especially pronounced among big enterprises in Slovakia. Moreover, small and medium size enterprises stressed the chances for new market acquisition. At the same time those firms expected an increase in competitive pressure from foreign competitors.

However, the formal *ex post* econometric evidence on the consequences of the euro adoption in the new EU members states for their aggregate trade flows is still lacking. The only exception is the study by Aristovnik and Meze (2009) who used a time series approach to study the *ex post* effect of the EMU creation for Slovenian trade. They argued that the trade benefits of the entry of new countries into the EMU would thus not be the same as the benefits of the initial formation of the EMU in the nineties. Their claim has been

tested on the example of Slovenia. A regression analysis of time series showed that there had been a positive effect on Slovenia's exports into and a negative effect on its imports from the Eurozone precisely at the time of the creation of the EMU in 1999. However, they did not study the *ex post* effects of 2006 Slovenia accession to the Eurozone.

ANALYTICAL FRAMEWORK

The analytical framework used in this study is based on the generalized gravity equation derived from the trade theory models that assume incomplete specialization in production. In the traditional gravity models trade flows are explained by the economic size of the trading partners and the distance between them. As argued in the introduction such models are not appropriate for explaining the pattern of trade of the Central European countries as they assume complete specialization in production. Therefore, in our specification in addition to the standard gravity variables we will also use the measures of relative factor endowments (Bergstrand (1990), Cieřlik (2009)). Moreover, we will also control for changes in trade policy that occurred during the period covered by our sample that reflect multilateral as well as regional trade liberalization. Our estimating equation used to study the determinants of bilateral trade flows, specified in the logarithmic form, is as follows:

$$\ln T_{ijt} = \alpha_0 + \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 \ln land_{it} + \alpha_4 \ln land_{jt} + \alpha_5 \ln Dist_{ij} + \alpha_6 EMU_{ijt} + \alpha_7 ERM2_{ijt} + \alpha_8 CPemu_{ijt} + \alpha_9 \ln Exchange_sd_{ijt} + \xi' Z_{ijt} + c_{ij} + \theta_t + \varepsilon_{ijt}$$

where:

T_{ijt} : bilateral exports between country i and j in year t ;

Y_{it} : GDP in country i in year t ;

$land_{it}$: arable land *per capita* in country i in year t ;

Y_{jt} : GDP in country j in year t ;

$land_{jt}$: arable land *per capita* in country j in year t ;

$Dist_{ij}$: distance between country i and j ;

EMU_{ijt} : dummy variable that takes value 1 if both countries are the members of the European Monetary Union in year t and 0 otherwise;

$ERM2_{ijt}$: dummy variable that takes value 1 if both countries are the members of ERM2 in year t and 0 otherwise;

$CPemu_{ijt}$: (*Central_pegged_to_EMU*): dummy variable that takes value 1 if both countries decided to stabilize their exchange rates by pegging their national currencies to the euro in year t and 0 otherwise;

$Exchange_sd_{ijt}$: exchange rate volatility between country i and country j in year t ;

Z_{ijt} : vector of other explanatory variables that may affect bilateral trade between country i and country j in year t (such as WTO and OECD membership, regional trading agreements and customs unions, historical ties, geographic location: contiguity, landlocked). The complete list of variables is presented below.

c_{ij} : individual country-pair specific effect that may be fixed or random depending on model specification;

θ_t : random, not observable time specific effect in the period t , affecting all observations in the same way.

ε_{ijt} : error term.

In addition to the standard set of gravity variables in our equation we used a set of control variables, that includes economic geography and historical ties variables as well as trade policy variables. Economic geography variables include contiguity and landlocked location. Contiguity may stimulate cross-border trade, while landlocked location may discourage trade due to lack of sea access. Moreover, many former French colonies pegged their currencies to the euro (previously the French franc) to facilitate trade. Therefore, we added an extra variable to control for this fact. Furthermore, communist past may affect trade of Central European countries. We speculate that trade in Central European countries might have been below the potential level because those countries were relatively closed under the communist regime.

Trade policy variables include various institutional arrangements facilitating development of international trade at the global or regional scale. World trade facilitating arrangements include GATT/WTO and OECD memberships. The main regional agreement affecting trade is the European Union. In addition to this we included also the variables describing participation in free trade areas concluded by Central European countries among themselves (CEFTA) and with the EU (Europe Agreements). These agreements can be seen as intermediates steps proceeding full EU membership. The aim of these agreements was to gradually liberalize trade and approximate legislation of Central European countries to EU standards.

Economic geography variables:

$contig_{ijt}$: dummy variable that takes value 1 if there is a common border between countries i and j in year t and 0 otherwise;

$repl_locked_i$: dummy variable indicating whether reporter country has the access to sea;

$partl_locked_j$: dummy variable indicating whether partner country has the access to sea;

Historical ties variables:

$Africa_EMU_{it}$: dummy variable that takes value 1 if a non-European (African) pegged its exchange rate to the euro in year t and 0 otherwise .

$part_CentralEurope_j$: dummy variable that takes value 1 if partner country is the Central European country and 0 otherwise;

Trade policy variables:

$GATT_WTO_{ijt}$: dummy variable indicating whether in year t both countries are the GATT/WTO members.

$OECD_{ijt}$: dummy variable indicating whether in year t both trading countries are the OECD members;

EU_{ijt} : dummy variable that takes value 1 if both countries are the members of the European Union in year t and 0 otherwise;

$Europe_Agrmt_{ijt}$: dummy variable that takes value 1 if CEE country was the member of the European Agreement in year t with the European Union and 0 otherwise;

$CEFTA_{ijt}$ (*Central Free Trade Area*): dummy variable indicating whether both trading countries in year t were the members of the CEFTA.

The generalized gravity equation was estimated using standard panel data techniques including fixed and random effects as well as using the Hausman-Taylor (H-T) approach to control for the potential endogeneity of the key explanatory variables such as: the EMU, the ERM2 and the various forms of pegging the exchange rates of Central European currencies to the euro. Our empirical specification includes an unobserved effect c_i that can be often correlated with explanatory variables. In this case the joint error term can be defined as $v_{ijt} = c_{ij} + \varepsilon_{ijt}$. In the case when the individual effect c_i is correlated with the explanatory variables, the estimation results will suffer from the simultaneity bias due to the correlation between the individual effects and the explanatory variables. The standard solution to this problem is to use fixed effects (FE) or first differences (FD). The main drawback of the aforementioned approaches is inefficiency of these estimators if some of the explanatory variables are in fact not correlated with the individual effects.⁴ Therefore, we refer to an intermediate solution and choose the Hausman-Taylor approach as the preferred estimation method. The main idea behind the Hausman-Taylor estimator is to use the time varying variables, assumed to be exogenous, as instruments to estimate the coefficients on the time invariant variables.⁵ There are two advantages of the HT estimator. First, it is more efficient than the FE estimator given assumptions concerning exogeneity of the explanatory variables are valid. Second, it allows us to obtain the parameter estimates on the time invariant explanatory variables.⁶ The explanatory variables can be divided into two groups: those that are correlated with c_i (endogenous) and those that are not (exogenous). In making our distinction between exogenous and endogenous variables we generally followed the approach proposed by Belke and Spies (2008). This approach assumes that the dummy variables for a membership in preferential trade and monetary agreements are endogenous variables. The H-T estimator allows us to obtain the estimates for all explanatory variables.

DATA SOURCES

⁴ Another drawback of this approach is the elimination of the potentially interesting variables which are time invariant, such as distance, from the model.

⁵ The Hausman-Taylor approach to estimate a standard gravity model was used by Egger and Pfaffermayr (2004), among other, in the context of OECD countries, and more recently by Belke and Spies (2008) in the context of euro adoption in Central and Eastern European countries. However, we are not convinced that the Hausman-Taylor estimator is helpful to solve the simultaneous causality in this context. First, the Hausman-Taylor estimator assumes that some explanatory variables are correlated with the individual-level random effects, but none of the explanatory variables are correlated with the regression error term. Thus, it does not correct the simultaneity problem completely, if omitted factors that affect both trade and integration vary not only by country pair but also over time. Second, as we know from previous research by Rose and others, using instrumental variables is not helpful here because there are no good instruments for the introduction of the euro.

⁶ Although the estimates of the coefficients on time invariant variables are not the main focus of our paper the possibility of estimating them is useful because the correct signs and realistic values on them can serve as a test of consistency of the empirical model with the economic theory that drives the gravity equation.

In our study we used bilateral trade flows of two Central European countries: Slovakia and Slovenia that were treated as *reporters*, among themselves as well as with all other countries, that were treated as *partners*, excluding the smallest countries.⁷ The detailed list of partner countries is provided in the appendix I. Our dependent variable is the volume of bilateral exports from the reporter to the partner country. This can be interpreted also as the volume of bilateral imports from the partner to the reporter country.⁸

The sample covers the period 1992-2010 which yields around 4.5 thousand observations for the combined sample of two countries. Since both Slovakia and Slovenia are small countries there are no observations for all partner countries in all years. We assumed that the lack of bilateral observations means no trade for a given country pair in a given year.

Macroeconomic data were obtained from the World Development Indicators (WDI) published on-line by the World Bank in Washington. Exchange rate data were called from the International Financial Statistics (IFS) 2011 database published on CD-ROM by the International Monetary Fund (IMF). The complete description of the dataset and data sources used in our study is provided below.

- Exports: data expressed in the current US dollars for exports (*gross exports*). Trade data comes from the WITS (*World Integrated Trade Solution*) database, compiled jointly by the World Bank, WTO and UNCTAD.
- *Exchange_sd_{ijt}*: variable measuring volatility of bilateral exchange rates in the importing and the exporting country. Bilateral exchange rates and their volatility were calculated using data from *International Financial Statistics* (IFS) database compiled by the International Monetary Fund, where the exchange rates were expressed in relation to the SDR of particular countries at the end of the month. Following earlier studies exchange rate volatility was measured using the standard deviation of first differences of logs. These differences are equal to zero when the exchange rate does not change.
- *GDP*: GDP variable is measured in current US dollars. GDP data comes from *World Development Indicators* (WDI) database compiled by the World Bank. GDP variable measures the economic size of trading countries.
- *Arable land per capita*: Data comes also from the WDI database. *Arable land per capita* measures differences in factor proportions between trading partners.
- *Dist_{ij}*: Geographic distance between trading countries measured using the *great circle formula*. Distance variable proxies for trade costs. Data on distance comes from CEPII (*Centre d'Etudes Prospectives et d'Informations Internationales*) database.
- *CONTIG_{ij}*: dummy variable indicating whether both trading countries share a common order;
- *OECD*: dummy variable indicating whether both trading countries are the OECD members;
- *GATT_WTO*: dummy variable indicating whether both countries are the GATT/WTO members.
- *CEFTA (Central Free Trade Area)*: dummy variable indicating whether both trading countries are the members of the CEFTA.

⁷ The smallest economies with the population less than 200 thousand inhabitants were excluded from our sample.

⁸ This interpretation should, however, be treated with caution due to asymmetry of the countries included in the groups of reporter and partner countries.

- *Europe Agreements*: dummy variable indicating the existence of the European Agreement between the CEE country and the EU member.
 - *Central_to_EMU*: dummy variable indicating whether the CEE country pegged its exchange rate to the euro.
 - *Extra_Europe_to_EMU*: dummy variable indicating whether a non-European (mainly African countries of the former French Franc zone) country when trading with the EMU member pegged its exchange rate to the euro.
 - *ERM 2*: dummy variable indicating participation in *Exchange Rate Mechanism 2*.
 - *EMU*: dummy variable indicating whether both trading countries are the members of the EMU.
- Landlocked and contiguity data come from CEPII (*Centre d'Etudes Prospectives et d'Informations Internationales*) data base. Other variables were created by the authors on the basis of publicly available information.

ESTIMATION RESULTS

In this section we firstly present estimation results on the *ex post* impact of the euro on bilateral exports of Slovakia and Slovenia that have already adopted the common currency. Secondly, we present the estimation results for trade flows of all countries for which data was available.

Estimation results for Slovenia and Slovakia

Our estimation results were obtained for the full sample for bilateral exports as well as the bilateral exports of two Central European countries: Slovakia and Slovenia. The estimation results for the bilateral exports obtained for the combined sample using three different estimation methods: the FE, RE and HT estimators are reported in Table 1.

TABLE 1. Estimation Results for the Combined Sample for Slovenia and Slovakia 1992-2010

(t- and z-stats)

Estimation method	FE (1)	RE (2)	H-T (3)
lrep_GDP	0.957*** (3.922)	0.928*** (3.788)	0.956*** (4.028)
lpart_GDP	0.607*** (7.602)	0.945*** (32.468)	0.612*** (7.963)
lrep_Land	-0.48 (-0.469)	-0.498 (-0.484)	-0.481 (-0.484)
lpart_Land	-0.448*** (-3.145)	0.004 (0.079)	-0.405*** (-3.133)
ldist		-1.624*** (-21.383)	-4.091*** (-3.014)
contig		0.009 (0.020)	10.205 (0.544)
rep_landlocked		0.495 (0.418)	0.376 (0.270)
part_landlocked		-0.413** (-2.495)	-1.175 (-0.994)
cefta	0.302* (1.743)	0.362** (2.104)	0.304* (1.803)
part_central_europe		0.285 (0.612)	-9.566 (-1.111)

europe_agreement	0.101 (0.929)	0.021 (0.202)	0.101 (0.957)
eu	0.331*** (2.619)	0.278** (2.228)	0.328*** (2.674)
oecd	0.602*** (5.225)	0.575*** (5.273)	0.603*** (5.391)
gatt_wto	0.279*** (2.736)	0.001 (0.007)	0.276*** (2.781)
exchange_sd	-0.128 (-1.071)	-0.093 (-0.828)	-0.127 (-1.094)
emu	-0.137 (-0.831)	-0.111 (-0.676)	-0.135 (-0.838)
central_to_emu	0.123 (0.794)	0.123 (0.796)	0.124 (0.823)
extra_europe_to_emu	-0.608*** (-3.919)	-0.725*** (-4.715)	-0.607*** (-4.024)
erm_2	-0.072 (-0.323)	-0.021 (-0.094)	-0.071 (-0.328)
cons	0.764 (0.568)	13.923*** (7.051)	34.309*** (2.974)
Number of observations	4770	4770	4770
Number of groups	326	326	326
r2_overall	0.4428081	0.7984832	
r2_between	0.5142812	0.8742437	
r2_within	0.2857729	0.2806798	

In column (1) of Table 1 we present the estimates of the benchmark gravity equation estimated via the fixed effects estimator in which the dependent variable is defined as the log of bilateral exports. The majority of the estimated parameters on the remaining explanatory variables derived from the trade theory and trade policy are statistically significant and display expected signs. In particular, the estimated parameters on both partner and reporter GDP were positive and statistically significant at the 1 per cent level.

It is also worth noting that the multilateral liberalization within GATT/WTO and OECD increased exports of Slovenia and Slovakia to their partner countries. Also the EU membership contributed to the expansion of exports of these Central European countries. Due to space constraints we do not go into details concerning the interpretation of all parameters as they serve as control variables here and our attention is focused mainly on the trade implications of the euro adoption.

It turns out that the estimated coefficient on the *EMU* membership, our key explanatory variable describing the situation when both trading countries are the members of the EMU, is not statistically significant. Thus, participation in the EMU does not expand trade of the new Eurozone member countries. This result is in contrast to the previous empirical results obtained for the original EMU members.

Also another potentially important variable that turned out to be statistically not significant was *Exchange_sd* that measured the exchange rate volatility. This is not in line with our initial expectations that the reduction in exchange rate volatility is associated with higher exports. This

result might be due to the fact that exchange rate volatility in both countries was relatively low in 2000s, especially in Slovenia.

Moreover, our estimation results reveal a positive but not statistically significant coefficient on the *Central_to_EMU* dummy variable. This variable indicates that the decision of some CEE countries to peg their local currencies to the euro did not contribute to the expansion of some Central European countries exports. This result is different from the results reported by Cieřlik, Michalek and Mycielski (2009) for the broader sample of countries in the pre-crisis period for which the decision of some Central European countries to peg their local currencies to the euro has strongly contributed to the expansion of their exports. This may be due to the fact that in our previous paper we used a different sample of countries, a different time span and a different set of control variables. In particular, some variables like the number of years of EMU membership was not applicable to Slovenia and Slovakia.

Another variable that also turned out to be not statistically significant was the *ERM2* variable. This suggest that the ERM2 membership did not help directly in export expansion. The contraction of trade within the Eurozone during the crises of 2008-2009 might have been responsible for these results. We devote more attention to this issue in the subsequent section.

The negative sign is reported in the case of the estimated parameter on the *Extra_Europe_to_EMU* dummy variable which is statistically significant at the 1 per cent level. Thus, the decision of some African countries to peg their currencies to Euro has depressed their exports to Slovenia and Slovakia in the period covered by our sample. This may be due to the fact that these countries are among the poorest and least developed countries that export mainly raw materials which very sensitive to the business cycle. Thus the 2008-2009 crisis limited their export revenues and negatively affected their imports from Slovenia and Slovakia.

The robustness of our benchmark estimates is investigated in the remaining columns of Table 1. In column (2) we estimate the same gravity equation for bilateral exports using the random effects estimator instead of the fixed effects. The estimation results obtained via the random effects look very similar to those obtained via the fixed effects. In particular, the estimated parameters on the EMU, ERM and *Central_to_EMU* are not statistically significant. A major important difference is that the estimated parameter on the GATT-WTO variable lost its statistical significance, while the EU and CEFTA variables became statistically significant at the 5 per cent level when the random effects estimator is used.

In column (3) we estimate the same equation for exports using the Hausman-Taylor estimation method. However, the estimation results obtained using this method do not differ much from the results obtained previously using the fixed and random effects estimators.

In Tables 2 and 3 we present the estimation results for the bilateral exports obtained separately for Slovenia and Slovakia, respectively. The particular columns of these tables are the counterparts of columns in Table 1.

TABLE 2. Estimation Results for Slovenia 1992-2010 (t- and z-stats)

Estimation method	FE	RE	H-T
lpart_GDP	0.710*** (7.114)	0.911*** (22.453)	0.729*** (7.750)
lpart_Land	-0.129 (-0.721)	0.039 (0.578)	-0.094 (-0.602)
ldist		-1.805*** (-16.347)	-2.465** (-2.285)
contig		-0.286 (-0.455)	0.278 (0.015)
part_landlocked		-0.536** (-2.248)	-0.743 (-0.600)
cefta	0.137 (0.640)	0.169 (0.794)	0.137 (0.664)
part_central_europe		0.047 (0.075)	-1.08 (-0.245)
europe_agreement	0.007 (0.052)	-0.033 (-0.260)	0.005 (0.037)
eu	0.363** (2.373)	0.309** (2.034)	0.359** (2.425)
oecd	-0.012 (-0.052)	0.034 (0.154)	-0.006 (-0.028)
gatt_wto	0.402*** (3.210)	0.11 (0.985)	0.395*** (3.259)
exchange_sd	-0.21 (-1.360)	-0.229 (-1.573)	-0.209 (-1.402)
emu	-0.159 (-0.779)	-0.177 (-0.877)	-0.154 (-0.780)
central_to_emu	0.098 (0.484)	0.125 (0.623)	0.094 (0.482)
extra_europe_to_emu	-1.109*** (-6.140)	-1.221*** (-6.841)	-1.108*** (-6.337)
erm_2	-0.186 (-0.629)	-0.128 (-0.434)	-0.185 (-0.646)
cons	4.649*** (11.000)	19.403*** (20.478)	24.912*** (2.725)
Number of observations	2377	2377	2377
Number of groups	162	162	162
r2_overall	0.5112172	0.8080326	
r2_between	0.5907686	0.8733255	
r2_within	0.2646392	0.2615957	

The results obtained for Slovenia using different estimation methods are quite similar to the results obtained for the combined sample. In the case of Slovenia participation in the Eurozone (EMU and ERM2 variables) did not have statistically significant impact on its exports. Similarly, neither the decision to peg the exchange rate against the Euro nor the reduction in the exchange rate

volatility affected Slovenian exports. An important difference with respect to the combined sample results is that the estimated parameter on the OECD variable is not statistically significant. This is not surprising given the fact that Slovenia joined the OECD very recently.

TABLE 3. Estimation Results for Slovakia 1994-2010 (t- and z-stats)

Estimation method	FE	RE	H-T
lpart_GDP	0.444*** (3.546)	0.965*** (23.699)	0.450*** (3.703)
lpart_Land	-0.794*** (-3.601)	-0.019 (-0.293)	-0.778*** (-3.671)
ldist		-1.450*** (-14.159)	-2.285 (-0.909)
contig		0.122 (0.184)	58.001 (0.720)
part_landlocked		-0.302 (-1.353)	-3.294 (-0.688)
cefta	0.455* (1.648)	0.562** (2.052)	0.456* (1.697)
part_central_europe		0.492 (0.677)	-42.166 (-0.749)
europe_agreement	0.188 (1.007)	0.029 (0.166)	0.187 (1.029)
eu	0.298 (1.421)	0.253 (1.225)	0.297 (1.454)
oecd	0.902*** (5.921)	0.811*** (5.706)	0.903*** (6.090)
gatt_wto	0.169 (1.040)	-0.068 (-0.503)	0.168 (1.063)
exchange_sd	-0.059 (-0.324)	0.053 (0.310)	-0.057 (-0.324)
emu	-0.113 (-0.353)	-0.035 (-0.111)	-0.111 (-0.357)
central_to_emu	0.05 (0.186)	0.053 (0.197)	0.05 (0.193)
extra_europe_to_emu	0.113 (0.418)	-0.002 (-0.009)	0.114 (0.432)
erm_2	0.055 (0.165)	0.071 (0.213)	0.054 (0.167)
cons	4.421*** (8.549)	16.402*** (18.584)	22.794 (1.073)
Number of observations	2393	2393	2393
Number of groups	164	164	164
r2_overall	0.318644	0.7940788	
r2_between	0.3076205	0.8771225	
r2_within	0.318604	0.3092308	

The results obtained for Slovakia are similar to the results obtained for Slovenia. In the case of Slovakia neither participation in the Eurozone (EMU and ERM2 variables) nor the reduction in the exchange rate volatility (*Central_to_EMU* and *exchange_sd*) had a statistically significant effect on its exports. An important difference between Slovakia and Slovenia is, however, related to the

EU, OECD and GATT-WTO memberships. The participation in the EU and GATT-WTO positively affected Slovenian exports and had no effect on the exports of Slovakia. However, the participation in the OECD had no impact on Slovenian exports but positively affected exports of Slovakia.

Estimation results for all countries

Our results for Slovenia and Slovakia demonstrate that the accession to the EMU did not result in a statistically significant increase in their exports. First, we hypothesize that the lack of significance of the EMU variable for the new member states in export regressions may result from the fact that the accession to the already functioning monetary union is different from the simultaneous foundation of the union by several large countries that decided to adopt the common currency. In the latter case the synergy effect of the common currency for the founding countries should be stronger compared to the former case when only one small country joins the monetary union. Second, the lack of statistical significance of the parameter on the EMU variable for the new member countries might result from the coincidence of the accession of Slovenia and Slovakia with the world crisis that depressed the world trade flows.⁹ In order to verify those hypotheses we perform the analysis for bilateral trade flows among all countries for which statistical data was available.¹⁰ The estimation results for all reporting countries with population exceeding 200ths. obtained using the Hausman-Taylor estimating method are reported in Table 4.

TABLE 4. Hausman-Taylor Estimation Results for All Countries 1990-2010 (z-stats)

	(1)	(2)	(3)	(4)	(5)	(6)
Cefta	-0.006 (-0.083)	-0.004 (-0.049)	-0.006 (-0.077)	-0.007 (-0.086)	-0.006 (-0.080)	-0.005 (-0.059)
Oecd	0.323*** (9.606)	0.322*** (9.568)	0.322*** (9.581)	0.321*** (9.545)	0.321*** (9.530)	0.320*** (9.522)
gatt_wto	0.217*** (17.311)	0.217*** (17.310)	0.217*** (17.316)	0.217*** (17.310)	0.217*** (17.310)	0.217*** (17.306)
europe_agreement	0.102***	0.100***	0.102***	0.101***	0.102***	0.099***

⁹ In particular trade in the automotive sector was strongly negatively affected by the world crisis. The world exports in this sector dropped by around 50 per cent in the first quarter of 2009. The exports of cars and their components constitute a large share of total exports of both Slovakia and Slovenia (see appendix IV).

¹⁰ Our analysis follows the previous study by Cieřlik, Michařek and Mycielski (2009) for the broader sample of countries in the pre-crisis period for which the decision of some Central European countries to peg their local currencies to the euro has strongly contributed to the expansion of their exports.

	(3.165)	(3.116)	(3.154)	(3.130)	(3.152)	(3.089)
exchange_sd	-0.044***	-0.045***	-0.044***	-0.043***	-0.043***	-0.044***
	(-3.391)	(-3.405)	(-3.394)	(-3.317)	(-3.316)	(-3.327)
lrep_GDP	0.846***	0.845***	0.846***	0.845***	0.845***	0.844***
	(88.382)	(88.309)	(88.378)	(88.213)	(88.213)	(88.147)
lpart_GDP	0.724***	0.723***	0.724***	0.723***	0.723***	0.723***
	(88.151)	(88.092)	(88.147)	(88.076)	(88.076)	(88.024)
lrep_Land	0.019	0.018	0.018	0.018	0.018	0.017
	(1.228)	(1.213)	(1.223)	(1.159)	(1.157)	(1.149)
lpart_Land	-0.036**	-0.036**	-0.036**	-0.036**	-0.036**	-0.036**
	(-2.366)	(-2.377)	(-2.373)	(-2.392)	(-2.394)	(-2.398)
eu	0.123***	0.135***	0.127***	0.133***	0.133***	0.142***
	(3.300)	(3.589)	(3.393)	(3.572)	(3.554)	(3.774)
rep_eu0	-0.014	-0.013	-0.014	-0.011	-0.011	-0.011
	(-0.774)	(-0.750)	(-0.766)	(-0.622)	(-0.628)	(-0.606)
part_eu0	-0.102***	-0.101***	-0.102***	-0.099***	-0.099***	-0.099***
	(-4.647)	(-4.609)	(-4.635)	(-4.502)	(-4.507)	(-4.474)
central_to_emu	0.132**	0.132**	0.127**	0.135**	0.134**	0.137**
	(2.177)	(2.187)	(2.102)	(2.224)	(2.206)	(2.264)
emu	-0.081	0.048	-0.069	-0.07	-0.083	0.036
	(-1.104)	(0.572)	(-1.061)	(-1.069)	(-1.125)	(0.419)
rep_emu0	-0.048**	-0.049**	-0.048**	-0.051**	-0.051**	-0.051**
	(-2.202)	(-2.239)	(-2.209)	(-2.323)	(-2.320)	(-2.351)
part_emu0	0.031	0.029	0.03	0.029	0.029	0.027
	(1.205)	(1.143)	(1.191)	(1.117)	(1.123)	(1.069)
emu_cum	-0.032***	-0.042***	-0.029***	-0.029***	-0.027***	-0.038***
	(-3.390)	(-4.181)	(-3.090)	(-3.063)	(-2.798)	(-3.600)
rep_emu0_cum	-0.027***	-0.027***	-0.027***	-0.025***	-0.025***	-0.025***
	(-9.625)	(-9.701)	(-9.644)	(-8.464)	(-8.456)	(-8.523)
part_emu0_cum	-0.018***	-0.018***	-0.018***	-0.016***	-0.016***	-0.016***
	(-5.427)	(-5.501)	(-5.445)	(-4.794)	(-4.787)	(-4.846)
erm_2	-0.124	-0.138	-0.129	-0.137	-0.136	-0.147
	(-1.196)	(-1.333)	(-1.240)	(-1.320)	(-1.305)	(-1.417)
rep_erm20	-0.080***	-0.082***	-0.081***	-0.081***	-0.081***	-0.083***
	(-3.413)	(-3.508)	(-3.434)	(-3.465)	(-3.456)	(-3.535)
part_erm20	0.028	0.025	0.027	0.024	0.024	0.021
	(0.981)	(0.861)	(0.954)	(0.829)	(0.838)	(0.737)
SVN_SVK_emu	0.005				0.046	
	(0.045)				(0.380)	
ldist	-1.515***	-1.514***	-1.515***	-1.515***	-1.515***	-1.514***
	(-44.560)	(-44.520)	(-44.553)	(-44.508)	(-44.509)	(-44.475)
col45	2.604***	2.606***	2.604***	2.604***	2.604***	2.605***
	(9.394)	(9.397)	(9.395)	(9.385)	(9.385)	(9.387)
rep_central_europe	0.805***	0.807***	0.805***	0.808***	0.808***	0.810***
	(5.786)	(5.800)	(5.789)	(5.806)	(5.803)	(5.816)
part_central_europe	-0.439***	-0.436***	-0.438***	-0.436***	-0.436***	-0.434***
	(-2.813)	(-2.797)	(-2.810)	(-2.795)	(-2.798)	(-2.783)
rep_landlocked	-1.054***	-1.054***	-1.054***	-1.055***	-1.055***	-1.056***
	(-14.166)	(-14.172)	(-14.167)	(-14.180)	(-14.178)	(-14.185)
part_landlocked	-0.866***	-0.866***	-0.866***	-0.866***	-0.866***	-0.866***
	(-11.940)	(-11.942)	(-11.940)	(-11.934)	(-11.933)	(-11.935)
new_emu		-0.256**				-0.221*
		(-2.359)				(-1.904)
emu_crisis_real			-0.145	-0.158*	-0.165*	-0.095
			(-1.628)	(-1.769)	(-1.809)	(-0.991)
rep_emu0_crisis_real				-0.052*	-0.052*	
				(-1.741)	(-1.742)	(-1.723)

part_emu0_crisis_real				-0.138***	-0.138***	
				(-2.857)	(-2.855)	(-2.863)
cons	14.748***	14.742***	14.746***	14.744***	14.744***	14.740***
	(48.887)	(48.853)	(48.880)	(48.837)	(48.837)	(48.810)
N	257506	257506	257506	257506	257506	257506
N_g	21268	21268	21268	21268	21268	21268

In column (1) we present the benchmark results based on the original specification of Cieřlik, Michalek and Mycielski (2009) augmented with the additional dummy variable for Slovenia and Slovakia indicating their membership in the EMU. The majority of our explanatory variables are statistically significant and display expected signs. In particular, the standard gravity variables (GDP, distance, landlocked, colony) are statistically significant at the 1 per cent level. Also trade policy variables indicating membership in preferential trade agreements such GATT-WTO, OECD, EU and the Europe Agreement are statistically significant at the 1 per cent level. In contrast to our previous study the estimated parameter on the EMU variable is not statistically significant while the estimated parameter on the emu_cum variable is statistically significant at the 1 per cent level and displays a negative sign. This means that the overall effect of the EMU accession on bilateral trade of the EMU members is negative.

The other variables related to the functioning of the Eurozone (rep_emu0, part_emu0, rep_emu0_cum, part_emu0_cum) reveal similarities to our previous results. In particular, the rep_emu0_cum and part_emu0_cum variables display negative signs and are statistically significant at the 1 per cent level. In contrast to our previous results the part_emu0 variable is not statistically significant and the estimated parameter on the rep_emu0 variables displays a negative sign and is statistically significant at the 5 per cent level. This means that both exports and imports from the Eurozone to the third countries decreased. This decrease might be the effect of the world economic crisis of 2008-2009. We address this issue later on.

Moreover, the ERM2 estimator is also statistically not significant, while the estimated parameter on the rep_erm2 variable displayed a negative sign and was statistically significant at the 1 per cent level. In other words, the countries that stabilized their real exchange rates with some limited degree of volatility by accessing to the ERM II such as Estonia, Latvia and Lithuania did not experience an increase in their bilateral trade flows, while experienced a decrease in their exports to the third countries.

Comparing the results obtained for all countries with the results obtained for Slovenia and Slovakia, it can be noted that the estimated parameter on the exchange_sd variable is statistically significant at the 1 per cent level while the estimated parameter on the central_to_emu variable is statistically significant at the 5 per cent level. This means that both the lower level of exchange rate volatility and its complete elimination by the decision of Central European countries to peg their

national currencies against the euro positively affect exports. However, the estimated parameter on the SVN_SVK_EMU variable is not statistically significant. Therefore, we cannot claim that the results obtained for Slovenia and Slovakia are different from the results obtained for the old EMU members as in both cases the EMU variable is not statistically significant.

In column (2) we present the estimates of a similar specification in which we use a dummy variable for all four new EMU (*new_emu*) members instead of the SVN_SVK_EMU dummy variable for Slovakia and Slovenia only. The estimated parameter on this variable is negative and statistically significant at the 5 per cent level. Thus we hypothesize that the accession to the Eurozone in the late 2000s by Cyprus and Malta reduced their exports while it did not affect exports of Slovenia and Slovakia.

The lack of statistical significance for the old EMU member states in our present study might be due to the fact that the sample covers a longer period of time including the years of crisis 2008-2009. Therefore, we try to verify the second hypothesis to which extent the reduction of the world trade flows during the crisis affected the old and the new EMU members. In order to analyze the impact of crisis we introduced a new dummy variable indicating whether in a given year GDP in a given country a drop in real GDP was reported.¹¹ This variable can be used for reporter, partner and both countries simultaneously.

The estimation results obtained from the specification in which the dummy variable indicating that both trading EMU members faced a drop in real GDP are reported in column (3). It turns out the estimated coefficient on the EMU_crises_real variable is negative but not statistically significant. In order to explore further the impact of crises on the EMU members we included two additional variables in the next specification: rep_EMU0_crisis_real and part_EMU0_crisis_real indicating that reporter and partner EMU members faced real crisis, respectively.

The estimation results obtained from the specification in which three dummy variables reflecting the impact of crisis are reported in column (4). It turns that all three dummy variables display negative signs and are significant although at different levels of statistical significance. This confirms our second hypothesis. In particular, the part_EMU0_crisis_real variable is statistically significant at the 1 per cent level while the other two variables were statistically significant at the 10 per cent level only. It means that non-EMU countries exporting to the Eurozone faced a significant drop in their exports during the crisis. The reduction of exports of the EMU members to both EMU and non-EMU partner countries was statistically less significant.

In column (5) we extended the specification of the estimating equation by adding the SVN_SVK_EMU variable indicating the membership of Slovenia and Slovakia in the EMU. In this

¹¹ According to this definition of real crisis in 2008 real GDP drop was reported in 20 countries while in 2009 in 93 countries.

way we tried to control for the interaction of crisis faced by the Eurozone members and accession to the EMU by these two countries. However, this variable is not statistically significant. This means that the participation of these countries in the Eurozone had no negative effect on their exports during the crisis.

In column (6) we replaced the SVN_SVK_EMU variable with new_EMU variable for all four new EMU members. This time, however, the estimated parameter on this variable is negative and statistically significant at the 10 per cent level. It may suggest that the exports of the other two new EMU members: Cyprus and Malta were more negatively affected by the crisis compared to Slovakia and Slovenia.

CONCLUDING REMARKS

The main goal of this paper was to investigate the *ex post* trade effects of the euro adoption for Central European countries that have so far adopted the euro and to draw lessons for the other countries in the region that are to join the Eurozone in accordance with the EU accession treaties. In our study we focused mainly on two Central European countries: Slovakia and Slovenia which are the largest of the new EU member countries. Unfortunately, we could not extend our analysis to include Estonia due to the lack of data covering the period after the Eurozone accession. However, we were able to extend our analysis of the trade effects of the euro adoption by the EU new member states to include two Mediterranean countries: Cyprus and Malta.

Our results show that the EMU accession and membership of these countries did not stimulate their bilateral exports. Therefore, it should not be expected that the euro adoption will significantly contribute to the trade expansion of other EU new member states from Central and Eastern Europe in the nearest future. These results are in sharp contrast to the majority of studies analyzing *ex post* trade implications of the Eurozone membership for the old member countries which demonstrated that the participation in the Eurozone increased their trade. Moreover, these results are in contrast to the *ex ante* studies aiming at estimation of the euro adoption by the Central European EU member states.

Therefore, firstly we hypothesized that this surprising result might have been due to the fact that the accession to the already existing monetary union might have differed from the foundation of the union. Secondly, the lack of statistical significance of the parameter on the EMU variable for the new member countries might have resulted from the coincidence of the accession of Slovenia and Slovakia with the world crisis that depressed the world trade flows.

The attempt to verify these hypotheses yield mixed results. On the one hand, we could not prove that the trade effect of joining the EMU differs from the effect of the EMU foundation as both

effects turned out not to be statistically significant. Therefore, the results obtained for Slovakia and Slovenia were similar to the results obtained for the founding members of the Eurozone. However, this observation does not extend to the whole group of the four new Eurozone members as exports from Cyprus and Malta were adversely affected by the euro adoption.

On the other hand, we found that the crisis significantly depressed the trade flows of the Eurozone members which confirmed our latter hypothesis. In particular, the exports of third countries to the Eurozone declined. This drop was partly compensated by the EU membership for those countries that did not peg their currencies to the euro. However, this drop was bigger in the case of countries that pegged their currencies to the euro, such as the Baltic states and Bulgaria, or were the members of the Eurozone including Slovenia and Slovakia.

Moreover, the countries that stabilized their real exchange rates with some limited degree of volatility by accessing to the ERM II such as Estonia, Latvia and Lithuania did not experience an increase in their bilateral trade flows, while experienced a decrease in their exports to the third countries. Thus, the EU new member states from Central and European Europe with the flexible exchange rates such as the Czech Republic, Hungary, Poland and Romania were in a relatively better position. The exchange rates in those countries reacted to the business cycle downturn in 2008-2009 and their currencies depreciated against the euro.¹² This has temporarily lowered their relative prices and have improved trade balances of those countries in the short run.

Our empirical results, in particular the role of exchange rate flexibility, should be verified for the longer period of time and a broader sample of the Central and Eastern European countries. In particular the analysis of ex post trade consequences of the euro adoption should be extended to include Estonia which was not taken into account in our study due to the lack of data covering the period after the Eurozone accession.

In our analysis due to the lack of appropriate data we did not take into account the potential implications of the inflow of foreign direct investment to countries of Central and Eastern Europe. The increase in the inflow of FDI, and consequently the increase in the involvement of multinational corporations in foreign trade of CEE countries, may result in the increase in the importance of intra-firm trade. This in turn might weaken the impact of exchange rate variability on trade flows. This issue requires closer attention in further studies.

Moreover, it would be useful to study the trade consequences of the euro adoption at the firm level by looking at the propensity of particular firms to export. However, this approach would require the use of individual firm level data which are not widely for a large number of countries. This will complement the existing studies on the impact of accession to EMU conducted at the macroeconomic level using aggregated trade data by micro-analysis based on the firm-level data.

¹² See Appendix III illustrating the changes in the exchange rate levels of CEECs.

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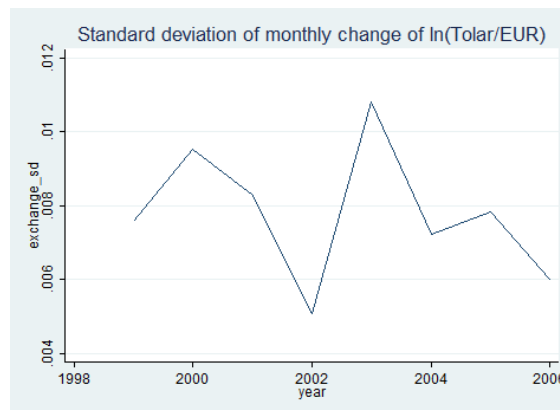
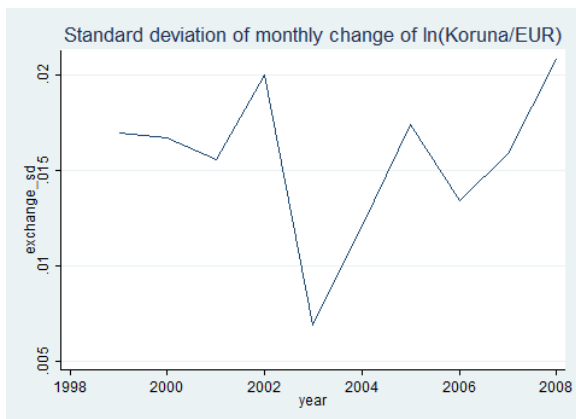
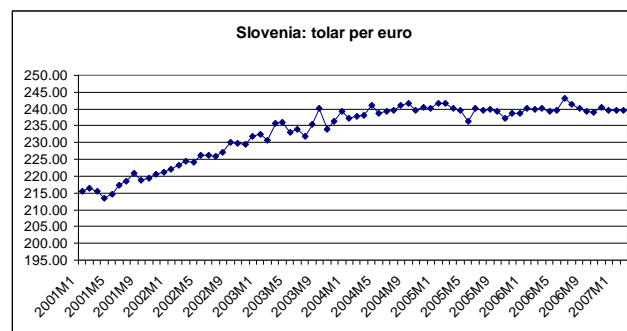
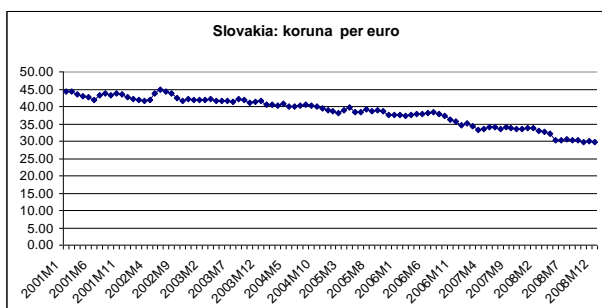
Appendix I. List of countries analyzed in our sample

Partners: countries with population over 200 thousand inhabitants

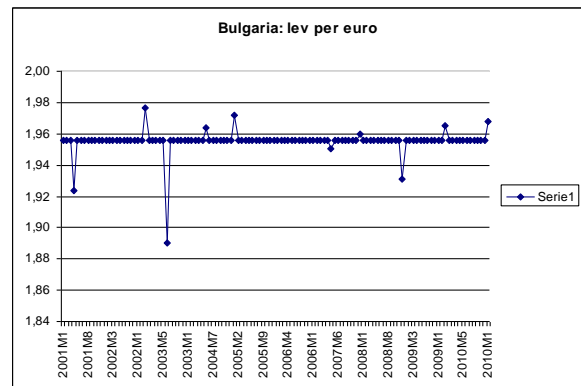
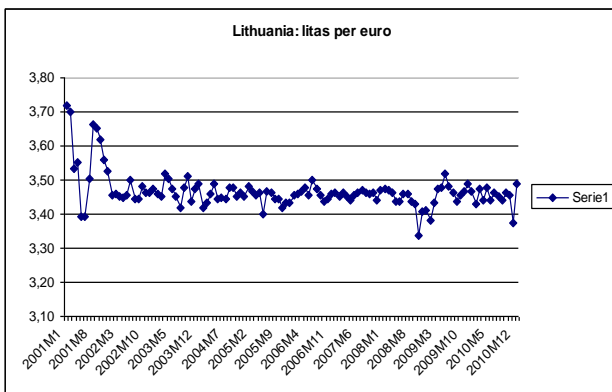
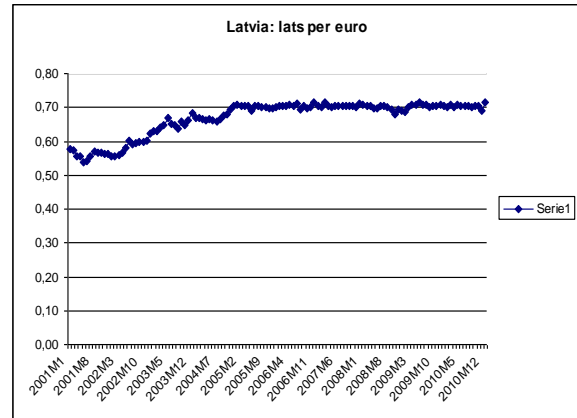
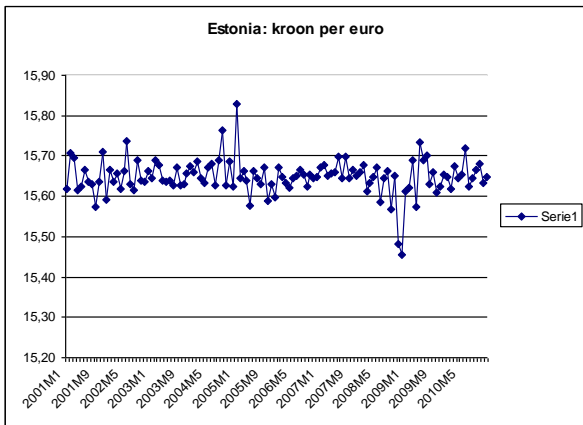
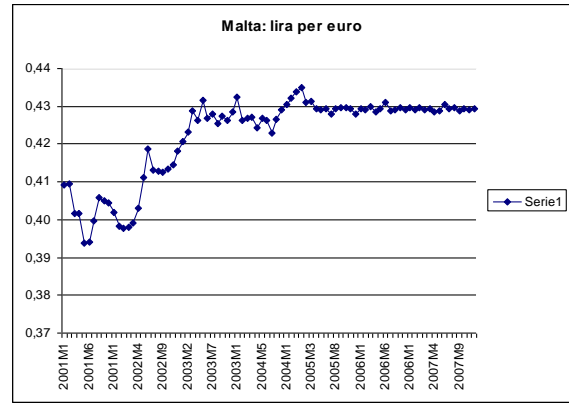
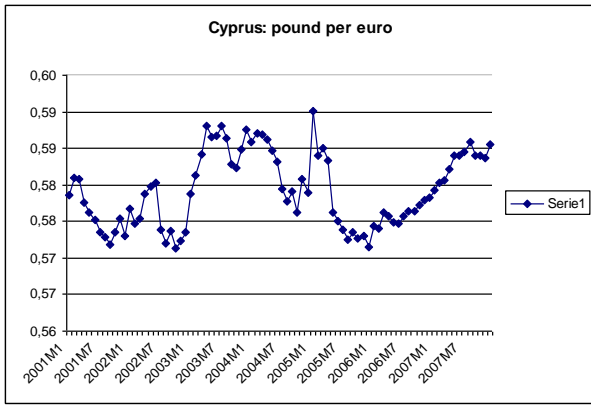
Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde,

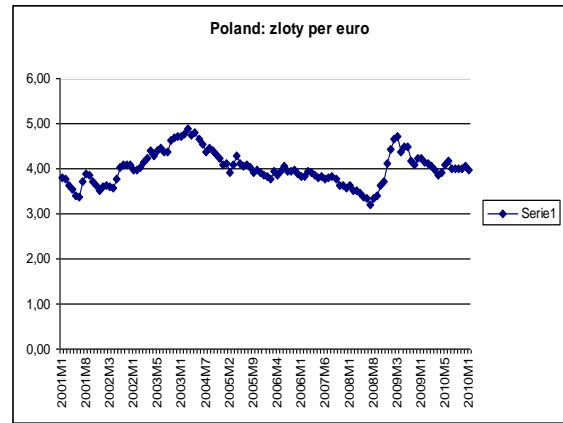
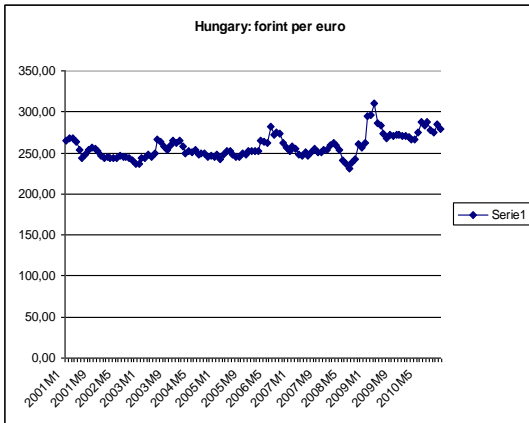
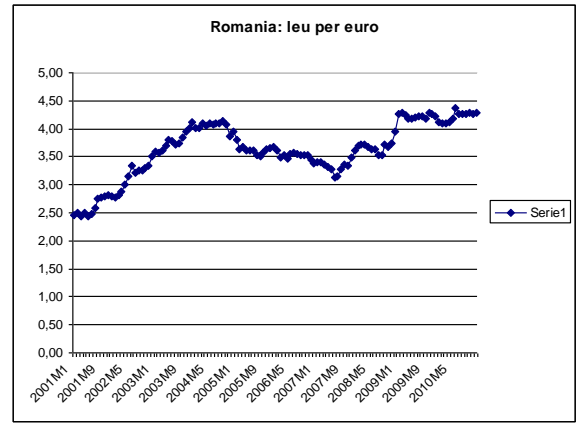
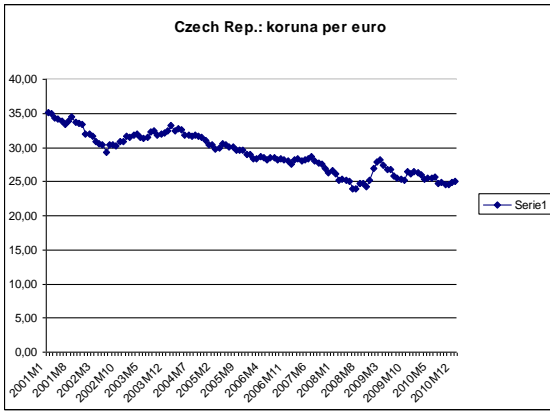
Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt Arab Rep., El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia(excludes Eritrea), Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran Islamic Rep., Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Rep., Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macedonia FYR, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovak Republic, Solomon Islands, South Africa, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Appendix II: The evolution of levels and volatilities of exchange rates in Slovenia and Slovakia



Appendix III. The exchange rate levels in Cyprus, Malta and other CEEC's countries that are not members of Euroland





Appendix IV: The role of automotive sector in total exports of Slovenia and Slovakia

