Eastern Europe Integration vs. Mercosul: Asymmetric Exchange Rate Impacts on Exports after Regional Integration

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Abstract
This study aims to show how similar economic regional integration brought different impact on exports caused by exchange rate variation, and the larger asymmetry observed after regional integration. Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania are the countries observed in the EU, while the whole Mercosul is taken into account. The economic region and the related intra-group commerce becomes a buffer to exchange rate fluctuation, less sensible to currency appreciation. The proximity to first world countries seems to be an important advantage when comparing the same results with Mercosul, a region comprised only of developing countries. A GMM panel data model was used to estimate the responses of exports caused by exchange rate shocks, using data from several international institutions such as: UN's Comtrade for international commerce and the IMF and World Bank for GDP data and exchange rates.

Keywords: exchange rate, asymmetric effects, bilateral trade
JEL codes: F1, F31, F15

1. Introduction

The importance of regional economic integration is easily understandable as competition around the globe increases, an increased market size and "trade creation" effects, formed by non-tariff trade barriers, are among the multiple benefits member states enjoy in a regional integration. Europe is known for the European Union and its Eurozone, however since 2004 several countries in Eastern Europe[1] have entered the EU but not the Eurozone. Such an arrangement allows the exchange rate to play an essential role in order to compete with more established countries such as Germany. A similar design can be found in South America, the Mercado Comum do Sul (Mercosul), established in 1991, is a common trade region without currency integration. Such an arrangement brings the opportunity to compare the effects of economic regional integration by focusing on the role exchange rate plays on regional trade. To accomplish this the study compare how exports respond to exchange rate shocks, within regional integration and with the rest of the world, and how asymmetric the responses are depending on the type of shock.

The link between exchange rate movements and international trade has been the focus of a great deal in the literature. While theoretical models predict that exchange rate depreciations boost exports and appreciation inhibit it, the empirical literature lacks consensus on the size and relevance of such effects. One line of research with aggregate data (Kenen and Rodrik; 1986; Hooper and Kohlhagen, 1978; Bahmani-Oskooee and Ratha, 2008; among others) found that the elasticity of exports relative to exchange rates is rather small. Even though, other approaches found that the impact of exchange rate movements on exports is quite substantial when using separate data, at the level of firms (Roberts and Tybout, 1997; Goldberg and Tracy, 1999; Verhoogen, 2007; Dincer and Kandil, 2008; Cheung and Sengupta, 2012), it would not be an appropriate approach when trying to model the behavior on a group of countries. This difference between the empirical estimates was dubbed in the literature as the "disconnection of exchange rate", according to Demian and Mauro (2015), one of six problems in international macroeconomics outlined by Obstfeld and Rogoff (2000).

[1] Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania.

Another asymmetric impact measured in the recent literature is the volatility of the exchange rate. Erdal et al. (2012) conducted an empirical study of the effect of volatility of the real effective exchange rate (REERV) on exports and agricultural imports in Turkey between 1995 and 2007. The empirical results, estimated by a GARCH, indicate that there was a positive long-term relationship between the REERV and exports, while there was a negative relationship in the long-term between the REERV and imports. The result is in agreement with Huchet-Bourdon and Bahmani-Oskooee (2013).

Although other methodologies have gained more space, strong results are still found. Edwards and Yeyati (2005) found substantial asymmetric exchange rate effects on exports on the macro level. Dekle et al. (2007) discuss the problems generated by aggregating the data, both on the macro and time level (years or quarters rather than months or weeks), but it may be possible to overcome this problem by increasing the number of observations, by building a data panel setting using pairs of countries as the groups. With this in mind, two groups of countries seem to be in a enough similar situation to compare such asymmetric impacts of the exchange rate, Mercosul (countries in South America) and the Eastern Europe countries that have joined EU's commerce zone.

2. Model and Data

The countries analyzed are as follow:

- Mercosul: Argentina, Brasil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela.
- Eastern Europe[2]: Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania.

The variables of interest are the GDP, exchange rates, consumer price index and exports spanning the year from 2001 to 2014. All data were collect in the data banks of the IMF, World Bank and the UN Comtrade. Exports were collect in total value by pairs of countries, with the countries studied being the exporter. GDP collected in current prices, exchange rates were collected in relation to de dollar. The timeframe chosen was based on availability of data (some countries had many missing years on exports and exchange rate before 2001, to avoid transition periods of currency changes and to have a starting point where all countries studied are part of their current economic regions. The series presented a cointegration of order one, treatment given following Engle and Granger (1987).

The model applied is similar to the ones used in other recent studies (Cheung and Sengupta, 2013 and Demian and Mauro 2015). The base equation is as follows:

$$\ln(\mathrm{X}_{i,t}^{j}) = \alpha + \beta_1 \ln(GDP_{i,t}^{j}) + \beta_2 \ln(\mathrm{GDPD}_{t}^{j}) + \beta_3 \ln(\mathrm{RER}_{i,t}^{j}) + \beta_4 \ln(\mathrm{X}_{i,t-1}^{j}) + \sum_{k=5}^{n} \beta_5 Controls_{i,t}^{j} + \varepsilon_{i,t}^{j} \qquad (1)$$

The long-term equation is composed by *X* as exports, *GDP* as the gross domestic product of the importer, *GDPD* as the gross domestic product of the exporter, *RER* as the real exchange rate, *Controls* stands for possible dummy variables in order to smooth irregular periods (2002 and 2003 for Argentina eg.), *j* determines the exporter, *i* determines de importer and *t* stands for the year. When estimating the asymmetric impacts of the *RER* we let it interact with dummies indicating the direction of the variation.

Following the strategy delineated by Demian and Mauro (2005), we ignore missing values[3], making our panel unbalanced, and some dummies were considered when exports fluctuate more than 200% between years. Four estimations were made with equation (1), intragroup exports and exports for the rest of the world, both for Mercosul and Eastern Europe[4], with Eastern Europe having a higher number of partners than Mercosul in the intragroup commerce. For the exports to the rest of the world, outside of the common commerce zone, we considered all countries that represent more than 1% share on the exports, with the exception of Gibraltar due to the lack of data.

[2] The sample of countries in the EU, but not the Eurozone.
[3] Chaney (2008) and Santo-Silva and Tenreyro (2004) discusses at length how to deal with missing values.
[4] Used in reference of the sample of countries studied.

Due to the nature of the model, fixed effects panel data with temporal correlation, Cizek et al. (2014) propose a three-step GMM in addition to other approaches (Arellano and Bond, 1991; and Blundell and Bond, 1998) to correct correlated errors, which was used here.

The way the *RER* was constructed depreciation of the exchange rate increases the *RER*, so the expected value for its coefficient must be positive.

3. Results

In this section we present the results of the base equation, starting by the Eastern Europe, and then we present the asymmetric effects.

3.1 Base Estimation

Table 1 presents the results for the Eastern Europe[5] estimation, with most coefficients being significant, with the exception of the domestic GDP in the intragroup exports. All coefficients found are positive, as expected of their relationship with exports. Given that a rise in the RER, domestic currency depreciation, lowers relative prices to importers, or in general makes it more favorable to export than sell to the domestic market, a rise of exports is expected[6]. The *RER* seems to be more relevant when determining exports outside the common commerce zone.

Table 1: Eastern Europe Base Estimation

Intragroup Exports			**Rest of the World Exports**		
Variable	**Coefficient**	**Std. Error**	**Variable**	**Coefficient**	**Std. Error**
C***	(11.7564)	3.3838	C***	(7.8583)	1.3112
LOG(GDP)***	0.6905	0.2326	LOG(GDP)***	0.2653	0.0913
LOG(RER)*	0.2690	0.1571	LOG(RER)*	0.5367	0.3072
LOG(X(-1))***	0.5594	0.0512	LOG(X(-1))***	0.6861	0.0480
LOG(GDPD)	0.0801	0.1383	LOG(GDPD)**	0.2300	0.1024
R-squared	0.9799		R-squared	0.8583	
N	2,074		N	1,570	

Note: ***p<0.01, **p<0.05, *p<0.10

Source: author's calculation

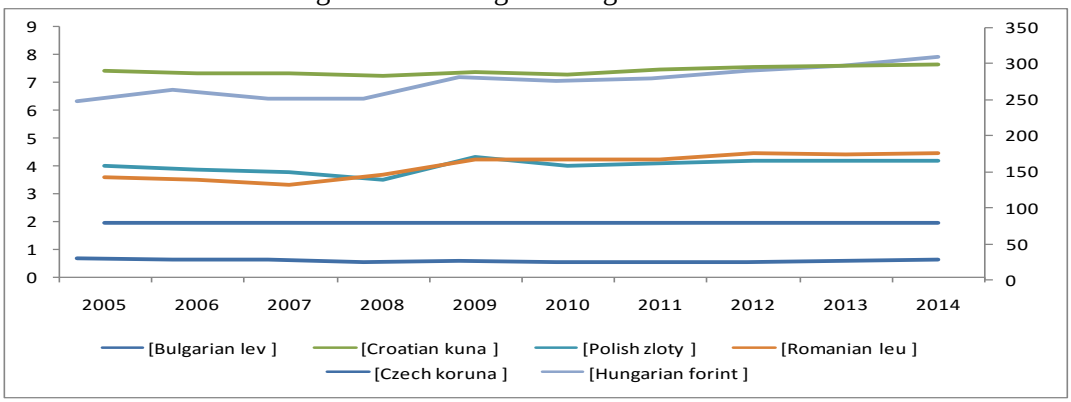
The lower elasticity for the *RER*, and higher elasticity for the *GDP*, for the intragroup commerce have other explanations besides the common commerce zone, entering the EU comes with several restriction that must be followed, meaning that no large exchange rate variations happened between the domestic currencies and the Euro.

As Figure 1 shows, even with some slight variations, the rates have been following the Euro, in the case of Bulgaria it almost becomes a fixed rate. It could be argued that while there is some space to explore the exchange rate to compensate international competition, if the trends inside the EU continue such effects will disappear.

[5] Used in reference of the sample of countries studied.

[6] Fang and Miller (2007) give a brief overview on the matter.

Figure 1: Exchange Rate against the Euro



Source: IMF, Czech Koruna and Hungarian Forint on the right side vertical axis

In Table 2, we have the same estimations for the Mercosul countries. The results are less consistent as the level of significance has been lowered, but the coefficients present the correct sign. We have similar results, with *RER* presenting a lower elasticity in the common commerce zone and both elasticities being higher than the ones estimated for the Eastern Europe countries.

Table 2: Mercosul Base Estimation

Intragroup Exports			**Rest of the World Exports**		
Variable	**Coefficient**	**Std. Error**	**Variable**	**Coefficient**	**Std. Error**
C	0.0020	2.4694	C**	(5.8583)	2.7172
LOG(GDP)*	0.2032	0.1173	LOG(GDP)*	0.3432	0.2032
LOG(RER)*	0.3911	0.2258	LOG(RER)*	0.6512	0.3555
LOG(X(-1))***	0.4362	0.0843	LOG(X(-1))**	0.3362	0.1886
LOG(GDPD)	0.0497	0.6729	LOG(GDPD)	0.1497	0.3263
R-squared	0.9110		R-squared	0.7588	
N	910		N	3,310	

Note: ***p<0.01, **p<0.05, *p<0.10

Source: author's calculation

3.2 Asymmetric Impacts

For the asymmetric impacts of the exchange rate we let dummy variables, separating positive and negative variations, interact with the *RER* in order to measure the elasticity. All results can be seen in Table 3.

Table 3: Asymmetric Effects

Intragroup			
		Coefficient	**Std. Error**
Mercosul	*RER appreciation**	(0.1798)	0.1080
	RER depreciation	0.0413	0.1397
Eastern Europe	*RER appreciation*	(0.0813)	0.1678
	RER depreciation*	0.2783	0.1657

Rest of the World			
		Coefficient	**Std. Error**
Mercosul	*RER appreciation**	(0.2172)	0.1293
	RER depreciation***	0.5128	0.2590
Eastern Europe	*RER appreciation*	(0.1971)	0.2252
	RER depreciation***	0.4573	0.2131

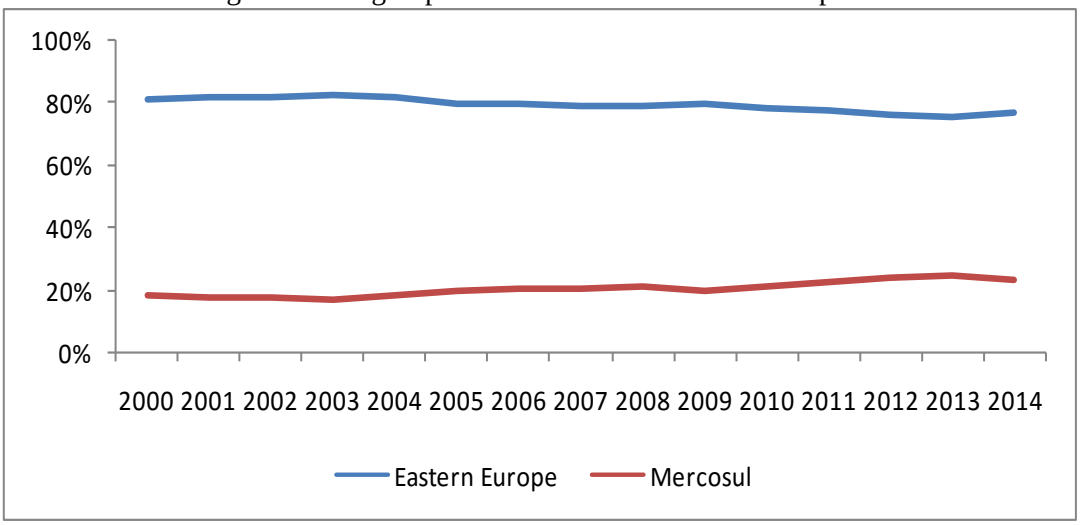
Note: ***p<0.01, **p<0.05, *p<0.10

Source: author's calculation

For the impacts in the common commerce zones we have mixed results, Mercosul had significant results only for the appreciation of the exchange rate and Eastern Europe was the other way around. Some of it could be explained with the difference from the regions, share of exports and type of exports. On Figure 2 we show the share of intragroup exports, over total exports, for both regions. As we can see, the EU is a much more relevant partner for the Eastern Europe[7] countries then Mercosul is for its South American partners.

For the exports directed to the rest of world we had much more robust findings, with only the appreciation of the exchange rate not being significant for the Eastern Europe, but in both cases we have higher results when comparing with the intragroup commerce, and Mercosul has the highest elasticities overall.

Figure 2: Intragroup Commerce Share over Total Exports



Source: UN Comtrade

4. Conclusion

The study presents empirical estimates of the elasticity of exports to the exchange rate for an economic region, instead of countries alone. With the comparison of common commerce zones it is a way to infer the quality of the economic integration. Even though the main results, intragroup asymmetric effects, were mixed it is quite telling how each region reacts to its partners, Mercosul presents a significant effect of decreasing exports inside the common commerce zone with exchange rate variation, while the Eastern Europe countries exhibit the contrary. One has the tendency to reduce integration with its partners, while the other has the tendency to advance integration.

Several facts might explain the results better, meaning the model needs a more profound analysis and work. Some relevant differences that ask for more control are the economic development of commercial partners, type of product being exported, a measure of the response of imports (when the exports of a country falls, do the imports of its partners also falls or does it substitute it importing from other countries?) and checking if the effects are maintained when exploring the firms as other studies have done.

In sum, in the face of less trade barriers the impact of the exchange rate, be it in the general relationship or its asymmetric effects, on regional trade is lessened relative to its impact to general international trade and evidence suggests that an effective integration will look more like EU than Mercosul.

[7] Used in reference of the sample of countries studied.

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