

## **BUSINESS CYCLE SYNCHRONIZATION AND ITS LINKS TO TRADE INTEGRATION IN NEW EU MEMBER STATES**

**IVAN SUTÓRIS**

Center for Economic Research and Graduate Education – Economics Institute, Prague,  
Politických vězňů 7, Prague, Czech Republic  
e-mail: ivan.sutoris@gmail.com,

**ŽANETA LACOVÁ, MARIANA POVAŽANOVÁ**

Matej Bel University in Banská Bystrica, Faculty of Economics,  
Department of Economics,  
Tajovského 10, Banská Bystrica, Slovak Republic  
e-mail: zaneta.lacova@umb.sk, mariana.povazanova@umb.sk

### **Abstract**

*This paper examines the business cycles synchronization (BCS) between the euro area and six new EU member states (NMS) – the Czech Republic, Estonia, Hungary, Poland, Slovakia and Slovenia – in order to determine the endogeneity of the optimal currency area formed by the euro area and these countries. Special attention is paid to possible impact of trade integration on BCS. It seems that the BCS between the NMS and the euro area was catalyzed by the EU integration process until 2008 and was only slightly negatively affected by the crisis in Europe. Moreover, significant differences between countries with the European currency and without the European currency are not observed. Afterwards, we document that the trade integration between the NMS and the euro area has continued to increase since the beginning of the transformation process in the NMS, including the crisis and post-crisis periods. Concerning the effect of the trade integration of the NMS to the European Monetary Union (EMU) on the BCS, our results indicate a positive and significant relationship. Thus, our results are in compliance with the endogeneity hypothesis of the optimal currency area formed by the euro area and the NMS.*

**Key words:** *business cycle synchronization, trade integration, new EU member states.*

### **1. Introduction**

European monetary integration attires the attention of both academic and non-academic debates, especially from the perspective of the reflection of the last crisis. Some member states of the current EU from the very beginning of the formation of the monetary union oppose to the EMU membership, while the other are members of it. However, the member states which have joined the EU since 2004, should met the Copenhagen criteria and thus, the euro adoption is not an option, but an engagement for them. For these countries, all the aspects concerning the monetary integration are relevant. The EMU membership is suitable when the benefits exceed the costs of monetary integration. One of some frequently highlighted costs of creating monetary union concerns the risk of asymmetric shocks in the common currency area. In the situation when the economy of monetary union is hit by asymmetric shocks, one-size-fits all monetary policy may not be appropriate for each member state. In this context, if trade integration among the member states tends to foster BCS, then

the costs associated with the adoption of the common currency are reduced by reduction the riskiness of asymmetric shocks.

## 2. Literature Review

According to the traditional optimal currency area (OCA) theory introduced by Mundell (1961), McKinnon (1963) and Kennen (1969), three criteria must hold if countries want to form an OCA, namely the high degree of trade integration between them, the high degree of their business cycle synchronization and high degree of labor mobility and wage flexibility in their economies. The authors consider the first two criteria to be exogenous. However, in more recent literature, this issue is further investigated since many researchers argued that trade integration could affect business cycle synchronization. So many studies are intended at examining whether countries with higher trade intensity have synchronized their business cycle.

One could find two different strands describing the effects of trade integration on business cycle synchronization, stressing the structure of the mutual trade. The first, defended by Krugman (1991), and Eichengreen (1992) is based on the idea that if inter-industry trade prevail among the trading partners, and trade integration occurs as a result of economies of scale, countries are trading according to theory of comparative advantage. In this case, sector-specific shocks may become country-specific shocks, because countries are more specialized. This could result in more asymmetric shocks or to less synchronization of business cycle. Another view is expressed by the European Commission (1990) and in some literature (e.g. Gouveia and Correia, 2013) is called the “specialization hypothesis“. If the trade between industrial European nations is largely intra-industry trade, e.g. trade among similar products within the same industry, supporting the trade patterns described by new trade theory, supply or demand industry-specific shocks will lead to symmetric effects. Gouveia and Correia (2013) pointed out two reasons for the second hypothesis. The first is that, according to the Keynesian multiplier, the business cycle of one country could spill over to trading partners. Another explanation is that, if higher trade linkages increase intra-industry trade, and aggregate demand shocks induce industry-specific shocks, which are similar among the countries, thus intra-industry trade leads to similar shocks between trading partners and strengthens their synchronization.

Frankel and Rose (1998) in their pioneer article analyzed this issue empirically. In particular they tested the hypothesis that more integration can be expected to lead to more highly correlated business cycles. They found evidence of a positive impact of increased regional trade on business cycle synchronization for 21 industrialized countries. Inspired by their work many other authors were also trying to find out whether endogenous relationship holds between international trade and business cycle synchronization in various countries and different time periods. In addition to trade integration some researchers examined also the impact of other factors like policy coordination. Some of them based on their results support the idea of endogeneity between international trade and co-movement of business cycle. Since the main aim of this article is not to bring comprehensive study of literature focused on examining topic, just some authors are mentioned hereafter.

Grigoli (2011) tested above mentioned hypothesis for the Mercosur countries (with the exclusion of Paraguay). Using the data from 1991 to 2008, his empirical findings indicate a positive effect, implying intra-industry trade.

Gouveia and Correia (2013) examine synchronization in the euro area and the role of intra-EMU trade from 1981 to 2011. Their results indicate that the intensification of business cycle synchronization that occurred in the nineties across almost all countries could partially be

explained by the increase in trade, which has been strengthened since the start of the run-up to the EMU.

Not all the authors based on their results have confirmed the direct relationship with the business cycles and bilateral trade, or come to mixed results. Some of them argue that the structure of bilateral trade rather the overall trade should be examined.

For example, Fidrmuc (2001) has shown that, based on a cross-section analysis of OECD countries between 1990 and 1999, convergence of business cycles relates to intra-industry trade, but there is no direct relationship between business cycles and bilateral trade intensity.

Calderon et al. (2007) gathered annual information for 147 countries for 1960-99 and found that countries with higher bilateral trade exhibit higher business cycle synchronization. Countries with more asymmetric structures of production exhibit a smaller business cycle correlation. The impact of trade integration on business cycles is higher for industrial countries than both developing and industrial-developing country pairs. The impact of trade intensity on cycle correlation is smaller, the greater is the production structure asymmetries between the countries.

Several studies were focusing on the group of former centrally planned economies. For example, Babetskii (2005) provides support for the Frankel and Rose's hypothesis from a sample of ten Central and Eastern European countries. He had find that an increase in trade intensity leads to higher symmetry of demand shocks: the effect of integration on supply shock asymmetry varies from country to country; and a decrease in exchange rate volatility has a positive effect on demand shock convergence.

### 3. Data and Methods

For our analysis, we use quarterly data from the OECD's Monthly Statistics of International Trade Database. Concerning the GDP data at the quarterly basis, they are also collected from the OECD National Account Database. The studying period starts in 1991 and ends in the last quarter of 2013, covering the following sub-periods: (1) the sub-period of transformation process of the Central and Eastern European economies, (2) the sub-period of the preparation of these economies for the EU accession, (3) the sub-period of the EU membership and the preparation of the EMU accession and (4) the crisis and post-crisis sub-period.

Our sample consist of six New Member States of the European Union for which the necessary data (at least for some of four studying sub-periods) are available: Czech Republic (CZE), Estonia (EST), Hungary (HUN), Poland (POL), Slovakia (SVK) and Slovenia (SVN). The data for Lithuania, Latvia, Romania and Bulgaria are not provided by the OECD International Trade Database. Two countries, joining the EU in 2004 (so having the status of "new member states"), namely Malta and Chypre, are excluded. In contrast to other NMS, these two countries did not pass through the transformation process of their economies.

The methodology we apply is consistent with that applied by Gouveia and Correia (2013) for Southern European Countries. Firstly, we analyze synchronization between the business cycle in the euro area and the chosen NMS (independently by country). Although this is not the main objective of our paper, we emphasize to compare the synchronization in the countries which have already joined the EMU (Slovenia, Slovakia and Estonia) with those which have not joined the EMU yet (Czech Republic, Hungary and Poland).

Secondly, we focus on trade integration between the NMS in our sample and the Euro Area Member States (EA-17). The purpose is to identify whether the intra-EMU trade intensification as a gradual process occurs in the countries and remains during the last crisis and post-crisis period in our sample.

Finally, we use econometric panel data analysis to examine the relationship between trade integration and the business cycle synchronization in our sample. For this purpose, we employ the general model developed by Frankel and Rose (1998).

#### 4. Business Cycle Synchronization between EMU and NMS

The business cycle synchronization (BCS) between the EMU as a whole and the individual NMS was confirmed by various authors in the previous studies (Benčík, 2011; or di Giorgio, 2016). Our aim is to confirm the continuity of this phenomena, applying the data from the crisis and post-crisis period.

We begin by calculating the cyclical component of GDP by applying the Hodrick-Prescott (HP) filtering. Although other methods of detrending techniques are also used in empirical literature (like Baxter-King filtering), the results are not considerably different (see for example Gouveia and Correia (2013)). Afterwards, the correlation coefficients are calculated for each country under study. To examine the evolution of the degree of the BCS over the studying period, we compute the correlation coefficients for six countries in the four sub-periods defined, as well as the average values of correlation coefficient for groups of the NMS with and without the common currency. The results are presented in table 1.

Table 1: Correlation coefficient between real activity in NMS and in Euro Area (EA-17)

	1991 – 1996	1997 – 2003	2004 – 2008	2009 – 2013
Czech Republic	-0.9120	0.6464	0.9416	0.9462
Hungary	0.9509	0.4929	0.7637	0.8150
Poland	-0.1518	0.4624	0.9320	0.4674
NMS without euro	-0.0376	0.5339	0.8791	0.7429
Estonia	0.5260	0.0088	0.8865	0.7559
Slovakia	-0.9488	-0.5032	0.8581	0.9227
Slovenia	-0.8189	0.5622	0.9583	0.9223
NMS with euro	-0.4139	0.0226	0.9009	0.8669
All NMS	-0.2258	0.2782	0.8900	0.8049

Source: the authors.

#### 5. Trade Integration between EMU and NMS

To capture development of trade intensity between the EMU and the NMS, we apply three different measures. The first measure (*TRADE1*) indicates the volume of trade of a specific country with 17 Member States of the Euro Area as a percentage of a country's GDP (traditional approach to measurement of degree of a country's economic openness summing value of export (*X*) and import (*M*)):

$$TRADE1_{i,EMU,t} = \frac{(X_{i,EMU,t} + M_{i,EMU,t})}{GDP_{i,t}}, \quad (1)$$

Analogically, the measures representing the country's export  $X$  as a fraction of a country's GDP ( $TRADE2$ ) and the country's import  $M$  as a fraction of a country's GDP ( $TRADE3$ ) are calculated according the following equations:

$$TRADE 2_{i,EMU,t} = \frac{X_{i,EMU,t}}{GDP_{i,t}}, \quad (2)$$

$$TRADE 3_{i,EMU,t} = \frac{M_{i,EMU,t}}{GDP_{i,t}}. \quad (3)$$

The higher value of these measures indicates the trade between the specific country and the euro area as being more intensive. The average values of these three measures for countries in our sample, according to four defined sub-periods, are presented in table 2.

Table 2: Average values of trade intensity measures between NMS and Euro Area (in %).

	1991 – 1996	1997 – 2003	2004 – 2008	2009 – 2013
<i>TRADE 1</i>				
Czech Republic	12.44	17.77	38.48	47.57
Estonia	n.a.	n.a.	24.78	26.68
Hungary	10.53	17.88	34.71	40.60
Poland	6.29	7.70	16.28	18.06
Slovakia	n.a.	13.92	29.28	33.84
Slovenia	n.a.	13.74	39.89	43.94
Average NMS	-	-	30.57	35.11
<i>TRADE 2</i>				
Czech Republic	5.81	9.04	21.11	27.64
Estonia	n.a.	n.a.	9.29	11.74
Hungary	5.09	9.37	17.67	21.41
Poland	2.77	3.27	7.85	9.36
Slovakia	n.a.	7.11	16.76	20.73
Slovenia	n.a.	6.16	18.04	21.29
Average NMS	-	-	15.12	18.69
<i>TRADE 3</i>				
Czech Republic	6.64	8.73	17.36	19.93
Estonia	n.a.	n.a.	15.49	14.94
Hungary	5.44	8.51	17.04	19.19
Poland	3.52	4.44	8.43	8.69
Slovakia	n.a.	6.81	12.52	13.11
Slovenia	n.a.	7.58	21.85	22.66
Average NMS	-	-	15.45	16.42

Source: the authors.

According to our results, a gradual increase in trade integration occurred in all countries from our sample during the studying period. The share of NMS-EMU trade varies from 6.29% of GDP (POL) to 12.44% (CZE) in the transition period. During the last sub-period under analysis (2009-2013), this indicator varies from 18.06% (POL) to 47.57% (CZE). The same tendency occurs both in share of exports to EA-17 countries in GDP ( $TRADE 2$ ), as well as in imports to EA-17 in GDP ( $TRADE 3$ ). It seems that the trade openness of NMS towards the EMU Member States was positively affected by the EU integration process. In contrast to

twelve EMU Member States who noticed a downward trend in intra-EMU trade in the crisis period (see Gouveia and Correia, 2013), the data for NMS do indicate a positive tendency in trade intensity in the crisis and post-crisis period.

When comparing the exports and the imports (*TRADE 2* and *TRADE 3*), one can say that the negative trade imbalance of NMS from the beginning of the studying period are replaced by the positive trade imbalance in case of four NMS in the crisis and post-crisis period. For example, in the Czech republic, the negative trade imbalance of 0,83 % of GDP in the transition period becomes the positive trade imbalance of 7,71% of GDP in the crisis and post-crisis period.

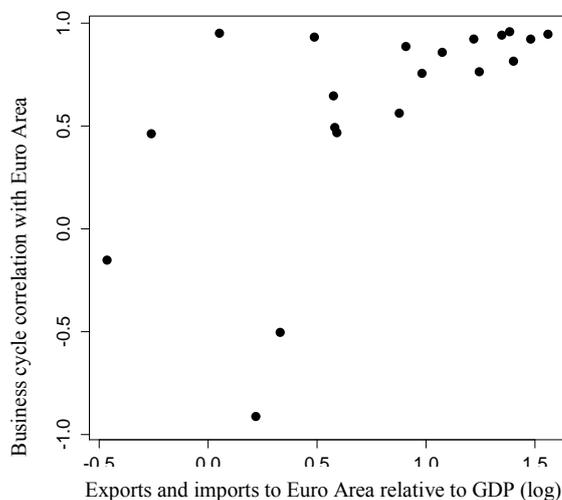
## 6. Trade Integration between EMU and NMS

Following Gouveia and Correia (2013), we estimate the following equation to analyze the effect of trade integration on BCS:

$$BCS_{i,EMU,t} = \alpha_0 + \alpha_1 TRADE_{i,EMU,t} + \varepsilon_{i,EMU,t} \quad (4)$$

where  $BCS_{i,EMU,t}$  represents the correlation coefficient between the cyclical component of real GDP in country  $i$  and the cyclical component in the euro area over time period  $t$ .  $TRADE_{i,EMU,t}$  denotes the natural logarithm of the trade intensity between country  $i$  and the 17 EMU member states at period  $t$ , applying three trade integration measures. The data corresponding to *TRADE 1* are presented in figure 1 and the results of the estimations of the coefficient according to three measures used are presented in table 3.

Figure 1: Relationship between *TRADE 1* (log) and BCS



Source: the authors.

The estimated coefficients take the positive sign and are generally statistically significant. These results are in compliance with those obtained by Gouveia and Correia (2013) for twelve Euro area membes. The fact that more trade with the euro area members affects positively the BCS between a specific country and the euro area in case of NMS in our sample means that the costs of euro adoption can be generally reduced by the endogeneity of OCA formed by the euro area and the NMS.

Table 3: Estimates of the coefficient  $\alpha_1$

	Dependent variable: BCSYNC					
	Pooled OLS			With country fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
TRADE 1	0.530*** (0.167)			0.721*** (0.221)		
TRADE 2		0.465*** (0.155)			0.650*** (0.194)	
TRADE 3			0.570*** (0.180)			0.788*** (0.260)
Obs.	20	20	20	20	20	20
R <sup>2</sup>	0,359	0,335	0,358	0,449	0,464	0,413

Note: standard errors in parentheses; \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Source: the authors.

## 7. Conclusion

This paper examines the impact of trade integration on business cycle synchronisation in case of six new EU Member States (NMS): the Czech Republic, Estonia, Hungary, Poland, Slovakia and Slovenia. Firstly, we find that rise of trade integration between NMS and the euro area is a gradual process, not negatively affected during the crisis and post-crisis period. Concerning the synchronization of business cycle (BCS) between NMS and euro, which seems to be catalysed by the EU integration process until 2008 appears to be only slightly negatively affected by the last crisis in Europe. Moreover, the significant differences between countries with european currency and without european currency are not observed. Concerning the effect of trade integration of the NMS to EMU on the BCS, our results indicate a positive and significant relationship. Thus, our results are in compliance with the hypothesis of the endogeneity of OCA formed by the euro area and the NMS. According to this hypothesis, BCS caused by increase in trade can be performed only by the intra-industry trade channel which is in contrast to the hypothesis of countries' trade specialisation. Another outcome of this result is that the costs of euro adoption by NMS can be generally reduced by the endogeneity of OCA formed by the euro area and the NMS.

## Acknowledgements

This research paper originated in partial fulfilment and with support of the project KEGA No. 019UMB-4/2016 "Innovative teaching of the economic theory in the Slovak, English and French language".

## References

- [1] BABETSKII, J. 2005. Trade integration and synchronization of shocks : Implications for EU enlargement. In *Economics of Transition*, 2005, vol. 13, iss. 1, pp. 105-138.
- [2] BENČÍK, M. 2011. Business cycle synchronisation between the V4 countries and the euro area in 1996 – 2010. In *Ekonomický časopis*, 2012, vol. 60, iss. 1, pp. 3-18.
- [3] CALDERON C., CHONG A., STEIN E. 2007. Trade intensity and business cycle synchronization : Are developing countries any different? In *Journal of International Economics*, 2007, vol. 71, iss. 1, pp. 2–21.

- [4] DI GIORGIO, C. 2016. Business cycle Synchronization of CEECs with the euro area : A regime switching approach. In *Journal of Common Market Studies*, 2016, vol. 54, iss. 2, pp. 284-300.
- [5] EICHENGREEN, B. 1992. Should the Maastricht Treaty be saved? In *Princeton Studies in International Finance* 74. Princeton : Princeton University, 1992. [cit. 2016-02-26] [https://www.princeton.edu/~ies/IES\\_Studies/S74.pdf](https://www.princeton.edu/~ies/IES_Studies/S74.pdf).
- [6] EUROPEAN COMMISSION 1990. One money, one market. In *European Economy*, 1990, vol. 44. [cit. 2016-02-26] [http://ec.europa.eu/economy\\_finance/publications/publication7454\\_en.pdf](http://ec.europa.eu/economy_finance/publications/publication7454_en.pdf).
- [7] FIDRMUC, J. 2001. The endogeneity of optimum currency area criteria, intra-industry trade and EMU enlargement. Bank of Finland. BOFIT Discussion Papers 8. [cit. 2016-02-26] <http://www.suomenpankki.fi/pdf/100362.pdf>.
- [8] FRANKEL, J., ROSE, A. 1998. The endogeneity of the optimum currency area criteria. In *The Economic Journal*, 1998, vol. 108, iss. 449, pp. 1009-1025.
- [9] GOUVEIA, S., CORREIA, L. 2013. Trade integration and business cycle synchronization in the euro area : The case of southern European countries. In *Journal of Economic Integration*, 2013, vol. 28, iss. 1, pp. 85-107.
- [10] GRIGOLI, F. 2011. The impact of trade integration on business cycle synchronization for Mercosur countries. In *The European Journal of Comparative Economics*, 2011, vol. 9, iss. 1, pp. 103-131.
- [11] KENEN, P. 1969. The theory of optimum currency areas : An eclectic view, in monetary problems of the international economy. Chicago : University of Chicago Press, 1969, pp. 41-60.
- [12] KRUGMAN, P. R. 1991. *Geography and trade*. Cambridge : MIT Press, 1991.
- [13] MCKINNON, R. 1963. Optimum currency areas. In *The American Economic Review*, 1963, vol. 53, pp. 717-25.
- [14] MUNDELL, R. 1961. A theory of optimum currency areas. In *The American Economic Review*, 1961, vol. 51, iss. 4, pp. 657-65.