

Business cycle correlation between the Euro area and the Balkan countries

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Abstract

This paper examines the degree of trade integration and business cycle synchronisation between eight Balkan countries and the Euro area over the period 2000:1-2011:4. The main findings are that Slovenia and the Former Yugoslav Republic of Macedonia exhibit a high level of openness relative to Euro area and seem to have achieved a large degree of business cycle synchronisation with the aggregate Euro area cycle. The other Balkan countries are characterized by high trade integration with the EMU (except Greece and Turkey) and a rather modest degree of association with the Euro area cycle, although Turkey is nearest the average of the EMU countries. We further document that there is a tendency for an increase in the degree of synchronisation with EMU for all Balkan countries. We also note, however, that at the end of the period, the degree of synchronisation has become less pronounced.

Keywords: Business cycles, Synchronization, Balkan countries, European integration, Euro area

JEL Classification: E32, F15, F41

1. Introduction

Over the last decade, the future of the Balkan economies in Europe has increasingly become a subject of attention in economic literature. Also the European Commission has expressed an interest in the development of civic society in these countries, giving priority to administrative and judicial reforms and strengthening the rule of law.

In January 2007, Bulgaria and Romania joined European Union (EU) and in July 2013, Croatia became the twenty-eighth Member State. Meanwhile, other Balkan countries are at various stages of candidacy for membership in the EU. It is likely that the Balkan economies will benefit from joining the European and Monetary Union (EMU) by reduction of trade costs between its Member States and an increase in the convergence in their relations. Therefore, a relevant question is whether these economies should also expect to face high costs from EMU membership.

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The traditional theory of Optimum Currency Areas (OCA), first developed by Mundell (1961), and enriched with contributions from McKinnon (1963) and Kenen (1969), among others, explores the criteria and the costs and benefits associated with participation in a monetary union. These criteria provide helpful guidelines for the investigation into whether or not certain countries would be good candidates for a monetary union¹. The economic costs of a common currency increase with: the intensity and the frequency with which countries are affected by asymmetric shocks; the inflexibility of prices and wages; the immobility of production factors; the degree of specialisation of the economy; and the absence of fiscal federalism. In short, OCA literature holds that two countries are able to form a stable monetary union if the benefits are greater than the costs of renouncing individual monetary and exchange rate policy. Thus, the net economic benefit of a currency union with asymmetric shocks is greater the larger the trade volume, the smaller the asymmetric shocks and the larger the correlations of disturbances (Bayoumi, 1994).

A second strand in OCA literature deals with the potential endogenous effects of a common currency. Frankel and Rose (2008) argue that the fact of monetary union itself may increase trade and synchronization business cycles so that, even if a country group had not qualified as an OCA *ex ante*, it may turn into an OCA *ex post*². However, Krugman (1993) suggests that a rise in trade would facilitate industry specialization across countries and hence trade would become increasingly inter-industry giving rise, consequently, to less synchronized cycles.

Regarding empirical evidence of OCAs, some seminal papers appeared in the run-up to the inception of the euro. These studies assessed why specific groups of countries may form an OCA by analyzing and comparing a variety of OCA properties using several econometric techniques (e.g. Bayoumi and Eichengreen, 1993, 1997; Artis and Zhang, 1997, 1999). The investigation was gradually expanded to other European countries, firstly to the Central and Eastern European countries and more recently the new Balkan countries³. The majority of authors used samples that included only a limited number of countries from the Balkan group (Fidrmuc, 2004; Babetskii, 2005; Afonso and Furceri, 2008; Darvas and Szapáry, 2008; Gligorov et al., 2008; Damyanov and Stefanov, 2010; Dumitru and Dumitru, 2010; Savva et al., 2010; Sideris, 2010; Benčík, 2011; Akkoyun et al., 2012; Tsanana et al., 2012; Gomez, 2012; Vesselinov, 2012; Botrić, 2013). Conversely this paper extends the analysis to a large set of Balkan countries.

In our analysis, we focus on two of the most relevant criteria: (i) the degree of economic openness and; (ii) business cycle synchronisation which has been regarded as a “meta-property” in operationalization the OCA. On the one hand, the more a country is integrated in international trade, the more benefits it can enjoy from belonging to a currency union. On the other hand, the closer the degree of cycle synchronization, the lower the stabilization costs of renouncing individual monetary and exchange rate policy will be.

¹ For a survey of the OCA literature see Mongelli (2005).

² See De Grauwe and Mongelli (2005) for a survey concerning the endogeneity of OCAs.

³ Firdmuc and Korhonen (2006) provide an excellent overview on the fulfilment of the OCA criteria by Central and Eastern European Countries.

The relevance of these two criteria for assessing the costs and benefits of adopting a common currency and the fact that there is a major lack of research on them, especially in the case of the Balkan countries, has contributed to our decision to undertake the research described in this paper. In summary, the contribution of this paper is threefold: 1) to analyse how trade integration has evolved over time in the Balkan economies; 2) to explore whether the cycles of the Balkan countries are increasingly synchronised relative to that of the Euro area as a whole; 3) to provide a joint empirical assessment of these two criteria by using Frankel's (1999) diagram.

The remainder of this paper is structured as follows. Section 2 provides a description of the data and the methods used in the empirical analysis. Section 3 presents and discusses the results. Section 4 summarizes and concludes.

2. Data and methods

We focus our assessment on two key criteria for membership in an OCA: trade intensity and business cycle synchronisation. Our investigation applies to eight countries situated in Southeastern Europe⁴. Two of them (Greece and Slovenia) are EMU members. Bulgaria and Romania have been members of the EU since 2007, and Croatia joined the Club on July 1st 2013⁵. The three other countries of our sample - The Former Yugoslav Republic of Macedonia (FYROM), Serbia, and Turkey – are formal candidates for membership. Almost all Balkan non-EMU members are using the euro as an anchor currency but they have different exchange rate regimes. Bulgaria has a euro-base currency board while the exchange rate regimes of FYROM, Croatia and Romania are characterized by a managed float, and Serbia and Turkey has an inflation-targeting strategy with a freely floating exchange rate⁶.

The methodology consists of three steps. First, we analyse the degree of trade integration between the Euro area and the Balkan countries for 2000-2011. We use three measures: (i) the sum of total exports and imports of goods divided by the country's gross domestic product (GDP); (ii) the sum of exports to and imports from the Euro area as a fraction of the country's GDP; and (iii) the sum of exports to and imports from the Euro area as a fraction of total trade. The results are compared with those of the simple (unweighted) average of the Euro area countries (EMU17) with the aim of understanding to what extent the Balkan countries are similar to EMU countries⁷.

⁴ The remaining four Balkan countries (Albania, Bosnia and Herzegovina, Kosovo and Montenegro) were not included due to data constraints.

⁵ Croatia is the second, after Slovenia in 2004, of the seven states that emerged from the wreckage of Yugoslavia to join the club.

⁶ For a more detailed overview of these exchange rate regimes see the IMF, 2012, Annual Report on exchange arrangements and exchange restrictions.

⁷ Along the paper, Euro area, EMU and EMU17 have the same meaning. However, the use of EMU17 is to emphasize that the empirical study includes all the 17 countries that were members of the EMU at May 2013 (Austria, Belgium, Finland, France, Germany, Spain, Ireland, Italy, Luxembourg, Netherlands, Portugal, Greece, Slovenia, Cyprus, Malta, Slovakia and Estonia).

For the Balkan countries, the annual bilateral trade flows in goods, total exports and imports, and GDP are from the Statistical Database of the United Nations Conference on Trade and Development (UNCTAD)⁸. The trade indicators for EMU17 were provided by Eurostat (accessed in March 2013).

The second step in our assessment is a comparison of the association between the aggregate Euro area and Balkan countries' business cycles. We use seasonally adjusted quarterly real GDP, which in general covers the 2000:1-2011:4 period. The Euro area aggregate includes the seventeen current EMU Member States. Full details about the data sources are provided in Table 1. The definition of the sample period was constrained by the unavailability of quarterly GDP data further back in time.

The econometric framework adopted here corresponds to a *deviation cycle* approach to the measurement of the business cycle. The cyclical components were obtained by filtering the log of real GDP with the band-pass (BP) filter (Baxter and King, 1999) and the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997)⁹.

Table 1: Data sources

Country (EU/EMU accession year)	Sample period	Source
Bulgaria (EU - 2007)	2000:1-2011:4	Eurostat (1997:1-2012:4)
Croatia (EU - July 2013)	2000:1-2011:4	Eurostat (2000:1-2012:3)
FYROM (candidate)	2004:1-2011:4	Eurostat (2004:1-2012:3)
Greece (EMU - 2001)	2000:1-2011:1	Eurostat (2000:1-2011:1)
Romania (EU - 2007)	2000:1-2011:4	Eurostat (2000:1-2012:4)
Serbia (candidate)	2001:1-2011:4	NBS (2001:1-2012:3)
Slovenia (EMU - 2007)	2000:1-2011:4	Eurostat (1995:1-2012:4)
Turkey (candidate)	2000:1-2011:4	OECD (1998:1-2012:3)
EMU17	2000:1-2011:4	Eurostat (1995:1-2012:4)

Note: The main source is the Eurostat, but the real GDP for Serbia has been extracted from databases of the National Bank of Serbia (NBS), and the real GDP for Turkey from OECD National Accounts database (accessed in March 2013).

We gauge synchronisation using two measures: (i) the Spearman's rank correlation coefficient, computed between the business cycle of individual Balkan countries and the Euro area aggregate cycle; and (ii) the indices of concordance introduced by Harding and Pagan (2002), which measure the proportion of time in which two series are in the same cyclical phase. As a reference, we also compute the degree of business cycle synchronization within

⁸ For Serbia, trade data are only available from 2008. Before this, Serbia and Montenegro were constituted as a state union.

⁹ For the HP the smoothing parameter λ was set at 1600, which is the conventional value for quarterly data. We obtained results that are qualitatively similar with both filters. The results obtained with HP filter are available on request.

the Euro area, measured as the simple average of the correlations coefficients/concordance indices of each EMU17 member's cyclical component with the cyclical component of the aggregate EMU17. We also calculate the mean absolute deviation of the corresponding business cycle, which enables us to see the volatility of the Balkans' business cycles.

In order to study the development of business cycle synchronisation along the sample period we employ versions of the correlation/concordance indices for several sub-samples. First, we compute rolling measures using a window of 16 observations. Then, we calculate the indices in fixed intervals of four years, defined according to relevant events in European integration for the Balkan countries.

The first is from 2000 to 2003, which is a period marked by the setting up of the Stabilization and Association Process, the framework for EU negotiations with the Western Balkan countries. The second sub-period is from 2004 to 2007, and it covers the enlargement of EU with countries from Central and Eastern Europe. The last sub-period, from 2008 to 2011, corresponds to the global economic crisis and sovereign debt crisis in the Euro area.

In a final step, we use the Frankel's (1999) diagram relating trade integration with business cycle synchronisation as joint criteria for assessing how appropriate the adoption of the euro by Balkan countries would be. We consider the overall period and two sub-samples: the pre-crisis period (2000-2007) and the crisis period (2008-2011).

3. Results and discussion

3.1 Trade integration

Table 2 displays the degree of openness relative to EMU17, the total degree of openness to the World, and the share of trade with EMU17 as percentage of total trade for each Balkan country and for the average of the EMU17 countries. The figures reported are averages for the period 2000-2011.

Table 2: International trade in goods for Balkan countries, 2000-2011

	Bulgaria	Croatia	FYROM	Greece	Romania	Serbia	Slovenia	Turkey	EMU17
Trade with EMU (% of GDP)	46.6	32.7	40.8	13.8	36.7	23.2 ¹⁾	59.9	14.4	31.7
Trade with world (% of GDP)	99.2	58.6	92.3	30.9	67.5	60.2 ¹⁾	109.0	40.3	62.7
Trade with EMU (% of total trade)	47.3	55.8	44.4	44.9	54.4	38.6 ¹⁾	55.6	36.1	50.6

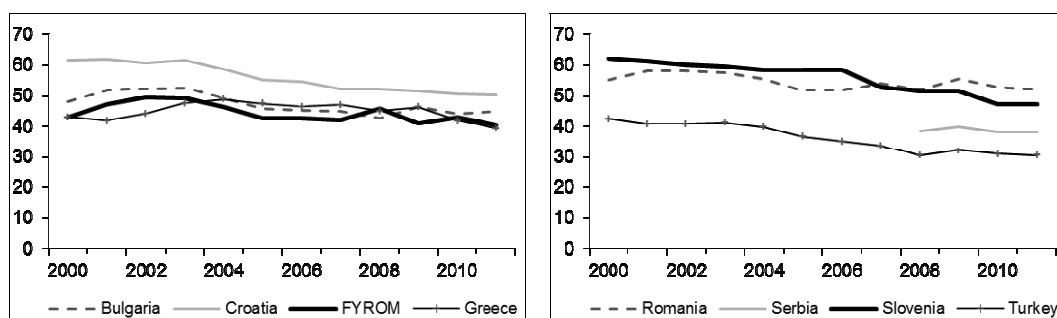
Sources: United Nations Conference on Trade and Development (accessed in March 2013); Values for EMU17 are from the Eurostat (accessed in March 2013)

Note: ¹⁾ Data for 2008-2011.

It can clearly be seen that there are significant differences in the degree of openness among the countries under analysis. It is important to note that five countries (Slovenia, Bulgaria, FYROM, Romania and Croatia) have a degree of openness with EMU17 higher than the average of intra-EMU trade. The lowest openness ratios are those of Greece and Turkey, whose average of exports to and imports from EMU17 represents about 14% of the respective GDP. The proportion of trade with EMU17 varies from 36% of total trade (Turkey) to 55.8% (Croatia).

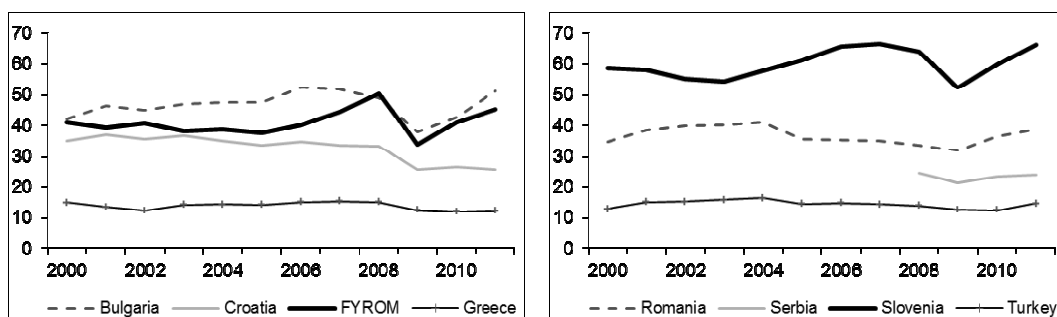
The evolution of trade with EMU both as a percentage of overall trade and of GDP through the period between 2000 and 2011 is given in Figures 1 and 2.

Figure 1: Trade with the EMU as a percentage of total trade for Balkan countries, 2000-2011



Source: United Nations Conference on Trade and Development (accessed in March 2013)

Figure 2: Trade with the EMU as a percentage of GDP for Balkan countries, 2000-2011



Source: United Nations Conference on Trade and Development (accessed in March 2013)

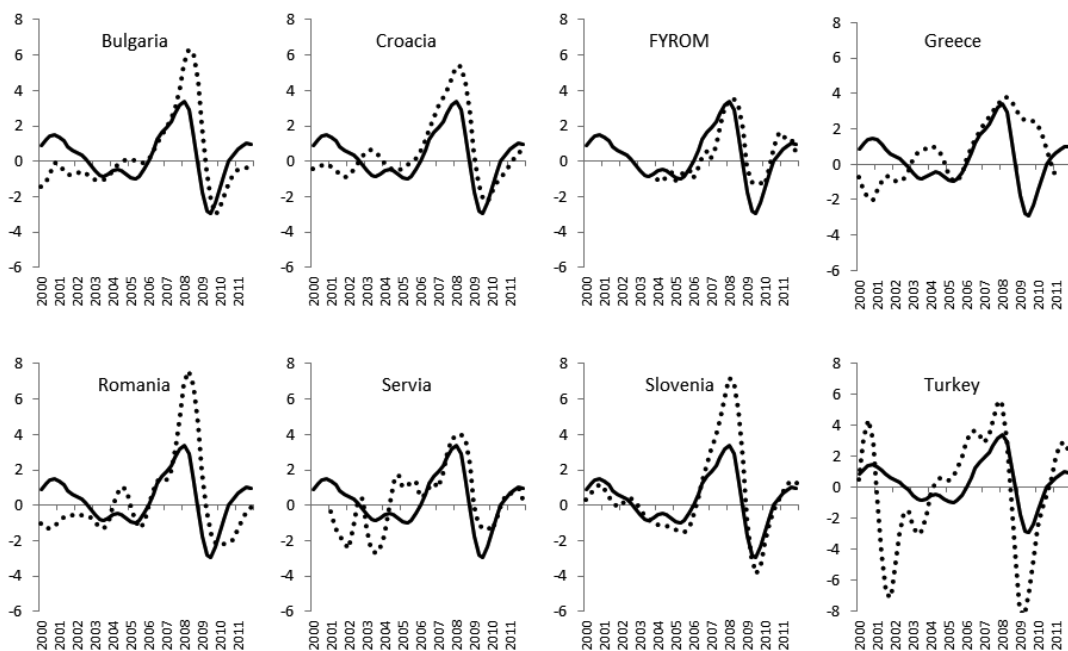
Figures 1 and 2 show some relevant tendencies over the past eleven years. On the one hand, there is a visible tendency to decrease the share of EMU trade as a proportion of total trade in all countries, this being more pronounced in Slovenia and Turkey. On the other hand, if we ignore the year of 2009, when the world crisis caused a contraction in

global trade (IMF, 2010), almost all countries had a tendency to increase their openness ratio or at least, to maintain it.

3.2 Business cycle synchronization

Figure 3 displays the cyclical component of real GDP, identified with the BK filter, with solid and dotted lines representing the cycle of Euro area aggregate (EMU17) and of each of the eight Balkan countries respectively, over the period of 2000:1-2011:4. Visual inspection of the figure suggests that all countries experienced expansionary business cycles from the first quarter of 2006 to the fourth quarter of 2008 when the global economic and financial crisis affected the Balkan economies. This is followed by a period of recession which seems to have been particularly prevalent in Turkey, which records a deviation from the trend of -8.2% in 2009:2, which is higher than the deviation from the trend of -7.1% in 2001:4.

Figure 3: Business cycles of Balkan countries and EMU



Source: Author's calculations

Table 3 displays, for the overall period, our two measures of synchronization of each country's cyclical component with that of EMU, as well as the measure of the volatility of business cycles.

Table 3: Business cycle synchronization vis-à-vis the EMU, 2000:1-2011:4

	Bulgaria	Croatia	FYROM	Greece	Romania	Serbia	Slovenia	Turkey	EMU17
Correlation	0.48*	0.54*	0.83* ²⁾	0.03	0.45*	0.49* ³⁾	0.93*	0.67*	0.81*
Concordance	0.56	0.56	0.88 ²⁾	0.36	0.52	0.61 ³⁾	0.92	0.67	0.84
Volatility of business cycle	1.50	1.37	1.25 ²⁾	1.42	1.73	1.42 ³⁾	1.76	3.01	1.14

Source: Author's calculations

Notes: (*) Indicates statistical significance at a level of 1%.

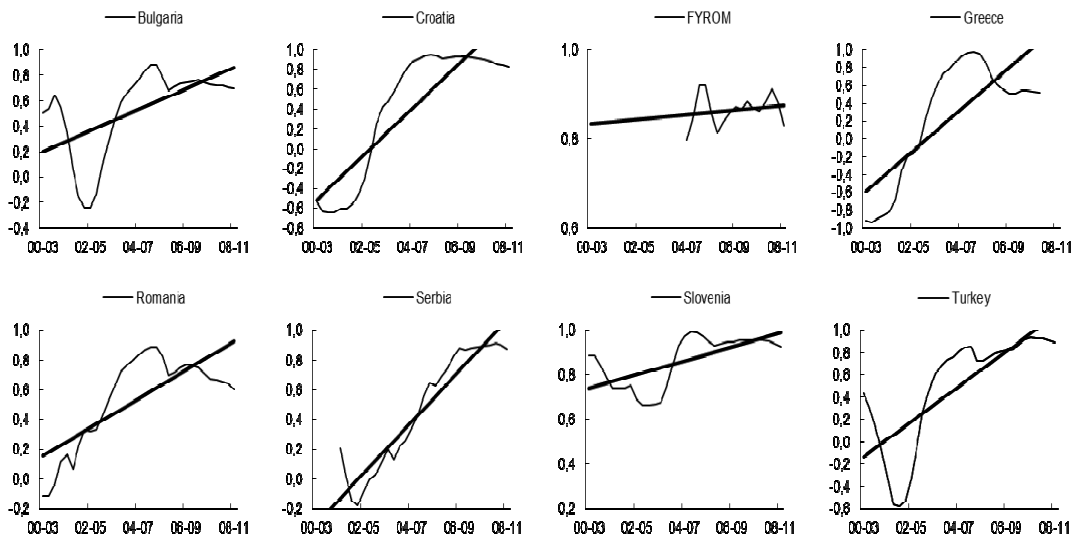
²⁾ Data for 2004-2011

³⁾ Data for 2001-2011

As Table 3 shows, we obtained similar results with the two measures of synchronization. All countries, except Greece, display a positive and statistically significant business cycle correlation with EMU. Out of the eight Balkan countries, Slovenia and FYROM exhibit a strong association with the Euro area cycle. It is remarkable that these two countries show a higher degree than the synchronization recorded by the individual members of EMU (they display a simple mean of 0.81 and 0.84, for correlation and concordance, respectively). The remaining countries display rather modest levels of association with the Euro area cycle. Concerning the amplitude of the cycles, all the countries are above the EMU17 average. Turkey registers the highest volatility (3.01) while FYROM and Croatia are the countries with the lowest volatility (1.25 and 1.37, respectively).

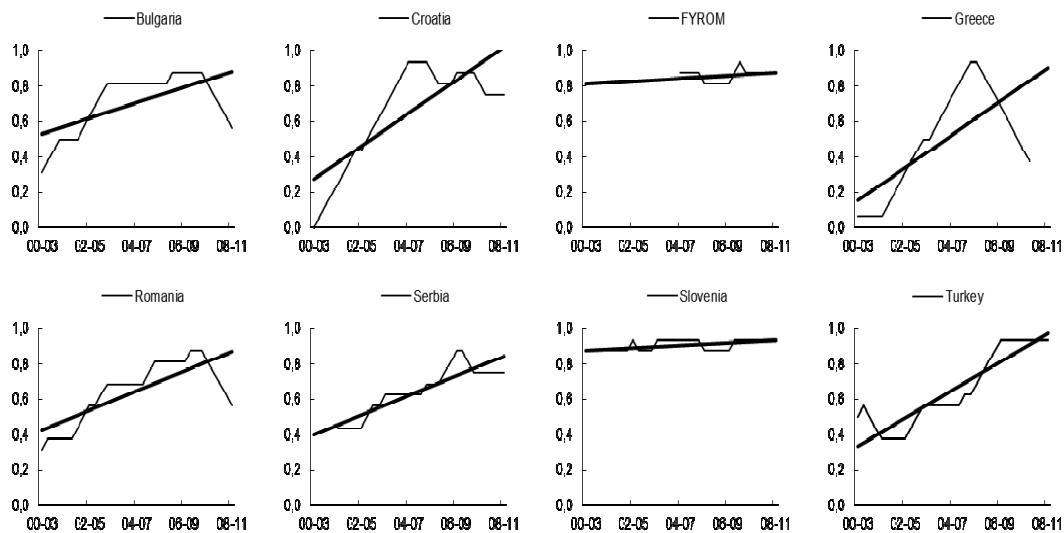
Next, we move to a sequential analysis of the 2000-2011 period. Figures 4 and 5 show the rolling-estimations for business cycle synchronization, as well as a linear trend of sequential synchronization. Overall, analysis of figures 4 and 5 suggests that there is a gradual tendency for an increase in the degree of synchronization with EMU17 for all Balkan countries. However, at the end of the period, we should point out a slight reduction of synchronization.

Figure 4: Rolling correlations coefficients of individual cycles with the EMU



Source: Author's calculations

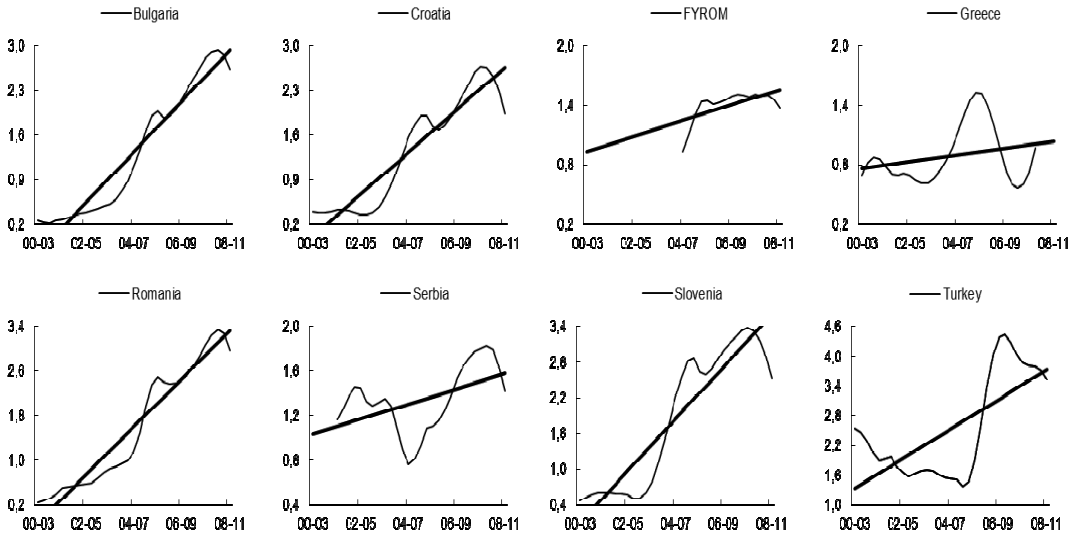
Figure 5: Rolling concordances of individual cycles with the EMU



Source: Author's calculations

Figure 6 compares the volatility of the business cycles of each Balkan country, presenting the value of the mean absolute deviation for rolling periods of 4 years. The figure clearly shows that all Balkan countries exhibit a clear upward trend in the amplitude of their cycles.

Figure 6: Rolling mean absolute deviation in business cycles



Source: Author's calculations

The results of business cycle synchronization between each Balkan country and the Euro area for the three selected sub-samples are provided in Table 4. Looking at the period 2000-2003 it is clear that Slovenia has business cycles that may be considered significantly synchronized with that of the Euro area, with a correlation coefficient and a concordance index of 0.89 and 0.88, respectively. In the case of Bulgaria and Turkey the degree of synchronization is relatively modest. Among the remaining four countries, there are two cases of negative and statistically significant correlations (Greece and Croatia). In the second sub-period we can see that for all countries (with the exception of Serbia) the cycle is relatively well synchronized, and Slovenia shows an almost perfect correlation with the Euro area. The most striking fact to emerge from comparing the first to the second sub-period is that the degree of synchronisation with EMU has increased remarkably for all countries. By contrast, in the recent recession period almost all countries show a decrease in the synchronization between their cycles and the Euro area cycle.

Table 4: Business cycle synchronization vis-à-vis the EMU for sub-periods

	Sub-period	Bulgaria	Croatia	FYROM	Greece	Romania	Serbia	Slovenia	Turkey
Correlation		0.51	-0.53	–	-0.91	-0.11 ^a	0.45 ^a	0.89	0.44
Concordance	2000-2003	0.31	0.00	–	0.06	0.31	0.31	0.88	0.50
Volatility		0.27	0.40	–	0.69	0.25	0.87	0.47	2.55
Correlation		0.76	0.88	0.80	0.92	0.83	0.34 ^a	0.98	0.81
Concordance	2004-2007	0.81	0.94	0.88	0.75	0.69	0.63	0.94	0.56
Volatility		1.11	1.57	0.94	1.11	1.15	0.76	2.21	1.53
Correlation		0.70	0.83	0.83	0.25 ^a	0.61	0.88	0.93	0.90
Concordance	2008-2011	0.56	0.75	0.88	0.38	0.56	0.75	0.94	0.94
Volatility		2.64	1.94	1.37	1.09	2.98	1.43	2.54	3.52

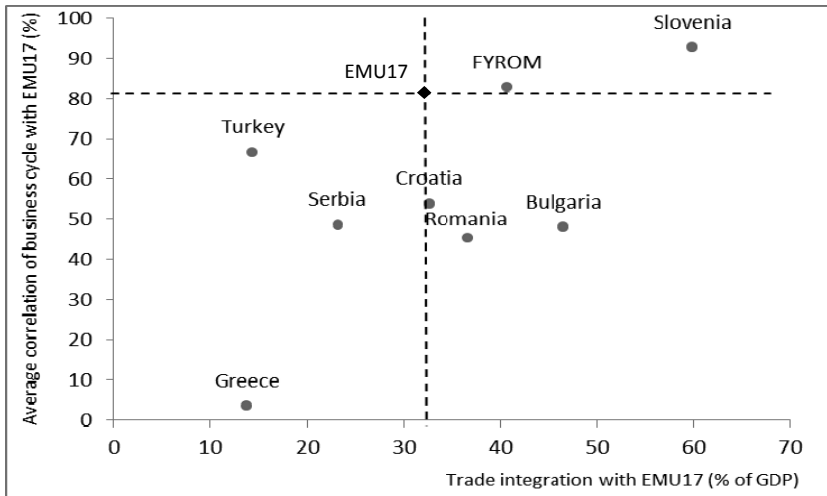
Source: Author's calculations

Note: (a) The correlation coefficient is not statistically significant at the 10% level.

As an analysis from the Economist Intelligence Unit (2012) notes, the Balkan transition economies (such as Bulgaria, Croatia, FYROM, Romania and Serbia) suffered the most from the global recession of 2008-09 with the recession lasting into 2010. This was partly because Romania, the largest of the Balkan economies, dragged the average figure down.

3.3 A joint assessment

Following Frankel (1999), in order to judge the readiness of Balkan countries to join the euro we provide in Figure 7 a joint assessment of the two criteria. The figure jointly displays the degree of trade integration with EMU17 (as a percentage of the GDP) from Table 2 and the cyclical correlation of each country with the Euro aggregate cycle from Table 3. As a reference point, our diagram includes the average figures of intra-EMU trade and cyclical correlation for EMU17, as well as a vertical and a horizontal line crossing the EMU17 *locus*. These lines define four quadrants in the diagram.

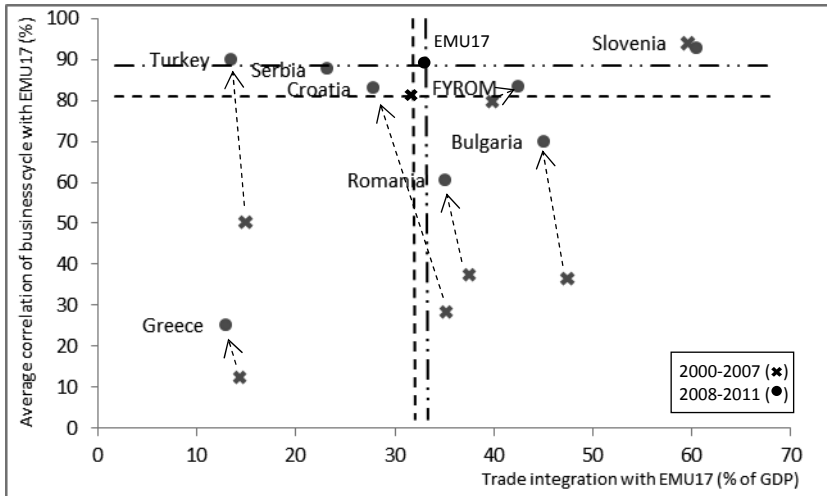
Figure 7: Trade integration and Cyclical correlation with EMU, 2000-2011

Source: Author's calculations

The figure shows that two countries lie in the first quadrant: Slovenia and FYROM are the countries in the sample that perform better than the average of EMU17 in both criteria. Three countries: Greece, Serbia and Turkey, fall in the third quadrant. These fare worse than the average of EMU17 in both criteria, although Turkey is nearest the EMU average concerning cycle correlation. The remaining countries (Croatia, Romania and Bulgaria) fall into the fourth quadrant because they perform better than the EMU average concerning trade with Euro area whilst faring worse than the average concerning synchronization of business cycles.

As Frankel (1999) points out, “such parameters as openness and cyclical correlation are not fixed for all time”. To understand better the evolution of the two criteria over the sample period we provided in figure 8 a diagram with the average of the openness to EMU and the average of cycle correlation for the period pre-crisis (2000-2007) and the average openness to EMU and the cyclical correlation for the crisis period (2008-2011). The values for the sub-period 2000-2007 are represented with crosses and those for the sub-period 2008-2011 with circles. Essentially, from the 2000-2007 to the 2008-2011 period, the Balkan countries intensified in terms of cycle correlation; in contrast there appears to be a slight decrease of trade openness relative to EMU17. Only Slovenia and FYROM increased slightly in trade openness. In this analysis by sub-periods the EMU17 average recorded an increase in cycle correlation slightly larger than the increase in correlation in trade openness.

Figure 8: Trade integration and Cyclical correlation with EMU, for sub-periods



Source: Author's calculations

4. Summary and conclusions

In this paper we have examined elements that could help us decide whether a country entering the EMU has the conditions to be successful, and how successful of the countries under analysis are likely to be. According to traditional OCA theory, the best suited candidates for currency union are characterized by a high degree of trade integration and a large business cycle synchronisation so that renouncing their individual monetary and exchange rate policies would not give rise to major economic costs. Bearing this in mind, we analysed the degree of economic integration between the Euro area and eight Balkan countries. Two of them (Greece and Slovenia) are EMU Members, three are EU Members (Bulgaria, Romania and Croatia) and the remaining three (FYROM, Serbia, and Turkey) are candidates for EU membership.

First, we have computed three measures of trade intensity between the Euro area and the Balkan countries for 2000-2011. Second, we have calculated a number of alternative measures of synchronisation and volatility in order to characterise the degree of association between the aggregate Euro area and Balkan countries' business cycles, as well as their progress during the period between 2000 and 2011. With regard to the first criteria, the results of the paper show that, with the exception of Greece and Turkey, the Balkan countries are relatively open to trade and have significant trade links with the EMU, implying potential benefits from decreased transaction costs and a lower risk of asymmetric shocks.

With regard to the second criteria, our results point to a positive and statistically significant degree of synchronisation of Balkan countries (except Greece) vis-à-vis the EMU-wide business cycle. Croatia, Turkey, Bulgaria and Romania show a strong increase

in business cycle correlation from the period 2000-2007 to 2008-2011. Notwithstanding, when we consider the full period the majority of countries present a moderate degree of association, quite far away from those of the EMU average. Slovenia and FYROM are an exception as they have a high degree of association with the Euro area cycle, with correlation/concordance above the average correlation/concordance for the EMU Member States. Greece is a very special case as it presents both poor synchronisation of its cycles, as well as a very low level of openness with the Euro area. On the other hand, all the Balkan countries present a high volatility in their cycles, which is greater than the EMU average.

We have documented that the degree of business cycle synchronisation in Balkan countries has changed over the time studied, on the basis of measures of correlation, concordance, and standard deviation for a 4 year rolling sample. In general the rolling correlations and concordances have shown that the synchronisation of the Balkan countries has increased. However, at the end of the period, we have noted a slight decrease of synchronisation. When we split the sample period into three sub-periods (2000-2003; 2004-2007; 2008-2012), we observe a notable increase in the degree of synchronisation from the first to the second sub-period for all countries (except for Serbia). Regarding the evolution from the second to the third sub-period we can observe a greater heterogeneity where we observe a slight decrease in the degree of synchronisation in almost all countries, with the exception of Serbia and Turkey; FYROM remains with a similar synchronisation pattern, while Greece behaves in a substantially different fashion from all the other countries. We have found that business cycle volatility has increased during all three periods studied and is particularly relevant from the second to the third sub-periods and for countries like Bulgaria, Romania and Turkey the volatility over the third sub-period more than doubled.

All in all, we conclude that the relative position of the Balkan countries varies from one to another. Slovenia and FYROM seem to display the best conditions for a currency union. Greece is the country presenting the biggest challenges as it exhibits looser connections to the Euro area cycle. On the other hand, Bulgaria, Romania and Croatia are well positioned with regards to trading integration with the Euro area, while Turkey and Serbia show little trade integration with the EMU. Despite the fact that the cycles in Turkey have been increasingly correlated with the Euro area aggregate they remain very volatile. The synchronisation of business cycles in Croatia, Serbia, Romania and Bulgaria are still quite distant from the average of the EMU, so they need to progress further with regards to these criteria in order to adopt the euro without major stabilization costs.

Finally, two caveats are in order. First, our data are for a relatively short sample period. As time proceeds, a longer series would allow for a refinement of the econometric approach and, thus, yield potentially more robust results. Second, if our analysis, which is based on two criteria of OCA, took into account other criteria (such as the flexibility of prices and wages, the mobility of production factors, the degree of specialization of the countries' production structure, the ability of insurance mechanisms and fiscal policies to smooth out shocks) we believe that the conclusions would not be substantially different.

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References

- Afonso, A. and Furceri, D., 2008, 'EMU enlargement, stabilization costs and insurance mechanisms', *Journal of International Money and Finance*, 27, 2, pp. 169-187.
- Akkoyun, H., Günay, M. and Şen-Doğan, B., 2012, 'Business Cycle Synchronization of Turkey with Euro Area and the US: What Has Changed After 2001?' *Central Bank of the Republic of Turkey Working Paper*, 12/15, Turkey.
- Artis, M. and Zhang, W., 1997, 'International Business Cycles and the ERM: Is there a European Business Cycle?', *International Journal of Finance and Economics*, 2, 1, pp. 1-16.
- Artis, M. and Zhang, W., 1999, 'Further evidence on the international business cycle and the ERM: Is there a European business cycle', *Oxford Economic Papers*, 51, 1, pp. 120-132.
- Babetskii, I., 2005, 'Trade integration and synchronization of shocks - Implications for EU enlargement', *Economics of Transition*, 13, 1, pp. 105-138.
- Baxter, M. and King, R., 1999, 'Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series', *Review of Economics and Statistics*, 81, pp. 575-93.
- Bayoumi, T. and Eichengreen B., 1993, 'Shocking Aspects of European Monetary Unification', Torres F. and Giavazzi, F., *Adjustment and Growth in the European Monetary Union*, Cambridge University Press, pp. 193-229.
- Bayoumi, T. and Eichengreen, B., 1997, 'Ever closer to heaven? An optimum-currency-area index for European countries', *European Economic Review*, 41, 3-5, pp. 761-770.
- Bayoumi, T., 1994, 'A formal model of optimum currency areas', *IMF Staff Papers*, 41, 4, pp. 537-554.
- Benčík, M., 2011, 'Business cycle synchronisation between the V4 countries and the euro area', *National Bank of Slovakia Working and Discussion Papers*, 1, Slovakia.
- Botrić, V., 2013, 'Determinants of Intra-industry Trade between Western Balkans and EU-15: Evidence from Bilateral Data', *International Journal of Economic Sciences and Applied Research*, 6, 2, pp. 7-23.
- Damyanov, A. and Stefanov, G., 2010, 'Business Cycle Synchronizations between the Bulgarian Economy and the European Union', *South-Eastern Europe Journal of Economics*, 8, 2, pp. 171-185.
- Darvas, Z. and Szapáry, G., 2008, 'Business cycle synchronization in the enlarged EU' *Open Economies Review*, 19, 1, pp. 1-19.

- De Grauwe, P. and Mongelli, F., 2005, 'Endogeneities of Optimum Currency Areas: What Brings Countries Sharing a Single Currency Closer Together?', *European Central Bank Working Paper Series*, 468.
- Dumitru, I. and Dumitru, I., 2010, 'Business cycle correlation of the new member states with Eurozone - the case of Romania', *Romanian Journal of Economic Forecasting*, 13, 4, pp. 16-31.
- Fidrmuc, J., 2004, 'The Endogeneity of the Optimum Currency Area Criteria, Intra-Industry Trade, and EMU Enlargement', *Contemporary Economic Policy*, 22, pp. 1-12.
- Fidrmuc, J. and Korhonen, I., 2006, 'Meta-analysis of the business cycle correlation between the euro area and the CEECs', *Journal of Comparative Economics*, 34, 3, pp. 518-537.
- Frankel J., 1999, 'No Single Currency Regime is Right for all countries or at all times', *Essays in International Finance*, 215, Princeton University.
- Frankel, J. and Rose, A., 1998, 'The Endogeneity of the Optimum Currency Area Criteria' *Economic Journal*, 108, pp. 1009-1025.
- Gligorov, V., Iara, A., Landesmann, M., Stehrer, R. and Vidovic, H., 2008, *Western Balkan Countries: Adjustment Capacity to External Shocks, with a Focus on Labour Markets*, The Vienne Institute for International Economic Studies Research Reports, 352, Austria.
- Gomez, D., Ortega, G. and Torgler, B., 2012, 'Synchronization and diversity in business cycles: A network approach applied to the European Union', Center for Research in Economics, Management and the Arts (CREMA) Working Paper Series, 1, CREMA, Switzerland.
- Harding, D. and Pagan, A., 2002, 'Dissecting the cycle: a methodological investigation.' *Journal of Monetary Economics*, 49, pp. 365-81.
- Hodrick, R. and Prescott, E., 1997, 'Postwar U.S. Business Cycles: An Empirical Investigation', *Journal of Money Credit and Banking*, 29, pp. 1-16.
- International Monetary Fund (IMF), 2010, *World Economic Outlook October 2010*, International Monetary Fund Publication Services, Washington.
- International Monetary Fund (IMF), 2012, *Annual Report on exchange arrangements and exchange restrictions 2012*, International Monetary Fund Publication Services, Washington.
- Kenen, P., 1969, 'The Theory of Optimum Currency Areas: An Eclectic View', Mundell, R. and Swoboda, A., *Monetary Problems of the International Economy*, University of Chicago Press, Chicago, pp. 41-60.
- Krugman, P. 1993, 'Lessons from Massachusetts for EMU', Torres, F. and Giavazzi, F., *Adjustment and Growth in the European Union*, Cambridge University Press, Cambridge, pp. 241-60.
- McKinnon, R., 1963, 'Optimum Currency Areas', *The American Economic Review*, 53, 4, pp. 717-25.
- Mongelli, F., 2005, 'What is European Economic and Monetary Union Telling us About the Properties of Optimum Currency Areas?' *Journal of Common Market Studies*, 43, 3, pp. 607-35.

- Mundell, R., 1961, 'A Theory of Optimum Currency Areas', *The American Economic Review*, 51, 4, pp. 657-65.
- Savva, C., Neanidis, C. and Osborn, D., 2010, 'Business cycle synchronization of the euro area with the new and negotiating member countries', *International Journal of Finance & Economics*. 15, 3, pp. 288-306.
- Sideris, D., 2010, 'The Western Balkans on the road to the EU: An assessment of their integration with the euro zone using the Generalized Purchasing Power Parity approach', Bank of Greece.
- The Economist Intelligence Unit, 2012, 'Eastern Europe economy: Balkan vulnerability', June 14th.
- Tsanana, E., Katrakilidis, C. and Pantelidis, P., 2012, 'Balkan Area and EU-15: An Empirical Investigation of Income Convergence', Karasavvoglou, A. and Polychronidou, P., *Balkan and Eastern European Countries in the Midst of the Global Economic Crisis*, Contributions to Economics, Springer-Verlag Berlin Heidelberg.
- Vesselinov, R., 2012, 'New Composite Indicators for Bulgarian Business Cycle', *International Journal of Economic Sciences and Applied Research*, 5, 2, pp. 101-111.