REAL AND NOMINAL CONVERGENCE, THE SYNCRONIZATION OF BUSINESS CYCLES BETWEEN THE NEW EUROZONE MEMBERS (NEM) SLOVENIA, SLOVAKIA, CYPRUS, ESTONIA AND THE CORE EUROZONE

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After the accession of newly members in the European Union in 2004 and 2007 these countries are expected to adopt the common currency: Euro. The nominal convergence must be achieved until then as the Maastricht treaty implies but in order to be an Optimum-Currency-Area (OCA) these countries economies are expect to behave similarly to those of the European. We test the synchronization of the business cycle between the EU12 and Slovenia, Slovakia, Cyprus and Estonia using as a measure their GDP evolution. The GDP for all the states are seasonally adjusted using the X12-ARIMA methodology, we apply the Hodrick-Prescott filter in order to capture the trend and cycle of GDP, using the correlation coefficient we test their level of synchronisation. The main findings are that their level of synchronisation has rise over the 1995-2011 period, also adopting the common currency Euro doesn't seem to have an impact on the level of busyness cycle synchronisation.

Keywords: Eurozone, business cycle synchronisation, Hodrick-Prescott filter, Optimum-Currency-Area Jel codes: E32, C22

1. Introduction

The monetary union means adopting the same currency by at least two countries, Euro area, or that of the most important commercial partner, the dollarization in Latin America (Ecuador, Peru). For Romania an important significance has been given by the "Euro zone"; now that our country is a EU member, it should focus on continuing the process of integration into European economic and monetary union and the next step is to adopt the Euro. The benefits of achieving a monetary union are related to the existence of an optimal currency areas where an optimum currency area is defined as a geographical region in which the member states must use fixed exchange rates or a single currency. (Mundell, 1961) presents the criteria that a country must satisfy to be part of an optimal currency area: business cycle synchronization, high degree of labour mobility, diversified production, a high degree of openness of the economy and symmetry to the external shocks.

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Country	HICP Inflation	Gerneral government deficit	General government gross debt	ERM II membership	Exchange rate vis-à- vis euro	Long term interest rates
Reference value	max. 1%	max. 3%	max. 60%	min. 2 years	+/- 15%	6%
Bulgaria	1.70%	2.80%	17.40%		-	6.9
Czech Republic	0.30%	5.70%	39.80%		2.6	4.7
Hungary	4.80%	4.10%	78.90%		4.5	8.4
Latvia	0.10%	8.60%	48.50%	since 2 May 2005	-0.4	12.7
Lithuania	2.00%	8.40%	38.60%	since 28 June 2004	-	12.1
Poland	3.90%	7.30%	53.90%		8.4	6.1
Romania	3.40%	2.40%	30.50%		2.9	9.4
		Source: ECB	Convergence	e Report, 2010		

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A preliminary stage of adopting the Euro is compliance with the fulfilment of the convergence (Tabel 1) criteria of the Maastricht Treaty (1992): the average inflation rate should not exceed with more than 1.5 percentage points the average of the most performing three members, the long-term interest rates should not exceed with more than two percentage points the average of the top performing members, consolidated budget deficit should be less than 3% of GDP, public debt should be below 60% of GDP, exchange rate fluctuations against the Euro should fall within a corridor of + / - 15% of the average level.

In this paper we investigate the correlation of business cycle between the Eurozone and the NMS who adopted Euro: Cyprus, Slovakia, Slovenia, Estonia.

2. Literature review

In his seminal paper of (Mundell, 1961) \square which analysis the Optimal Currency Area (OCA) he finds that the economic benefit depends on the mobility of production factors, the level economic openness, economic diversification, wage and price flexibility, the synchronization of business economic cycles and the shock symmetry. (Frankel & Rose, 1997) finds that an optimum area is endogenous if countries have a strong trade and synchronization of business cycles, (Ricci, 1997) propose a two country monetary model of trade and observes that the benefit from adopting a single currency is correlated with shock symmetry, labour mobility, inflation differential. (Mongelli, 2002) in an analysis of the OCA discuss the specialisation versus endogeneity of the countries in an currency union, (Alesina & Barro, 2003) finds that there are well established Euro and dollar area but not yen area, (Blaszkiewicz, 2003) observe that Central and Eastern countries are having a high open trade with the European Union but only Hungary and Slovenia have shock correlation, (Darvas & Szapáry, 2004) analyse not only the GDP comovement but also the industry, trade, consumption, services and investment, finding that for the core countries of European Union (Austria, Belgium, France, Germany, Italy and Netherlands) show a high degree of synchronisation, while for the periphery (Finland, Ireland, Portugal, Spain) countries the level of synchronization is lower, also the Central and Eastern European Countries (CEEC) Hungary, Poland and Slovenia are the most synchronized while Czech Republic and Slovakia are less synchronized and in the case of Baltic states they aren't synchronized at all nerveless the degree of synchronisation has significantly increased in the 1993-1997 and 1998-2002 period for all the countries. (Sander & Kleimeier, 2004) analyses the monetary policy in the Eurozone between 1993 and 2002 concluding that when using the monetary policy rate proxy the pass-through increased in the analysed period and that real and nominal convergence lead to a homogeneous transmission in the Eurozone. The European Union is not entirely an optimum currency area, there are differences in labour mobility, however, joining an economic union and then a monetary union showed that the euro zone economies become integrated as a result of monetary union (Baldwin, 2006). In their meta-analysis (Fidrmuc & Korhonen, 2006) review the existing studies on OCA and observe that Central and Eastern European countries, also the methodology used by research range from using HP and Kalman filters, supply and demand shock, VAR models to dynamic correlation, the date used are usually quarterly and sometimes monthly. The most of studies (Fidrmuc & Korhonen, 2006) are on new EU members while in the case of Romania and Bulgaria the number of studies are small, the highest correlations of the business cycle is for Hungary followed by Slovenia and Poland and only in the case of Lithuania are negative. (Afonso & Furceri, 2007) analyses the sectoral business synchronisation finding that industry, building and agriculture are the highest correlated sectors while the services sector has a low business cycle and volatility. (Bîtcă, Preotu, Radu, & Tonița, 2007) analyze the synchronisation of CEEC's (including Romania) and finds that the level of synchronization is higher for the 2002-2006 period then in the 1997-2001, Romania and Bulgary have the lowest level of correlation. (Ionut Dumitru & Dumitru, 2010) test the degree of readiness of New Member States (NMS) using for extracting the trends and cycles from GDP the following

methods: quadratic trends, Hodrick-Prescott filter, Band-Pass filter, Beveridge-Nelson decomposition, Wavelet transformation and principal component analysis (PCA) the main findings regarding Romania are that the level of synchronisation is the lowest, but the level of correlation has increase the most for Romania and Slovakia, continuing their the research for Romania (I. Dumitru & Dumitru, 2011) finds that the demand shock are negative for Romania while in the case of supply shock the level of correlation has raise over the 1997-2009 period.

3. Data and methodology

The countries analysed are Cyprus, Estonia, Slovakia, Slovenia which adopted the Euro between 2002 and 2011, Malta was excluded because the data were available only from 2000. The GDP data series obtained from Eurostat are quarterly and span over the 1995-2011period. The GDP for the EU12 and the NEM (New Eurozone member) are de-trended using the X-12 Arima methodology, in order to extract the trend and cycle we use the Hodrick-Prescott filter (Hodrick & Prescott, 1997) and the Band-Pass filter (Baxter & King, 1995), in order to capture the level of synchronisation we will calculate the level of correlation in 5 years groups.

The Hodrick-Prescott filter has the following form:

$$\sum_{t=1}^{T} (y_t - T_t)^2 + \lambda \sum_{t=2}^{T-1} [(T_{t+1} - T_t) - (T_t - T_{t-1})]^2$$
(1)

where $^{\lambda}$ is a penalisation parameter, which in the case of quarterly data will have the value $\lambda = 1600$

4. Results

The evolution of GDP (Figure 1) for the period 1995-2011 has an upward trend, with the exception of 2008-2009 when the European Union was in recession, we will eliminate seasonal component using X12-Arima methodology.



Figure 1. GDP and GDP de-seasonal evolution 1995-2011

Where the variable: Cyprus, Euro_area, Estonia, Slovenia, Slovakia represents the GDP and Cyprus_d11, Euro_area_d11, Estonia_d11, Slovenia_d11, Slovakia_d11 represents the smoothed series without the seasonal influence. Applying the Hodrick-Prescott filter we extract the cyclical and trend component.



Source: authors calculation

Where hp represents the cycle and hpt the trend, we observe that the trend is upward for all the analysed countries, in order to capture the synchronisation of business cycle we will compare the correlation coefficient (Table 2) over the following periods 1995-2011, 1995-2000, 1997-2002, 1999-2004, 2000-2005, 2002-2007, 2004-2009, 2006-2011.

Table 2. The correlation coefficients for the business cycle

using the observations 1995:1 - 2011:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.7149	0.9010	0.7253	0.5964	hp_Euro_ared11		
using the observ	vations 1995:1 - 2	000:4					
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.5291	-0.3485	-0.1574	-0.3879	hp_Euro_ared11		
using the observations 1997:1 - 2002:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.6100	-0.4487	-0.1239	-0.4504	hp_Euro_ared11		

using the observations 1999:1 - 2004:4

Correlation Coefficients,

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hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.7518	0.6238	0.2705	0.4881	hp_Euro_ared11		
using the observations 2000:1 - 2005:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.7179	0.7566	0.6809	0.5836	hp_Euro_ared11		
using the observations 2002:1 - 2007:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.8597	0.9641	0.8690	0.7835	hp_Euro_ared11		
using the observations 2004:1 - 2009:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.7771	0.9625	0.8143	0.6994	hp_Euro_ared11		
using the observations 2006:1 - 2011:4							
hp_Euro_ared11	hp_Cyprusd11	hp_Estoniad11	hp_Sloveniad11	hp_Slovakiad11			
1.0000	0.7350	0.9608	0.7690	0.6519	hp_Euro_ared11		

For the 1995-2002 period we find that Estonia, Slovenia and Slovakia are negatively correlated with the EU12 while Cyprus is linear correlated for all the sample period, the highest correlation is observed in the case of Cyprus 0.61 and the lowest negative correlation is observed for Slovakia. From 2000 on all the countries became positively correlated with EU12, so we can observe that for the last period the highest correlation is for Estonia and Slovenia, while Cyprus has a lower correlation, while Slovakia is the least correlated from the analysed countries. Nevertheless it can be observe that the degree of synchronization of the business cycles has an upward trend and we can expect that Slovenia, Slovakia and Cyprus to became more correlated in time. These countries adopted the Euro as follows: Cyprus - 1 January 2008, Estonia – 1 January 2011, Slovakia – 1 January 2009, Slovenia – 1 January 2007, so as the level of correlation for the last period (2006-2011) is lower then the previous periods we cannot draw the conclusion that adopting the Euro increases the level of business cycle synchronisation.

Analysing the degree of synchronisation between the NEM's we can postulate that the other countries which are suppose to adopt the common currency: Bulgaria, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania should have also a high degree of business cycle syncronization.

5.Conclusion

This paper analysis the degree of business cycle synchronisation in order to asses if the NEM's states will form am Optimum-Currency-Area, the research is build upon the seminal papers of (Mundell, 1961) using a methodology similar to those proposed by (Darvas & Szapáry, 2004). Using the GDP series evolution for EU12 and Cyprus, Estonia, Slovakia, and Slovenia for the 1995-2011 period, we apply the X12-Arima methodology in order to seasonally adjust the series and decompose the GDP evolution in trend and cycle using Hodrick-Prescott filter. In order to test the level of synchronisation we use the correlation coefficient, the main finds refer to the rise in the synchronisation cycle and the fact that adopting Euro didn't rise the level of synchronisation between these economies.

References

Afonso, A., & Furceri, D. (2007). Sectoral business cycle synchronization in the European Union. Complexity, (January), 1-26.

Alesina, A., & Barro, R. (2003). Optimal currency areas, (1958). Retrieved from http://www.nber.org/chapters/c11077.pdf

Baldwin, R. (2006). In or out: does it make a difference. An evidence based analysis of the trade effects of, 1-99.

Baxter, M., & King, R. G. (1995). Measuring business cycles approximate band-pass filters for economic time series. National Bureau of Economic Research, 81(November), 575-593. Retrieved from http://www.nber.org/papers/w5022

Blaszkiewicz, M. (2003). Do Candidate Countries Fit the Optimum-Currency-Area Criteria? CASE Network Studies and, (December). Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1443832

Bîtcă, R., Preotu, V., Radu, G., & Tonița, M. A. (2007). Influența adoptării Euro asupra ciclicității economice. Romania.

Darvas, Z., & Szapáry, G. (2004). Business cycle synchronization in the enlarged EU: Comovements in the new and old members. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=508564

Dumitru, Ionut, & Dumitru, I. (2010). Business Cycle Correlation of the New Meber States with Eurozone-The Case of Romania. Journal for Economic Forecasting, (4), 16–31. Institute for Economic Forecasting.

Dumitru, I., & Dumitru, I. (2011). Similarity of Supply and Demand Shocks Between the New Member States and the Euro Zone. The Case of Romania. Journal for Economic Forecasting, (1), 5–19. Institute for Economic Forecasting.

Fidrmuc, J., & Korhonen, I. (2006). Meta-analysis of the business cycle correlation between the euro area and the CEECs. Journal of Comparative Economics.

Frankel, J. A., & Rose, A. K. (1997). The Endogeneity of the Optimum Currency Area Criteria, (September).

Hodrick, R., & Prescott, E. C. (1997). Postwar US business cycles: an empirical investigation. Journal of Money, Credit, and Banking, 29(1), 1-16.

Mongelli, F. (2002). New Views on the Optimum Currency Area Theory: What is EMU Telling Us?, (138). Retrieved from http://repec.org/res2002/Mongelli.pdf

Mundell, R. (1961). A theory of optimum currency areas. The American Economic Review, 51(4), 657-665. Retrieved from http://www.jstor.org/stable/10.2307/1812792

Ricci, L. (1997). A model of an optimum currency area, 2, 0-32.

Sander, H., & Kleimeier, S. (2004). Convergence in euro-zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration. Journal of International Money and Finance.