THE SYNCHRONIZATION PROCESS OF CREDIT CYCLES: EVIDENCE FROM EU COUNTRIES

Stanislav Percic, PhD Student, Constantin-Marius Apostoaie, PhD, "Al. Ioan Cuza" University of Iași

Abstract: The scope of this study is to analyze the synchronization process of credit cycles in EU countries. The importance for such a study derives from the fact that synchronized credit cycles are perceived as a condition for the efficient implementation of common economic policies within the EU, as well as a precondition for a deeper economic integration within this area. The study focuses on twelve developing as well as advanced economies from the European Union over a period span of 24 years. The following steps are taken: a) firstly, the study focuses on the overall synchronicity of the credit cycles where a static analysis is being performed (on the basis of cross-correlation matrix) on the credit given to the private non-financial sector, and b) secondly, using a rolling correlation method, the study looks at the evolution of the synchronization process of the credit cycles within the EU countries. The findings revealed credit cycles are quite heterogeneous in the analyzed sample. Countries from Northern, Southern and South-Eastern Europe exhibit the most consistent synchronization movement, while, in contrast, Western Europe shows the least conformity. The second part of the investigation revealed that the credit cycles synchronicity among European countries was affected by two prolific economic events that occurred between 1990 and 2013: the establishment of the Eurozone and the global financial crisis.

Keywords: credit cycle, cross-correlation matrix, rolling correlation, synchronization, European Union

1. INTRODUCTION

The analysis of economic phenomena synchronicity is a topic of great interest for researchers, but especially for policy makers within the economic and monetary unions. The synchronicity of economic phenomena is the barometer of efficiency of economic policies implemented at the level of a group of states.

The aim of this paper is to investigate the synchronicity of credit cycles on a sample of 12 member states of the European Union, members and non-members of the Eurozone, from 1990 to 2013.

An in-depth analysis of the literature, using the most relevant databases revealed, in the limits of our knowledge, a poor representation of studies dealing with credit cycle synchronicity (the vast majority of them focusing on the synchronicity of economic cycles).

However, as demonstrated by studies of Lown and Morgan (2006) or Cocriș, Apostoaie and Percic (2013), the relationship between credit cycles and economic cycles is one of interdependence and mutual influence, for which the credit cycle behavior is very close to that of the economic cycle. Thus, a review of studies on business cycles synchronicity will

provide us the research methodology and tools required for the analysis of credit cycles synchronicity.

The rest of the paper is structured as follows: part 2 captures briefly the current state of the literature in the field, part 3 presents the dataset and methodology used in the study, part 4 presents the results of the empirical analysis and part 5 resumes the main findings and presents the future directions of the research.

2. LITERATURE REVIEW

The synchronicity of economic phenomena, and especially of cyclical economic phenomena (business cycles), remains a subject of great interest among researchers. The theoretical foundations of business cycles synchronicity could be found in the Theory of Optimum Currency Areas (OCA), formulated and proposed by Mundell (1961).

The authors noticed that in the last decade, there was an increased interest in examining whether the Eurozone can be classified as an OCA. One of the research directions analyses whether the deepening of economic integration is followed by an increase in the synchronization of business cycles. In this context, arise two well-founded but at the same time contradictory viewpoints.

On the one hand, the "specialization hypothesis" presented by Krugman (1993), argues that, as a result of the effects of the economies of scale and the externalities of agglomeration, economic integration leads to concentration of industrial activities in the regions. This increasing specialization transforms the sectorial shocks into the region-specific shocks (regional shocks) which will raise the share of asymmetric shocks and differentiation of regional economic cycles. Therefore, this pessimistic perspective argues that along with the creation of the Economic and Monetary Union (EMU), business cycles (especially regional ones) could become more divergent. In support of this hypothesis, Papageorgiou, Michaelides and Milios (2010) show that during the 1992-1999 period span, the EU states have inclined to synchronize their economic cycles in a greater proportion than in the period that followed the introduction of the euro. After the 1999's the synchronicity of business cycles has weakened at EU level, but increased within different groups of states. Filis et al. (2010), when analyzing the economic cycles of Bulgaria and the rest of the European Union, found a low degree of convergence between them.

On the other hand, the "endogenous hypothesis" proposed by Frankel and Rose (1998), claims that an intensification of trade between countries and regions of a currency area as a result of the elimination of trade barriers will reduce disparities between countries and will increase the synchronicity of business cycles. Moreover, the coordination of economic policy will also amplify the convergence between the currency area member states. According to this hypothesis, the OCA criteria could be fulfilled ex-post under the influence of a single currency and a common monetary policy. The economic literature captures a large number of studies that come to prove this hypothesis. For example, Crespo-Cuaresma and Fernández-Amador (2010) analyzed the business cycles among European countries and concluded that since the EMU creation, the synchronicity of economic cycles intensified between member states. De Haan, Inklaar and Jong-a-Pin (2005) argue that the degree of business cycles synchronization within the Eurozone increased and emphasize that the main reason for this is the intensification of mutual trade between these countries.

The literature proposes various methods of analysis and measurement of cyclical economic phenomena synchronicity, among them the most relevant being the *cross-correlation matrix* (Correia and Gouveia, 2013; Obradovic and Mihajlovic, 2013, etc.), *rolling correlation analysis* (Papageorgiou, Michaelides and Milios, 2010; Gouveia, 2014, etc.), *concordance analysis* (Sergo, Poropat and Gržinić, 2012; Jiménez-Rodríguez Morales-Zumaquero and Egert, 2013, etc.), *comparative visual analysis of records* etc.

3. METHODOLOGICAL APPROACH

Data used

In order to analyze the credit cycle synchronicity among the member states of the European Union, we chose a sample of 12 countries that represent Northern, Central, Western, Southern and South-Eastern geographical areas (see Table 1).

Table 1 *Sample list of European Union member states distributed by geographical areas*

Central Europe		**Western Europe**		**Northern Europe**		**Southern and South-Eastern Europe**	
Country	Acronym	Country	Acronym	Country	Acronym	Country	Acronym
Austria	AT	Belgium	BE	Denmark	DK	Greece	EL
Germany	DE	France	FR	Finland	FI	Italy	IT
		Ireland	IE	Sweden	SE	Portugal	PO
						Spain	ES
2		3		3		4	

Source: *authors' elaboration*

The selected states cover all the geographical areas of the EU, this approach aiming to fulfill thus the uniform geographical distribution and to facilitate the possibility of applying the method of comparing geographical areas and highlighting their specific features (e.g. comparing the Nordic countries, which are more cautious and prudent with the southern, which are more wasteful). Also it was taken into account to include in the proposed sample, the so called PIIGS countries (Portugal, Italy, Ireland, Greece and Spain) in order to capture the common trends and to propose some explanations for their sluggish progress during the recent financial crisis.

In the present research we included sets of data of *the total volume of credit to private non-financial sectors by domestic banks* as describing variable of credit cycle in European Union.

In terms of financial instruments, credit covers loans and debt securities. The series have quarterly frequency, capture the outstanding amount of credit at the end of the reference quarter and covers the period from the fourth quarter of 1990 to the fourth quarter of 2013 (1990: Q4 - 2013: Q4). We chose this period to include the new historical interval in Europe that started with the collapse of the socialist system and the reunification of Germany on October 3rd, 1990.

The primary data source is the Bank for International Settlements (BIS) data base. Since the volumes of credit for Denmark and Sweden are presented in their national

currencies, the Danish krone (DKK) and Swedish krone (SEK) (the volumes of credit for the rest of the countries are presented in euro, as they are part of the Eurozone), for uniformity we have transformed them into the European single currency, making use of the quarterly average of DKK and SEK to EUR / ECU available on Eurostat.

Methodology and tests

The first phase of the research consists in a preliminary analysis of the time series, aiming to test the normality of the data distribution and their stationarity. Moreover, this step involves the transformation and adjustment of the time series in order to ensure assumptions of normality and stationarity.

We used the numerical method Jarque-Bera test (JB) to verify the normality of distribution of the data series. In order to transform the data series so that they follow a normal distribution and to homogenize all the analyzed data sets, it was decided to apply the logarithm function (natural logarithm) on all data series proposed for research.

To test the stationarity of the data series, the Augmented Dickey-Fuller (ADF) test was employed. The number of lags used was selected according to the AIC (Akaike Information Criteria) and SIC (Schwarz Information Criteria) information criteria.

The second phase of the research consists in the analysis of credit cycles synchronicity among the EU states. For our study we chose the *cross-correlation matrix* analysis of previously filtered data, which is the method most commonly used by researchers to study economic phenomena synchronicity.

Basically, for a pair of variable, the cross correlation captures the linear interdependence between them and estimate the extent to which these two variables synchronize their movements. Cross correlation is determined by the formula:

$$r_c = \frac{\sum_{i=1}^{n}(x_i - m_x)(y_i - m_y)}{\sum_{i=1}^{n}(x_i - m_x)^2 (y_i - m_y)^2},$$

where r_c is the correlation coefficient, x and y are the analysed variables, while m_x and m_y are the average values of the variables.

The preceding step for construction and analysis of the correlation matrix is to filter the available data by separating the cyclical trend component. The literature suggests several methods of filtration, the most common being the Hodrick-Prescott (HP), Baxter-King (BK) and Christiano-Fitzgerald (CF) filters. In this paper the HP filter was used, being the most widely used among researchers in the field.

In order to deepen the analysis of credit cycles synchronicity the authors have decided to apply the *rolling correlations method*. In this study we made use of 4 quarters rolling windows, considered to be reasonable in terms of the length of the credit cycle.

4. EMPIRICAL RESULTS

Preliminary analysis of the time series

In order to ensure optimal conditions for the analysis of the time series we made a series of econometric tests and adjustments on them. Therefore, we used the JB test.

Table 2 *The results of the Jarque-Bera normality test*

Region	**Central e**	**Western Europe**	**Northern Europe**	**Southern and South-n Europe**

Countr	Austria	Germany	Belgium	France	Ireland	Denmark	Finland	Sweden	Greece	Italy	Portugal	Spain
J-B	7,258	16,41	5,817	11,69	8,953	10,81	10,60	15,49	11,12	9,412	8,658	11,28
Prob.	0,027	0,000	0,055	0,003	0,011	0,004	0,005	0,000	0,004	0,009	0,013	0,004

Source: *Authors' elaboration*

Analyzing the JB normality test results (see Table 2) we can notice that the data series as a whole do not follow a standard normal distribution. There would be a small exception in the case of Belgium, where the relevance of the test exceeds the 5% threshold. However, given the fact that the literature allows lifting relevance threshold to 10%, we strongly believe that the data series do not follow a standard normal distribution. In order to transform the data series so that they follow a normal distribution and to homogenize the data sets, it was decided to apply the logarithm function (natural logarithm) on all the data series of the research.

The next step of the preliminary analysis of time series was to test the stationarity of the data series which was made using the ADF test, with a number of lags selected according to the AIC and SIC information criteria. The final results of the stationarity tests are summarized in Table 3.

Table 3 *The results of the stationarity tests*

Region	**Central Europe**		**Western Europe**			**Northern Europe**			**Southern and South-Eastern Europe**			
Country	Austria	Germany	Belgium	France	Ireland	Denmark	Finland	Sweden	Greece	Italy	Portugal	Spain
ADF test	I(2)*	I(2)*	I(1)**	I(2)*	I(2)*	I(2)*	I(1)*	I(1)*	I(2)*	I(2)*	I(2)*	I(2)*

Source: *Authors' elaboration*

Note: * and ** denote the significance at the levels 1% and 5%

The results of the stationarity test lead us to conclude that the vast majority of the data series are integrated of order II. These series are non-stationary (called generic DSP series – "difference stationary processes") and their trend is further eliminated by calculating the second order differences. In order to preserve the homogeneous nature of the data series used, it was decided to calculate the second order difference for all.

Cross-correlation matrix analysis

The analysis of the cross-correlation matrix processed using the HP filter (see Graphic 1) shows that only 80.43% of the analyzed pairs of countries are positive correlated, while nearly 20% of them follow a negative correlation. Most of the adverse pairs are formed by Sweden, Germany, Belgium, France and Finland. Graphic 1 reveals that credit cycles are not

synchronized between Germany and Belgium, on the one hand, and most of the Nordic countries, on the other hand. Sweden does not synchronize credit cycles with all analyzed geographic regions equally.

Graphic 1 *Cross-correlation matrix*

	Austria	Belgium	Germany	Denmark	Greece	Spain	Finland	France	Ireland	Italy	Portugal	Sweden
Austria	1.000000											
Belgium	0.6591*	1.000000										
Germany	0.6335*	0.6793*	1.000000									
Denmark	0.4447*	0.0273+	-0.3400*	1.000000								
Greece	0.8334*	0.4253*	0.2179**	0.8086*	1.000000							
Spain	0.7387*	0.3328*	0.0283+	0.9088*	0.9753*	1.000000						
Finland	-0.0900+	-0.3306*	-0.6997*	0.7962*	0.3815*	0.5572*	1.000000					
France	-0.0054+	-0.3100*	-0.7600*	0.7783*	0.3713*	0.5472*	0.8665*	1.000000				
Ireland	0.6928*	0.4255*	0.2194**	0.7906*	0.8964*	0.8883*	0.4270*	0.2451**	1.000000			
Italy	0.7768*	0.4054*	0.1356+	0.6645*	0.8637*	0.8594*	0.3500*0	0.4893*	0.5866*	1.000000		
Portugal	0.9253*	0.6014*	0.7331*	0.3706*	0.7721*	0.6618*	-0.0804+	-0.177**	0.7501*	0.6132*	1.000000	
Sweden	-0.4064*	-0.6140*	-0.8949*	0.4917*	-0.0621+	0.1446+	0.8165*	0.8536*	-0.0726+	0.0455+	-0.4773*	1.000000

-1,0:-0,8 | --0,79:--0,6 | -0,59:-0,4 | -0,39:-0,2 | -0,19:0,0 | 0,0:0,2 | 0,21:0,4 | 0,41:0,6 | 0,61:0,8 | 0,81:1,0

Source: *Authors' elaboration*

Note: * and ** denote the significance at the levels 1% and 5%

+ Probability values are higher than the threshold of 10%

It appears that the percentage of pairs of states that show a very strong positive correlation (c> 0.8) is only of 18.48%, the share of strong positive correlated pairs (0.6 <c <0.79) reaches 25%, while the percentage of aggregate pairs with moderate positive correlation (0.4 <c <0.59) and weak to moderate positive correlation (0 <c <0.39) is more than 36.96% of the analyzed pairs.

The strongest level of correlation is recorded between Spain and Greece (c = 0.9753), Portugal and Austria (c = 0.9253), Denmark and Spain (c = 0.9088), while the smallest indicators can be traced between Denmark and Belgium (c = 0.0273) or Spain and Germany (0.0283). Moreover, we can observe very high negative correlation coefficients between Germany on the one hand, and Sweden (c = -0.8949), France (c = -0.7600) and Finland (c = -0.6997) on the other hand.

The lack of synchronicity between credit cycles in Germany and the mentioned countries might be due to the special status of the country, but also to the acyclic behavior of this so called EU "locomotive": saving during the expansion periods and spending during the periods of economic stagnation.

Graphic 2 *Cross-correlation matrices (geographical distribution)*

Central Europe

	Austria	**Germany**
Austria	1.000000	
Germany	0.6335*	1.000000

Northern Europe

	Denmark	**Finland**	**Sweden**
Denmark	1.000000		
Finland	0.7962*	1.000000	
Sweden	0.4917*	0.8165*	1.000000

Western Europe

	Belgium	**France**	**Ireland**
Belgium	1.000000		
France	-0.3100*	1.000000	
Ireland	0.4255*	0.2451**	1.000000

Southern and South-Eastern Europe

	Greece	**Spain**	**Italy**	**Portugal**
Greece	1.000000			
Spain	0.9753*	1.000000		
Italy	0.8637*	0.8594*	1.000000	
Portugal	0.7721*	0.6618*	0.6132*	1.000000

-1,0:-0,8	--0,79:-0,6	-0,59:-0,4	-0,39:-0,2	-0,19:0,0	0,0:0,2	0,21:0,4	0,41:0,6	0,61:0,8	0,81:1,0

Source: *Authors' elaboration*

Note: * and ** denote the significance at the levels 1% and 5%

+ Probability values are higher than the threshold of 10%

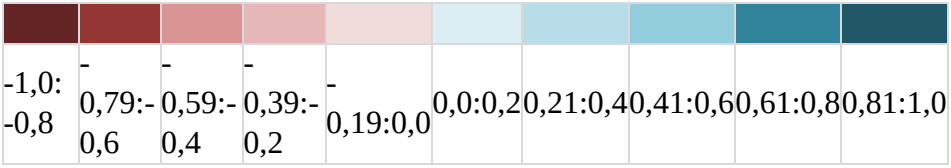
When analysing the cross-correlation matrices in each region (see Graphic 2), we noticed a strong synchronicity of credit cycles in the countries of Southern and South-Eastern Europe, moderate to strong in the case of the Nordic countries and Central Europe, and weak between the states of Western Europe. In Northern Europe the correlation coefficients fluctuate between 0.49 and 0.82, with a higher synchronicity recorded between a member and a non-member states of the Eurozone (0.80 <c <0.82) than between two non-member states (c = 0.49). Regarding Western Europe, synchronicity is weak and inconsistent, the correlation

coefficients ranging between -0.31 and 0.43. The largest discrepancies are recorded between France and Belgium, where it reached -0.31.

Southern and South-Eastern Europe has the highest level of synchronicity. Moreover, it preserves a homogeneous character within the entire analyzed region. The correlation coefficients related the southern states vary between 0.61 and 0.98, the highest synchronicity being recorded between Spain and Greece, and the lowest between Portugal and Italy.

Graphic 3 *Cross-correlation matrix (PIIGS states)*

	Greece	**Spain**	**Ireland**	**Italy**	**Portugal**
Greece	1.000000				
Spain	0.9753*	1.000000			
Ireland	0.8964*	0.8883*	1.000000		
Italy	0.8637*	0.8594*	0.5866*	1.000000	
Portugal	0.7721*	0.6618*	0.7501*	0.6132*	1.000000



Source: *Authors' elaboration*

Note: * and ** denote the significance at the levels 1% and 5%

+ Probability values are higher than the threshold of 10%

The specific features of the group of states from Southern and South-Eastern Europe may be associated with the PIIGS group of countries (see Graphic 3), where the credit cycles of Greece, Italy, Portugal and Spain are synchronized in a proportion ranging from 59% to 99%. The PIIGS is a cluster created with the first 'germs' of the global financial crisis, which is characterized by a constant synchronicity of the credit cycles. This constancy and persistence observed among the member states is the result of the close historical ties, tight economic relations, geographical proximity or even cultural affinities of the southern states.

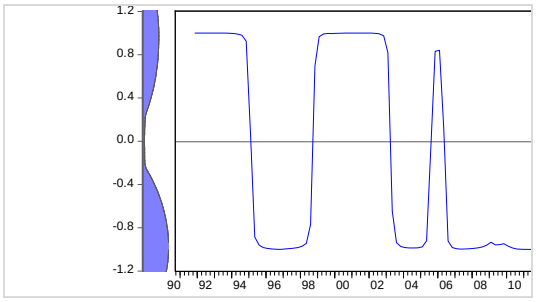
Rolling correlation analysis

When analysing Graphic 4, we found a sharp fluctuation of the correlation coefficients between the credit cycle of Austria and that of Germany. Despite the geographical proximity, common cultural affinities, these two countries succeed to synchronize their credit cycles only during the immediate period after the reunification of Germany and the Eurozone edification (at the turn of the millennium).

Graphic 4 *Graphical representations of the rolling correlations among Central European countries*

Austria

Germany



Source: *Authors' elaboration*

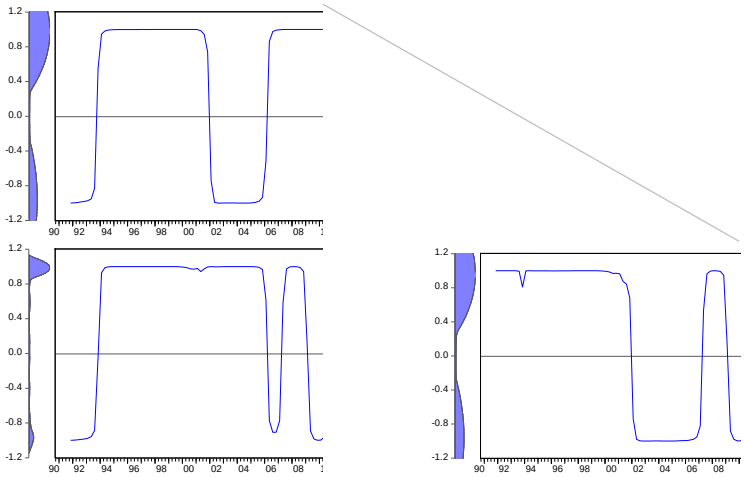
An interesting finding is related to the behavior of credit cycles of Germany and Austria during the recent financial crisis (and shortly before the outbreak of it): they leave the synchronicity shortly before the crisis, keeping the same character throughout the entire period of turbulences.

Graphic 5 *Graphical representations of the rolling correlations among Northern European countries*

Denmark Finland

Finland

Sweden



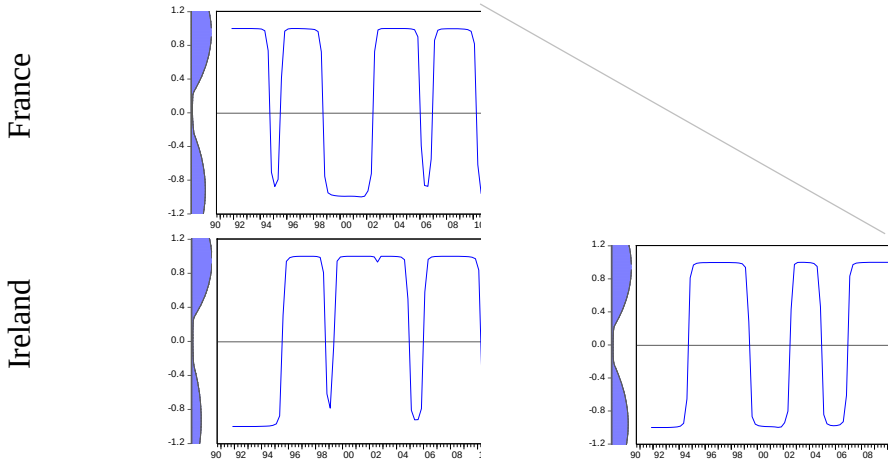
Source: *Authors' elaboration*

According to Graphic 5 the credit cycles synchronization among the group of Nordic countries started with the EU accession of Sweden and Finland in 1995. The credit cycles of Sweden and Finland have been synchronized even before this date, but this changed as soon as Finland adopted the euro. Moreover, the Finland's accession to the Eurozone has affected the credit cycles synchronicity of Denmark. Only after the first signs of overcoming the financial crisis we can observe a synchronization of credit cycles between all of the three northern states.

The evolution of the correlation coefficients between the credit cycles of Western European is very volatile. Credit cycles are synchronized only during 1994 Q2-1997: Q2 and 2006: Q1-2008: Q2.

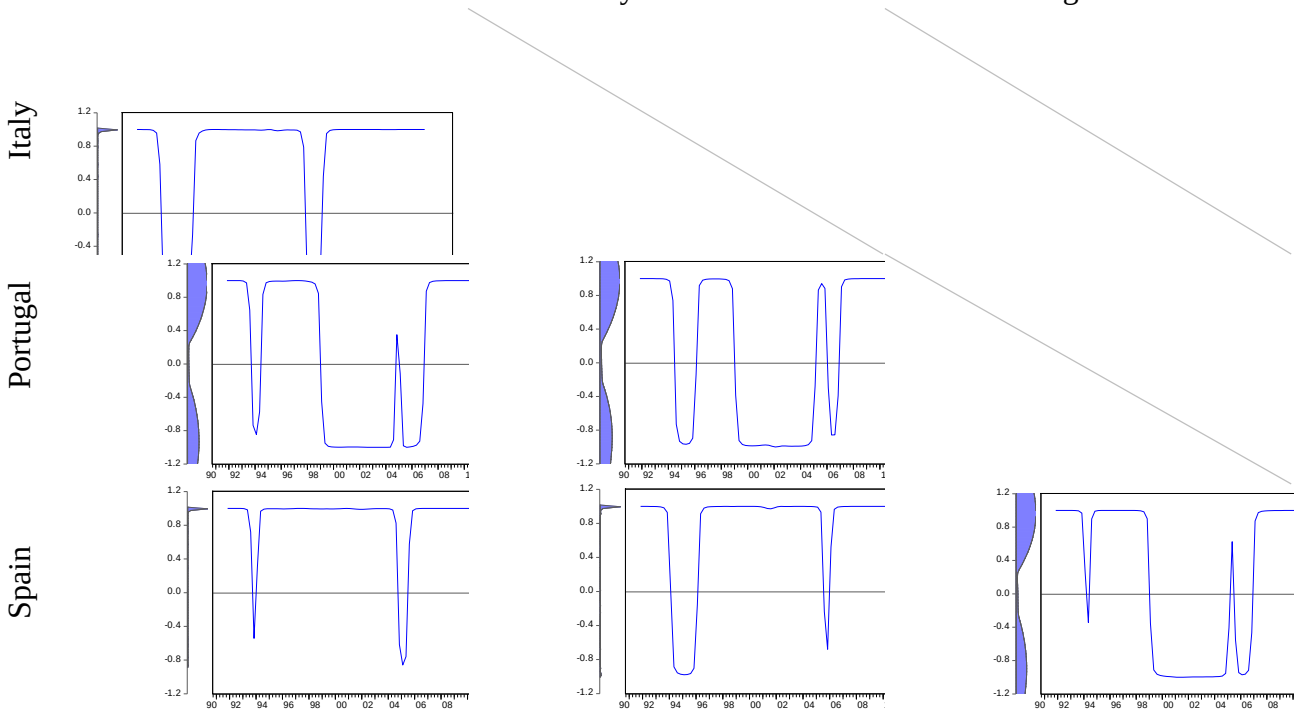
Graphic 6 *Graphical representations of the rolling correlations among Western European countries*

Belgium France



Source: *Authors' elaboration*

Graphic 7 *Graphical representations of the rolling correlations among Southern and South-Eastern European countries*



Source: *Authors' elaboration*

Analyzing the Kernel density corresponding to each pair of countries we found that the share of positive and negative correlation coefficients is approximately equal, with the exception of the pair formed by Ireland and Belgium, where credit cycles were synchronized for most of the time.

When analyzing Graphic 7, one can notice that there is a synchronization of the credit cycles among Southern and South-Eastern European countries for the most of the analyzed interval. Although Portugal recorded negative coefficients during 1998-2006 in relation to the rest of the listed states, the Southern and South-Eastern European countries have perfectly synchronized their credit cycles with the first signs of the financial crisis, a trend maintained until today.

CONCLUSIONS

After studying the synchronicity behavior of the credit cycles in 12 member states of the European Union during the 1990-2013 period, the following conclusions can be depicted:

1. We cannot speak of a perfect synchronicity of the credit cycles among our analyzed countries. The evolution of credit cycles between European Union member states are characterized rather by global heterogeneity or regional synchronicity.
2. From a *static perspective*, the sample of countries from Western Europe (which includes Belgium, France and Ireland) is characterized by the lowest level of credit cycles synchronicity, the correlation coefficients recording the lowest values and the largest discrepancies ($-0.31 < c < 0.43$). The pair of states from Central Europe (referring here to Austria and Germany), tend to a moderate synchronicity, while Northern Europe (Denmark, Finland and Sweden) and Southern and South-Eastern Europe (Greece, Italy, Portugal and Spain) are the regions with the highest degree of synchronicity of credit cycles, the coefficients in these regions exceeding the threshold of 0.7-0.8, and very often reaching the peak (pair formed by Spain and Greece recorded coefficients of above 0.98). Most probably, the high level of synchronicity of the credit cycles among the states from Southern and South-Eastern Europe are due to causes less fortunate: all of them are part of the PIIGS cluster that have faced financial troubles during the recent financial crisis.
3. From a *dynamic perspective* (retrospective radiography) the findings do not differ greatly from those mentioned earlier. We found a sharp fluctuation of the correlation coefficients for the Central Europe countries. The credit cycles of the Western European countries were moderately synchronized throughout the analyzed period, although there were long periods when credit developments followed different trends for each of the western states. The correlation coefficients between the Nordic credit cycles fluctuate in a high degree, but for the most of the time they got positive values. There is a synchronization of the credit cycles among Southern and South-Eastern European countries for most of the analyzed interval. Although Portugal recorded negative coefficients during 1998-2006 in relation to the rest of the listed states, the Southern and South-Eastern European countries have perfectly synchronized their credit cycles starting with the first signs of the financial crisis, a trend maintained until today.

The credit cycles synchronicity is quite heterogeneous in the analyzed sample, which motivates us to support that the European Union, and especially the Eurozone is not yet ready for the transition to the next level of economic integration, the banking integration.

We realize that this study is only an insight into the analysis of credit cycle synchronicity, but in the future, we intend to improve it by expanding the number of countries, improving the range of descriptive variables and completing the research methodology with complex econometric tools.

BIBLIOGRAPHY

1. Cocriş, V., Apostoaie, C.M., Percic, S. (2013), Analysis of the Credit and Business Cycles: Evidence from Twelve European Economies. Proceedings of the International

Economic Conference of Sibiu „Post Crisis Economy: Challenges and Opportunities", XX edition, Sibiu, Romania, 665-674.
2. Correia, L., Gouveia, S. (2013), Business Cycle Synchronisation at the Regional Level: Evidence for the Portuguese Regions. Regional and Sectoral Economic Studies, Vol. 13-1, 91-108.
3. Crespo-Cuaresma, J., Fernández-Amador, O. (2010), Business Cycle Convergence in EMU: A First Look at the Second Moment. Forschungsschwerpunkt Internationale Wirtschaft Working Paper 54.
4. De Haan, J., Inklaar, R., Jong-a-Pin, R.(2005), Will Business Cycles in the Euro Area Converge: A Critical Survey of Empirical Research. Centre for Economic Research Working Paper 2005/08.
5. Filis, G., Floros, C., Costas, L., Beneki, C. (2010), Are EU and Bulgarian Business Cycles Synchronized? Journal of Money, Investment and Banking, 14: 36-45.
6. Frankel, J., Rose, A. (1998), The Endogeneity of the Optimum Currency Area Criteria. Economic Journal, 108, 1009-1025.
7. Gogas, P., Kothroulas, G. (2009). Two speed Europe and business cycle synchronization in the European Union: The effect of the common currency. University Library of Munich, Germany, MPRA Paper 13909.
8. Gouveia, S. (2014), Business cycle correlation between the Euro area and the Balkan countries, International Journal of Economic Sciences and Applied Research 7 (1): 33-49.
9. Jiménez-Rodríguez, R., Morales-Zumaquero, A., Égert, B. (2013), Business Cycle Synchronization between Euro Area and Central and Eastern European Countries. Review of Development Economics, 17(2), 379–395.
10. Krugman, P. (1993), Lessons from Massachusetts for EMU, Adjustment and Growth in the European Union, F. Torres e F. Giavazzi (eds), Cambridge University Press, 241-260.
11. Lown, C., Morgan, D.P. (2006), The Credit Cycle and the Business Cycle: New Findings Using the Loan Officer Opinion Survey. Journal of Money, Credit, and Banking, Vol. 38, No. 6, 1575-1597.
12. Mundell, R. (1961), A Theory of Optimum Currency Areas. The American Economic Review, 51, 657-65.
13. Obradovic, S., Mihajlovic, V. (2013), Synchronization of Business Cycles in the Selected European Countries, PANOECONOMICUS, 6, 759-773.
14. Papageorgiou, T., Michaelides, P.G., Milios, G.J. (2010), Business cycles synchronization and clustering in Europe (1960–2009). Journal of Economics and Business 62 (2010), 419–470
15. Šergo, Z., Poropat, A., Gržinić, J. (2012), Business Cycle Synchronization in Croatia. South East European Journal of Economics and Business, Volume 7, Issue 1, 29-41.

ACKNOWLEDGEMENT

This work was cofinanced from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013, project number

POSDRU/159/1.5/S/134197 „Performance and excellence in doctoral and postdoctoral research in Romanian economics science domain”.