

Cyclical synchronization in the EMU along the financial crisis: An interpretation of the conflicting signals

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Abstract

We analyze how cyclical synchronization in the EMU evolved since the onset of the current financial crisis. The standard measures of cyclical correlation suggest that while the cycle of the euro area became more aligned with the cycles of other developed economies, the EMU itself apparently entered into a phase of cyclical divergence. We show that as a matter of fact the bulk of the member states remained closely aligned, and the seeming decline in synchronization is due to a few countries decoupling from the euro area. Next we present empirical evidence that the foundations that explain the evolution of the national cycles against the EMU aggregate through the crisis were already latent in 2007. Greece and Ireland deviate from the general pattern, the former because of its loose fiscal policy all along the period 2000-2007, and the latter due to the flexibility of its labor market.

JEL classification

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Keywords

international business cycles; euro area; cyclical convergence; asymmetric responses

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Introduction

Cyclical synchronization has always been regarded as a primary indicator to evaluate the running of the European Monetary Union (EMU). Since its very formation, the euro area congregated a bunch of countries with marked structural differences, heterogeneous institutional settings, and high risks of experiencing asymmetric shocks or displaying asymmetric responses to common shocks. In spite of that, they agreed to surrender monetary and exchange rate policies to a central authority, and hence to losing control of key instruments to stabilize their economies. It was thought that such loss would be compensated by the endogenous mechanisms of convergence of the currency area, the power of national fiscal policies to offset idiosyncratic shocks, and the adoption of structural reforms that would make the weaker economies more competitive.

The first years of the EMU witnessed some fluctuations in cyclical synchronization, but the crisis that originated in 2007 casts serious doubts on whether the EMU will manage to survive in its current form. For that reason, in this paper we examine how cyclical synchronization in the euro area evolved since the onset of the crisis. More specifically, we address three issues.

First, we compare output comovements within the euro area to international developments, to gauge whether the EMU displayed some particular behavior in the period. Second, we investigate to what extent the observed decline of a broad indicator of intra-euro-area synchronization may be due to a small group of countries decoupling from the aggregate cycle, while the bulk of member states remains closely aligned, or even is increasingly in phase. Finally, we seek to identify the determinants of the observed differences across member states, in order to figure out why each country performed the way it did.

The paper is organized as follows. After this introduction, Section 2 reviews the literature on currency areas, to make clear why cyclical synchronization is so important for a monetary union, and to highlight the factors that strengthen the convergence of the national cycles of its members. Section three sketches the methodology for extracting cyclical components from observed data, and to measuring cyclical synchronization. Section four reports the empirical findings and discusses their implications for the euro area performance in recent years. Section 5 concludes.

Literature review

The theoretical foundations of the EMU lie on the Theory of Optimal Currency Areas (Mundell, 1961). The benefits of joining a currency area are the lower costs for international transactions and the explicit commitment to building long-term relationships with the other member states, while the major drawback is the loss of monetary and exchange rate policies independence. The final balance is case-specific, and must be assessed in an empirical way.

The aftermaths of giving up policy autonomy depend on the degree of asymmetry of the shocks and of the transmission channels. If the shocks are common and propagate in a symmetric way, all the members will be at the same cyclical phase and the centralized management of monetary policy will be fully efficient to stabilize the national economies. If, on the contrary, there are idiosyncratic shocks, or common shocks that propagate in an asymmetric way, national cycles will diverge and the common monetary policy will be rather different from the one that an independent, national authority would have adopted. Therefore, cyclical synchronization is a central issue to gauge the success of a currency area.

Even though some authors expressed their concerns on the success of the euro area because of the low level of ex ante synchronization (Eichengreen, 1990 and 1993), more recent research pointed out that the formation of a currency area

fosters output comovements across its members (De Grauwe and Mongelli, 2005). According to this endogeneity hypothesis, cyclical profiles need not be identical when the area is launched, as its operation will promote synchronization. However, some minimum level of output comovements seems to be required at the beginning, to avoid the costs of imposing a common monetary policy to countries that are not in the same phase of the cycle at the first stages of the union.

The literature has analyzed in full detail the factors that strengthen cyclical comovements, both from the theoretical perspective and its relevance for the euro area. The most mentioned are trade intensity, financial integration and convergence of macroeconomic policies. Price rigidities and labor market regulations are also pointed out, as more flexible economies are better prepared to cope with asymmetric shocks.

Trade integration is usually considered to be the most prominent factor leading to increased cyclical comovements. Nevertheless, the theoretical effect of an increase in trade on the comovement of output is ambiguous, as it depends on the type of goods that are traded. Frenkel and Rose (1998), see also Rose (2000), claims that higher bilateral trade leads to more correlated cycles, on the assumption that the increase in trade is mainly intra-industry trade. If this is the case, any demand or industry shock will have similar effects on the cycles of both countries, and they will move together. But Krugman (1991) observed that openness to trade induces higher specialization, and in the medium term the increase in trade is mainly of the inter-industry type. In that event, the same demand or sectoral shock will have asymmetric effects, and trade integration will result in lower correlations across countries.

As the final effect is an empirical matter, there has been a lot of research to determine the net contribution of the observed growth in trade within the euro area. Most studies find that the association is positive and significant, but there is still an open debate on the actual impact on trade intensity on cyclical synchronization, see the survey by de Haan et al (2008).

Currency unions promote financial integration across members, but its outcome on cyclical synchronization is theoretically undetermined. Demand effects arising from savings or investment decisions in one country will affect the real economy in other member states if the links across financial markets are strong. On the other hand, increased bilateral financial flows allow for more efficient allocation of capital, and stimulate specialization of production according to each country's comparative advantages. If demand effects prevail, financial linkages will propagate any given shock throughout, but if the currency area results in more specialized economies, asymmetric effects will dominate and output comovements will be lower.

In the case of the euro area, there is no empirical evidence of a negative impact of financial integration on cyclical convergence, but it is also difficult to find a strong positive relationship between financial linkages and output correlation (de Haan et al 2008, Dees and Zorelli 2011).

Convergence in macroeconomic policies is seen as another major force to inducing higher synchronization. But, once again, its actual contribution to cyclical convergence must be assessed in each situation, and in the euro area it seems that the outcomes were not as satisfactory as expected. In the 2000s the common monetary policy allowed for inflation differences amongst the member states that translated into differences in real interest rates, in a self-reinforcing process that was one of the major sources of decoupling of some faster growing economies. Fiscal policies, which were managed independently by national authorities, were far from optimal, as they tended to be pro-cyclical and fueled divergence between overheating countries and the rest (European Commission, 2004 and 2006).

Finally, the role of flexible product and labor markets has been stressed in recent years. If prices and wages are flexible, changes in the cyclical conditions translate

immediately into changes in competitiveness, reducing the need of large variations in the policy instruments, the duration of the adjustment, and the risk of overshooting. On the contrary, when the markets are rigid and prices are sticky, large drops in quantities are needed to compensate idiosyncratic shocks and the adjustment is much more costly (European Commission 2004 and 2005, Artis et al 2008).

Methodological framework

In the empirical analysis we apply well established procedures to facilitate the comparison of our results to those previously reported in the literature. We adopt the deviation-cycle approach, where the cyclical component is defined as the deviation of the observed GDP from its long-run trend. It assumes a structural model of the form

$$y_t = p_t + c_t \quad (1)$$

where y_t is logged GDP at t , p_t its long-run trend, and c_t the cycle. To carry out such decomposition we use the Hodrick-Prescott (HP) filter, which estimates the trend as

$$\{p_t\}_{t=1}^T = \arg \min \left[\sum_{t=1}^T (y_t - p_t)^2 + \lambda \sum_{t=3}^T (\Delta^2 p_t)^2 \right] \quad (2)$$

where T is the sample size, Δ is the difference operator and λ is a penalty parameter that determines the degree of smoothness of the trend; with quarterly data, as we shall consider in Section 4, the usual practice is to set $\lambda=1600$. Once p_t is known, the cyclical component is derived from (1); by construction, it is expressed as a percentage deviation from trend GDP. The properties of the HP filter have been extensively documented, see Kaiser and Maravall (2001) for a thorough discussion.

From the perspective of signal extraction theory, the HP procedure relies on a low-pass filter that separates a low frequency component (the trend) from medium- and short-frequency components (the cycle); the cutoff point is set by λ . Recent research opts for extracting the cycle by using bandpass filters, that assume a structural model of the form

$$y_t = p_t + c_t + u_t \quad (3)$$

where u_t captures oscillations with periods too short to be considered part of the business cycle. To estimate c_t the cyclical band should be defined ex ante, and it is typically assumed to lie between 1.5 and 8 years. Some examples of this approach are the BK filter (Baxter and King, 1999), the CF filter (Christiano and Fitzgerald, 2003), and the bandpass variant of the HP filter (Artis, 2003).

The theoretical properties of the HP filter and the bandpass alternatives are quite different, but there is empirical evidence that the qualitative conclusions on cyclical synchronization are invariant to the specific procedure used to extract the cyclical component. Although different methods lead to different cyclical signals for a given time series, the measures of comovement are similar as long as the same procedure to estimate the cycle is used for all the series (Altavilla 2004, de Haan et al 2008).

Once the cyclical components are known, the next step is to measure to what extent the cycles move in phase. A variety of approaches have been suggested: dispersion statistics, correlation coefficients, concordance indices, factor analysis,

spectral analysis, etc. The most popular procedure consists of computing bivariate correlations to quantify pairwise relationships, and calculating their mean to get a summary measure. Yet, to execute this procedure some practical aspects have to be addressed.

The first issue is whether there exists a reference cycle that national developments should be compared to. There has been a long debate on the existence of a euro area cycle, see for instance the review by Konstantakopoulou and Tsionas (2010), and for the moment no firm conclusion has been achieved. In view of that, some authors do not consider any reference and measure global synchronization by taking the unweighted mean of all the possible pairwise correlations between the member states (Gayer 2007, Artis et al 2008). Another approach consists of selecting a reference cycle in an empirical way, by defining its value at t as the median of all the national cycles at that moment (Mink et al, 2007). In this paper we opted for taking the cycle of the euro area as the benchmark, because this is the reference that the European Central Bank tracks to set its policy instruments.

Another decision has to be made concerning the time span of observations used to computing the correlation coefficients, usually referred to as the size of the window. This is an extremely relevant issue, as the conclusions may be sensitive to the final choice (European Commission, 2006). Long windows are to be avoided when the focus is on the changes in the very final part of the sample, as they miss the most recent developments. Short windows, however, are known to be more volatile, and to produce artificial drops in the correlations near the turning points of the cycles if the size of the window is less than the duration of the cycle.

The empirical literature has considered window sizes ranging from three to ten years (Papageorgiou et al, 2010). In particular, the European Commission monitors cyclical convergence in the euro area by using windows of 4, 6 and 8 years (European Commission 2004, 2006 and 2010). We opted for a window size of four years, which appears to be the shortest span free from spurious drops in correlations. Once the coefficient is computed, the result is assigned to the last t of the time interval that was used in its calculation, so the correlation at t measures comovement in the four years up to that point. The bivariate correlations between each member state and the euro area were calculated over a series of rolling windows with a fixed length of four years, to track the change in output comovements over time. Synchronization for the area as a whole at each t is measured by the mean value of all bivariate correlations for that moment.

Empirical results and discussion

We use data on quarterly real GDP for the aggregate of the euro area, eleven member states (Belgium, Germany, Ireland, Greece, Spain, France, Italy, the Netherlands, Austria, Portugal and Finland), three members of the European Union that did not join the currency area (Denmark, Sweden and the United Kingdom), and three external countries (Switzerland, Japan and the USA). All the data are obtained from Eurostat. Following the usual practice in empirical studies, the EMU aggregate consists of the 12 countries that formed the currency union up to December 2006.

Quarterly GDP for Greece is only available from 2000:1 onwards, so the working sample starts at this date. Previous data on the other countries were used to improve the estimates of the cyclical component at the beginning of the sample. The sample information ends in 2011:4, with the exceptions of Ireland (2011:3), Greece (2011:1) and Portugal (2011:3). In these countries the missing quarters of 2011 were forecasted with the restriction that the annual figure should be equal to the European Commission forecast for the whole year 2011.

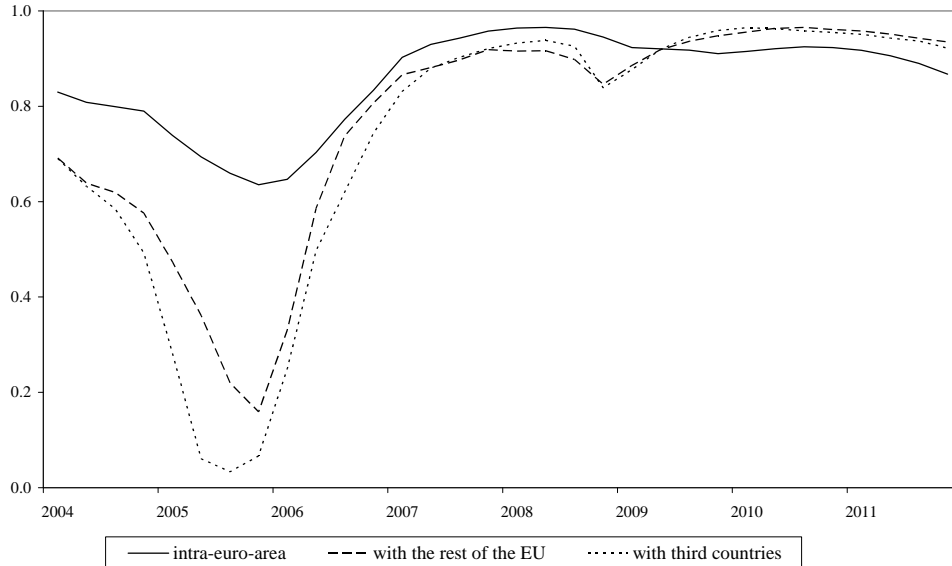
Figure 1 displays some raw measures of synchronization from 2004:1 to 2011:4. The line for the euro area represents the mean values of the bivariate correlations

between each member state and the area as whole, and captures the degree of intra-euro-area synchronization. The line for the countries of the European Union that do not belong to the euro area is computed as the mean of the bivariate correlations of the three countries within this group (Denmark, Sweden and the United Kingdom) with the EMU aggregate, and gives information about how the cyclical synchronization within the European Union has evolved. The third line reports the mean correlation of Switzerland, Japan and the USA with the euro area, and is aimed to reflect global trends in economic integration. Taken together, the three lines give insight into whether the changes in output comovements within the EMU are a particular development of the currency union, or part of a more general European or world pattern.

The Figure shows that all types of synchronization fell until 2005, and then started to increase up to 2008. The values for 2005 were computed with data for the period 2002-2005, which included the recession of the beginning of that decade and the early stages of the subsequent recovery. National cyclical developments were rather heterogeneous in that period, but became more homogeneous as the expansion consolidated. As expected, cyclical synchronization was higher within the euro area than in the European Union or the developed world.

The onset of the crisis brought about substantial changes. Aside from some transitory, idiosyncratic responses that lowered the correlations dated at the second half of 2008, the contraction in international trade and the financial contagion caused international synchronization to be especially high in 2009 and 2010, to the extent that the mean correlations of the euro area with the rest of the European Union and with external countries attained their highest values in the sample period.

Figure 1. Mean cyclical correlations with the euro area for a 4-year rolling window



At the same time, the EMU looked as if it had entered into a phase of cyclical divergence. The mean correlation within the area fell and became smaller than the correlations of the euro area with the rest of the European Union and the rest of the world. To confirm that the fall in the mean correlation of the euro area is not a spurious correlation due to using a window that is too short, Figure 2 plots the results for a 6-year rolling window. Despite some changes attributable to the different time span, the Figure confirms that the mean correlation for the members of the euro area is falling since 2008, and that in the final part of the sample it is below the two other lines.

Figure 2. Mean cyclical correlations with the euro area for a 6-year rolling window

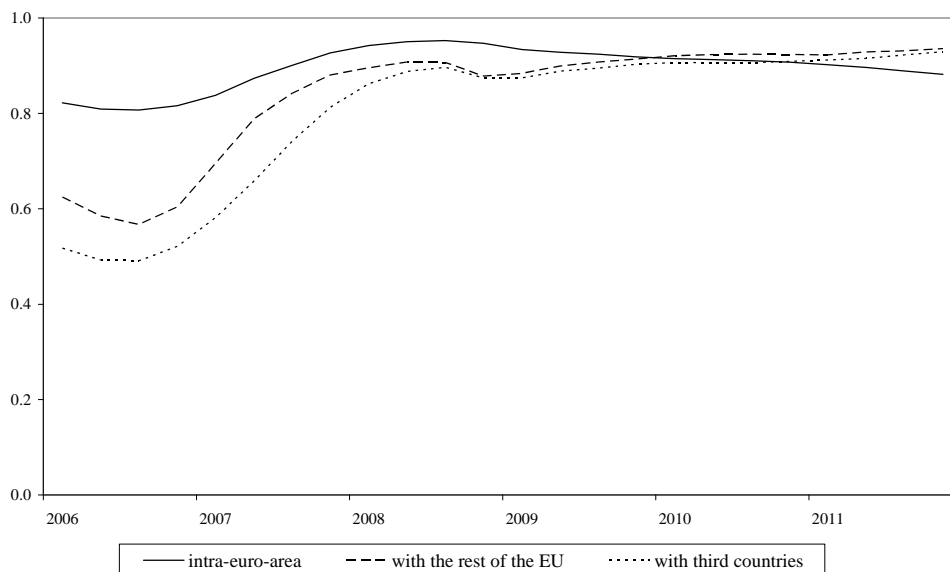
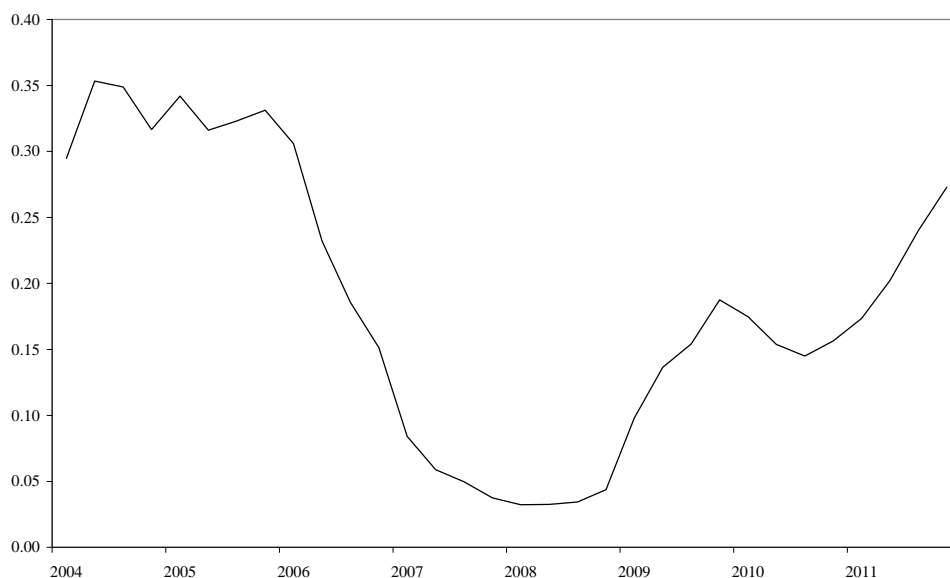


Figure 3 corroborates the apparent euro area divergence. At each t it depicts the standard deviation of the eleven bivariate correlations between the cycle of each member state and the EMU cycle. An increase of the spread of the correlations is a sign of divergence (Gayer, 2007), and it can be seen that the dispersion has been increasing since 2009.

Figure 3. Standard deviation of the bivariate correlations of the cycles of the member states with the euro area cycle, for a 4-year rolling window



Actually, the features sketched in Figure 1 are surprising. First, because the European and international upsurges in synchronization suggest that the current crisis is driven by common shocks that propagate worldwide through symmetric transmission channels, and the intra-euro-area increasing divergence does not match in this context. Second, because Figure 1 indicates that cyclical synchronization is higher between the EMU as a whole and other currency areas

than inside the euro area, an empirical finding that is in opposition to the primary theoretical foundations of monetary unions.

A likely explanation to bring together the opposed evolutions of the correlation coefficients in Figure 1 is that the decline within the euro area is not a general feature of the EMU as a whole, but a particular trait of a small group of member states. If this is the case, one would find large, stable correlations with the euro area aggregate for most members, together with a few countries that are decoupling quite abruptly from the euro area cycle.

Figure 4 depicts the sequence of rolling correlations of the cycle of each member state with the euro area aggregate from 2004:1 to 2011:4. Figure 5 highlights the changes in the correlations through the crisis. For each country, it concentrates on the correlations with the EMU dated at 2007:3 and 2011:4; the first set was computed with data for the period 2004:4 to 2007:3, while the second set merges the observations from 2008:1 to 2011:4. To complete the picture, it includes the six countries in the sample that do not belong to the EMU, to give an account of the change in the correlations of the euro area with the rest of the European Union and the rest of the world.

Figures 4 and 5 confirm the existence of different cyclical patterns amongst the EMU members. The correlations for Belgium, Germany, France, Italy, the Netherlands, Austria and Finland are high and do not exhibit any trend. These countries were closely aligned in 2007 and, except for some minor, transitory decoupling in 2008, have remained approximately in the same situation all through the crisis.

The other four member states exhibit remarkable changes. Spain and Portugal entered into a phase of growing desynchronization, to the extent that in 2011:4 the six correlations of the non-member countries with the euro area were higher than the Portuguese, and four were higher than the Spanish. Greece has totally decoupled from the euro area. Ireland evolved in the opposite direction, as its correlation picked up and has been growing steadily since 2009.

Figure 4. Bivariate cyclical correlations between the member states and the EMU, for a 4-year rolling window: whole sequence from the working sample

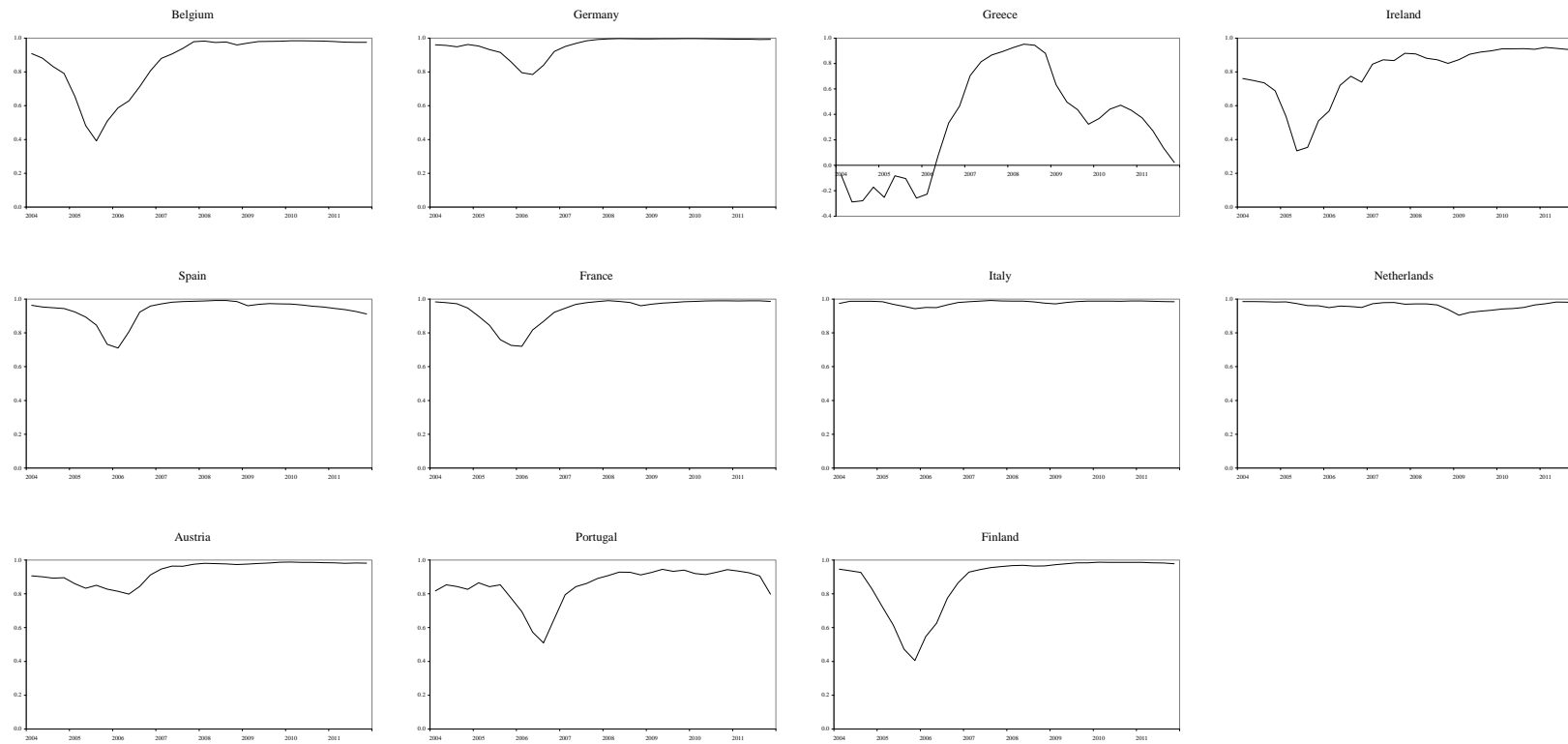
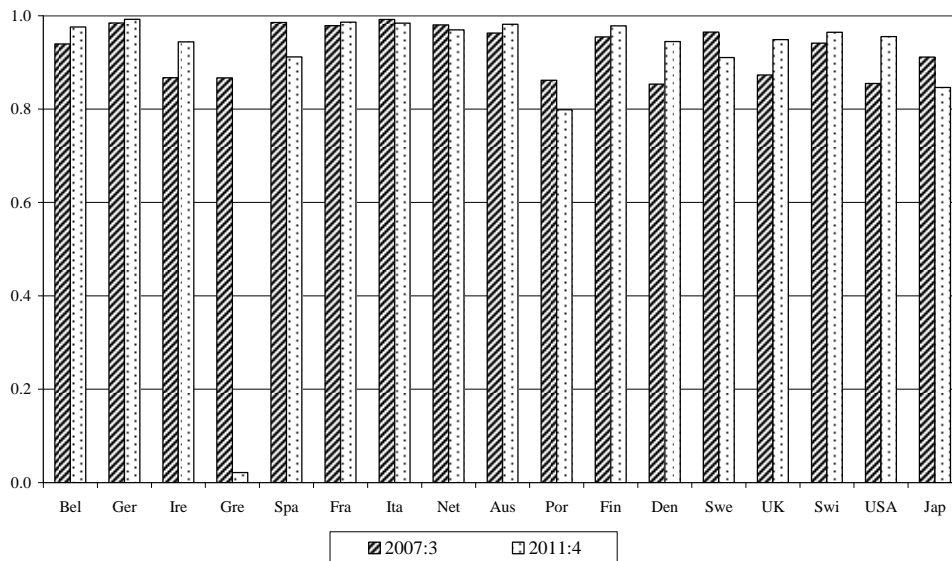


Figure 5.- Bivariate correlations between the member states and the EMU, for a 4-year rolling window: summary for relevant dates



These results offer a tentative explanation to harmonize the conflicting signals in Figure 1, namely increased international synchronization and growing intra-euro-area divergence. On the whole, large symmetric shocks, worldwide economic integration and international spillovers led to relative highs in international synchronization. But in a few members of the euro area the common shocks launched powerful asymmetric effects, that induced quite idiosyncratic fluctuations. It can be shown that the decline in the intra-EMU mean correlation reported in Figure 1 is explained for the most part by the contribution of the bivariate correlations between Greece and the euro area. When the sequence of mean correlations is computed without the Greek data, it is found that the output comovements within the EMU have not reduced during the crisis, and that the intra-euro-area synchronization has been higher than the synchronization with the rest of the European Union or the rest of the world. The decline in the Spanish and Portuguese correlations has some influence on the average, but their contribution is not big enough to induce a false impression of divergence for the area as a whole.

As a final point, we investigate the factors that may explain why member states behave differently. For doing so we analyze the relationships between the change in the cyclical correlation of the members of the euro area between 2011:4 and 2007:3, and a variety of indicators. The influence of each indicator is assessed individually, as there are only eleven observations and some of them are outliers, as we discuss below, so there are not enough degrees of freedom for a joint appraisal. The variables were selected on the basis of the literature review in Section 2, including some that capture latent imbalances and policy management to account for the convergence of macroeconomic policies. All in all, nine indicators are considered:

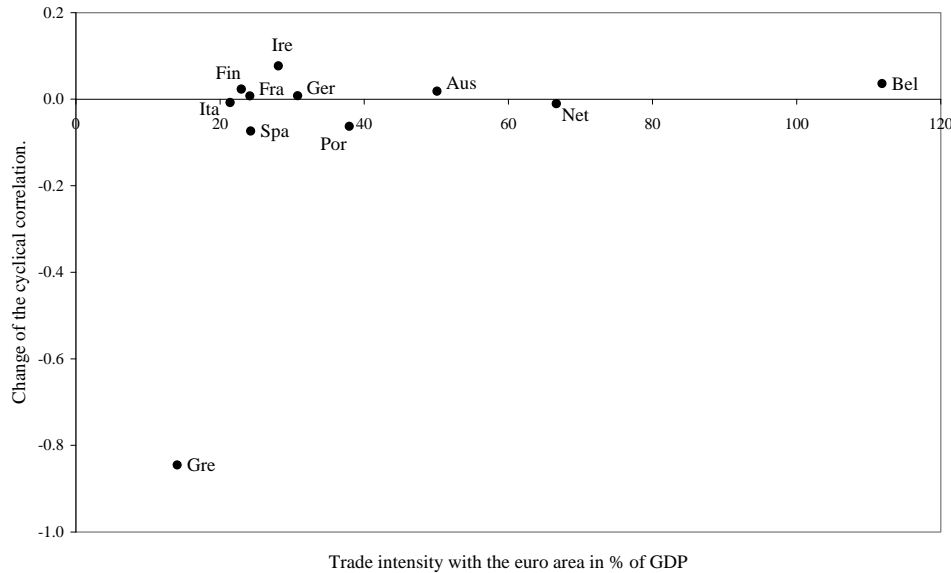
- One is for trade intensity with the euro area (12 countries). For each member state, trade intensity in goods is obtained as the sum of exports and imports for 2007 with that partner, expressed in % of GDP.
- One for financial openness, the net international investment position in % of GDP for 2007.
- One for labor market rigidity, version 2 of the OECD's employment protection index for 2007.

- Two for discretionary fiscal policy: the cyclically adjusted net lending of general government in % of GDP for 2007, to capture the fiscal stance just before the beginning of the crisis; and its sum over the period 2008-2010, as an indication on how national authorities managed fiscal policy in the recent past.
- One for the loss of competitiveness between 2000 and 2007, the real exchange effective rate computed with the GDP deflator.
- Two for the private credit dynamics, the 3-year average for 2005-2007 of the private credit flow in % of GDP, and the non-consolidated debt of the private sector in % of GDP for 2007.
- One for excess national demand, the 3-year average for 2005-2007 of the current account balance in % of GDP.

All the data were taken from the Eurostat web with the exception of the employment protection index, that was obtained from the OECD. Most indicators refer to 2007 or the period 2005-2007, as we are interested in determining whether the factors that led to changes in the output comovements for the period of the crisis were already latent before it started. Besides, the use of lagged values of the indicators reduces the endogeneity bias (Imbs 2004, de Haan et al 2008), and simplifies testing whether the relationship is statistically significant.

To illustrate the type of association we focus on, Figure 6 plots the change in the cyclical correlations between 2011:4 and 2007:3 against the indicator of trade intensity with the euro area. To measure the direction and strength of this relationship we compute the correlation coefficient between the two variables and report its value in Table 1, as well as the p-value that tests its significance.

Figure 6.- Change in the bivariate cyclical correlation between 2011:4 and 2007:3 against trade intensity with the euro area for 2007



Simple inspection of Figure 6 reveals that Greece is an outlier that distorts the underlying relationship, and a more detailed analysis shows that Ireland is another outlier. This is not a special trait of the trade indicator, but a general characteristic of the set of potential explanatory variables that will help to assess the idiosyncratic behavior of these two countries. Because of that, for each indicator reported in Table 1 three variants of the correlation coefficient were computed: with the data of all the member states in the sample (eleven countries), without Greece (ten countries) and without Greece and Ireland (nine).

Table 1. Correlation coefficients between the change in output comovements and its potential determinants

Indicator	All the members (11 countries)	Without Greece (10 countries)	Without Greece and Ireland (9 countries)
Trade intensity with the euro area	0.32 (0.331)	0.21 (0.561)	0.39 (0.296)
Net international investment position	0.62 (0.043)	0.70 (0.025)	0.86 (0.003)
Employment protection	-0.34 (0.305)	-0.84 (0.002)	-0.74 (0.024)
Cyclically adjusted net lending of general government (2007)	0.77 (0.006)	-0.02 (0.963)	0.19 (0.620)
Cyclically adjusted net lending of general government (2008-2010)	0.45 (0.161)	-0.12 (0.740)	0.84 (0.004)
Real effective exchange rate with GDP deflator	-0.10 (0.776)	-0.21 (0.563)	-0.71 (0.031)
Private credit flow	-0.06 (0.855)	-0.18 (0.616)	-0.73 (0.024)
Private debt	0.42 (0.204)	-0.20 (0.575)	-0.53 (0.143)
Current account balance	0.56 (0.074)	0.48 (0.156)	0.79 (0.012)

Notes: see the main text for the definition of the variables; the figures in parentheses are the p-values to test the null hypothesis of no linear dependence

When Greece and Ireland are filtered out most relationships are statistically significant at the 5% level, and the coefficients have the expected signs. The results in Table 1 show that the foundations that explain the evolution of most national cycles vis-à-vis the EMU aggregate in the crisis were laid in 2007, in the form of the net international investment position, the level of employment protection, competitiveness developments, the growth of the credit for the private sector, and the current account balance. Besides, the fiscal stance in the period 2008-2010 is also relevant, as loose discretionary fiscal policies in the first years of the crisis tended to lower national comovements with the rest of the EMU. The only indicators that are not statistically significant are trade intensity and the private sector debt. Both point estimates are high and have the expected sign, and it is quite likely that the null hypothesis of no linear relationship has not been rejected because of the low power of the tests due to the small size of the sample.

Table 1 also gives some hints on why Greece and Ireland deviate from the general pattern. The Greek performance is the consequence of its fiscal stance and the ensuing public debt burden, as the yearly cyclically adjusted net borrowing of the Greek government averaged 6.3% of GDP in the period 2000-2007. The current level of the public debt is a major structural weakness, its correction will take a long period where the Greek cycle will be out of sync with the euro area, and all through that time Greece will continue to be an outlier within the EMU.

In the Irish case the imbalances of the economy in 2007 suggested that Ireland would decouple in the course of the crisis, as Spain and Portugal did. Quite the opposite, the Irish cycle became more aligned with the euro area cycle, and that explains why the correlation coefficients with the excess demand and credit indicators are not statistically significant when Ireland is included. In contrast, the correlation with the employment protection is higher in absolute value and much more significant than when Ireland does not enter in its calculation. Taken together, these results point at the Irish recoupling being mainly explained by the high flexibility of its labor market. Such flexibility may have allowed market forces to play a leading role in the adjustment process, reducing the asymmetric impacts of the common shocks that hit the euro area, and compensating the negative starting conditions induced by the overheating of the Irish economy in 2007.

Conclusions

Cyclical synchronization within the EMU has traditionally been a source of concern, but in recent years there are serious doubts whether the euro area will be able to cope with the powerful asymmetric responses to the shocks that launched the financial crisis in 2007. Though the crisis is still on the run, it is essential to evaluate its potential consequences on the EMU, and this paper aimed to give some tentative empirical evidence on this issue.

As we centered on a short, particular period of time, the data were scarce, and such paucity limited the statistical techniques that could be applied. Therefore, the empirical analysis has a number of limitations, and its conclusions should be interpreted with prudence. Even so, the methodology developed in the previous sections provided some appealing results on the evolution of cyclical convergence, and on the factors that determined such evolution.

In particular, we focused on three major issues. First, we compared synchronization in the euro area to international developments. We found that, on average, the cycle of the euro area became more aligned with the cycles of the rest of the European Union and of other developed economies. This result supports the conventional view that the crisis was activated by common financial shocks that propagated worldwide along symmetric transmission channels, leading to growing international synchronization amongst the developed economies in 2009-2010. Within the euro area, however, member states gave the impression of entering into a phase of cyclical divergence. Furthermore, since 2009 the mean correlation within the EMU is lower than the mean correlations of the area with the rest of the European Union and the rest of the world, a result that challenges the theoretical foundations of a currency area.

As a consequence, we concentrated on investigating the causes of the intra-euro-area performance. We found that the cycles of most member states remained closely aligned to the EMU aggregate, while a few members, namely Ireland, Greece, Spain and Portugal, reported remarkable changes in their comovements. Actually, the apparent decline in the intra-euro-area synchronization is mainly due to the contribution of the Greek data. When the sequence of mean correlations is computed only with the data of the ten other member states, it displays no trend along the crisis, and its values are higher than the mean correlations with the rest of the European Union and the rest of the world.

This finding confirms that large symmetric shocks, economic integration and international spillovers resulted in higher synchronization, both inside the EMU and across the developed economies all through the world. In some countries, however, the common shocks unleashed forceful asymmetric effects that induced quite distinctive fluctuations, and such fluctuations were influential enough to distort the general measures of comovement for the euro as a whole.

Finally, we examined the possible causes of the different cyclical performances of the members of the euro area. We compared the correlations between each national cycle and the EMU aggregate in 2011:4 and 2007:3, and appraised to what extent the observed variation could be explained by a variety of potential determinants. Most indicators referred to 2007 or the period 2005-2007, to assess whether the factors that led to changes in the output comovements in the course of the crisis were already latent before its inception.

For the largest part of members, the foundations of the change in the cyclical correlations can be traced back to 2007: the position of each country in terms of its net international investment position, the level of employment protection, competitiveness developments, private credit dynamics, and current account balance, all of them are statistically related to its cyclical performance in the period 2007-2011. Trade intensity and the private sector debt in 2007 were not found to be significant, although the point estimates were quite high and had the expected sign.

We also investigated why Greece and Ireland deviated from the general pattern. The Greek performance is the consequence of its loose fiscal policy all along the period 2000-2007, that resulted in a sharp increase of the public debt. The Irish recoupling appears to be explained by the high flexibility of its labor market, that allowed market forces to play a leading role in the adjustment process. Their contribution compensated the adverse starting conditions induced by the excessive

private demand in 2007, and helped to offset more rapidly the shocks that hit the euro area.

The major policy implication stemming from our work is the need that national authorities maintain policy discipline, not only in the current particular circumstances, but also as a general rule. Whatever indicator is considered, we showed that most overheating countries in 2007 decoupled from the euro area cycle in the following years, with the consequence that the single monetary and exchange rate policies became exceedingly costly for the member states that reported large positive output gaps before the crisis. Endogenous synchronization was not powerful enough to coping with the accumulated national disequilibria. This task has to be tackled by national macroeconomic policies, that should avoid discretionary pro-cyclical biases that fuel internal imbalances.

References

- Altavilla, Carlo (2004) 'Do EMU members share the same business cycle?', *Journal of Common Market Studies* 42(5): 869-896.
- Artis, Michael. (2003) 'Is there a European business cycle?', *CESifo Working Paper No. 1053*.
- Artis, Michael., Jarko Fidrmuc and Johann Scharler (2008) 'The transmission of business cycles. Implications for EMU enlargement', *Economics of Transition* 16(3): 559-582.
- Baxter, Marianne and Robert G. King (1999) 'Measuring business cycles: Approximate band-pass filters for economic time series', *Review of Economics and Statistics* 81(4): 575-593.
- Christiano, Lawrence and Terry J. Fitzgerald (2003) 'The band pass filter', *International Economic Review* 44(2): 435-465.
- De Grauwe, Paul and Francesco P. Mongelli (2005) 'Endogeneities of optimum currency areas: what brings countries sharing a single currency closer together?', *Working Paper Series No. 468*, European Central Bank.
- De Haan, Jakob, Robert Inklaar and Richard Jong-A-Pin (2008): 'Will business cycles in the euro area converge? A critical survey of empirical research', *Journal of Economic Surveys* 22(2): 234-273.
- Dees, Stéphane and Nico Zorelli (2011) 'Business cycle synchronisation. Disentangling trade and financial linkages', *Working Paper Series No. 1322*, European Central Bank.
- Einchengreen, Barry (1990) 'One money for Europe? Lessons from the US currency union', *Economic Policy* 5(1): 117-187.
- Eichengreen, Barry (1993) 'European monetary unification', *Journal of Economic Literature* 31(3): 1321-1357.
- European Commission (2004) 'Cyclical convergence in the euro area: Recent developments and policy implications', *Quarterly Report on the Euro Area* 3(2): 27-38.
- European Commission (2005) 'Growth differences in the euro area', *Quarterly Report on the Euro Area* 4(2): 19-29.
- European Commission (2006) 'Cyclical synchronisation within the euro area: What do recent data tell us?', *Quarterly Report on the Euro Area* 5(2): 19-24.
- European Commission (2010) 'How has the financial crisis affected cyclical differences within the euro area?', *Quarterly Report on the Euro Area* 9(2): 25-28.

Frankel, Jeffrey A. and Andrew K. Rose (1998) 'The endogeneity of the optimum currency area criteria', *Economic Journal* 108(449): 1009–1025.

Gayer, Christian (2007) 'A fresh look at business cycle synchronisation in the euro area', *European Economy – Economic Papers Number 287*.

Imbs, Jean (2004) 'Trade, finance, specialization, and synchronization', *Review of Economics and Statistics* 86(3): 723–734.

Konstantakopoulou, Ioanna and Efthymios Tsionas (2011) 'The business cycle in Eurozone economies (1960 to 2009)', *Applied Financial Economics* 21(20): 1495-1513.

Kaiser, Regina and Agustín Maravall (2001) *Measuring Business Cycles in Economic Time Series*, New York: Springer-Verlag.

Krugman, Paul R. (1991) *Geography and Trade*, Cambridge, MA: MIT Press.

Mink, Mark, Jan Jacobs and Jakob de Haan, J. (2007) 'Measuring synchronicity and co-movement of business cycles with an application to the euro area', *CESifo Working Paper No. 2112*.

Mundell, Robert A. (1961) A theory of optimum currency areas, *American Economic Review* 51(4): 657–665.

Papageorgiou, Theofanis, Panayotis G. Michaelides and John G. Milios (2010) 'Business cycle synchronization and clustering in Europe (1960-2009)', *Journal of Economics and Business* 62(5): 419-470.

Rose, Andrew K. (2000) 'One money, one market: the effect of common currencies on trade', *Economic Policy* 15(30): 9–45.