

THE CONVERGENCE OF THE BUSINESS CYCLES IN THE EURO AREA

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Abstract

The Euro Area is confronted with the persistence of the sovereign debt crisis. The financial markets have frequently tested the resistance of the Euro Area, as the countries from the Southern part of the region face a tough macroeconomic adjustment process.

The economic divergence is one of the factors that determined the current situation in the European Monetary Union. This divergence (nominal and real) was paid little attention by the financial markets and economists during the last years of the Great Moderation. However, the attitude changed when the Great Recession hit the region.

This paper treats the behaviour of the business cycles of the Euro Area (12) member countries during the period 1996-2011. The convergence of the business cycles of the member countries of a currency union is one of the important criteria mentioned by the literature on Optimal Currency Areas. According to the results, the business cycles of the Euro Area (12) countries converged before the launch of the euro (1999) and diverged after 2004. The divergence intensified in the context of the global crisis.

Keywords: business cycles, European Monetary Union, Cobb-Douglas, Optimal Currency Areas

JEL Classification: C22, E32, F02

1. Introduction

The literature on Optimal Currency Areas mentions the convergence of the business cycles of the member countries of a monetary union as a fundamental issue. By joining a currency union the countries give up the independence of the monetary policy and of the foreign exchange policy, important adjustment instruments when the economies are confronted with economic shocks. Hence, the importance of the business cycles convergence within the monetary union: this determines a better economic synchronization, which leads to a more efficient transmission of the monetary policy established by the central bank of the Monetary Union. This, in turn, reduces the probability of occurrence of the asymmetric shocks.

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Before the launch of the euro (January 1999) the European countries passed through a process of nominal convergence, according to the criteria established by the Treaty of Maastricht. However, the nominal convergence process did not lead to a sustainable real economic convergence (the spirit of the Treaty). In other words, the letter of the Treaty was respected by the European countries in order to qualify for the Euro project.

In fact, after 1999 there can be noticed a nominal divergence process across Europe, if we take into account the evolution of the inflation rates, but also of the budget deficits. This nominal divergence is an important factor contributing to the real divergence across Europe, which intensified after the launch of the Great Recession. At the same time, the lack of credible mechanisms for financial stability and macroeconomic policies coordination across Europe determined the accumulation of macroeconomic disequilibria, which proved dramatic for some member countries during the Great Recession.

The rest of the paper has the following structure: chapter 2 presents the most important aspects regarding the convergence of the business cycles in a monetary union, as mentioned by the literature on Optimal Currency Areas; chapter 3 describes the econometric methodology employed in order to analyse the convergence of the business cycles in the Euro Area (12); the last chapter present the empirical results and the conclusions.

2. On business cycles convergence in a currency union

By participating to a currency union a country gives up the independence of the monetary policy and of the foreign exchange policy, important instruments used in the adjustment processes in the context of the economic shocks (either symmetric or asymmetric). For instance, in the case of the Euro Area, the central bank establishes the monetary policy taking into account the aggregate macroeconomic climate (at the region level), not the situation of a single state. In other words, the monetary policy decisions might present adverse effects for the small economies of the monetary union confronted with a different economic climate (compared with the region climate).

The convergence of the business cycles in a monetary union is one of the fundamental criteria mentioned by the Optimal Currency Area theory. The importance of this criterion is obvious. The convergence of the business cycles of the member states contributes to a better economic synchronization. In other words, the business cycles convergence determines a more efficient transmission of the monetary policy established by the central bank of the Monetary Union.

The literature distinguishes between the concept of *specialisation* [Krugman (1993)] and the concept of *endogeneity* [Frankel and Rose (1998)].

In the paper “*Lessons of Massachusetts for EMU*” Krugman proves that an increasing economic integration within a currency union leads to the industrial specialisation of its regions. In other words, the probability of occurrence of

asymmetric shocks is increasing. The Nobel Prize takes the example of New England from the United States, where the industrial specialisation determined the instability of exports, pro-cyclical capital flows and a real economic divergence. Consequently, Krugman concluded at the beginning of the 1990s that the process of economic and monetary integration in Europe risked leading to the specialisation of the member countries, according to the comparative advantages. In fact, Krugman signalled that after the launch of the euro several countries would turn vulnerable to the demand shocks.

The paper of Kalemli-Ozcan et al (2001) proves that the financial integration leads to the intensification of the industrial specialisation. The concept of specialisation is also mentioned by Frankel (1999): a higher degree of economic integration leads to a lower economic diversification, which in turn contributes to the increase of the probability of occurrence of the asymmetric shocks.

On the other hand, according to the *endogeneity* criterion, the economic and monetary integration determines a higher economic synchronisation of the member countries. A common currency can be perceived as a long-term commitment. Consequently, the monetary union has positive effects for the investment flows across the member countries, leading to the consolidation of monetary integration, through several mechanisms: the *spill-over* of the productivity shocks, the macroeconomic discipline.

Frankel and Rose (1998) consider that the increasing economic integration determines a higher convergence of the member countries of a currency union. In other words, a currency union might become optimal in time (ex post), even though it was not optimal at the beginning (ex ante). In the case of Europe, the introduction of the euro might contribute, per se, to a higher integration of the member countries, and a convergence of these economies.

3. Description of the Methodology

In order to analyse the convergence of the business cycles in the Euro Area (12) I estimated the cyclical component of the GDP during the period 1996-2011. The cyclical component of the GDP was determined by difference between the GDP (% , y/y) and the potential GDP (% , y/y). Afterwards, I employed the standard deviation, the classic indicator used to measure the convergence / divergence. I used the data from the Eurostat for the GDP (% , y/y) for the period 1995-2011.

In order to estimate the potential GDP I started from the Cobb-Douglas production function:

$$Y_t = \alpha \times L_t + (1 - \alpha) \times K_t + U_t \quad (2.1),$$

where Y_t , L_t , K_t and U_t represent the evolution of the GDP (y/y), the evolution of the labour input (y/y), the evolution of the capital stock (y/y) and the total factor productivity.

In order to get the potential GDP I estimated the structural components (the trend) for the labour input and for the total factor productivity, by applying the Hodrick-Prescott filter (shortly described in the following lines). Mathematically, the potential GDP can be expressed in the following form:

$$Y_t^* = \alpha \times L_t^* + (1 - \alpha) \times K_t + U_t^* \quad (2.2),$$

where Y_t^* , L_t^* and U_t^* represent the trend component of the GDP, labour input and total factor productivity.

For the labour input I considered the labour force, the participation rate, the unemployment rate and the number of working hours:

$L = \text{labour force} * \text{participation rate} * (1 - \text{unemployment rate}) * \text{number of working hours}$ (2.3).

In what regards the capital stock, I applied the perpetuity method:

$$K_t = K_{t-1} \times (1 - d) + FBCF_t \quad (2.4),$$

where K_t represents the capital stock (year t), d represents the depreciation ratio and $FBCF_t$ represents the gross fixed capital formation. I started from the capital stock of 1995, as estimated in the paper of Derbyshire et al. (2011) and a depreciation ratio of 10%.

For the GDP, the components of the labour input and gross fixed capital formation I used the annual data from Eurostat for the period 1995-2011.

I estimated the total factor productivity by applying the Hodrick-Prescott filter for the U_t series,

$$U_t = Y_t - \alpha \times L_t - (1 - \alpha) \times K_t \quad (2.5)$$

I considered a value of 0.65 for the parameter α , as employed by the European Commission (the paper of D'Auria et al. (2010)).

The Hodrick-Prescott filter

This methodology distinguishes between a cyclical component and a trend component of a macroeconomic variable ($Y_t = Y_t^* + Y_{tc}$). The cyclical component of the indicator is obtained according to the following mathematical relation:

$$\text{Min} \sum_{t=1}^T (Y_t - Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} ((Y_{t+1}^* - Y_t^*) - (Y_t^* - Y_{t-1}^*))^2 \quad (2.6)$$

where Y_t represents the macroeconomic variable, Y_t^* represents the trend of this variable, λ is a measure of smoothness, so that the lower the value of this parameter, the closer the trend follows the variable.

In the extreme case when $\lambda = 0$, then the trend would equal the actual variable. Hodrick-Prescott suggests a value of 1600 when working with quarterly data and 100 for annual data. However, some other contributions in the literature suggest the use of other values for λ .

After estimating the cyclical component of the GDP for the member states of the Euro Area (12) and of the currency union I computed the standard deviation (σ), according to the formula:

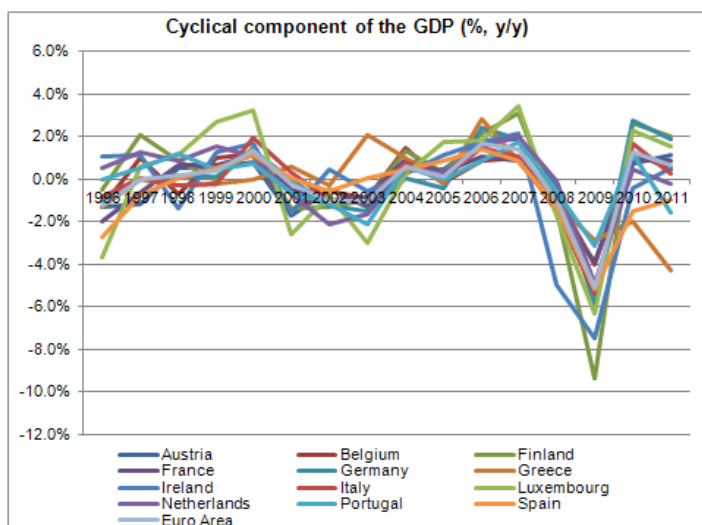
$$\sigma^2 = \frac{\sum (x_i - \bar{x})^2 \cdot n_i}{\sum n_i} \quad (2.7)$$

where x_i represents the cyclical component of the GDP for the country i and $\bar{x}$ represents the cyclical component of the GDP of the Euro Area.

4. Empirical results

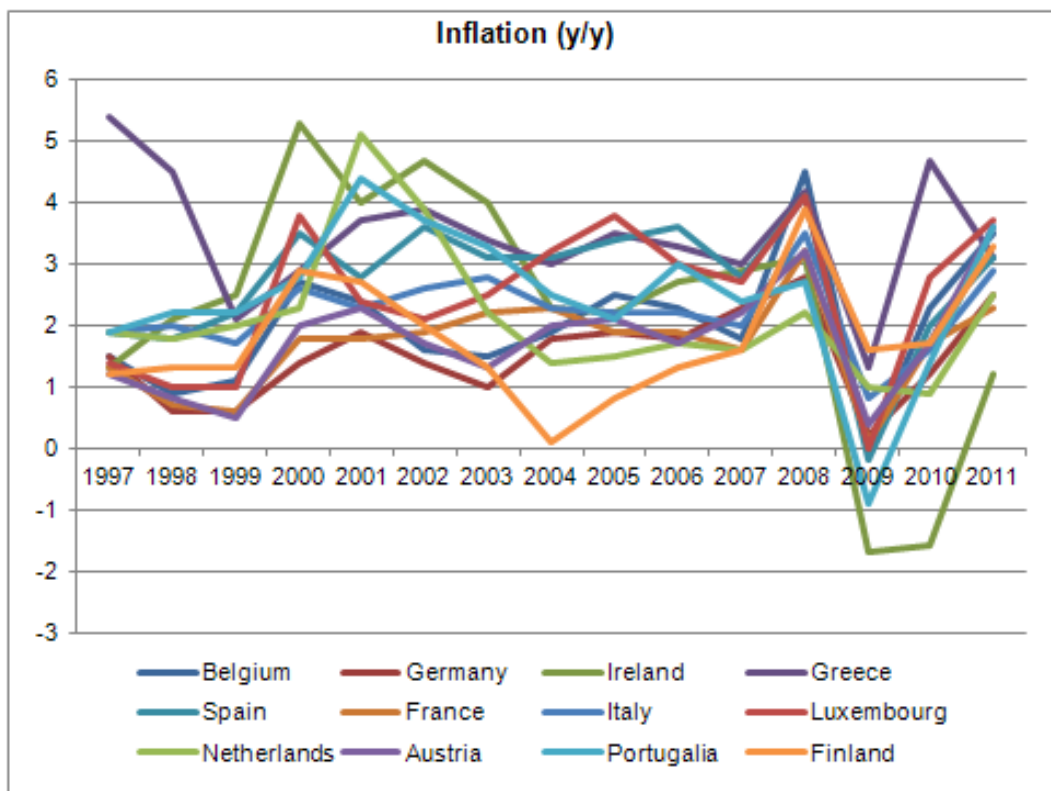
The figures 4.1 and 4.2 present the evolution of the cyclical components of the GDP (for the member countries of the Euro Area (12)) and the standard deviation (for this component).

Figure 4.1. The cyclical component of the GDP for the countries of the Euro Area (12)



Source: Own estimates, according to the econometric methodology (Chapter 3)

Figure 4.2. The standard deviation for the cyclical component of the GDP for the countries of the Euro Area (12)

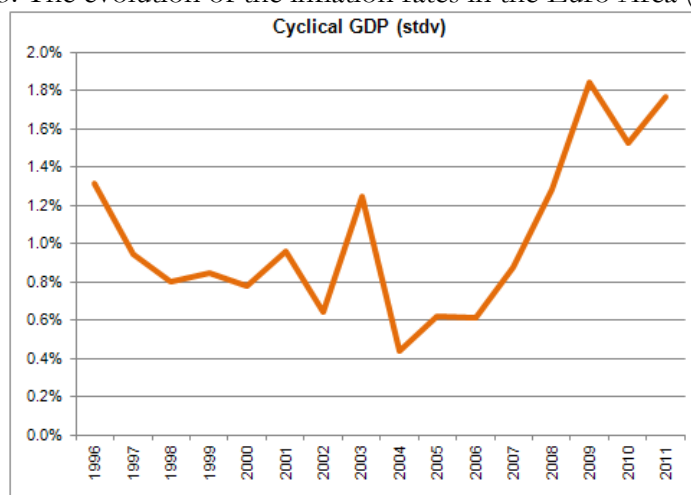


Source: Own estimates, according to the econometric methodology (Chapter 3)

There can be noticed a decline of the standard deviation computed for the cyclical component of the GDP for the member countries of the Euro Area (12) during the period 1996-1999. In other words, the business cycles of the European countries converged before the launch of the euro. This convergence can be explained by the measures implemented by the governments in order to attain the Maastricht criteria in order to qualify for the monetary union project.

On the one hand, the inflation rates declined across the European countries during the 1990s (as can be seen in the figure 4.3). This evolution was supported by several factors: the central banks turned independent from the political power (as established by the Treaty); the import of credibility from Bundesbank (in terms of the price stability track record); the confidence in the project of the common currency. The convergence of the inflation contributed to the convergence of the long-term interest rates across Europe.

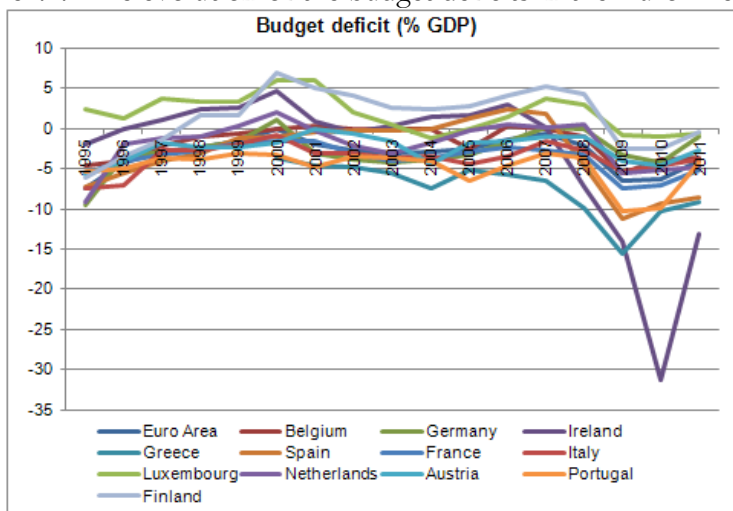
Figure 4.3. The evolution of the inflation rates in the Euro Area (12)



Source: Eurostat

On the other hand, the European governments adopted and implemented several measures in order to adjust the public finances (the fiscal consolidation process) and respect the Maastricht rules. Consequently, there can be noticed a trend of budgetary consolidation after the signature of the Treaty until the launch of the euro (the figure 4.4). This budgetary consolidation process was supported by the favourable macroeconomic climate (above potential growth, due to the technologic revolution).

Figure 4.4. The evolution of the budget deficits in the Euro Area (12)



Source: Eurostat

However, the convergence of the business cycles across the Euro Area (12) was not sustainable, as after the launch of the euro there can be noticed important fluctuations and an upward trend (after 2004) of the standard deviation (the indicator used in order to measure the convergence of the business cycles).

In other words, after 2004 there is obvious the divergence of the business cycles across the euro area. This divergence process intensified after the launch of the Great Recession, as can be noticed on the graph (4.2).

The divergence of the business cycles after the launch of the euro can be fundamentally justified by several factors: on the one hand, after the introduction of the euro the states did not have the same incentives to respect the Maastricht criteria (several countries violated the rules of the Stability and Growth Pact during the first half of the 2000s); at the same time, the common monetary policy and the persistence of the inflation differential determined a divergence of the real interest rates; the intensification of the divergence after the launch of the Great Recession might have been determined by the different reactions of the European economies to the global liquidity crisis.

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