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The impact of the Great Recession on the

European Union countries

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Title: The impact of the Great Recession on the European Union countries

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Abstract: Although the Great Recession has been a global phenomenon affecting most developed (and emerging) economies, in the case of the European Union (EU), there are significant differences among EU individual countries and among EU groups of countries, like euro and non-euro countries regarding the depth and duration of the crisis. The paper analyses the effects of the economic and financial crisis on a set of seventeen economic and financial variables, comparing the economic performance of the EU economies before and after the onset of the crisis. The analysis confirms the hypotheses, first, of the existence of significant differences on the performance during the crisis of the EU economies, and, second, that the EU economies most affected by the crisis have been the euro countries, mainly those that join the euro after 1999. In this sense, and focusing on the Eurozone, the paper shows a rising divergence in the macroeconomic performance of euro countries, a divergence process that has been amplified during the Great Recession.

Key words: Great Recession, economic and financial crisis, Great Recession, European Union, Eurozone, convergence

Journal of Economic Literature classification: C22, O52, O57, P52



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1. Introduction

Although the Great Recession is a global phenomenon, with roots outside the European Union (EU), its impact has been deeper and longer lasting in the EU than elsewhere. Indeed, according to the World Economic Outlook Database (April 2015) of the International Monetary Fund (IMF), the long-term economic growth forecasts (up to the year 2020) for the EU are much lower than those of the other regions of the planet. Thus, in 2014 the real GDP of the European Union and the European Monetary Union (EMU) were only 4.6 per cent and 2.1 per cent higher respectively than in 2006. The IMF forecasts that in the year 2020 the real GDP of the EU and the Eurozone will be 17 and 12 per cent, higher respectively, than in 2006. In contrast, the IMF forecasts the real GDP of United Kingdom, the United States of America and Asian emerging and developing economies will be, respectively, 22, 28 and 169 per cent higher in 2020 than in 2006.

However, the impact of the Great Recession has not been the same in all the European countries. The objective of this paper is to analyze the different effects of the economic and financial crisis among the European Union Member States, focusing on the behavior of a number of real and financial variables since the year 2003 to evaluate the impact of the crisis.

In this sense, the paper is structured in two different but complimentary sections. In the first section we will analyze the impact of the individual countries that form the European Union. In these two sections, our objective is to know the countries that have been more seriously affected by the crisis and to detect whether the membership to the Eurozone has led to a significantly different impact regarding non-euro EU countries. In the second section, our attention will be focused on the performance of the Euro area, with objective of analyzing whether the crisis has led to a coherence of the Eurozone. Final section summarizes and concludes.

2. The impact of financial and economic crisis on the European Union economies

The objective of this section is to analyze the different effects of the economic and financial crisis among the European Union Member States, focusing on the behavior of a number of real and financial variables between the years 2003 and 2013 to evaluate the impact of the crisis. Since we have used data until 2013, we have excluded Croatia from the EU countries because it joined the EU in this year. Thus, we will analyze the performance of seventeen economic variables grouped into seven categories:

1. Economic activity: real GDP growth rate, GDP per capita growth rate, potential GDP growth rate, output gap
2. Labour market: employment growth rate, unemployment rate, real wages growth rate, real unit labour costs growth rate
3. Income distribution: adjusted wage share, GINI coefficient
4. Inflation: inflation rate (CPI)
5. Balance of payments: balance on current account
6. Public finances: public budget balance, public debt
7. Financial balance sheets of total economy: financial assets, financial liabilities, net financial assets

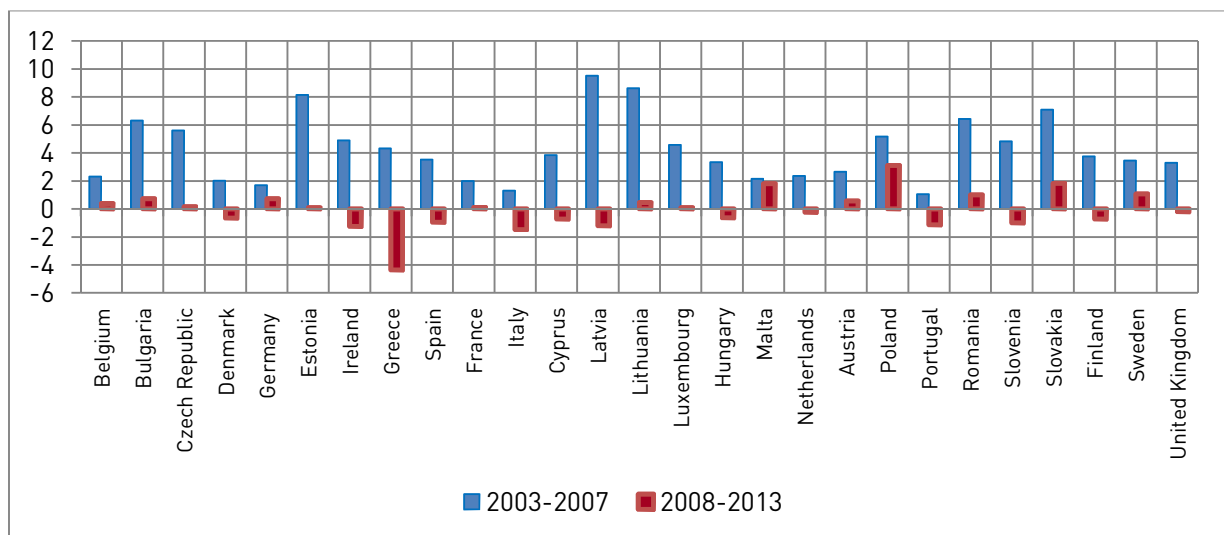
The existence of significantly different impacts of the Great Recession on the European economies questions the sustainability of the current institutional setting of the European Union and the Eurozone (Benczes and Szent-Ivanyi 2015). Many studies argue that the increasing heterogeneity in economic performance in the EU as a whole and the eurozone countries in particular is the direct consequence of the incorporation of economies with differing structures to those in the pre-existing member states (Arestis and Sawyer 2012; Bitzenis, Karagiannis, and Marangos 2015; Carrasco and Peinado 2015; Gibson, Palivos and Tavlos 2014; Mendonça 2014; Perraton 2011; Onaran 2011). This higher heterogeneity increases the possibility of asymmetric

shocks, and, simultaneously, reduces the effectiveness of single and common rules for macroeconomic policies (Dodig and Herr 2015).

In this section we will analyze the behavior of the former economic variables for each of the countries belonging to the European Union (EU-27). Given that our objective is to analyze the impact of the Great Recession on the economic performance of the EU economies, we will analyze the changes registered for the analyzed variables between the average value of each variable in the period before the crisis (2003-2007) and after the crisis (2008-2013). For most variables, we will also analyze the variation between the data recorded in the years 2007 and 2013. This data will help us to evaluate both the depth and the duration of the crisis.

2.1 Economic activity

Figure 1. Real GDP growth rate (%)



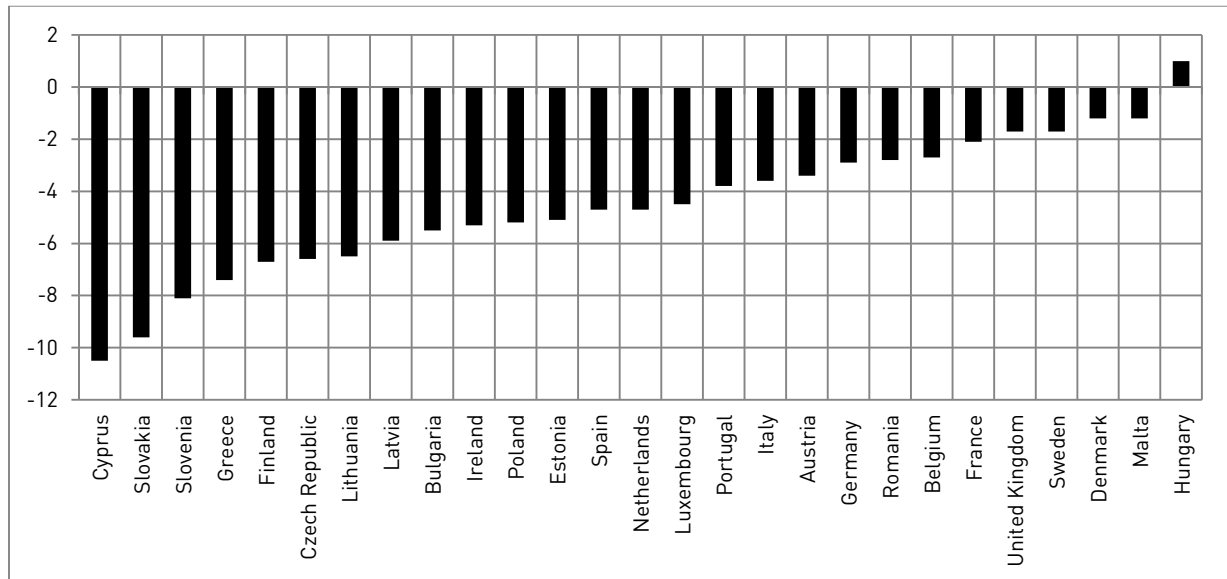
Source: our calculations based on Eurostat

Figure 1 shows the real GDP growth rate recorded before and after the onset of the crisis in 2007. It is easy to note the deep impact of the crisis. Before the crisis all EU countries recorded positive GDP growth rates, most of them above 2%. However,



between 2008 and 2013, the average annual GDP growth rate has been negative in 13 EU countries, and in eight countries (Ireland, Greece, Spain, Italy, Latvia, Portugal and Slovenia) this average GDP growth rate has been below -1%. In this period only four countries (Malta, Poland, Romania and Sweden) have registered average annual economic growth rates above 1%

Figure 2. Variation of the real GDP growth rate between 2007 and 2013



Source: our calculations based on Eurostat

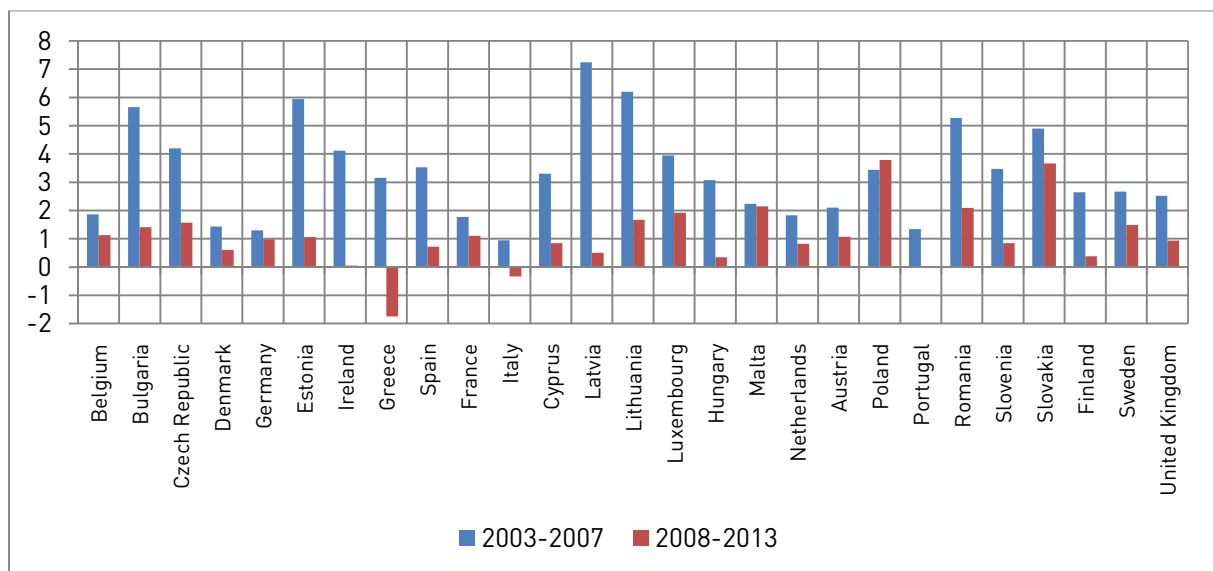
An alternative way to evaluate the impact of the crisis is to calculate the difference between the GDP growth rates in 2007 and 2013. This difference, besides working as a proxy of the duration of the crisis, also is useful to study the depth of the crisis because it allows to studying the (partial or total) recovery of the economic growth registered before the Great Recession. Moreover, by comparing the data of the different countries, we can evaluate the EU most and least affected by the crisis.

Figure 2 shows that only in one country (Hungary) the economic growth in 2013 was higher than in 2007. However, this result is explained because the economic crisis began in Hungary in the year 2007, when the GDP growth rate fell from the 3.9% in

2006 to 0.1%. Therefore, in all the EU countries the GDP growth rate in 2013 is well below than in 2007. However, this deceleration is not homogenous. It must be emphasized that the most seriously affected countries are members of the Euro zone, mainly countries that joined the euro after 1999 (EMU-6). Conversely, it is also relevant to highlight the (relative) better performance of three economies (United Kingdom, Sweden and Denmark) that do not belong to the euro area.

The second analyzed variable related to the economic activity is the rate of growth of potential GDP. As can be seen in the figure 3, all the EU economies recorded before the crisis positive rates of growth of their potential GDP. The highest rates of growth took place in Latvia and Lithuania, with average annual growth rates above 6%, and with other economies like Bulgaria, Estonia and Romania, growing above 5%. Italia was the country with the worst performance, merely 1%.

Figure 3. Average annual potential GDP growth rate (%)



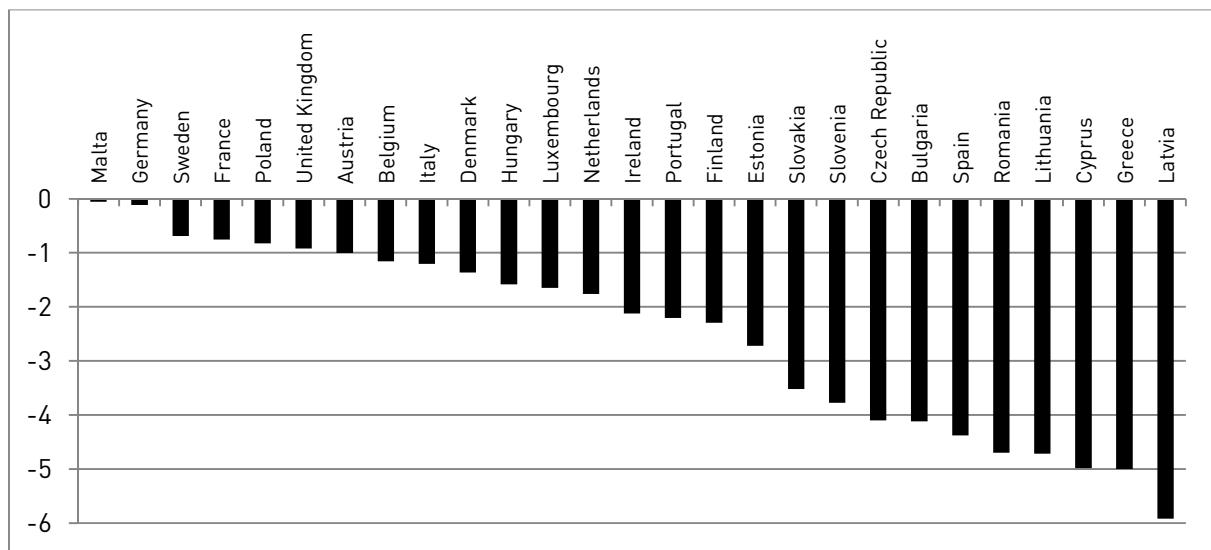
Source: our calculations based on AMECO

The burst of the crisis led to a generalized collapse in the potential growth in Europe. Only Poland and Slovakia recorded an average potential GDP growth rate over 3%, with

Malta and Romania registering a rate hardly over 2%. The worst performance has taken place in Greece and Italy, which have registered negative rates of growth of the potential GDP. Ireland and Portugal have recorded a zero growth of their potential GDP, and in Latvia, Hungary and Finland the average potential GDP growth rate has been below 0.5%.

The figure 4 shows the decline in the potential GDP growth rate between 2007 and 2013. Although in all the countries the rate of growth of potential GDP in 2013 has been below that of the year 2007, in six economies this fall is less than 1 percentage point, and in the cases of Malta and Germany hardly 0.1 percentage point lower.

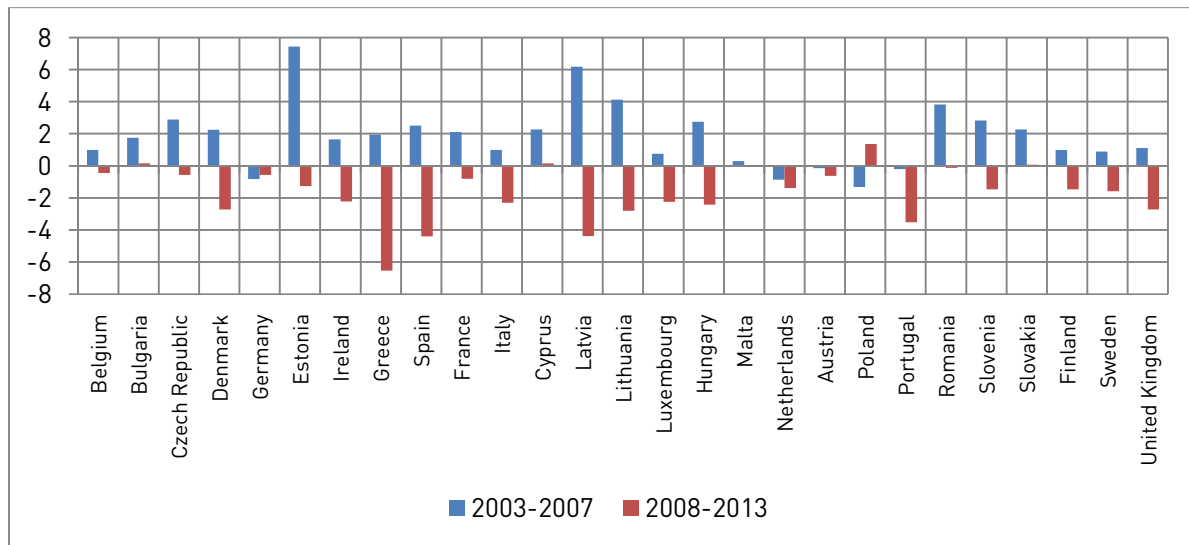
Figure 4. Variation of the potential GDP growth rate between 2007 and 2013



Source: our calculations based on AMECO

Conversely, in 10 countries the decline in the growth of potential GDP exceeds 3 percentage points, It must be emphasized that out of these 10 countries, only one country (Spain) is part of the group of countries that created the euro in 1999, and that there are other 6 counties that joined the euro at a later date.

Figure 5. Average output gap (%)

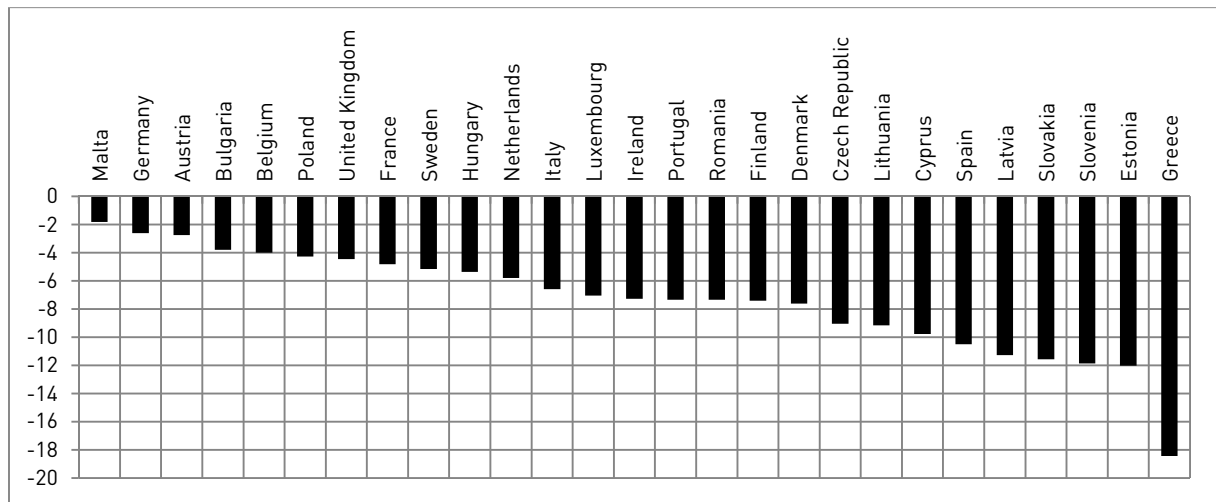


Source: our calculations based on AMECO

The output gap can be used to evaluate the business cycle of the EU countries. Looking of the data of the figure 5, we can see that during the period 2003-2007, all the EU economies were in an expansion (a positive output gap), with the exceptions of Germany, Austria Netherlands, Poland and Portugal. The existence of a negative output gap in these five countries is explained by the bad performance in the first years of the pre-crisis period. The mirror can be found in Estonia, Latvia, Lithuania and Romania, whose positive output gaps were above 4%.

On the contrary, during the crisis period (2008-2013), only four countries, Bulgaria, Cyprus, Slovakia and, mainly, Poland have registered a positive output gap. Measured by the output gap, the biggest recession has taken place in Greece (-6.5%), followed by Latvia (-4.4%), Spain (-4.4%), y Portugal (-3.5%). It is remarkable the cases of Greece, whose output gap reached 14% in 2012 and 2013, and Latvia that in 2009 and 2010 registered an output gap of -11%, when in 2007 its output gap peaked 11.7%.

Figure 6. Variation of the output gap between 2007 and 2013 (percentage points)



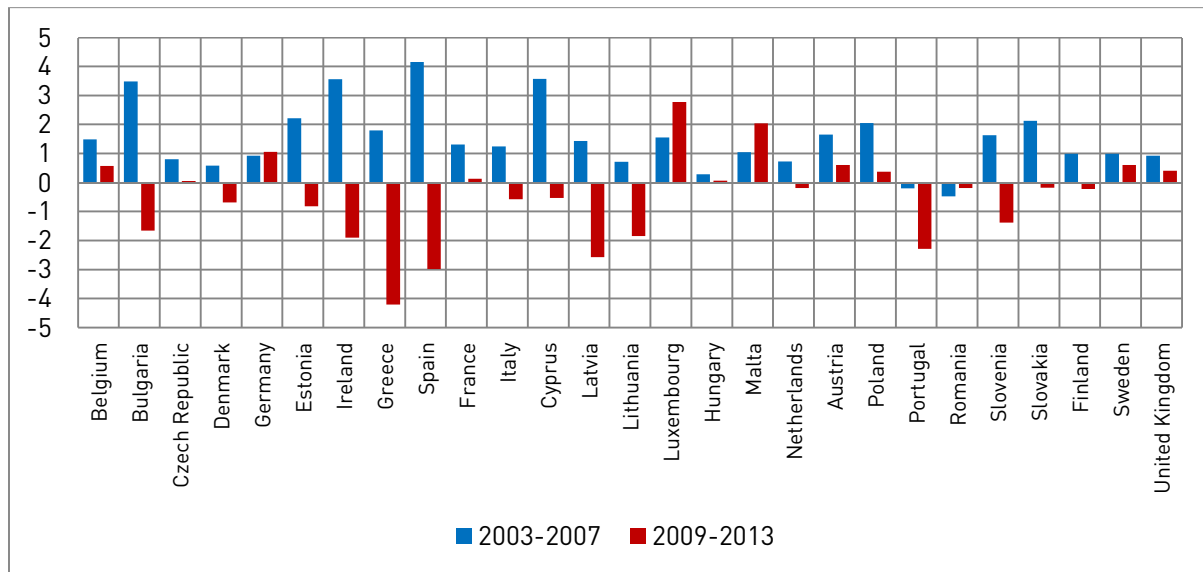
Source: our calculations based on AMECO

Figure 6 shows the variation of the output gap between 2007 and 2013. In six economies, this variation is above 10 percentage points. But the most remarkable outcome is that the eight countries that have registered the highest decline in the output gap belong to the Eurozone, and that only one country, Spain, was one of the founders of the European Monetary Union in 1999.

2.2 Labour market

The analysis of the impact of the Great Recession on the European labour markets is carried out on the basis of four variables: the employment growth rate, the unemployment rate, the rate of growth of real wages, and the rate of growth of real unit labour costs.

Figure 7. Annual average employment growth rate (%)

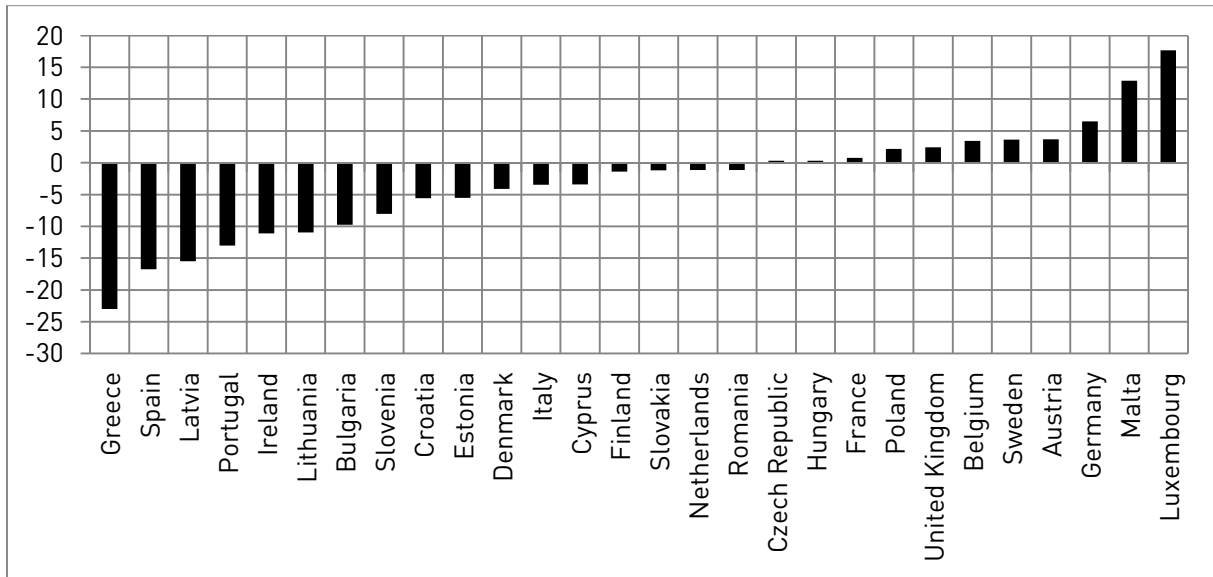


Source: our calculations based on Eurostat

The figure 7 shows the average annual total employment growth rate in the EU. If we focus on the pre-period crisis, the most relevant outcome is that there was a generalized process of employment creation between 2003 and 2007. Indeed, in these years only in Portugal and Romania there was a decline in total employment. This situation changed dramatically after 2008. Between 2008 and 2013 the average annual employment growth rate has been negative in 16 countries.

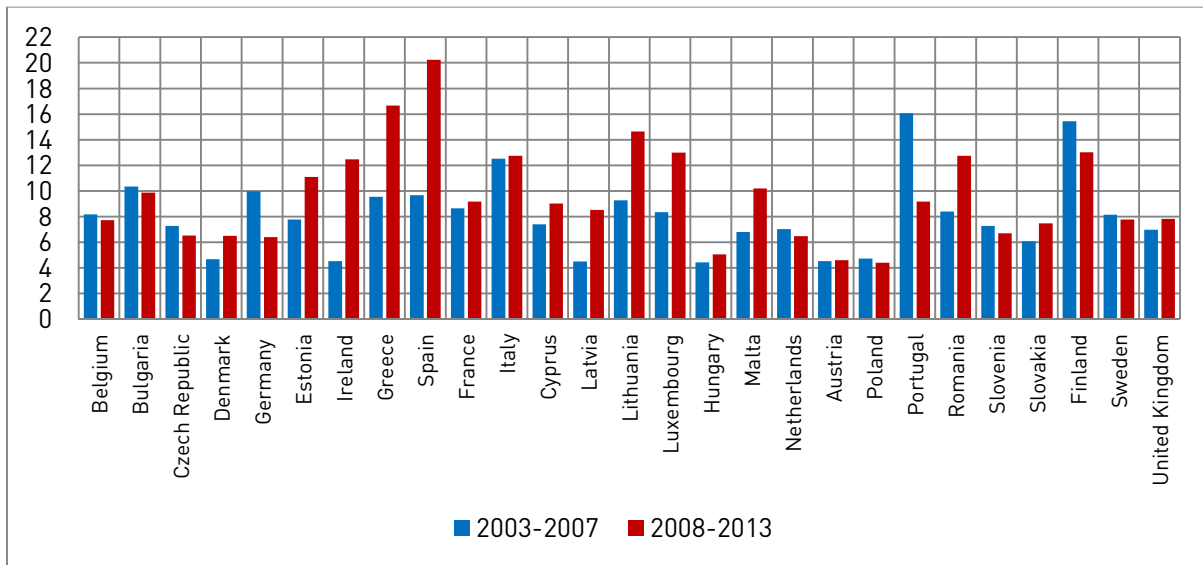
As a result, in 17 EU countries the total employment in the year 2013 was below that existing in 2007 (see figure 8). There are 6 countries where the crisis has destroyed more than 10 per cent of the employment existing in 2007, and with the only exception of Bulgaria, all of them belong to the euro area. On the contrary, in 3 economies, there has been an employment creation process exceeding the figure of 5 per cent.

Figure 8. Variation of total employment in the years 2008 to 2013 (percentage of total employment registered in 2007)



Source: our calculations based on Eurostat

Figure 9. Average unemployment rate (%)



Source: our calculations based on Eurostat

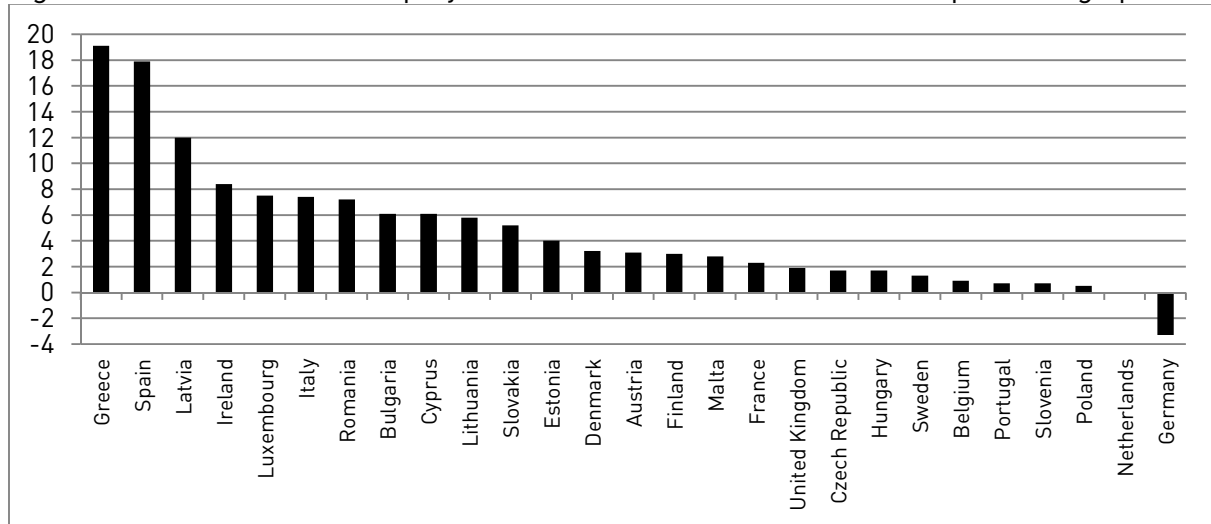
It could be expected that the impact of the Great Recession on the European labour markets had led to a generalized and substantial rise in the unemployment rate. But this outcome has not taken place. As can be seen in figure 9, in 10 economies the unemployment rate in 2008-2013 has been lower than that existing in 2003-2007: Belgium, Bulgaria, Czech Republic, Germany, Netherlands, Poland, Portugal,



Slovenia, Finland and Sweden. However, in most cases, this result is explained by the high unemployment rates registered in many cases in the early years of the decade of the 2000s.

Indeed, the results are different when we observe the change in the unemployment rate between 2007 and 2013 (see figure 10). In these years, the unemployment rate has increased with only two exceptions: Netherlands and Germany.

Figure 10. Variation of unemployment rate between 2007 and 2013 (percentage points)



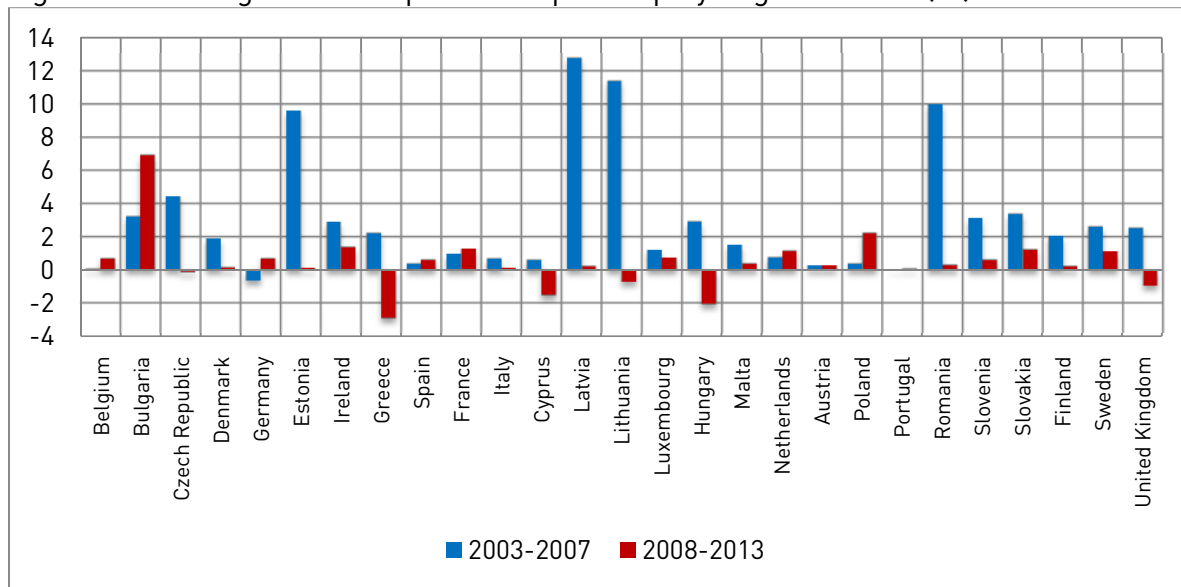
Source: our calculations based on Eurostat

In nine countries the unemployment rate has increased in more than 6 percentage points, standing out the huge increases registered in Greece and Spain (the two countries with the highest unemployment rate. Again, it must be emphasized that the six countries with the highest increase of the unemployment rates belong to the Eurozone.

When we focus on the real wages growth (figure 11), we can see the huge differences in the real wages growth during the pre-period crisis. The most striking fact is that, contrary to what happened in the other EU countries, in Germany and Portugal there was a decline in real wages, with annual real wages growth rates amounting to -0.7

and -0.1 per cent, respectively. On the contrary, the highest real wages growth rates took place in Latvia (12.8%), Lithuania (11.4%), Romania (10%) and Estonia (9,6%). Indeed, in some of these countries the real wages growth rate peaked 20%, as it is the case of Latvia (2007) and Romania (2005 and 2008). The lowest increase of real wages took place in Belgium (0.1%), Austria (0.3%) and Spain and Poland (0.4%).

Figure 11. Average real compensation per employee growth rate (%)

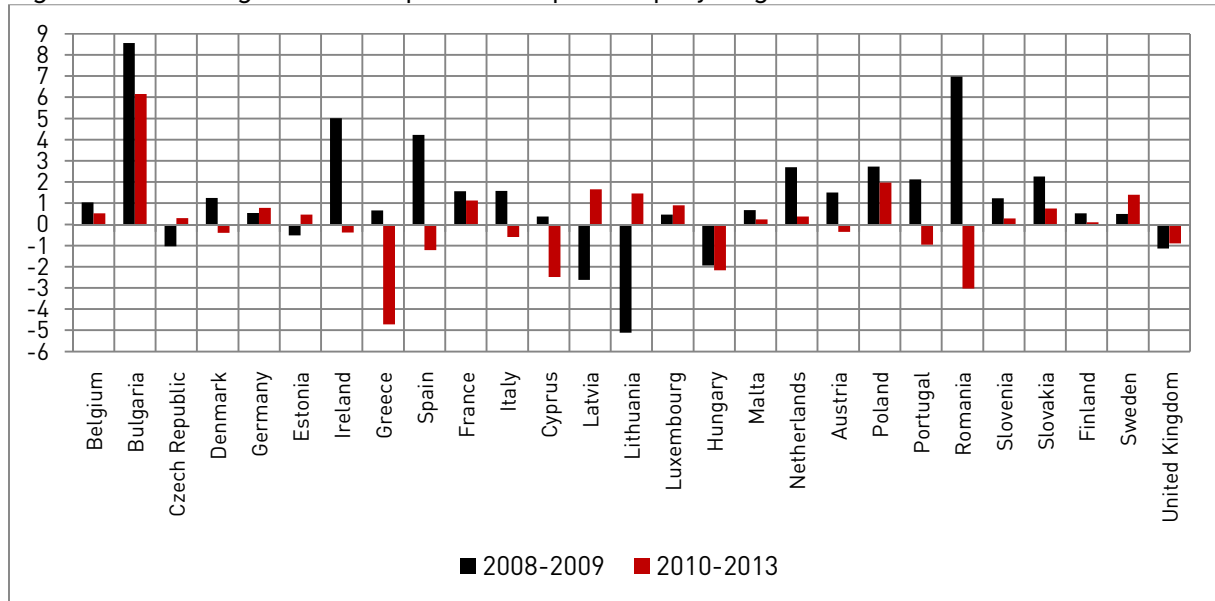


Source: our calculations based on AMECO

With a few exceptions, the Great recession has led to a moderation in the wage growth, although the number of countries that registers an average negative growth rate of real wages is low: Czech Republic (-0.1%), Greece (-2.9%), Cyprus (-1.5%), Lithuania (-0.7%), Hungary (-2.1%) and the United Kingdom (-1%).

However, previous data hide the different behavior of real wages after the onset of the crisis. In the years 2008 and 2009, real wages only fell in six countries (Lithuania, Latvia, Czech Republic, Estonia, Hungary and United Kingdom). In most countries, the real wages kept on rising at similar rates that those registered before the crisis, with the exceptions of Bulgaria, Ireland and Spain, whose wage growth was substantially higher than before the crisis (see figure 12).

Figure 12. Average real compensation per employee growth rate since 2008 (%)

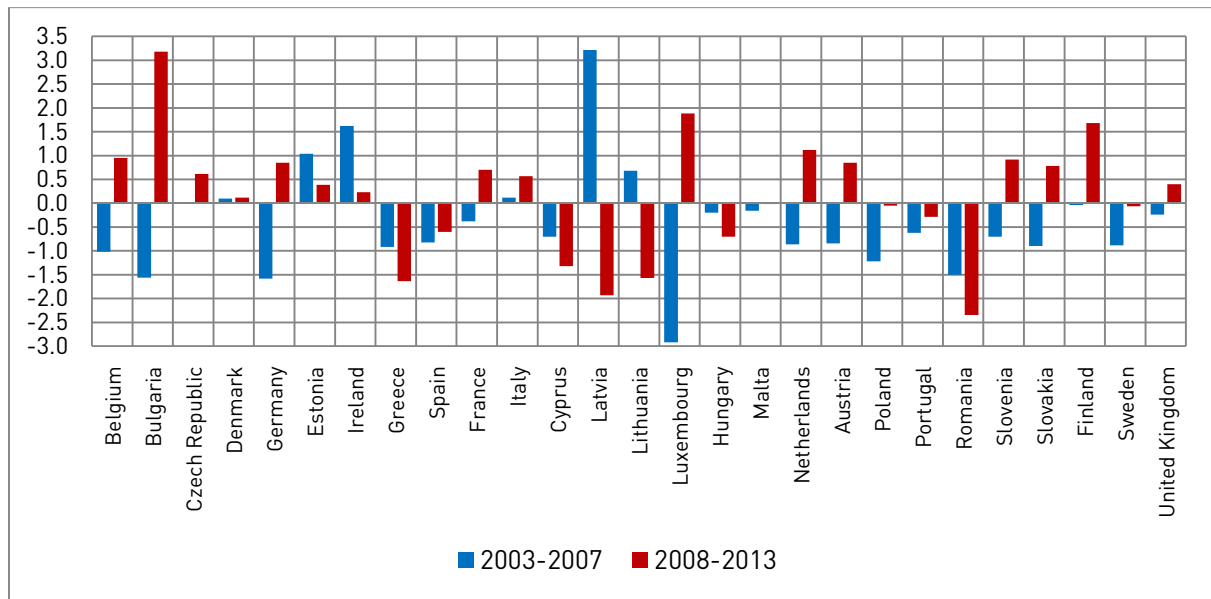


Source: our calculations based on AMECO

As can be seen in figure 12, the highest impact of the crisis on real wages has taken place since 2010. With a few exceptions, the real wages growth rate has been lower in 2010-2013 than in 2008-2009. In 2010-2013 ten economies have registered a decline in real wages, standing out the negative average annual real wages growth rates of countries like Portugal (-1%), Spain (-1.2%), Hungary (-2.2%), Cyprus (-2.5), Romania (-3%) and Greece (-4.7%).

Despite the increase registered in the real wages before the crisis, real unit labour costs (ULCs) fell in most EU countries in the years previous to the burst of the crisis. As figure 13 shows, real ULCs only increased in four countries: Estonia, Ireland, Lithuania and Latvia. It must be highlighted the cases of Bulgaria, Romania, Germany and Luxembourg, countries in which their real ULCs were declining at an annual rate above 1.5 per cent.

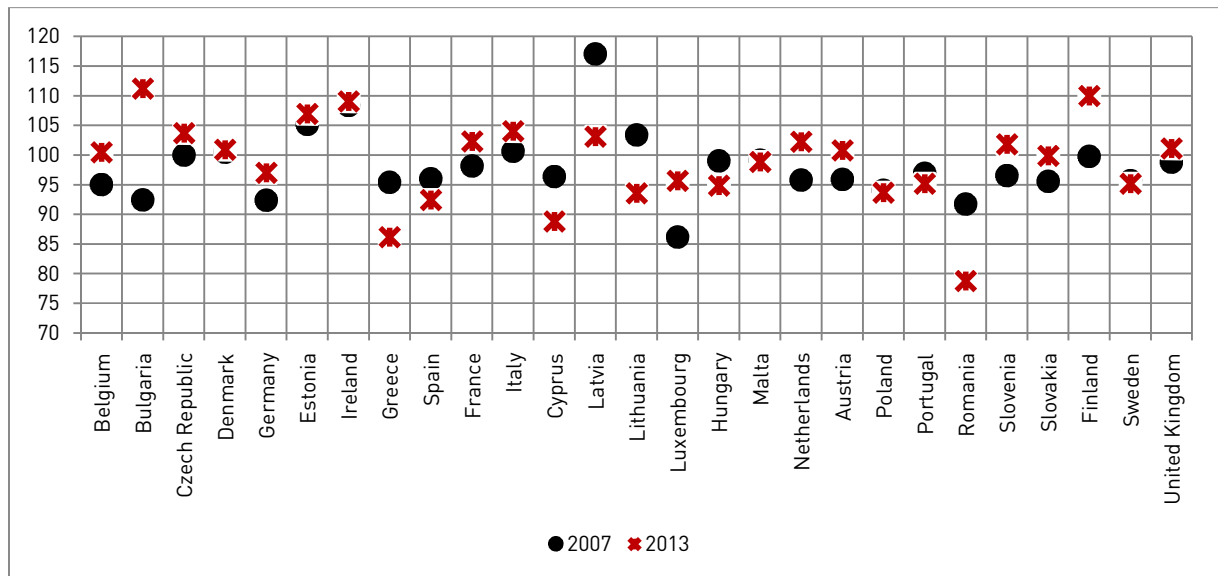
Figure 13. Average annual real unit labour costs growth rate (%)



Source: our calculations based on Eurostat

This behavior of real ULCs has changed since the year 2008. Real ULCs have increased between 2008 and 2013 in sixteen countries. As we can see, the larger declines in the real ULCs have happened in Romania, Latvia, Greece, Lithuania and Cyprus, countries where the real ULCs are declining since 2008 at an annual rate exceeding 1 per cent.

Figure 14. Real unit labour costs in the European Union (2002=100)



Source: our calculations based on Eurostat

Figure 14 give us a better idea of the evolution of the real ULCs since 2003. With the aforementioned four countries, real ULCs were lower in 2007 than in 2002. Therefore, the loss of competitiveness that most EU countries suffer in relation to Germany is explained not by an increase of real ULCs in Europe, but by the much more intense decline registered German real ULCs.

The economic crisis has changed this scenario in a substantial manner. In fourteen countries, real ULCs are higher in 2013 than in 2002. The decline in real ULCs has been negligible in countries like Malta, Poland, Portugal and Sweden. On the contrary, a significant decline in the real ULCs has happened in countries like Greece, Cyprus, Lithuania, Spain and, mainly, Romania

2.3 Income distribution

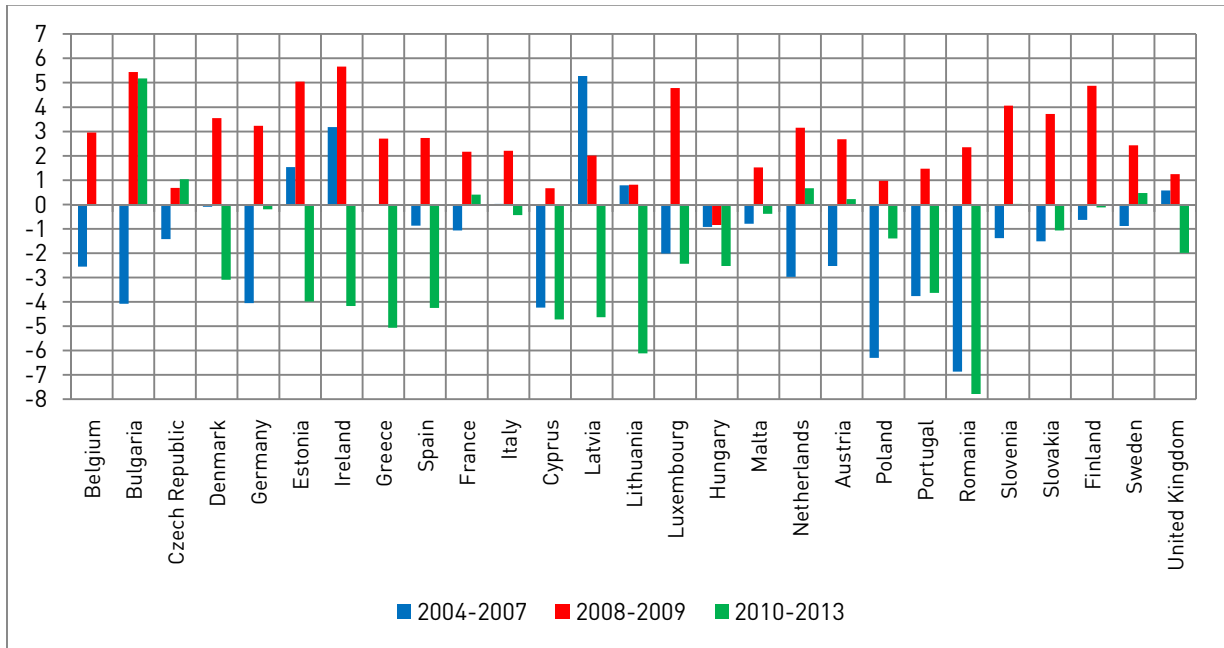
To analyse the changes in the income distribution, we will focus both on the functional and on the personal distribution of income. In the first case, we will analyse the changes in the adjusted wage share. For a better understanding of the changes



registered in this variable, we have divided the whole period into three sub-periods: 2004-2007, 2008-2009 and 2010-2013. Table 15 shows the results.

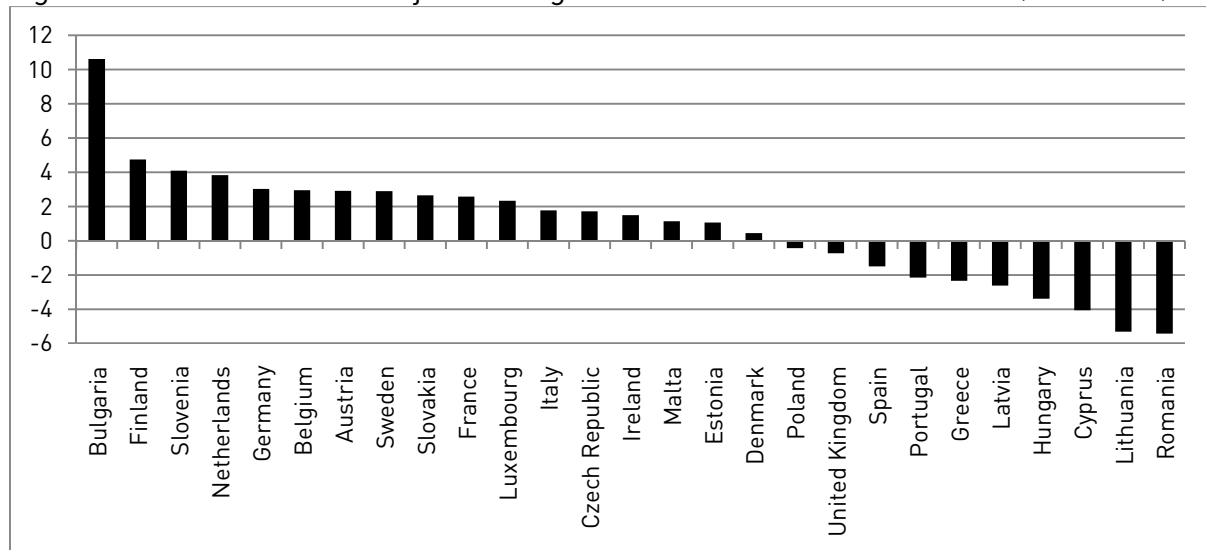
Between 2003 and 2007, the adjusted wage share fell in all EEU countries, with the only exceptions of five countries: Estonia, Ireland, Latvia, Lithuania and the United Kingdom. We want to emphasize the large decline (above 4 percentage points of the GDP) of wage incomes registered in five countries: Bulgaria, Germany, Cyprus, Poland and Romania.

Figure 15. Variation in the adjusted wage share (percentage points of GDP)



Source: our calculations based on AMECO

Figure 16. Variation of the adjusted wage share between 2007 and 2013 (% of GDP)



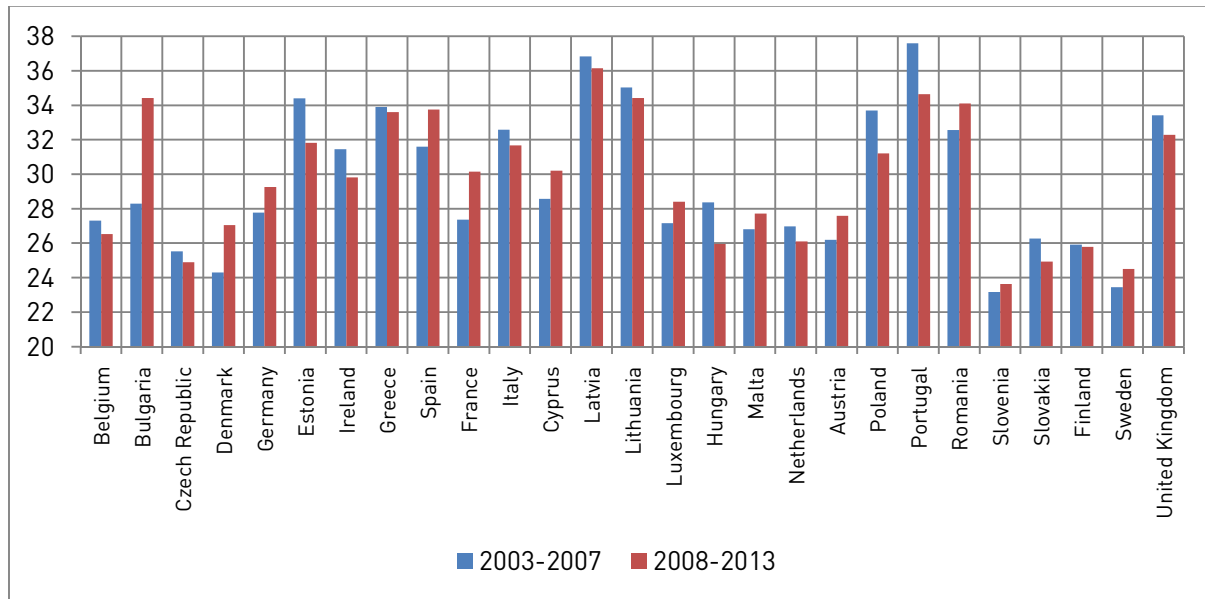
Source: our calculations based on AMECO

This pattern reversed at the beginning of the crisis. Thus, with the only exception of Hungary, the adjusted wage share increased noticeably, a proof that, at a first stage, (real) wages and employment were not seriously affected by the crisis. The scene is dramatically different since 2010. Between 2010 and 2013, the adjusted wage share has declined in nineteen countries, and in eight countries (Estonia, Ireland, Greece, Spain, Cyprus, Latvia, Lithuania and Romania) the decline exceeds 4 per cent of the GDP. As a result of this process, the adjusted wage share as declined since the year 2008 in ten countries (see figure 16).

The second analysis of income distribution is based on the Gini coefficient of equivalised disposable income. Figure 17 shows the large differences existing in the European Union related to the income distribution, both before and after the burst of the financial crisis in 2008. Five countries registered a Gini coefficient below 26: Slovenia (23.2), Sweden (23.5), Denmark (24.3), Czech Republic (25.5) and Finland (25.9). It is easy to see that the Scandinavian countries enjoyed the most egalitarian income distribution in the European Union. On the contrary, the least egalitarian income distribution happened in Italy and Romania (32.6), United Kingdom (33.4),

Poland (33.7), Greece (33.9), Estonia (34.4), Lithuania (35), Latvia (36.8), Portugal (37.6). With the exception of the UK, the least egalitarian countries are Mediterranean and central and eastern Europe.

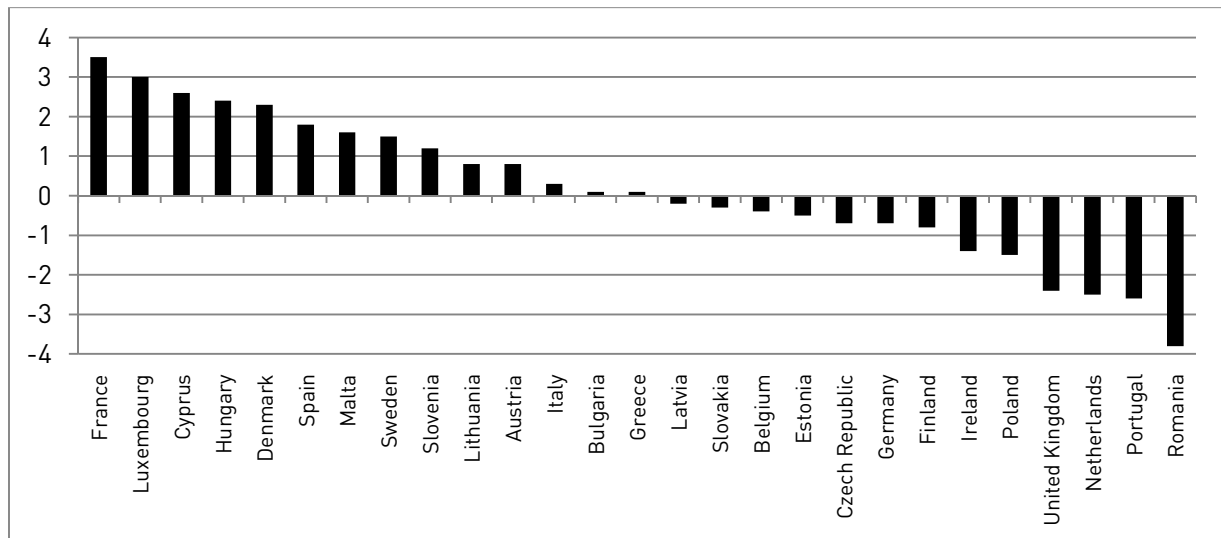
Figure 17. Gini coefficient



Source: Our calculations based on Eurostat

The crisis has led to an increase in the income inequalities in eleven countries, standing out above all the cases, Bulgaria where its Gini coefficient has risen in 6.1 points. The figure 17 confirms that the most and the least egalitarian countries remain, with minor changes, basically the same. However, if we want to know how much the crisis has impacted on the personal income distribution in the EU, it is better to look at figure 18, that shows the changes registered in the Gini coefficients between 2008 and 2013.

Figure 18. Change in the Gini coefficient between 2008 and 2013



Source: Our calculations based on Eurostat

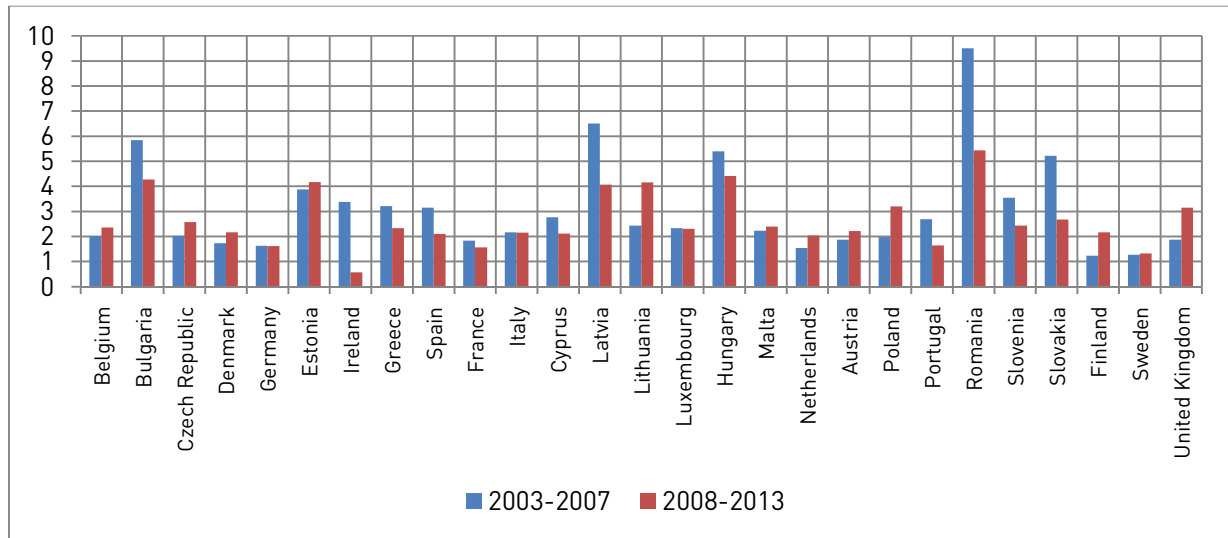
Since the onset of the financial crisis, the income distribution is more egalitarian in 13 countries. It is remarkable the fact that four of the five countries that has registered the highest decline in the Gini coefficient were, precisely, the countries with the least egalitarian income in the EU (Poland, Portugal, Romania and the United Kingdom). The worst performance, on the contrary, is registered in France, Luxembourg, Cyprus, Hungary and Denmark. With the exception of Denmark, these countries were not among those with the more egalitarian income distribution. Therefore, we can state that the crisis, in general has not had a significant negative impact on those countries that before the crisis has a more egalitarian income distribution.

2.4 Inflation

Figure 19 shows the evolution of inflation rate, measured by the Consumer Price Index (CPI) in the European Union. The most remarkable fact is that before the crisis, the most inflationary economies were those that at that time were not member of the Eurozone. It is surprising that the average annual inflation rate after 2008 has only been lower than that registered in the period 2003-2007 in 11 countries. However, this

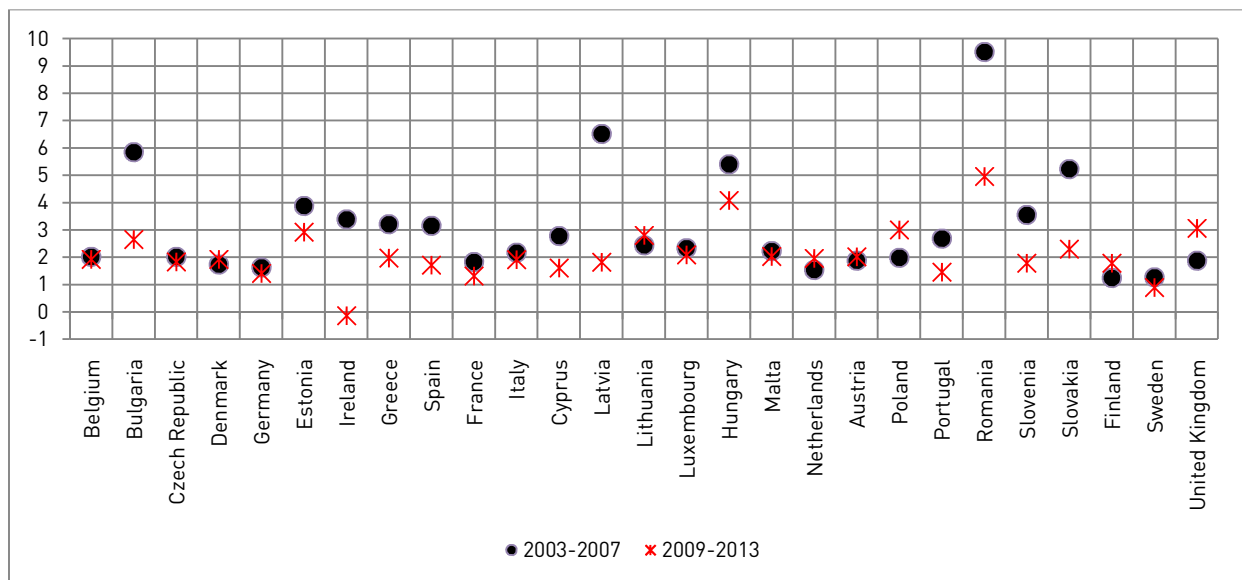
result is explained by the hike registered in the inflation rate in the year 2008: in this year the inflation rate accelerated in 25 EU countries.

Figure 19. Average annual inflation rate (%)



Source: Our calculations based on AMECO

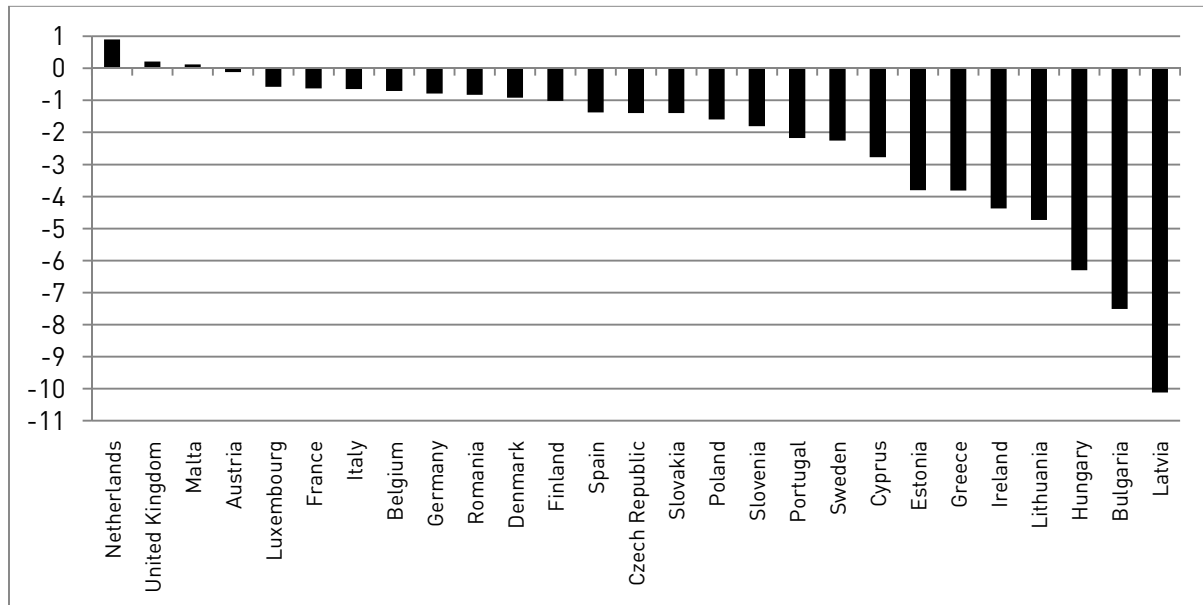
Figure 20. Average annual inflation rate for the periods 2003-2007 and 2009-2013 (%)



Source: Our calculations based on AMECO

To avoid this problem, in figure 20 we show the average annual inflation rates for the periods 2003-2007 and 2009-2013. Now it is more evident the disinflationary impact of the Great Recession, mainly in the most inflationary countries before the crisis.

Figure 21. Variation of inflation rate between 2007 and 2013 (percentage points)



Source: Our calculations based on AMECO

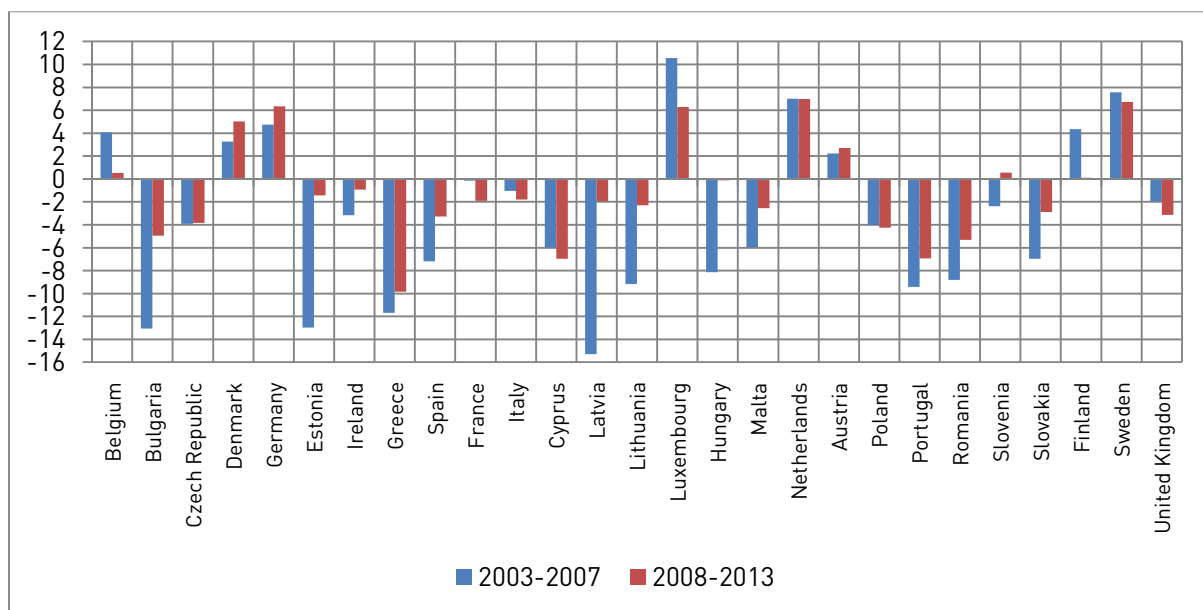
However, even with the removal of the year 2008, the inflation rates have been higher since 2009 than before the crisis (Denmark, Lithuania, Netherlands, Austria, Poland, Finland and the United Kingdom). This result is due to the fact that in most countries the inflation rates were declining since 2009.

Thus, when we calculate the change in the inflation rates registered between 2007 and 2013, as we show in figure 21, we can better appreciate the disinflationary impact of the financial crisis. Thus, in four countries the inflation rate in the year 2013 was higher than in 2007. In the rest of EU countries the inflation rate was lower in 2013.

2.5 Balance on current transactions

The situation of the balances on current transactions of EU countries was characterized in the years before the crisis by a generalized negative balance. As figure 22 shows, in the years 2003-2007, only eight countries recorded a surplus in the balance on current transactions: Belgium, Denmark, Germany, Luxembourg, Netherland, Austria, Finland and Sweden. Out of these countries, in five countries the surplus on current transactions exceeded 4 per cent of GDP: Finland, 4.3%), Germany (4.7%), Netherlands (7%), Sweden (7.6%) and Luxembourg (10.6%). In the case of deficit countries, 13 economies registered deficits above 4% of GDP, standing out the cases of four countries, whose average annual deficits exceeded 10% of GDP: Greece (11.7% of GDP), Bulgaria and Estonia (13% of GDP) and Latvia (-15.3 of GDP).

Figure 22. Average balance on current transactions (% of GDP)

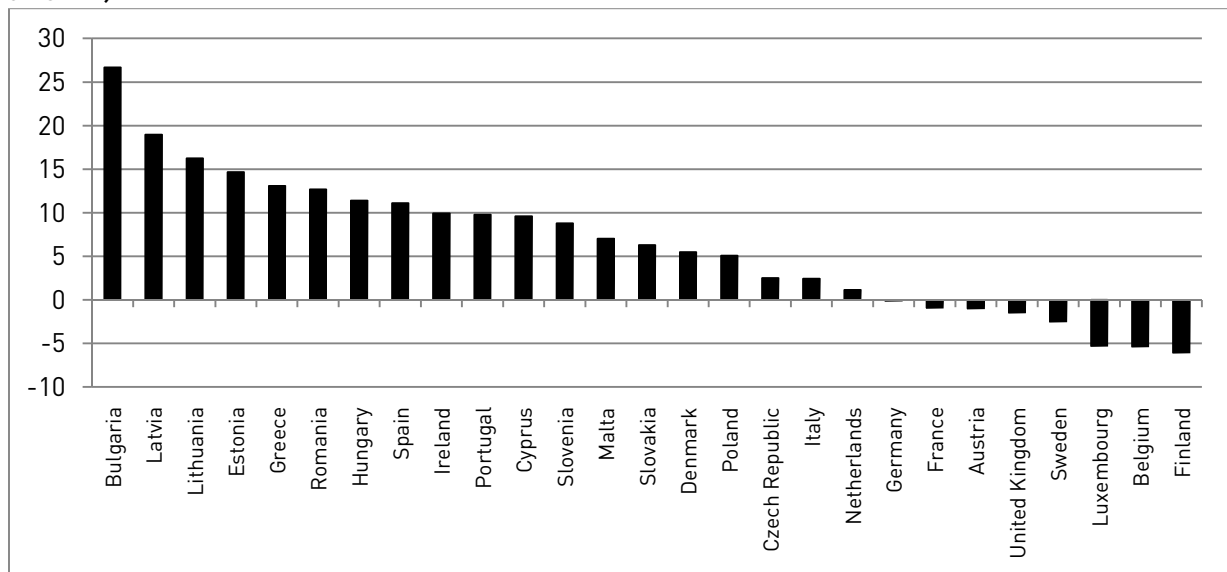


Source: Our calculations based on AMECO

The Great Recession, and the consequent decline in the economic activity and the aggregate demand, has led to a substantial improvement in the balance on current transactions. Although in the period 2008-2013, only nine countries register surpluses

in the balance on current transactions, in 18 countries there is an improvement in the balance on current transactions. Out of the other 9 countries, in four countries (Belgium, Luxembourg, Finland and Sweden), the crisis has come with a decline in their respective surpluses, in four countries there has been an increase of the balance on current transactions (France, Italy, Cyprus, Poland and the United Kingdom).

Figure 23. Variation of the balance on current transactions between 2007 and 2013 (% of GDP)



Source: Our calculations based on AMECO

It is important to emphasize that eight countries which, on average, have recorded a deficit in the balance on current transactions over the years 2003 to 2013, in the year 2013 have registered a surplus in the balance on current transactions: Bulgaria, Ireland, Spain, Italy, Lithuania, Hungary, Malta and Slovakia.

In this sense, the figure 23 allows a better understanding of the dimension of the adjustment in the balance on current transactions that has happened during the Great Recession. Only in eight countries, there has been a worsening in the balance on current transactions, standing out the substantial worsening that has taken place in Luxembourg, Belgium and Finland (above 5 per cent of the GDP). On the contrary, in

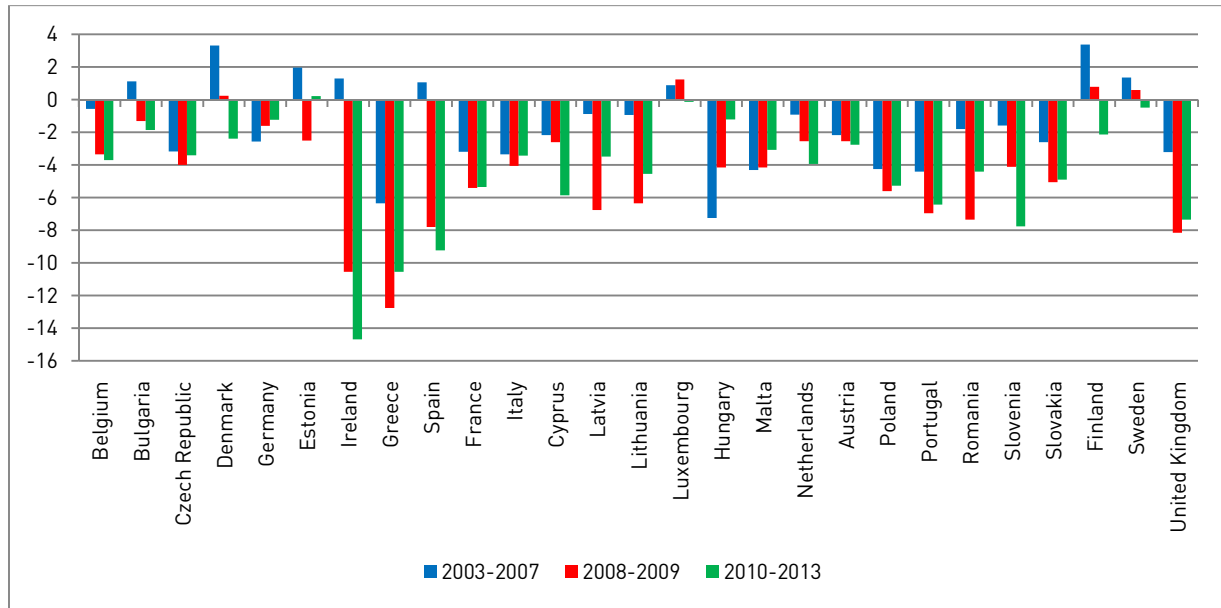
twelve countries the improvement in the external balance exceeds 8 per cent of the GDP.

2.6 Public finances

To analyze the impact of the crisis on the public finances of EU countries we will focus on two variables related to the size of fiscal imbalances: the public budget balance and the public debt, both variables being measured as percentages of the GDP.

Figure 24 shows the evolution of the public budget balances since 2003. During the pre-crisis years, most EU countries registered deficits in their public finances. The only exceptions were Bulgaria, Denmark, Estonia, Ireland, Spain, Luxembourg, Finland and Sweden. Out of the 19 deficit countries, in nine countries the fiscal deficit was above 3 per cent of the GDP (Czech Republic, Greece, France, Italy, Hungary, Malta, Poland, Portugal and United Kingdom). It must be noticed that in 2007 there was a generalized deterioration in the situation of public finances in the EU that affected to 24 countries, and thus only in three countries (Austria, Germany and Netherlands) the public budget balance improved in 2007

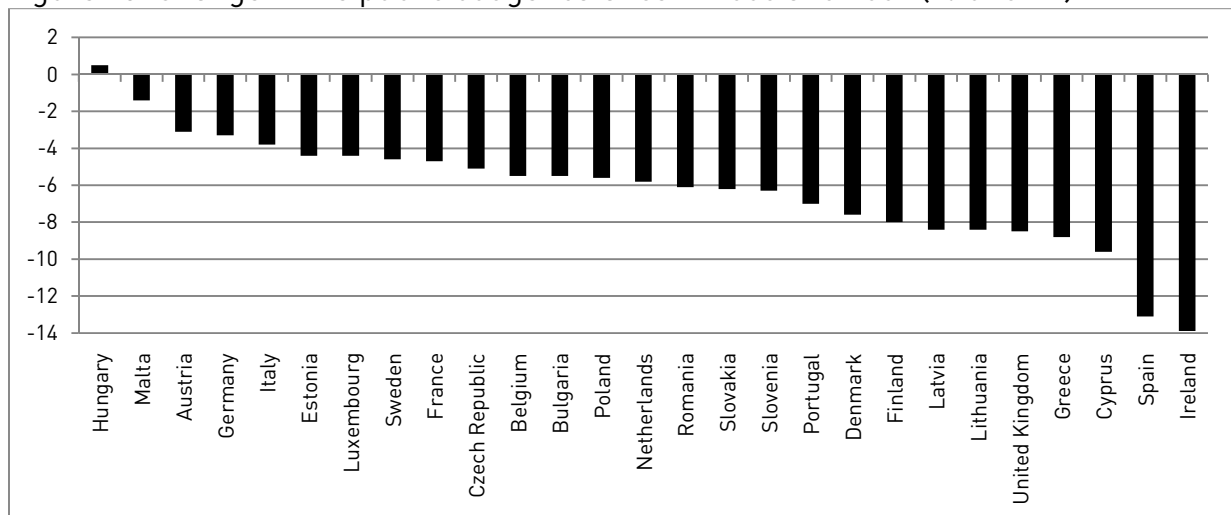
Figure 24. Public budget balances (% of GDP)



Source: Our calculations based on Eurostat

The burst of the crisis led to a strong deterioration of public finances. Thus, in the years 2008 and 2009 only four countries (Denmark, Luxembourg, Finland and Sweden) generated a fiscal surplus. In 17 countries the fiscal deficits were exceeded the 3 per cent of the GDP; standing out the cases of Ireland (10.6% of GDP) and Greece (12.8%).

Figure 25. Change in the public budget balance in 2008 and 2009 (% of GDP)

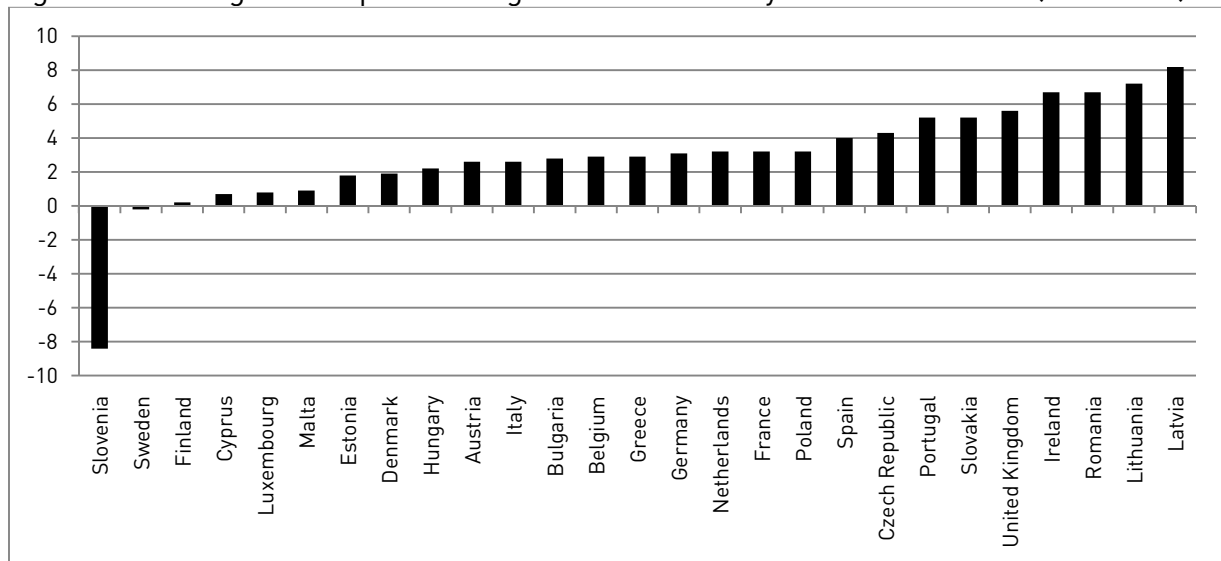


Source: Our calculations based on Eurostat

Figure 25 shows the accumulated impact of the crisis on the public budget balance (PBB) in the years 2008 and 2009. We have calculated the difference between the PBB

registered in 2009 and that of the year 2007. With the exception of Hungary, whose public finances registered and improvement, all the EU countries saw how their public finances suffered a strong deterioration, standing out the cases of Greece, Cyprus, Spain and Ireland.

Figure 26. Change in the public budget balance in the years 2010 to 2013 (% of GDP)



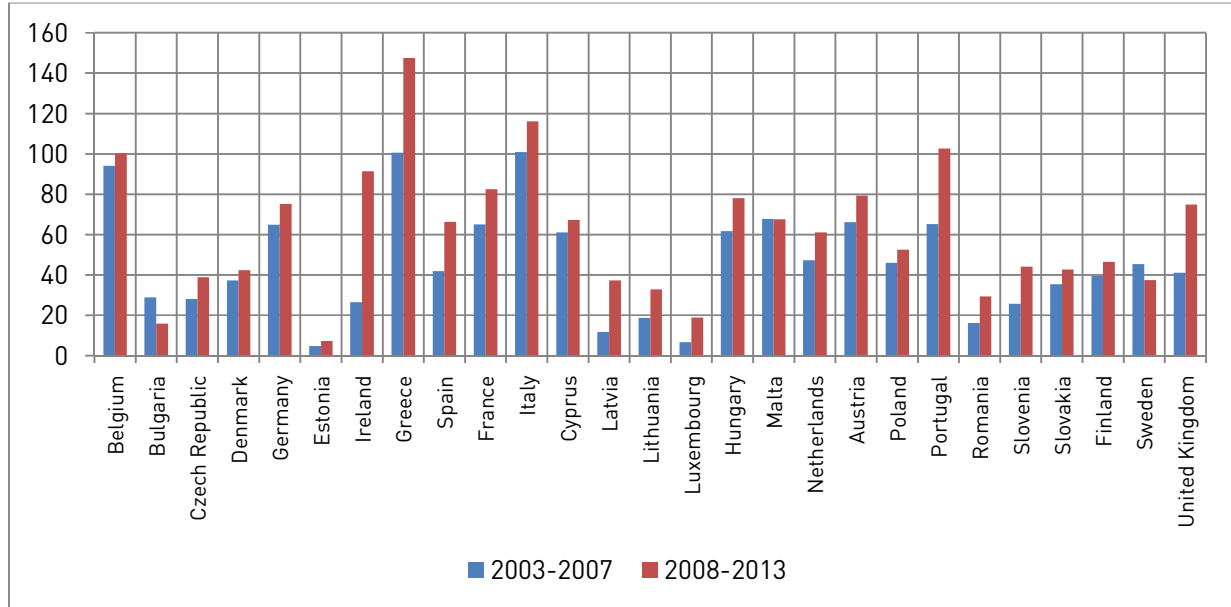
Source: Our calculations based on Eurostat

In 2010 a period of fiscal austerity spread in Europe. Although, as an average, in 2010-2013 18 EU countries had fiscal deficits above 3 per cent of the GDP, the public budget balances improved significantly, as figure 26 shows. With the exceptions of Slovenia (due to the impact of bank rescues on the public finances in the year 2013) and Sweden), in the other EU countries there was a decline in the fiscal deficits and an increase in the fiscal surpluses, with eight countries registering an improvement in the public budget balances that exceeded four percentage points of the GDP.

The situation of the public budget balances has affected the size and the evolution of the public debt in the EU, as figure 27 shows. Using again as a benchmark the threshold set in the Maastricht Treaty, before the crisis the size of the public debt exceeded 60 per cent of GDP in ten countries (Belgium, Germany, Greece, France, Italy,

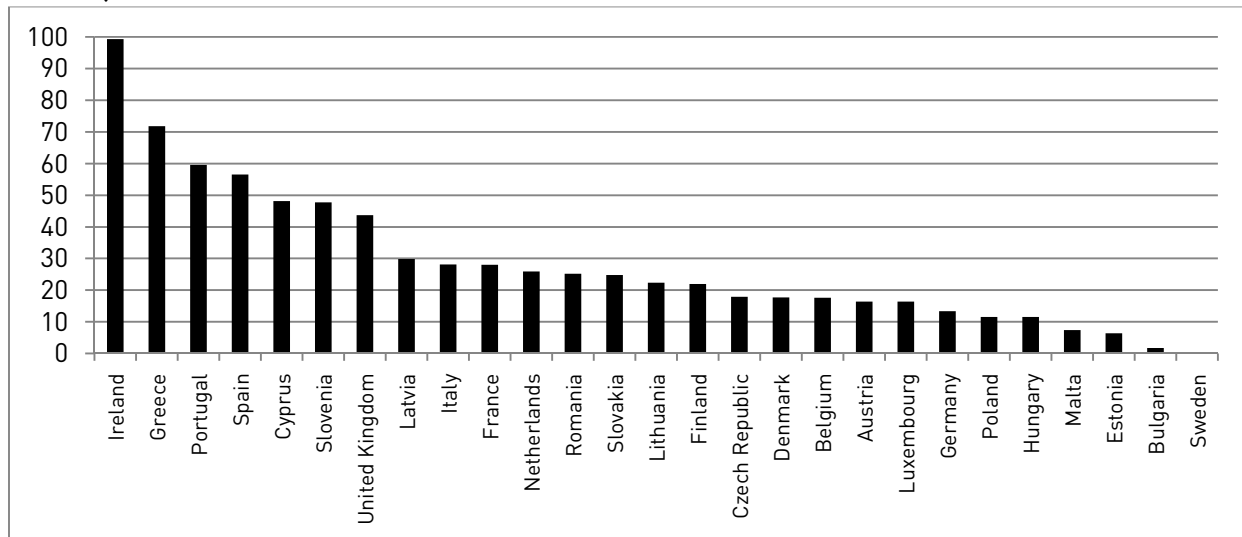
Cyprus, Hungary, Malta, Austria and Poland). It is striking the fact, that with the exception of Hungary, the highest indebted countries belonged to the Eurozone.

Figure 27. Public debt (% of GDP)



Source: Our calculations based on AMECO

Figure 28. Accumulated increase in the size of public debt between 2007 and 2013 (% of GDP)



Source: Our calculations based on AMECO

The deterioration in the public budget balances has implied that in the post-period crisis the size of the public debt is larger than in the period 2003-2007 (with the only

exception of Bulgaria). However, the figure 27 does not give a correct picture of the huge increase registered in the public debt in most countries, because, as mentioned, it shows the average of the two sub-periods, thus hiding the rising trend registered in most countries

To avoid this problem in the figure 28 we show the change registered in the size of public debt between the years 2008 and 2013. In seven countries, the increase in the stock of public debt is below 15 per cent of the GDP (Germany, Poland, Hungary, Malta, Estonia, Poland and Sweden). On the contrary, the increase in the stock of public debt is above 40 per cent of the GDP in seven countries (Ireland, Greece, Portugal, Spain, Cyprus, Slovenia and United Kingdom), with six of these countries belonging to the euro.

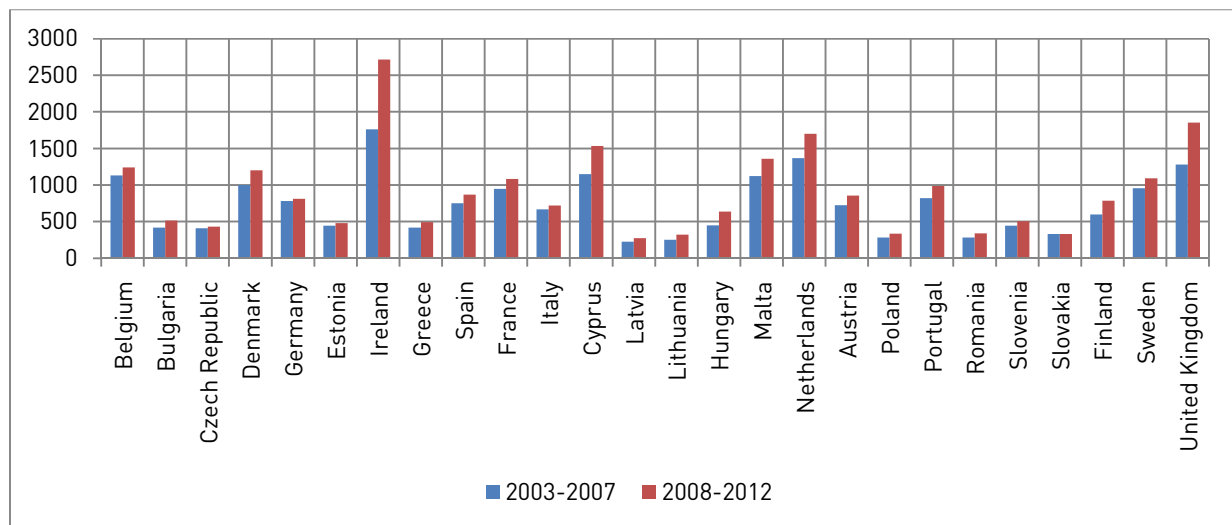
2.7 Financial balance sheets

This sub-section will analyze the impact of the crisis on the size of the financial assets, financial liabilities and net financial liabilities of the total economy, that is, we will not make a disaggregated analysis by sectors. Like in the previous section, the source of the data is Eurostat. The data analyzed refer to the period 2003-2012, because at the time of elaborating this deliverable data about all EU countries were not available. The analysis does not include Luxembourg due both to the lack of available data before the year 2007 and to the huge size in this country of the financial assets and liabilities (6 times larger than the second country in terms of the size of the financial assets and liabilities measured as a percentage of the GDP).

Figure 29 shows the size of the financial assets in the total economy of the EU-27 countries. The figure shows the remarkable differences in the size of financial assets both before and during the financial and economic crisis, where the smallest size of the financial assets is registered in the central and eastern European countries.

According to the data of the figure 29, the size of financial assets has not declined in any EU economy, and thus, it could be argued that the financialisation process has not been reverted with the crisis. This conclusion, however, must be qualified if we look at the changes registered in the size of financial assets between 2007 and 2012.

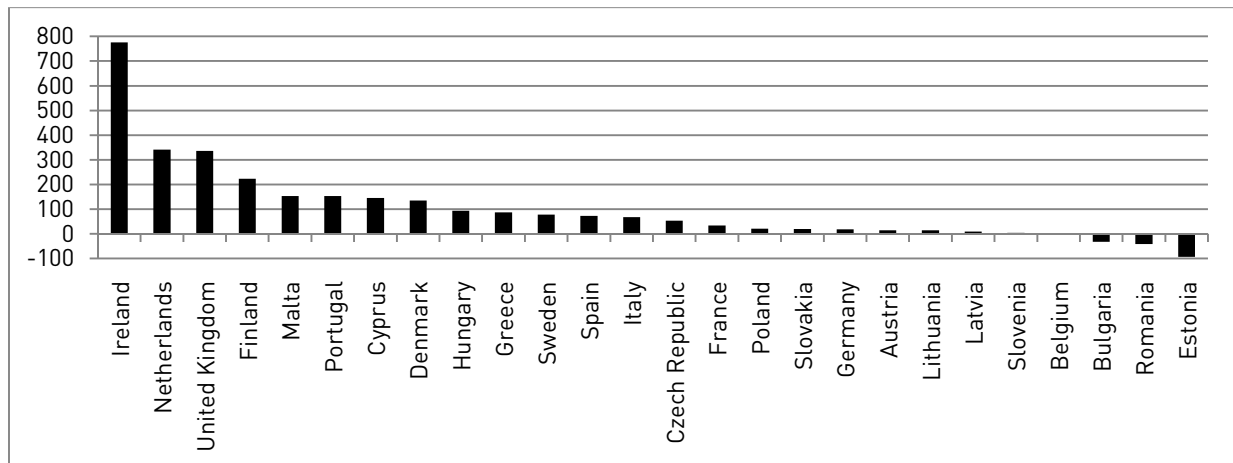
Figure 29. Financial assets (% of GDP)



Source: Our calculations based on Eurostat

According to the data of the figure 30, in 2012 the size of the financial assets was smaller than in 2007 in four countries. In 8 countries, there was a moderate (less than 50 per cent of the GDP) increase of the size of financial assets, and in 8 countries between 2008 and 2012 the financial assets has increased above 100 per cent of the GDP, standing out the cases of Ireland, Netherlands and United Kingdom.

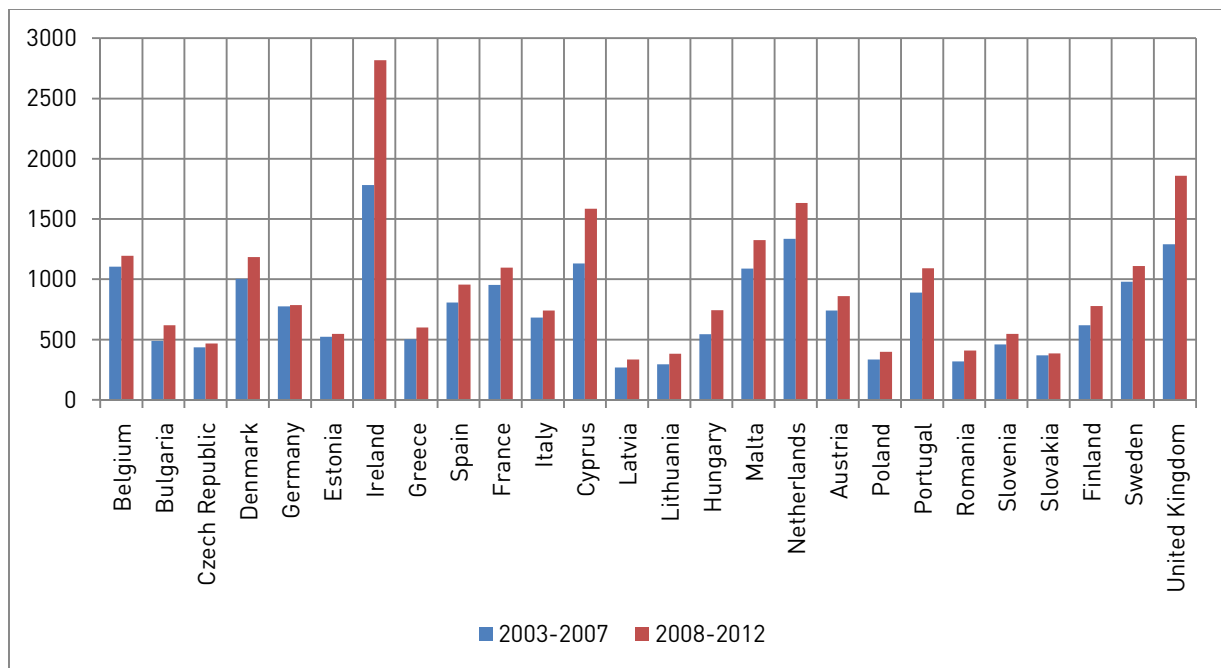
Figure 30. Variation in the size of financial assets between 2008 and 2012 (% of GDP)



Source: Our calculations based on Eurostat

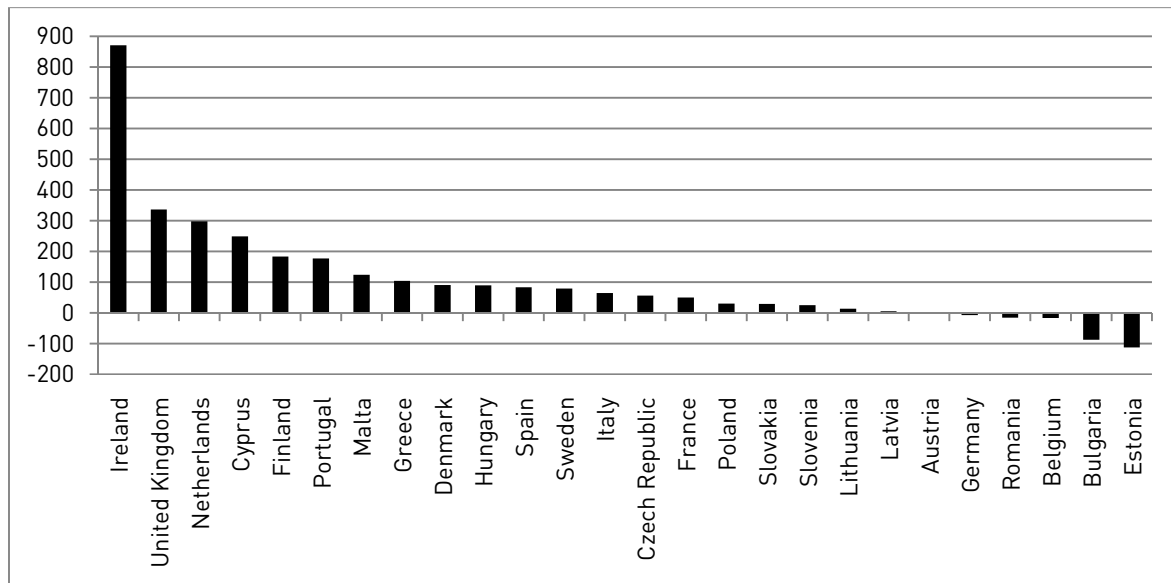
Similar conclusions are obtained when we analyze the evolution of the financial liabilities of the total economy (see figures 31 and 32).

Figure 31. Financial liabilities (% of GDP)



Source: Our calculations based on Eurostat

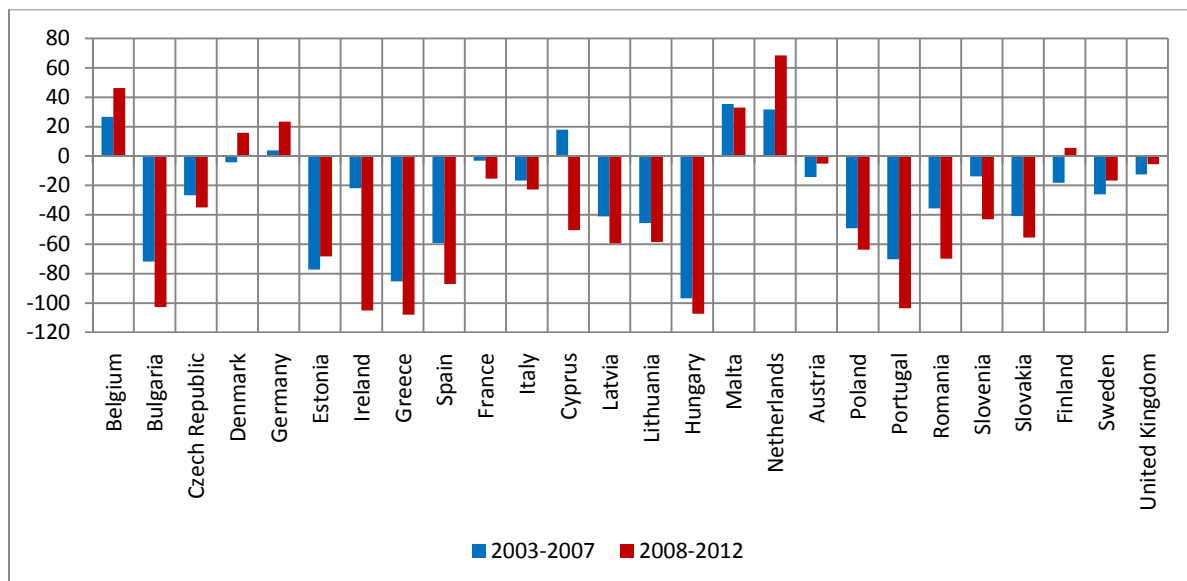
Figure 32. Variation in the size of financial liabilities between 2008 and 2012 (% of GDP)



Source: Our calculations based on Eurostat

If the analysis of the evolution of the financial assets and liabilities can give us an idea about the intensity of the financialisation processes in the EU, the study of the evolution of the net financial assets helps us to know the debtor or creditor position of a country (see figure 33).

Figure 33. Net financial assets (% of GDP)

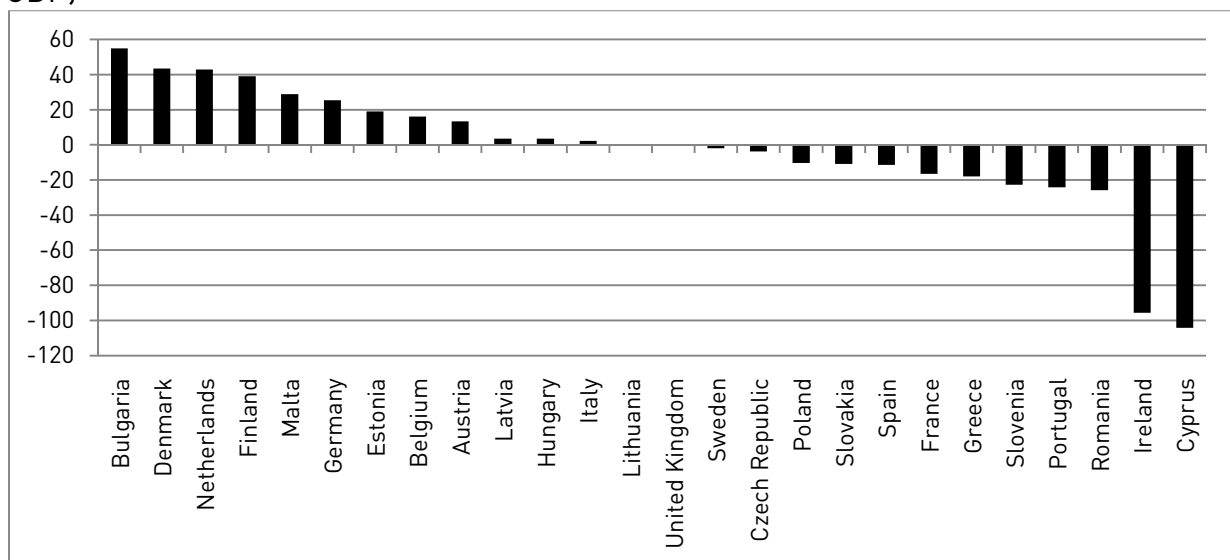


Source: Our calculations based on Eurostat



Before the crisis, only five countries had a creditor financial position: Belgium, Germany, Cyprus, Malta and Netherlands. The other 21 countries had a debtor position, standing out the cases of Bulgaria, Estonia, Greece, Spain, Hungary and Portugal. In the crisis period, only 6 countries registered a creditor financial position: Belgium, Denmark, Germany, Malta, Netherlands and Finland. But, and being more important, only five countries registered during the crisis an improvement (small debtor position or larger creditor position) in their financial position: Netherlands, Austria, Finland, Sweden and the United Kingdom.

Figure 34. Variation in the size of net financial assets between 2008 and 2012 (% of GDP)



Source: Our calculations based on Eurostat

To avoid the problem generated by working with averages, in the figure 34 we show the variation in the financial position between 2008 and 2012. A positive value implies an improvement in the financial position, and vice versa. In twelve out of the 26 countries there is a strong deterioration of the financial position, mainly in the cases of Ireland and Cyprus. On the contrary, there is a significant improvement (more than 20 per cent of the GDP) in the financial position of Bulgaria, Denmark. Netherlands, Finland, Malta and Germany.

2.8 Conclusions

The analysis of the selected economic (real and financial variables) shows that, in general, the countries that have had a worst performance during the Great Recession have been the new member states of the Eurozone, that is those that join the euro after its creation in 1999. Out of those countries that joined the European Monetary Union in the year 1999, it is Spain the country that registers the deepest impact of the crisis.

Regarding those countries that are not part of the Eurozone (EU-10), it must be emphasized that the larger impact of the crisis is registered in two countries, Latvia and Lithuania, which are nowadays part of the Eurozone.

These results show that the crisis in the European Union is basically a crisis of the Eurozone, but that even in this area there are different effects, with the new member states and the peripheral countries, mainly Spain, being the most affected countries. This allows to concluding that, although the origin of the crisis is the same for the whole EU, there some circumstances in certain economies that make that the impact of this common shock has been more severe in these economies.

3. The impact of the crisis on the coherence of the Eurozone

Even before the creation of the European Monetary Union, it was commonly argued that member states did not form an optimum currency area. By focusing the convergence requirements into variables of nominal nature, there was no guarantee that the members that joined, at a first stage or later, the Eurozone achieved a sufficient real convergence that gave rise to a high synchronization of the national business cycles, thus avoiding the problems due to the problem of the loss of autonomy in key areas of the macroeconomic policy, namely the monetary policy and the loss of the tool of the exchange rate. However, defenders of the process of



monetary integration argued that real convergence would be a (medium or long-term) consequence of the monetary unification (Mongelli, 2013; Gibson, Palivos and Tavlos, 2014).

Therefore, this strategy of creation and subsequent enlargement of the European Monetary Union implied that the Eurozone was, in an (highly) optimistic view, at least in the first years of its creation, more prone to suffer asymmetric shocks: that is, countries could be at different phases of the business cycle (mainly explained by the existence of domestic shocks), or the intensity (duration) of the booms-busts could be significantly different (due to the very domestic shocks or because common shocks could have different impact on the member states).

This problem is more serious if the heterogeneity is not corrected with the time, that is, if the asymmetric shocks are not temporary but permanent. In other words, if the desired process of real convergence among the monetary union member states does not take place or takes longer time than expected¹.

This is an even greater problem if the monetary union (or the individual member states) does not have tools to correct or absorb these shocks, regardless whether it means that common economic policies are not able to absorb the domestic shocks or that national economic policies lacks of the required flexibility to correct the deviations of the domestic business cycle.

Recent literature offers mixed conclusions about the evolution of the heterogeneity of the Eurozone and the synchronization of the national business cycles. Cavallo and Ribba (2015), conclude, analyzing eight euro countries, that there exists a significant macroeconomic heterogeneity in the euro area, where the business cycles of some

¹ Obviously this problem increases if there is an enlargement process in monetary union, in which the new member states differ significantly of the incumbent ones.



countries like Greece, Ireland or Portugal are mainly dominated by local shocks. Ferroni and Klaus (2015) show a decoupling of Spain of Germany and France. Benzces and Szent-Ivanyi (2015) argue that there was a convergence process in the European economies that, however, was reversed after the onset of the economic and financial crisis. Finally, contrary to these views, Gächter and Riedl (2014) argue that the introduction of the euro has led to a higher correlation of the business cycles of the member states, increasing the symmetry of national business cycles.

The analysis of the previous section has clearly shown that the economic and financial crisis, a shock that can be defined as a common shock for the EU, in general, and the Eurozone, in particular, has had a different impact in the Member states of both areas. Regarding the European Monetary Union, the doubt would be whether this differential effect is purely accidental or, on the contrary, it is the result of a structural behavior of the Eurozone that proves the existence and the importance of the asymmetric shocks in the Euro area.

As Carrasco et al. (2016) shows, the different impacts of the Great Recession on the “old” and “new” euro economies emphasizes the problems of consistency in the enlargement process of the European Monetary Union, as far as this enlargement implies greater (macro)economic heterogeneity and increased coordination problems with (possibly) more frequent asymmetric shocks.

The objective of this section is to analyse the coherence of the Eurozone, understood as the macroeconomic performance heterogeneity of the euro member states. To be more precise, our analysis has a dynamic nature. We will analyse whether since the creation of the European Monetary Union the differences in the macroeconomic performance of the members states have diminished, maintained, or, on the contrary, it has increased.

3.1. Data and methodology

As mentioned in the previous section, in the section we have analysed the differences in the economic performance of the Euro area member states. Namely, we have focused our attention on the evolution of fourteen variables, related to six categories of real (non-financial) variables:

1. Economic activity: real GDP per capita, real GDP growth rate, GDP per capita growth rate, potential GDP growth rate, output gap
2. Labour market: employment growth rate, unemployment rate, real wages growth rate, real unit labor costs growth rate
3. Income distribution: adjusted wage share (% of GDP), GINI coefficient
4. Inflation: inflation rate (CPI)
5. Balance of payments: balance on current account (% of GDP)
6. Public finances: public budget balance (% of GDP), public debt (% of GDP)

The data of these variables have been obtained in Eurostat and the AMECO database. The period that we have analysed corresponds to the years 1995 to 2013, both included. Since the last year analysed is 2013, we only analyse seventeen countries, excluding Latvia and Lithuania, because these two countries joined the euro after this year.

Given that our interest is focused on the national differences existing in the values registered in the fourteen countries, we have calculated, for the data available for each year, the standard deviation of each macroeconomic variable. Once that for each variable we have calculated the evolution of the standard deviation, our objective is to detect the possible existence of a trend in the evolution of the standard deviation. Thus, if we are able to detect a trend for this standard deviation to fall over the years, we will be able to talk of the existence of a convergence process in this variable, but if we

detect a trend for this standard deviation to rise throughout the years, we will be able to talk of the existence of a divergence process in this variable.

In sum, we are developing an analysis of sigma-convergence, where the objective is to detect the existence of a trend in the evolution over the years of the standard deviation of the values recorded of a variable in a group of individuals, in this case, countries. Thus, we are making a regression of the standard deviation of a certain variable, where the independent variable is a time trend:

$$\text{StdDev}_t = \beta_0 + \beta_1 \text{trend} + u_t \quad (\text{Equation 1})$$

If in equation 1 the parameter β_1 is negative, therefore we can talk of the existence of a convergence process in this variable, and when β_1 is positive, therefore we can talk of the existence of a divergence process.

As far as the only independent variable, (besides the constant term) is the time trend, equation 1 implies the analysis of a process of unconditional convergence, where time is the only variable that explains the changes in the dependent variable. To detect other potential determinants of the changes in the differences among individuals of the value of the analyzed variable, it is useful to make an analysis of conditional σ -convergence:

$$\text{StdDev}_t = \beta_0 + \beta_1 \text{trend} + X_t + u_t \quad (\text{Equation 2})$$

In equation 2, X_t is a vector of variables that can influence the change in the standard variation of the variable in question. In our analysis we have included two different variables that can constitute a proxy of the economic situation of the countries. The first variable is called "recession", and it is a dummy that tries to show the situation of the Eurozone in the business cycle. Namely, the dummy recession takes the value 0 in the boom phase of the business cycle, and 1 during the recession phase. The existence



of a recession (boom) has been determined by the value of the output gap of each country in all the years analysed, where a negative output gap is identified as a recession and a positive output gap as an expansion. The value and the sign of the output gap of the Eurozone for each country-year has been obtained as the unweighted average of the national output gaps. The national output gaps have been obtained at the AMECO database. Thus, the dummy recession takes the value 1 in 9 years: 1995, 1996, 1997, 2003, 2009, 2010, 2011, 2012 and 2013.

The second variable tries to collect the impact of the Great Recession on the convergence-divergence process of the macroeconomic performance in the Eurozone. This variable is represented by a dummy called "recession" that takes the value 1 during the years 2009 to 2013 (and 0 between 1995 and 2008).

Therefore, our analysis tries to know whether the process of convergence (divergence) in the macroeconomic performance in the euro area is influenced by the business cycle of the Eurozone and whether the extraordinary nature, depth and length of the current economic and financial crisis is generating an additional impact on the macroeconomic performance of the euro member states, and, consequently on the coherence of the Eurozone.

The differences in the national performance in the analysed variables, and, therefore, in the convergence-divergence process of the Eurozone, however, can be affected by the existence of extreme cases. This implies that the value of a variable recorded in one country (or several countries) in a specific year can be significantly higher or lower than that recorded in the rest of countries, and, consequently, generating a bias that can influence the result of the analysis.

To avoid the bias generated by these extreme values, we have made two different analyses of the process of unconditional and conditional σ -convergence. In the first

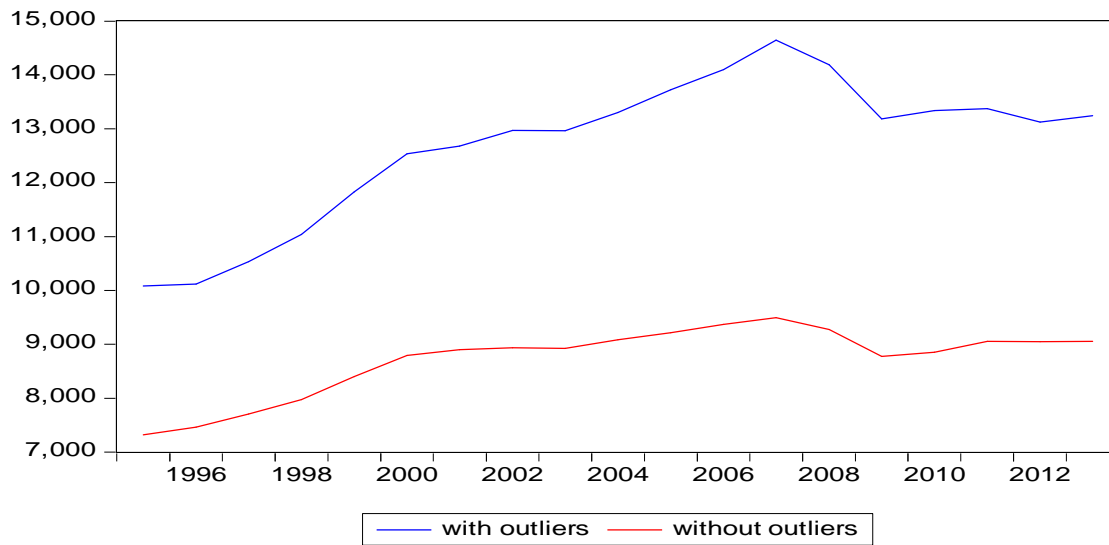
analysis we have included all the available data. In the second analysis we have excluded those values (country-year) that can be considered as extreme values. To define a value as an extreme value, we have made a box-plot analysis, and here for each year the data considered as a far or close outlier will be defined as an extreme value, and, therefore, excluded from the analysis.

2.2. Results

As mentioned in previous section, we have estimated by OLS the existence of a process of conditional and unconditional σ -convergence for the fourteen variables related to the macroeconomic performance of the 17 euro economies during the years 1995 to 2013. In this section, we will present and analyze the results of this analysis.

Figure 35 shows the evolution of the standard deviation of the rate of growth of real GDP with and without outliers. The box plot analysis detected the existence of one outlier or extreme value: Luxembourg, for the whole period 1995-2013. As expected, as will happen in all variables), the exclusion of the extreme values makes that the standard deviation of the economic growth in the Eurozone be less pronounced. Both with and without Luxembourg, figure 35 shows a rising divergence in the real GDP per capita within the Eurozone.

Figure 35. Standard deviation of real GDP per capita



Source: Our calculations based on Eurostat

The regression analysis has detected the existence of a process of conditional divergence (see table 1). This divergence process is independent on the exclusion or inclusion in the analysis of Luxembourg conditional to crisis and recessions. The analysis shows that the diverging process is halted during recessions. Moreover, the Great Recession has also led to a convergence in the real GDP per capita in the Eurozone

Table 1. OLS regression of the standard deviation of real GDP per capita

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers
C	20749 (0.409)	8792 (0.000)	10250 (0.000)	9383 (0.000)	11391 (0.000)	8147 (0.000)	10643 (0.000)	7834 (0.000)
Trend	-283.2 (0.719)	19.172 0.729	342.98 (0.000)	21.350 (0.841)	213.86 (0.000)	99.373 (0.000)	307.28 (0.000)	138.56 (0.000)
Dcrisis			-2484 (0.000)	-567.159 (0.002)			-1741.58 (0.002)	-730.59 (0.008)
Drecession					-1335 (0.000)	-686 (0.000)	-565.19 (0.034)	-363.19 (0.020)
AR(1)	0.919 (0.000)	1.152 (0.000)		0.855 (0.000)				
AR(2)		-0.384 (0.117)						
Mean dependent variable	12828	8873	12683	8794	12683	8717	12683	8717
R ²	0.910	0.896	0.917	0.954	0.876	0.877	0.935	0.923
F-statistic	76.325 (0.000)	37.375 (0.000)	88.665 (0.000)	97.071 (0.000)	56.770 (0.000)	57.160 (0.000)	72.885 (0.000)	60.043 (0.000)
D-W	1.498	1.806	1.148	1.517	1.314	1.493	1.451	1.359
Jarque-Bera	3.002 0.222	1.875 (0.395)	0.952 (0.621)	0.061 (0.969)	1.332 (0.513)	8.661 (0.013)	0.930 (0.627)	0.049 (0.975)
Breusch-Pagan-Godfrey	0.206 0.655	0.990 (0.335)	2.545 (0.109)	0.734 (0.496)	0.071 (0.931)	0.348 (0.710)	1.846 (0.178)	0.721 (0.504)
Breusch-Godfrey LM	1.099 (0.362)	2.827 (0.102)	1.356 (0.289)	1.011 (0.392)	0.876 (0.438)	0.524 (0.602)	0.349 (0.711)	0.074 (0.526)

p-values in parenthesis

Figure 36 shows the evolution of the standard deviation of the real GDP growth rates with and without outliers. The box plot analysis detected the existence of the following outliers or extreme values: Ireland (1996, 1998, 1999 and 2000), Estonia (1997, 2000, 2003, 2005, 2006, 2009 and 2011), Luxembourg (1999 and 2000), Slovakia (2000 and 2007), Greece (2010 and 2011) and Cyprus (2013).

Figure 36. Standard deviation of real GDP growth rates



Source: Our calculations based on Eurostat

Table 2 shows the regressions made in the eight models analysed (the same for the fourteen variables): unconditional sigma-convergence with and without outliers, and conditional sigma-convergence with and without outliers.

Table 2. OLS regression of the standard deviation of real GDP growth rate

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers #
C	2.262 (0.000)	1.619 (0.000)	2.432 (0.000)	1.580 (0.000)	2.137 (0.000)	1.583 (0.000)	2.212 (0.000)	1.026 (0.000)
Trend	0.008 (0.650)	0.013 (0.447)	-0.027 (0.297)	0.021 (0.437)	0.001 (0.935)	0.001 (0.534)	-0.007 (0.803)	0.072 (0.000)
Dcrisis			0.589 (0.086)	-0.134 (0.692)			0.174 (0.730)	-1.069 (0.000)
Drecession					0.393 (0.045)	0.111 (0.568)	0.316 (0.289)	0.689 (0.000)
AR(1)								-0.613 (0.005)
AR(2)								-0.786 (0.003)
Mean dependent variable	2.336	1.737	2.336	1.737	2.336	1.737	2.336	1.706
R ²	0.012	0.034	0.182	0.044	0.237	0.054	0.243	0.678
F-statistic	0.212 (0.650)	0.064 (0.447)	1.787 (0.199)	0.368 (0.697)	2.489 (0.114)	0.460 (0.639)	1.609 (0.229)	4.633 (0.016)
Wald-F statistic								20.910 (0.000)
D-W	2.052	2.043	2.343	2.024	1.959	2.130	2.046	2.138
Jarque-Bera	0.352 (0.838)	1.581 (0.453)	1.075 (0.584)	1.611 (0.446)	1.069 (0.585)	1.196 (0.549)	1.150 (0.562)	0.891 (0.640)
Breusch-Pagan-Godfrey	0.158 (0.695)	0.002 (0.963)	0.311 (0.736)	0.119 (0.887)	0.075 (0.927)	0.030 (0.969)	1.184 (0.349)	3.917 (0.034)
Breusch-Godfrey LM	0.054 (0.946)	0.571 (0.576)	0.792 (0.471)	0.609 (0.557)	0.067 (0.934)	0.840 (0.452)	0.310 (0.738)	0.187 (0.832)

p-values in parenthesis

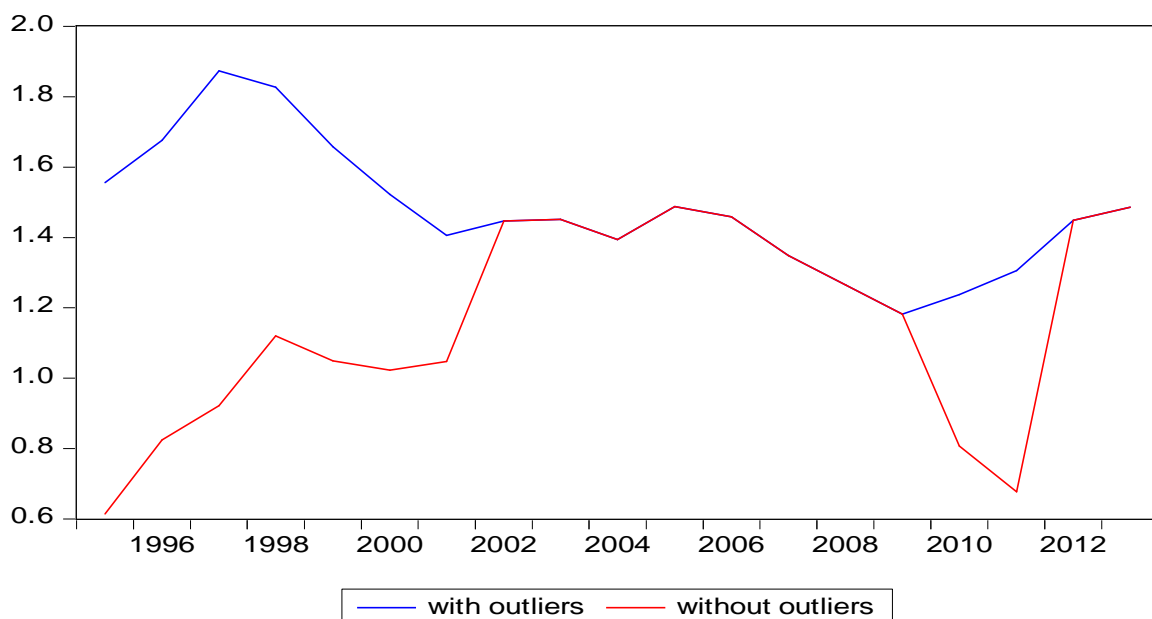
White Heteroskedasticity-consistent standard errors and covariance



Model 8 shows the existence of a significant conditional divergence process. This divergence process takes place when extreme values are excluded of the analysis and when the dummy variables related to the existence of a recession and to the Great Recession are included in the equation. The model allows to concluding that there is a divergence process when outliers are excluded and that this divergence process accelerates when the Eurozone is in a recession. However, the Great Recession has contributed to a strong decline of the differences in the economic growth of euro countries.

The third variable related to the evolution of the GDP is the potential GDP growth rate. In this case the box-plot analysis has detected the existence of the following outliers: Ireland (in the years 1995 to 2001), Slovakia (2010 and 2011) and Greece (2010 and 2011). A simple look to the figure 37 does not help to reach any conclusion about the existence of a convergence or divergence process regarding this variable.

Figure 37. Standard deviation of potential GDP growth rate



Source: Our calculations based on AMECO



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 266800



Table 3. OLS regression of the standard deviation of potential GDP growth rate

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers #	Model 4 Without Outliers #	Model 5 With Outliers #	Model 6 Without Outliers #	Model 7 Model With Outliers #	Model 8 Without Outliers #
C	1.697 (0.000)	1.158 (0.002)	1.700 (0.000)	0.797 (0.000)	1.697 (0.000)	1.059 (0.000)	1.675 (0.000)	0.804 (0.000)
Trend	-0.025 (0.000)	0.008 (0.758)	-0.025 (0.006)	0.058 (0.000)	-0.027 (0.000)	0.255 (0.018)	-0.024 (0.006)	0.057 (0.002)
Dcrisis			0.005 (0.942)	-0.605 (0.006)			-0.050 (0.570)	-0.593 (0.045)
Drecession					0.042 (0.216)	-0.272 (0.021)	0.052 (0.178)	-0.009 (0.9371)
AR(1)	1.148 (0.000)	0.547 (0.084)	1.141 (0.000)		1.107 (0.000)		1.160 (0.000)	
AR(2)	-0.793 (0.001)		-0.793 (0.002)		-0.813 (0.000)		-0.821 (0.001)	
Mean dependent variable	1.458	1.160	1.458	1.160	1.458	1.160	1.458	1.160
R ²	0.875	0.386	0.875	0.530	0.890	0.382	0.894	0.530
F-statistic	30.510 (0.000)	4.726 (0.025)	21.131 (0.000)	9.050 (0.002)	24.520 (0.000)	4.962 (0.021)	18.588 (0.000)	5.659 (0.008)
Wald F-statistics		0.074 (0.788)			11.317 (0.001)		5.540 (0.014)	
D-W	2.205	1.693	2.223	1.686	2.366	1.269	2.199	1.680
Jarque-Bera	1.392 (0.498)	0.513 (0.773)	1.373 (0.503)	1.032 (0.596)	0.716 (0.698)	0.324 (0.850)	0.543 (0.761)	1.015 (0.601)
Breusch-Pagan-Godfrey	0.068 (0.797)	0.752 (0.398)	0.057 (0.944)	5.867 (0.012)	3.357 (0.060)	3.357 (0.060)	5.325 (0.013)	3.871 (0.031)
Breusch-Godfrey LM	0.657 (0.537)	1.561 (0.246)	0.667 (0.534)	2.116 (0.157)	2.045 (0.166)	2.045 (0.166)	0.331 (0.726)	2.301 (0.139)

p-values in parenthesis

White Heteroskedasticity-consistent standard errors and covariance

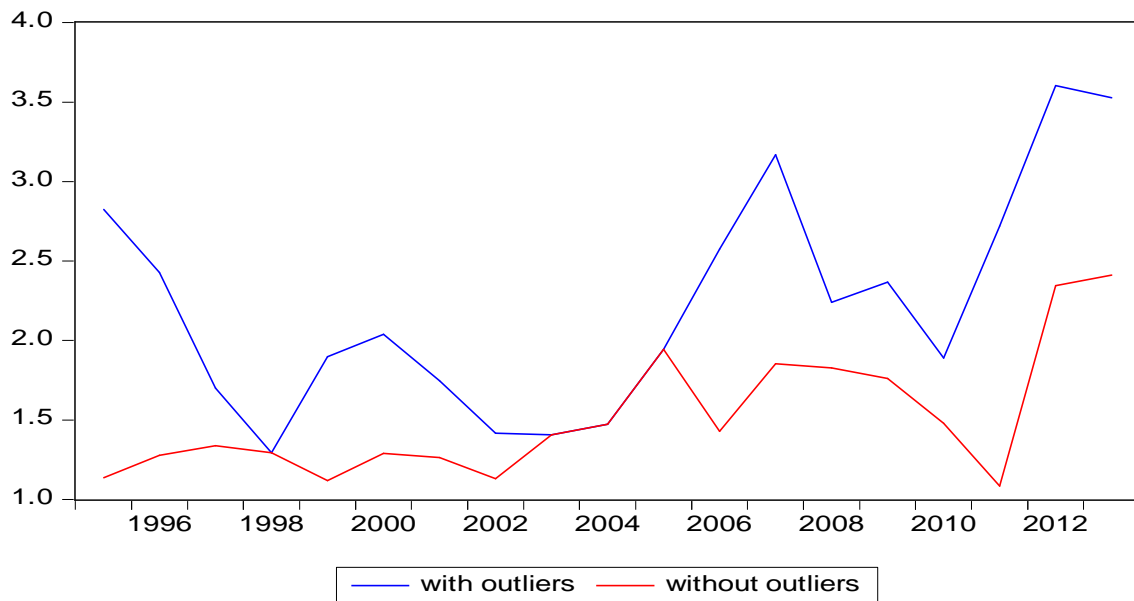
Table 3 shows the results of the different OLS regressions carried out. It must be emphasized that the results are different depending on the inclusion or exclusion of the extreme values. When all data are included in the analysis, we detect a process of unconditional convergence. In this case, neither the existence of a recession in the Eurozone or the Great Recession exert a significant impact on this trend. However, the results are different when we exclude the outliers. Now, we have detected a process of conditional divergence, with the existence of recessions and the Great Recession leading to a convergence process. It is important to mention that although by separate both dummies are significant, when we include the two of them in the regression (model 8), only the dummy related to the Great Recession remains significant, and its coefficient reaches a high (negative) value, showing the deep and generalized impact of the crisis, mainly in the countries with previous high GDP growth rates.

The final variable analyzed related to the evolution of the GDP is the output gap, a variable that can be used as a proxy of the phase of the business cycle in each euro country and, also, as a proxy of the depth of the business cycle.

In the case of the output gap, the box-plots have detected a high number of extreme values or outliers: Estonia (1995, 1996, 1999, 2006, 2007, 2009 and 2010), Slovakia (1997, 2000 to 2003, and 2007), Portugal (1999), Luxembourg (2000), Spain (2011) and Greece (2011 to 2013).

In this case, it is a easy to detect in the figure 38 an increase over the years of the standard deviation of the output gaps in the Eurozone, regardless we are included or not the extreme values.

Figure 38. Standard deviation of output gap



Source: Our calculations based on AMECO

The regressions (table 4) show a significant process of unconditional divergence, that takes place with and without outliers. Here, neither the existence of a recession or the Great Recession exert a significant influence on this trend.

The next four variables are related to the performance of the labour markets in the Eurozone. The first variable is the annual rate of growth of total employment. The box-plot analysis has detected the existence of extreme values in seven countries: Ireland (1998, 1999 and 2009, Estonia (1999 and 2011), Spain (2000, 2002 and 2005), Slovakia (2000 and 2009), Cyprus (2001 and 2007), Greece (2011 and 2012) and Luxembourg (2012).

Table 4. OLS regression of the standard deviation of output GDP

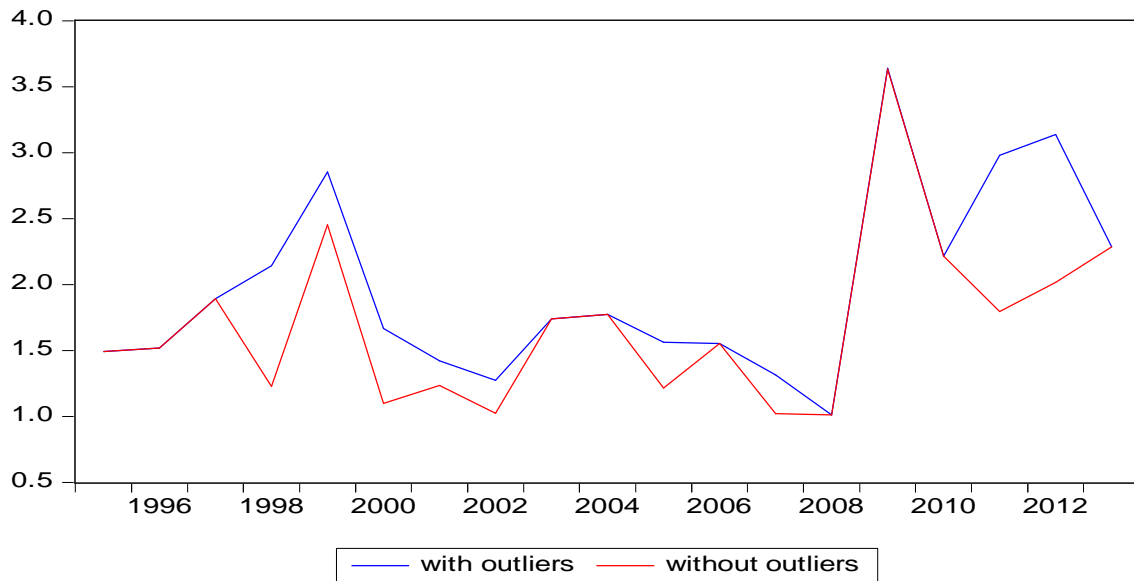
	Model 1 With Outliers	Model 2 Without Outliers #	Model 3 With Outliers	Model 4 Without Outliers #	Model 5 With Outliers #	Model 6 Without Outliers #	Model 7 Model With Outliers	Model 8 Without Outliers #
C	0.832 (0.243)	1.083 (0.000)	0.795 (0.323)	1.043 (0.000)	0.838 (0.260)	1.077 (0.000)	0.783 (0.344)	0.912 (0.000)
Trend	0.131 (0.032)	0.048 (0.005)	0.136 (0.081)	0.056 (0.000)	0.130 (0.051)	0.048 (0.003)	0.137 (0.090)	0.068 (0.000)
Dcrisis			-0.058 (0.914)	-0.136 (0.575)			-0.108 (0.873)	-0.383 (0.232)
Drecession					0.016 (0.954)	0.018 (0.836)	0.047 (0.895)	0.158 (0.217)
AR(1)					0.018 (0.016)		0.542 (0.019)	
Mean dependent variable	2.190	1.519	2.190	1.519	2.190	1.519	2.190	1.519
R ²	0.639	0.468	0.639	0.478	0.639	0.468	0.640	0.501
F-statistic	13.309 (0.000)	14.964 (0.000)	8.292 (0.002)	7.331 (0.005)	8.284 (0.002)	7.057 (0.006)	5.787 (0.006)	5.037 (0.013)
Wald F-statistics		10.111 (0.005)		11.987 (0.000)		8.771 (0.002)		9.267 (0.001)
D-W	1.793	1.716	1.836	1.776	1.774	1.741	1.816	1.806
Jarque-Bera	0.746 (0.688)	2.229 (0.327)	0.736 (0.691)	1.044 (0.593)	0.747 (0.688)	2.570 (0.276)	0.733 (0.692)	1.547 (0.461)
Breusch-Pagan-Godfrey	2.100 0.166	7.338 (0.014)	1.175 (0.305)	5.795 (0.012)	1.126 (0.350)	4.382 (0.030)	0.761 (0.534)	3.574 (0.039)
Breusch-Godfrey LM	0.574 (0.576)	1.363 (0.285)	0.504 (0.616)	1.414 (0.275)	0.568 (0.580)	1.316 (0.299)	0.476 (0.630)	2.261 (0.143)

p-values in parenthesis

White Heteroskedasticity-consistent standard errors and covariance

A look to figure 39 could lead to the conclusion that there has been a divergence process regarding the evolution of total employment in the euro economies. However, this conclusion is far from being so evident.

Figure 39. Standard deviation of the annual total employment growth rates



Source: Our calculations based on Eurostat

Thus, the data of table 5 show that we could talk of a divergence process when all the data are included. However, if we exclude the outliers of the analysis, we cannot find any significant trend.

The results change dramatically when we make the analysis of conditional sigma-convergence including separately in the regressions the dummy variables recessions and the Great Recession (models 3 to 6). Here, there is no significant trend in the evolution of the standard deviation of the rate of growth of total employment, but both dummies are significant (with and without outliers). Thus, both recessions and the Great Recession are leading to a higher divergence in the evolution of total employment, being higher the impact of the Great Recession.

Table 5. OLS regression of the standard deviation of total employment growth rate

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers
C	1.506 (0.000)	1.350 (0.001)	1.993 (0.000)	1.752 (0.000)	1.324 (0.000)	1.146 (0.000)	2.272 (0.000)	1.697 (0.000)
Trend	0.051 (0.083)	0.038 (0.1653)	-0.051 (0.102)	-0.046 (0.156)	0.041 (0.136)	0.026 (0.268)	-0.076 (0.048)	-0.042 (0.3081)
Dcrisis			1.683 (0.000)	1.388 (0.002)			2.208 (0.001)	1.284 (0.058)
Drecession					0.577 (0.065)	0.647 (0.023)	-0.399 0.239	0.078 (0.831)
Mean dependent variable	1.972	1.695	1.972	1.695	1.972	1.695	1.972	1.695
R ²	0.165	0.110	0.636	0.500	0.329	0.361	0.669	0.501
F-statistic	3.371 (0.083)	2.101 (0.165)	13.986 (0.000)	8.008 (0.003)	3.938 (0.040)	4.537 (0.027)	10.114 (0.000)	5.036 (0.013)
D-W	1.667	2.123	2.031	2.375	1.766	2.247	2.344	2.349
Jarque-Bera	0.816 (0.664)	6.708 (0.034)	1.353 (0.508)	4.223 (0.121)	3.073 (0.215)	15.773 (0.000)	0.579 (0.748)	5.074 (0.079)
Breusch-Pagan-Godfrey	1.482 (0.240)	0.586 (0.454)	1.244 (0.314)	1.389 (0.227)	0.040 (0.960)	0.080 (0.922)	1.045 (0.401)	1.572 (0.237)
Breusch-Godfrey LM	0.281 (0.758)	0.210 (0.812)	0.311 (0.737)	0.629 (0.547)	0.089 (0.914)	0.769 (0.482)	1.270 (0.313)	0.645 (0.540)

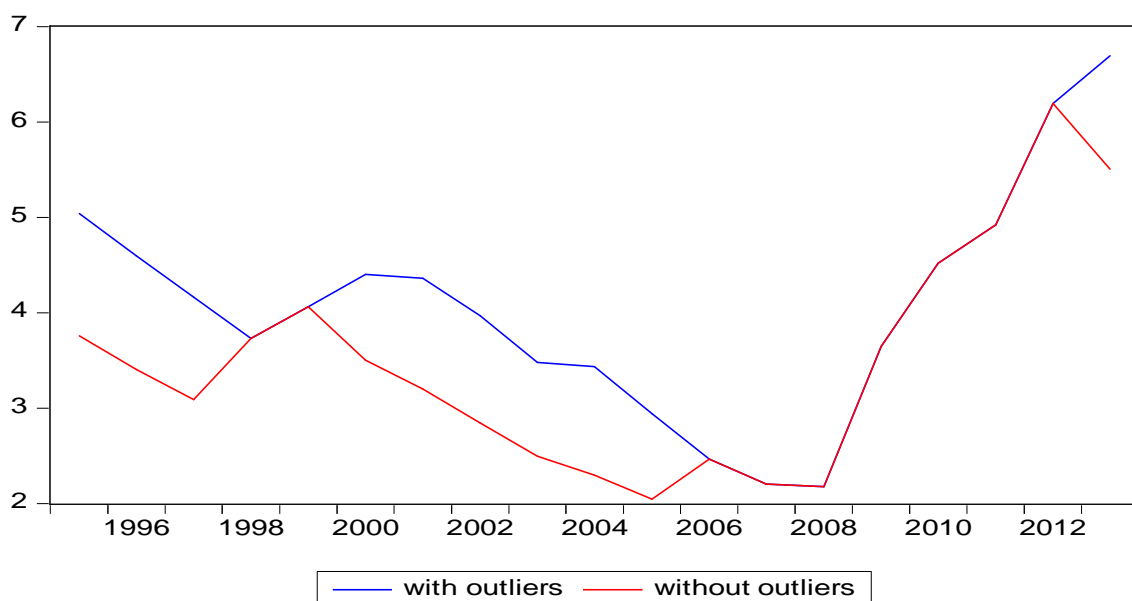
p-values in parenthesis



When we include both dummies in the regressions (models 7 and 8), the existence of a recession is no longer significant, and only the Great Recession remains statistically significant, generating a strong diverging process. It is important to note that we can detect a significant convergence process (a negative value of the coefficient of the variable trend), but this outcome only takes place when we included all the data (we include extreme values). If we exclude the outliers, we are not able to detect any significant trend in the evolution of total employment

The next variable related to the labour market performance in the unemployment rate. For this variable we have detected extreme values for only three countries: Spain (1995 to 1997), Slovakia (2000 to 2005) and Greece (2013).

Figure 40. Standard deviation of unemployment rate



Source: Our calculations based on Eurostat

Looking at figure 40, it could be argued the existence of a diverging process in the evolution of unemployment rates in the euro countries. However, the results that table 6 shows are not so evident.

Table 6. OLS regression of the standard deviation of the unemployment rate

	Model 1 With Outliers #	Model 2 Without Outliers #	Model 3 With Outliers #	Model 4 Without Outliers #	Model 5 With Outliers #	Model 6 Without Outliers	Model 7 Model With Outliers #	Model 8 Without Outliers #
C	3.789 (0.000)	2.782 (0.001)	4.673 (0.000)	3.668 (0.000)	3.340 (0.000)	-2.236 (0.818)	4.554 (0.000)	3.926 (0.000)
Trend	0.029 (0.719)	0.077 (0.281)	-0.158 (0.001)	-0.110 (0.001)	0.004 (0.937)	0.388 (0.395)	-0.147 (0.017)	-0.134 (0.007)
Dcrisis			3.052 (0.001)	3.060 (0.000)			2.827 (0.010)	3.546 (0.001)
Drecession					1.421 (0.025)	0.075 (0.829)	0.170 (0.650)	-0.370 (0.291)
AR(1)						0.870 (0.000)		
Mean dependent variable	4.054	3.478	4.054	3.478	4.054	3.462	4.054	3.478
R ²	0.019	0.138	0.575	0.724	0.377	0.777	0.577	0.734
F-statistic	0.332 (0.571)	2.736 (0.116)	10.838 (0.001)	21.020 (0.000)	4.854 (0.022)	16.267 (0.000)	6.834 (0.004)	13.866 (0.000)
Wald F-statistics	0.133 (0.719)	1.235 (0.281)	11.387 (0.000)	13.487 (0.000)	3.125 (0.071)		8.868 (0.001)	8.665 (0.001)
D-W	0.262	0.320	0.645	1.068	0.664	1.681	0.645	1.129
Jarque-Bera	0.128 (0.937)	0.794 (0.672)	0.969 (0.615)	0.986 (0.610)	0.832 (0.659)	1.431 (0.488)	0.771 (0.679)	2.623 (0.269)
Breusch-Pagan-Godfrey	7.566 (0.013)	6.445 (0.021)	8.127 (0.003)	5.255 (0.017)	3.337 (0.061)	1.789 (0.201)	5.022 (0.013)	3.991 (0.028)
Breusch-Godfrey LM	23.615 (0.000)	16.145 (0.000)	6.313 (0.011)	2.425 (0.124)	5.256 (0.019)	0.198 (0.823)	6.037 (0.001)	1.860 (0.194)

p-values in parenthesis

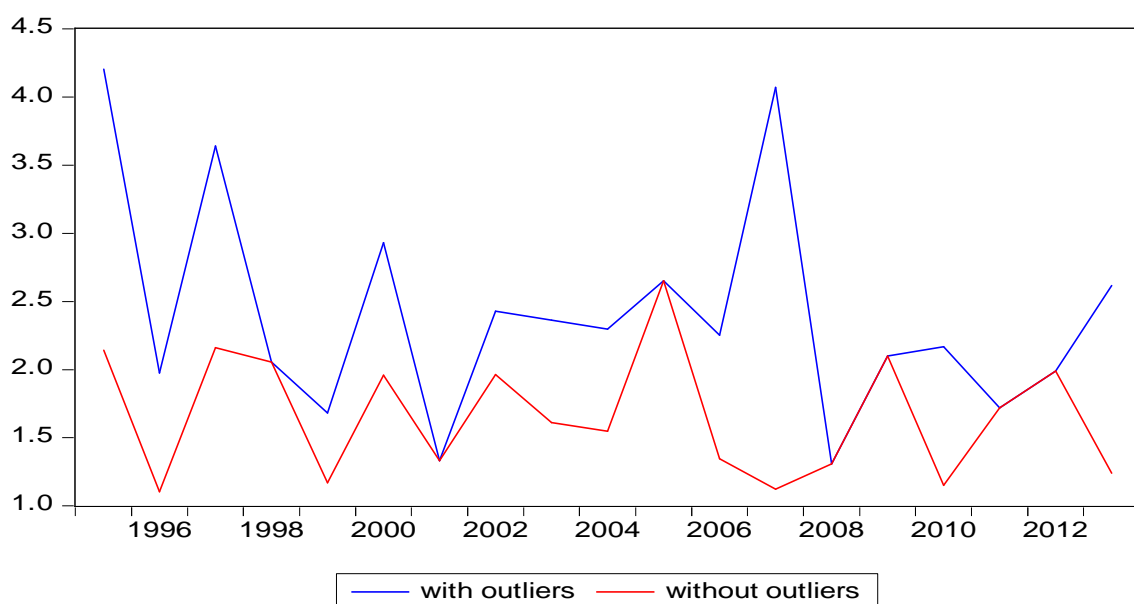
HAC standard errors and covariance



First, there is no significant unconditional trend. Actually, we can only find a significant convergence process when we include in the regressions the dummy related to the Great Recession. When we include in the regressions the dummy related to the existence of a recession (models 5 and 6), there is no significant trend, and the dummy is only significant when we exclude the extreme values. Actually, when we include both dummies, only the dummy related to the Great Recession remains significant. It is important to notice both the small (converging) impact of the time trend and the very high (diverging) impact that the Great Recession has generated on the national unemployment rates.

The third variable is the real wages growth rate. Box-plot analysis has detected the existence of outliers in four countries: Estonia (1995, 1997, 2000, 2003, 2004, 2006, 2007 and 2013), Slovakia (1996, 1997, 1999, 2007 and 2010), Greece (2002, 2010 and 2013) and Cyprus (2013) A look to figure 41 does not detect a clear-cut trend. This result is corroborated by the results of the OLS regressions shown in table 7.

Figure 41. Standard deviation of real wages growth rates



Source: Our calculations based on AMECO

Table 7. OLS regression of the standard deviation of real wages growth rates

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers
C	2.775 (0.000)	1.730 (0.000)	2.769 (0.000)	1.765 (0.000)	2.672 (0.000)	1.789 (0.000)	1.921 (0.000)	1.740 (0.000)
Trend	-0.040 (0.243)	-0.008 (0.562)	-0.039 (0.474)	-0.014 (0.520)	-0.046 (0.198)	-0.018 (0.118)	0.049 (0.183)	-0.012 (0.542)
Dcrisis			-0.020 (0.995)	0.106 (0.706)			-1.492 (0.024)	-0.113 (0.768)
Drecession					0.327 (0.400)	0.135 (0.351)	0.795 (0.046)	0.198 (0.454)
AR(1)		-0.432 (0.081)		-0.434 (0.093)		-0.536 (0.047)	-0.571 (0.011)	-0.538 (0.055)
AR(2)						-0.443 (0.095)		-0.457 (0.097)
Mean dependent variable	2.409	1.640	2.409	1.640	2.409	1.671	2.309	1.671
R ²	0.079	0.195	0.079	0.204	0.120	0.407	0.445	0.412
F-statistic	1.459 (0.243)	1.825 (0.195)	0.687 (0.517)	1.196 (0.346)	1.092 (0.359)	2.066 (0.148)	2.615 (0.048)	1.545 (0.253)
D-W	2.561	2.169	2.565	2.149	2.572	2.162	2.210	2.184
Jarque-Bera	1.411 (0.493)	0.825 (0.661)	1.381 (0.501)	1.393 (0.498)	2.375 (0.304)	3.899 (0.142)	3.845 (0.146)	2.476 (0.289)
Breusch-Pagan-Godfrey	1.343 (0.262)	0.004 (0.941)	1.094 (0.358)	0.699 (0.512)	0.372 (0.695)	1.171 (0.338)	0.833 (0.497)	1.108 (0.380)
Breusch-Godfrey LM	1.408 (0.275)	1.741 (0.213)	1.455 (0.270)	1.948 (0.185)	1.185 (0.334)	0.053 (0.948)	0.202 (0.819)	0.213 (0.811)

p-values in parenthesis



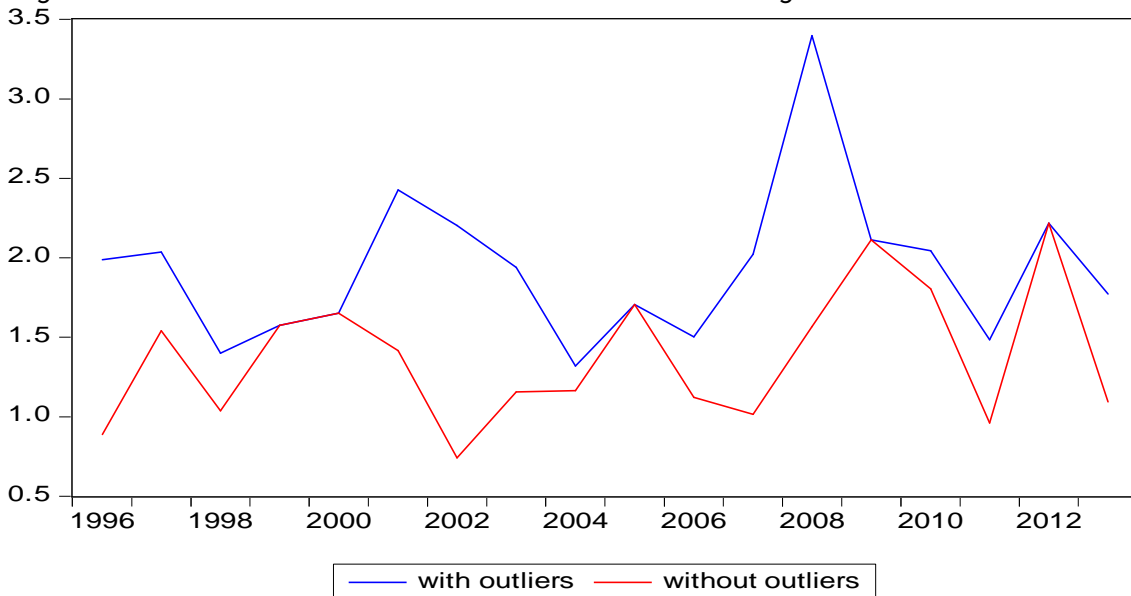
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 266800



We have not detected any conditional or unconditional trend. Moreover, the dummy variables related to the existence of recession and the Great Recessions are significant when we include all the data, but they are not longer significant. In any case it is important to notice that while the existence of a recession leads to a higher divergence in the unemployment rate in the Eurozone, the Great Recession has implied a higher convergence in the national unemployment rates.

The fourth variables related to the labour market performance is the real unit labour costs (ULCs) growth rate. Box-plot analysis have allowed the detection of a high number of extreme values: Slovakia (1995 and 1996), Estonia (1996, 2007, 2008, 2010 and 2011), Italy (1998), Luxembourg (2001, 2003, 2006, and 2008), Malta (2001), Greece (2002 and 2013), Cyprus (2002 and 2013) and Ireland (2002, 2004, 2007, 2008 and 2011).

Figure 42. Standard deviation of real unit labour costs growth rates



Source: Our calculations based on Eurostat

Table 8. OLS regression of the standard deviation of real unit labour costs growth rates

	Model 1 With Outliers	Model 2 Without Outliers #	Model 3 With Outliers #	Model 4 Without Outliers #	Model 5 With Outliers	Model 6 Without Outliers #	Model 7 Model With Outliers	Model 8 Without Outliers
C	1.791 (0.000)	1.159 (0.000)	1.661 (0.000)	1.301 (0.000)	1.795 (0.000)	1.143 (0.000)	1.479 (0.000)	1.535 (0.000)
Trend	0.014 (0.512)	0.022 (0.287)	0.039 (0.431)	-0.003 (0.887)	0.015 (0.529)	0.019 (0.353)	0.055 (0.198)	-0.024 (0.340)
Dcrisis			-0.362 (0.529)	0.394 (0.250)			-0.741 (0.252)	0.849 (0.064)
Drecession					-0.023 (0.926)	0.106 (0.592)	0.306 (0.415)	-0.327 (0.261)
AR(1)								-0.524 (0.085)
Mean dependent variable	1.933	1.376	1.933	1.376	1.933	1.376	1.933	1.404
R ²	0.027	0.083	0.074	0.157	0.027	0.098	0.117	0.330
F-statistic	0.448 (0.512)	1.464 (0.243)	0.607 (0.557)	1.404 (0.276)	0.214 (0.809)	0.821 (0.458)	0.621 (0.612)	1.484 (0.267)
Wald F-statistics		1.212 (0.287)	0.398 (0.678)	0.951 (0.408)		0.578 (0.572)		
D-W	1.724	2.368	1.595	2.467	1.722	2.309	1.535	2.094
Jarque-Bera	9.819 (0.007)	1.229 (0.540)	2.489 (0.288)	1.199 (0.548)	8.817 (0.012)	1.341 (0.511)	3.111 (0.211)	0.726 (0.695)
Breusch-Pagan-Godfrey	0.372 (0.550)	5.734 (0.029)	3.051 (0.077)	4.416 (0.031)	1.420 (0.272)	4.075 (0.038)	2.303 (0.121)	0.998 (0.424)
Breusch-Godfrey LM	0.400 (0.677)	0.679 (0.522)	0.532 (0.599)	1.181 (0.337)	0.377 (0.692)	0.625 (0.550)	0.661 (0.533)	2.441 (0.137)

p-values in parenthesis

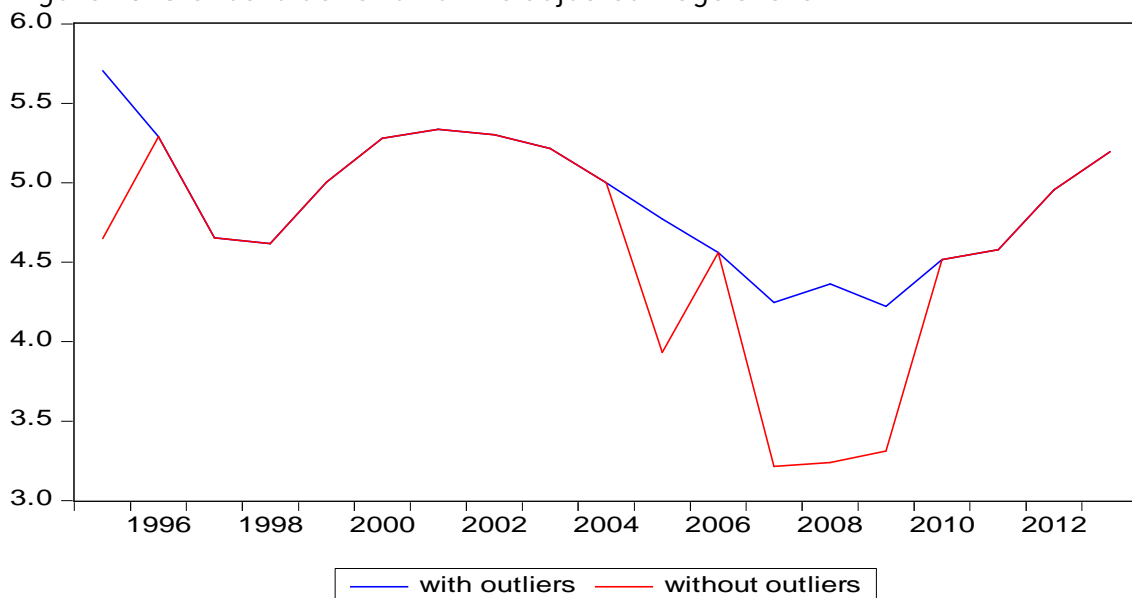
White Heteroskedasticity-consistent standard errors and covariance

At a glance, it is difficult to find in the figure 42 any clear-cut trend in the evolution of the standard deviations of real ULCs. Actually, this result is corroborated in the OLS regressions (see table 8).

We have not been able to detect any significant trend in the evolution of the real ULCs. Furthermore, the only variable that is statistically significant is the dummy related to the current economic and financial crisis, which is leading to a higher divergence in the evolution of the real ULCs. Nonetheless, this result is reached only when we exclude of the analysis the extreme values.

We want also to emphasize that, contrary to other variables, the explanatory capacity of the model, measured by the R-squared is very low. This implies that, besides the non-existence of a trend in the evolution of real ULCs, the evolution of the dispersion of national ULCs is explained by other variables different than the very evolution of the business cycle in the Eurozone or the burst of the Great Recession

Figure 43. Standard deviation of the adjusted wage share



Source: Our calculations based on AMECO

Table 9. OLS regression of the standard deviation of the adjusted wage share

	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers
C	5.172 (0.000)	5.014 (0.000)	5.089 (0.000)	5.217 (0.000)	5.179 (0.000)	5.070 (0.000)	5.088 (0.000)	5.180 (0.000)
Trend	-0.030 (0.273)	-0.030 (0.687)	-0.011 (0.704)	-0.062 (0.479)	-0.028 (0.335)	-0.043 (0.550)	-0.011 (0.720)	-0.059 (0.513)
Dcrisis			-0.341 (0.109)	0.353 (0.639)			-0.344 (0.161)	0.234 (0.802)
Drecession					-0.065 (0.534)	-0.175 (0.630)	0.003 (0.974)	0.118 (0.795)
AR(1)	1.208 (0.000)	0.630 (0.012)	1.324 (0.000)	0.582 (0.037)	1.228 (0.000)	0.596 (0.022)	1.324 (0.000)	0.577 (0.047)
AR(2)	-0.659 (0.013)		-0.739 (0.005)		-0.673 (0.015)		-0.739 (0.008)	
Mean dependent variable	4.812	4.622	4.812	4.622	4.812	4.622	4.812	4.622
R ²	0.727	0.435	0.778	0.444	0.736	0.444	0.778	0.447
F-statistic	11.594 (0.000)	5.793 (0.013)	10.564 (0.000)	3.735 (0.036)	8.405 (0.001)	3.736 (0.036)	7.748 (0.002)	2.633 (0.082)
D-W	2.330	1.911	1.855	1.966	2.262	1.993	1.855	2.002
Jarque-Bera	1.142 (0.564)	3.181 (0.203)	0.291 (0.864)	2.638 (0.267)	0.868 (0.647)	2.962 (0.227)	0.287 (0.866)	2.756 (0.250)
Breusch-Pagan-Godfrey	0.817 (0.380)	0.532 (0.476)	0.147 (0.863)	1.157 (0.340)	1.821 (0.198)	0.715 (0.505)	0.093 (0.962)	0.736 (0.547)
Breusch-Godfrey LM	1.038 0.386	1.582 (0.242)	0.071 (0.931)	1.849 (0.199=	0.601 (0.566)	2.044 (0.172)	0.067 (0.935)	2.012 (0.180)

p-values in parenthesis

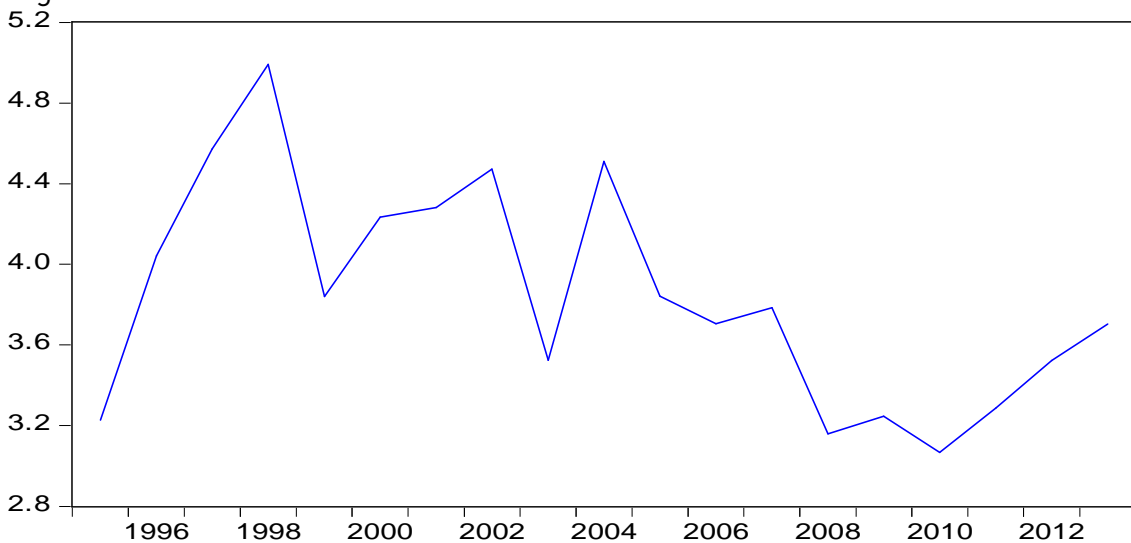
White Heteroskedasticity-consistent standard errors and covariance

The third category of analyzed variables is related to the income distribution in euro countries. We have analyzed two variables, one related to the income functional distribution (the adjusted wage share) and the other to the personal income distribution (the Gini coefficient). In the case of the functional income distribution, there is only one country that registers extreme values: Slovakia (1995, 2005, 2007, 2008 and 2009). A look to figure 43 does not allow to detect a clear-cut trend, and, actually, this preliminary conclusion is corroborated in the regressions shown in table 9.

We have not found any trend in the evolution of the standard deviation of the adjusted wage share. Actually, neither the trend nor the two dummy variables related to the existence of recessions and the Great Recession exert a significant impact on the dispersion of adjusted wage shares in the Eurozone.

In the case of the dispersion in the personal income distribution, we have not found any extreme values or outliers. Figure 44 allows to detecting a declining trend in the dispersion of the Gini coefficient

Figure 44. Standard deviation of the Gini coefficient



Source: Our calculations based on Eurostat

The regressions that we have run confirm this idea, detecting a convergence process in the Gini coefficient (see table 10). The Great Recession would have not exerted any significant impact. However, the recessions would have a significant effect, accelerating the process of convergence.

Table 10. OLS regression of the standard deviation of the Gini coefficient

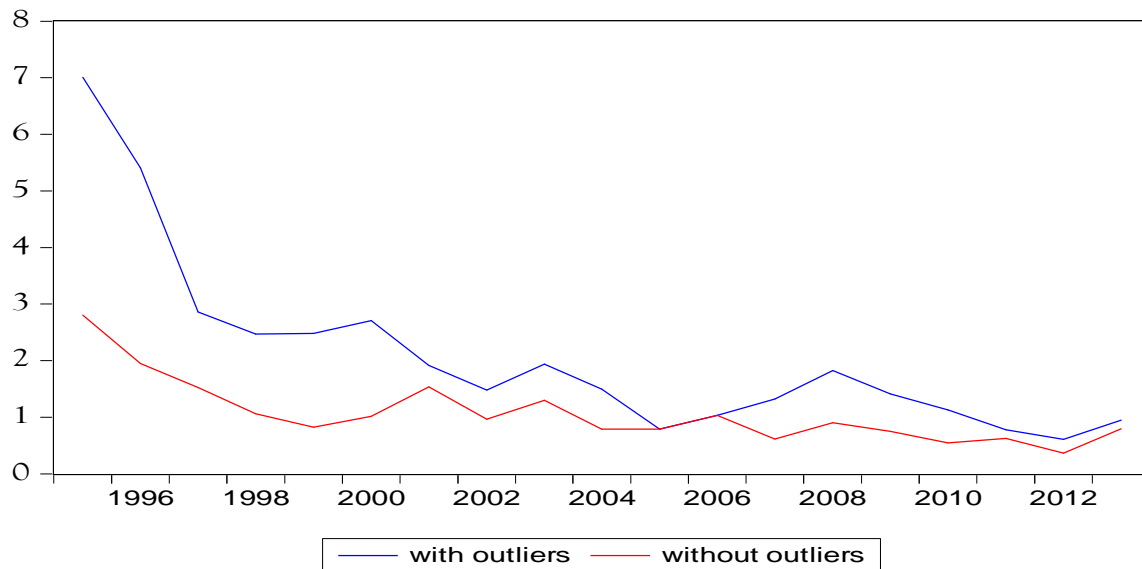
	Model 1 #	Model 2	Model 3	Model 4
C	4.322 (0.000)	4.224 (0.000)	4.451 (0.000)	4.652 (0.000)
Trend	-0.053 (0.037)	-0.032 (0.309)	-0.046 (0.025)	-0.071 (0.059)
Dcrisis		-0.338 (0.391)		0.469 (0.407)
Drecession			-0.407 (0.064)	-0.614 (0.073)
Mean dependent variable	3.842	3.842	3.842	3.842
R ²	0.297	0.330	0.437	0.463
F-statistic	7.213 (0.015)	3.947 (0.040)	6.214 (0.010)	4.314 (0.022)
Wald F-statistics	5.122 (0.036)			
D-W	1.480	1.591	1.454	1.346
Jarque-Bera	0.289 (0.865)	0.127 (0.938)	0.295 (0.862)	0.373 (0.829)
Breusch-Pagan-Godfrey	4.331 (0.052)	1.901 (0.181)	1.282 (0.304)	1.346 (0.296)
Breusch-Godfrey LM	0.077 (0.925)	0.026 (0.974)	0.298 (0.746)	0.829 (0.458)

p-values in parenthesis

White Heteroskedasticity-consistent standard errors and covariance

We have also analyzed the existence of a trend in the evolution of national rates of inflation, measured by the national consumer price indexes (CPI). In this case, we have found extreme values for 5 countries: Estonia (1995 to 1998, 2007, 2008, 2011 and 2012), Slovenia (1995 to 2000), Slovakia (1998 to 2004, and 2012), Ireland (2007, 2009, 2010) and Greece (2010, 2012 and 2013). Figure 45 shows the evolution of the standard deviation of national CPIs with and without these outliers.

Figure 45. Standard deviation of the CPIs



Source: Our calculations based on AMECO

Table 11 confirms the existence of an unconditional convergence process, regardless the inclusion or exclusion of the outliers. This convergence process is maintained when we make the analysis of the conditional sigma-convergence. However, in this case, the impact of the existence of recessions and that of the Great recession is less obvious.

If we introduce separately both variables, they are significant when we include all the data (that is when outliers are included), and in both cases the impact is the same, leading to a higher divergence in the inflation performance. Excluding these extreme values, however, implies that they are no longer significant. If we include simultaneously both variables (models 7 and 8), when outliers are included no dummy variables is significant. However, the redundant variables test show that dummy related to the Great Recession is not significant. This implies that, with and without outliers, only the dummy of the existence of recessions is significant, and that during recessions there is a higher divergence in the national inflation rates.

Table 11. OLS regression of the standard deviation of the CPI

	Model 1 With Outliers #	Model 2 Without Outliers *	Model 3 With Outliers *	Model 4 Without Outliers *	Model 5 With Outliers *	Model 6 Without Outliers	Model 7 Model With Outliers *	Model 8 Without Outliers
C	4.110 (0.000)	1.761 (0.000)	4.548 (0.000)	1.851 (0.000)	3.724 (0.000)	1.632 (0.000)	3.630 (0.000)	1.399 (0.000)
Trend	-0.224 (0.004)	-0.077 (0.002)	-0.317 (0.004)	-0.096 (0.010)	-0.246 (0.000)	-0.084 (0.000)	-0.234 (0.009)	-0.055 (0.043)
Dcrisis			1.513 (0.078)	0.310 (0.250)			-0.219 (0.852)	-0.542 (0.190)
Drecession					1.221 (0.026)	0.408 (0.106)	1.318 (0.125)	0.648 (0.012)
Mean dependent variable	2.085	1.065	2.085	1.065	2.085	1.065	2.085	1.065
R ²	0.610	0.581	0.684	0.606	0.754	0.711	0.755	0.743
F-statistic	26.627 (0.000)	23.634 (0.000)	17.376 (0.000)	12.346 (0.000)	24.567 (0.000)	19.729 (0.000)	15.408 (0.000)	14.506 (0.000)
Wald F-statistics	10.595 (0.004)	13.319 (0.001)	11.101 (0.000)	8.572 (0.002)	19.015 (0.000)		12.780 (0.000)	
D-W	0.545	1.064	0.833	1.181	1.189	1.381	1.214	1.551
Jarque-Bera	7.311 (0.025)	4.818 (0.089)	5.099 (0.078)	2.271 (0.321)	2.322 (0.313)	2.233 (0.327)	2.065 (0.356)	3.777 (0.151)
Breusch-Pagan-Godfrey	6.069 (0.024)	5.235 (0.035)	3.348 (0.061)	3.371 (0.060)	5.222 (0.018)	2.359 (0.126)	6.083 (0.006)	2.350 (0.113)
Breusch-Godfrey LM	3.377 (0.061)	0.377 (0.692)	2.390 (0.127)	0.267 (0.7689)	1.236 (0.320)	0.239 (0.790)	1.090 (0.364)	1.354 (0.292)

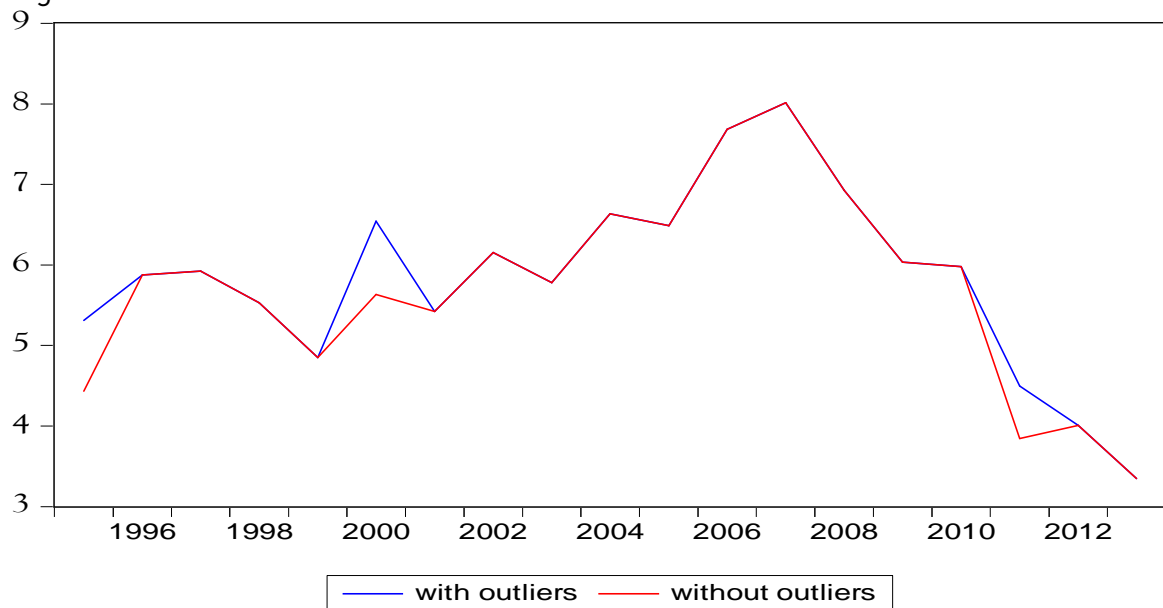
p-values in parenthesis

White Heteroskedasticity-consistent standard errors and covariance

* HAC standard errors and covariance

In the category of the performance of the national balance of payments, we have analyzed the dispersion of the balance on current transactions (measured as a percentage of the GDP). The box-plot analysis has only detected two countries with extreme values: Luxembourg (1995 and 2000) and Greece (2011). Looking at the evolution of the standard deviations of this balance (see figure 46), it is difficult to reach any clear-cut conclusion about the existence of a time trend.

Figure 46. Standard deviation of the balance on current transactions



Source: Our calculations based on AMECO

The regression analysis has detected the existence of a conditional divergence process that is independent on the inclusion or exclusion of the extreme values (see table 12). The existence of a recession in the Eurozone is not significant. However, the Great Recession has generated a high and significant impact, leading to a strong convergence process in the national balances on current transactions.

Table 12. OLS regression of the standard deviation of the balance on current transactions

	Model 1 With Outliers *	Model 2 Without Outliers *	Model 3 With Outliers #	Model 4 Without Outliers #	Model 5 With Outliers #	Model 6 Without Outliers	Model 7 Model With Outliers #	Model 8 Without Outliers #
C	6.172 (0.000)	5.933 (0.000)	5.406 (0.000)	5.084 (0.000)	8.887 (0.044)	9.730 (0.125)	5.448 (0.000)	5.098 (0.000)
Trend	-0.036 (0.462)	-0.024 (0.755)	0.125 (0.011)	0.155 (0.006)	-0.244 (0.336)	-0.301 (0.424)	0.121 (0.082)	0.154 (0.025)
Dcrisis			-2.645 (0.003)	-2.931 (0.003)			-2.566 (0.037)	-2.906 (0.022)
Drecession					-0.363 (0.284)	-0.302 (0.532)	-0.060 (0.903)	-0.019 (0.967)
AR(1)					0.796 (0.001)	0.797 (0.001)		
Mean dependent variable	5.841	5.713	5.841	5.713	5.871	5.784	5.841	5.713
R ²	0.032	0.012	0.481	0.500	0.576	0.614	0.481	0.500
F-statistic	0.565 (0.462)	0.217 (0.646)	7.428 (0.005)	8.018 (0.007)	6.339 (0.006)	7.452 (0.003)	4.648 (0.017)	5.012 (0.013)
Wald F-statistics		0.100 (0.754)	6.278 (0.009)	6.647 (0.007)	0.935 (0.415)		4.452 (0.019)	4.257 (0.023)
D-W	0.550	0.496	1.230	1.224	2.202	1.906	1.219	1.221
Jarque-Bera	0.174 (0.916)	0.233 (0.889)	0.165 (0.920)	0.625 (0.731)	0.665 (0.718)	0.254 (0.880)	0.173 (0.916)	0.632 (0.728)
Breusch-Pagan-Godfrey	5.721 (0.028)	5.433 (0.032)	6.320 (0.009)	10.037 (0.001)	2.886 (0.087)	0.211 (0.811)	3.921 (0.029)	6.243 (0.005)
Breusch-Godfrey LM	7.962 (0.004)	7.635 (0.005)	0.837 (0.453)	0.786 (0.474)	0.202 (0.819)	0.272 (0.766)	0.812 (0.465)	0.755 (0.489)

p-values in parenthesis

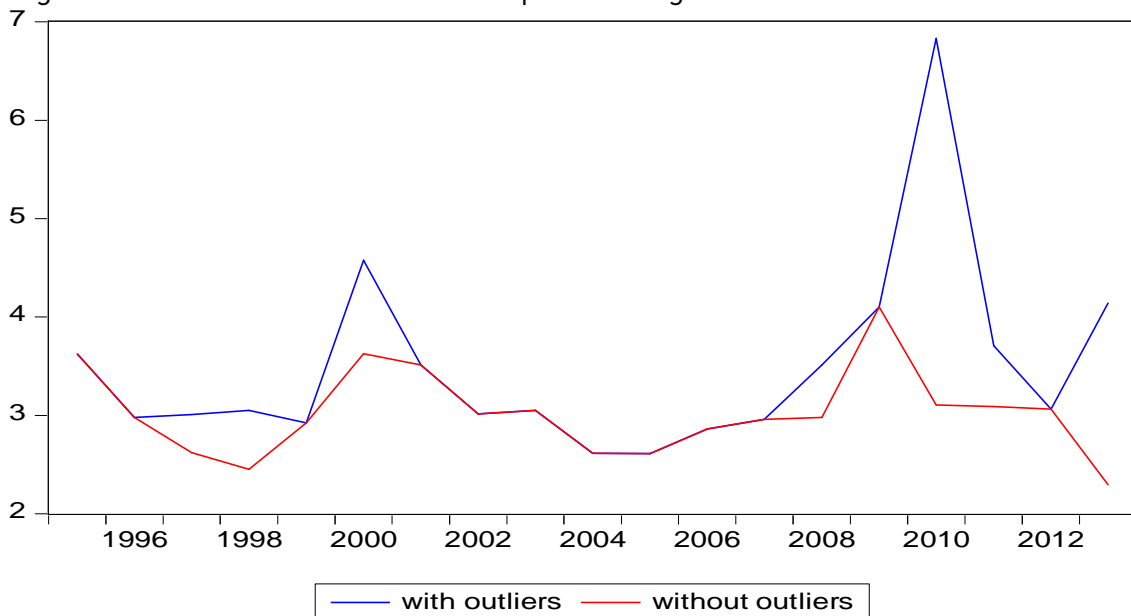
White Heteroskedasticity-consistent standard errors and covariance

* HAC standard errors and covariance

The final category analyzed is related to the performance of national public finances. We have focused our analysis on the evolution of the public budget balance and the public debt of the general governments, measuring both variables as percentage of the GDP.

In the case of the public budget balance, the box-plot analysis has detected extreme values in seven countries: Luxembourg (1997), Greece (2008 and 2013), Slovenia (2013), Malta (1998), Slovakia (2000) and Ireland (2010 and 2011). Although the number of outliers is not high, however they lead to relevant differences in the evolution of the standard deviation of the balance on current transactions when we exclude these extreme values, as figure 47 shows, something that could lead to different conclusions depending on the inclusion or exclusion of these outliers.

Figure 47. Standard deviation of the public budget balance



Source: Our calculations based on Eurostat

Table 13. OLS regression of the standard deviation of public budget balance

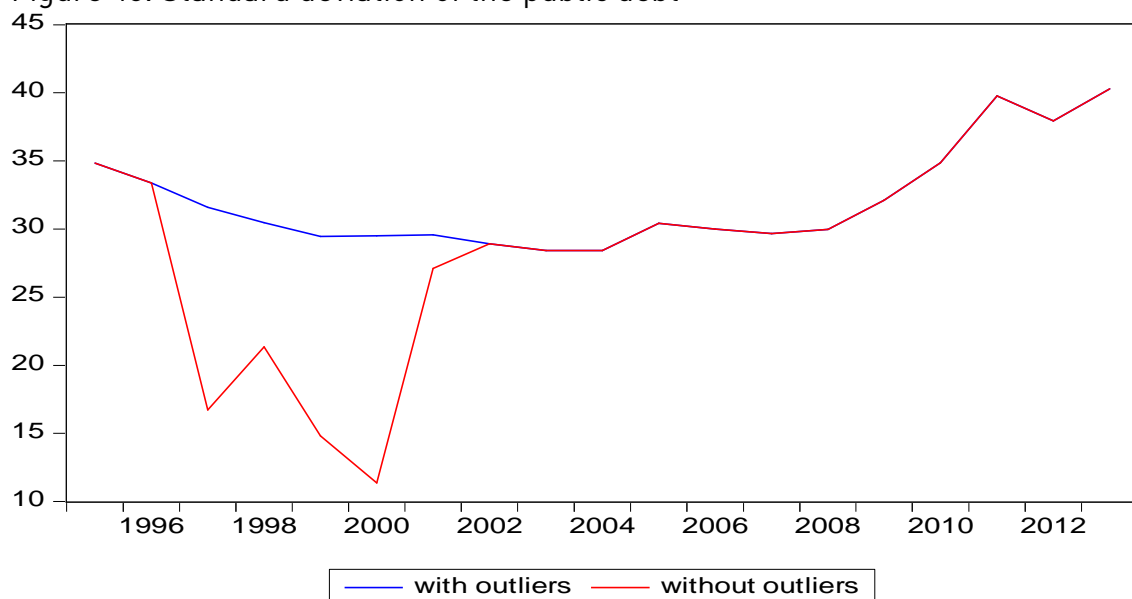
	Model 1 With Outliers	Model 2 Without Outliers	Model 3 With Outliers	Model 4 Without Outliers	Model 5 With Outliers	Model 6 Without Outliers	Model 7 Model With Outliers	Model 8 Without Outliers
C	2.973 (0.000)	3.074 (0.000)	3.438 (0.000)	3.211 (0.000)	2.792 (0.000)	3.022 (0.000)	3.666 (0.000)	3.281 (0.000)
Trend	0.056 (0.172)	-0.005 (0.774)	-0.042 (0.448)	-0.034 (0.250)	0.046 (0.258)	-0.008 (0.672)	-0.062 (0.369)	-0.040 (0.279)
Dcrisis			1.605 (0.030)	0.471 (0.208)			2.037 (0.076)	0.603 (0.308)
Drecession					0.572 (0.204)	0.166 (0.451)	-0.328 (0.604)	-0.100 (0.765)
Mean dependent variable	3.480	3.025	3.480	3.025	3.480	3.025	3.480	3.025
R ²	0.106	0.004	0.339	0.101	0.194	0.040	0.351	0.106
F-statistic	2.024 (0.172)	0.084 (0.774)	4.107 (0.036)	0.903 (0.424)	1.931 (0.177)	0.339 (0.717)	2.708 (0.082)	0.598 (0.625)
D-W	1.593	1.391	2.209	1.169	1.776	1.225	2.320	1.206
Jarque-Bera	26.503 (0.000)	1.601 (0.448)	16.130 (0.000)	0.118 (0.942)	23.055 (0.000)	0.985 (0.610)	14.851 (0.000)	0.077 (0.961)
Breusch-Pagan-Godfrey	1.192 (0.290)	0.104 (0.750)	2.123 (0.152)	1.670 (0.219)	0.761 (0.483)	0.410 (0.669)	1.495 (0.256)	1.378 (0.287)
Breusch-Godfrey LM	0.586 (0.568)	0.936 (0.413)	0.358 (0.704)	1.440 (0.269)	0.348 (0.711)	1.303 (0.302)	0.576 (0.575)	1.158 (0.344)

p-values in parenthesis

As table 13 shows, there is no time trend in the evolution over the years of the national public budget balances, and consequently we cannot talk of the existence of a process of conditional or unconditional convergence or divergence process. It is also important to emphasize that the existence of a recession in the Eurozone is not significant and that the Great Recession has led to a higher divergence of national public budgets, although when we exclude the outliers this variable stops to be significant.

In the case of the public debt, the outliers detected are all of them concentrated between 1997 and 2002, that is the years before and after the creation of the European Monetary Union in 1999: Luxembourg (1997, 1998, 1999 and 2000), Estonia (1997, 1998, 1999 and 2000), Belgium (1997, 1998, 1999, 2000 2001 and 2002), Italy (1997, 1998, 1999 and 2000) and Greece (2000). The large difference recorded in the evolution of the standard deviation of public debt in these years makes difficult to find any clear time trend, mainly when all countries and years are included in the analysis (see figure 48).

Figure 48. Standard deviation of the public debt



Source: Our calculations based on Eurostat

Table 14. OLS regression of the standard deviation of public debt

	Model 1 With Outliers #	Model 2 Without Outliers #	Model 3 With Outliers #	Model 4 Without Outliers #	Model 5 With Outliers #	Model 6 Without Outliers #	Model 7 Model With Outliers #	Model 8 Without Outliers #
C	3.078 (0.952)	21.059 (0.000)	31.538 (0.000)	22.829 (0.000)	27.632 (0.000)	19.063 (0.000)	30.038 (0.000)	16.818 (0.002)
Trend	1.899 (0.436)	0.878 (0.019)	-0.186 (0.180)	0.503 (0.323)	0.250 (0.026)	0.767 (0.021)	-0.050 (0.766)	1.048 (0.025)
Dcrisis			8.438 (0.001)	6.114 (0.102)			5.606 (0.130)	-5.231 (0.430)
Drecession					4.634 (0.000)	6.319 (0.052)	2.155 (0.245)	8.632 (0.129)
AR(1)	0.871 (0.000)							
Mean dependent variable	31.928	28.966	32.081	28.966	32.081	28.966	32.081	28.966
R ²	0.874	0.382	0.675	0.432	0.630	0.540	0.710	0.556
F-statistic	52.123 (0.000)	10.534 (0.004)	16.631 (0.000)	6.096 (0.010)	16.664 (0.000)	9.427 (0.001)	12.242 (0.000)	6.267 (0.005)
Wald F-statistics	0.639 (0.436)	6.648 (0.019)	8.864 (0.002)	16.247 (0.000)	11.132 (0.000)	14.603 (0.000)	8.068 (0.001)	13.736 (0.000)
D-W	2.358	0.928	1.113	1.029	1.235	1.619	1.296	1.884
Jarque-Bera	1.340 (0.511)	0.652 (0.721)	0.376 (0.828)	0.747 (0.688)	1.855 (0.395)	1.101 (0.576)	1.469 (0.479)	1.043 (0.593)
Breusch-Pagan-Godfrey	6.898 (0.018)	9.673 (0.006)	6.271 (0.009)	6.610 (0.008)	2.953 (0.081)	7.309 (0.005)	3.758 (0.034)	6.245 (0.005)
Breusch-Godfrey LM	0.623 (0.551)	1.980 (0.172)	1.127 (0.351)	1.643 (0.228)	0.834 (0.454)	0.436 (0.654)	0.812 (0.465)	1.084 (0.366)

p-values in parenthesis

White Heteroskedasticity-consistent standard errors and covariance

Table 14 shows the existence of an unconditional divergence process that takes place when the outliers are excluded of the analysis (see model 2). This divergence process accelerates during recessions (models 5 and 6)

4.3 Conclusions

The analysis carried out in the previous section has given rise to different results, depending on the analyzed variable. In the cases of the adjusted wage share, the real ULCs growth rate, the real wages growth rate and the public budget balance, we have not found a significant time trend, and, therefore, we cannot talk of the existence of a convergence or divergence process.

Only in the cases of the unemployment rate, the Gini coefficient and the inflation rate there is clear and significant convergence process. On the contrary, in the cases of the real GDP per capita, the GDP growth rate, the output gap, the balance on current transactions and the public debt we have detected a significant divergence process, thus exacerbating the differences existing before the creation of the European Monetary Union.

If we focus on the dummy variables related to the existence of a recession in the Eurozone and the current Great Recession, we find again mixed results. Thus, recessions lead to a divergence in the unemployment rate, the employment growth rate, the public budget balance and the public debt. Conversely, it contributes to reduce the national differences in the real GDP per capita and the balance on current transactions. The Great Recession, on its behalf, is contributions to a convergence in the real GDP per capita and the balance on current transactions (like recessions), and to a divergence in the unemployment rate, the employment growth and the fiscal imbalances.



Finally, unclear results have been obtained in some variables like the potential GDP growth rate, the employment growth and the real GDP growth rate. The reason is that the results obtained depend on we include or not the extreme values.

In sum, our analysis has not been able to find a significant convergence in the macroeconomic performance of EMU countries. On the contrary, our result point out to a higher divergence in the macroeconomic performance of Eurozone countries. Moreover, we have found that both recessions and the current crisis generate a relevant and significant impact on the convergence-divergence process, implying that the results obtained in previous studies on the convergence in the Eurozone can be affected by the period analyzed and the situation of the business cycles in the whole Eurozone and in the member states.

Finally, we want to emphasize that the Great Recession has increased the divergence in many macroeconomic outcomes, generating the risk of a higher heterogeneity if the crisis becomes chronic-endemic or makes structural the bad performance (low growth-stagnation) recorded in many countries.

4. Conclusions

The different descriptive and empirical analyses developed in the deliverable have shown that the impact of the economic and financial crisis in the European Union, a shock that can be considered as a common shock for the whole area, has not been symmetrically distributed and that that impact has been more intense in euro that in no-euro European Union countries. Moreover, if we focus our attention on the performance of the Eurozone, it is again clear that within the euro area, the impact of the crisis has been more severe in the PIIGS countries (Portugal, Ireland, Italy, Greece and Spain) and in the new member states. In

other words, the crisis has been more severe in the peripheral countries than in the core euro countries.

These results, that is, the facts that, first, the impact of the crisis has been larger in the Eurozone in relation to other developed and developing economies and other non-euro EU countries, and, second, that, within the Eurozone the effects of the crisis have been more severe in the peripheral countries, imply that there are common (structural problems of competitiveness) and individual-endemic problems (endemic of some economies) affecting the euro countries.

Therefore, the crisis has led to a rising divergence in the euro area, exacerbating previous differences in the economic performance of euro countries. As far as this divergence has not only a cyclical nature, but also a structural-permanent one, the coherence of the Eurozone can diminish, making the working (survival?) of the (current?) euro area more problematic.

References

Arestis, P. and Sawyer, M. (eds.) (2012) *The Euro Crisis*, Palgrave Macmillan, Basingstoke.

Benczes, I. and Szent-Ivanyi (2015) "The European economy in 2014: fragile recovery and convergence", *Journal of Common Market Studies*, 53, S1, pp. 162-180.

Bitzenis, A., Karagiannis, N. and Marangos, J. (eds.) (2015) *Europe in Crisis. Problems, Challenges and Alternative Perspectives*, Palgrave Macmillan, Basingstoke.

Carrasco, C.A., Ferreiro, J., Gálvez, C., Gómez, C. and González, A. (2016) “The impact of the financial and economic crisis on European Union Member States”, in Hein, E., Detzer, D. and Dodig, N. (eds.) *Financialisation and the Financial and Economic Crises. Country Studies*, Edward Elgar, Cheltenham, forthcoming.

Carrasco, C.A. and Peinado, P. (2015) “On the origin of European imbalances in the context of European integration”, *Panoeconomicus*, 62(2), pp. 177-191.

Cavallo, A. and Ribba, A. (2015) “Common macroeconomic shocks and business cycle fluctuations in Euro area countries”, *International Review of Economics and Finance*, 38, pp 377-392.

Dodig, N. and Herr, H. (2015) “Current account imbalances in the EMU: an assessment of official policy responses”, *Panoeconomicus*, 62(2), pp. 193-216.

Ferroni, F. and Klaus, B. (2015) “Euro area business cycles in turbulent times: convergence or decoupling”, *Applied Economics*, 47, 34-35, pp. 3791-3815.

Gächter, M. and Riedl, A. (2014) “One money, one cycle? The EMU experience”, *Journal of Macroeconomics*, 42, pp. 141-155.

Gibson, H.D., Palivos, T. and Tavlos, G.S. (2014) “The crisis in the Euro area: an analytical overview”, *Journal of Macroeconomics*, 39, Part B, pp. 233-239.

Mendonça, A. (2014) “The European crisis and global economy dynamics: continental enlargement versus Atlantic opening”, *Panoeconomicus*, 5, Special Issue, pp. 543-569.

Mongelli, F.P. (2013) "The mutating euro area crisis. Is the balance between "sceptics" and "advocates" shifting?" *European Central Bank Occasional Paper Series*, No. 144.

Onaran, Ö. (2011) "The crisis in Western and Eastern EU: does the policy reaction address its origin", in Arestis, P. Sobreiro, R. and Oreiro, J.L. (eds.) *An Assessment of the Global Impact of the Financial Crisis*, pp. 135-158, Palgrave Macmillan, Basingstoke.

Perraton, J. (2011) "Crisis in the Euro zone", in Arestis, P. Sobreiro, R. and Oreiro, J.L. (eds.) *An Assessment of the Global Impact of the Financial Crisis*, pp. 84-107, Palgrave Macmillan, Basingstoke.

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THE ABSTRACT OF THE PROJECT IS:

The research programme will integrate diverse levels, methods and disciplinary traditions with the aim of developing a comprehensive policy agenda for changing the role of the financial system to help achieve a future which is sustainable in environmental, social and economic terms. The programme involves an integrated and balanced consortium involving partners from 14 countries that has unsurpassed experience of deploying diverse perspectives both within economics and across disciplines inclusive of economics. The programme is distinctively pluralistic, and aims to forge alliances across the social sciences, so as to understand how finance can better serve economic, social and environmental needs. The central issues addressed are the ways in which the growth and performance of economies in the last 30 years have been dependent on the characteristics of the processes of financialisation; how has financialisation impacted on the achievement of specific economic, social, and environmental objectives?; the nature of the relationship between financialisation and the sustainability of the financial system, economic development and the environment?; the lessons to be drawn from the crisis about the nature and impacts of financialisation? ; what are the requisites of a financial system able to support a process of sustainable development, broadly conceived?'

THE PARTNERS IN THE CONSORTIUM ARE:

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3	School of Oriental and African Studies	UK
4	Fondation Nationale des Sciences Politiques	France
5	Pour la Solidarite, Brussels	Belgium
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