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SQUARING THE CYCLE: FINANCIAL CYCLES, CAPITAL FLOWS AND MACRO-PRUDENTIAL POLICY IN THE EURO AREA

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Highlights

- Before the financial and economic crisis, monetary policy unification and interest rate convergence resulted in the divergence of euro-area countries' financial cycles. This divergence is deeply rooted in the financial integration spurred by currency union and strongly correlated with intra-euro area capital flows. Macro-prudential policy will need to deal with potentially divergent financial cycles, while catering for potential cross-border spillovers from domestic policies, which domestic authorities have little incentive to internalise.

- The current framework is unfit to deal effectively with these challenges. The European Central Bank should be responsible for consistent and coherent application of macro-prudential policy, with appropriate divergences catering for national differences in financial conditions. The close link between domestic financial cycles and intra-euro area capital flows raises the question of whether macro-prudential policy in the euro area can be compatible with free flows of capital. Financial cycle divergence had its counterpart in the build-up of macroeconomic imbalances, so effective implementation of the Macroeconomic Imbalance Procedure would support and strengthen macro-prudential policy.

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Introduction

The financial crisis has prompted a renewed interest in macro-prudential policy as a framework to address the stability of the financial system as a whole, rather than only its individual components. The crisis taught us that while being an objective of global relevance, preserving financial stability is even more important in contexts in which financial linkages are strong and deep, such as in the euro area. The set-up of an effective macro-prudential framework is also especially important for the euro area because of the low interest rate environment created by the European Central Bank's expansionary policy.

However, the macro-prudential debate is mainly held in a global context, somewhat neglecting the specific features of Europe. Defining the optimal macro-prudential policy setting for a heterogeneous monetary union like the euro area poses additional challenges to those in the case of a standalone country. The purpose of this paper is to contribute to the European macro-prudential discussion by establishing empirically the special challenges that the set-up of macro-prudential policy in the euro area needs to confront, because of the strong financial integration and the free flow of capital.

Section 1 establishes two facts that have important policy implications for the set-up of macro-prudential policy in the euro area. First, the euro area has a financial cycle, like any standalone country. Over the last decade, this cycle has been 'well-behaved', fluctuating moderately. Second, behind this smooth cycle, individual countries' positions were diverging substantially across the euro area.

Section 2 investigates the reasons behind this divergence, and shows that it was very much linked to what could be considered the most important achievement of currency union, i.e. financial integration[1]. This analysis suggests that while the euro area was becoming more financially integrated with the world, during the first decade of the twenty-first century, most of the surge in financial activity associated with the introduction of the single currency is explained by intra-area activity. It will also show how the introduction of the euro and the associated convergence of interest rates to historically low levels, boosted credit demand in the euro area's southern countries, which the banking sector was able to meet through increased external borrowing from other euro-area countries.

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[1] Section 2 updates and expands section 4.6 from Darvas *et al* (2015) and from Merler (2014)

Section 3 will make the link between financial cycles and their macroeconomic counterpart, and show that financial-cycle divergence was accompanied by growing external imbalances and the disanchoring of domestic savings and investment in euro-area countries. The historically low rates associated with the introduction of the euro spurred a credit boom in the southern countries, but the bulk of credit went to the housing sector (from which arises the importance of house-price development for describing the credit cycle).

The conclusion from the empirical analysis is that the pre-crisis divergence in financial cycles within the euro area was closely associated with capital flows and especially with *intra*-euro area flows. This finding has important policy implications, because it raises the question of whether macro-prudential policy can be compatible with a monetary union characterised by the free flow of capital. Section 5 looks at the special challenges that macro-prudential policymaking faces in a heterogeneous monetary union such as the euro area, and discusses the current set up in light of the empirical findings.

1.   Financial cycles in the euro area

Understanding the development of the financial cycle is key for the purposes of macro-prudential policymaking. The literature suggests that peaks of financial cycles are closely associated with financial crises, and that the cycle helps detect financial distress risks in their build-up phase. An analysis of financial cycles for both the euro area and its member states is therefore a natural starting point for discussing the macro-prudential set up of the euro area, especially since the literature on this topic is relatively new and limited[2].

As far as the empirical representation is concerned, the literature has established two important stylised features of the financial cycle. First, the financial cycle has a much lower frequency than the traditional business cycle. Borio *et al* (2012) show that the average length of financial cycles in a sample of seven industrialised countries since the 1960s has been around 16 years, and that financial cycles normally have greater amplitude than business cycles. The length and amplitude of the financial cycle depend on policies adopted (Borio *et al*, 2012), but the literature identifies a tendency for financial variables to evolve at a relatively slow pace.

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[2] To our knowledge a financial cycle analysis in the European context has been conducted only recently by Schüler *et al* (2015).

Second, the financial cycle appears to be most parsimoniously and effectively described by fluctuations in credit and property prices (Borio *et al*, 2012). These two variables tend to co-vary rather closely with each other, and the variability in the two series is dominated by low-frequency components. While there are studies that focus exclusively on credit growth (e.g. Aikman *et al*, 2015; Schularick and Taylor, 2012), the emerging consensus is that the financial cycle is best described by including also house-price growth. The reason for this is that booming credit is often associated with housing bubbles, reinforcing the risks to financial stability (Jorda *et al*, 2015; Claessens *et al*, 2014). Beyond credit and house prices, equity prices are often found to be noisier, because of their potentially large short-term fluctuations, and less clearly associated with financial crises (Claessens *et al*, 2011). Schüler *et al* (2015) also include benchmark bond yields in their analysis of financial cycles, but fluctuations in bond yields display medium/short frequencies, and they are likely to be more relevant for the shorter frequency business cycles, which are analysed for monetary policy purposes. Including them could therefore also blur the separation between monetary and macro-prudential policy (Schoenmaker and Wierts, 2016).

In this paper, credit cycles are estimated for both the euro area as a whole and 11 member states. We follow the methodology in Borio *et al* (2012) and Aikman *et al* (2015), and apply a band-pass filter[3] to isolate specifically medium-term credit cycles, defined as cycles in real credit growth with duration between eight and 30 years. The same analysis is replicated also on real house prices, and the information from these two cycles is eventually combined into a summary indicator, by means of principal component analysis. Throughout this paper, countries will sometimes be aggregated into three macro-groups: South (including the countries that were subject to macroeconomic adjustment programmes i.e. Greece, Ireland, Spain and Portugal), North (Austria, Belgium, Finland, Germany and the Netherlands) and an intermediate Centre (including France and Italy, that came under market stress during the crisis but not to the point of needing assistance). The reason for doing this is that these countries display similar features and aggregating them allows a clearer and more forceful presentation of the results.

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[3] More specifically, following Borio *et al* (2012) and Aikman *et al* (2011), we apply the band-pass filter developed by Christiano and Fitzgerald (2003), which is implementable in statistical packages like STATA and it is a common choice in the existing literature on financial cycle. Christiano and Fitzgerald provided evidence that their filter is preferable to the one developed by Baxter and King (1999) when extracting lower frequencies (and recent works agree on the fact that the financial cycle displays a lower frequency than the traditional business cycle). Aikman *et al* (2011) also experiment with a Hodrik-Prescott filter and find comparable results, but they conclude that the choice of appropriate parameters is less straightforward.

1.1   Domestic credit cycles in the euro area and member states

During the euro area's first decade of life, credit developments in its members diverged significantly (Figure 1). In the so-called euro 'South', bank credit to the non-financial private sector boomed, growing faster than for the euro area as a whole, and more than doubling in percentage of GDP between 1999 and 2009. In the North, credit tended to grow slowly, stagnate, or even decrease over the same period. In Germany, for example, bank credit to the private sector decreased by almost 20 points of GDP from 1999 to 2012. In between these two extremes, an intermediate Centre including Italy and France experienced positive credit growth, faster than the North but slower than the South.

Figure 1: Bank credit to domestic private sector (% GDP)
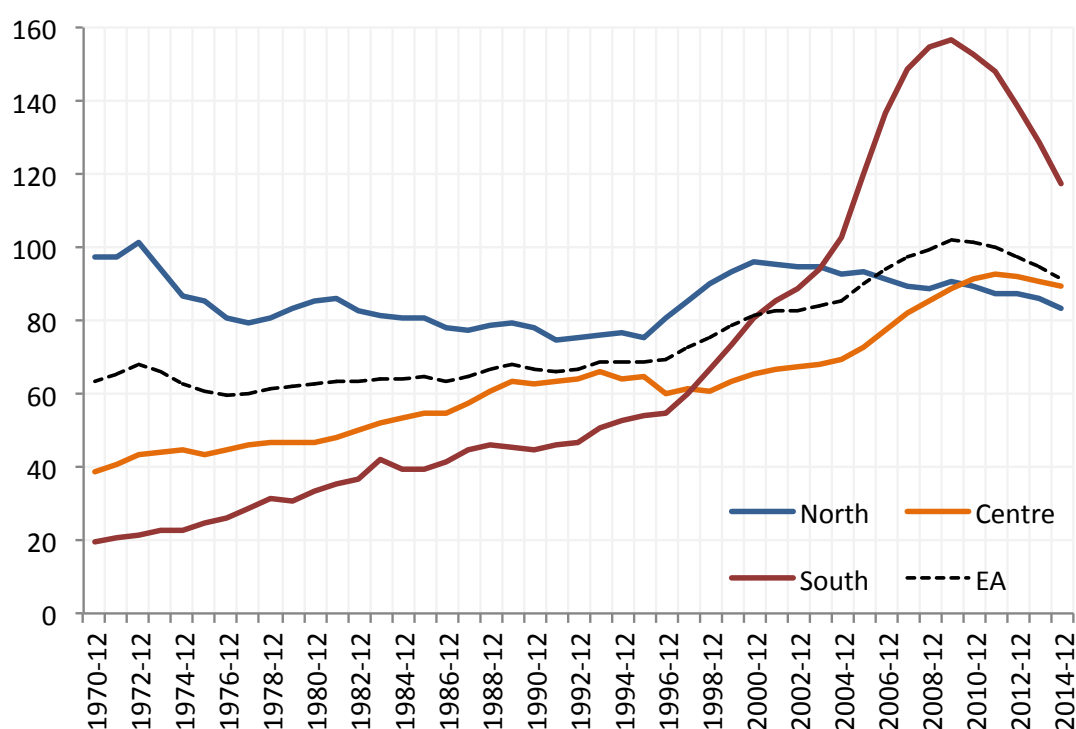
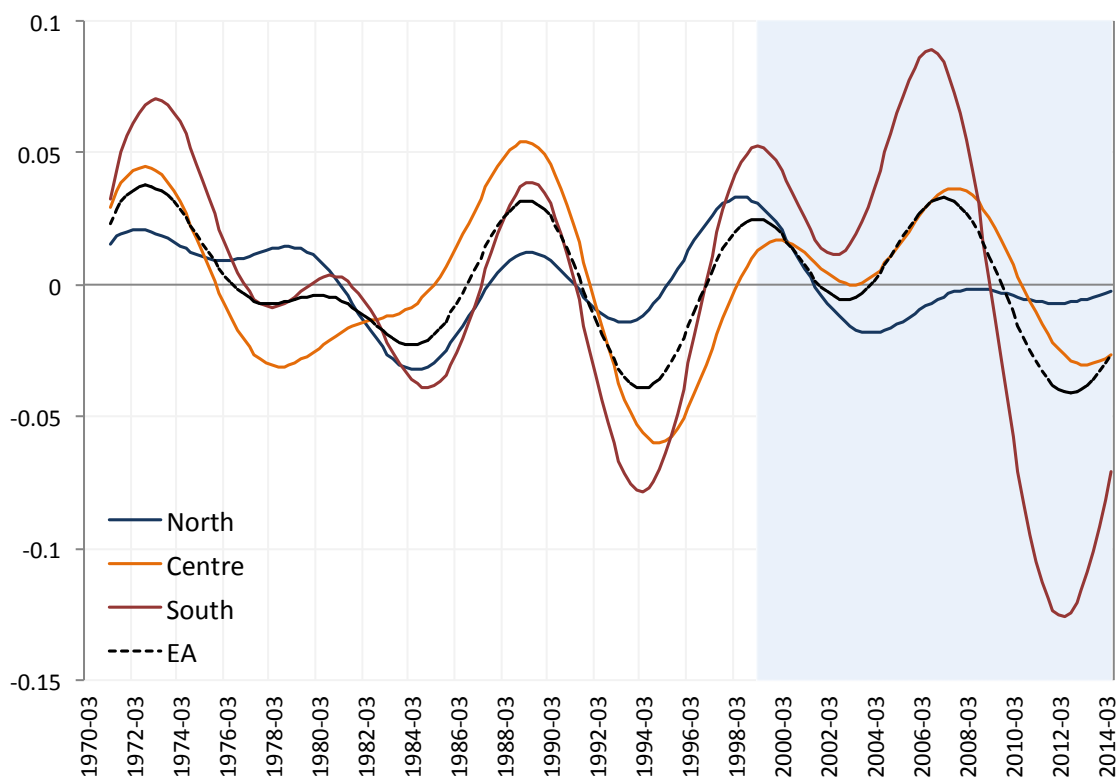*Source: BIS; National Sources; IMF; AMECO.*
Note: groups are defined as follows: North includes Austria, Belgium, Finland, Germany and the Netherlands; Centre includes France and Italy; South includes Greece, Ireland, Portugal and Spain.

The existence of significant differences in the credit cycles of euro-area countries is confirmed by a formal financial cycle analysis (Figure 2). Here, we estimate cycles in the growth of domestic banks' credit to the non-financial private sector, in real terms[4]. Our sample consists of 11 euro-area countries,

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[4] Data comes from a recently constructed BIS cross-country dataset and series have been checked against those provided by national authorities. Whenever needed, series have been backdated using growth rates from the historical statistics in IMF IFS. All series have been deflated using CPI series from IFS and are converted in logarithms, so that the annual growth rate is defined as the 4-quarters log difference.

over the period 1960:Q1 to 2014:Q4[5]. A measure of overall credit to the private sector would be preferable, but quality and availability of data beyond bank credit are not always good enough. However, given the importance of bank intermediation in the euro area, bank credit is especially relevant from a policy perspective.

Figure 2: Estimated cycle in the growth of real bank credit to the private sector

Source: Bruegel based on data from BIS; National Sources; IMF; AMECO.Note: shaded area indicates the period after currency unification.

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[5] The aggregate for the euro area as a whole is constructed as the sum of individual countries' positions.

Table 1: Credit cycles - pairwise correlations in selected time period

year < 1999	North	Centre	South
North	1		
Centre	0.2194	1	
South	0.6995	0.7522	1
EA	*0.6735*	*0.8595*	*0.9615*

year > 1998	North	Centre	South
North	1		
Centre	0.1683	1	
South	0.1031	0.8674	1
EA	*0.2578*	*0.9519*	*0.9599*

1998 < year < 2008	North	Centre	South
North	1		
Centre	0.2082	1	
South	0.0035	0.866	1
EA	*0.3852*	*0.9418*	*0.9068*

year > 2007	North	Centre	South
North	1		
Centre	0.5246	1	
South	0.8118	0.895	1
EA	*0.7229*	*0.96*	*0.984*

Two interesting facts emerge. First (and unsurprisingly), the euro area has a credit cycle just like a standalone country, and this credit cycle has behaved very moderately and smoothly over the last decade. Second, there has been divergence in financial cycles within the euro area, starting around the time of currency union. In the early 2000s, southern countries entered a rapid expansion phase of their credit cycle, which lasted until 2008, when the financial crisis abruptly turned the boom into a bust. The opposite happened to the northern countries, which entered a phase of sluggish real credit growth at about the same time. The credit cycle of France and Italy followed closely the aggregate cycle of the euro area, with a moderate expansion from 2000-08 and a moderate contraction subsequently. Table 1 shows the pairwise correlations of these four financial cycles, and confirms a drop in correlation of northern countries' financial cycle and the financial cycle of the other groups, as well as the aggregate cycle of the euro area, between 1999 and 2008.

Group aggregates offer an effective synthetic picture, but the divergence is also striking at the individual country level. This is especially evident from a comparison of cycles in six cases: Germany, the Netherlands, Spain, Ireland, Italy and France (Figures 3, 4 and 5). Between 2001-09, these countries' credit cycles diverged markedly. In 2001, real credit growth entered a downward phase in Germany and the Netherlands, while in Spain and Ireland the opposite happened. It is interesting to notice that in Spain and Ireland, real credit growth appeared to have peaked in the late 1990s and was

on a downward path, but it rapidly diverted back upwards in 2001, after the introduction of the euro. France and Italy, on the other hand, moved very closely to the euro-area cycle[6].
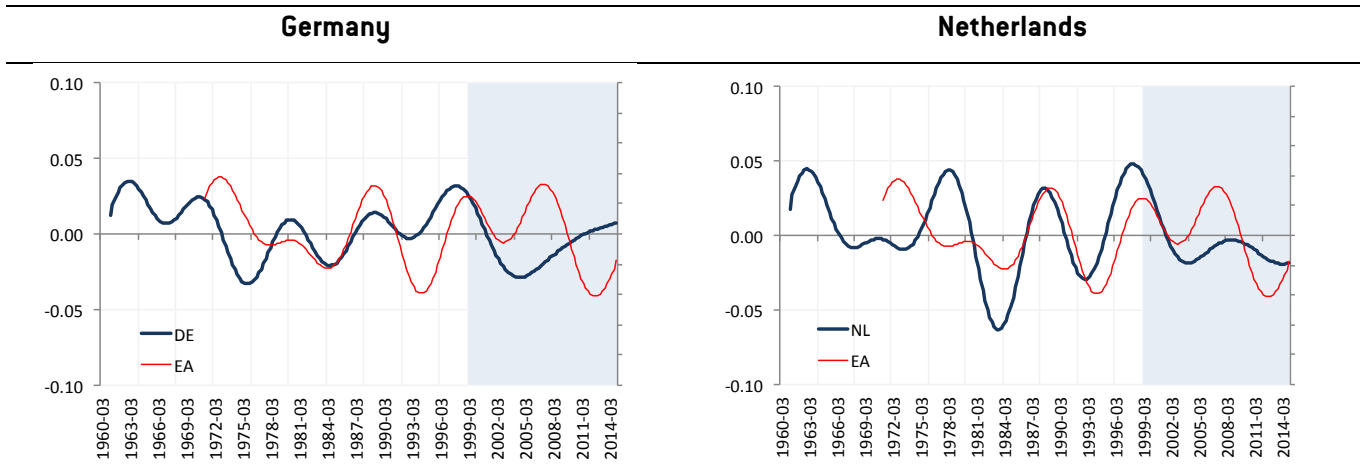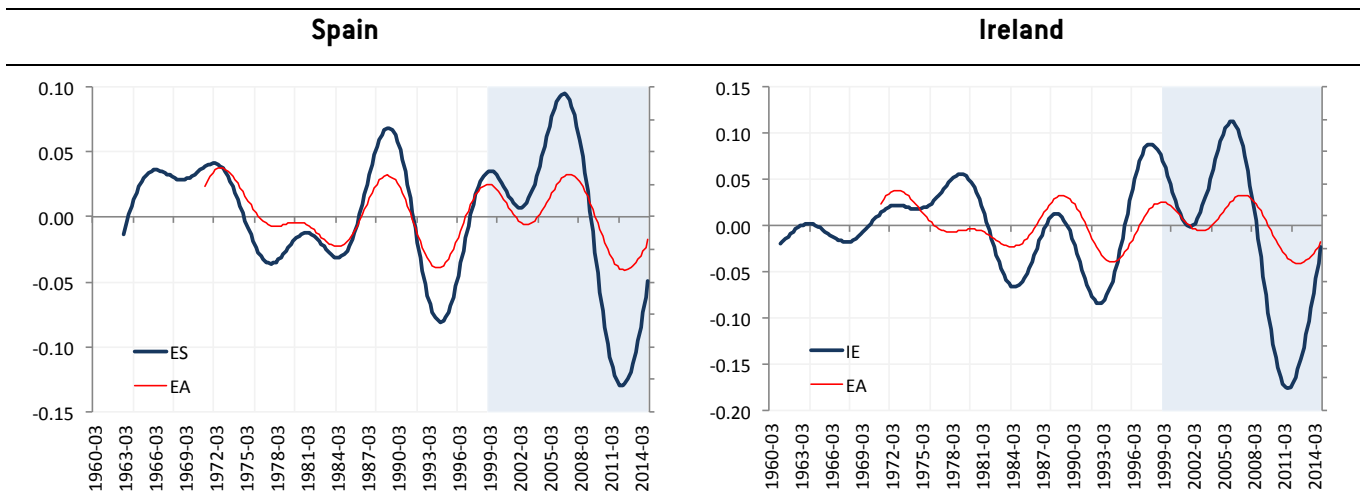
Figure 3: Credit Cycles – Individual countries

Germany

Netherlands

Figure 4: Credit Cycles – Individual countries

Spain

Ireland

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[6] The same analysis has been replicated using as an underlying variable the growth in credit-to-GDP ratio. Cycles in credit-to-GDP appear less aligned before the crisis than cycles in real credit growth, but the main results are confirmed for the three groups and individual countries.

Figure 5: Credit Cycles – Individual countries
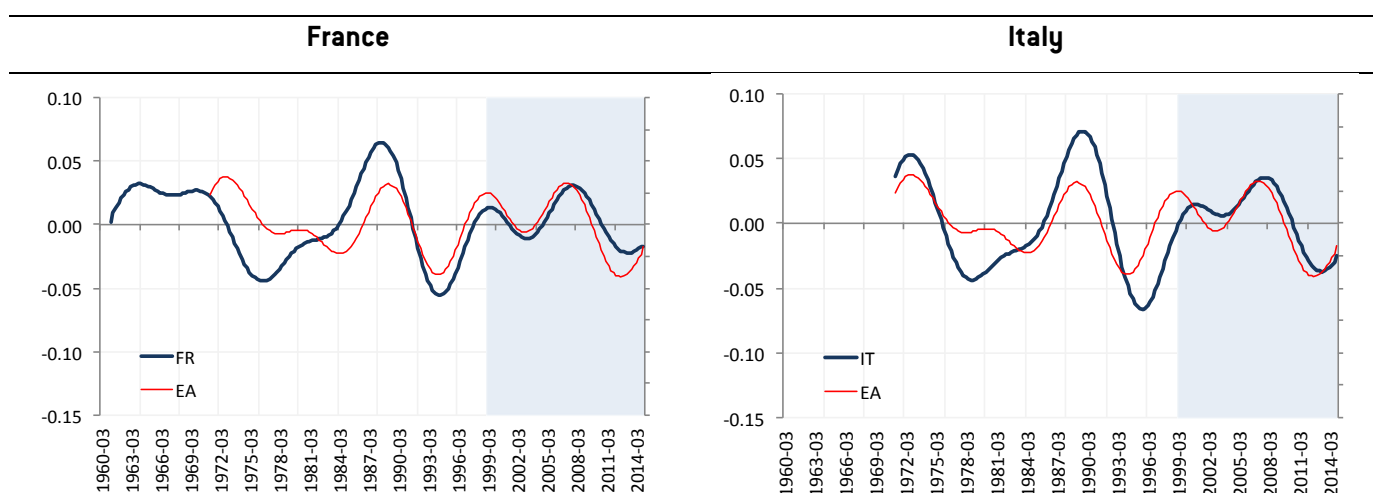
France	Italy

Note: real bank credit to domestic private sector, year-on-year growth (BIS, National Sources, IMF and own calculations). Shaded area indicates the period after currency unification. Time series ends in 2014-Q4 for all countries.

1.2   House-price cycles in the euro area and member states

In several countries, the surge in bank credit was closely associated with a housing boom. Figure 6 shows banks' credit to the domestic private sector in the South, broken down by borrower and by end-use of the credit. The share of credit directed to non-financial corporations operating in the construction sector and real estate activities, or directed to households for housing purposes increased from 34 percent of the total in 1992 to 63 percent in 2007.

Figure 6 South: Bank credit to private sector by sector and purpose (euro bn)
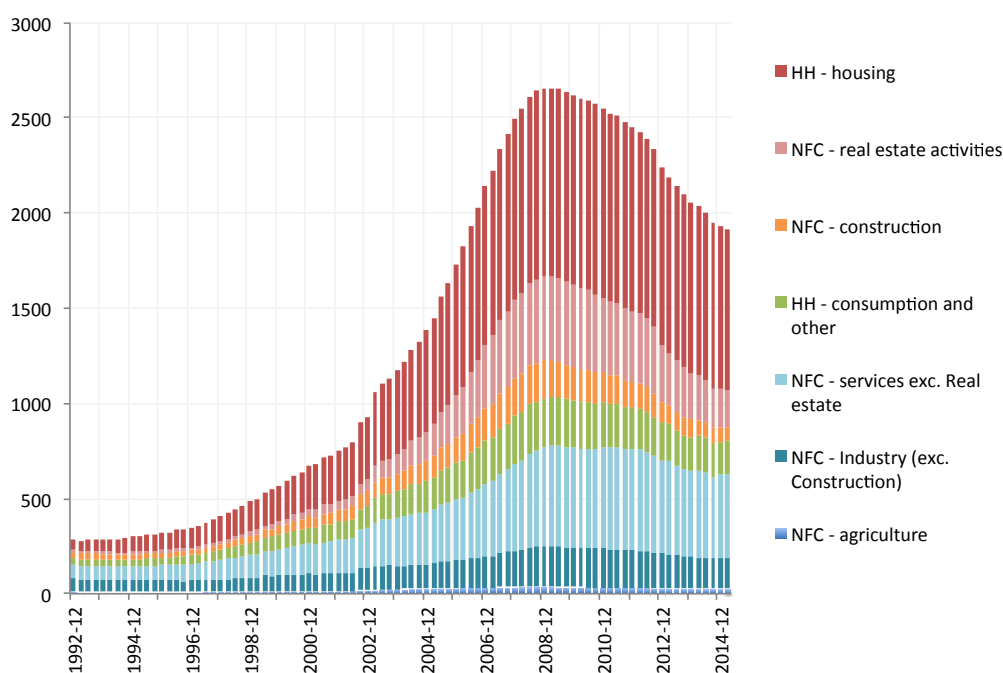
Source: Bruegel based on data from National Central Banks. Note: South=ES; GR; IE; PT. Last available data is 2015 Q1.

The divergence in credit cycles is therefore reflected in different house-price developments in different euro-area countries, over the pre-crisis period (Figure 7). In the North, real house prices peaked in 1994, started to decrease in the late 1990s up to 2009, and have recently started to increase again. There are intra-group differences: prices decreased in real terms from 2000-09 in Germany, whereas in the Netherlands they kept growing until the crisis, but at a slower pace than before 2000. In the Centre and South, prices increased very rapidly from 1999 on, and decreased during the crisis. Spain and Ireland experienced both the strongest and fastest pre-crisis growth and the deepest contraction in real house prices during the crisis. Italy and France underwent again slightly more moderate expansion and contraction phases.

Figure 7: real house prices (2010=100)
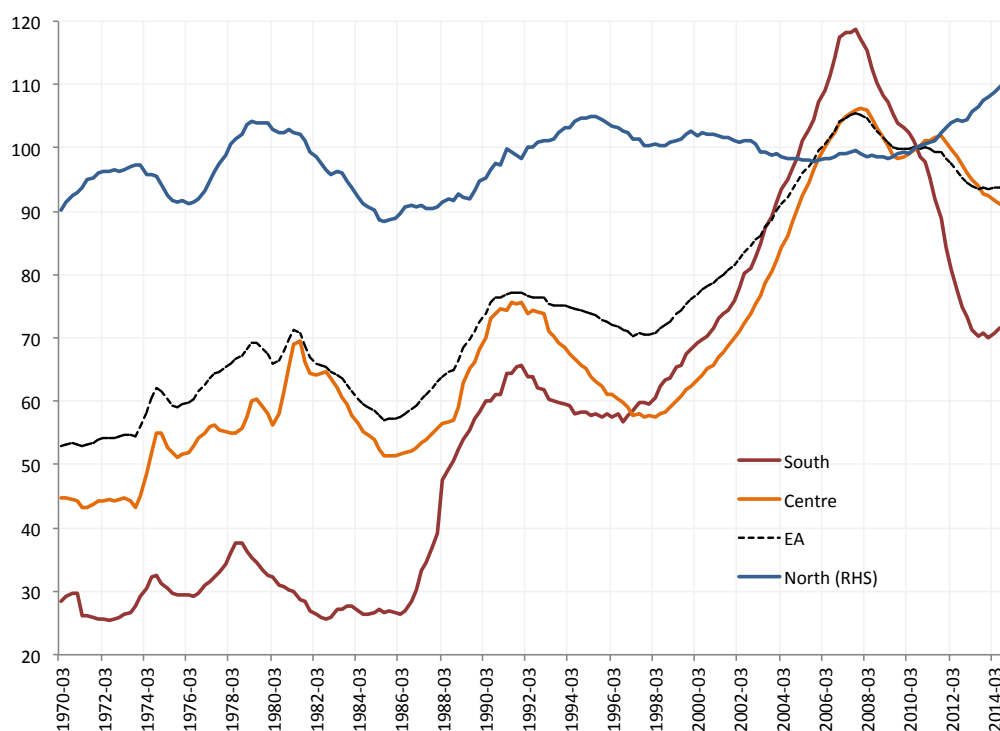
Source: OECD. Note: GDP-weighted aggregate of country indexes; time series ends in 2014-Q4 for all countries.

Monitoring housing prices will be especially relevant for the euro area in the current low interest rate environment, given the link between housing prices, economic activity and credit. Cheap credit is an essential driver of housing bubbles, while housing prices affect credit markets, as they determine the value of collateral that households can borrow and banks can lend against (ECB, 2015). Understanding the cycles in house prices is therefore important from both a macroeconomic and financial stability point of view.

We replicate here the analysis carried out in the previous section and estimate cycles in real house-price growth. Data on real house prices comes from OECD statistics, and it is only available from 1970Q1 on for most of the countries. Data is missing in several years for Austria, Greece and Portugal, making the series too short for the purpose of filtering medium-term frequencies. These countries have therefore been excluded from the sample in this exercise. The estimated cycles of real credit and real house prices yield consistent messages, and intra-euro area divergence is also evident the growth of real house prices (Figure 8 and Table 2).

Figure 8: Real House prices cycles
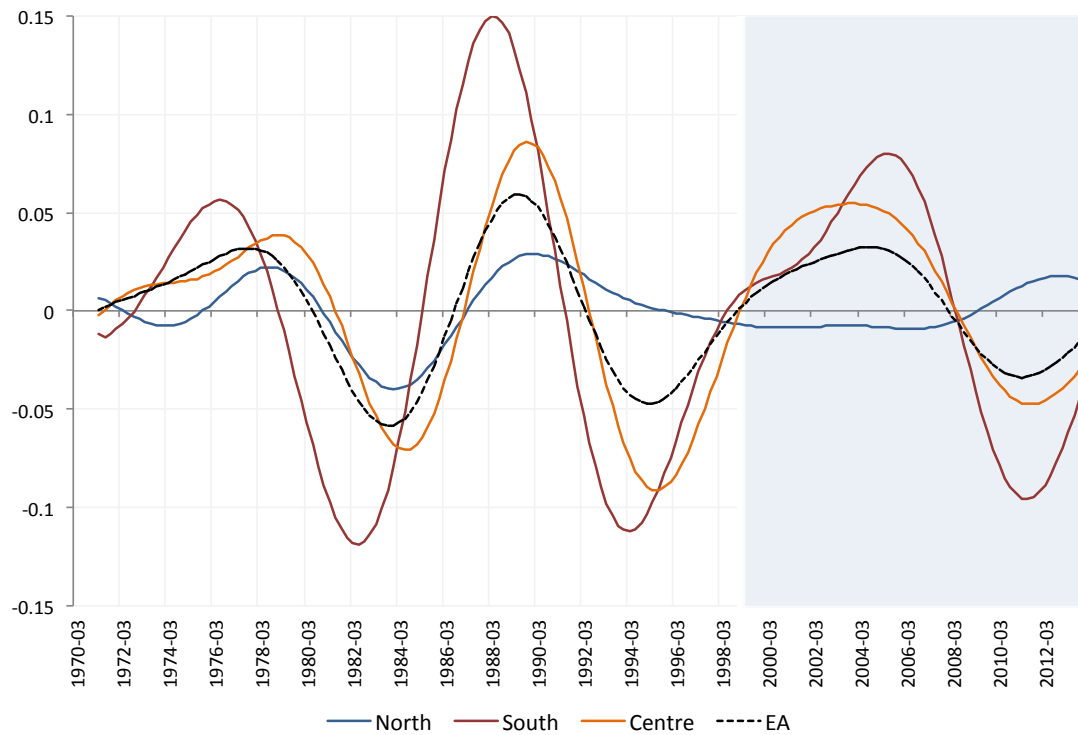
Source: Bruegel based on data from OECD. Note: shaded area indicates the period after currency unification.

Table 2: Housing cycles - pairwise correlations

year < 1999	North	Centre	South
North	1		
Centre	0.6893	1	
South	0.4047	0.6608	1
EA	*0.7635*	*0.9395*	*0.8162*

year > 1998	North	Centre	South
North	1		
Centre	-0.8963	1	
South	-0.8568	0.9499	1
EA	*-0.8473*	*0.9889*	*0.9729*

1998 < year <2008	North	Centre	South
North	1		
Centre	-0.0916	1	
South	-0.3072	0.5883	1
EA	*-0.1187*	*0.9628*	*0.7629*

year > 2007	North	Centre	South
North	1		
Centre	-0.7431	1	
South	-0.5129	0.9513	1
EA	*-0.3885*	*0.903*	*0.9897*

1.3   A rudimentary financial cycle measure

Cycles in credit and house prices can be combined into a unique synthetic indicator, by means of principal component analysis (PCA). PCA is a statistical technique used to reduce multivariate data into a smaller set of components that capture the maximum amount of variance from the underlying series[7]. Here PCA is used to summarise into a single indicator the information contained in the variance of credit growth and the growth of real house prices[8]. The principal component indicator is only estimated for those countries that have a long enough time series for both credit and house prices, i.e. all countries in the sample with the exclusion of Austria, Greece and Portugal[9].

Figure 9: Financial cycle: principal component of cycles in real house prices and credit
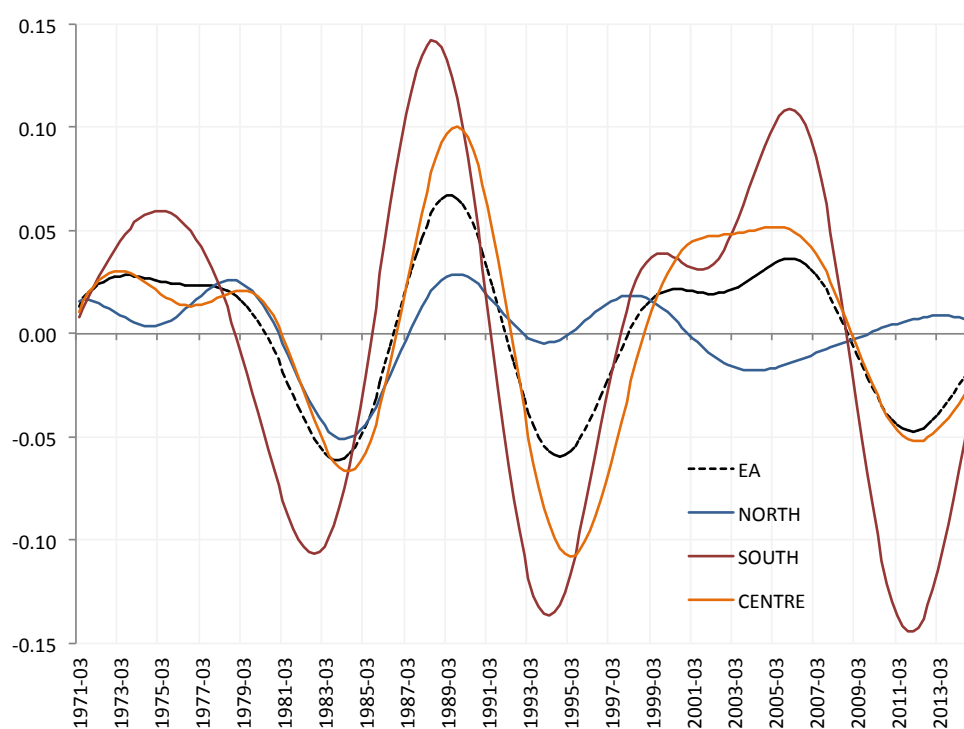
Source: Bruegel based on data from BIS; National Sources; IMF; AMECO; OECD.

This simple measure of the financial cycle (Figure 9) confirms the previous findings, in particular the existence of a moderate financial cycle for the euro area as a whole and divergence between countries since the late 1990s (Table 3). In Spain and Ireland, the introduction of the euro seems to be

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[7] PCA can be based on covariance or correlation matrix, the different being that in the second case a re-normalisation of the data would be involved. This is particularly important in case the data are expressed in different scales, which could otherwise influence the result. In this paper, since the previously estimated financial cycles were already expressed in the same scale, the covariance-based PCA has been applied.

[8] See also Schüler *et al* (2015).

[9] The definition of the three groups in Figure 9 has been changed accordingly, meaning that Figure 9 is not entirely comparable with Figure 2.

associated with the start of a big expansion phase in the financial cycle (Figure 11). In Germany and the Netherlands the opposite happened (Figure 10), and both countries entered a downturn phase in the late 1990s. France and Italy again moved very closely to the euro-area aggregate financial cycle (Figure 12).

Table 3: Financial cycles - pairwise correlations

year < 1999	North	Centre	South
North	1		
Centre	0.5763	1	
South	0.4802	0.7924	1
EA	*0.7395*	*0.9406*	*0.8909*

year > 1998	North	Centre	South
North	1		
Centre	-0.7538	1	
South	-0.7137	0.9599	1
EA	*-0.6889*	*0.9813*	*0.9922*

1998 < year <2008	North	Centre	South
North	1		
Centre	-0.8461	1	
South	-0.5908	0.4379	1
EA	*-0.5512*	*0.5447*	*0.9643*

year > 2007	North	Centre	South
North	1		
Centre	-0.8747	1	
South	-0.6883	0.953	1
EA	*-0.7575*	*0.9787*	*0.9948*

Figure 10: Summary indicator of Financial Cycles – Individual countries vs. EA (red line)

Germany (blue line) — *Netherlands (blue line)*
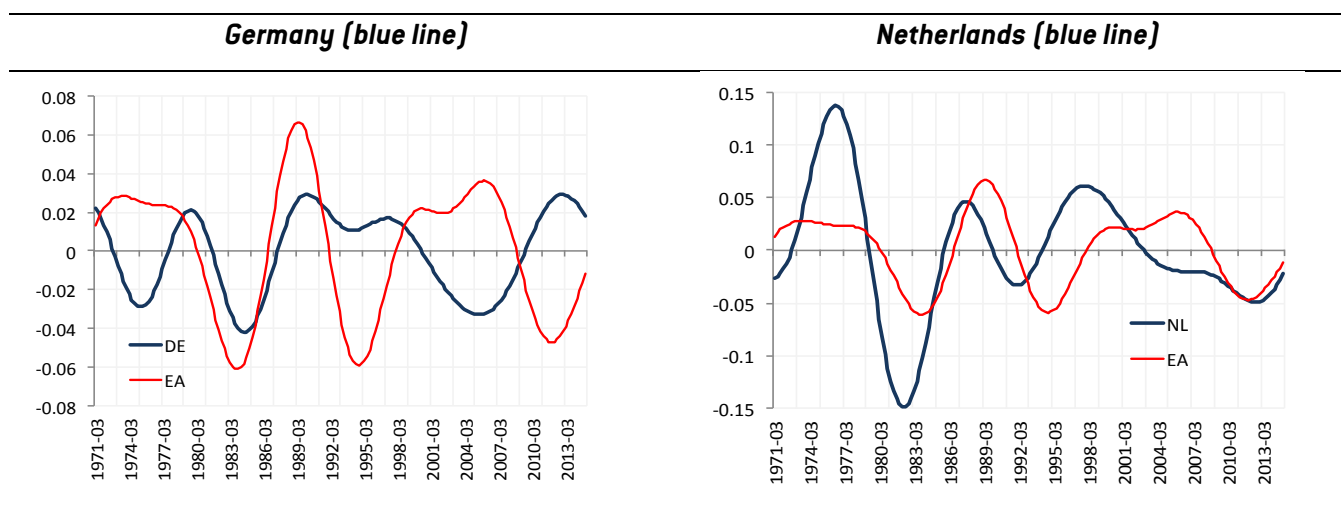
Figure 11: Summary indicator of Financial Cycles – Individual countries vs. EA (red line)

Spain (blue line)	*Ireland (blue line)*
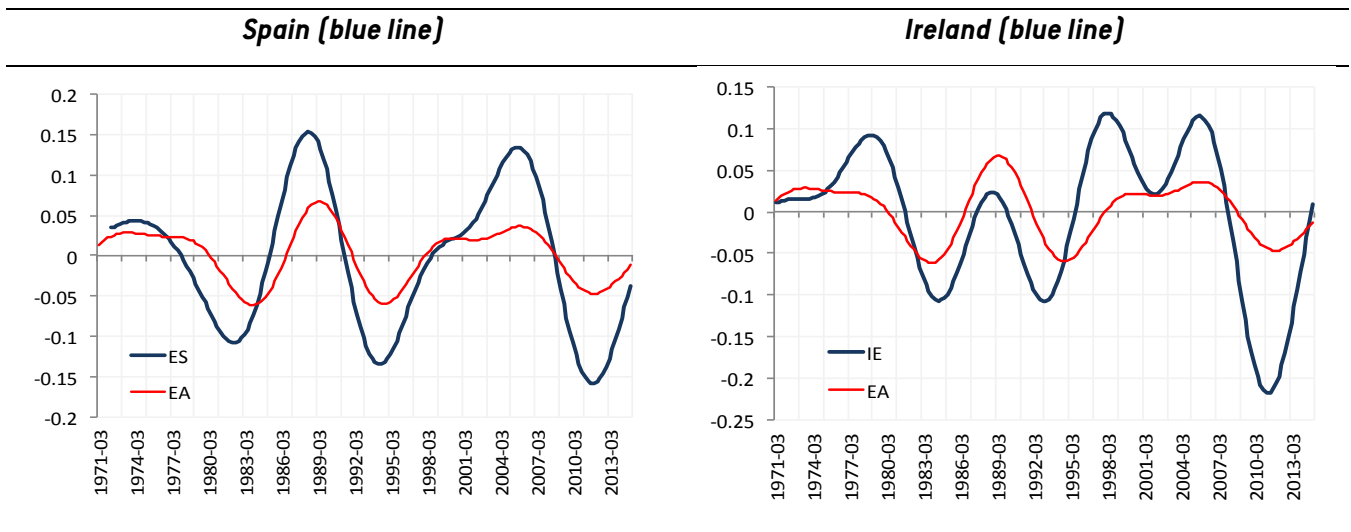
Figure 12: Summary indicator of Financial Cycles – Individual countries vs. EA (red line)
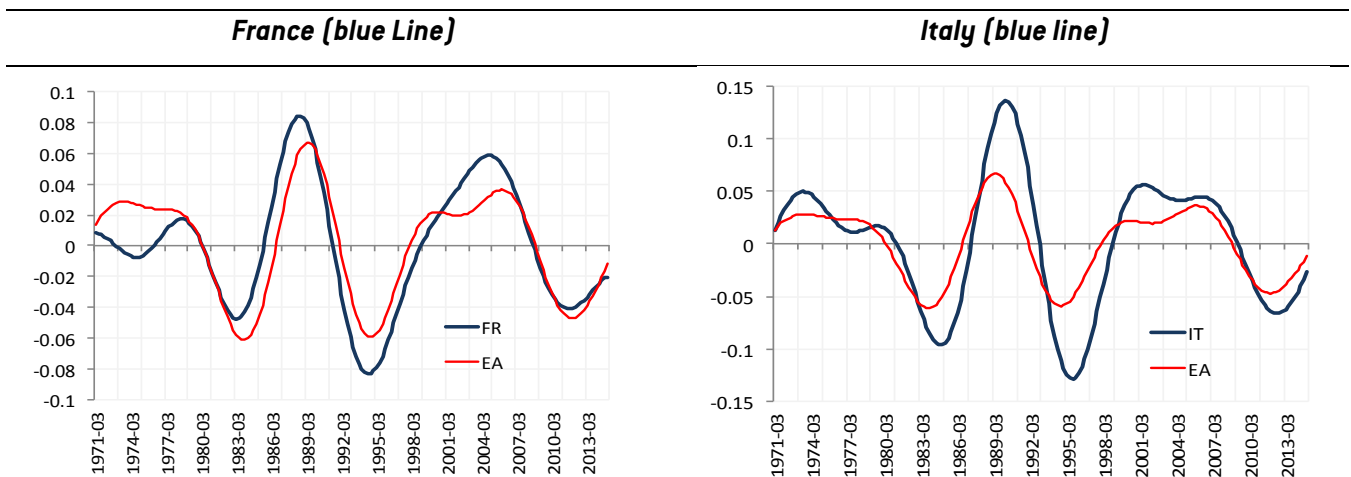
France (blue Line)	*Italy (blue line)*

Note: real bank credit to domestic private sector, year-on-year growth (BIS, National Sources, IMF and own calculations).

1.4   Developments outside the euro area

Section 1.3 showed the existence of significant differences in the domestic financial cycles of euro-area member states. To understand whether this phenomenon was peculiar to euro-area countries, here we replicate the analysis for selected EU non-euro area countries. Data is less readily available for non-euro area countries, especially those countries that joined the EU in 2004 and after. Computation of financial cycles requires very long time series, so it is only possible to replicate the analysis of the previous section for the UK, Denmark and Sweden.

Comparing real credit cycles for the UK, Denmark and Sweden with the previously estimated credit cycle for the euro area yields an interesting result (Figure 13). Perhaps somewhat strikingly, these four credit cycles have been very similar since the early 1990s. Credit cycles in the UK, Denmark and Sweden have been closer to the euro-area cycle than the domestic credit cycles of euro-area member states have been. This suggests that credit developments for the euro area as a whole (i.e. considered as it were a single country) were very much in line with what was going on in the rest of the EU. The picture is less clear in terms of house-price cycles (Figure 14), for which developments appear more diverse. But housing markets are very national markets and differences in house-price cycles in different countries can reflect structural country characteristics (ECB, 2015; European Commission, 2011). Thus, it should not be surprising that cycles in house prices appear more idiosyncratic than credit cycles.

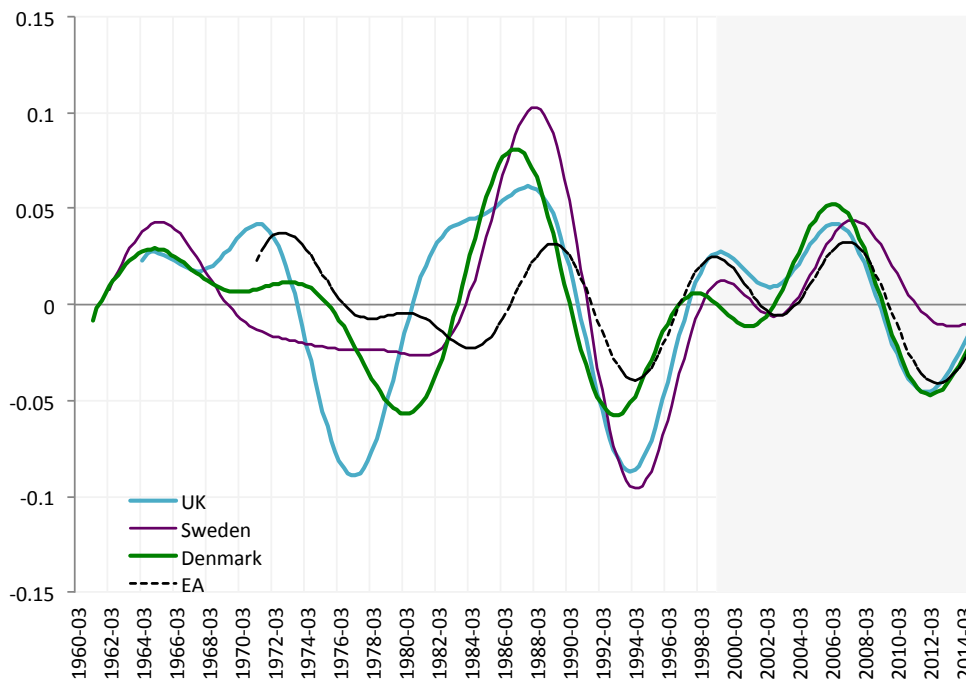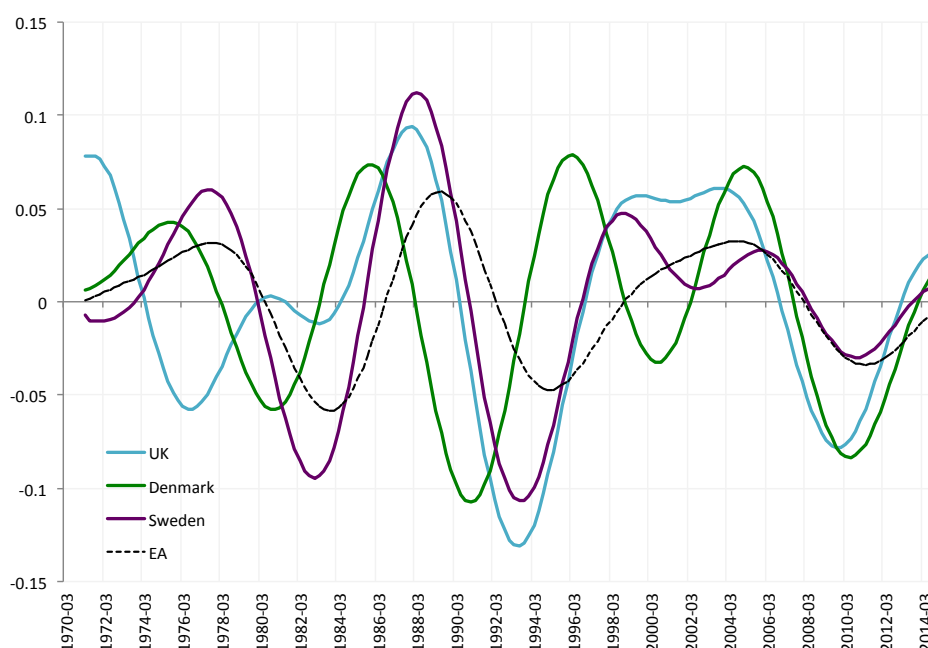**Figure 13: Real credit cycles – UK, Denmark, Sweden, Euro area**

Figure 14: Real house price cycles – UK, Denmark, Sweden, Euro area

Sources: Bruegel based on data from BIS, IMF and AMECO.

Overall, the financial cycle analysis conducted in this paper has established two facts that are important from a policy perspective. First, the euro area has a financial cycle, like any standalone country. Over the last decade, this cycle has been 'well-behaved', fluctuating very moderately. The credit cycle of the euro area as a whole (i.e. considered as if it were a single country) has been very much in line with credit cycles in other big EU non-euro area countries, such as the UK, Denmark and Sweden. Second, behind this smooth cycle, individual countries' positions diverged substantially within the euro area. For Germany and the Netherlands, 1999 marked the turn of the cycle into a contraction phase that lasted till very recently. For countries in the South the opposite happened, and currency unification is associated with the start of a big expansion. France and Italy experienced more moderate fluctuations and remained closely aligned with the euro-area cycle. These results are valid for cycles in credit and house prices, and for a summary indicator combining the two.

2 Explaining the divergence of financial cycles within the euro area

Why did countries' financial cycles diverge so markedly, within the euro area? Before 2000, whenever the cycle of the euro area as a whole was in an expansion (or contraction) phase, it tended to be the result of all countries being in an expansion (or contraction) phase. Since 2001, this has no longer been the case. The origin of financial cycles' divergence appears to be very closely associated with the introduction of the euro. As a matter of fact, this divergence is deeply rooted in what would have been considered, until not too long ago, the greatest success of the single currency, i.e. financial integration and the cross border capital flows spurred by it.

2.1 The euro, interest rates convergence and cross border lending

Over the three past decades, significant financial integration happened at a global level, as a result of many countries liberalising their financial accounts and of the surge in financial innovation. Lane and Milesi-Ferretti (2006) show that financial integration for industrial countries increased by a factor of seven, from 45 percent in 1970 to over 300 percent in 2004. The introduction of the single currency, however, made the process even more rapid and sizable in the euro area.

There are generally two ways to measure financial integration: price indicators and quantity indicators. Price-based integration is usually assessed looking at dispersion of interest rates/spreads or assets return differentials (Baele *et al*, 2004)[10]. Quantity-based measures build on indicators of cross-border activity such as capital flows or stocks of external assets and liabilities, and are helpful to investigate the extent to which investors internationalise their portfolios.

Price-based indicators show a rapid increase in financial integration in the run up to the introduction of the euro. The no-arbitrage condition would require that interest rate differentials across countries reflect expected exchange rate fluctuations and differences in risk premia for financial instruments. Currency union removes, by definition, the risk of exchange rate fluctuations. As a consequence, the interest rates for financial instruments with similar characteristics should be similar in members of the monetary union.

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[10] Price-based measures of financial integration rely on the idea of the 'law of one price', according to which assets that have similar characteristics should be priced similarly in different countries. In a context of perfect financial integration, we should not observe discrepancies in asset prices or returns that can be traced back to the geographical origin of the assets.

Before currency unification, differences in benchmark rates reflected different monetary policy rates and the exchange rate risk, as well as differences in countries' macroeconomic fundamentals (De Sola Perea and Van Nieuwnhuyze, 2014). The anticipation of the introduction of the euro was associated with a rapid convergence of interest rates on the sovereign bond market suggesting that – once the exchange rate risk was eliminated and monetary policy centralised – financial markets priced equally the country risk of different members of the monetary union, as if they had identical fundamentals (an assumption that was strongly reconsidered during the crisis).

Figure 15: Euro area: pre and post euro inter-bank rates (3 months)
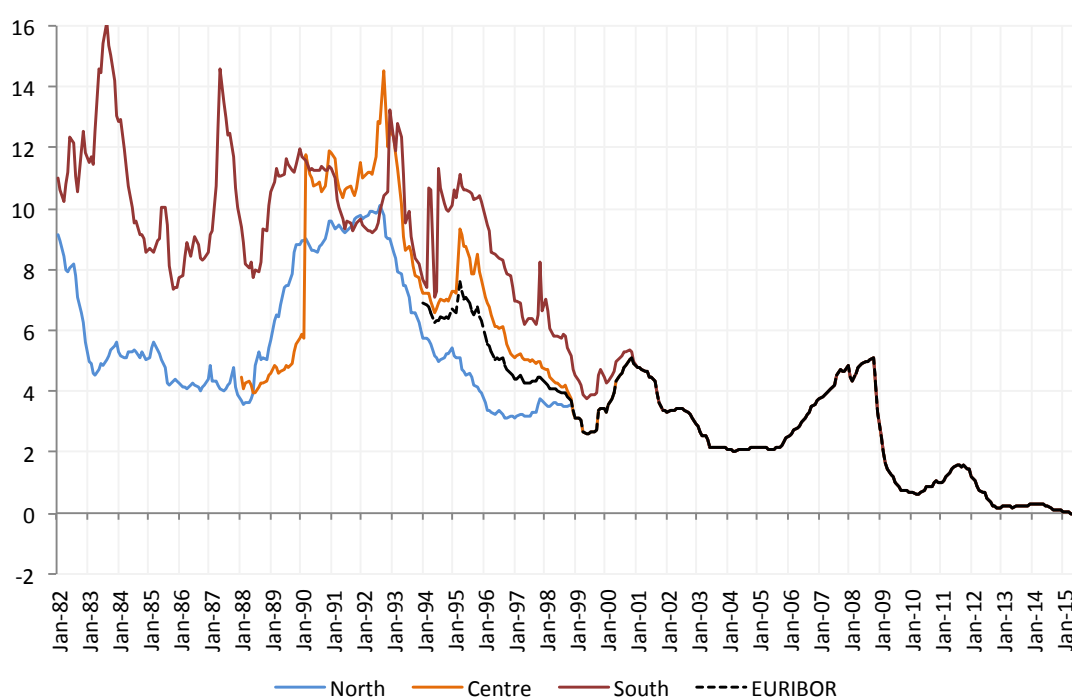
Source: Bruegel based on data from Datastream and National central banks.Note: it is not immediate to find pre-euro interbank rates, as many central banks don't publish them any longer, or at least not at all maturities. Here, 3-months rates are used because this is the maturity for which pre-euro rates are still available for the largest number of countries. North = Austria, Finland, Germany, the Netherlands; Centre = France, Italy; South = Greece, Spain Portugal.

This rapid and sizable process of financial integration was a key factor behind the divergence of countries' financial cycles within the euro area. The cross-country convergence of benchmark interest rates induced by monetary policy unification translated in fact into very different credit developments at the country level.

Convergence was not limited to the interest rates on government bonds, but also visible in money market and interbank rates, which differed significantly before 1996 (Figure 15). Sovereign and interbank rates represent the benchmark for interest rates charged by banks on their lending to the private sector. Thus, interest rates charged by banks on loans to non-financial corporations and households also converged markedly in the second half of the 1990s, towards a lower bound represented by rates in the North group of countries (Figure 16).

The rapid downward convergence of retail interest rates fuelled credit demand in the South, because borrowing from banks had literally never been cheaper in these countries. On the other hand, banks were now able to meet the higher credit demand, because the currency union expanded their funding pool significantly beyond national borders. They were now part of an integrated euro-area wide financial market, in which the cost of funding had significantly dropped and cross-border risk seemed to have vanished.

Figure 16: Euro area: pre and post euro rates on bank loans to NFCs
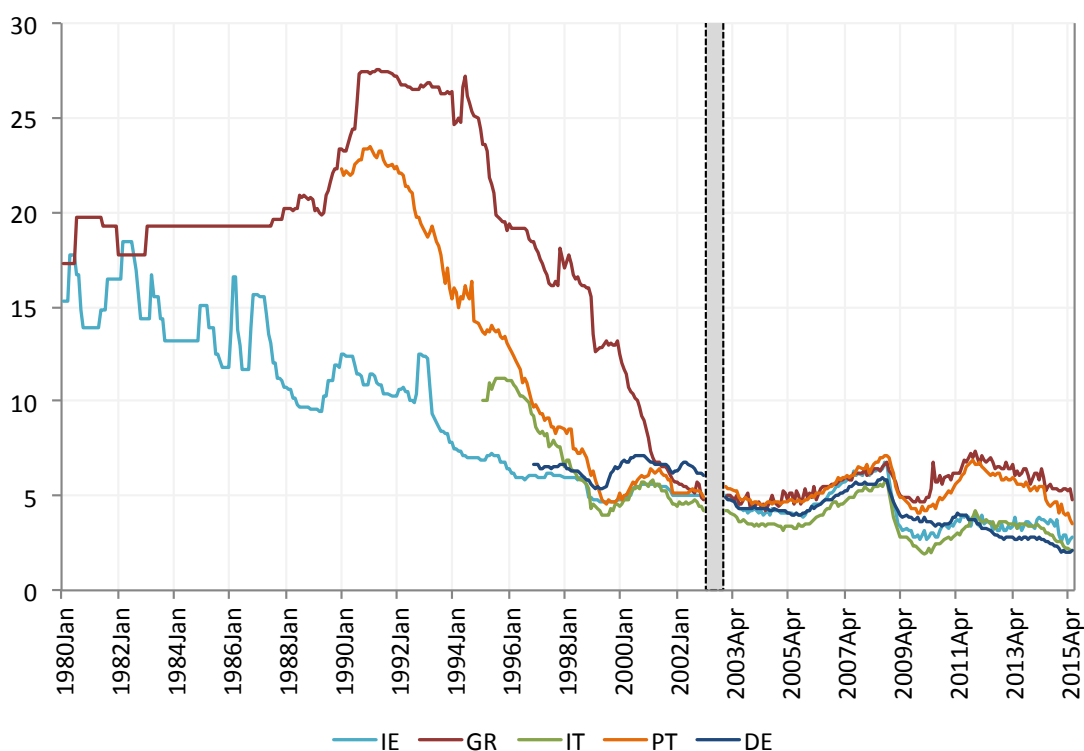
Source: Bruegel based on data from National central banks. Note: pre-euro data is only available for few countries. In 2003 a new series of interest rates was computed: the break in the figure serves as reminder that the two series may not be fully consistent.

Quantity-based indicators of financial integration show indeed a massive increase in euro-area bank lending activity after the introduction of the euro. The outstanding amount of loans to euro-area borrowers from euro-area banks doubled, between 1999 and 2008, whereas holdings by euro-area banks of debt securities issued by euro-area issuers more than doubled (Merler, 2013; Darvas *et al*, 2014).

This increase in bank lending was mostly driven by an explosion in cross-border activity, in particular intra-area[11] lending. Loans granted by euro-area banks to residents in other euro-area countries almost tripled over 10 years, whereas loans granted to domestic borrowers 'just' doubled[12] (Figure 17). A sector breakdown would show that bank cross-border lending was mostly wholesale activity (Sapir and Wolff, 2013): about 80 percent of banks' loans to other euro-area borrowers were directed to other banks in other euro-area countries, while retail banking remained a predominantly domestic activity.

2.2 Funding the credit cycle: financial integration, capital flows and domestic credit development

The integration of the interbank market gave euro-area banks access to a euro-area wide deposit base. This was a key factor for banks in the South to be able to finance credit growth well beyond the growth of their 'core' deposit base[13]. The funding gap was filled by non-core liabilities, i.e. liabilities vis-à-vis domestic non-bank financial institutions, borrowing from foreigners and issuance of banks debt securities[14]. For banks in the South, this measure of non-core funding grew from 34 percent in 1997 to 60 percent of total funding in 2008. The increase is mostly attributable to an expansion in intra-euro area non-core deposits, which grew by three times between the early 2000s and the crisis. The link between external borrowing and domestic credit growth is evident in Figure 17. Domestic credit growth in the years immediately after currency unification was significantly above the growth of core deposits, and more in line with the pre-crisis growth pattern of non-core liabilities.

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[11] The Eurosystem provides statistics on cross-border loans and securities holdings of euro area banks, but these only distinguish between 'domestic' and 'other euro area'. Loans and holdings vis-à-vis the rest of the world are aggregated into a single category called 'external assets'. Some, but not all, of the national central banks do provide a disaggregation by instrument of the assets vis-à-vis the rest of the world (which are used later in the analysis). So for comparability purposes in this paragraph the analysis is restricted to ECB data, looking only at 'domestic' versus 'other euro area' positions.

[12] It's important to point out that these figures also include bank loans.

[13] Defined here as domestic deposits of households and non-financial corporations.

[14] This definition follows Shin *et al* (2011).

Figure 17: South: banks' credit, core and non-core funding – 4-quarters growth rate (%)
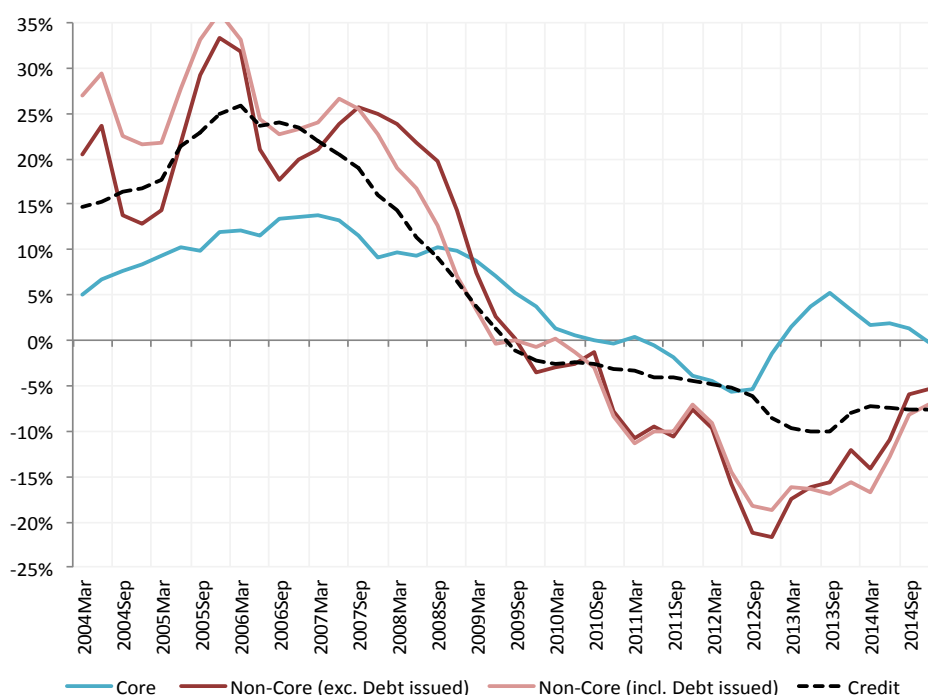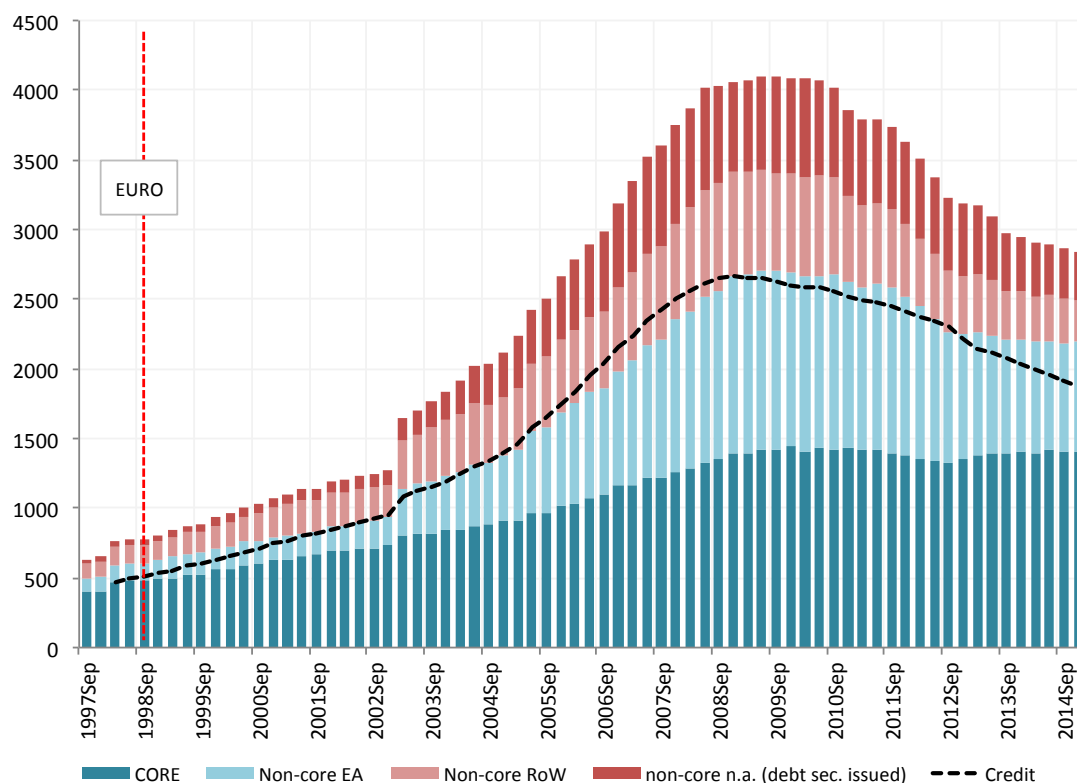

Source: Bruegel based on ECB and BIS data. Note: there are data limitations for Ireland, as highlighted in the previous figure. Since the growth rate would be significantly more sensible than the stock to the inclusion of a new country, only covers the period for which data for all countries are available (ie 2003 on).

In June 2008, before the crisis, core deposits accounted for only 48 percent of the outstanding stock of banks' credit to the domestic non-financial private sector in the South. The remaining 52 percent was matched by intra-euro area non-core liabilities, mostly banks' borrowing from banks in other euro-area countries (Figure 18)[15].

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[15] Banks' heavy reliance on intra-euro area liabilities increased significantly the financial stability risk associated with the financing of pre-crisis credit boom. Shin *et al* (2011) find evidence that various measures of non-core liabilities, and especially the liabilities to the foreign sector, serve as a good indicator of the vulnerability to currency and credit crises, because banks' non-core liabilities, especially non-resident deposits, are by nature more volatile than core liabilities. The point is even more valid in the context of a currency union, where capital movements are completely free, there is no exchange rate risk and cross-border investment can be reverted especially fast. This became clear during the crisis, when countries in the South experienced strong outflows of private capital which, absent the ECB liquidity provision and EU/IMF programme money, would have qualified as a full-fledged sudden stop (Merler and Pisani-Ferry, 2012).

Figure 18: South: bank credit to private sector vs. banks' core and non-core funding, broken down geographically

Source: Bruegel based on ECB data.Note: data for Ireland on non-core funding from rest of the world (RoW) are only available since 2003, so Ireland in only included starting from that date. This is the reason why a jump appears on the chart around that date). Core deposits include domestic households and non-financial corporations' deposits. Non-core includes all deposits from other domestic non-bank financial institutions as well as deposits from non-residents and debt securities issued. Non-core deposit are broken down into external funding coming from within the euro area and from outside, while this is not possible for debt securities issued.

The existence of a strong relationship between domestic credit growth and international capital flows is an established fact (Lane and McQuade, 2012). From the perspective of conducting macro-prudential policy in a monetary union, however, what matters is the geographical provenance of these flows. Macro-prudential policy could not (and should not) limit in any direct way flows that were internal to the monetary union. If these flows are responsible for the build-up of financial instability, then the single currency significantly complicates the life of a macro-prudential authority.

Hale and Obstfeld (2012) analyse the geography of international debt flows up to 2008 and provide evidence that after the currency unification, core EMU countries increased their borrowing from outside of EMU and their lending to the EMU periphery. Hobza and Zeugner (2012) constructed a new database

of bilateral external assets and liabilities[16], which allows a bilateral breakdown of external flows and stocks for FDI, portfolio equity, portfolio debt and other investment[17]. Using Hobza and Zeugner (2012) bilateral data, we are able to shed more light on the relationship between pre-crisis domestic credit growth and capital flows.

The left panel of Figure 19 plots the change in domestic credit-to-GDP against the change in net external debt-to-GDP over the period 2003-08 for the eleven euro-area countries considered in this paper, with the exception of Ireland[18]. As found by Lane and McQuade (2012), the correlation is very strong over this period. The reason for choosing net debt rather than the total financial account is that financial integration in the euro area was mostly a tale of debt integration. Using the Hobza and Zeugner (2012) database, it is possible to see that debt instruments accounted on average for 64 percent of external assets and 67 percent of total external liabilities over the period 2002-12, across the 11 euro-area countries considered in this paper[19].

This correlation is not a new finding, and it suggests that those countries where domestic credit-to-GDP was growing more were also experiencing the worst deterioration in external net debt position. More interesting results emerge when breaking-down the total changes in external net-debt bilaterally, i.e. vis-à-vis different partners. This shows that the existing pre-crisis correlation between domestic credit growth and growth of external net debt was almost entirely determined by external positions vis-à-vis other euro-area members (Figure 19, right). The correlation between domestic credit growth and growth of net debt vis-à-vis the rest of EU or rest of the world was significantly weaker (Figure 20, left and right)[20].

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[16] Following Waysand *et al* (2010).

[17] The author is grateful to Hobza and Zeugner for sharing the restricted version of their dataset, which allows a more detailed breakdown than the published version.

[18] Following Lane and McQuade (2012), we exclude Ireland from this analysis, as it is a very big outlier.

[19] This fact is not without consequences: Schoenmaker and Wierts (2015) develop a small model illustrating how debt financing can amplify financial shocks within the economy.

[20] The same findings hold when total NIIP is used, although all correlations tend to be weaker.

Figure 19: Domestic credit vs. private net debt (stocks) vis-à-vis different partners 2003-2008
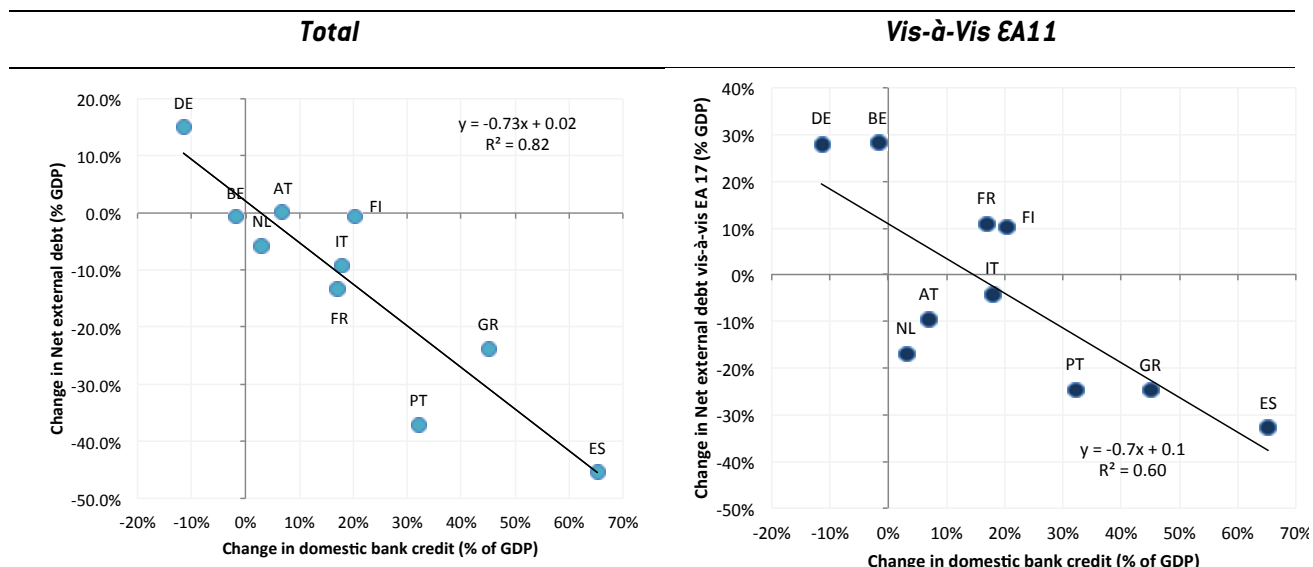
Total	Vis-à-Vis EA11

Figure 20: Total Net Debt Position (stocks) vis-à-vis different partners

Vis-à-Vis rest of EU	Vis-à-Vis rest of the world
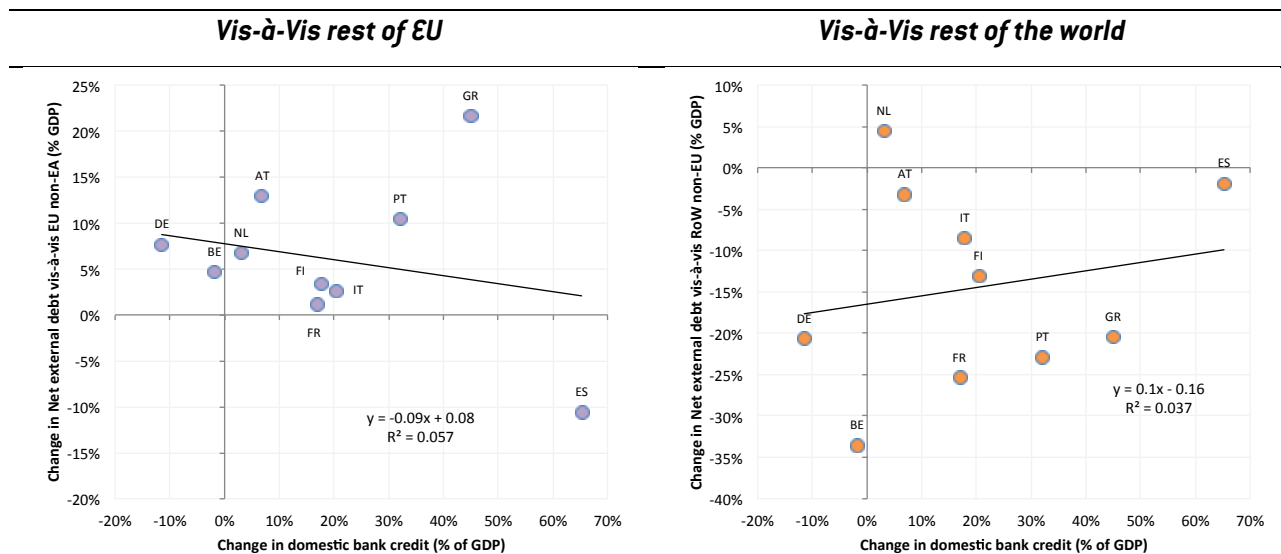
Source: Bruegel based on Hobza and Zeugner (2012), BIS.

The evidence presented in this section suggests that the divergence in credit and financial cycles documented in Section 1 was strongly associated with the increase in cross-border capital flows (in particular debt flows) that were internal to the monetary union. In southern countries, the unprecedentedly low interest rates fuelled a credit demand boom, which banks were able to fund by borrowing from banks in other euro-area countries, at unprecedentedly low cost. This is reflected in the explosion of cross-border inter-bank lending, in the increase in banks' intra-euro area non-core

liabilities and in the strong correlation between domestic credit growth and intra-euro area debt liabilities.

These findings point to specific challenges for the set-up of macro-prudential policy in the euro area, in order to ensure that it is effective in preventing financial stability risk, while remaining compatible with a monetary union in which capital flows are free by definition, and where intra-area capital flows are found to play such an important role in shaping countries' financial cycles.

3   The macroeconomic counterpart of financial cycle divergence

From a macroeconomic point of view, the divergence in financial cycles had its counterpart in the disanchoring of domestic savings and investment in euro-area countries. Back in 1980, Feldstein and Horioka (1980) highlighted the existence of an economic 'puzzle' for financial integration. Running a cross-country regression of domestic investment rates on domestic savings rates, they found a large, positive coefficient, contradicting the theoretical prediction for a frictionless open economy. They interpreted this as a sign that sizable financial frictions existed in reality in international capital markets, hindering capital flows and indirectly limiting risk sharing across countries.

In 2002, three years after the introduction of the euro, Blanchard and Giavazzi (2002) documented persistent current account divergences and a significant drop in the correlation between national investment and national savings, in euro-area countries. This finding was consistent with what theory would predict for countries undergoing a strong process of financial integration. Table 4 updates and extends the analysis in Blanchard and Giavazzi (2002). The first column reports the coefficients of a regression of national investment on national savings in percentage of GDP, estimated from a panel of the 11 euro-area countries considered in the rest of this paper, over three sub-periods between 1975 and 2012[21]. As a comparison, the same analysis is also run for a panel comprising 27 EU member states and for the EU as a whole.

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[21] The coefficients have been obtained following Blanchard and Giavazzi (2002), who used data up to 2001. A consistency check has been previously performed, replicating the exact analysis of the paper and is available in the appendix.

Table 4 Correlation of national savings and investments (Feldstein-Horioka coefficients)

| Period	11 EA countries (panel)	EA as a whole (aggregate of 11 countries)	27 EU countries (panel)	EU as a whole (aggregate of 27 countries)
1975-1998	0.33*** [0.077]	0.46** [0.175]	0.11 [0.079]	0.26** [0.111]
1999-2007	-0.08* [0.040]	0.73*** [0.061]	0.09** [0.042]	1.06*** [0.48]
2008-2014	0.23*** [0.068]	0.45 [0.933]	0.28** [0.052]	0.82 [0.96]

Source: Bruegel using data from AMECO ESA 2010. Note: the classification of several items affecting savings and investment accounting were changed last year with the release of the new ESA2010 that we use. Results for the Euro area using ESA 1995 are available in the Annex, which indicate broadly similar findings, which are actually stronger in terms of significance. Parenthesis include Huber-White robust standard errors. EA and EU composition changed over time, but here we consider it fixed, because some countries entered the EU/EA within the time intervals that are considered in Table 1, not exactly at beginning or end of it.

The regression shows that for euro-area members, cross-country saving-investment correlation was positive and significant until 1998, it became negative and significant between 1999 and 2007, and became again positive and significant during the crisis. The second column of

Table shows the correlation of aggregate savings and investment for the euro area as a whole, i.e. considered as a single country. The picture looks very different: at the aggregate euro-area level, no decoupling of savings and investment is evident over the period 2000-08. The correlation remained always positive, strong and significant until the crisis, while after 2008 the coefficient loses significance. This is consistent with the fact that the euro area as a whole ran a balanced financial (and current) account over the decade preceding the crisis, while it has recently started to run a persistent financial account deficit.

Table 4 also shows that the disanchoring of savings and investment in the period between 1999 and 2007 is stronger in the case of the euro area than for the EU. The only negative parameter is found for the panel of 11 euro-area countries (-0.08), while for the EU countries the parameter estimate is positive, though rather small, 0.09. For the euro area as a whole and for the EU as a whole, the parameter estimates are positive and rather large, 0.73 for the euro area and 1.06 for the EU.

Figure 21: Savings-Investment Correlation in the EA and EU, 1980-2014 (Estimated correlation coefficients)
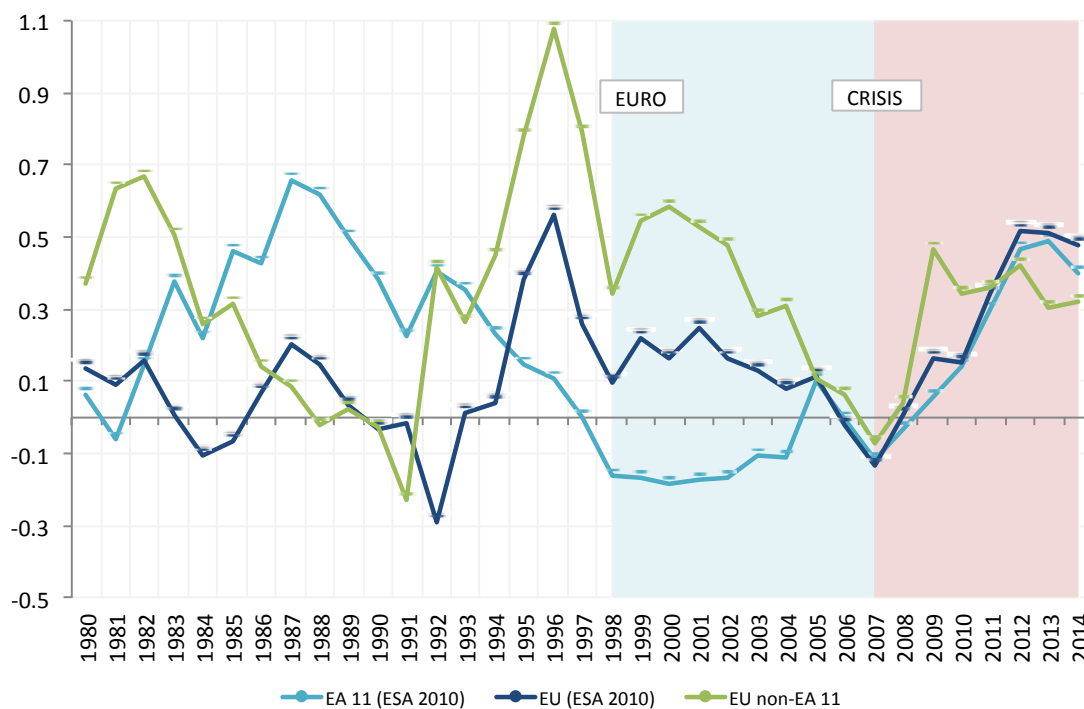
Source: Bruegel based on data from AMECO. Note: EA 11 includes the EA countries considered throughout all the paper, i.e. Austria, Belgium, Germany (West Germany, before 1990), Ireland, Greece, Spain, France, Italy, Netherlands, Portugal, Finland. Data for all these countries are available in AMECO since 1960. EU includes all the 27 EU member States. Data for some EU countries are not available for the earlier years (some of these countries did not even exist before). In particular, data in AMECO are available since 1980 for Poland, Romania and Hungary; since 1990 for Bulgaria and Czech Republic; since 1991 for Slovenia; since 1992 for Latvia and Lithuania; since 1993 for Estonia and Slovakia. The country composition of both EA and EU varied over time; here the groups are fixed to ensure comparability with Table 1.

Figure 21 plots the individual correlation coefficients obtained from yearly regressions for the EU as a whole and for the two subgroups composed of the 11 euro-area countries considered in this paper versus the other countries. It clearly shows that the pre-crisis negative savings-investment correlation has been a characteristic feature of euro-area countries, and it follows a gradual decline in correlation started in the early 1990s. Similar disanchoring can be observed for non-euro area countries, for which an approximately 0.5 correlation coefficient around 2000 gradually declined below zero for 2007[22]. Incidentally, it is interesting to notice that savings-investment correlation started to decline well before the single currency was effectively introduced, starting in 1992, when the Treaty of Maastricht was signed. The Treaty established the completion of the EMU as a formal objective, so this suggests the existence of a significant anticipation effect connected to financial integration and the single currency.

This pattern for euro-area countries is consistent with what shown in the previous sections. Monetary policy unification in 1999 induced the convergence of interest rates at very low levels. This translated into the divergence of credit cycles across countries, with credit growth booming in the South and stagnating in the North. The elimination of the exchange rate risks spurred massive intra-euro area capital flows (documented in Section 2), which allowed credit supply in the South to expand beyond the domestic deposit base and meet credit demand. In those countries, the inflow of foreign capital allowed investment to disanchor from national savings and expand significantly beyond it. As a result, the current account balance (which represents the difference between national savings and investments) went persistently deeper into negative territory. Northern countries instead were net savers over the same period. National savings remained above national investment in the North (as reflected in the increase in current account surpluses) and these excess savings were channelled abroad (to the South). Figure 22 shows that there is indeed strong correlation between the pre-crisis dispersion of credit growth and the pre-crisis dispersion in current accounts, across euro-area countries. And Figure 23 shows that in the South, the evolution of current account as percentage of GDP mirrored the evolution of credit to GDP.

Figure 22: Dispersion in credit vs. dispersion in current account

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[22] Since the central and eastern European countries joined the EU in 2004/2007, it is interesting to note that correlation also declined parallel to their EU accession.
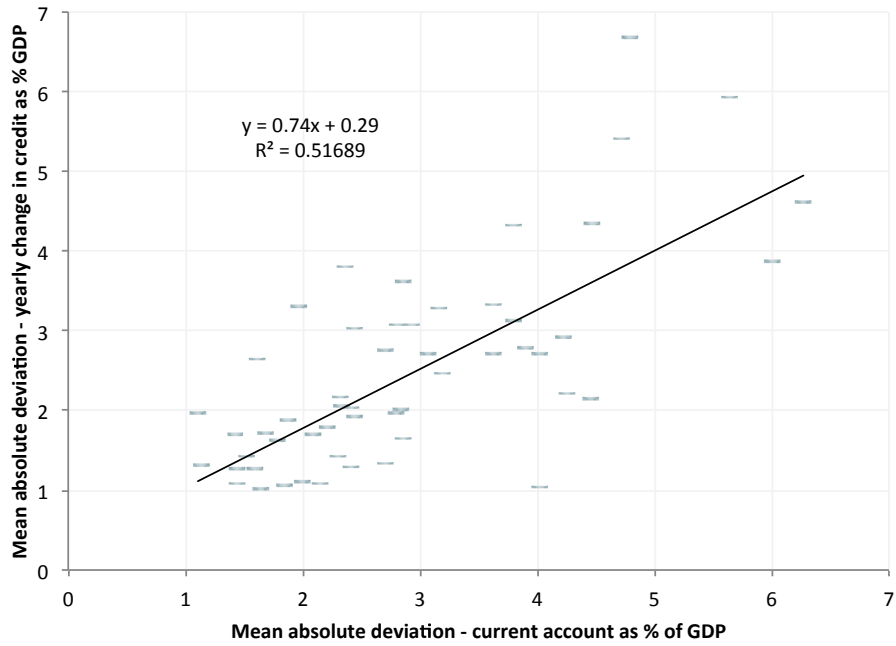
Figure 23: South: domestic credit vs. domesticsavings/investment gap
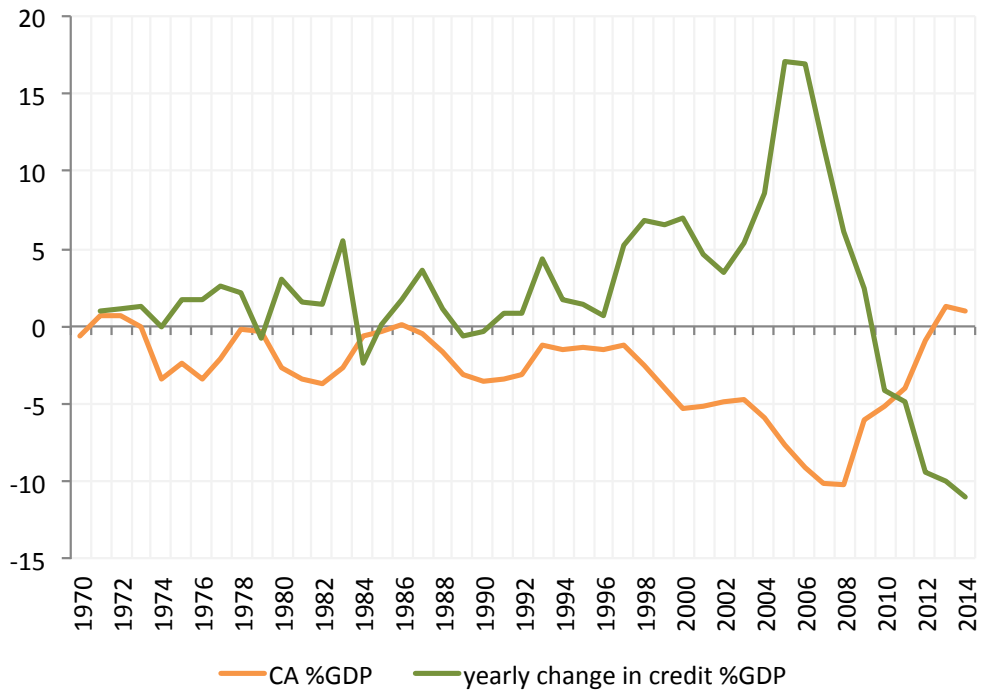
Source: Bruegel based on data from AMECO and BIS.

The correlation between domestic savings and investment started to increase again in 2008 both in the euro area and in non-euro area countries, it became positive again in 2009, and in 2012 it reached its 1993 level. This is consistent with the disruption of financial integration both in the euro area and in

central-European EU member states since 2008, and with the consequent financial account adjustment. Interestingly, the pre-crisis capital flows and their reversal within the euro area are similar to developments observed in central and eastern European EU member states, although the impact was different because the absorption function played by the ECB in the euro area (Alcidi and Gros, 2013).

The belief that current account imbalances within a monetary union would be harmless was proved wrong by the crisis. There are two reasons for this. First, models establishing the optimality of a succession of current account deficits implicitly assume that the inter-temporal budget constraint is satisfied, so that the accumulation of foreign liabilities is matched by future surpluses. Giavazzi and Spaventa (2010) show that fulfilment of that condition constrains the destination of foreign capital inflows even in a currency union. Section 2 showed that intra-euro area capital flows financed the boom of credit in the South, and Figure 6 in Section 1 showed that the bulk of this credit ended up in non-tradable construction and real estate, casting doubts on the fulfilment of this inter-temporal solvency constraint. Second, the fact that the growth of macroeconomic imbalances was financed mostly via capital flows that were internal to the monetary union and thus could not be limited in an explicit way, made it especially prone to the risk of reversal. This became evident in 2010-12, when countries in the South of the euro area effectively underwent a balance-of-payment crisis with capital flights that would have qualified as fully fledged sudden stops, without the ECB liquidity provision (Merler and Pisani-Ferry, 2012).

4 Macro-prudential policy in the euro area: rationale and special challenges

This paper has established several facts that are especially relevant from the perspective of macro-prudential policy, for which the financial cycle constitutes an important 'target'[23]. Based on these results, this section reviews the rationale for macro-prudential policy in the euro area and the special challenges for the set-up of macro-prudential policy in a heterogeneous monetary union.

4.1 Rationale for macro-prudential policy in the euro area

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[23] According to Smets (2013), macro-prudential policy should have four intermediate targets: mitigate and prevent excessive credit growth and leverage, mitigate and prevent excessive maturity and liquidity mismatch, limit excessive exposure concentrations and finally limit bail-out expectations.

The objective of macro-prudential policy can be described as limiting the risk of widespread disruptions to the provision of financial services, and thereby minimising the impact of such disruptions on the economy as a whole (Columba *et al*, 2011). System-wide risk can arise because of existing interconnections in the financial system, creating the pre-requisites for contagion across institutions and potentially across countries. Micro-prudential policy, which looks at financial institutions individually, is necessary to limit individual risk but might not be sufficient to ensure stability of the system as a whole.

While being an objective of global relevance, preserving financial stability is even more important in a context in which cross-country financial linkages are strong and deep, such as in the euro area. The original design of EMU did not include tools to prevent (or deal with) non-fiscal imbalances, and financial instability was not perceived as a significant risk. *Ex post*, this view proved short sighted. During the crisis, the cross-border capital flows spurred by the introduction of the single currency became highly destabilising, and the financial integration achieved since 1999 was severely harmed. In light of this lesson, the set-up of an effective macro-prudential framework appears especially important for the future of the euro area. Financial integration without a comparable level of micro- and macro-prudential policy integration might in fact be prone to major reversals (see also Sapir and Wolff, 2013).

Moreover, the low interest rate environment spurred by ECB expansionary policy, while needed to stimulate demand in an economic downturn, might encourage excessive risk taking by the financial sector. This makes the exercise of strong micro-prudential supervision but also the set-up of effective macro-prudential tools in the EMU, even more necessary and topical (Claeys and Darvas, 2015). ECB Vice-President Vítor Manuel Ribeiro Constâncio drew attention to the issue in a recent speech, in which he stressed that in the case of EMU, the concern for financial stability risk stemming from low rates is made more acute by the fact that cyclical conditions are also diverging across countries. In this environment, *"monetary policy needs a complement, and that complement is macro-prudential policy"* (Constâncio 2015). Risk might be building up in the financial sector and asset prices might deviate from fundamental levels even without significant movement in CPI inflation (Schoenmaker and Wierts, 2016, make a similar point). The potential for the ECB's monetary policy to react would be limited in that case, because monetary policy targets consumer-price inflation and does not generally take asset prices into account.

In a heterogeneous monetary union like EMU, in which there are divergences in inflation dynamics at country level, the counteractive role of monetary policy is even more limited, because the central bank targets the average inflation rate. In fact, the single monetary policy might have itself played a significant role in the build-up of pre-crisis imbalances. Figure 24 shows Taylor rules computed for the South, North and Centre groups of countries, compared to the actual ECB policy rate. As noted in Darvas and Merler (2013), for several countries in the euro area, the single ECB rate was significantly different from what an optimal Taylor rule would have predicted. In particular, the actual ECB rate was consistently lower than would have been predicted for the South, driving real interest rates to low levels and thereby fuelling the credit boom.

Figure 24: Taylor Rules interest Rates vs. actual ECB policy rate
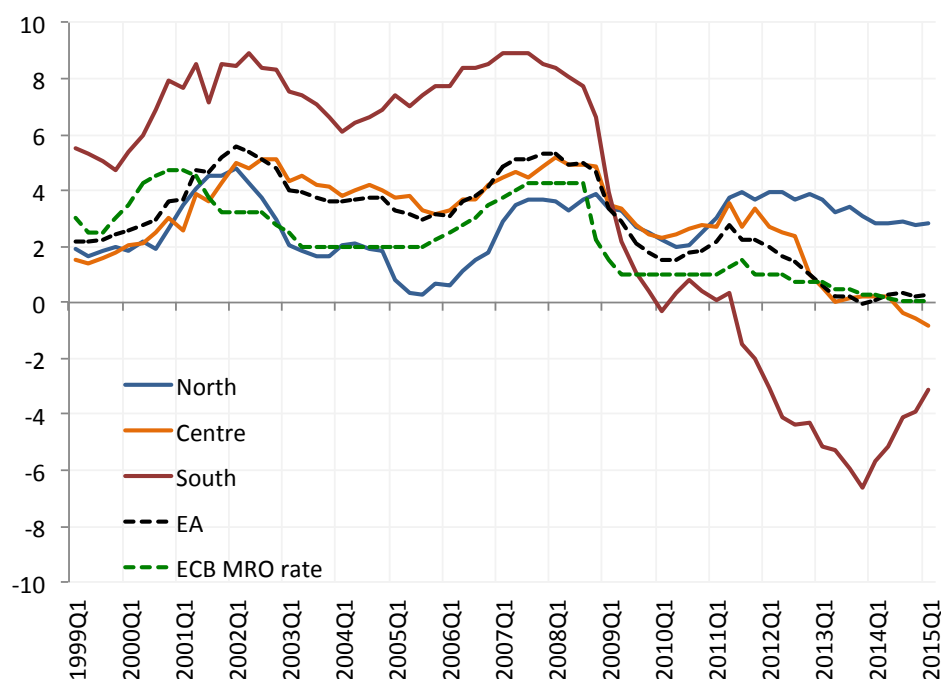
Source: Bruegel computation based on Darvas & Merler (2013).

4.2   Special challenges for macro-prudential policy in the euro area

The rationale for an effective macro-prudential policy is therefore especially strong in a heterogeneous monetary union, but research devoted to establishing the best design of a macro-prudential policy framework for the euro area has been relatively limited. The macro-prudential debate mainly takes

place in a global context, somewhat neglecting the specific features of Europe[24]. Defining the optimal macro-prudential policy setting for a monetary union like EMU poses additional challenges beyond those faced by a standalone country, some of which were highlighted in the previous sections.

The empirical analysis in Section 1 suggests that financial cycles diverged significantly at the country level before the crisis, while fluctuations at the aggregate euro-area level were very moderate. While the initial EMU-related interest rate shock will not happen again, these results are likely to continue to characterise the euro area in the future, if the single monetary policy remain suboptimal at the national level as shown in Figure 23. Then there is strong support for the idea that macro-prudential policy in the euro area should be differentiated across member states, taking into account their specificities.

Members of the currency union are subject to a common monetary policy, and in principle cannot impose direct limits/controls on the flow of capital, as emerging countries sometimes do[25]. This paper has shown that the divergence in domestic financial cycles of euro-area countries was very much driven by capital flows, and that these capital flows were internal to the monetary union. This evidently point to the existence of significant challenges for the set-up of macro-prudential policy in EMU, in order to ensure that it is effective in preventing financial stability risk, while remaining compatible with the free flow of capital.

The overlap between capital flows management (CFM) measures and macro-prudential policy measures (MPM) has been recognised by the G20[26], the Organisation for Economic Cooperation and Development and the International Monetary Fund. The primary objectives of CFMs and MPMs do not necessarily overlap. CFMs are measures designed to contain the scale, or influence the composition, of capital flows, while MPMs are prudential tools primarily designed to limit systemic financial risk and maintain financial system stability, irrespective of whether the origin of the risk is domestic or cross-border (IMF, 2012). Both the OECD and the IMF, however, recognise that there are situations when CFMs and MPMs overlap: to the extent that capital flows are the source of systemic financial sector risks, the tools used to address those risks can be seen as both CFMs and MPMs.

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[24] For very comprehensive review see Schoenmaker and Wierts (2016).

[25] There are two qualifications to this point. First, while being unimaginable earlier, the severe crisis in Cyprus has led to the introduction of payments and capital controls, which were approved by European institutions. Second, despite the establishment of the European Banking Authority, which aims to coordinate between home and host supervisors in the EU, several unilateral actions were adopted by national supervisors to ring-fence banking activities. In February 2013, the European Commission even had to issue a statement trying to limit such activities (see e.g. Bloomberg 'EU Warns of 'Disproportionate' Crackdown on Cross-Border Banking', 4 February 2013).

[26] G20 Coherent Conclusions for the Management of Capital Flows Drawing on Country Experiences (2011).

Let's take the case of a country in which capital inflows into the banking sector contribute to a boom in domestic credit and asset prices. In this case, a restriction on foreign borrowing by banks would aim at limiting capital inflows, slowing down domestic credit and asset price increases, and reducing liquidity and exchange rate risks faced by banks. In such cases, the measures are designed to limit capital inflows as well as reduce systemic financial risk and would be considered both CFMs and MPMs (IMF, 2012).

Neither the IMF nor the OECD frameworks consider countries in monetary unions, for which the use of instruments would be significantly more constrained. Handling the macro-prudential policy toolkit will therefore be especially difficult in the case of the euro area, where capital flows must be free by definition but where they have also been the most important driver of financial-cycle divergence and financial instability. One reason to ease this constraint would be to act on the underlying domestic macroeconomic imbalances that are driving the capital flows, which could be done by effectively implementing the Macroeconomic Imbalance Procedure (MIP).

5 Macroprudential policy in the euro area: tools and institutional set up

From the evidence presented in the previous sections, macro-prudential policy in the euro area faces the challenge of resolving two (potentially conflicting) goals:

- Deal in an effective way with potentially divergent financial cycles across countries, preventing the build-up of risks to financial stability from underlying domestic imbalances;

- Cater for the cross-border implications of macro-prudential policy in a monetary union, where a high degree of financial integration might induce potential cross-country spillovers from domestic policies, which domestic authorities in turn would have little incentive to internalise

These two goals appear complementary in the quest for financial stability in the euro area. But if looked at in isolation, they could lead to potentially conflicting policy prescriptions. The challenge is therefore to find a combination of tools and institutional set-up that is compatible with both.

In the euro area, the process to set up a macro-prudential policy framework started with the creation of the European Systemic Risk Board (ESRB) in 2010, gathering representatives from national central banks and supervisors from all EU countries. The ESRB was not given any direct authority over policy instruments, but has the power to issue recommendations and warnings about systemic risks to national authorities.

Recently, the regulation establishing the Single Supervisory Mechanism (SSM) conferred on the ECB some active competences in macro-prudential policy, alongside national authorities. This could be potentially an important step towards addressing the two issues mentioned above. In practice, however, the effectiveness of the new structure risks being undermined by two substantial problems.

First, the relationship between the ECB and national authorities under the SSM regulation is complex. While the ECB can express objections to measures proposed by a national authority, the authority concerned only has to *"duly consider the ECB's reasons prior to proceeding with the decision"* (Article 4a(1)). The ECB cannot block such measures. However, the ECB is given the power to apply higher requirements for capital buffers and more stringent measures than those set by the national authorities, with the aim of addressing systemic or macro-prudential risks. And again the ECB is only obliged to *"duly consider"* the objections of national supervisors, if any, but these objections do not have blocking power. In other words, the framework seems to be articulated under the principle of 'the stronger wins' (Darvas and Merler, 2013), which might give rise to uncertainty or delay, when it comes to macro-prudential policy implementation.

Second (and probably more important), the macro-prudential tools available to the ECB are more limited than the arsenal available to national supervisors, and in particular the ECB's toolkit excludes those instruments that would be the most important for macro-prudential policy in EMU.

Macro-prudential authorities rely on a series of tools that can be roughly divided into two main categories (Blanchard *et al*, 2013): tools seeking to influence lenders' behaviour, such as time-varying capital requirements, leverage ratios or dynamic provisioning, and tools focusing on borrowers' behaviour, such as ceilings on loan-to-value ratios (LTVs) or on debt-to-income ratios (DTIs).

On the lenders' side, capital-based measures already exist at the European level based on Capital Requirement Regulation (CRR)/Capital Requirement Directive (CRD IV). These include, for example, the

Countercyclical Capital Buffer (Art. 130, 135-140, CRDIV), the Systemic Risk Buffer (Art. 133-134, CRD IV) and capital surcharge on systemically important institutions (Art. 131, CRD IV). Art. 458 of the Capital Requirement Regulation (CRR) also includes Large Exposure limits, the Capital Conservation Buffer, Sectoral Risk Weights (in the residential and commercial property sectors) and Intra-financial Sector Exposures whereby higher risk weights can be set vis-à-vis financial sector exposures.

Some countries have already started implementing these measures. In the euro area, the Netherlands was among the first to introduce systemic risk buffers in July 2014. Similar measures have been adopted in Estonia, Denmark, Sweden and Austria (Constâncio, 2015). However, part of the literature assessing macro-prudential policy tools points to the existence of several problems connected to capital-based measures. Apart from the counter-cyclical capital buffer, capital-based measures tend to be applied in a static way, and more generally are found to have more indirect and limited effects on cyclical adjustments and the costs of loans (BCBS, 2010; Constâncio, 2014), which can make them less effective in restraining excessive credit demand in environments of house price appreciation.

Borrower-based instruments tend to be more used in advanced economies than in emerging ones, and there is evidence suggesting they are especially effective in reducing credit and house prices growth (Claessens *et al,* 2013; Cerruti *et al*, 2015; IMF, 2014). An increasing number of euro-area countries are introducing such measures to address the impact of low interest rates on housing market developments. Estonia has introduced limits on LTV, DSTI and maturity restriction requirements for commercial banks issuing housing loans (Constâncio, 2015). Ireland has taken the decision to place ceilings on the proportion of mortgage lending with a high LTV and LTI ratios, while the Netherlands has introduced a gradual tightening of its LTV caps, decreasing by 1 percentage point each year until the LTV reaches 90 percent in 2028 (Constâncio, 2015). Slovakia has progressively tightened the share of loans with LTV ratios and introduced a recommendation on maximum maturity and requirement for income verification and internal borrower repayment assessment for banks, and Lithuania has been implementing its Responsible Lending Regulation since autumn 2011 (Constâncio, 2015).

Borrower-based tools appear to be especially important for the effective conduct of macro-prudential policy, because of the strong link between housing and credit growth, which puts the housing market at the origin of potential financial stability risk. These tools have the advantage of allowing the regulator to target particular sectors affected by financial imbalances and can be tailored to country-specific circumstances, which is especially important in a heterogeneous monetary union like the euro

area (Claeys and Darvas, 2015). However, since they do not fall under European legislation (i.e. they are not included in CRR/CRD IV), borrower-based tools can be used in countries that included them in their national legislation, but they cannot be used by the SSM.

This level of national discretion over borrower-based macro-prudential measures is problematic, because it implies potentially significant coordination issues. The few examples quoted in previous paragraphs serve as an illustration of the degree of heterogeneity in counties' preferences regarding borrower-based macro-prudential tools. Differences in how these measures are formally codified at the national level add to this complication. In some countries, borrower-based measures are codified in the context of financial stability, while in others they fall under consumer protection law, e.g. in the Netherlands and Latvia (Constâncio, 2015). The different classification is not a mere formality, because it determines who retains the decision power over these measures at the national level. Hartmann (2015) refers to an unpublished survey by the ESRB conducted in summer of 2013, which found that 16 EU countries can potentially use LTVs, 6 DTIs, 2 LTIs and 3 payment-to-income limits, but that not all of the national macro-prudential authorities have the power to determine these limits. In countries where the primary purpose of the measures is *"consumer protection"* (3 cases) or *"bank solvency requirements"* (4 cases) other authorities might have the primary power over them (Hartmann 2015). Moreover, macro-prudential policy is not delegated to the same kind of authorities in different countries: in some countries, the responsibility falls to national central banks, in others the finance ministry or specific financial supervisors (ASC 2014). This heterogeneity implies the potential need for coordination between different types of institutions with different mandates and time horizons and, given the high political and social sensitivity of implementing borrower-based measures, the risk of paralysis and inaction is significant.

In conclusion, there appears to be a strong rationale for increasing the ECB's macro-prudential powers, for a number of reasons (Darvas and Merler, 2013; Claeys and Darvas, 2015). First, monetary policy targets CPI and not asset prices, but risk may be building up (especially in the current very low-interest rate environment) even without showing up in the CPI. Second, in a heterogeneous monetary union, monetary policy is even less able to address risks to financial stability than it would be in a standalone country and to some extent it could reinforce financial sector divergence (Darvas and Merler, 2013). Third, the ECB is in a position to internalise potentially significant cross-country spillovers. Section 1 has shown that financial cycles diverged at the country level in the euro area before the crisis, suggesting that, if this were to happen again in the future, macro-prudential policy would need to cater

for country specificities. However, as shown in Section 2, financial stability in a monetary union is a supra-national issue, and cross-country financial spillovers can be especially strong and destabilising within a single currency area in which capital flows drive the financial cycle. This is an externality that national macro-prudential authorities might fail to internalise, as the systemic dimension they are concerned with is that of their own country, not of the area as a whole.

The SSM has been given potentially relevant macro-prudential powers, but in practice these are substantially limited by the fact that the ECB cannot directly use those tools that could be most effective in preventing the build-up of financial stability risk in a low interest rate environment, because these tools are not included in EU legislation. The result is a two-tier system in which national authorities co-exist with the ECB in a relationship in which the 'stronger wins', and where the application of borrower-based tools is entirely up to the national level, with the risk of inaction because of the highly political nature of these tools. The ESRB could issue recommendations to promote consistent implementation across the EU, but they are also subject to complex 'comply or explain' mechanisms and Constâncio (2015) points out that so far, no such recommendation exists for the real estate market.

At present, the framework for macro-prudential policy in the euro area seems unfit to deal effectively with the special challenges that this policy presents in the context of a heterogeneous monetary union. One obvious starting point for improvement would be to strengthen the legal basis of the macro-prudential framework for borrower-based instruments, allowing the SSM to access this part of the toolkit that is currently left to national discretion. This would reduce the heterogeneity in the application of these tools and would limit the risk of inaction because of their politically sensitive nature, but it would necessarily require an initiative from the European Commission to open a review of the European framework under CRR/CRD IV. On top of that, the ECB should become the prime actor of macro-prudential policy in the euro area, responsible for fast, consistent and coherent application (including internalising cross-border effects), with appropriate divergences catering for national differences in financial conditions.

Conclusion

This paper aims to contribute to the European macro-prudential discussion, which is still in a relatively early phase. We investigated the relationship between the euro introduction on financial integration in

Europe, and on the behaviour of financial cycles in the euro area. Based on this analysis, we highlighted a number of special challenges for the set-up of macro-prudential policy in the euro area, stemming from the strong degree of financial integration and the free flow of capital that characterise the monetary union.

We showed that before the crisis, financial cycles diverged significantly in different euro-area countries (Section 1). Data is less readily available for non-euro area countries, but estimated credit cycles for the UK, Denmark and Sweden are found to have been closer to the euro-area cycle, than the credit cycles of individual euro-area countries. This suggests that credit developments in the euro area as a whole (ie considered as it were a single country) were very much in line with what was going on in the rest of the EU and that divergence was an internal story.

We argued that the divergence in financial cycles is deeply rooted in the financial integration that followed the unification of monetary policy. The rapid convergence of interest rates fuelled a credit demand boom in the South (section 2). At the same time, banks became able to meet this higher credit demand thanks to increased cross-border banking flows within the euro area, which were facilitated by the currency union. We showed in section 2 that the divergence in financial cycles at the country level was very strongly correlated with cross-border debt flows, and especially with the intra-euro area component of these flows. This evidence allows us to draw out a number of very relevant policy implications.

While the unique episode that followed the introduction of the euro in 1999 might not be repeated in the future, the euro area will likely remain heterogeneous, and financial and economic cycles will likely deviate in different member states. Given that monetary policy cannot be country-specific and might even reinforce the build-up of imbalances in some parts of EMU while being too restrictive in others (section 4), the rationale for an effective macro-prudential policy is especially strong.

Heterogeneity implies that macro-prudential policy will need to cater for country specificities, something that monetary policy cannot do. Yet financial stability in a monetary union is a supra-national issue: cross-country financial spillovers can be especially strong and national authorities would have little incentive to internalise them. Therefore, we see a strong rationale for entrusting the ECB with stronger macro-prudential powers, making it the prime actor in macro-prudential policymaking. While the SSM has been given potentially relevant new competences, its effectiveness

is limited by the fact that it cannot directly use those tools that could be most effective in preventing the build-up of financial stability risk in a low interest rate environment, because these tools are not included in EU legislation. The euro area's macro-prudential system is currently a two-tier system in which national authorities and the ECB have certain tools governed in a complex relationship. Coordination problems are potentially very relevant, as is the risk of inaction by national authorities because of the political sensitivity of these tools.

This framework for macro-prudential policy in the euro area is unfit to deal effectively with the special challenges that macro-prudential policy presents in the context of a heterogeneous monetary union. It should be reinforced, by allowing the ECB to adopt borrower-based tools, which require a modification of the SSM legal framework. The ECB should be the prime actor of macro-prudential policy in the euro area, responsible for consistent and coherent application (including internalising cross-border effects), with appropriate divergences catering for national differences in financial conditions.

The close link between domestic financial cycles and intra-euro area capital flows raises the question of whether macro-prudential policy in the euro area would be compatible with free flows of capital. We have shown that before the crisis, intra-euro area debt flows played a major role in shaping the evolution of domestic financial cycles. But members of the currency union in principle cannot impose direct limits/controls on the flow of capital, to curb their domestic credit cycle.

In light of this, an especially important role could be played by the Macroeconomic Imbalance Procedure (MIP), established in 2011 to monitor and deal with excessive macroeconomic imbalances in euro-area member states. Section 3 has shown that the macroeconomic counterpart of financial cycle divergence has been the build-up of significant macroeconomic imbalances. This creates a foundation for significant synergies between the MIP and macro-prudential policy. Many of the macroeconomic variables that form the MIP's 'scoreboard' for assessing the existence of excessive imbalances are also important in the context of macro-prudential early warning. If effectively run, the MIP can potentially tackle the underlying macroeconomic drivers of the financial cycle in a pre-emptive way, and ease some of the hurdles that the ECB could face in implementing effective macro-prudential policy while remaining consistent with the very essence of a monetary union.

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