

Credit cycles, external imbalances and macro-prudential policy in the Euro area

Silvia Merler

Johns Hopkins SAIS; Bruegel Think Tank

Introduction

The financial crisis has shown the cost of systemic disruptions to financial stability, prompting new interest in the study of financial cycles and in macro-prudential policy as a way to address this risk. Despite the relevance of the topic, there is hardly a consensus on the definition of financial cycle. Borio (2012) argues that the term should denote self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into booms followed by busts. While being an objective of global relevance, preserving financial stability is especially relevant in contexts of deep financial integration such as the euro area (EA). This paper contributes to the discussion by establishing a number of special challenges that macro-prudential policy needs to confront in the euro area, due to the strong financial integration and free flow of capital. We estimate credit, housing and financial cycles for the EA as a whole as well as for eleven member states and three large EU-non-euro area countries. We show that the euro area has a financial cycle like any standalone country, and that before the crisis this cycle has been smooth, while individual countries' financial cycles diverged substantially. We show that the pre-crisis credit cycles divergence in the euro area is endogenously related to intra-EA capital flows spurred by the introduction of the single currency. We also look at the relative importance of competitiveness and financial factors in explaining intra-EA current account imbalances, highlighting the importance of credit development and financial integration for the pre-crisis macroeconomic divergence. On the basis of this evidence, we draw a number of important policy implications for the conduct of macroprudential policy in the euro area.

Financial cycles in the euro area

Understanding the development of the financial cycle is key to preserving financial stability. The literature on financial cycle analysis in the European context is quite recent¹. As far as the empirical representation is concerned, two stylised features of financial cycles have been established. First, they have a much lower frequency than the traditional business cycles. 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. Second, the financial cycle appears to be most parsimoniously and effectively described by fluctuations in credit and property prices (Borio *et al*, 2012), as booming credit is often associated with housing bubbles (Claessens *et al*, 2014). In this paper we focus on credit and house prices, as the core drivers of the financial cycles. Beyond these variables, equity prices and bond yields are sometimes considered in the literature. However, 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 financial cycle analysis, but fluctuations in yields display medium/short frequencies that are likely to be more relevant for business cycles, analysed for monetary policy purposes (Schoenmaker and Wierdsma 2016).

We estimate credit cycles for the euro area as a whole, for eleven member states and for three large EU-non-EA countries. We follow the methodology in Borio *et al* (2012) and Aikman *et al* (2015), and apply a band-pass filter² to isolate medium-term credit cycles,

¹ See for example Schüler *et al* (2015), Stremmel (2015), Bezemer *et al*. (2016), Galati *et al*. (2016)

² 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 and it is a common choice in the existing literature on financial cycle. Christiano and Fitzgerald provided evidence that their filter is preferable

defined as cycles in real credit growth with duration between eight and 30 years. The same analysis is replicated on real house prices, and the information from credit and housing cycles is then combined into a summary indicator, by means of principal component analysis. Throughout the paper, countries will be aggregated into three macro-groups: South, which includes those countries that underwent a full or partial EU/IMF programme (Greece, Ireland, Spain and Portugal), North, including the crisis that were less visibly affected by the euro area crisis (Austria, Belgium, Finland, Germany and the Netherlands) and an intermediate Centre (France and Italy). The reason for this aggregation is to achieve a clearer synthetic presentation of results, but we report all individual countries' estimates in the online data appendix. During the euro area's first decade of life, credit developments in its members diverged significantly. In the euro 'South', bank credit to the non-financial private sector boomed, more than doubling in percentage of GDP between 1999 and 2009. In the North, credit tended to grow slowly, stagnate, or even decrease. In between these two extremes, the intermediate Centre including Italy and France experienced positive credit growth, faster than in the North but slower than in the South.

We estimate cycles in the growth of domestic banks' credit to the non-financial private sector in real terms³, for eleven euro-area countries⁴ over the period 1960:Q1 to 2014:Q4⁵.

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* (2015) also experiment with a Hodrik-Prescott filter and find comparable results, but they conclude that the choice of appropriate parameters is less straightforward.

³ Whenever needed and possible, series have been backdated using the growth rates from comparable series from IMF IFS or national sources. 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.

⁴ The EA countries considered are Austria, Belgium, Finland, France Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. Cycles are also estimated for Denmark, Sweden and the UK, as a comparison.

Two interesting facts emerge (Figure 1). First, the euro area has a credit cycle just like any standalone country, and this credit cycle has moved very moderately and smoothly over the last decade. Second, there has been divergence in individual countries' credit cycles within the euro area, starting around the time of currency unification. In the early Two Thousands, southern countries entered a rapid credit expansion phase, which lasted until 2008. The opposite happened to northern countries, where real credit growth turned sluggish 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 pairwise correlations, and confirms that between 1999 and 2008 the correlation between northern countries and the other groups, as well as with the euro area as a whole, dropped.

[INSERT Figure 1]

[INSERT TABLE 1]

In several countries, the surge in bank credit was closely associated with a housing boom. The divergence in credit cycles is thus reflected in different house-price developments. 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. In the Centre and South, prices increased rapidly from 1999 and decreased during the crisis. **Error! Reference source not found.** We estimate cycles in real house-prices growth using OECD data on real house prices. This data is only available from 1970:Q1 on for most of the countries and it is missing in several years for Austria and Greece, making the series too short for filtering medium-term frequencies. These countries have thus been excluded from the sample in this exercise. The estimated

⁵ The aggregate for the euro area as a whole is constructed as the sum of individual countries' positions. Data is from the BIS credit statistics. A measure of overall credit to the private sector would be preferable, but it is not available for all countries in long time-series. However, given the importance of bank intermediation in the euro area, bank credit is especially relevant from a policy perspective.

cycles of real credit and real house prices yield consistent messages, and intra-EA divergence is also evident in real house prices growth (Figure 2 in data appendix).

[INSERT TABLE 2]

Cycles in credit and house prices can be combined into a unique synthetic indicator, by means of principal component analysis (PCA), a statistical technique used to reduce multivariate data into a smaller set of components that capture the maximum amount of variance from the underlying series⁶. We use PCA to summarise into a single measure the information contained in the variance of credit and real house prices growth.

[INSERT TABLE 3]

This simple measure of financial cycle confirms the existence of a moderate cycle for the EA as a whole and the cross-country divergence starting around the time of currency unification (Table 3). Group aggregates offer an effective synthetic picture, but it is most important to look at the individual countries' cycles, which we report in full in the online data appendix⁷.

To understand whether the financial cycle divergence was peculiar to euro-area countries, we also estimate credit and housing cycles for three large EU non-euro area members. **Error! Reference source not found.** Comparing real credit cycles for the UK, Denmark and Sweden

⁶ PCA can be based on covariance or correlation matrix, in the second case a re-normalisation of the data would be involved. This is particularly important in case the series to be combined are expressed in different scales. In this paper, since the previously estimated financial cycles were already expressed in the same scale, the covariance-based PCA has been applied.

⁷ See online data appendix

and the euro area⁸ reveals that these four 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. This suggests that credit developments for the euro area as a whole (i.e. considered as if it were a single country) were very much in line with what was going on in the rest of the EU. It is especially interesting to notice that this is not only a feature of Denmark, whose currency is pegged to the euro and whose cycle could be expected to be close to the EA one. The picture is less clear in terms of house-prices⁹, but housing markets are very national and differences in house-price cycles can reflect important structural idiosyncratic characteristics (ECB, 2015).

Overall, this financial cycle analysis has established two facts that are important from a policy perspective. First, the euro area has a cycle, like any standalone country. Over the last decade, this cycle has moved smoothly. The credit cycle of the euro area has been in line with other large EU non-euro area countries. Second, behind this smooth aggregate cycle, individual countries' positions diverged substantially. Northern countries entered a contraction phase around the time of currency unification, while for countries in the South the opposite happened. France and Italy experienced more moderate fluctuations and remained closely aligned with the EA cycle. These results are valid for cycles in credit and house prices, as well as for a principal component summary indicator.

Explaining credit cycles divergence within the euro area

Why did credit cycles diverge so markedly, within the euro area? Table 1 shows that before 2000, whenever the cycle of the area as a whole was in an expansion (contraction) phase, it tended to be the result of all countries being in an expansion (contraction) phase. Since

⁸ Figure 3 in data appendix

⁹ Figure 4 in data appendix

2001, this has no longer been the case. We will argue in this section that this divergence is rooted in what would have been considered, until not long ago, the greatest success of the single currency, i.e. financial integration and the cross border capital flows spurred by it.

Over the three past decades, significant financial integration happened at a global level (Lane and Milesi-Ferretti 2006). The introduction of the single currency made the process very sizable in the euro area. Price-based indicators show a rapid increase in financial integration in the run up to the euro introduction (see ANONYMOUS REF 2016). From a theoretical perspective, the no-arbitrage condition implies that interest rate differentials across countries reflect expected exchange rate fluctuations and differences in risk premiums for financial instruments. Currency union removes the risk of exchange rate fluctuations, so the interest rates for financial instruments with similar characteristics should be similar, across members of a monetary union. Before currency unification, differences in benchmark rates reflected different monetary policy and the exchange rate risk, as well as differences in countries' macroeconomic fundamentals (De Sola Perea and Van Nieuwnhuyze, 2014). The anticipation of the euro introduction was associated with 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. This assumption was strongly reconsidered during the crisis (De Grauwe and Ji 2012). Convergence was also visible in money market and interbank rates, which differed significantly before 1996. Sovereign and interbank rates represent the benchmark for interest rates charged on lending to the non-financial private sector. Thus, banks' retail rates also converged in the second half of the Nineties. The existence of inflation differentials pushed real rates even lower, in the South, fuelling credit demand. On the other hand, banks were able to meet the higher credit demand, because their funding pool had expanded

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. Quantity-based indicators of financial integration show a massive increase in euro-area bank lending activity associated with the introduction of the euro. The outstanding amount of loans from euro-area banks to euro-area borrowers doubled, between 1999 and 2008. This increase in bank lending was mostly driven by an explosion in cross-border activity, in particular intra-area 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 (ANONYMOUS REF 2016). Bank cross-border lending was mostly wholesale activity: 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 predominantly domestic (Sapir and Wolff, 2013). 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 base¹⁰. The funding gap was filled with non-core liabilities, i.e. liabilities vis-à-vis domestic non-bank financial institutions, borrowing from foreigners and issuance of bank debt securities¹¹. For banks in the South, this measure of non-core liabilities grew from 34 percent of total funding in 1997 to 60 percent in 2008, and the increase is mostly attributable to an expansion in intra-euro area non-core deposits.

The link between banks’ external borrowing and domestic credit growth is very strong. Domestic credit growth in the years immediately after currency unification was significantly above the growth of banks’ core deposits, and more in line with the pre-crisis growth of non-core liabilities (Figure 2). In June 2008, core deposits equaled only 48 percent of the

¹⁰ Defined here as domestic deposits of households and non-financial corporations.

¹¹ This definition follows Shin *et al* (2013).

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 5 in data appendix).

[INSERT FIGURE 2]

The existence of a strong relationship between domestic credit growth and international capital flows is an established fact (Lane and McQuade 2012). Borio and Disyatat (2011) argues that the main contributing factor to the financial crisis was the “excess elasticity” of the international monetary and financial system, which failed to restrain the build-up of unsustainable credit and asset price booms (“financial imbalances”). From the perspective of EA macroprudential policy, it is more interesting to establish whether these flows came from within or outside the single currency area. Hale and Obstfeld (2012) analyse the geography of international debt flows up to 2008 and provide evidence that after currency unification, core EMU countries increased their borrowing from outside the EMU and their lending to EMU periphery. Using a new database of bilateral external assets and liabilities constructed by Hobza and Zeugner (2012), we are able to shed more light on the link between pre-crisis domestic credit growth and capital flows in the EA. Figure 3 (left) shows the change in domestic credit-to-GDP against the change in net external debt-to-GDP over the period 2003-08 for the euro-area countries in this paper, except Ireland¹². As found by Lane and McQuade (2012), the correlation is very strong over this period, suggesting that those

¹² Following Lane and McQuade (2012), we exclude Ireland from this analysis, as it is a very big outlier. Financial integration in the euro area was largely a tale of debt integration. Using Hobza & Zeugner 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 2002-12, across our sample.⁵

countries where domestic credit was growing more were also experiencing the worst deterioration in external net debt position (Figure 4 left).

[INSERT FIGURE 3]

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 explained by external positions vis-à-vis other euro-area members (Figure 3 right). The correlation between domestic credit growth and growth of net debt vis-à-vis the rest of the EU or rest of the world was significantly weaker¹³. Ideally, we would like to compute cycles in intra-EA/total capital flows, and correlate them with the estimated financial cycles. The availability of data on bilateral capital flows/stocks is however too limited to allow this, as bilateral positions are only available at the yearly frequency and for a very short time-span. This *prima facie* evidence however suggests that the pre-crisis divergence in credit cycles of euro-area countries was strongly associated with cross-border capital flows internal to the monetary union. In southern countries, the unprecedentedly low interest rates fuelled a credit 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, the increase in banks' intra-euro area non-core liabilities and the strong correlation of domestic credit growth and debt liabilities vis-à-vis other EA countries.

¹³ Figure 6 in data appendix

The macroeconomic counterpart of financial cycle divergence

The macroeconomic counterpart of financial cycles divergence was a dis-anchoring of domestic savings and investment, which was known but somewhat disregarded before the crisis. Feldstein and Horioka (1980) highlighted the existence of an economic ‘puzzle’ for financial integration: running a cross-country regression of domestic investment on domestic savings rates, they found a large, positive coefficient, contradicting the theoretical prediction for a frictionless open economy. They interpreted it as a sign that sizable financial frictions existed in international capital markets, hindering capital flows and indirectly limiting risk sharing across countries. Blanchard and Giavazzi (2002) documented persistent current account divergences and a significant drop in the correlation of national investment and savings in the euro-area, immediately after the euro introduction. This finding was consistent with theoretical predictions for countries undergoing a process of financial integration and it was interpreted as a sign of convergence. 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 comprising the 11 EA countries in this paper, over five sub-periods between 1975 and 2012. As a comparison, the same analysis is run for a panel of 27 EU member states and for the EA and EU as a whole, i.e. considered as single countries.

[INSERT TABLE 4]

For EA members, cross-country saving-investment correlation was positive and significant until 1998, it became negative and significant between 1999 and 2007, and again positive and significant during the crisis. The picture looks very different when looking at the EA as a whole: at the aggregate level, no decoupling of savings and investment is evident over the

period 2000-08. The correlation remained positive, strong and significant until the crisis, while after 2008 the coefficient loses significance. This is consistent with the fact that the EA as a whole ran a balanced financial 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 dis-anchoring of savings and investment between 1999 and 2007 is stronger for the EA than for the EU. The only negative parameter is found for the panel of 11 EA countries, while for the EU countries the parameter is positive, though small¹⁴. For the EA and EU as a whole, the estimates are positive and rather large. As a robustness check, we run the analysis in table 4 using as a time threshold the entry into force of the Maastricht Treaty (end-1993) rather than the introduction of the euro (1999). Results for the EA and EU as a whole are confirmed, as well as for the panel of EU countries. For the EA panel, we find a negative coefficient also over the period 1994-2007, but the coefficient is not significant. This suggests that the signing of the Maastricht Treaty, which established the completion of the EMU as a formal objective, created a significant anticipation effect connected to financial integration and the single currency. Saving-investment correlation started to decline, but it became effectively negative only from 1999 on.

The savings-investment pattern observed for EA 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 divergence of financial cycles across countries, with credit growth booming in the South and stagnating in the North. The elimination of the exchange rate risks spurred intra-euro-area capital flows, which allowed

¹⁴ As a robustness check, we also run the panel specification dropping Luxembourg, which tends to be an outlier with very low savings investment correlation. Results are confirmed, and coefficient and significance increase when doing so.

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 dis-anchor from national savings. Northern countries on the other hand tended to be net savers over the same period and the excess savings were channelled to the South. The correlation between domestic savings and investment started to increase again in 2008, returned positive in 2009, and in 2012 it reached back to the 1993 level. This is consistent with the disruption of financial integration both in the EA and Central-European EU since 2008.

But what is the empirical relationship between credit cycles developments and the pre-crisis macroeconomic imbalances? Credit developments before the crisis need to be put in a context of wide competitiveness differentials among countries in the euro area. The underlying roots of macroeconomic imbalances differed considerably across countries (Alcidi et al. 2014), but the loss of competitiveness was an important factor in the build-up of imbalances – sometimes combined with a lack of domestic demand (Belke et al. 2025) – and it is a crucial issue also in the recovery (Gros 2016; Belke et al. 2010). Capital flows and competitiveness are not unrelated: Belke et al. (2013) show that capital inflows are an important determinant of inflation in Central and Eastern European countries, and that this may cover both capital inflows which contribute to productivity-driven inflation and capital inflows which are translated directly into inflation and not backed by productivity gains. We assess empirically the relative importance of competitiveness and credit developments in explaining current account dynamics before and after the crisis by means of a current account regression model, which includes the following standard explanatory variables¹⁵:

¹⁵ Chinn and Prasad (2003), Gruber and Kamin (2007), Chinn and Ito (2007), Gagnon (2011), Cheung, Furceri and Rusticelli (2013), Chinn, Darvas (2016)

- General government fiscal balance (positive expected sign): if consumers perceive an increased fiscal deficit as a rise in disposable income without anticipation of future taxes, higher fiscal deficit will lower national savings and thereby deteriorate the current account balance leading to a “twin deficit” situation.
- GDP in Purchasing Power Standards (PPS) in percentage of the EU average (negative expected sign): the neoclassic theory of economic growth suggests that relatively poorer countries offer higher rates of return, and are likely to attract capital inflows.
- Real GDP growth (expected negative sign): faster growth rates are expected in relatively poorer countries, and consequently they may be associated with higher expected rates of return and potentially larger current account deficits. Moreover, faster economic growth could also signal faster productivity growth, which could also attract capital inflows and worsen the current account balance.
- We include three variables to proxy for countries’ demographic profile: young and old dependency ratios and population growth¹⁶. All these demographic factors are expected to be negatively correlated with savings and therefore with the current account. The life-cycle hypothesis predicts a hump-shaped relationship between age and personal savings, with the middle-aged portion of the population saving relatively more than the young and the elderly, while the neoclassical growth theory suggests a negative association between population and economic growth.
- Lagged Net International Investment Position (NIIP)¹⁷ as percentage of GDP is an indicator of a country’s external indebtedness and it is expected to have a positive

¹⁶ These variables, as well as the index of terms of trade, are sourced from the World Bank Development Indicators

¹⁷ We use Eurostat data on countries’ net international investment position (NIIP) in percentage of GDP. For earlier years, if Eurostat data is missing, we complete the time series with the measures of Net Foreign Assets provided by Lane and Milesi-Ferretti (1999)

sign, because the larger the amount of Net Assets that a country owns abroad and the higher its net investment income. Given that this variable is determined by the accumulation of past current account balances, the variable is lagged.

- We also include a terms of trade indicator, which represents the value of a country's exports relative to its imports and is expected to have a positive sign, and a measure of countries trade openness.

In addition to these baseline factors, we add three variables to shed light on the link of pre-crisis current account developments with competitiveness on one hand, and credit developments on the other:

- We include the yearly Real Effective Exchange Rate (REER) in terms of Unit Labour Costs, to capture countries' relative cost competitiveness position. We expect it to have a negative sign, because less competitive countries (i.e. countries with a higher relative REER) are expected to have worse current account positions. REER is a relative measure so it is always computed with respect to a reference benchmark. Here we choose the measure of REER against the 18 Euro area partners, because we are only focussing on 11 EA countries in this paper and our story is very much a story of divergence internal to the EA group.
- To assess the importance of credit developments for the current account position, we include the yearly change in the stock of banks' credit to private sector as percentage of GDP. This is the same variable used to estimate credit cycles, which we found to be strongly correlated with intra-euro area capital flows. If our argument is valid, we expect to see a negative correlation between credit increase and current account.
- We also include the yearly change in long-term real interest rates, as a proxy for the decreasing costs of credit and pace of financial integration. We expect it to be

positively correlated with the current account, as countries that experienced the largest decrease in interest rates are also likely to have experienced the largest deterioration in their current account¹⁸.

We estimate a panel regression of current account balances in percentage of GDP using yearly data over 1995-2014 for the 11 countries considered in this paper. The analysis is run for the whole period as well as separately for 1995-2008 and 2009-2014. The term of trade indicator is only available from 2000 on, so in order to include this variable the analysis is restricted over the periods 2000-2008 and 2009-2014. Current account data display strong autocorrelation, which needs to be taken into consideration. Parameters are therefore estimated with Prais-Winsten regressions and standard errors are computed under the assumption that disturbances can be heteroskedastic, serially auto-correlated of order one and contemporaneously correlated across panels (panel corrected standard errors)¹⁹.

Table 5 shows the results. All explanatory variables have the expected sign – with the exception of initial NIIP and old-age dependency ratio – and they tend to be statistically significant. Our variables of interest – credit developments, relative competitiveness and the change in long-term real interest rates – also have the expected signs. Countries with a relatively higher REER (i.e. relatively less competitive) tend to display a smaller current account surplus or a larger deficit. The same holds for countries experiencing larger increase in credit to GDP and larger decrease in the long-term real interest rates. Before the crisis, all three variables are found to be strongly significant. The coefficients for competitiveness and credit development for the pre-crisis period are of similar magnitude, while that of interest

¹⁸ As credit growth could be strongly correlated with this variable we also try to exclude it, but the results are unaffected.

¹⁹ see e.g. Von Hagen and Schmitz (2009) using this method; IMF (2013) suggests using an identical AR(1) coefficient; we try both a common and a panel-specific AR(1) with very similar results.

rate is larger. The interest rate dynamics understandably loses significance after 2008, while credit and competitiveness remain significant, but the coefficient for competitiveness becomes much larger.

[INSERT TABLE 5]

This suggests that the pre-crisis growth of imbalances can be traced back to both competitiveness and credit/financial developments, whereas after 2008 the current account dynamics are best explained in terms of competitiveness adjustment. This is consistent with the rest of the story in this paper.

The belief that current account imbalances within a monetary union would be harmless was proven 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 the fulfilment of such condition constrains the destination of foreign capital inflows to productive sectors, even in a currency union. Intra-euro-area capital flows financed the boom of credit in the South, but a significant share of that credit ended up in non-tradable construction and real estate, casting doubts on the fulfilment of this inter-temporal solvency constraint (Gabrish et al. 2015). This is visible in the data: while total bank credit to the private sector was growing in the euro-area South, the share of credit directed to non-financial corporations operating in construction 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 7, data appendix). Second, we showed how macroeconomic imbalances were linked to capital flows

that were mostly internal to the monetary union and therefore could not be limited in an explicit way. This made them especially prone to the risk of reversal: it became evident in 2010-12, when countries in the South underwent a balance-of-payment crisis with capital flights that would have qualified as full sudden stops, if the ECB had not counteracted it by providing liquidity to the banking system (Merler and Pisani-Ferry 2012).

Conclusion

The financial crisis has shown the cost associated with disruptions of financial stability, prompting a renewed interest in macro-prudential policy. While being an objective of global relevance, preserving financial stability is even more important when financial linkages are strong and deep, such as in the euro-area. When reviewing the scholarly analysis of European monetary integration, Eichengreen (2012) highlights that it especially missed the need for effective oversight of banking and financial systems at the level of the monetary union. The original design of the 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. This paper aims to contribute to the European macro-prudential discussion, by establishing some special challenges for that macro-prudential policy needs to confront in the euro-area, due to deep financial integration and free flow of capital. We investigated the relationship between currency unification, financial integration and the behaviour of financial cycles in the euro-area. We showed that the euro-area has a financial cycle, like any standalone country, and that this cycle was very smooth over the first 15 year of the euro. Behind it, the cycles of individual euro-area members diverged significantly. Estimated credit cycles for three large EU-non-euro-area countries (UK, Denmark and Sweden) are found to have been closer to the euro-area cycle, than the credit cycles of

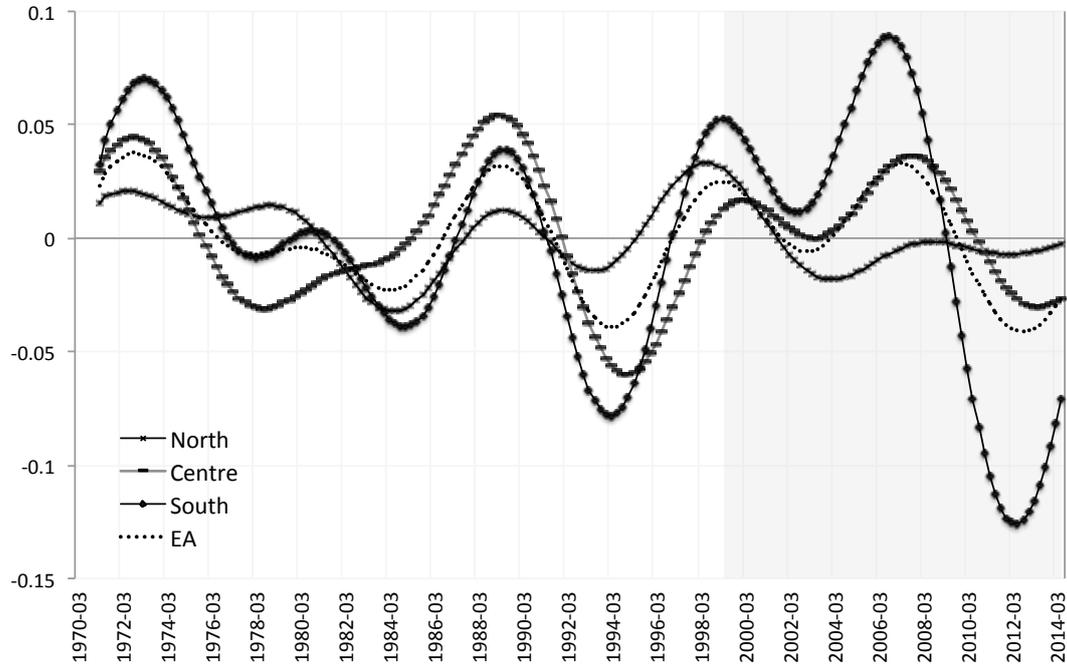
individual euro-area countries. This suggests that credit developments in the euro-area as a whole (i.e. considered as it were a single country) were very much in line with what was going on in the rest of the EU, despite the significant internal divergence. We argued that the divergence in euro-area countries' financial cycles is deeply rooted in the financial integration that followed monetary policy unification. The rapid downward convergence of retail interest rates fuelled credit demand in the South. At the same time, currency unification made it easier for banks to meet the higher credit demand, because it expanded their funding pool significantly beyond national borders and reduced funding cost. We showed , that the pre-crisis divergence in credit cycles across euro-area countries was strongly correlated with cross-border intra-euro area debt flows.

This evidence allows us to draw a number of very relevant policy implications. Since 2008, many things have changed in the euro area: domestic demand have been compressed partially by the initial financial market reaction and partly by fiscal policy (Gros 2015; Belke et al. 2015), and the competitiveness adjustment has gone a long way (European Commission 2015). Does this reduce the need for macroprudential supervision? We believe that this is not the case. The unique interest rate shock that followed the introduction of the euro in 1999 might not be repeated in the future, but our analysis suggests that credit dynamics should nevertheless be closely monitored. The the euro area still faces very specific challenges due to the fact of being a heterogeneous monetary union where intra-area capital flows are unrestrained and play such a key role in shaping domestic financial cycles. Given that monetary policy cannot be country-specific (although Bouvet et al. 2013 find that ECB policy is to some extent influenced by national shocks) and might even reinforce the build-up of imbalances in some parts of EMU while being too restrictive in others (Barigozzi et al. 2014), the rationale for an effective macro-prudential policy is strong. Heterogeneity implies that macro-prudential policy will need to cater for country

specificities. At the same time, macro-prudential policy in the euro-area should cater for cross-country financial spillovers that can be especially strong in a monetary union. The Single Supervisory Mechanism (SSM) Regulation assigns to the ECB some active macroprudential powers – which the European Systemic Risk Board (ESRB) did not have. This essentially allows the ECB to have a supranational macroprudential oversight, catering for the cross-country spillovers that domestic authorities may have little incentive to internalise (Darvas and Merler 2013). The close link between domestic financial cycles and intra-euro-area capital flows raises the question of whether macro-prudential policy in the EA would be compatible with the free flows of capital that define a monetary union, since the dividing line between macro-prudential measures and capital flows management measures is often blurry. We have shown that before the crisis, intra-EA 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 on the flow of capital, to curb the domestic credit cycle. We have also shown that the macroeconomic counterpart of financial cycle divergence has been the dis-anchoring of savings and investment and the build-up of macroeconomic imbalances. This suggests the potential for synergies between the Macroeconomic Imbalance Procedure (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 could be synergic in tackling the underlying macroeconomic drivers of the financial cycle in a pre-emptive way, supporting macro-prudential policy in the quest for financial stability. To this effect, the MIP should be made less focussed on single-countries, more focused on integrating macroeconomic and financial analysis, and freed from political considerations.

FIGURES AND TABLES

Figure 1: Credit cycles in the euro area



Source: author's calculations based on data from BIS; National Sources; IMF; AMECO; OECD.

Note: credit data for Italy is only available from 1970 on, so when presenting the aggregate EA and group cycles we only show the period from 1970 on

Table 1: Credit cycles - pairwise correlations

year < 1999				year > 1998			
	North	Centre	South		North	Centre	South
North	1			North	1		
Centre	0.2194	1		Centre	0.1683	1	
South	0.6995	0.7522	1	South	0.1031	0.8674	1
EA	0.6735	0.8595	0.9615	EA	0.2578	0.9519	0.9599

Note: the underlying variable is our estimated cycle in real credit growth

Table 2: House prices cycles - pairwise correlations

year < 1999				year > 1998			
	North	Centre	South		North	Centre	South
North	1			North	1		
Centre	0.7001	1		Centre	-0.8552	1	
South	0.4131	0.663	1	South	-0.8371	0.9462	1
EA	0.772	0.9395	0.8168	EA	-0.8088	0.9889	0.9713

Note: the underlying variable is our estimated cycle in real house prices growth. EA is the EA15

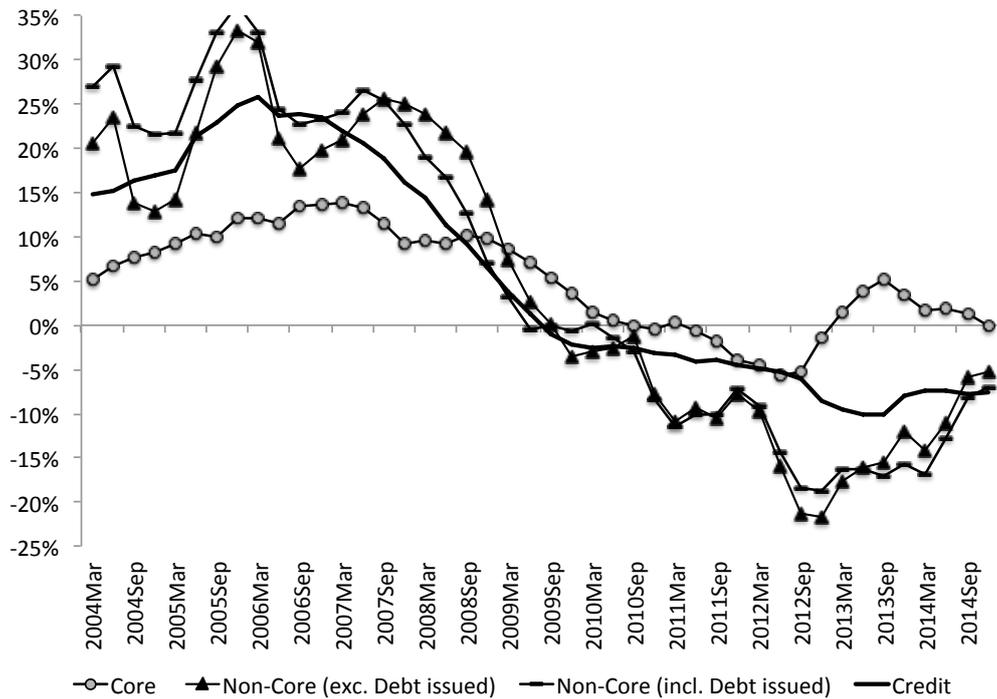
aggregate real house price provided by OECD

Table 3: Financial cycles - pairwise correlations

year < 1999				year > 1998			
	North	Centre	South		North	Centre	South
North	1			North	1		
Centre	0.4925	1		Centre	-0.8122	1	
South	0.4167	0.7912	1	South	-0.8002	0.9565	1
EA	0.6001	0.9406	0.8738	EA	-0.767	0.9813	0.9882

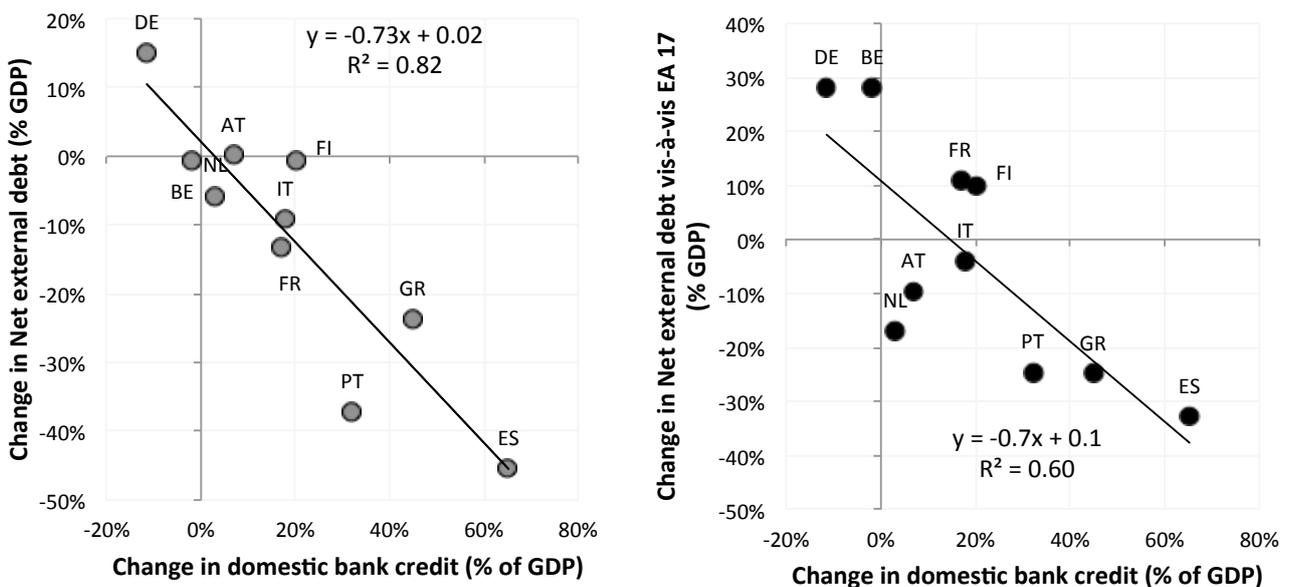
Note: the underlying variable is our PCA estimated measure of financial cycle described in the text

Figure 2: Growth of domestic credit vs. growth in core and non-core bank liabilities



Source: author's calculations based on data from BIS, ECB and National Central Banks
 Note: core liabilities refer to liabilities to domestic households and non-financial corporations; non-core liabilities refers to liabilities to domestic non-bank financial institutions, borrowing from foreigners and issuance of banks debt securities

Figure 3: Change in credit growth vs. change in net external debt vis-à-vis different partners



Source: Author's calculations based on Hobza and Zeugner (2012), BIS

Table 4: Correlation of national savings and investments

Period	11 EA countries (panel)	EA as a whole (aggregate of 11 countries)	27 EU countries (panel)	27 EU minus LUX (panel)	EU as a whole (aggregate of 27 countries)
1975-1993	0.42*** [0.085]	0.54*** [0.169]	0.03 [0.094]	0.19 [0.152]	0.36*** [0.485]
1975-1998	0.33*** [0.077]	0.46** [0.175]	0.11 [0.079]	0.25** [0.114]	0.26** [0.111]
1994-2007	-0.03 [0.037]	0.57*** [0.172]	0.15*** [0.044]	0.22*** [0.046]	0.45* [0.211]
1999-2007	-0.08* [0.040]	0.73*** [0.061]	0.09** [0.042]	0.15*** [0.433]	1.06*** [0.48]
2008-2014	0.23*** [0.068]	0.45 [0.933]	0.28** [0.052]	0.299*** [0.053]	0.82 [0.96]

Source: own calculations using data from AMECO ESA 2010. We used gross national savings and gross fixed capital formation in percentage of GDP. *Note:* EA and EU composition changed over time, but here we consider it fixed, because some countries entered the EU/EA in the middle of the time intervals considered, not exactly at beginning or end of it. We also tried a specification for aggregate EU26 (excluding Luxembourg) but results were almost identical to aggregate EU27 case.

Table 5 – Current account regression

Dep-Var: CA (% GDP)	Common AR(1)			Panel-specific AR(1)		
	full period	2000 -2008	2009-2014	full period	2000 -2008	2009-2014
Fiscal Balance (% GDP)	.280*** [.0069]	0.255** [.0927]	.201** [.0950]	.219*** [.0628]	.246*** [.0879]	.212** [.0851]
Initial NIIP (% GDP)	-.025*** [.0066]	-.017*** [.0056]	.017 [.0216]	-.015** [.0066]	-.015*** [.0049]	.018 [.0185]
Change in private credit (% GDP)	-.157*** [.0337]	-.141*** [.0479]	-.09* [.0545]	-.143*** [.0281]	-.145*** [.083]	-0.097** [.0494]
REER ULC 18	-.254*** [.0538]	-.19*** [.0629]	-.524*** [.1030]	-.263*** [.0465]	-.235*** [.0643]	-.562*** [.0856]
Change Long-term real interest rate	.015 [.0866]	.361** [.1458]	-.02 [.1042]	.011 [.0833]	.437*** [.1411]	-.024 [.0954]
Age dep. Old	.253 [.2026]	.583** [.2428]	.039 [.1703]	.378** [.1861]	.639*** [.2376]	.173 [.1953]
Age dep. Young	-1.22*** [.2812]	-1.36*** [.3781]	-1.49*** [.4930]	-1.15*** [.2763]	-.87** [.3830]	-1.83*** [.4471]
Population growth (%)	-.923*** [.2322]	-1.96*** [.5918]	-.336* [.1797]	-1.12*** [.3139]	-1.12** [.5149]	-3.55*** [.1339]
Real GDP growth (%)	-.285** [.1116]	-.128 [.1468]	-.304** [.1238]	-.305*** [.0954]	-.198 [.1300]	-3.66*** [.1081]
GDP PPS (%EU)	-1.11** [.5539]	-.459 [.3479]	-.535 [.4941]	-1.05** [.4641]	-.159 [.3339]	-.042 [.4860]
Terms of Trade	.073 [.0833]	.176* [.1017]	.249* [.1363]	.067 [.0716]	.196** [.0594]	.184 [.1246]
Openness Ratio	-.002 [.0254]	.008 [.0335]	.053 [.0400]	-.026 [.0260]	-.01 [.0310]	.067* [.0377]
R2	0.92	0.97	0.97	0.95	0.98	0.97
Observations	165	99	66	165	99	66
Country FE	y	y	y	y	y	y
Year FE	y	y	y	y	y	y

Source: author's estimation based on data from World Bank; Eurostat; Lane and Milesi-Ferretti (1998)

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