II. Financial cycle in euro area

This section explores the issue of financial cycles in the euro area, taking into account the broader and expanding literature in this area. The measure of the financial cycle explored in this section synthesises information on credit flows and house prices in the Member States and at the aggregate euro area level. When equity is also considered, the amplitude and leading properties of the financial cycle are seen to increase. The synchronisation between domestic financial and business cycles appears relatively strong in all but a few euro area Member States. Financial cycles tend to be somewhat less synchronised across Member States than business cycles, but a fair degree of correlation is still in evidence, especially at the level of individual financial variables.

The pre-crisis upswing phase of the euro area financial cycle was preceded by an increase in cross-border debt flows. In the debtor countries, the financial cycle appears to have been at least partly fuelled by debt inflows. The post crisis period saw a slowdown in cross-border debt investment activity, a reversal in previous debt flows and a subsequent downswing in the financial cycle of debtor countries.

An econometric analysis of a positive shock to the financial cycle shows that it can boost economic activity and economic sentiment temporally, although at the cost of a medium-term correction and increase in uncertainty. Expansionary phase of the financial cycle may be linked to the build-up of macroeconomic imbalances, which call for a comprehensive and timely approach to macroprudential policy. ([18])

II.1. Introduction

Since the global financial crisis, an intense discussion on the interlinkages between macroeconomic and financial developments has emerged. There is now a large body of empirical evidence that suggests that adverse financial developments and different financial frictions can have strong negative impacts on real economic activity. In the euro area, the double dip recession that followed 2008 was closely linked to financial factors, and financial developments have been behind the prolonged period of low investment activity. ([19])

Whereas the idea that financial systems behave procyclically is not new, ([20]) recent literature empirically documents that financial developments show *cyclical behaviour* akin to the business cycle, leading to the coining of the term *financial cycle*. Specifically, the financial cycle can be defined as a medium-term co-movement of key financial variables, namely credit and asset prices. The upward swing in the financial cycle can be accompanied by an accumulation of imbalances that may result in financial turmoil once these unwind. Evidence from international data confirms that excessive credit growth is a common precursor of banking crises ([21]) and that economic recoveries following financial crises tend to be more sluggish. ([22]) In fact, prolonged downturns following a credit-driven expansion that resulted in the misallocation of productive resources can even impact potential growth due to the risks of hysteresis and the need to reallocate resources in the presence of financial frictions. ([23])

The linkages between business and financial cycles have spurred a debate not only over how to increase the effectiveness of policies to ensure

([18]) This article has been prepared by Daniel Monteiro and Bořek Vašíček. The authors wish to thank Reuben Borg and Stan Maes for their useful comments.

([19]) See for example: Balta, N. and B. Vašíček (2016), 'Financial channels and economic activity in the euro area', *Quarterly Report on the Euro area,* Vol. 15, No. 2, pp. 19-31.

([20]) Fisher, I. (1933), 'The debt-deflation theory of great depressions', *Econometrica*, Vol. 1, No. 4, pp. 337-357; Hayek, F. A. (1933), *'Monetary Theory and the Trade Cycle*', Clifton, New Jersey; Minsky, H. P. (1982), *'Can 'It' Happen Again?, Essays on Instability and Finance*', M. E. Sharpe., Armonk.

([21]) Drehmann, M. and M. Juselius (2014), 'Evaluating early warning indicators of banking crises: Satisfying policy requirements', *International Journal of Forecasting*, Vol. 30, Issue 3, pp. 759-780; Babecký, J., T. Havránek, J. Matějů, M. Rusnák, K. Šmídková and B. Vašíček (2014), 'Banking, debt, and currency crises in developed countries: Stylized facts and early warning indicators', *Journal of Financial Stability*, Vol. 15, pp. 1-17.

([22]) Reinhart, C.M. and K.S. Rogoff (2014), 'Recovery from financial crises: Evidence from 100 episodes', *American Economic Review*, Vol. 104(5), pp. 50-55, May; Jordà, O., M. Schularick and A.M. Taylor (2013), 'When credit bites back', *Journal of Money, Credit and Banking*, Vol. 45, Issue s2, pp. 3–28.

([23]) Ball, L. (2014), 'Long-Term Damage from the Great Recession in OECD Countries', *NBER Working Paper*, No. 20185; Furceri, D. and A. Mourougane (2012), 'The effect of financial crises on potential output: New empirical evidence from OECD countries', *Journal of Macroeconomics*, Vol. 34, Issue 3, pp. 822-832; Oulton, N. and M. Sebastiá-Barriel (2017), 'Effects of financial crises on productivity, capital and employment', *Review of Income and Wealth*, Vol. 63, Issue s1, vol. S90-S112.

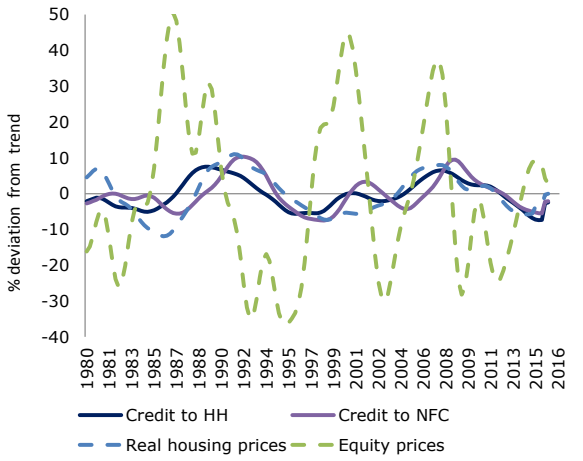
financial stability (macro- and micro-prudential policies) – which has led to significant evolution of the framework at European level ([24]) – but also on their coordination with policies aimed at macroeconomic stability (monetary and fiscal policies). This latter debate is a pressing one for the euro area given its drive for integrated policies in a context of heterogeneity and strong financial linkages between Member States.

This section revisits the issue of the financial cycle from the euro area perspective. It discusses ways to track the financial cycle in the euro area and provides some evidence on its synchronisation with the business cycle and across countries. In addition, it documents the link between the financial cycle of individual Member States and intra-euro area capital flows, and provides evidence on the impact of the financial cycle on overall macroeconomic developments in the euro area. Finally, it discusses some tentative implications for the current policy debate on the link between macroeconomic and financial developments, the role of macroprudential policies and institutional changes proposed for the euro area.

II.2. Tracking financial cycles in the euro area

The concept of the financial cycle describes cyclical financial developments (at country level) in a single metric. This is achieved by extracting long-term developments (trend) from the overall patterns to identity medium-term fluctuations (cycle) in financial variables, akin to the trend-cycle decomposition of GDP. However, there are several empirical challenges in tracking the financial cycle.

Graph II.1: **Cyclical components of key financial variables in the euro area**



(1) The euro area financial variables were obtained as follows: First, the cyclical component was derived (using a band-pass filter with a frequency band of 8-80 quarters) for each of the following (logged) variables: i) real credit to households, ii) real credit to non-financial corporations, iii) real house prices, and iv) equity prices at a country level (8 EA countries with sufficiently long time series: BE, DE, ES, FI, FR, IT, LU, NL). Second, the country-level cyclical components were aggregated (for each variable) using the share of GDP of each country in overall EA-8 GDP.
Source: ECB, BIS, authors' calculations

What financial indicators are the most relevant? The financial cycle can be tracked both by indicators of quantity and prices. Most studies employ i) *credit indicators*, namely total credit to the private sector, which is sometimes disaggregated into credit to households and to non-financial corporations and expressed as a ratio of GDP or total assets, as well as ii) *real housing prices* (or a derived variable, such as the price-to-income ratio), which show robust links to past financial crises. ([25]) This set of variables is sometimes coupled with equity prices, benchmark interest rates and yields, and other macro-financial variables. Graph II.1 plots the cyclical developments of four key financial variables, namely loans to households, loans to non-financial corporations, real house prices and equity prices for the euro area. ([26]) While the co-movement of credit variables and housing prices is evident, the cyclical dynamics of equity prices feature a substantially larger *amplitude* and far

([24]) The European Systemic Risk Board (ESRB) was established in 2010 for the macro-prudential surveillance of the EU financial system in order to prevent and mitigate systemic risks to financial stability. The Single Supervisory Mechanism (SSM) was established in 2013 as one of the pillars of the banking union. It grants the ECB a supervisory role to monitor the implementation of the single rulebook and the financial stability of banks based in the euro area. The Capital Requirements Directive IV (CRD IV) and the associated Capital Requirements Regulation (CRR) were passed in 2013 and introduced new macro-prudential instruments such as the counter-cyclical capital buffer and the possibility of increasing risk weights on mortgage loans.

([25]) Jordà, Ò., M. Schularick and A.M. Taylor. (2015), 'Betting the house', *Journal of International Economics*, Vol 96, Supplement 1, pp. S2-S18.

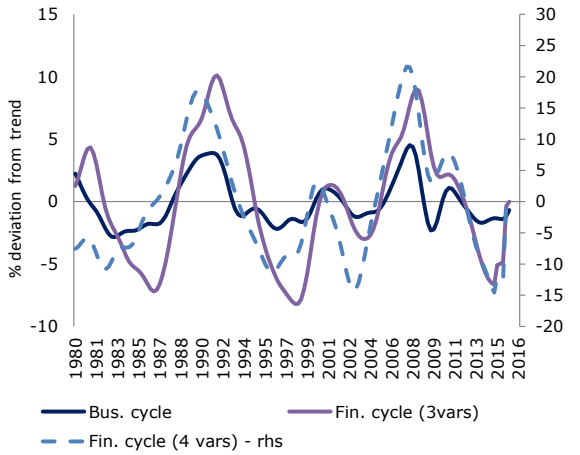
([26]) The authors of this section would like to thank G. Rünstler and co-authors for having provided the underlying country data, which are used to derive cyclical components in Graph II.1 and elsewhere in this section. For an extensive analysis of financial cycles in the EU using different methods, see ECB (2018), 'Real and Financial Cycles in EU countries: Stylized facts and modelling implications', *ECB Occasional paper*, No. 205.

less synchronisation in the timing of *turning points*. In fact, equity cycles appear to anticipate somewhat credit and housing cycles, which can be possibly understood as a consequence of the fact that efficient equity markets immediately reflect future expectations that may take longer to translate and materialise into investment decisions and the real economy.

Identifying the overall financial cycle. There is a clear trade-off between preserving the information contained in *individual* financial variables and identifying *systemic* financial developments using composite indicators. Graph II.2 presents the financial cycle for the euro area as a composite indicator (based on a common factor) of cyclical developments of individual financial variables plotted in Graph II.1. Given the rather distinct cycles of equity prices, one measure of the financial cycle includes this variable, while the other excludes it. It can be noticed that the presence of equity prices in the composite indicator not only augments the amplitude of the financial cycle ([27]) but also tends to anticipate the cyclical turning points. In face of the low synchronisation of equity prices with the other financial variables, ([28]) the financial cycle used for further analysis will be based on credit and housing prices only. ([29])

The duration of the financial cycle can be estimated by the analysis of the series' turning points. Most studies agree that financial cycles tend to be longer (lasting between 12 and 18 years) and to have a larger amplitude than business cycles. There is nevertheless evidence that GDP is also subject to longer-term fluctuations that broadly align with credit and housing cycles. ([30])

Graph II.2: **Financial and business cycles in the euro area**



(1) The euro area financial cycle was obtained as follows: First, the cyclical component was derived (using a band-pass filter with a frequency band of 8-80 quarters) for each of the following (logged) variables: i) real credit to households, ii) real credit to non-financial corporations, iii) real house prices, and iv) equity prices at a country level (8 EA countries with sufficiently long time series: BE, DE, ES, FI, FR, IT, LU, NL). Then, the euro area financial cycle was obtained as the first principal component of the aggregated EA-8 variables: credit to households, credit to non-financial corporations and real house prices (3 vars), or these three variables plus equity prices (4 vars). Finally, the principal component was re-normalised to have the same standard deviation as the mean standard deviation of the underlying four (resp. three) variables.
The euro area business cycle was obtained by aggregating the cyclical components of the EA-8 countries using the share of GDP of each country in overall EA-8 GDP as weights.
Source: ECB, BIS, authors' calculations

While the larger amplitude of the financial cycle in the euro area is apparent in Graph II.2, the relative length of both cycles is not easy to compare in view of the limited time span of financial variables. Moreover, it should be noted that the preselected parameters of statistical filters can affect the estimated length of the financial cycle. The band-pass filter used in this chapter is applied with a rather wide frequency of 8-80 quarters to all the variables (i.e. the cycles are allowed to last between from 2 till 20 years) in order to minimise the impact of the subjective assumptions on of the estimated cycle length. ([31])

([27]) While principal component analysis normalises the underlying variables (with the first eigenvalue determining the variance of the first principal component), the factor used as a measure of financial cycle was re-normalised here and elsewhere in this article to have the same standard deviation as the mean standard deviation of the underlying 3, resp. 4 variables.

([28]) This is reflected also in substantially lower explanatory power of the first principal component when equity prices are included. In that case, the first principal component explains 60% of the overall variability in the series, as opposed to 80% when equity prices are excluded.

([29]) This is consistent with other studies that used different filtering methods. See for example: Galati, G., I. Hindrayanto, S.J. Koopman and M. Vlekke (2016), ' Measuring financial cycles in a model-based analysis: Empirical evidence for the United States and the euro area', *Economics Letters*, Vol. 145, pp. 83-87; Menden, C. and C.R. Proaño (2017), 'Dissecting the financial cycle with dynamic factor models', *Quantitative Finance*, 17(12), pp. 1965-1994, Schüler, Y.S., P. Hiebert and T.A. Peltonen (2015), 'Characterising the financial cycle: a multivariate and time-varying approach', *ECB Working Paper*, No. 1846.

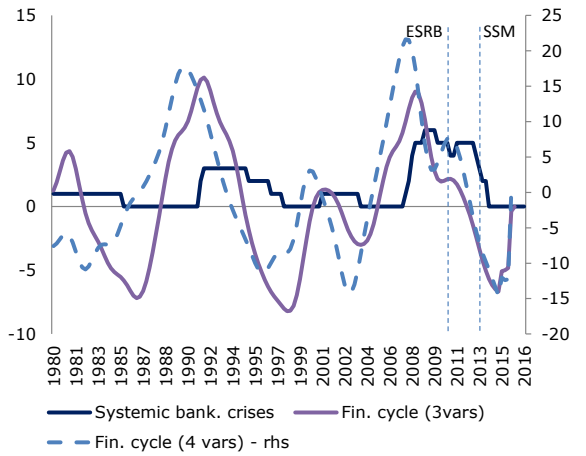
([30]) See for example ECB (2018), 'Real and Financial Cycles in EU countries: Stylized facts and modelling implications', *ECB Occasional paper*, No. 205.

([31]) For the use of the band-pass filter in economic analysis see, for example, Christiano, L.J. and T.J. Fitzgerald, (2003), 'The band pass filter', *International Economic Review*, Vol. 44, No. 2, pp. 435-465. Multivariate methods have also been proposed that do not

Why is the financial cycle of interest? Graph II.2 suggests there is a visible co-movement between financial and business cycles in the euro area. As before, the measure of the cycle incorporating equity developments appears to lead both the business and the three-variable financial cycles, possibly reflecting the ability of equity markets to anticipate and immediately price in expectations. While synchronisation does not imply causality, there is widespread agreement that the upswing in the financial cycle may at times be linked to the building-up of imbalances whose unwinding (i.e. the downswing in the financial cycle) can have a detrimental effect on the real economy. The term *balance sheet recession* ([32]) that has been often used to characterise the global financial crisis, refers precisely to the situation where private indebtedness (accumulated during the upswing in the financial cycle) is perceived as too high in a given adverse economic context, inducing changes in the behaviour of private agents. Over time, agents increase savings in order to decrease their debt (deleveraging), cutting down on consumption and investment, which deepens the recession. The decline in asset prices used as collateral for loans implies that nominal debt can now exceed the value of assets, resulting in negative equity and in the *de facto* insolvency of many debtors. The creditors (typically banks) may become illiquid and insolvent themselves, which may result in a banking and financial crisis.

Market actors do not internalise the systemic risks they generate for the system. For example, fire sales and credit crunches induce externalities. Specifically, the sell-off of specific assets can affect other asset categories and cause a generalised decline in asset prices, a deterioration of the balance sheets of intermediaries and investors, a decline in the value of collateral, and the drying up of bank financing. The existence of such externalities needs to be tackled by public action, namely by macroprudential policy.

Graph II.3: **Financial cycle and systemic banking crises in the euro area**



(1) The construction of the financial cycle (EA-8 countries: BE, DE, ES, FI, FR, IT, LU, NL) is explained in the note of Graph II.2. The banking crises refer to the number of systemic banking crises in EA-8 countries.
Source: ECB, BIS, authors' calculations; banking crises are taken from Lo Duca, M. et al. (2017): A new database for financial crises in European countries: ECB/ESRB EU crises database. Developed by FSC MPAG and ESRB AWG, ECB Occasional Paper, No. 194.

Graph II.3 comparing the financial cycle with a measure of the occurrence of *systemic banking crises* ([33]) in the euro area countries suggests that peaks in the financial cycle are often followed by systemic banking crises. In fact, the financial cycle measure that includes equity as well as credit and housing prices seems to be a leading indicator of banking crises. ([34]) The statistical link between the peak of the euro area financial cycle and the onset of systemic banking crises in several Member States is evident around 1991 and 2008. The graph also shows that banking crises usually last for several years, coinciding with the downward phase of the financial cycle. ([35]) The cyclical development of key financial variables can be seen as much as a macroeconomic fact as the business cycle. As for the latter, it is important to avoid excessive

suffer from some of the band-pass filter's shortcomings. See for example Rünstler, G. and M. Vlekke, M. (2018), 'Business, housing, and credit cycles', *Journal of Applied Econometrics*, Vol. 33, Issue 2, pp. 212-226.

([32]) The term is mostly attributed to Richard Koo and was widely used to refer to the recession in Japan in the 1990s and to the recession in the US and other countries in the context of the global financial crisis.

([33]) The identification of systemic banking crises come from Lo Duca, M. et al. (2017): A new database for financial crises in European countries: ECB/ESRB EU crises database. Developed by FSC MPAG and ESRB AWG, *ECB Occasional Paper*, No. 194.

([34]) Schüler et al. (2015), op. cit. show that a financial cycle indicator composed of credit and asset prices is a robust predictor of systemic banking crises (in 13 EU countries) on a horizon of up to three years, outperforming the popular credit-to-GDP gap.

([35]) From the EA-8 sample (BE, DE, ES, DE, FR, LU and NL), the systemic banking crises hit IT, FI and FRA in 1991, DE in 2000 and BE, DE, ES, DE, FR, LU and NL after 2008. Even around 2000 when a banking crisis hit the largest EU Member State, Germany, the financial cycle of the euro area attained a local maximum (and the German financial cycle was at its peak: see Graph II.5, right-hand panel).

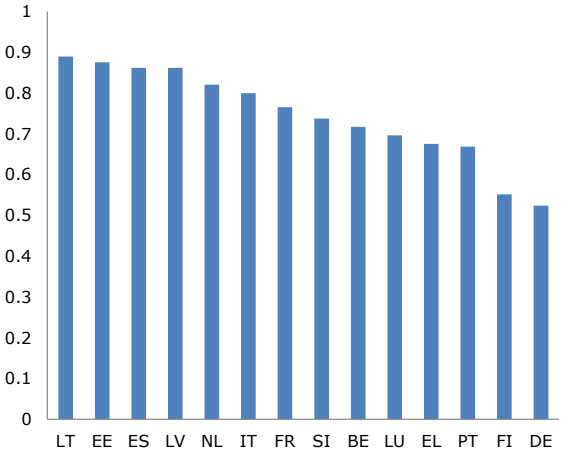
upswings that are inevitably followed by costly readjustments. Therefore, macroprudential policy (discussed in sub-section II.6) aims at smoothing the financial cycle at country level. At the euro area level, numerous institutional changes were implemented in the recent years and others are being discussed to reduce the vulnerabilities (related, for example, to intra-euro area financial flows as discussed in sub-section II.4) but also to make the euro area more resilient to adverse shocks (see also Graph II.3).

II.3. Synchronisation between cycles across the euro area

Most empirical studies agree that the financial cycle has a longer length and a higher amplitude than the business cycle, but the two cycles also seem to interact ([36]), as the peaks and troughs of the financial cycle often coincide with turning points in the business cycle (see Graph II.2). ([37]) The synchronisation between business and financial cycles has implications for the nexus between monetary and macroprudential policy. While monetary policy aims to stabilise inflation and the business cycle, it has implications for credit developments and thus also for the financial cycle. Consequently, there has been an ongoing discussion on whether monetary policy decisions should take financial stability concerns into account ('leaning against the wind') ([38]) in as much as such policies do not only bring benefits for financial stability but also carry macroeconomic costs. ([39]) Macroprudential policies in turn aim to maintain overall financial stability by affecting credit supply, and thus real economic variables such as consumption and investment.

A common measure of synchronisation is *concordance*, which is the proportion of time when two series, in this case the business and financial cycles, are in the same phase, i.e. both displaying positive or negative values. ([40]) Graph II.4 suggests that the domestic financial and business cycles of Member States appear quite synchronised. At the euro area level, they are in the same phase 70% of the time. However, concordance varies among Member States, with Germany showing the least synchronisation between its domestic business and financial cycle.

Graph II.4: **Concordance between domestic business and financial cycles in selected euro area countries**



(1) The value of concordance is bounded between 0 and 1. It expresses the proportion of time when the domestic business and financial cycles are in the same phase, i.e. both displaying positive or negative values.
Source: ECB, BIS, authors' calculations

It is also possible to look at synchronisation between countries. In fact, the issue of business cylce synchronisation between Member States has been discussed ever since the idea of a common currency was born. For a better cross-country comparison, Graph II.5 plots the business cycles and financial cycles of individual Member States. The graph shows quite a high degree of synchronisation between the business cycles of Member States but also a degree of decoupling since the global crisis. The amplitude of the business cycle, by contrast, varies significantly across Member States, a fact that may be related to structural differences (smaller countries tend to show a higher amplitude, for example) but which may also be linked to

([36]) Drehmann, M., C. Borio and K. Tsatsaronis (2012), 'Characterising the financial cycle: don't lose sight of the medium term', *BIS Working Papers*, No. 380; Borio, C. (2014), 'The financial cycle and macroeconomics: What have we learnt?', *Journal of Banking & Finance*, No. 45, pp. 182-198.

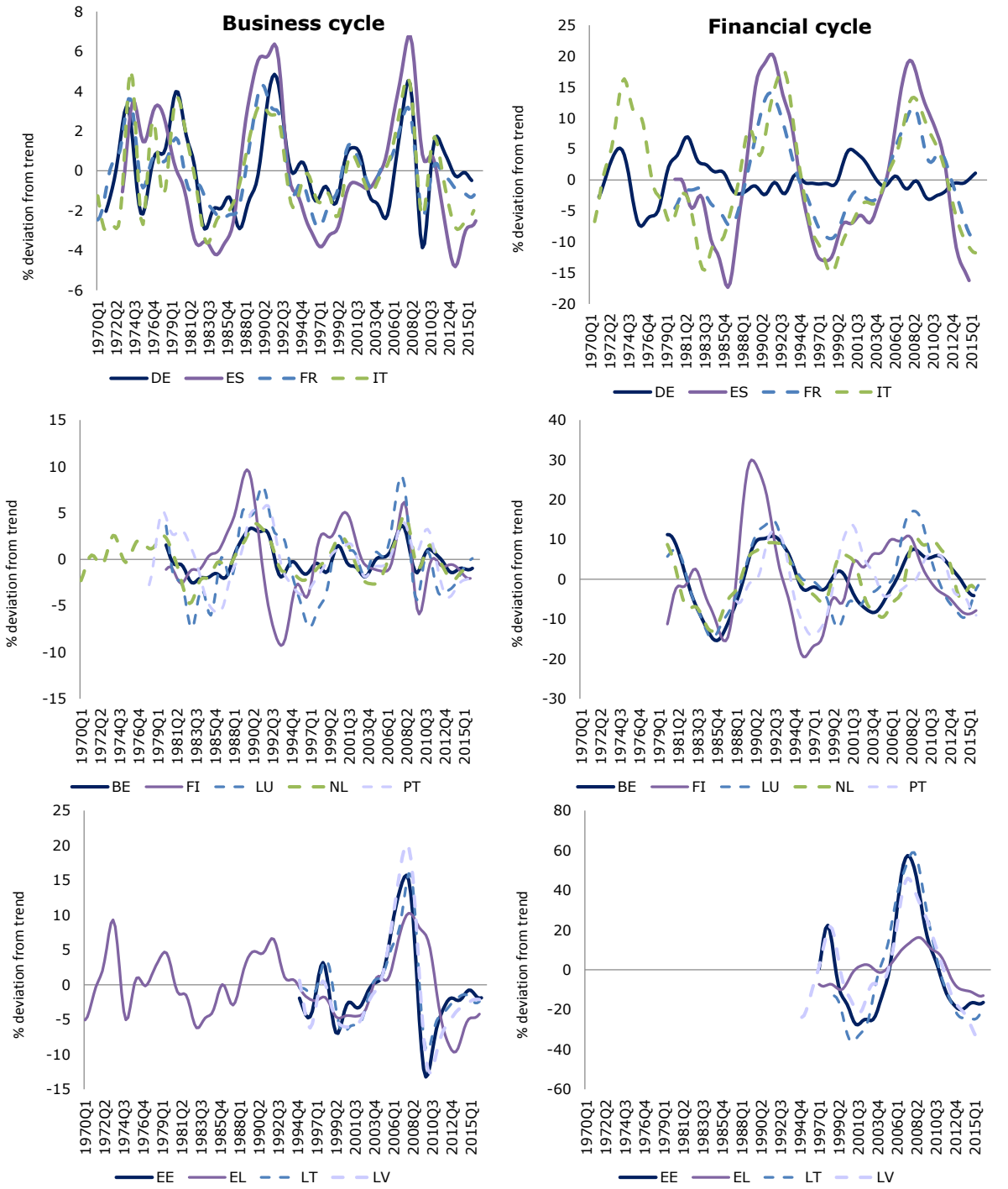
([37]) Claessens, S., M.A. Kose and M.E. Terones (2012), 'How do business and financial cycles interact?', *IMF Working Paper*, No. 11/88; Jordà, O., M. Schularick and A.M. Taylor (2017), 'Macrofinancial history and the new business cycle facts', Chapter in *NBER Macroeconomics Annual 2016*, Vol. 31, pp. 213-263.

([38]) Borio, C. and P. Lowe (2002), 'Asset Prices, Financial and Monetary Stability: Exploring the Nexus', *BIS Working Paper*, No. 114.

([39]) Svensson, L.E.O (2017), ' Re-evaluating the result that the costs of 'leaning against the wind' exceed the benefits', Voxeu, 24 January 2017.

([40]) Harding, D. and A. Pagan (2003), 'A comparison of two business cycle dating methods', *Journal of Economic Dynamics and Control*, Vol. 27, Issue 9, pp. 1681-1690. The value of concordance is bounded between 0 and 1.

Graph II.5: **Domestic financial cycle and business cycle in euro area countries**



(1) Firstly, the cyclical components were derived (using a band-pass filter with a frequency band of 8-80 quarters) for the following (logged) variables: real credit to households, real credit to non-financial corporations, and real house prices at a country level. Secondly, the financial cycle was calculated as the first principal component of the series previously obtained.
Source: ECB, BIS, authors' calculations

potentially divergent financial cycles (see right-hand panel).

Financial cycles are in general less synchronised across Member States than business cycles and the differences in amplitude are even more pronounced. For example, the German and Finish financial cycles show little synchronisation with other Member States. While the German financial cycle shows a very small amplitude and negative correlation with most other Member States, the Finnish financial cycle features much larger

amplitudes. ([41]) This is consistent with Graph II.4, where Germany and Finland attained the lowest concordance between their domestic financial and business cycles. The financial cycles of Baltic countries show larger amplitudes than other Member States and are rather synchronised which each other.

Another way to look at the synchronisation from the euro area perspective is to compare the concordance between the domestic financial (or business) cycle of each Member State and the common financial (or business) cycle developments across the Member States. ([42]) This is done in Graph II.6, which shows that the synchronisation is relatively lower for new Member States, which may be related to their ongoing convergence process but also possibly the relatively small size of their economies. ([43]) Graph II.6 also reconfirms that the German financial cycle is substantially less synchronised with the other euro area countries than its business cycle. In fact, financial developments appear significantly more a-cyclical in Germany than in other Member States and the amplitude of the cycle is relatively smaller both for credit and housing prices. ([44]) While it is difficult to pin down a single reason for the German financial cycle singularity, there are a few intuitive explanations. First, Graph II.2 suggests that re-unification may have played some role as the cycle amplitude decreased since 1990s. Second, there is cross country evidence ([45]) that length and amplitude of financial cycle increase with share of private home ownership, which stands at around 50% in Germany compared to values above 60% for the UK and the US and above 70% for Italy and Spain. Third, the bank funding seems to play role as well. ([46]) Namely, funding strategies relying on securitisation and wholesale sources seem to be linked to higher house credit boom and bust, while the retail deposits represent the principal funding source for German banks.

Whereas the previous analysis of concordance looked at financial cycles as a composite indicator of several financial variables, one may compare developments across Member States for each financial variable (e.g. housing prices). Such analysis (not reported here in detail) suggests that there each type of financial variable is significantly synchronised across the Member States. Credit to non-financial corporations and equity prices, for example, appear more synchronised across Member States than they do within them. ([47]) Some of this synchronisation can be seen as an outcome of the euro, which eliminated currency risks, led to a decline and convergence in interest rates and increased cross-border financial flows. Empirical evidence also suggests that a consequence of these developments was both a decline in the synchronisation of mortgage credit to households as well as an increase in the synchronisation of credit to non-financial corporations. ([48]) Consequently, it maybe that the euro introduction affected individual components of the financial cycle at the country level but the aggregate euro area cycle did not change significantly around 1999 as suggested by Graph II.2. The formal statistical analysis suggests that there is sligh decrease in persistence of financial cycle (and even the business cycle) of the aggregated euro area, there is no indication that the euro introduction would represent a major structural break. ([49])

([41]) Rünstler and Vlekke (2018), op. cit. argue that the financial cycle is longer for countries with higher rates of home ownership.

([42]) The common developments across the euro area are in this case represented by the first principal component of domestic financial and business cycles of euro area countries (BE, DE, EE, EL, ES, FI, FR, IT, LT, LU, LV, NL, PT, SI) rather than a GDP-weighted average of domestic cycles. However, the results using GDP-weighted averages are rather similar.

([43]) The low synchronisation of the new Member States is not driven by their smaller size but rather by genuinely distinct developments.

([44]) Similar features of the German financial cycle have been reported elsewhere; see for example Alcidi, C. (2017), 'Fiscal Policy Stabilisation and the Financial Cycle in the Euro Area', DG *ECFIN European Economy - Discussion Papers*, No. 052; ECB (2018), op. cit., Strohsal, T. C. Proaño and J. Wolters (2015), 'Characterizing the financial cycle: Evidence from a frequency domain analysis', *Discussion Paper Deutsche Bundesbank* No 22/2015.

([45]) Huber, S. (2016), 'Housing booms and busts: convergence and divergence in OECD countries', Universitat Pompeu Fabra, mimeo; Rünstler and Vlekke (2018), op. cit..

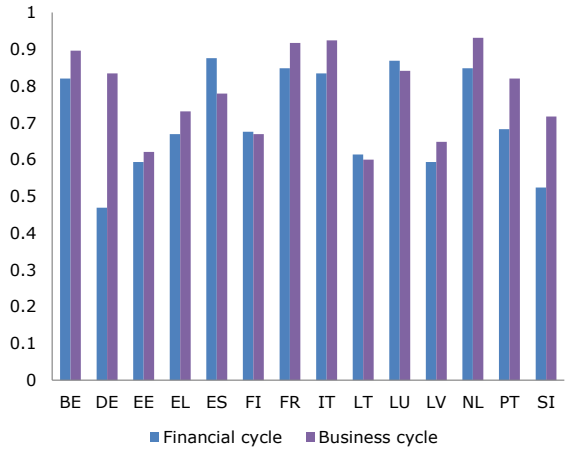
([46]) Cerutti, E., J. Dagher and G. Dell'Ariccia, G. (2017). 'Housing finance and real-estate booms: a cross-country perspective'. *Journal of Housing Economics*, Vol. 38, 1-13.

([47]) Similar results are obtained by means of wavelet analysis by Scharnagl, M. and M. Mandler (2016), 'Financial cycles in the euro area: a wavelet analysis', Bundesbank, mimeo.

([48]) Samarina, A., L. Zhang and D. Bezemer (2017), 'Credit cycle coherence in the eurozone: Was there a euro effect?', *Journal of International Money and Finance*, Vol. 77, pp. 77-98.

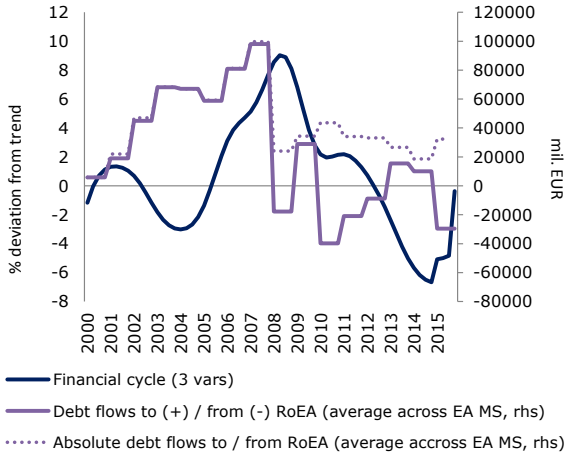
([49]) Wile the visual inspection of financial cycle and its component does not point to major changes in properties of financial cycles, a formal statistical analysis detects several potential structural breaks but most of them ocurr in periods distant from 1999, the most pronounced one being 2008, i.e. the Global financial crisis.

Graph II.6: **Concordance of domestic financial and business cycles with the rest of the euro area**



(1) The reference euro area financial is obtained as the first principal component of financial cycles of euro area countries (BE, DE, EE, EL, ES, FI, FR, IT, LT, LU, LV, NL, PT, SI). The business cycle is proxied also by the common cycle obtained through principal component analysis.
Source: ECB, BIS, authors' calculations

Graph II.7: **Financial cycle and average debt flows in the euro area**



(1) The construction of the financial cycle (EA-8 countries) is explained in the note of Graph II.2.
Source: Eurostat, BIS, authors' calculations. Financial flow data is based on an update of the database described in Hobza, A. and Zeugner, S. (2014). 'Current accounts and financial flows in the euro area', Journal of International Money and Finance, vol. 48, pp. 291-313, authors' calculations

II.4. Financial cycle and cross-border financial flows in the euro area

Cross-border financial flows, in particular portfolio and other investment as well as interbank credit, can have a significant impact on credit provision in the domestic market and on the evolution of house and stock prices, thereby driving national financial cycles. These cross-border dynamics can furthermore imply a decoupling between financial and trade flows, pointing to the usefulness of looking beyond current account imbalances and of keeping track not only of net but also of gross capital flows in understanding economic developments. ([50]) Not only can international flows drive domestic cycles, but the converse is also possible, for example when a domestic boom attracts external financing from countries with more subdued dynamics, or where savings are higher.

While country-level variables are often used to estimate financial cycles, the latter can also have a very pronounced international dimension, as suggested by the concordance measures seen in the previous sub-section and by the role of cross-border flows. The existence of global financial cycles – as manifested, e.g. by co-movements in gross capital flows, asset prices, banking sector leverage and credit growth across countries – has been argued in the literature. The dynamics of global cycles can generally be linked to developments in leading economies, particularly the US, and can be tracked by indicators of risk aversion (e.g., the VIX), interest rates, or economic growth. ([51])

As discussed in the previous sub-section, there is a significant degree of synchronisation in financial variables across the euro area, suggesting the possibility of supra-national financial cycles. To the extent that a euro area cycle exists, its emergence is likely to have resulted from the elimination of exchange rate risk and the convergence of interest rates brought about by a common monetary policy, which reinforced cross-border financial flows and

([50]) Avdjiev, S., B. Hardy, S. Kalemli-Ozcan and L. Servén (2017), ' Gross Capital Flows by Banks, Corporates and Sovereigns', *National Bureau of Economic Research Working Paper*, No. 23116.

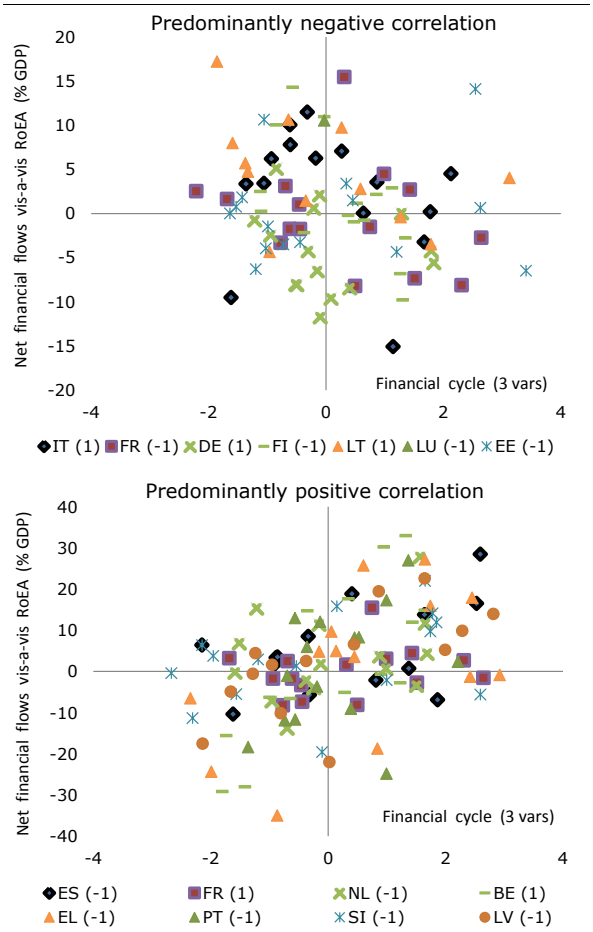
([51]) To the extent that the international financial cycle tends to be driven by business-cycle phenomena (as opposed to, say, a gradual build-up in credit), its length is deemed to be similar to the real business cycle.

ultimately shaped the financial cycles of individual Member States.

Graph II.7 suggests there is a link between cross-border financial flows ([52]) and the financial cycle at the euro area level. ([53]) Namely, the pre-crisis upswing in the financial cycle was preceded by large and sustained financial outflows from euro area Member States to the rest of the euro area through the form of investment in debt instruments. The sharp reversal of these flows in 2008 coincided with a turning point in the euro area financial cycle, which marked the beginning of a downswing that lasted until 2014. The post-crisis period was characterised not only by disinvestment in cross-border debt instruments, but also by lower cross-border activity when compared with the pre-crisis period (as measured in Graph II.7 by average absolute debt flows). At country level, however, there is no evidence of a systematic relationship across Member States between net cross-border debt flows and individual financial cycles during the 2000-2015 period. As depicted in Graph II.8, the correlation between the two variables changes sign depending on the country concerned, but also on whether it is measured contemporaneously, with a lag or with a lead. ([54])

The role of cross-border flows was highlighted by the euro area debt crises, as the reversion in these flows amplified differences in economic performance and credit growth across creditor and debtor countries. ([55]) As shown in Graph II.9, the crisis witnessed a reversal from positive net debt inflows to net debt outflows in some of the debtor countries most severely affected by the crisis. In this group of countries, sustained net debt inflows preceded and possibly fuelled the expansion in the financial cycle, as shown in a synthetic measure of the cycle in Graph II.9. Following the collapse in net debt inflows, the financial cycle is seen to eventually enter into a contractionary phase. These dynamics arguably have their counterpart in creditor countries, where debt outflows are seen to reverse into inflows, or at least to move into balanced dynamics, with the onset of the crisis. In the group of creditor countries shown in Graph II.9, the expansion in the synthetic measure of the cycle anticipates, rather than lags, the increase in the debt inflows.

Graph II.8: **Financial cycle vs. net debt inflows, selected euro area countries (2000-2015)**



(1) In the legend, the numbers next to the country codes describe whether the financial cycle is plotted against financial flows lagged by one year (-1), or against financial flows leading by one year (1). FR is represented in both graphs due to the absence of a clearly predominant sign of correlation. Outlier data points are not depicted in the graphs.
Source: Eurostat, BIS, authors' calculations. Financial flow data is based on an update of the database described in Hobza, A. and S. Zeugner, S. (2014) op. cit.

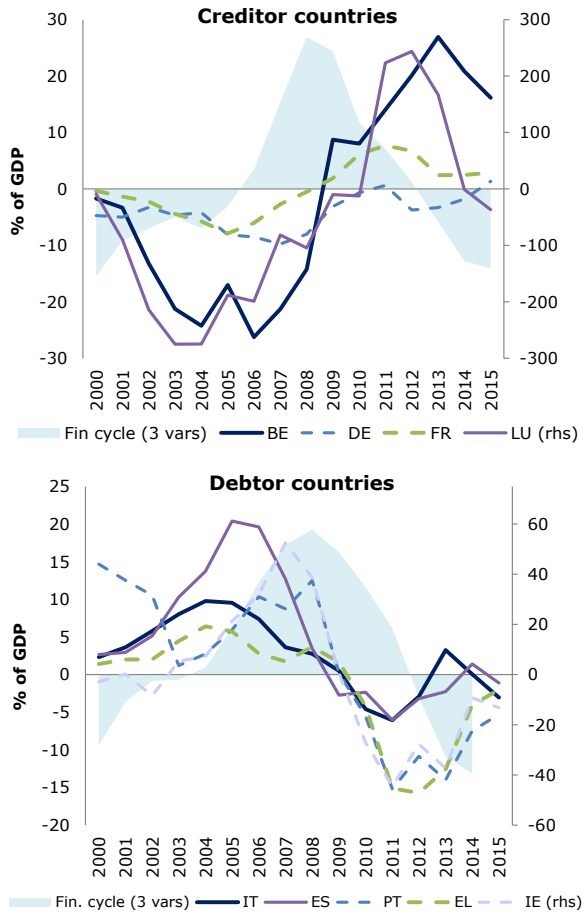
([52]) The financial flow data refers to overall bilateral debt flows between countries, irrespective of the institutional sector originating or receiving the flows. It includes portfolio investment and other investment (e.g., loans), but excludes official debt flows such as financial assistance and asset purchase programmes.

([53]) The financial cycle for the euro area is proxied (as in Graphs II.2 and II.3) by GDP-weighted average of financial cycles of 8 EA countries with sufficiently long time series: BE, DE, ES, FI, FR, IT, LU, NL. The net debt inflows also refer to these 8 EA countries, with the counterparty for each of these 8 countries being the rest of the euro area

([54]) In fact, correlations are generally stronger when measured with a lead or lag, rather than contemporaneously, meaning that the latter are not shown in Graph II.8.

([55]) Lane, P.R and P. McQuade (2014), 'Domestic credit growth and international capital flows', *Scandinavian Journal of Economics*, Vol. 116, No. 1, pp. 218-252.

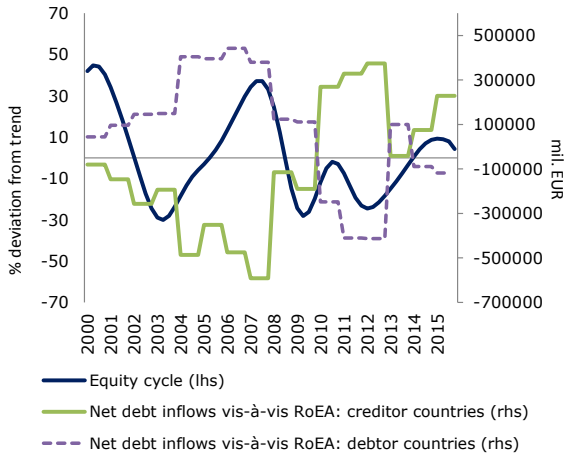
Graph II.9: **Net debt inflows vis-à-vis RoEA in creditor and debtor countries**



(1) The net debt inflows are the difference between debt inflows (+) and outflows (-) vis-à-vis RoEA (% of the GDP, 3-year centered moving average). France was included among the set of creditor countries notwithstanding its modestly negative NIIP due to the similarity in net debt flow dynamics when compared with other countries in this group. The financial cycle shown in each chart is an aggregate measure of the financial cycles of the plotted countries. The financial cycle was re-scaled for depiction purposes.
Source: Eurostat, BIS, authors' calculations. Financial flow data is based on an update of the database described in Hobza, A. and S. Zeugner, S. (2014) op. cit.

These observational facts notwithstanding, it should be noted that it is rather difficult to establish one-way causality between current account imbalances, intra-euro area financial flows and national financial cycles in the Member States. (56) In addition, as European banks intermediate cross-border flows well beyond the European continent, bank conditions in the EU (such as liquidity, funding and credit) potentially affect, alongside the conditions in the US, the global financial cycle. (57)

Graph II.10: **Equity cycle and net debt inflows in creditor and debtor countries**



(1) The equity cycle was calculated as described in the note to Graph II.1. The net debt inflows are the difference between debt inflows (+) and outflows (-) vis-à-vis RoEA
Source: Eurostat, BIS, authors' calculations. Financial flow data is based on an update of the database described in Hobza, A. and S. Zeugner, S. (2014), op. cit.

As mentioned in sub-section II.2, the equity cycle tends to lead the financial cycle when measured based on credit and house price variables. Graph II.10 relates an indicator of the euro area equity cycle to cross-border debt flows in selected creditor and debtor countries. It can be observed that the post-2003 upswing in equity prices coincided with greater investment by creditor countries in debt instruments of riskier debtor countries. When a bear market emerged in 2007, debt flows reverted towards safer creditor countries. Following a recovery in equities since 2012, this apparent flight to safety moderated once more. Overall, these dynamics suggests a tendency for euro area capital to flow towards the safer debt instruments of creditor countries in the presence of equity bear markets, and to riskier debtor countries when equity markets are bullish. The presence of a common safe asset in the euro area capable of absorbing capital flows when risk perceptions shift could arguably introduce a stabilising element to euro area financial flows. (58)

(56) For example Unger, R. (2017), 'Asymmetric credit growth and current account imbalances in the euro area', *Journal of International Money and Finance*, Vol. 73, pp. 435-451 argues that flows of bank loans to the non-financial corporations together with changes in competitiveness was the most important determinant of the build-up of current account imbalances in the deficit countries.

(57) H. Rey, H. Shin, E. Cerutti, S. Claessens and L. Ratnovski, L. (2017), 'Global liquidity and cross-border bank flows', *Economic Policy*, Vol. 32, Issue 89, pp. 81–125.

(58) For a listing of the different proposals for a common euro area safe asset see, e.g., M. Buti, G. Giudice, J. Leandro (2018),

II.5. Financial cycle and macroeconomic developments in the euro area

The relation between macroeconomic and financial developments in general, and business and financial cycles in particular, has elicited lively discussions in academic and policy circles in recent years. The finding that the financial cycle is longer, has led to the interpretation that financial and business cycles are inherently different phenomena and that the financial cycle can be an autonomous driver of the business cycle. ([59]) However, this view has also been challenged more recently, with arguments stressing that the strong medium-term co-movement of financial variables and output point to potential common drivers of both. ([60])

This sub-section provides some evidence on the macroeconomic impact of the financial cycle in the euro area using a panel Bayesian Vector Autoregression (BVAR) model. ([61]) The model allows for the tracking of the effects of financial cycle dynamics (measured as a common component of credit to households, credit to non-financial corporations and real house prices) on economic sentiment, perceived uncertainty, the business cycle (i.e., the cyclical component of real GDP), inflation and short-term interest rates in the euro area. ([62])

Graph II.11 presents how the macroeconomy of the euro area responds to an upward shock to the financial cycle (upper left-hand figure). Such a shock can be thought of as an (unexpected) expansion in credit and housing prices. The graph suggests that such financial expansion affects both subjective indicators (sentiment, uncertainty) and key macroeconomic variables (output, inflation, interest rates). Importantly, while the expansion in credit and housing prices has an expansionary effect on the economy in the short-term, it is followed by correction and negative impacts on economic activity in the longer term. ([63])

The detailed results in Graph II.11 show that the financial expansion quickly improves economic sentiment and expands output. However, the positive impact of economic activity is only temporary and after around three years the output is corrected downwards. At that time, economic sentiment is already on a declining path and economic agents' perceptions of uncertainty is increasing, possibly anticipating a downturn in the business cycle. Moreover, the initial increase in output is followed by a pick-up in inflation, and corresponding monetary tightening (higher short-term interest rates), which all have further dampening effects on output. All in all, the financial cycle seems to reinforce the cyclical fluctuation of output both in its expansionary and contractionary phases. Importantly, the contractionary phase is relatively long, as the output gap remains negative for several years.

Further analysis of the panel BVAR suggests that the impact of the financial cycle on the business cycle is stronger than the reverse. ([64]) Interestingly, when the financial cycle includes equity prices (in addition to credit and real housing prices, see Graph II.2), the impact of the financial cycle on the business cycles is stronger, while the impact of the business cycle on the financial cycle weakens. These findings are corroborated by studies for the US. ([65])

'Deepening EMU requires a coherent and well-sequenced package', VoxeU.org (25 April).

([59]) Drehman et al. (2012), op. cit..

([60]) ECB (2018), 'Real and Financial Cycles in EU countries: Stylized facts and modelling implications', *ECB Occasional paper*, No. 205.

([61]) The data availability allows including 14 euro area countries (BE, DE, EE, EL, ES, FI, FR, IT, LT, LU, LV, NL, PT, SI).

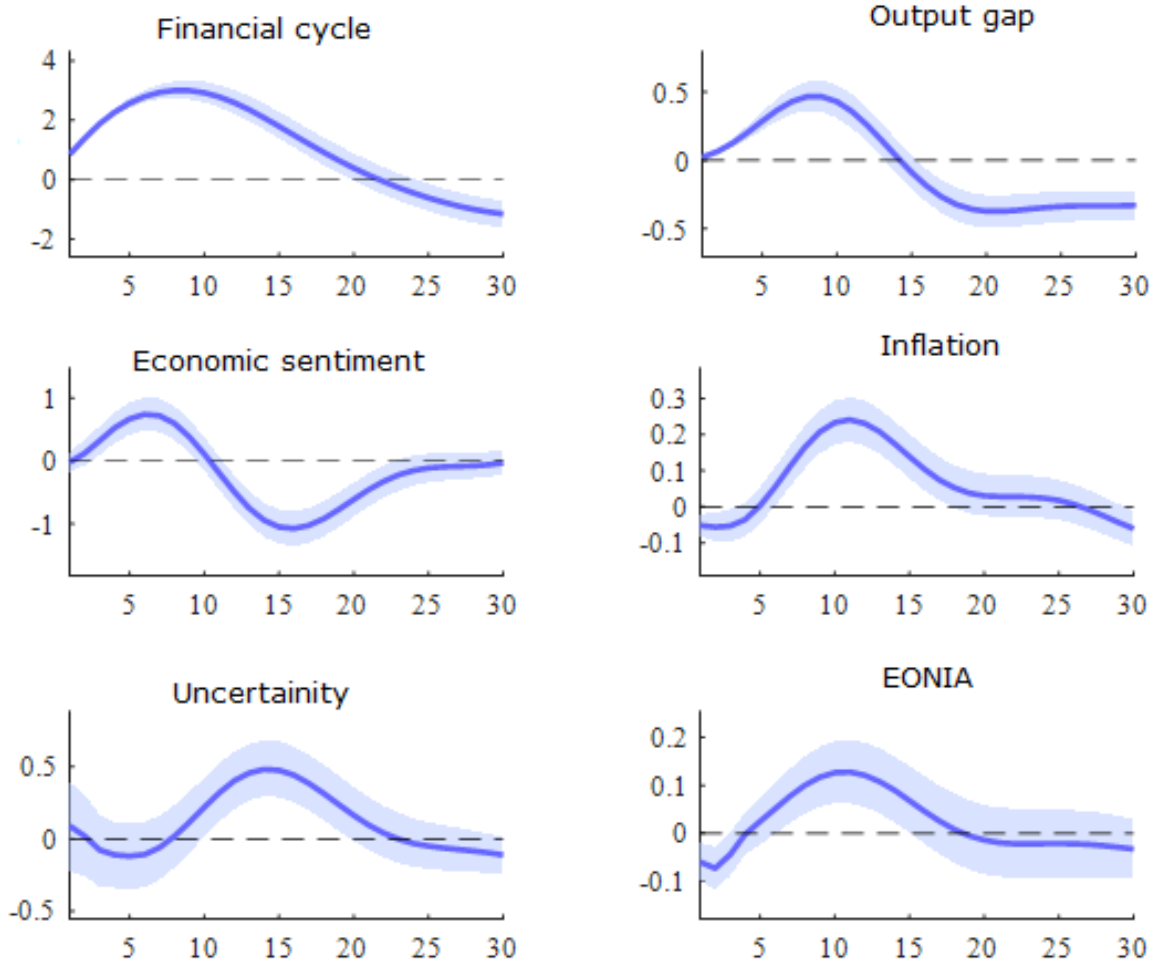
([62]) The model setting is largely as in Vašíček, B. (2017), 'Impact of uncertainty shocks in the euro area', *Quarterly Report on the Euro Area*, Vol. 16, No 3, pp. 25-40. Specifically, the BVAR model is estimated on quarterly data for 1996-2016. The model includes 6 variables (all of them stationary) in the following order: financial cycle (3 vars), the economic sentiment indicators (ESI), the uncertainty measure derived from the European Commission's business and consumer surveys (BCS) (for more details see Vašíček, 2017, op.cit.), output gap (GDP detrended by the band-pass filter), year on year change in HICP and short-term interest rate (EONIA). The macroeconomic data come from Eurostat and ECB, and the ESI and the uncertainty measure come from the European Commission. The model is estimated with four lags.

([63]) A pooled estimator is used and the reported impulse-response functions rely on the Cholesky factorisation. While the ordering of output, inflation and short-term interest rate is in standard monetary VARs, the additional variables are ordered first. However, alternative ordering delivers almost identical results. Specifically, the impact of financial cycle on the business cycle does not change when the latter is ordered first, nor if the other variables are excluded.

([64]) This is indicated by the forecast error variance decomposition and the result holds when business cycle is ordered in the VAR first.

([65]) Menden and Proaño (2017), op. cit. report similar findings for the US. Specifically, they confirm bi-directional causality between financial and business cycle but they also show that the financial cycle improves the GDP forecast and is useful in predicting recessions.

Graph II.11: **Impact of financial cycle on macroeconomic developments, panel of selected euro area countries**



(1) The graph represents the estimated impulse response of 6 variables included in the panel BVAR model (financial cycle, the economic sentiment indicator (ESI), an uncertainty measure derived from the BCS, a short term interest rate (EONIA), year-on-year change in HICP and the output gap) following a one standard deviation shock to the financial cycle (first variable in the model). The panel BVAR model is estimated for 14 euro area countries (BE, DE, EE, EL, ES, FI, FR, IT, LT, LU, LV, NL, PT, SI). The horizontal axis represents quarters. The vertical axis represents percentage points.
Source: Authors' calculations.

II.6. Financial cycle and macroprudential policy

Given the importance of financial cycles for the economy, prudential policies can be seen as a third pillar of the economic policy framework, complementing monetary and fiscal policies. While microprudential policy aims at safeguarding the stability of individual financial institutions by addressing their credit, market, and liquidity risks; macroprudential policy intends to safeguard the stability of the whole financial system by addressing excessive credit, maturity mismatches and contagion within the financial system. Macroprudential policy aims at limiting systemic risk through the use of primarily prudential tools. It has a 'cross-sectional' or 'structural' dimension (targeted at the vulnerabilities related to interconnectedness at a given point in time) and a 'time' or 'cyclical' dimension (targeted at vulnerabilities related to the build-up of risks over time). ([66]) The analysis in the previous sub-sections suggests that it may be useful to consider a broad scope for prudential policies, encompassing not only the banking sector, but the wider financial system.

The European Systemic Risk Board (ESRB) was established in December 2010 and is responsible

([66]) Detken et al. (2014), 'Operationalising the countercyclical capital buffer: indicator selection, threshold identification and calibration option', ESRB Occasional Paper No 5.

for macroprudential oversight of the financial system in the EU. The ESRB is set up as a coordination platform and information hub, which monitors risk from an EU-wide perspective across all sectors, and sets guidance on the use of macroprudential instruments. ([67])

Macroprudential policy uses a variety of tools, ranking from capital and liquidity requirements to borrower-based and housing-related tools (for example limits on loan-to-value ratios or debt-to-income ratios). ([68]) Given that some macroprudential policy instruments have only been added to the policy toolset – or more widely applied – in recent years, there is still limited evidence on their effectiveness and transmission channels. ([69]) Recent studies have found that borrower-based measures have a relatively significant effect on the demand for credit and, in turn, on consumption and investment. Capital-based measures can exert their effect on the supply of credit. Some evidence also suggests that the use of macroprudential tools may have a positive effect on long-term economic performance, but also that this effect depends on the development level and openness of the economy. ([70]) The limited evidence available for euro area countries suggests that instruments affecting the cost of bank capital are able to slow down credit growth and could reinforce the effects of monetary policy tightening. Loan-to-value ratios are also able to slow down housing booms, especially when monetary policy is loose. ([71]) A crucial issue for macroprudential policy is identifying the nature of 'excessive' credit growth in real time. The evidence suggests that credit booms accompanied by rapidly increasing housing prices and loan-to-deposit ratios typically precede systemic banking crises. ([72])

The nexus between macroprudential and other policies, notably monetary policy, has been extensively discussed in recent years, given the emergence of macroprudential policy making as a new policy area and its complementary nature with monetary and other regulatory policies. While each policy pursues different objectives (e.g., price stability versus financial stability) and uses different instruments, they complement each other as they both affect monetary and credit conditions in the economy. Their interaction and coordination faces particular challenges in a financially-integrated euro area where a single monetary policy is coupled with largely decentralised and only partly integrated macroprudential and regulatory policies.

Recent evidence suggests that macroprudential policies can have cross-border spillover effects, especially for countries with strong trade and financial linkages. ([73]) In particular, empirical evidence for the euro area confirms the existence of cross-border effects for some macroprudential instruments (loan-to-value ratios and sector-specific capital buffers) but also that the sign and magnitude of the spillovers depend on factors such as bank ownership structures and country characteristics. ([74]) Finally, stylised macrofinancial models of currency unions suggest that macroprudential tools (specifically, loan-to-value ratios) applied at Member State level can be used as a stabilisation tool and to prevent the emergence of imbalances among members of a monetary union. ([75]) There is, furthermore, evidence that macroprudential policies have positive spillover effects across the currency union, which strengthens the case for macroprudential policy coordination. ([76])

([67]) ESRB (2018), 'A review of macroprudential policy in the EU in 2017'. ESRB (2017), 'A review of macroprudential policy in the EU in 2016'. ESRB (2016), 'A review of macroprudential policy in the EU in 2015'.

([68]) ESRB (2014), 'ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector'. Other instruments, like exchange-rate based tools are more common in emerging economies.

([69]) Behn, Gross, Peltonen (2016), 'Assessing the costs and benefits of capital-based macroprudential policy', ESRB WP No 17, July.

([70]) See for example: Akinci, O. and J. Olmstead-Rumsey (2018), 'How effective are macroprudential policies? An empirical investigation', *Journal of Financial Intermediation*, Vol. 33, pp. 33-57; Boar, C., L. Gambacorta, G. Lombardo and L. Pereira da Silva (2017), 'What are the effects of macroprudential policies on macroeconomic performance?', *BIS Quarterly Review*; Cerutti et al. (2017), op. cit.

([71]) Zhang, Y. and T. Tressel (2017), 'Effectiveness and channels of macroprudential policies: lessons from the euro area', *Journal of Financial Regulation and Compliance*, Vol. 25, Issue 3, pp. 271-306.

([72]) Richter, B., M. Schularick and P. Wachtel (2017), 'When to Lean Against the Wind', *CEPR Discussion Papers*, No. 12188.

([73]) Kang, M.H., F. Vitek, M.R. Bhattacharya, M.P. Jeasakul, M.S. Muñoz, N. Wang and R. Zandvakil (2017), 'Macroprudential Policy Spillovers: A Quantitative Analysis', *IMF Working Paper*, No. 17/170.

([74]) Nocciola, L. and D. Żochowski (2016), 'Cross-border spillovers from macroprudential policy in the euro area', *BIS Papers*, No. 86g.

([75]) Brzoza-Brzezina, M., M. Kolasa and K. Makarski (2015), 'Macroprudential policy and imbalances in the euro area', *Journal of International Money and Finance*, Vol. 51, pp. 137-154.

([76]) Rubio, M and J.A. Carrasco-Gallego (2016), 'Coordinating macroprudential policies within the Euro area: The case of Spain', *Economic Modelling*, Vol. 59, pp. 570-582..

II.7. Conclusions

There has been growing evidence of the interlinkages between financial and macroeconomic developments. Historical evidence suggests that credit booms are often followed by financial crises and major economic downturns. ([77]) The period before the global financial crisis of 2008 was characterised by confidence effects, including expectations on asset returns, and an increase in international capital flows, which resulted in a 'credit supply' shock in some euro area Member States. ([78]) This was followed in the crisis period by sudden reversals as confidence waned, liquidity became an issue, and risk aversion set in.

This section illustrates that the financial cycle in the euro area countries can be captured by cyclical co-movements of credit and housing prices, and seems to be led by the evolution of equities. For most Member States, there is also a close link between their domestic financial and business cycles. The existence of genuine euro area-wide financial and business cycles hinges on the synchronisation of national cycles. This synchronisation is apparent for both types of cycles but it is stronger for business than for financial cycles. The asymmetries of financial cycles across the Member States seem to be driven, by factors including different perspectives on potential asset returns and intra-euro area financial flows. These asymmetries can be seen as positive because they allow cross-border risk sharing, but they need to be paired with a robust and integrated supervisory, regulatory, and budgetary framework at the euro area and EU level, as otherwise they may amplify economic fluctuations and drive cyclical divergence across the Member States.

The recognition of the nexus between financial and business cycled has broad policy implications. First, to understand the cyclical position of the economy, one may need to consider both macroeconomic and financial developments. ([79]) Consequently, some have argued that the weak economic dynamics of recent years, notably in the euro area, may reflect the temporal impact of the financial cycle rather than permanently weakened aggregate demand. ([80]) On the contrary, the current robust and broad-based economic expansion seems to get very little push from the financial developments as the credit and, in most Member States also the house price dynamics are rather moderate. Second, an increase in cross-border flows and a disconnect between net and gross financial flows calls for detailed surveillance of the latter. Indeed, a domestic credit boom financed from abroad can arise even if the net capital flows (and current account) remain stable. Capital inflows intermediated by the cross-border banking system are prone to reversal. This may call for macroprudential tools that are able to support equity and FDI capital inflows that are more resistant to negative shocks ([81]), whilst also reducing the divergence of financial cycles across Member States.

Recent governance changes and proposals for the euro area are altering the way financial developments interact with the macroeconomy but also the financial cycles of the Member States themselves. The EU financial regulatory framework, notably the Capital Requirement Directive / Capital Requirement Regulation, the Single Supervisory Mechanism and the European Systemic Risk Board, sets up a co-ordination mechanism among national and EU-level authorities involved in macroprudential policy-making. The Banking Union package aims to de-link national banking-sector risks from sovereign risks and may in turn reduce the destabilising impact of capital flows. However, some asymmetry of financial cycles will always be inevitable and thus cross-border private risk sharing mechanisms are needed. The Capital Markets Union package aims to increase private risk sharing but also deals with asymmetries of financial integration within the euro area, where interbank markets are much more integrated than stock markets, sovereign bond markets, or retail lending. ([82])

([77]) Gourinchas, P.O. and M. Obstfeld (2012), 'Stories of the Twentieth Century for the Twenty-First', *American Economic Journal: Macroeconomics,* No. 4, pp. 226-265.

([78]) Lane, P.R. (2013), 'Capital flows in the Eurozone', *European Economy Economic Paper*, No. 497.

([79]) Borio, C., P. Disyatat and M.Juselius (2016), 'Rethinking potential output: Embedding information about the financial cycle', *Oxford Economic Papers*, Vol. 69, Issue 3, pp. 655-677.

([80]) This counterargument against the secular stagnation hypothesis, i.e. the claim that aggregated demand is permanently weakened due to a decline in productivity growth and changes in saving behaviour, was put forth by Borio, C. 'Secular stagnation or financial cycle drag?', *Business Economics*, Vol. 52, Issue 2, pp. 87-98.

([81]) Broner, F, T. Didier, A. Erce and S. Schmukler (2013), 'Gross capital flows: Dynamics and crises', *Journal of Monetary Economics,* Vol. 60, pp. 113-33.

([82]) ECB (2017), 'Economic Bulletin', Issue 1/2017.