



EUROPEAN CENTRAL BANK
EUROSYSTEM

Financial integration in Europe

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Contents

Preface	3
Key messages	4
1 Overall assessment of financial integration	4
2 Selected policy issues for financial integration	6
Overview of the report	9
Chapter 1: Financial integration in the euro area: recent developments	10
1 General developments	11
2 Money and payment markets	18
3 Securities markets	25
4 Banking markets	32
Chapter 2: Eurosystem activities for financial integration	39
1 Reviewing financial supervision in the EU	41
2 Completing the banking union	43
3 Establishing the capital markets union	56
Special feature A: Financial development, financial structure and growth: evidence from Europe	65
1 Survey of the theoretical and empirical literature	68
2 New empirical evidence for Europe	85
Special feature B: Integrating euro area corporate bond markets: benefits and potential financial stability challenges	98
1 Introduction	99
2 The issuer perspective	100
3 Home bias	103
4 The holder perspective	107
5 Financial stability considerations	114

Special feature C: An empirical assessment of the Feldstein-Horioka's saving-retention coefficient as a measure of financial integration in the euro area	119
1 The Feldstein-Horioka puzzle	120
2 The major lines of criticism and interpretation of the puzzle	120
3 A general equilibrium explanation of the Feldstein-Horioka puzzle	121
4 Empirical evidence for the euro area	123
Statistical annex: Financial integration indicators 2018	127
1 Composite indicators of financial integration in Europe	127
2 Indicator of risk sharing	132
3 Standard indicators	133

Preface

The ECB's annual report on financial integration in Europe contributes to the advancement of the European financial integration process by analysing its development and the related policies. For the ECB, the market for a given set of financial instruments and/or services is fully integrated if all potential market participants with the same relevant characteristics: (1) face a single set of rules when they decide to deal with those financial instruments and/or services; (2) have equal access to the above-mentioned set of financial instruments and/or services; and (3) are treated equally when they are active in the market.¹ The report also discusses aspects of the “quality” of financial integration, such as whether it is delivering the desired economic benefits and is resilient.²

The Eurosystem has a keen interest in the integration and efficient functioning of the financial system in Europe, especially in the euro area, as reflected in the Eurosystem's mission statement. Financial integration fosters a smooth and balanced transmission of monetary policy throughout the euro area. In addition, it is relevant for financial stability and is one of the reasons behind the Eurosystem's task of promoting well-functioning payment systems. Without prejudice to price stability, the Eurosystem also supports the objective of completing the EU Single Market, of which financial integration is a key aspect.

In September 2005 the ECB published a first set of indicators of financial integration and an accompanying report assessing the state of euro area financial integration. Since then the work on financial integration has evolved and has resulted in the publication of a yearly report.

Since last year the report on financial integration in Europe has begun to alternate biennially between a full version and a more concise version. This approach has been chosen because financial integration tends to be a slow-moving process that does not require a full report every year. This year's report is the full version, also containing several special features. The biannual release of financial integration indicators on the ECB website remains unchanged.

¹ Baele, L. et al., “Measuring financial integration in the euro area”, *ECB Occasional Paper Series*, No 14, ECB, Frankfurt am Main, April 2004.

² Beck, R. et al., “Financial integration and risk sharing in a monetary union”, Special feature A in [Financial integration in Europe](#), ECB, April 2016.

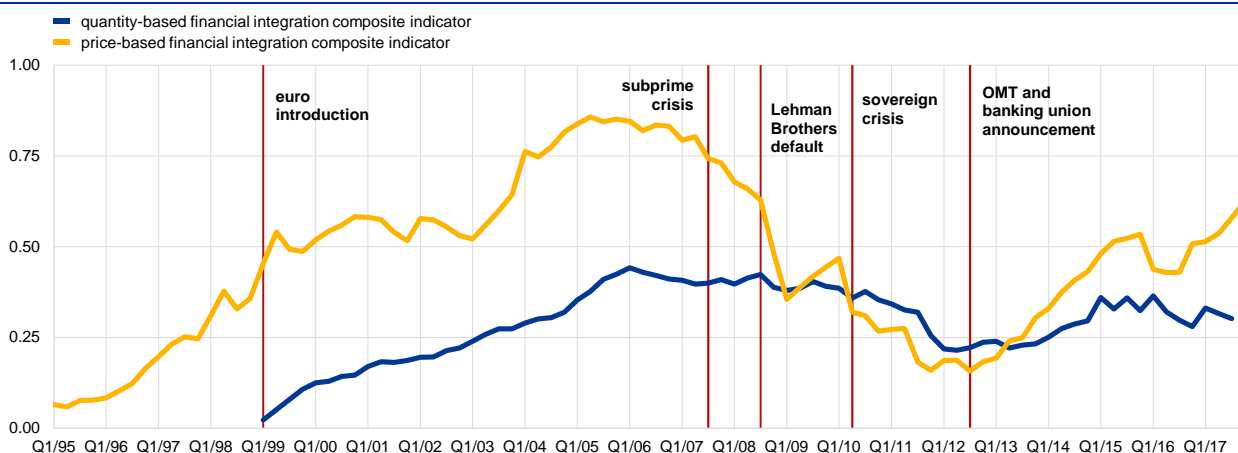
Key messages

1 Overall assessment of financial integration

- **The aggregate post-crisis reintegration trend in the euro area resumed strongly in prices but not in quantities.** The ECB's price-based composite indicator of financial integration shows a pronounced increase during 2017 (see yellow line in Chart A), after a temporary correction between late 2015 and end-2016 discussed in last year's report. This resumption of the post-crisis reintegration trend was driven in particular by convergence in equity returns and, to a somewhat lesser extent, in bond yields. However, bank retail interest rates gradually ceased to contribute to this trend. The main force behind this capital market-oriented integration process was the strengthening and broadening of the macroeconomic expansion in the euro area, which was quite uniform overall. In other words, economic fundamentals – as reflected for example in banks and non-financial corporations exhibiting less dispersed profitability prospects and credit risks – played a significant role in price-based convergence. In contrast, there was still no resumption of the post-crisis reintegration trend in quantities that had stalled in 2015. If anything, the quantity-based financial integration composite indicator has mildly declined since then (see blue line in Chart A), although its latest reading is slightly higher than observed in last year's report. This mild reduction over the past few years appears to result mainly from a lower share of cross-border interbank lending. While ECB monetary policy has supported money market integration, the ongoing injection of excess reserves – as expected – has reduced its counterparties' needs to trade across borders within the euro area money market.

Chart A

Price-based and quantity-based composite indicators of financial integration



Sources: ECB and ECB calculations.

Notes: The price-based composite indicator aggregates ten indicators covering the period from the first quarter of 1995 to the fourth quarter of 2017, while the quantity-based composite indicator aggregates five indicators available from the first quarter of 1999 to the third quarter of 2017. The indicators are bounded between zero (full fragmentation) and one (full integration). Increases in the indicators signal greater financial integration. For a detailed description of the indicators and their input data, see the Statistical annex.

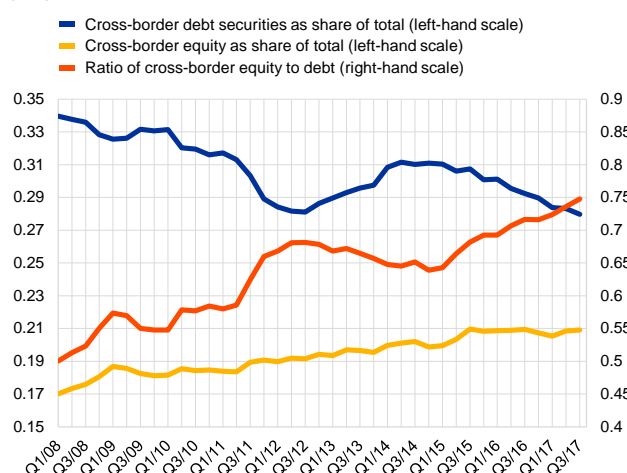
- Investment funds tend to play a favourable role in quantity-based financial integration, because many of them are quite diversified and therefore can also help other investors to spread their asset holdings across countries.** Euro area equity and bond investment funds tend to be quite diversified, across both euro area countries and the rest of the world (with the latter holdings recently increasing for bonds; see for example Charts S23 and S24 in the Statistical annex). Using the example of corporate bond portfolios, Special feature B illustrates that investing in UCITS (Undertakings for Collective Investment in Transferable Securities) allows other financial entities - notably insurance companies and pension funds but also banks - to achieve better diversified investments across euro area countries when compared with direct holdings. Given the increasing popularity of investment funds, this can make a material contribution to the quantity dimension of financial integration. At the same time, the financial stability implications of such structural change need to be monitored. European firms are relying on corporate bonds for their financing more than in the past and both households and various financial intermediaries are increasingly holding corporate bonds via investment funds. This changing environment might entail new sources of risk as well as different transmission channels of financial instability. These need to be properly understood against the background of potentially stretched valuations in some bond market segments.

Chart B

Indicators of the resilience of financial integration in the euro area

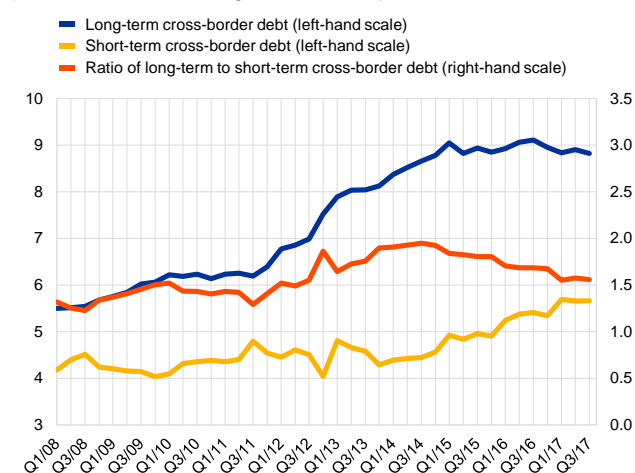
(a) Intra-euro area foreign equity holdings versus foreign debt holdings

(ratio)



(b) Intra-euro area foreign long-term debt holdings versus foreign short-term debt holdings

(left-hand scale: EUR trillions; right-hand scale: ratio)



Sources: (a) ECB, ECB calculation; (b) ECB calculation based on balance of payments data, Eurostat.

Notes: (a) The yellow line plots the evolution of holdings by euro area investors (all sectors) of equity issued by other euro area countries as a fraction of total euro area holdings of equities. The blue line plots the evolution of holdings by euro area investors (all sectors) of debt securities issued by other euro area countries as a fraction of total euro area holdings of debt securities. The orange line plots the ratio of the two shares. (b) The blue line shows the amount of long-term debt (maturity above one year) issued by euro area countries and held by residents of other euro area countries. The yellow line shows the amount of short-term debt (maturity less than one year) issued by euro area countries and held by residents of other euro area countries. The orange line shows the ratio of the two.

- Euro area financial integration has become more resilient to adverse shocks over time across several dimensions, except that cross-border**

short-term debt holdings have recently increased relative to long-term debt holdings. Equity investments tend to be more resilient to shocks than debt investments, foreign direct investments more than equity portfolio investments, retail bank lending more than interbank lending and long-term debt more than short-term debt (see Special feature A of the 2016 report “Financial integration in Europe”). Since the height of the financial crisis cross-border investment in the euro area has improved in terms of the first three of these dimensions. The left-hand panel of Chart B illustrates this for equity versus debt, for example (see orange line; the other two dimensions are shown in Charts 11 and 19 in Chapter 1). The only exception is that since the end of 2014 short-term cross-border debt holdings have increased relative to long-term debt holdings (see the right-hand panel of Chart B). This development needs to be monitored. While there are visible improvements in such resilience, the economic benefits of integration through cross-border risk sharing continue to be low in the euro area and have hardly improved since the estimates presented in last year’s report.

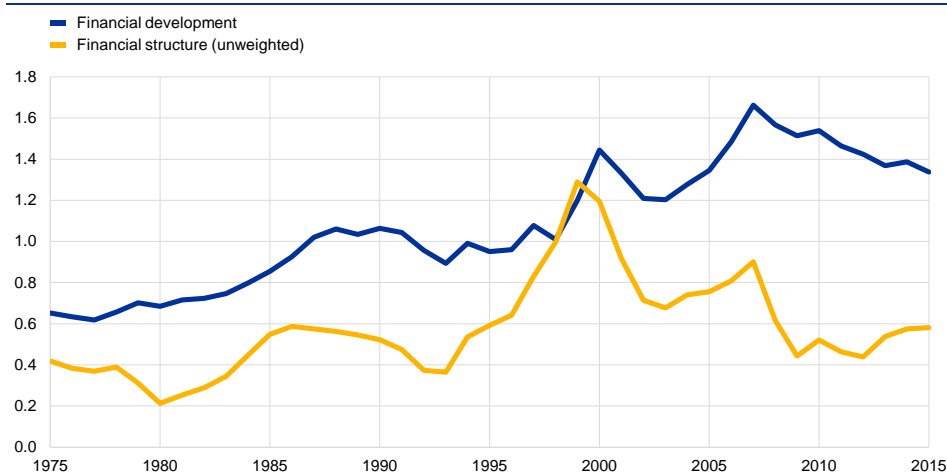
2 Selected policy issues for financial integration

- **The ECB’s activities contributing to financial integration and development over the reporting period focused on completing the banking union, establishing the capital markets union (CMU), and the review of the financial supervisory architecture.** As regards banking union, European Banking Supervision contributed to risk reduction as evidenced by increased capital, reduced leverage and reduced non-performing loans of euro area banks. Meaningful steps should also be taken towards further risk sharing by establishing both: a credible common fiscal backstop for the Single Resolution Fund that is fiscally neutral over the medium term; and a European Deposit Insurance Scheme. As regards the new analytical credit dataset (AnaCredit), data collection will start before the end of this year.
- **To support efficient liquidity management by cross-border banks, it should be both attractive and possible for them to receive the necessary liquidity waivers.** Under the European Union’s banking regulatory framework the Basel liquidity coverage ratio needs to be fulfilled at the individual level, i.e. by each subsidiary in a country other than the domicile of the parent bank. This could sometimes limit the rapid intragroup transfer of liquidity to the entity where it is needed most. But European banking supervision can (partially) waive the requirement for euro area subsidiaries provided certain prudential safeguards are in place. This liquidity waiver, however, can be overruled by Member States exercising their own option to only partially exempt intragroup exposures from large exposure limits. Consideration should be given to removing the Member State option for large exposures requirements and instead assigning it to the competent supervisor.
- **Further improving and harmonising insolvency frameworks in the euro area can have material beneficial effects on the functioning of the banking**

and capital markets unions, notably with regard to reorganisation proceedings and creditor participation. Recent ECB research provided empirical evidence that improved insolvency frameworks are conducive to private financial risk sharing in the euro area through both credit and capital markets (see Box 1 in Chapter 1). While the European Commission’s proposal for a directive on insolvency, restructuring and second chance in the context of CMU is a welcome step forward, it does not cover reorganisation proceedings or creditor participation. There is room for improvement in both the aforementioned dimensions, first in the median quality for the euro area and, second, in the rather large cross-country dispersion. Such insolvency reforms, however, can only be effective if they are supported by efficient judicial systems or the availability of a framework for out-of-court workouts. As slow and costly court proceedings in some euro area countries may be difficult to improve in the short term, it may be helpful to introduce harmonised non-binding EU guidelines for out-of-court restructuring, or even to create a formal out-of-court regime. Finally, the ECB considers that the EU banking regulatory framework would benefit from the introduction of a general depositor preference as well as further harmonisation in the treatment of supplementary capital instruments.

Chart C

Financial development and financial structure in the European Union



Sources: World Bank Financial Structure Database.

Notes: The chart plots the unweighted average, by year, of 21 EU countries' sum of bank credit to the private sector and stock market capitalisation, divided by GDP ("Financial development"), and the ratio of stock market capitalisation to bank credit to the private sector ("Financial structure"), over the period 1976-2015.

- Initiatives to further develop equity markets would promise to significantly foster innovation, growth and cross-country risk sharing in the euro area.** Recent literature suggests that growth is fostered not only by both bank and equity financing, but also by the “financial structure” (the ratio of equity market capitalisation to bank credit). New ECB research presented in Special feature A corroborates this for a sample of 21 EU countries between 1976 and 2015. In particular, during the decade before the financial crisis sectors dependent on external financing and facing better growth opportunities grew faster in countries with bigger stock markets. The same holds for high-tech and patent-intensive industries. Moreover, these effects were driven by

labour productivity growth and not by capital accumulation. All in all, the results support the view that equity markets play an important role in fostering innovative growth industries. Chart C shows that the average sum of equity market capitalisation and bank credit per country (“financial development”, as indicated by the blue line) has consistently grown in Europe since the late 1970s, even when taking the post-crisis correction into account. The average financial structure, however, has come down again to levels similar to the ones observed during the 1990s (red line). In other words, new initiatives may be needed to foster financing of the real economy through public and private equity markets. This is even more desirable because the literature suggests that equity investments are also particularly valuable for private financial risk sharing and that they enhance the resilience of financial integration relative to debt. Two directions that would help develop equity markets and their contribution to risk sharing, according to the research, include enhancing financial literacy among the population through education systems and continuing to enhance private pension savings, which is also needed to meet demographic challenges. For the integration of European securities markets, a major milestone in the post-trade landscape was reached last year when the Eurosystem completed the migration of TARGET2-Securities (T2S). 20 European markets and 21 central securities depositories are now operating on the single T2S platform.

Overview of the report

Chapter 1 contains the ECB's assessment of the degree of financial integration in the euro area. This is based on price-based and quantity-based indicators for both the aggregate level of financial integration and the levels of financial integration in four key financial market segments, notably the money, bond, equity and banking markets. Moreover, the chapter covers indicators of cross-country risk sharing in the euro area and of the resilience of integration. A box on “What could enhance private financial risk sharing in the euro area?” identifies factors and policies that are likely to enhance cross-border risk-sharing in the European Economic and Monetary Union through private financial channels. Another box on “Financial integration indicators based on money market statistics” provides additional perspectives on money market integration in the euro area, based on interest rates and quantities of actual money market transactions.

Chapter 2 summarises the main activities that the Eurosystem has pursued in 2017 and early 2018 with a view to fostering financial integration in the euro area. It focuses particularly on activities that contributed to strengthening the European financial supervisory architecture and advancing the important banking and capital markets union projects. A box providing an “Update on the application of cross-border waivers within the O&D framework” focuses on national options and discretions in the European regulatory framework that affect cross-border bank lending within euro area banking groups.

Special feature A, entitled “Financial development, financial structure and growth: evidence from Europe” empirically analyses the impact of financial markets on real economic activity in the EU and summarises recent evidence and insights from the literature on the impact of financial development and structure on economic growth.

Special feature B, entitled “Integrating euro area corporate bond markets: benefits and potential financial stability challenges” analyses recent developments in the euro area non-financial corporate bond market and discusses their implications for financial integration and stability.

Special feature C presents “An empirical assessment of the Feldstein-Horioka's saving-retention coefficient as a measure of financial integration in the euro area”.

Each chapter or special feature is preceded by a summary of results and conclusions: these further elaborate on the key messages above.

The **Statistical annex** provides details on the financial integration indicators used in the report. The set of 37 standard indicators includes the composite indicators and sub-indices presented in Chapter 1 and measures of cross-country risk sharing. For each financial integration indicator the economic rationale is described and more technical details are provided.

Chapter 1:

Financial integration in the euro area: recent developments

Financial integration in the euro area advanced modestly in 2017. The post-crisis reintegration trend in financial markets that had stalled for about a year resumed, although the pattern of progress was not uniform across and within the different financial market segments. The generally positive trend in capital markets was driven by the stronger, broader and quite uniform economic expansion in the euro area. This expansion was supported, inter alia, by the ECB's substantial monetary accommodation amid a global economic upswing and by progress made in bank restructuring, both of which occurred in a context of low market volatility. The resulting credit rating upgrades of certain euro area countries supported the trend of reintegrating capital markets. By contrast, the share of cross-border euro area transactions in the money market both in the secured and unsecured segments stayed relatively low. While ECB monetary policy operations supported money market integration over recent years, the intended increase in excess reserves held by the banking sector has also – as expected – reduced the need for cross-border trading in the money market. The uneven distribution of excess liquidity across the euro area, which partly reflects economic fundamentals, nevertheless showed some signs of diminishing in 2017. New daily data on cross-border transactions in the euro area money market suggest that there is a close and positive relationship between the dispersion of the credit quality of counterparties and the dispersion of their borrowing rates, particularly for the overnight unsecured segment and at longer maturities in the secured segment. Looking at euro area securities markets, cross-country differences in equity returns declined to levels similar to pre-crisis levels and to the dispersion between sectoral returns. The falling cross-country dispersion of yields on debt securities issued both by banks and by non-financial corporations in the euro area has mostly tracked the relative decline in default risk premia, i.e. issuer-specific factors, in recent years. The remaining dispersion of corporate bond yields due to excess bond premia, which is not considered to be related to credit quality, remained at a fairly low level, signalling that there is modest scope for further corporate bond market integration. Retail banking integration remained limited overall.

Overall, fundamental economic factors played a significant role in the financial integration developments observed since last year's report. The improvement in financial integration was particularly visible in the case of price-based indicators, especially those covering the capital markets. The sustainability of the resumed trend in price convergence is yet to be confirmed by the usually slower moving volumes of cross-border activity.

The evidence presented in this chapter does not suggest that all the economic benefits that might be expected from financial integration are already materialising. Whereas funding costs for firms (including SMEs) and households are more

uniformly low in the euro area than they were some years ago, cross-country private financial risk sharing is still seen as fairly limited. It is therefore vitally important to make further progress with the capital markets union and to complete the banking union. Drawing on recent research, this chapter identifies a number of new approaches which could be followed to enhance the contribution of banks and capital markets to cross-border risk sharing, enabling the household sector to maintain stable consumption trends. These include pension reforms, which are aimed at increasing retirement savings in countries where these are still low and providing incentives for sufficient diversification in equities and across countries, as well as measures to reduce obstacles to cross-border bank consolidation, improve financial literacy in the wider population and enhance the efficiency of reorganisation proceedings and creditor participation in insolvency frameworks.

On a further positive note, there are a number of signs that euro area financial integration is becoming somewhat more resilient to shocks than it was in the past. For example, foreign equity investment gained ground relative to foreign debt investment and foreign direct investment strengthened relative to portfolio equity investment. Moreover, cross-border bank lending to retail customers slowly increased over time in comparison with cross-border interbank lending (which is also affected by ECB monetary policy). The only exception is that during the last few years short-term debt has grown faster than long-term debt, partly reversing the previous trend towards long-term debt.

This chapter reviews recent developments affecting financial integration in the euro area. Section 1.1 gives a general overview of overall developments in financial integration in 2017, drawing on both price-based and quantity-based composite indicators. The three sections that follow assess the degree of financial integration in the three core segments of the euro area financial system, covering, in turn, the money market (Section 1.2), the securities markets (Section 1.3) and the banking markets (Section 1.4). The Statistical annex at the end of this report contains additional indicators that underpin the analysis in this chapter.

1 General developments

Overall and in general, financial integration improved modestly within the euro area in 2017. The evidence from a broad range of indicators suggests that the state of intra-euro area financial integration continued to recover in 2017 from the troughs reached in the depths of the European sovereign debt crisis. Even so, most recent integration developments were still relatively uneven across the four market segments considered in this report, i.e. the money, bond, equity and banking markets, with notable differences also between price-based and quantity-based indicators.

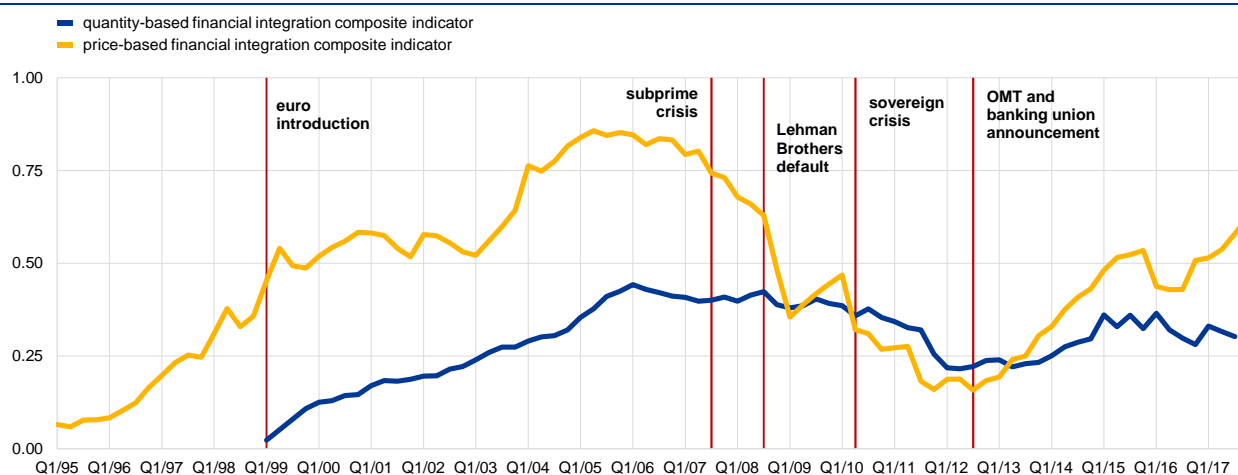
The improved integration was documented, inter alia, by the ECB's financial integration composite indicators over the review period (see Chart 1).

Compared with end-2016, the price-based financial integration composite indicator

increased markedly, supported by narrower cross-country price and interest rate dispersion.³ This trend was essentially observed across all market segments covered by the price-based indicator, although the sub-index for interest rate dispersion in the unsecured interbank market was rather volatile.⁴ The sub-indices covering capital markets, i.e. bond and equity markets, rose most strongly over the same period, reflecting significant and relatively uniform improvements in macroeconomic fundamentals across euro area countries and sectors, reducing, inter alia, the market prices for default risk for sovereign and private issuers. The continued pass-through of the Eurosystem’s non-standard monetary policy, giving rise to easier bank lending and market credit conditions, also played a positive role in this context. By contrast, the quantity-based composite indicator, which measures relative portfolio shares of intra-euro area cross-border asset holdings, increased marginally in 2017 compared with the fourth quarter of 2016. The sub-component for equity markets contributed to this upturn while that for bond markets was broadly stable and that of cross-border interbank lending continued to weigh against it.⁵ This may be related to the ECB’s ongoing injection of excess reserves into the euro area banking system, which as expected reduces the need for undertaking cross-border money market transactions.

Chart 1

Price-based and quantity-based financial integration composite indicators



Sources: ECB and ECB calculations.

³ This report does not explicitly discuss against which benchmark of “perfect integration” each of the price-based or quantity-based indicators of financial integration should be assessed. For instance, for all price dispersion-based indicators a benchmark of zero dispersion is an extreme assumption as it implicitly assumes cross-country convergence in all fundamental asset price determinants. Despite this, such an extreme assumption makes more sense from a very long-term ex ante perspective. The general issue is briefly discussed in Sections 1.1 and 1.2 of the Statistical annex since perfect-integration benchmarks are an integral part of the way both the price-based and the quantity-based composite indicators are computed.

⁴ For a graphical representation of developments in price-based financial integration composite sub-indices for the four market segments concerned, see Charts S1 to S4 in the Statistical annex.

⁵ The quantity-based financial integration composite indicator reflects developments in the shares of cross-border inter-MFI lending as well as MFI and investment fund cross-border holdings of bonds and equities relative to a benchmark in the form of a fully diversified portfolio. See Section 1.2 in the Statistical annex for further details.

Notes: The price-based composite indicator aggregates ten indicators covering the period from the first quarter of 1995 to the fourth quarter of 2017, while the quantity-based composite indicator aggregates five indicators available from the first quarter of 1999 to the third quarter of 2017. The indicators are bounded between zero (full fragmentation) and one (full integration). Increases in the indicators signal greater financial integration. For a detailed description of the indicators and their input data, see the Statistical annex.

It is important that the financial integration captured in prices and quantities produces the desired economic benefits (the “quality” of financial integration).

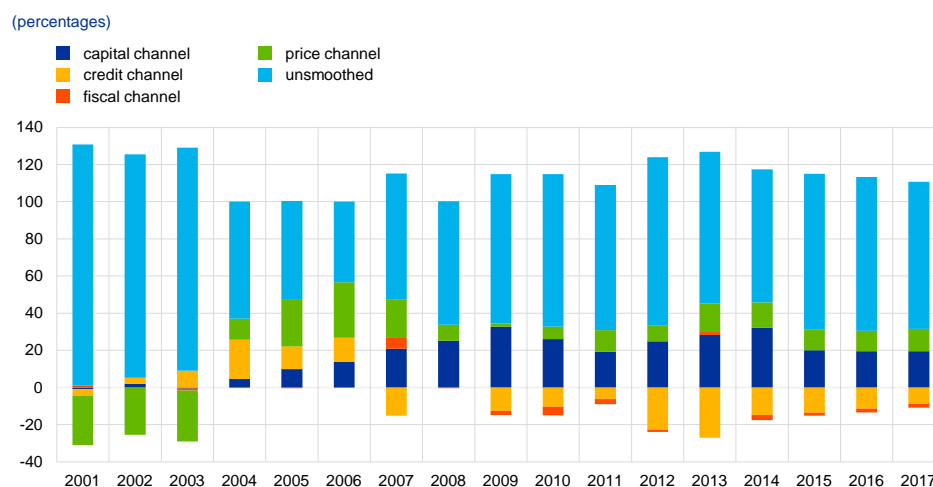
The quality of financial integration depends, inter alia, on its ability to withstand large asymmetric shocks and on whether it contributes to cross-country risk sharing within the monetary union.⁶ Chart 2 presents updated evidence in respect of the extent and composition of cross-border consumption risk sharing within the euro area, i.e. the ability to smooth (aggregate) domestic consumption in the presence of country-specific shocks to domestic income. The chart displays, by year, the contribution of the capital channel (primarily via cross-border ownership of productive assets and labour income from abroad, marked in dark blue), the credit channel (via cross-border borrowing and lending by both individuals and governments, marked in yellow), the fiscal channel (via cross-border transfers to both individuals and governments, such as remittances and EU structural funds, marked in red), and relative prices (via changes in the domestic consumer price index relative to the euro area, marked in green) to the smoothing of country-specific shocks to GDP. The remaining bar (marked in light blue) represents the portion of the shock to country-specific GDP that remains unsmoothed and is fully reflected in country-specific consumption growth.⁷

⁶ See Special feature A, “Financial integration and risk sharing in a monetary union”, in [Financial integration in Europe](#), ECB, April 2016.

⁷ The indicator was introduced as a regular monitoring tool in last year’s report. The respective contributions are calculated using an empirical model whose parameters are estimated over a ten-year rolling window. The bars display the share of a one-standard-deviation shock to domestic GDP growth that is absorbed by each risk sharing channel. The shares are computed on the basis of the cumulative impact of the shock on the variables, for each channel over a five-year horizon. The year-to-year variation in the shares reflects changes in the re-estimated model parameters. The individual bars may fall below 0% if one or more of the channels involved has a dis-smoothing effect on country-specific consumption growth. All bars together total 100%. See also Special feature A which studies the Feldstein-Horioka puzzle in a European context.

Chart 2

Consumption risk sharing in the euro area and its channels



Source: ECB calculations.

Notes: The chart displays, by year, the contribution of capital markets (via cross-border ownership of productive assets), credit markets (via cross-border borrowing and lending), fiscal tools (via public cross-border transfers), and relative prices (via changes in the domestic consumer price index relative to the euro area average index) to the smoothing of country-specific shocks to real GDP growth. The respective contributions are calculated using a vector-autoregression (VAR) model whose parameters are estimated over a ten-year rolling window of annual data, applying the Asdrubali and Kim (2004) approach enhanced for relative price adjustments. The bars display the share of a one-standard-deviation shock to domestic GDP growth that is absorbed by each respective risk-sharing channel. The shares are computed on the basis of the cumulative impact of the shock on the variables capturing each risk-sharing channel over a five-year horizon. Year-to-year variations in the shares reflect changes in the re-estimated model parameters. The remaining portion represents the portion of the shock to country-specific real GDP growth that remains unsmoothed and is fully reflected in country-specific consumption growth. The individual bars may fall below 0% if one or more of the channels involved has a dis-smoothing effect on country-specific consumption growth. All bars together total 100%.

Chart 2 suggests that the extent of cross-country risk sharing in the euro area remains quite low, highlighting the importance of policy initiatives such as the capital markets union and the completion of the banking union. As last year's report highlighted, although consumption risk sharing generally increased during the first years of the currency union – according to this yardstick – mainly driven by stronger credit and capital market contributions, the financial and sovereign debt crises were a major setback. As a result of these crises, the contribution of capital markets almost halved, and the contribution of credit markets even turned negative to the extent that consumption risk sharing dropped markedly, as indicated by the large rebounds in the share of unsmoothed income shocks.⁸ The contribution of fiscal transfers has always been negligible, in accordance with the way the Economic and Monetary Union has been designed. The indicator shows that as of 2017 (the rightmost bar of Chart 2), almost 80% of the idiosyncratic shocks to a country's GDP growth remained unsmoothed, and capital markets and changes in the relative prices of goods and services contributed most to risk sharing. In the light of that finding, according to the literature, capital and credit markets could make much larger contributions to risk sharing.⁹ Therefore, achieving progress with the capital

⁸ One caveat that should be mentioned is that this risk sharing indicator (like other indicators) is estimated on the basis of ten years of data up to the year indicated. As a consequence, the indicator will lag in time to some extent. For example, it is possible that euro area credit markets have now recovered to the extent that their contribution to risk sharing is already positive once again.

⁹ Asdrubali, P., Sorensen, B., and Yosha, O., "Channels of Interstate Risk Sharing: United States 1963-1990." *Quarterly Journal of Economics*, Vol. 111, 1996, pp. 1081-1110; Hepp, R., and von Hagen, J., "Interstate risk sharing in Germany: 1970-2006", *Oxford Economic Papers*, Vol. 65, 2013, pp. 1-24.

markets union and completing the banking union remain important policy agendas (see also Box 1).¹⁰

Box 1

What could enhance private financial risk sharing in the euro area?¹¹

Cross-regional and inter-temporal risk sharing can contribute to the macroeconomic stabilisation of economic areas via consumption smoothing. In a well-functioning monetary union, regions experiencing an economic downturn should be able to effectively receive income streams from regions enjoying an upturn, thus dampening the impact of the regional shocks and avoiding the materialisation of strong economic divergences. In particular, the economic literature on large federal states suggests that private financial risk-sharing can make a great contribution towards smoothing consumption. Cross-regional asset holdings lead to cross-regional income streams that can improve the consumption smoothing of economic agents.

In the light of the low consumption smoothing found for the euro area in Chart 2, it is important to identify factors and policies that could boost the contribution of private financial channels to risk sharing in the European Economic and Monetary Union (EMU).

Developing the framework of Asdrubali et al. (1996) and Corsetti et al. (2011)¹² further (see Chart 2), it is possible to empirically analyse the range of factors which boost risk-sharing through the capital channel and the credit channel. This box discusses the empirical results of these extensions, considering the impact of a set of theoretically well-understood factors on the smoothing of shocks to GDP through the two channels. On the basis of the changes required in the financial and economic structures identified by the research, this box discusses potential policy directions that promise to enhance private financial risk sharing in the euro area.

The credit channel of risk sharing appears to be facilitated by foreign bank penetration, financial literacy and the general trust of citizens. According to empirical estimates, an increased share of foreign-owned bank sector assets appears to facilitate cross-border lending and borrowing, thereby better insulating the domestic banking sector from regional shocks. The findings presented in this chapter (see Section 1.4 and the discussion on Chart 17 et seq.) and in a previous ECB publication¹³ indicate that the level of foreign bank penetration is, overall, relatively low for a banking union. Deepening the banking union would make it possible to reap further benefits from cross-border bank consolidation (also via the increased presence of transnational entities within the EMU), while safeguarding against potential risks. To achieve this goal, targeted policies both at EU and national level are needed to address the obstacles still faced by this consolidation. In this regard a series of options, ranging from harmonising taxation to streamlining merger reviews and introducing a

¹⁰ For a second, different indicator of the extent of income risk sharing that will be monitored, see Chart S7 in the Statistical annex. This indicator was presented in Special feature A of last year's report. While it continues to clearly reject the null hypothesis of perfect risk sharing, the measured reduction of the correlation between domestic consumption growth and domestic GDP growth since 2012 also suggests a gradual improvement in risk sharing.

¹¹ This box was written by A. Giovannini, P. Hartmann and A. Popov. It is based on the forthcoming ECB Discussion Paper "Financial integration, capital market development and risk sharing in the euro area" by the same authors and J. Imbs (Paris School of Economics).

¹² Asdrubali, Sorensen, and Yosha (op.cit.) and Corsetti, Dedola and Viani (2011), "Traded and nontraded goods prices, and international risk sharing: an empirical investigation", in Frankel and Pissarides (eds.), *NBER International Seminar in Macroeconomics 2011*, Chicago University Press.

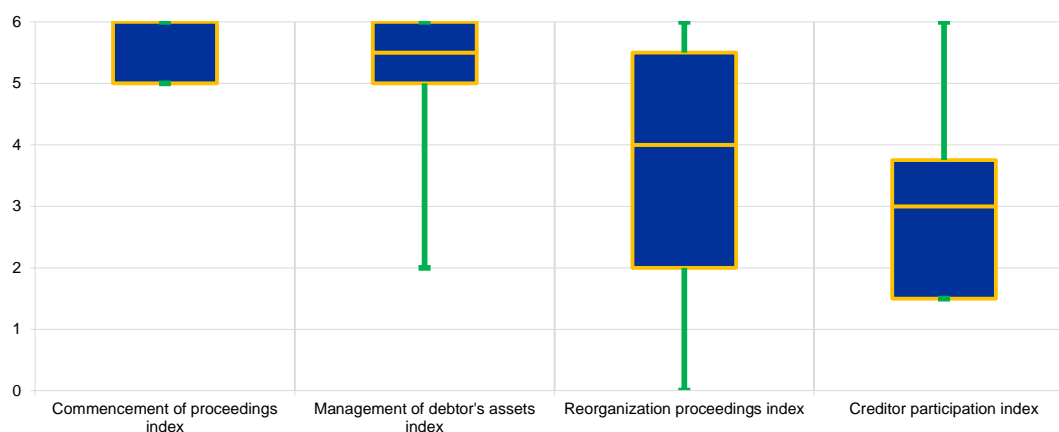
¹³ See the [Report on financial structures](#), ECB, October 2017.

European Deposit Insurance Scheme (EDIS), have been discussed in previous ECB reports.¹⁴ The empirical results also suggest that risk sharing through the credit channel improves as financial literacy in a society becomes more widespread – this is defined as the ability to understand the fundamental concepts of diversification, inflation, interest and compound interest. This is an important point for three reasons. First, the level of financial literacy currently varies widely across euro area countries, with 61% of the population being financially literate in the top quartile of these countries, compared with 37% in the bottom quartile. Second, the academic literature has documented the numerous benefits of financial literacy, from increasing the individual savings rate to improving households' portfolio returns. Third, the costs of investing in financial literacy are relatively low. For this reason, financial literacy could also be enhanced, for example, by improving the teaching of basic economic and financial concepts during secondary schooling.

Chart A

Dispersion of the strength of insolvency frameworks in the euro area

(index ranges from 0 to 6, with higher values indicating a stronger insolvency framework)



Sources: World Bank and ECB calculations.

Notes: Observations are from 2017. The commencement of proceedings index has three components: 1) Whether debtors can initiate both liquidation and reorganisation proceedings. 2) Whether creditors can initiate both liquidation and reorganisation proceedings. 3) What standard is used for the commencement of insolvency proceedings. The management of the debtor's assets index has six components: 1) Whether the debtor (or an insolvency representative on its behalf) can continue to perform contracts essential to the debtor's survival. 2) Whether the debtor (or an insolvency representative on its behalf) can reject overly burdensome contracts. 3) Whether transactions entered into before the commencement of insolvency proceedings that give preference to one or several creditors can be avoided after proceedings have been initiated. 4) Whether undervalued transactions entered into before the commencement of insolvency proceedings can be avoided after proceedings have been initiated. 5) Whether the insolvency framework includes specific provisions that allow the debtor (or an insolvency representative on its behalf), after the commencement of insolvency proceedings, to obtain the financing necessary to function during the proceedings. 6) Whether post-commencement finance receives priority over ordinary unsecured creditors during the distribution of assets. The reorganisation proceedings index has three components: 1) Whether the reorganisation plan is voted on only by the creditors whose rights are modified or affected by the plan. 2) Whether creditors entitled to vote on the plan are divided into classes, each class votes separately and the creditors within each class are treated equally. 3) Whether the insolvency framework requires that dissenting creditors receive as much under the reorganisation plan as they would have received in liquidation. The creditor participation index has four components: 1) Whether creditors appoint the insolvency representative or approve, ratify or reject the appointment of the insolvency representative. 2) Whether creditors are required to approve the sale of substantial assets of the debtor in the course of insolvency proceedings. 3) Whether an individual creditor has the right to access financial information about the debtor during insolvency proceedings, either by requesting it from an insolvency representative or by reviewing the official records. 4) Whether an individual creditor can object to a decision of the court or of the insolvency representative to approve or reject claims against the debtor brought by the creditor itself and by other creditors.

It would appear that risk sharing through the capital channel is enhanced by more widespread investment in mutual funds and in private pension and life insurance schemes. Pensions systems vary across the euro area. In particular, against a backdrop of ageing societies some countries already boast considerable private pension savings although others – especially a

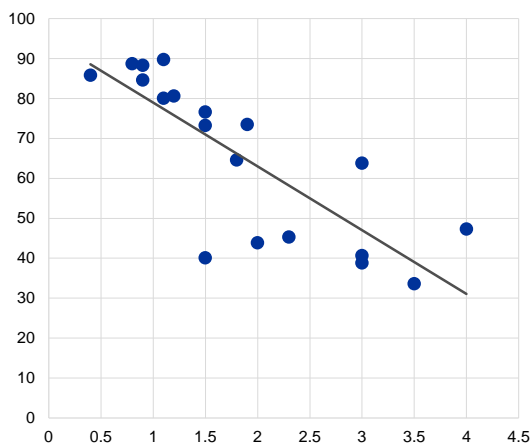
¹⁴ See, notably, Hartmann et al., "Cross-border bank consolidation in the euro area", Special feature A in [Financial integration in Europe](#), ECB, May 2017. On the relevance of EDIS, see Chapter 2 of [Financial integration in Europe](#), ECB, April 2016, and Chapter 2 of [Financial integration in Europe](#), ECB, May 2017.

number of large countries – have rather low savings, and still rely on substantial intergenerational “pay as you go” components. Moreover, only a small fraction of their pension investments are typically allocated to equity with relatively favourable risk sharing properties,¹⁵ so pension reforms in countries with low retirement savings could boost capital markets substantially. If designed well, these reforms could foster significant growth in euro area equity markets and strengthen cross-border diversification. That said, pension design is a major social choice so any measures beyond previous reform efforts¹⁶ would need to be discussed very carefully, also taking into account a number of important considerations in addition to cross-border risk sharing in EMU.

Chart B

Link between efficiency of judicial systems and recovery rate in the euro area

(y-axis: recovery rate, cents on the dollar)
(x-axis: time needed for creditors to recover their credit, years)



Sources: World Bank and ECB calculations.

Notes: Observations are from 2017. The recovery rate is recorded as cents on the dollar recovered by secured creditors through judicial reorganisation, liquidation or debt enforcement (foreclosure or receivership) proceedings. The time needed for creditors to recover their credit is recorded in calendar years. The period of time measured is from a company's default until the payment of some or all of the money owed to the bank. Potential delay tactics employed by the parties, such as the filing of dilatory appeals or extension requests, are taken into consideration.

More efficient insolvency frameworks appear to be associated with higher risk sharing via both the capital and the credit channels.

This empirical research finding shows that it is important to address the major shortcomings and divergence between insolvency frameworks which persist at the European level. This would require taking measures beyond the draft Directive on Insolvency, Restructuring and Second Chance proposed by the European Commission in the context of the capital markets union agenda.¹⁷ The proposed directive aims at fostering minimum harmonisation by focusing mainly on the common principles of early restructuring, enabling second chances for entrepreneurs, and addressing some of the efficiency aspects of insolvency procedures. Nevertheless, some points are not specifically addressed, such as the conditions for opening (and defining) insolvency proceedings and the ranking of claims (e.g. the role of secured creditors and creditor classes). World Bank data measuring the strength of insolvency

frameworks show that the rules for reorganisation proceedings and creditor participation seem to vary across euro area countries and are not, on average, at a high level (see Chart A). More efficient reorganisation plans would probably reduce failure rates, leading to less liquidation of

¹⁵ According to OECD data, the OECD average ratio of assets in pension plans to GDP, weighted according to the GDP of each country, was 83.0% in 2016. Seven OECD countries achieved asset-to-GDP ratios of over 100% – Denmark (209.0%), the Netherlands (180.3%), Canada (159.2%), Iceland (150.7%), Switzerland (141.6%), the United States (134.9%) and Australia (123.9%). These countries implemented private pensions a long time ago and, with the exception of Canada and the United States, have mandatory or quasi-mandatory private pension systems. Many other euro area countries have very low rates, even when public pension reserve funds are taken into consideration. For more information and data, see [OECD, Pensions at a Glance 2017 – OECD and G-20 indicators, Paris](#).

¹⁶ The recent wave of reforms implemented in Europe after 2008 mainly focused on raising pensionable age. Unlike prior reforms, there was little attempt was made to further shift assets from public pay-as-you-go schemes to privately funded schemes. See EPSC (2017) “[A Pan-European Pension Product: Filling the Pensions Gap and Refinancing the Economy](#)”, Issue 26, 29 June 2017.

¹⁷ See European Commission proposal for a Directive of the European Parliament and of the Council on preventive restructuring frameworks, second chance and measures to increase the efficiency of restructuring, insolvency and discharge procedures, and amending [Directive 2012/30/EU](#) and the [Opinion of the European Central Bank](#) on the proposed legislation.

profitable businesses. Moreover, more harmonised creditor ranking across euro area countries would help cross-border investors to assess risk-adjusted returns, thereby fostering equity market integration. Another key issue is ensuring timely procedures for recoveries – Chart B shows not only the high correlation between the time recoveries take and the amount recovered, but also the high dispersion that persists in the euro area. This calls for the courts to operate more efficiently in a number of Member States.

2 Money and payment markets

Money market indicators of financial integration according to different dimensions showed mixed evidence of slightly improved levels compared with the previous year and a continuing impairment when compared to pre-crisis levels. Money market integration was supported, inter alia, by the ECB's monetary policy measures such as the forward guidance on key interest rates¹⁸, the Asset Purchase Programme (APP), the Targeted Longer-Term Refinancing Operations (TLTRO) and the prolongation of the fixed rate tender procedure with full allotment in regular refinancing operations.¹⁹ Considering money market activity, the secured segment exhibited a modestly declining divergence of repo (repurchase agreement) rates on sovereign bond collateral across euro area countries, while spread movements in interbank lending rates in the unsecured money market were partly driven by outlier transactions in a context of lower market turnover. The share of intra euro area transactions, both in the secured and unsecured segments of the money market, stayed relatively low, partly reflecting economic fundamentals.

As the relative number of cross-border payment transactions in the TARGET2 system picked up in 2017 and at the beginning of 2018, the relative value of cross-border payments in euro stabilised at around pre-crisis levels. Chart 3 shows the share of euro-denominated cross-border payments in TARGET2, both in terms of value (in euro) and volume (number of transactions). The rapid decline of this share in terms of value but not in terms of volume after the Lehman Brothers bankruptcy in September 2008 suggests that large cross-border transactions (probably interbank transactions²⁰) were the most affected. As the Eurosystem stepped in to provide ample liquidity to the money market, the proportion of cross-border payments in euro recovered gradually, before declining markedly again when the sovereign debt crisis intensified between mid-2011 and the beginning of 2012. The subsequent gradual increase in the share of cross-border activity denominated

¹⁸ "The Governing Council expects the key ECB interest rates to remain at their present levels for an extended period of time, and well past the horizon of the asset purchases." Monetary Policy Decisions Press Release, ECB, 8 March 2018.

¹⁹ "The main refinancing operations and the three-month longer-term refinancing operations will continue to be conducted as fixed rate tender procedures with full allotment for as long as necessary, and at least until the end of the last reserve maintenance period of 2019." Monetary Policy Decisions Press Release, ECB, 25 January 2018.

²⁰ Of cross-border payments in TARGET2, interbank transactions have historically represented between 56% and 76% in value and between 25% and 34% in volume.

in euro in the total value of TARGET2 payments, partly spurred on by the APP, reached the pre-crisis levels of 40-45% in 2016-2017.

Chart 3

Share of euro-denominated cross-border activity in the TARGET2 payment system

(Cross-border value (EUR) and volume (number of transactions), percentage of total)



Source: ECB.

Notes: The series shows the monthly cross-border share in value and volume terms of all euro-denominated transactions settled in the TARGET2 system as a percentage of total transactions (T2S and technical transactions excluded). The total transaction value for 2017 amounted to an average of €1.7 trillion per day.

Mixed signs of improvement in money market integration were visible in terms of interest rate dispersion and spreads in both the secured and the unsecured markets.

Considering intra-euro area bilateral trades, the dispersion of interbank lending rates in the unsecured money market has been volatile in recent years, as can be seen in Chart S8 in the Statistical annex. The periods of higher interest rate spreads should be assessed against a background of declining transaction volumes on the back of the increasing amount of excess liquidity injected through the Eurosystem's monetary policy operations. In this environment of lower turnover, outlier transactions (i.e. those conducted at non-average rates), even at very small volumes, will have a more pronounced impact on interest rate dispersion. The ongoing dispersion in repo market rates should not be attributed to money market fragmentation as such, but should be seen instead as reflecting a growing demand for the high quality collateral to secure these repo transactions. Factors contributing to this increasing demand are the recent regulatory reforms²¹ as well as the regulation-driven use of high quality collateral in payment and settlement systems. As a side effect of the ongoing public sector asset purchases by the Eurosystem under the APP, the availability of high quality collateral has been significantly reduced, although the impact has, according to market participants' feedback, been mitigated by the introduction of the Eurosystem's securities lending arrangements.²²

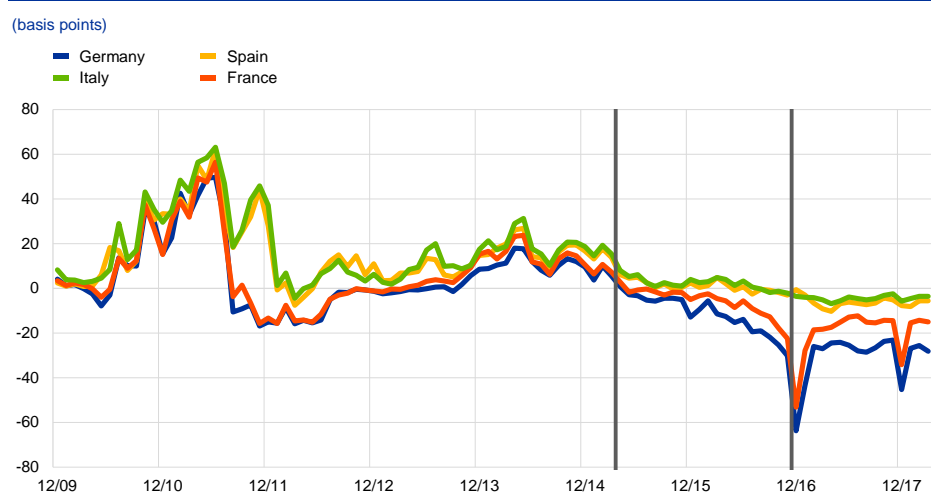
²¹ Some examples of the regulatory demand for high quality collateral include the use of central clearing for repo and derivatives markets and the resulting need for margin requirements by the clearing houses as well as the demand for high quality liquid assets (HQLA) for the purpose of complying with the LCR (Liquidity Coverage Ratio).

²² Securities purchased under the public sector purchase programme (PSPP) have been made available for securities lending in a decentralised manner by the ECB and some national central banks since 2 April 2015. An option to provide cash as collateral was introduced in December 2016.

These have supported a modest narrowing of the spread between repo rates against euro area sovereign bond collateral and the ECB's deposit facility rate, in particular for France and Germany (see Chart 4).

Chart 4

Monthly average spread between repo rates against sovereign bond collateral and the ECB's deposit facility rate



Sources: Bloomberg, Banco de España and ECB calculations.

Notes: The repo rates for Germany, France and Italy are based on Repo Funds Rate indices. The Spanish series is based on repos against Spanish sovereign bonds. Vertical grey lines refer to the introduction of the Eurosystem's securities lending arrangements (April 2015) and the option to provide cash as collateral (December 2016).

Another dimension of segmentation in the secured money market relates to the price differentiation between centrally cleared and bilateral trades. Central clearing and settlement through central counterparties (CCPs) has an advantage for the money market operators because of the possible netting out of their exposure. As a consequence, they incur less balance sheet costs of repo transactions as compared to bilateral trades, which enlarge the balance sheet, based on which some regulatory ratios, such as the leverage ratio, are measured and in some countries bank levies are imposed. Therefore, bank counterparties may be more willing to enter into those centrally cleared trades, which is reflected in the solid CCP-cleared trading volumes and the premium paid for the CCP-cleared trades, in particular at the reporting dates. However, CCPs can also have a significant market impact due to risk limits that they impose on the trades based on the origin of bidding institutions and the collateral that must be provided, which could lead to some banks being limited in their participation in centrally cleared trades. Moreover, bilateral trades are a sign of trust between market players, and as such reflect market integration.

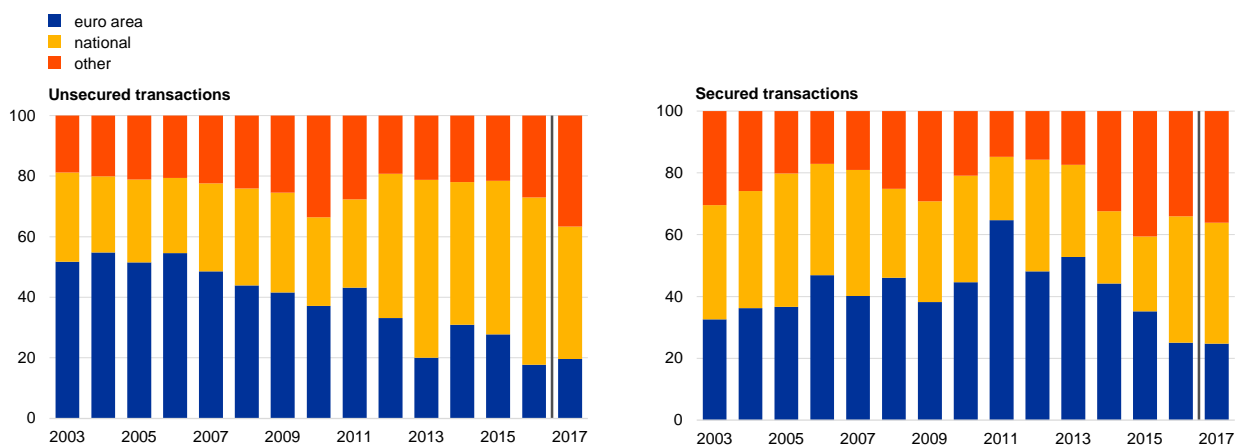
The level of money market integration, as measured in terms of cross-border secured and unsecured activity within the euro area, remained relatively low.

The latest preliminary data for 2017 show that the share of trading between domestic banks in the unsecured market was above 43%, compared with almost 40% for the secured market. The share of cross-border trading with counterparties from other euro area countries stood at 20% in the unsecured and at 25% in the secured market segment. For the unsecured money market segment the share of cross-border flows within the euro area slightly increased compared with 2016, although it

remained well below pre-crisis levels (Chart 5).²³ The fact that the Eurosystem still plays a significant intermediary role in the provision of liquidity indicates that counterparties in some member countries continue to have limited market access to cross-border unsecured funding. One explanation is that since the crisis, unsecured interbank trading in the euro area, as has been the case in other advanced economies, has steadily lost ground to secured transactions, reflecting a heightened demand for safety. Over the review period, the secured segment of the money market showed a broadly stable share of cross-border activity within the euro area, which despite rising volumes remained below pre-crisis levels (Chart 5).²⁴ Considering collateral issuer location, the share of domestic collateral has recently declined in favour of non-domestic euro area collateral.²⁵ For the FX swap market segment no signs of market fragmentation were observed based on MMS data, either in volumes or in pricing. However, large moves in the pricing of FX swap transactions on quarter-end reporting dates continue to show the impact of regulation on banks' balance sheet readjustments on reporting dates.

Chart 5
Geographical distribution of money market transactions

(annual data, percentages of total volumes)



Sources: The ECB's Euro Money Market Survey, Money Market Statistics (MMS) reporting agents, and ECB calculations.

Note: Data refer to the second quarter of each year. Data for 2016 (third quarter) and 2017 are taken from the MMS. All the data pertain to those reporting banks that were part of both the Money Market Survey panel and the MMS database. These data are still subject to potential revision.

Some remaining impairment in money market integration is also visible in the persistent uneven distribution of excess liquidity across euro area countries, although this concentration showed some signs of diminishing. The

Eurosystem's monetary policy operations since 2015 have led to a rising stock of excess liquidity held by the banking sector, which supports money market integration

²³ Cross-border flows are captured by "euro area" and "other" (i.e. non-euro area) flows. One of the recent drivers of the increasing share of non-euro area unsecured transactions stems from non-euro area institutions not having access to the ECB's deposit facility and therefore seeking to place their euro holdings with banks in euro area financial centres. This finding is based on both commentaries from money market participants as well as on ECB Money Market Statistics (MMS) reports from the 52 largest euro area banks.

²⁴ Non-euro area cross-border flows increased marginally in the secured money market.

²⁵ This information is based on MMS data from the 52 largest euro area banks. More information on indicators based on MMS data is presented in Box 2 of Chapter 1.

as such but weighs on the number of interbank transactions across the euro area. The concentration of excess liquidity could be attributed to three main fundamental factors: (i) the particular role of financial centres in the euro area and their importance for financial intermediation services, including for banks located outside the euro area; (ii) the regional differences in banks' business models that attract more excess liquidity to certain euro area countries than to others; and (iii) the general search for safe assets which has tended to favour liquidity held in 'safe haven' countries.²⁶ The distribution of excess liquidity became somewhat less concentrated in 2017, since it also started to increase in those countries which had previously not held any significant amounts of excess liquidity.

Box 2

Financial integration indicators based on money market statistics²⁷

The Money Market Statistics (MMS) are based on actual money market transactions conducted by the 52 largest credit institutions in the euro area.²⁸ Data collection started on 1 July 2016 and covers four segments of the euro-denominated money market: unsecured transactions, secured transactions, foreign exchange swaps and overnight index swaps (OIS). The counterparties for which money market transactions are reported include Monetary Financial Institutions (MFIs) as well as a range of other financial and non-financial institutions, including governments.²⁹ MMS facilitate an assessment of the degree of money market integration in the euro area, examining both the volume of cross border transactions and interest rate convergence.

Table A shows some indicators for volumes of money market activity. The aggregate trends observed in recent years continued in 2017 – the secured segment is the most significant in terms of nominal amounts negotiated. OIS activity takes place predominantly through central counterparties (CCPs), whose clearing and settlement services also play a key role for transactions in the secured segment.³⁰ Non-domestic activity is also particularly high for the foreign exchange swaps segment (over 80%) which has the greatest cross-border share of activity with counterparties outside the euro area (59%). In the unsecured segment, over 70% of overnight transactions take place cross-border with both euro area and non-euro area counterparties, while most longer-maturity transactions are with domestic counterparties.

²⁶ For a more detailed discussion see Baldo, L., Hallinger, B., Helmus, C., Herrala, N., Martins, D., Mohing, F., Petroulakis, F., Resinek, M., Vergote, O., Usciati, B. and Wang, Y. "The distribution of excess liquidity in the euro area", *ECB Occasional Paper Series*, No 200, November 2017.

²⁷ The authors of this box were Matteo Accornero and Nick Ligthart.

²⁸ For a list of reporting agents, please refer to the [MMS web page](#).

²⁹ For a comprehensive overview of all counterparties included in MMS data, please see the "[Reporting Instructions for the Electronic Transmission of Money Market Statistical Reporting](#)" (pp. 51-52).

³⁰ The ultimate counterparties of transactions taking place in CCPs cannot be identified under the current reporting framework.

Table A

Cross-border activity in the euro area money market, 2017

Segment	Maturity	Average daily nominal amount (billions of euros)	Domestic (percentage)	Non-domestic euro area (percentage)	Non-euro area (percentage)	Central Counter-Parties (CCPs) (percentage)
Unsecured	Overnight	52	27.8%	35.8%	36.3%	0.0%
	Other mat.	47	80.2%	11.5%	8.3%	0.0%
Secured	Overnight	249	3.6%	7.3%	16.1%	72.9%
	Other mat.	29	7.1%	10.0%	35.7%	47.2%
OIS	All	24	2.2%	1.8%	5.3%	90.7%
FX Swaps	All	111	14.4%	26.5%	59.1%	0.0%

Sources: ECB and ECB calculations.

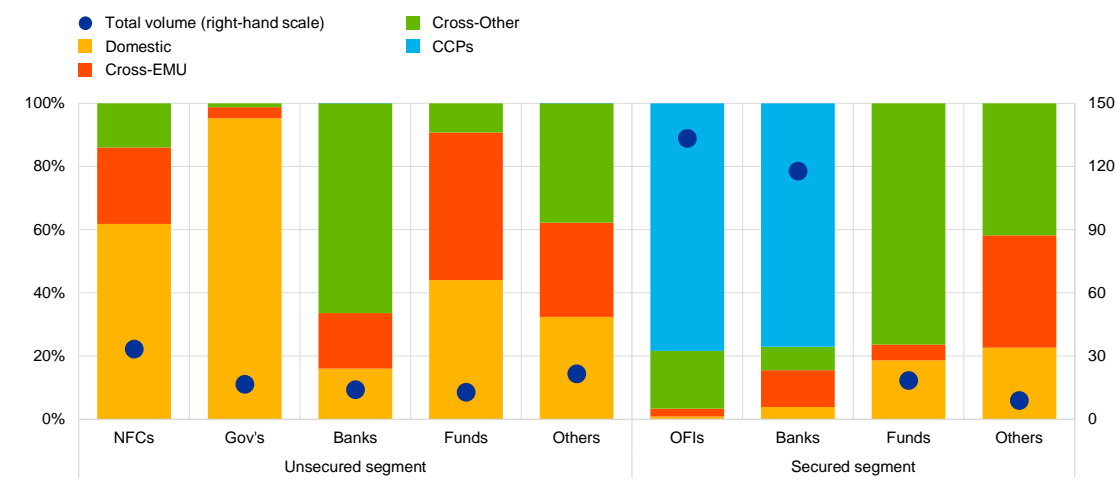
Notes: Observations are from 2017. The domestic (the counterparty is resident in the reporting agent's country), non-domestic euro area (the counterparty is non-domestic and located within the euro area), non-euro area (the counterparty is located outside the euro area), and CCP (the counterparty is a domestic or non-domestic CCP) categories add up to 100%. The sample is limited to: (i) only borrowing transactions for the unsecured and secured segments, (ii) only transactions involving the payment of a fixed rate for the OIS segment, and (iii) only transactions involving the purchase of foreign currency for the FX Swap segment. Transactions with the Eurosystem are excluded from the calculations.

Charts A and B break these figures down further. Chart A provides a breakdown of borrowing transactions by counterparty sector and market segment. In terms of nominal amounts (depicted by diamonds), the unsecured segment has mainly non-financial corporations (NFCs) or governments as counterparties, while the secured segment is by far the most widely used funding channel with other financial intermediaries (OFIs) or banks which, in most cases, operate as central counterparties. In terms of proportions (shown in bars), in the unsecured segment, domestic transactions represent a major share of transactions with NFCs, governments or investment and money market funds as counterparties. On the contrary, in the secured segment, domestic activity represents only a minor proportion of transactions with all counterparties. Chart B shows that non-domestic activity in the secured segment is dominated by CCPs and counterparties resident in France and Germany.

Chart A

Breakdown by counterparty sector

(percentages (bars – left-hand scale)
(EUR billions (dots – right-hand scale))

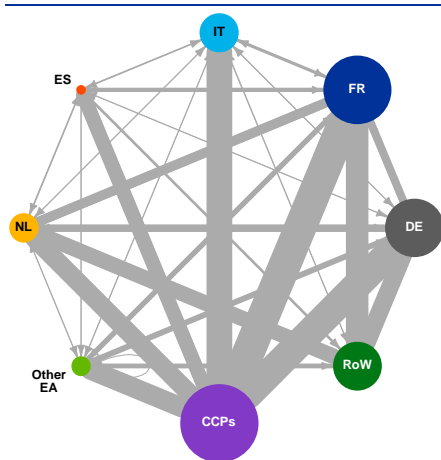


Sources: ECB and ECB calculations.

Notes: Observations are from 2017. The sample is limited to borrowing transactions in the secured and unsecured segments. Transactions with the Eurosystem are excluded from the calculations. CCPs with a banking licence are classified as banks. The "Funds" category includes both investment and money market funds. Transactions with domestic, non-domestic euro area, non-euro area and CCP counterparties are defined as in Table A.

Chart B

Cross-border activity (secured segment)



Sources: ECB and ECB calculations.

Notes: Observations are from 2017. The thickness of the arrows is proportional to the ranking of nominal amounts transacted. The size of the origins is proportional to the ranking of the overall cross-border nominal amounts transacted. The sample is limited to cross-border (borrowing and lending) transactions in the secured segment.

Table B and Chart C examine the dispersion of lending and borrowing rates as a measure of money market integration. In Table B

“within to total variance” ratios indicate full integration when they approach one, while “dispersion” and “spread” indicators show full integration when they approach zero. Price-based indicators suggest a generally good level of integration in money markets. As shown in Table B, the FX Swaps segment shows very little dispersion, indicating a high level of integration. Within to total variance ratios are somewhat lower for both the secured and the unsecured segments, in particular for unsecured borrowing transactions. In comparison with the OIS segment, both the unsecured and the secured segments also show relatively higher dispersions of spreads between domestic and cross-border funding. Banks resident in “lower-rated” euro area countries pay higher interest

rates, in particular in the overnight unsecured segment and in the secured segment at other, longer maturities. As Chart C shows, in 2017 there was a slight reduction in the dispersion of borrowing rates in the secured segment, associated with the simultaneous convergence of reporting agents’ credit ratings. Despite end-of-year volatility, the average of the interquartile range was lower over the second half of 2017 than it was over the first half of the year (by 24% and 9% for the overnight and the other maturities, respectively). Across the other money market segments displayed in Table B the interquartile ranges show no notable signs of convergence over 2017.

Table B

Interest rates for money market transactions

Segment	Maturity	Within to total variance ratio (lending)	Within to total variance ratio (borrowing)	Dispersion of cross-border vs. domestic transaction spreads (lending)	Dispersion of cross-border vs. domestic transaction spreads (borrowing)	Spread between banks resident in lower vs. higher rated euro area countries	Percentage of transactions by banks resident in lower rated euro area countries
Unsecured	Overnight	0.785	0.600	0.181	0.251	0.226	9%
	Other maturities	0.796	0.641	0.176	0.172	-0.073	6%
Secured	Overnight	0.762	0.779	0.142	0.269	0.078	18%
	Other maturities	0.757	0.749	0.100	0.198	0.256	17%
OIS	All	0.956	0.985	0.054	0.076	0.052	6%
FX Swaps	Overnight	0.995	0.995	0.003	0.004	-0.001	6%

Sources: ECB and ECB calculations.

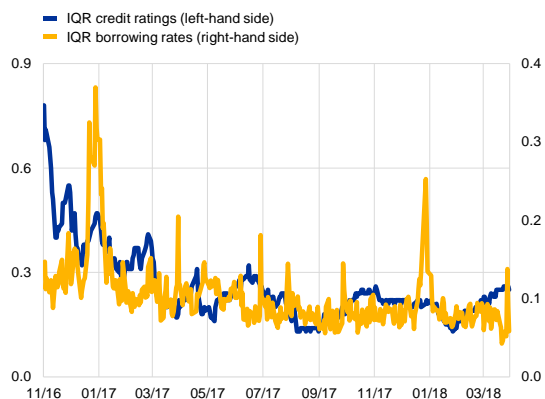
Notes: Observations are from 2017. In this table the OIS segment excludes forward contracts and the FX Swaps segment refers only to rates implicit in EUR/USD contracts. Within to total variance ratios are computed by dividing the average (weighted by the number of transactions) of the variances at country level by the total variance for the euro area: the higher the ratio the more complete the integration. The dispersions of cross-border versus domestic transaction spreads are computed by taking the standard deviations across countries of the volume weighted averages of the spreads between the interest rates of domestic and cross-border transactions: the lower the value, the more complete the integration. “Lower rated” euro area countries are defined as countries with sovereign bonds rated below AA-, while “higher rated” euro area countries are defined as countries with sovereign bonds rated AA- or above. Spreads are computed by taking volume weighted averages. Lending transactions are only reported between reporting agents and banks or CCPs. Borrowing transactions are reported between reporting agents and banks, as well as all MMS counterparties. Where an aggregation of transactions with different maturities or (for the secured segment) with different collateral is performed, this may reduce the precision of the indicators. The computations exclude transactions with the Eurosystem.

Chart C

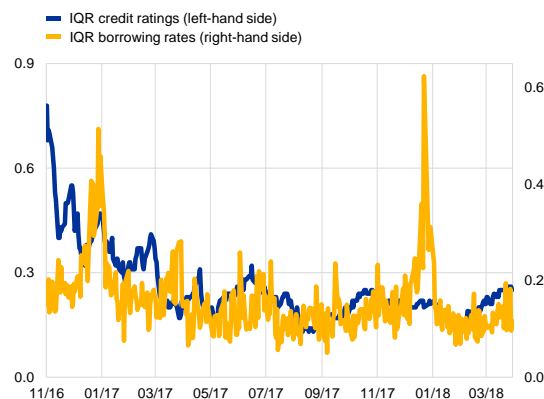
Convergence in both secured segment borrowing rates and credit ratings 2017

Secured transactions – overnight maturity

(percentage points)



Secured transactions – other maturities



Sources: ECB, Moody's, and ECB calculations.

Notes: The interquartile range (IQR) is the difference between the 75th and the 25th percentiles of the distributions of banks' volume weighted average interest rates. The sample is limited to banks for which the "expected default frequency in one year" credit rating series is available from Moody's (25 banks in total), and to transactions with a nominal amount above €1 million. Only one credit rating series is included for each banking conglomerate (21 series in total). Borrowing rates are subject to a 90% winsorisation.

The volume and price indicators based on MMS data presented in this box shed light on the level of integration in euro area money markets.

3 Securities markets

Trends in euro area securities markets generally signalled further financial integration in 2017, in particular in respect of price convergence. Euro area equity market integration, as measured by differences in returns between euro area countries, reached pre-financial crisis levels. Sovereign bond yields showed evidence of a return to cross-country convergence, while the trend of narrowing spreads of non-financial corporate bond yields continued on balance. The dispersion of euro area sovereign bond yields, which had increased from late 2015 until the beginning of 2017, decreased steadily for the remainder of the year, reaching once again the level seen around the announcement of the PSPP in January 2015 (Chart 6). The dispersion of yields on euro area non-financial corporate bonds remained well below that seen prior to the launch of the ECB's corporate sector purchase programme (CSPP) in March 2016.

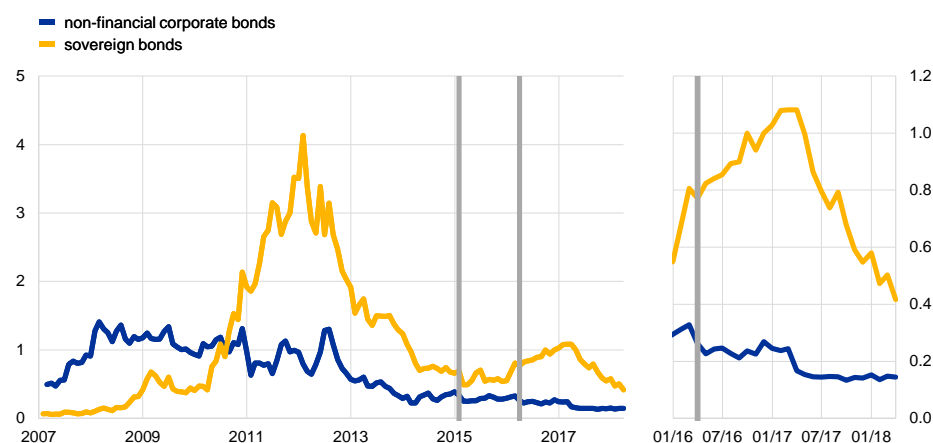
Political uncertainty in the euro area is likely to have been one of the main drivers of the widening divergence observed in sovereign bond yields at the start of 2017. During the first few months of 2017, financial markets witnessed some periods of heightened volatility, partly related to increased political uncertainty in some euro area countries, e.g. in the run up to the French presidential election. This resulted in some increases in euro area sovereign bond yields. In addition, the uncertainty may have supported demand for sovereign debt securities offering a high degree of liquidity, thereby acting to push down the yields on these assets, and

widening the yield spreads of the other euro area countries' bonds vis-à-vis the highly liquid bonds. For the remainder of 2017 sovereign bond yields generally tended to converge, a trend which was driven by the dissipation of perceived political uncertainty in some euro area countries and a significant improvement in the macroeconomic outlook for the euro area. The brighter macroeconomic environment, also spurred on by the PSPP, led to a decrease in the dispersion of euro area sovereign credit ratings. In particular, the ratings upgrade of Portugal by Standard & Poor's (to investment grade) resulted in large reductions in the yield on its government debt. This accounted for a sizeable part of the fall seen in the dispersion of euro area sovereign bond yields in the second half of the year. Nevertheless, dispersion also decreased among the yields of the remaining euro area sovereigns, albeit to a somewhat lesser extent.³¹ Similarly, dispersion also fell for sovereign credit default swap (CDS) rates (see Chart S14 in the Statistical annex).

Chart 6

Cross-country dispersion of euro area sovereign and non-financial corporate bond yields

(monthly data; standard deviation, percentage points)



Sources: Thomson Reuters, Bank of America Merrill Lynch and ECB calculations.

Notes: The chart shows standard deviations for Bank of America Merrill Lynch country indices for corporate bond spreads (issued by NFCs) and country ten-year benchmark government bond yields. Owing to data unavailability, data include observations for (i) Germany, Ireland, Spain, France, Italy, the Netherlands, Austria, Portugal and Finland (sovereign bonds); and (ii) Germany, Spain, France, Italy, the Netherlands, Austria and Finland (non-financial corporate bonds). Vertical grey lines refer to the announcements of the PSPP (January 2015) and the CSPP (March 2016). Latest observation: March 2018.

Spread convergence in non-financial corporate bonds can, to a large extent, be explained by issuer-specific factors. Indeed, one measure of issuer-specific factors, the estimated default risk for issuers of corporate bonds (Chart 7, blue line),³² has generally tracked changes in the trend for corporate bond spread convergence (Chart 6, blue line) quite closely in recent years. During 2017 the dispersion of default risk fell marginally, mirroring the reduction in the dispersion of corporate bond spreads. In comparison, the divergence of excess bond premia, i.e.

³¹ After excluding Portuguese government debt, the dispersion of euro area sovereign bond yields has fallen to 0.44, compared to 0.54 at the end of 2016.

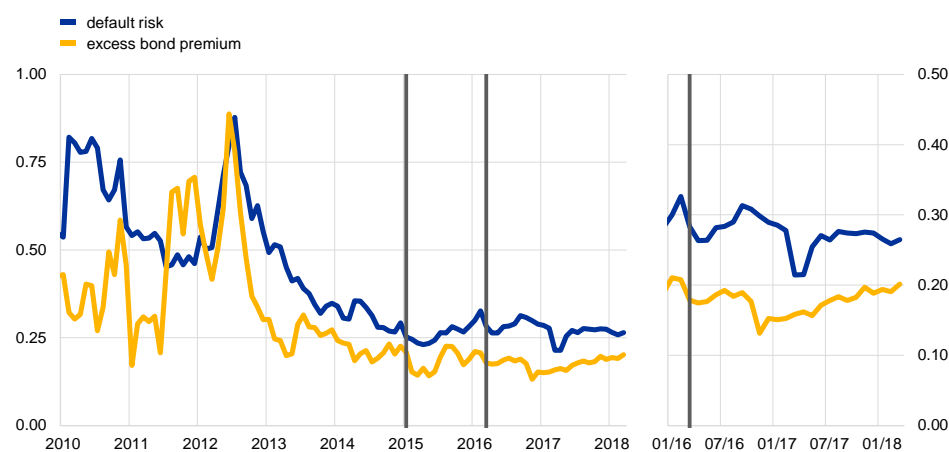
³² The default risk of issuers is calculated as the sum of observable credit risk (using credit ratings, distance to default or the expected default frequency (EDF), stock market volatility and other bond characteristics), and systematic risk (proxied by the monetary policy rate and countries' real-time macroeconomic forecasts).

the part of the credit spread not explained by estimated default risk, has shown only modest variation since late 2013, and on balance remained unchanged in 2016-17 (Chart 7, yellow line). Taken together, this suggests that a sizeable part of the dispersion of corporate bond spreads reflects discrimination shown by investors with regard to the credit quality of the issuer. Although there should be scope for some further progress on corporate bond market integration, a greater degree of market fragmentation would be expected for a more significant divergence of excess bond premia.

Chart 7

Cross-country dispersion of estimated excess bond premia and default risk across euro area Non-Financial Corporations

(monthly data; standard deviation, percentage points)



Sources: Bank of America Merrill Lynch, Moody's and De Santis, R., "Credit spreads economic activity and fragmentation", *Working Paper Series*, No 1930, ECB, 2016.

Notes: The excess bond premium (EBP) is the divergence of the corporate credit spread from the measured default risk of the issuer. It is obtained by estimating the asset swap spreads of individual bonds on the basis of company and sector-specific credit risk measures as well as bond-specific characteristics using a panel methodology. The bonds covered are euro-denominated investment-grade and high-yield bonds with a maturity ranging from one year to 30 years, contained in the Bank of America Merrill Lynch EMU corporate bond indices. To obtain the dispersion measures, the dispersion of default risk and EBP across nine euro area countries (Belgium, Germany, Ireland, Spain, France, Italy, the Netherlands, Austria and Finland) is used. Vertical grey lines refer to the announcements of the PSPP (January 2015) and the CSPP (March 2016). Latest observation: March 2018.

Turning to equity markets, convergence progressed further in the period under review, particularly at cross-country level.

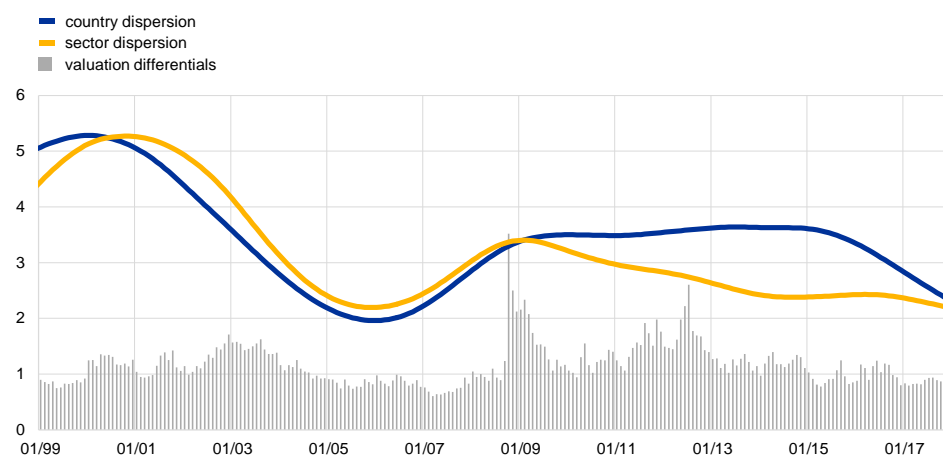
It was observed that equity market convergence continued when return dispersion was compared across euro area countries (Chart 8, blue line) with the more elevated levels witnessed during the crisis. The dispersion of equity returns across sectors, which had already decreased to almost pre-crisis levels in earlier years, broadly stabilised (Chart 8, yellow line). As a result, the excess of country dispersion over sector dispersion of equity returns continued to decline in the period under review, showing that euro area equity market integration was reaching levels last seen prior to the global financial crisis. That said, when measured using industry-specific valuation differentials across countries (Chart 8, grey bars), convergence did not change much in 2017.³³

³³ Higher bars indicate a greater degree of market segmentation. Valuation differentials based on industry-level analyst forecasts are calculated as the median of the absolute differences between the valuation of the stock market of an individual euro area country and the euro area average. For further details see also the explanations accompanying Chart S23 in the Statistical annex.

Chart 8

Indicators of equity market valuation dispersion

(country and sector dispersion: percentages; valuation differentials: percentage points)



Sources: Thomson Reuters and ECB calculations.

Notes:

(1) Valuation differentials: a larger valuation differential indicates a higher level of market segmentation. To obtain the indicator, the absolute difference between the stock market valuation level (based on analyst forecasts) of a given country and the euro area average is computed for each calendar month, based on industry portfolios that allow for different valuation levels in different industries. These absolute differences are then aggregated by calculating the median across countries (see notes to Chart S23 in the Statistical annex for further technical details).

(2) Country and sector dispersion: a larger country dispersion compared with sector dispersion indicates a higher level of market segmentation. Country and sector dispersions are filtered using the Hodrick-Prescott smoothing technique (see notes to Chart S17 in the Statistical annex for further technical details).

Latest observation: December 2017.

Measures of financial integration based on the portfolio structures of euro area securities investors showed mixed trends in the period under review.

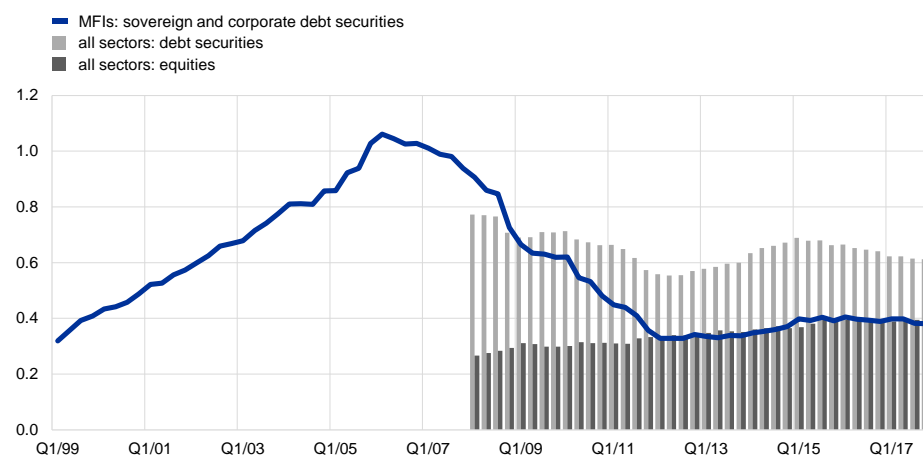
The share of investors' holdings of debt securities issued in other euro area countries relative to the share allocated to their domestic market continued to decline, from a ratio of 0.65 in Q2 2016 to a ratio of 0.62 at the end of Q2 2017, indicating a somewhat lower degree of financial integration (Chart 9, light grey bars). However, the ratio for equity holdings increased marginally to just over 0.40 at the end of Q2 2017 (Chart 9, dark grey bars). Monetary and financial institutions (MFIs), for which data over a longer timespan are available, are one of the most prominent sub-sectors of euro area investors. They largely maintained their relative exposure to euro area sovereign and corporate bonds issued outside their domestic market, showing a ratio of about 0.39 at the end of Q2 2017 (Chart 9, blue line)³⁴. On average, investors other than MFIs (pension funds, insurance corporations, investment funds and other asset managers) slightly increased their relative exposure to the domestic market in terms of debt securities issued in the euro area.³⁵

³⁴ Since the introduction of the PSPP, the ratio has remained largely stable.

³⁵ Special feature B in this report offers an analysis of home bias in euro area corporate bond markets.

Chart 9**Indicators of intra euro area cross-border portfolio allocations**

(ratio; 1.0 = identical portfolio shares)



Source: ECB.

Notes: A rising ratio indicates that euro area investors are allocating an increasing portfolio share to euro area assets outside their domestic market relative to the portfolio share allocated to their domestic market. A higher ratio therefore indicates a higher degree of cross-border euro area financial market integration. MFIs exclude the Eurosystem.

Latest observation: Q4 2017.

The economic literature is quite unanimous in concluding that the composition of international asset holdings would appear to have an important impact on the extent to which financial integration can withstand shocks (the “resilience” of integration).³⁶ It is therefore important to look at securities market integration in the light of the three main conclusions to be reached in this debate, i.e. the type of financial instruments used (debt or equity), the importance of the underlying motive (portfolio or foreign direct investment), and the investment horizon (short term or long term).

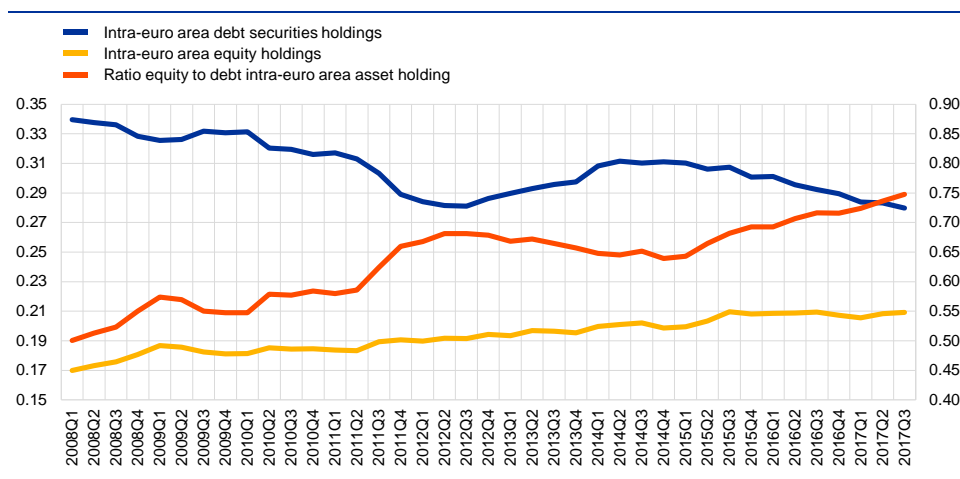
Equity investments are becoming increasingly significant for cross-border portfolios in the euro area compared with debt investments. It is important to examine the relative share of these financial instruments in order to assess the resilience of euro area financial integration and its enhanced risk-sharing properties. As discussed in the *Financial Integration Report 2016*, both theoretical and empirical studies argue that debt tends to be more prone to runs than equity. Moreover, it is believed that liquidity crises have often been triggered by sudden halts in debt investment rather than by equity-like forms of finance. With regard to euro area trends, as shown by Chart 9 and Chart 10, despite the partial reversal of debt flows witnessed in the aftermath of the sovereign debt crisis, the composition of intra-euro area asset holdings has shifted in recent years towards a growing foreign share of equity investment and a stable or declining share of foreign debt instruments. As a result, the ratio of intra euro area foreign equity investment (FDI and portfolio equity stock liabilities, including investments in fund shares) to intra euro area debt securities holdings has been increasing since the third quarter of 2014. This

³⁶ See Special feature A, “Financial integration and risk sharing in a monetary union”, in [Financial integration in Europe](#), ECB, April 2016.

evolution has been driven by an increase in the numerator (+5%) accompanied by a decrease in the denominator (-9%).

Chart 10

Intra-euro area asset holdings: foreign equity investment versus foreign debt investment



Source: ECB.

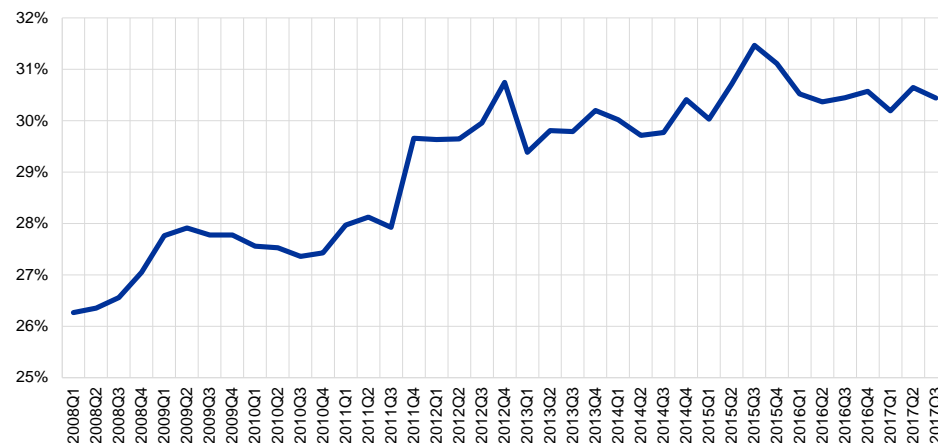
Notes: The blue line plots the evolution of holdings by euro area investors (all sectors) of equity issued by other euro area countries as a % of the total euro area holdings of equities. The yellow line plots the evolution of holdings by euro area investors (all sectors) of debt securities issued by other euro area countries as a % of the total euro area holdings of debt securities. The red line plots the ratio of the two shares.

A second key aspect of the composition of capital flows is their maturity, since short-term flows are thought to be more volatile. For the 4th reason, another way of looking at the importance of the composition of cross-border assets is to differentiate between FDI and portfolio equity investment. In the euro area, FDI-type flows appear to be more stable over time and are becoming increasingly significant – Chart 11 indicates that the share of intra-euro area FDI of total foreign investment has increased by almost 5 percentage points since 2008. Although the ratio has remained fairly stable over the past 12 months, it should be noted that FDI-type flows now represent almost one-third of overall foreign investment. Also in this case, the gradual increase has been driven mainly by the numerator, i.e. by a stronger increase in the value of intra-euro area FDI.

Chart 11

Intra-euro area asset holdings: share of FDI in total foreign investment

(percentages)



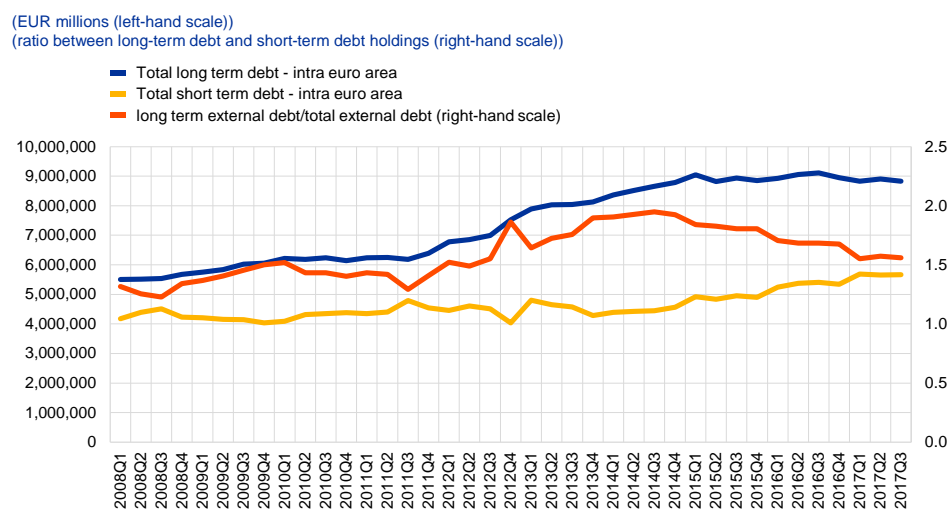
Source: ECB.

Note: The chart reports the ratio between the intra-euro area FDI flows and the total foreign investment in the euro area (i.e. direct, portfolio and other investments). For more information see the description of the methodology agreed for the *Financial Integration Report 2016*.

Since 2008, intra euro area exposure to long-term debt relative to short-term debt has increased significantly, although the ratio has once again been declining since the second half of 2014. The literature also points to a systematic link between an exposure to short-term debt and the likelihood (and severity) of financial crises. In the euro area, long-term debt stocks accounted for about half of total external debt in 2008, and this share has increased significantly since then. It is currently almost 60%, having reached a peak at the end of 2014. Chart 12 also shows, however, that new increases in short-term debt since late 2014 combined with stable long-term debt resulted in a reversal of a significant part of the earlier trend. Since this reversal has eroded part of the benefits of resilience, further developments should be monitored.

Chart 12

Intra-euro area asset holdings: long-term debt relative to short-term debt



Sources: ECB calculation on Balance of Payments data, Eurostat, 2017.
Notes: The dark blue line shows the amount of long-term debt (maturity above one year) issued by euro area countries and held by residents of other euro area countries. The light blue line shows all euro area debt held by residents of other euro area countries. The yellow line shows the ratio of the two.

4 Banking markets

The convergence of several price-based euro area banking market indicators continued or resumed in 2017, although the level of integration remained low, particularly in retail banking. The convergence observed was partly due to support from the ECB’s non-standard monetary policy measures and to fundamental economic factors. The uptick in several dispersion indicators that coincided with the debate around potential tapering and an eventual exit from the ECB’s asset purchase programme, however, suggests that the careful management of monetary policy normalisation may be important for financial integration. Quantity-based indicators continued to signal limited retail banking integration, either through the cross-border provision of services or the establishment of local units. At the same time, however, European banking integration has become more resilient.

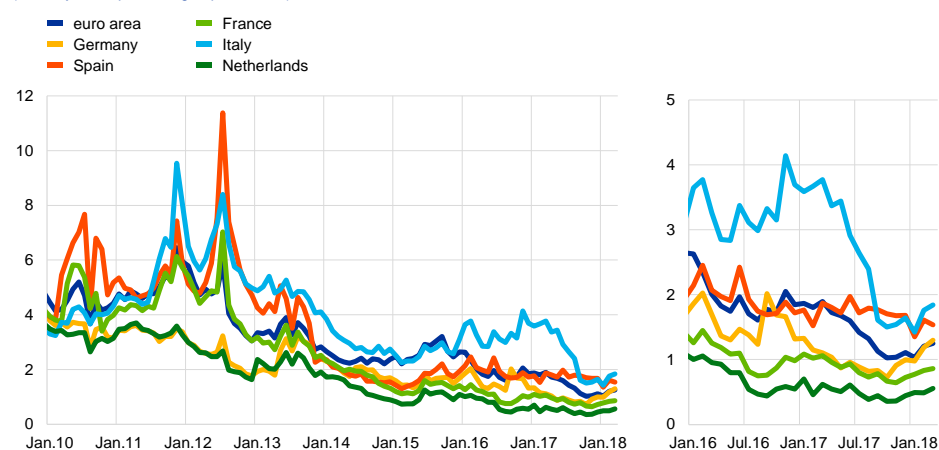
The growing divergence in bank bond yields observed in 2016 reversed significantly during the second half of 2017, partly in response to progress made in resolving non-performing loans in some euro area countries, but also mirroring developments in sovereign bond markets (see Section 1.3). On the one hand, this development was mainly due to a significant decrease in the yields of Italian bank bonds (Chart 13), following the positive market reaction to the resolutions, liquidations and recapitalisations of European banks plagued by non-performing loan (NPL) problems, most notably in Italy. The reduction in the stock of NPLs has probably also contributed to narrowing dispersion: around half of the €140 billion reduction in the stock of NPLs in significant euro area banks from June 2016 to June 2017 took place in Italian banks, and loan sales in the euro area during the

same period were also dominated by deals concluded in Italy.³⁷ On the other hand, Chart S18 in the Statistical annex shows that the dispersion of bank bond yields has decreased in parallel to that of sovereign bond yields, and Chart S19 showing the correlation between bank and sovereign credit default premia suggests that the link between bank and sovereign bond yields is still tight and, if anything, may have tightened still further in 2017.

Chart 13

Bank bond yields in selected euro area countries

(monthly data, percentages per annum)



Sources: Merrill Lynch Global Index and ECB calculations.

Note: Each line refers to an index that is constructed as the average of investment-grade and high-yield unsecured senior and subordinated bank bonds weighted by their market value.

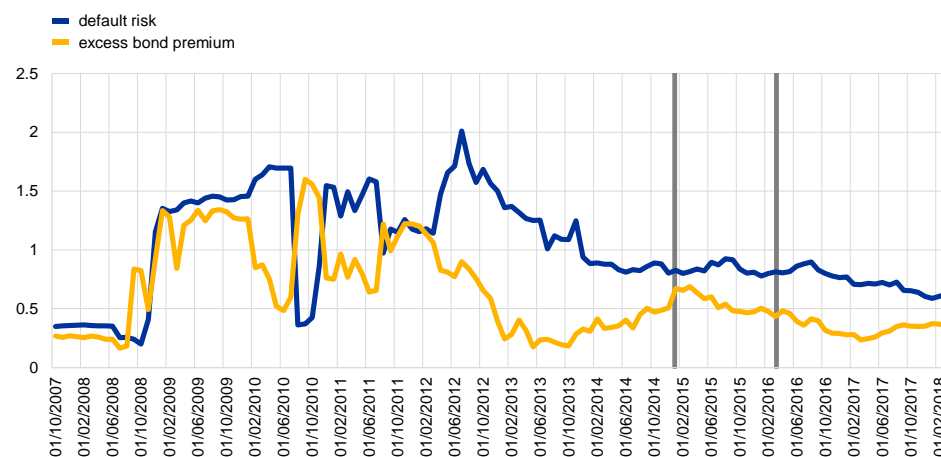
A closer look at the components of the bond yield dispersion confirms the view that a number of fundamental factors may have contributed to the divergence in 2016 and the subsequent convergence in 2017. Chart 14 shows

that the changes would mainly appear to reflect differences in the default risk for banks operating in different countries (blue line). The importance of other factors not related to default risk, such as market fragmentation which is likely to be captured in excess bond premia (yellow line), has diminished since the launch of the Eurosystem's public sector purchase programme (PSPP) in early 2015. The level of dispersion of excess bond premia is still lower than that of default risk, although for the available data it is not at historical lows.

³⁷ See [Financial Stability Review](#), ECB, November 2017. Although data on loan sales also include performing loans, these transactions consist overwhelmingly of NPLs. For Italy, the reduction includes the sale of NPLs concluded in September 2017, as well as a further sale which is expected to be completed by mid-2018. The total amount of the two operations is around €44 billion.

Chart 14**Cross-country dispersion of estimated excess bond premia and default risk across euro area Monetary Financial Institutions**

(monthly data; standard deviation, percentage points)



Sources: Bank of America Merrill Lynch, Moody's and De Santis, R., "Unobservable country bond premia and fragmentation", *Journal of International Money and Finance*, No 82, 2018, pp. 1-25.

Notes: The excess bond premium (EBP) is the deviation of the corporate credit spread from the measured default risk of the issuer. It is obtained by estimating the asset swap spreads of individual bonds on the basis of company and sector-specific credit risk measures as well as bond-specific characteristics, using a panel methodology. The bonds covered are euro-denominated investment-grade and high-yield bonds with a maturity ranging from one year to 30 years contained in the Bank of America Merrill Lynch EMU corporate bond indices. To obtain the dispersion measures, the dispersion of default risk and EBP across nine euro area countries (Belgium, Germany, Ireland, Spain, France, Italy, the Netherlands, Austria and Finland) is used. Vertical grey lines refer to the announcements of the PSPP (January 2015) and the CSPP (March 2016).

The level and the dispersion of bank lending rates continued to be influenced by the ECB's non-standard monetary policy measures.³⁸

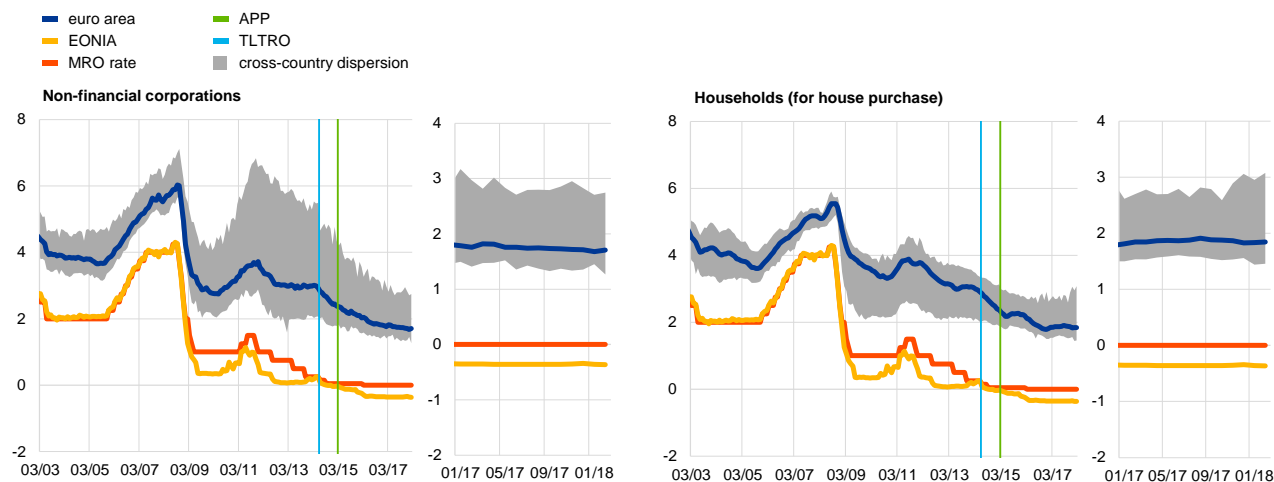
The dispersion of lending rates for firms continued to decrease during 2017 (Chart 15, left-hand side). The dispersion of interest rates for loans to non-financial corporations (NFCs) of below €1 million also continued to decline, indicating that access to finance for small and medium-sized enterprises (SMEs) improved, particularly in the countries that had been most affected by the financial crisis (Chart S36 in the Statistical annex). A part of this improvement may also be attributed to the ECB's corporate sector purchase programme (CSPP), which has reportedly increased banks' balance sheet capacity for lending to SMEs.³⁹ The dispersion of interest rates to households for house purchase remained roughly at levels seen during the previous year, but widened somewhat around the end of the year (Chart 15, right-hand side).

³⁸ See, for example, [The euro area bank lending survey - Third quarter of 2017](#), ECB, October 2017 and Box 5 in [Economic Bulletin](#), No 3, ECB, May 2017.

³⁹ See Box 2 in [Economic Bulletin](#), No 4, ECB, June 2017 and [Survey on the Access to Finance of Enterprises in the euro area](#), April to September 2017, ECB, November 2017. For empirical evidence based on Spanish data, see Arce, O., Gimeno, R. and Mayordomo, S. "Making room for the needy: The credit-reallocation effects of the ECB's corporate QE", Banco de España [Working Paper No 1743](#), September 2017.

Chart 15**Composite euro area bank lending rates for NFCs and households**

(monthly data, percentages per annum)



Sources: ECB and ECB calculations.

Notes: The indicator is computed by aggregating short and long-term rates, using a 24-month moving average of new business volumes. The cross-country dispersion displays the minimum-maximum range after trimming off extreme values.

The dispersion of bank deposit rates continued to follow the declining post-crisis trend for both NFCs and households (Chart 16). During the crisis, the large dispersion of deposit rates had been indicative of cross-country differences in the funding costs of banks. The convergence in household rates is also related to the de facto zero lower bound on deposit rates for individuals, which is in place in many countries. While the distribution in Chart 16 confirms that negative rates have been introduced on deposits for NFCs in some countries, the rates on household deposits face notable downward rigidities due to competitive pressures or the fact that at some stage banknotes might become a more attractive store of value for these depositors.⁴⁰ Consequently, a reduction of policy rates to below zero could reduce the dispersion of these rates.

Despite the long-term trends, several price indicators showed mild temporary divergences and/or increased volatility from the second quarter of 2017. This development, which coincided with a public discussion of the possible tapering of Eurosystem asset purchases and an eventual exit from the ECB's non-standard monetary policy measures, was seen for both the dispersion of bank lending and the dispersion of deposit rates (see Charts 15 and 16). In addition, although credit standards eased they showed increasing dispersion during the year, a widening which was particularly visible for housing loans (see Chart S32 in the Statistical annex). The dispersion of excess bond premia in Chart 14 displays an upward tick starting in the second quarter of 2017, while the default risk component continued to decline (in line with the falling five-year CDS premia for bank debt securities in Chart S14). These developments could indicate that a carefully managed withdrawal from the ECB's non-standard measures – when justified – will be important not only for

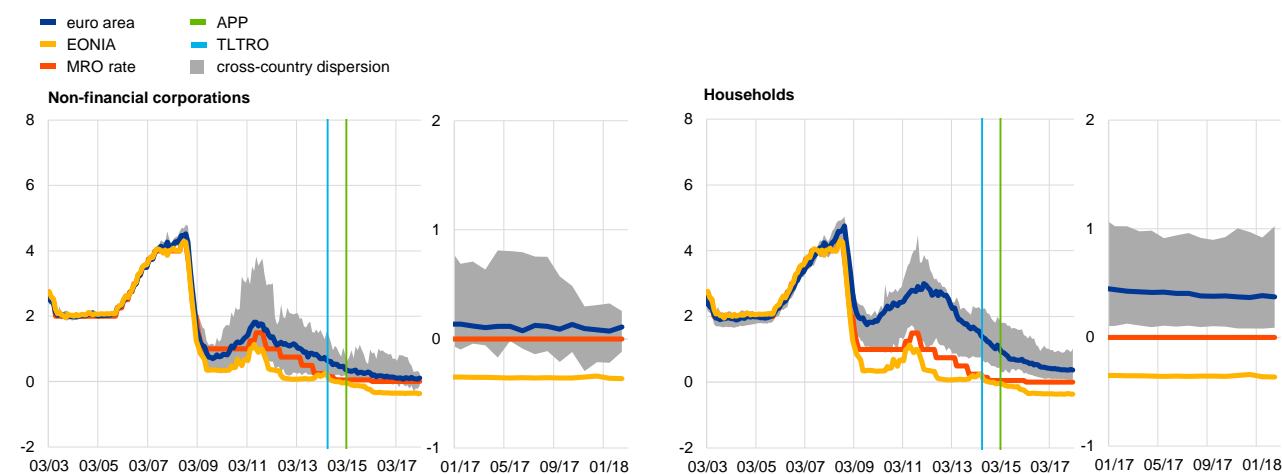
⁴⁰ See Box 4 entitled "The ECB's monetary policy and bank profitability", in *Financial Stability Review*, ECB, November 2016.

monetary policy purposes but also in order to preserve the levels of financial integration already achieved.

Chart 16

Composite euro area rates on bank deposits with agreed maturities for NFCs and households

(monthly data, percentages per annum)



Sources: ECB and ECB calculations.

Notes: The indicator is computed by aggregating short and long-term rates, using a 24-month moving average of new business volumes. The cross-country dispersion displays the minimum-maximum range after trimming off extreme values.

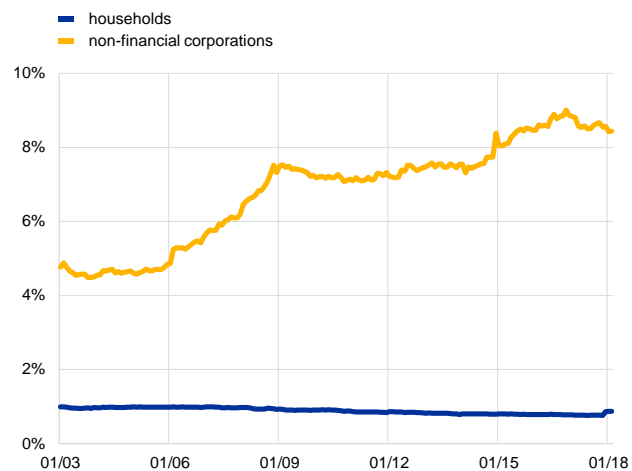
Quantity-based indicators of banking sector integration continued to signal fragmentation in retail banking. The provision of cross-border bank loans declined in 2017, reaching a share of 8.6% of total loans to firms and a negligible 0.9% share of loans to households in December 2017 (Chart 17). The share of cross-border bank deposits held by firms and households also stood at similarly low levels and declined during 2017 (Chart 18). Cross-border consolidation may be the most realistic way of achieving a higher degree of integration in retail banking markets.⁴¹ The number of cross-border branches and subsidiaries of foreign banks remained low in the euro area on aggregate, as did their share of assets and loans. However, cross-border merger and acquisition activity picked up slightly in the first half of 2017.⁴²

⁴¹ See, for example, the Special feature “Cross-border bank consolidation in the euro area” in [Financial integration in Europe](#) May 2017.

⁴² See [Report on financial structures](#), ECB, October 2017.

Chart 17**Share of cross-border loans in the euro area for NFCs and households**

(percentages per annum)

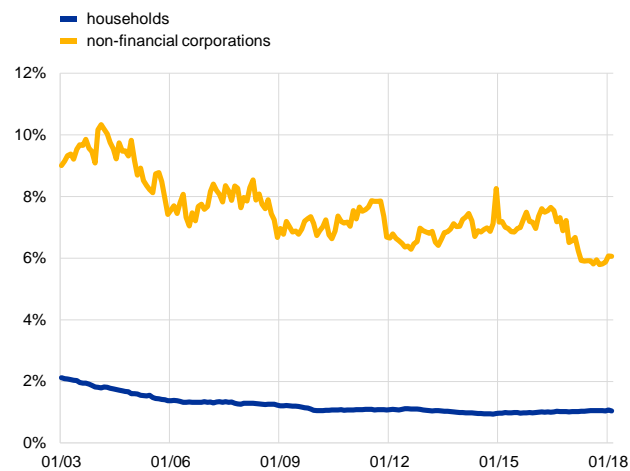


Source: ECB (BSI).

Note: Cross-border loans include loans to other euro area Member States for all maturities and currencies.

Chart 18**Share of cross-border deposits in the euro area for NFCs and households**

(monthly data; standard deviation, percentage points)



Source: ECB (BSI).

The gradual shift towards a more resilient form of banking integration is visible in the composition of intra-euro area cross-border lending.

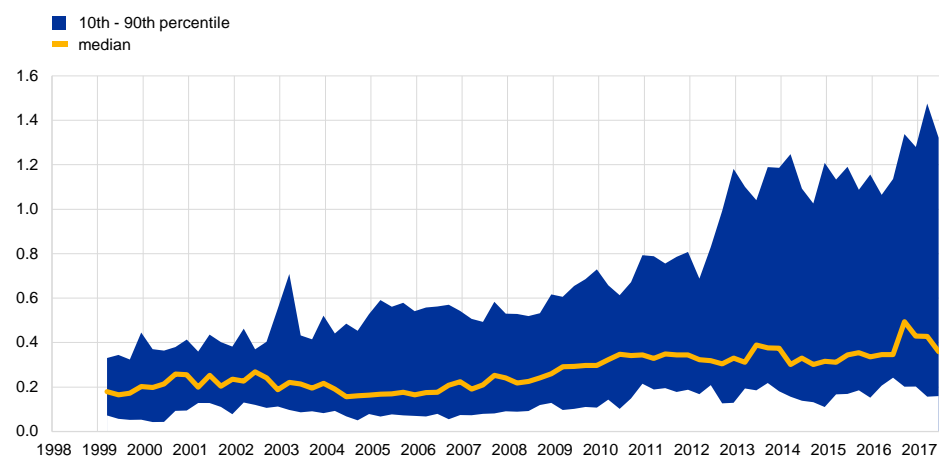
The economic literature has concluded that retail lending to foreign borrowers constitutes a more resilient form of financial integration than interbank lending.⁴³ Chart 19 shows the relation of direct cross-border bank lending to households and firms to cross-border interbank loans in the wholesale market. The median ratio across euro area countries remains low, indicating that cross-border lending to retail customers accounts for a much smaller share of total cross-border lending than that represented by the interbank markets. However, in the longer run, the share is slowly increasing, and the upper end of the distribution shows that cross-border retail lending is actually slowly becoming predominant in some (smaller) euro area countries. At aggregate level, the developments in 2017 are once again due to the reduction in cross-border interbank lending (which is also affected by monetary policy) rather than from an increase in direct cross-border lending to firms and households (see Charts S26 and S27 in the Statistical annex).

⁴³ The concept of resilience captures the ability of financial integration to resist and not unravel in the face of economic and financial shocks. See Special feature A in [Financial integration in Europe](#), ECB, April 2016.

Chart 19

Resilience of banking integration: Ratio of cross-border retail lending to wholesale lending

(monthly data; percentages; 10th-90th percentile distribution and median)



Source: ECB (BSI).

Notes: The chart shows the ratio of cross-border bank lending to households and NFCs (retail lending) to cross-border bank lending to banks (wholesale lending). This measure does not take into account lending to households and NFCs by local branches and subsidiaries of foreign banks.

Given that retail banking integration could lead to risk sharing and produce broader economic benefits, it is important to work to overcome the current fragmentation in the retail banking markets.⁴⁴ The overall low levels shown by quantity-based indicators, as well as the evidence provided in Chart 2 that credit markets acted as an amplifier rather than a dampener of shocks during the euro area crisis, underline the need to work towards improving the resilience of integration and increasing risk sharing in credit markets (see Box 1 in this chapter).

⁴⁴ See Special feature A in [Financial integration in Europe](#), ECB, April 2016, for an analysis of the risk sharing and welfare impact of the various forms of financial integration. For ongoing initiatives beyond the banking union see, in particular, the European Commission's Communication entitled [Consumer Financial Services Action Plan: Better Products, More Choice](#), 23 March 2017.

Chapter 2: Eurosystem activities for financial integration

In 2017 ECB activities supporting financial integration and development centred on a review of the financial supervisory architecture, completing the banking union, and establishing the capital markets union (CMU) within the EU. The review of the financial supervisory architecture was initiated by a package of proposals of the European Commission aimed at strengthening the European system of financial supervision (ESFS). The ESFS was created in 2010 and has, since then, been a key driver of financial integration by coordinating and harmonising regulatory and supervisory action across the EU. The Commission also reviewed the Single Supervisory Mechanism (SSM) with very positive conclusions, praise the ECB for the SSM's swift set-up and its remarkable success in fostering supervisory convergence and increasing the quality of supervision.

Discussions have continued in 2017 on how to complete the banking union, which has important implications for the integration of European credit markets. The ECB supports a mutually re-enforcing path of parallel risk reduction and risk sharing that will facilitate swift progress towards the completion of the banking union. During 2017 risks in euro area banks receded further and the resilience of the banking system increased. Since 2014, the banks directly supervised by the ECB have increased their capital by €234 billion, raising their capital ratios by 2.6 percentage points. This process continued throughout 2017. Over the same time period, overall bank indebtedness fell by more than a quarter, with the average fully-loaded leverage ratio increasing from 4% to 5.1%. Risk reduction in the banking union has been underpinned by further regulatory and supervisory convergence. Since its inception in 2014, ECB Banking Supervision has paid considerable attention to the problem of non-performing loans (NPLs) – over the last year the stock of NPLs among significant banks was reduced by 15%. Apart from its work on the resolution of the legacy stock of NPLs, the ECB is also increasing its focus on new NPLs. A common NPL transaction platform would not only help to reduce NPL levels but also support financial integration through its data harmonisation and cross-border features. In parallel to such risk-reducing measures, meaningful steps towards further risk sharing within the banking union should be taken. A credible common backstop to the Single Resolution Fund (SRF) that is fiscally neutral over the medium term is essential to safeguard financial stability and ensure a level playing field in the banking union. Establishing a European Deposit Insurance Scheme (EDIS) remains a priority in order to complete the banking union and foster financial integration and stability in Europe.

The ECB will continue to monitor potential impediments to the application of waivers. Wherever such impediments are not justified by prudential considerations, the ECB will argue in favour of removing them. In particular, consideration should be given to removing the Member State option for large exposures requirements and instead assigning it to the competent authority; this would ensure that a harmonised and

prudent policy is adopted across the euro area. With regard to cross-border capital waivers, the ECB supports the introduction of waivers of prudential requirements on an individual basis for subsidiaries whose head offices are located in a different Member State from the parent. This approach is consistent with the establishment of the banking union. Additional prudential safeguards and technical modifications could address any potential financial stability concerns.

The ESCB made further progress on establishing an analytical credit dataset (AnaCredit) related to the collection of detailed information on individual loans in the euro area in a more harmonised manner. In principle, data collection is scheduled to start in November 2018 for data relating to end-September 2018. The initial focus of AnaCredit is on information regarding credit granted by euro area credit institutions to legal entities, including non-financial corporations.

The capital markets union is a central policy initiative aimed at catalysing financial integration and development in the EU beyond the banking sector. Since the publication of the 2015 CMU Action Plan by the European Commission, a number of new challenges to financial integration have arisen which have made it necessary to underpin and reframe the EU's CMU agenda. The ECB believes that the CMU requires strengthened supervision and oversight across sectors and that a single rulebook for EU capital markets should be complemented by stronger supervisory convergence. The migration of TARGET2-Securities (T2S) was completed, marking a major milestone in the integration of the European securities post-trade landscape. As of the end of October 2017, a total of 20 European securities markets and 21 central securities depositories (CSDs) are now operating on the single T2S platform – a major milestone from a financial integration perspective. At its current stage of development, Distributed Ledger Technology (DLT) does not yet provide a solution for central-bank-operated financial market infrastructures. Many elements of a DLT-enabled financial market must be designed and assembled before DLT adoption may be considered a realistic possibility, including standards required to allow technical interoperability between different DLT solutions and with non-DLT systems, as well as standards required to ensure the interoperability of business processes.

This chapter reviews and describes the ECB's activities that supported financial integration during 2017. The ECB considers financial integration and development to be, first and foremost, market-driven processes. This means that policy initiatives that support financial integration and financial market development are typically aimed at enabling market forces to work across the euro area or address potential market failures. The ECB contributes to this by providing advice on regulatory and legislative initiatives, by catalysing private sector activities, and by acquiring knowledge concerning the state of financial integration. Section 1 of this chapter focuses on the ECB's activities related to the review of the European supervisory architecture for financial institutions. Sections 2 and 3 explain ECB activities related to efforts by the EU to complete the banking union and to establish a capital markets union, respectively.

1 Reviewing financial supervision in the EU

The European system of financial supervision (ESFS) and the Single Supervisory Mechanism (SSM) are reviewed by EU legislators. The ESFS and the SSM were created in 2010 and 2013 respectively, in order to rebuild trust in the financial system and to offer citizens more effective protection against financial instability. The ESFS consists of the three European Supervisory Authorities (ESAs) – the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA) – as well as the European Systemic Risk Board (ESRB). The ESFS institutions started work in January 2011, and it is now time to review this work.

1.1 Review of the European system of financial supervision

The European Commission published a package of proposals aimed at strengthening the European system of financial supervision (ESFS)⁴⁵ on 20 September 2017. Adopting these proposals would amend the regulations establishing the three ESAs and the ESRB Regulation, and would introduce modifications to the Directive on Insurance and Reinsurance (Solvency II) and the European Market Infrastructure Regulation (EMIR). The aim of the reforms is to ensure intensified supervisory convergence across the EU and to enhance the governance and funding structure of the ESAs. Moreover, the reforms propose extending direct supervision by the European Securities and Markets Authority to selected capital market sectors in order to reduce cross-border barriers and promote further market integration. In addition, a number of targeted amendments are aimed at strengthening the efficiency of the ESRB and reinforcing macroprudential coordination. The review considers possible changes to operations and decision-making in the ESAs.

The ECB welcomes the review of the ESFS and considers a number of legislative changes to be necessary. The establishment of the ESFS was a significant achievement in improving the coordination of financial regulation and enhancing supervisory convergence within the EU. This review now needs to take into account developments which have taken place over the past six years, in particular the establishment of the banking union and the progress made on the capital markets union (CMU). With regard to aligning the governance framework of the European Banking Authority (EBA) with stated objectives and developments, the ECB would like to emphasise that the banking union and the CMU are at different stages of progress. The review of the ESAs should not, therefore, necessarily produce three identical outcomes for the three agencies, but should instead address the agencies' respective mandates and functions. Specifically, with regard to the new supervisory functions included in the proposals, the ECB is of the view that certain proposed amendments to Regulation (EU) 1093/2010 (which established the EBA) do not adequately distinguish between the scope of the ECB's microprudential

⁴⁵ See [Communication on reinforcing integrated supervision to strengthen Capital Markets Union and financial integration in a changing environment](#).

supervisory tasks and the EBA's competence to set regulatory standards to promote supervisory convergence. The ECB considers it vital that synergies arising from the ECB's and the EBA's mandates are maximised. In order to achieve this objective, the duplication or inappropriate allocation of tasks should be avoided, since this could blur the responsibilities of the respective authorities, thereby rendering the system less effective as a whole.

The ECB believes it is necessary to create a single capital markets supervisor to reach the long-term goal of a stronger CMU. In line with this policy, and in relation to the changes proposed to ESMA, an important aspect is the Commission's move towards more integrated supervision for certain segments of capital markets such as pan-European investment fund schemes.

The ECB supports the limited number of targeted changes to the ESRB's governance and operational framework proposed by the European Commission. The purpose of the changes is to further strengthen the efficiency and effectiveness of the ESRB and enable it to fulfil its mandate more effectively. More specifically, the ECB considers the proposed changes to Regulation (EU) No 1092/2010 (which established the ESRB) to be necessary to adequately reflect the establishment of the SSM and to ensure that the ESRB is able to perform macroprudential oversight of the entire financial system. This is because market-based financing is becoming more important, particularly due to the establishment of the CMU. The ECB and the ESRB are of the view that the ECB is well placed to continue to provide analytical, statistical, financial and administrative support to the ESRB, in line with existing arrangements. Moreover, the ECB will also continue to support the ESRB to avoid duplicating work, thereby taking advantage of the benefits deriving from the ECB's risk assessment role and its analysis of the banking sector in the Member States that participate in the SSM.

1.2 Review of the Single Supervisory Mechanism

The overall conclusions of the Commission's review of the Single Supervisory Mechanism (SSM) are very positive, and praise the ECB for having successfully set up the mechanism. The Commission published its review in the form of a Report⁴⁶, accompanied by a Staff Working Document⁴⁷, on 11 October 2017. The Report notes that the effectiveness of banking supervision has improved in the euro area, and the integrated supervision of credit institutions has produced clear benefits by creating a level playing field and engendering confidence. The Report highlights, in particular, the SSM's remarkable success in furthering supervisory convergence. It has achieved this by increasing the quality of supervision through the development of policies and harmonised processes and procedures in core supervisory areas such as the Supervisory Review and

⁴⁶ See [Report on the Single Supervisory Mechanism established pursuant to Regulation \(EU\) No 1024/2013](#).

⁴⁷ See Commission [Staff Working Document accompanying the Report on the Single Supervisory Mechanism established pursuant to Regulation \(EU\) No 1024/2013](#).

Evaluation Process (SREP), internal model supervision, fit and proper assessments, common procedures and supervisory colleges. The Report also welcomes the ECB's constructive approach towards recommendations arising from reviews (e.g. by the European Court of Auditors (ECA), the International Monetary Fund (IMF), etc.), the ECB's successful cooperation with other EU and international bodies, as well as the delegation of decision-making powers relating to supervisory decisions, which has led to significant improvements in the efficiency of ECB supervisory decision-making.

The Report also offers clarifications and suggestions for further improvements to the regulatory framework. These include supervisory powers covering prudential capital deductions and provisioning policies (which are particularly relevant for tackling NPLs), the early intervention framework, and the ECB's powers to supervise investment firms⁴⁸ and EU branches of institutions which have their head offices in third countries. The Commission also makes a number of observations and recommendations on the functioning of the SSM, for example on safeguards for the ECB's shared services, the proportionality of supervisory fees, and transparency. Nonetheless, the Report concludes that no changes to the SSM Regulation are required at this stage.

2 Completing the banking union

Completing the banking union supports financial integration in Europe.

Legislative, regulatory and supervisory convergence within the banking union is conducive to a single integrated banking market. Banking union fosters effective private and public risk sharing across countries, and is aimed at breaking potential adverse feedback loops between bank and sovereign risk, thereby avoiding the renationalisation of banking markets in situations of severe crisis. Several banking market indicators in the euro area continued or recommenced integration in 2017: bank deposit rates continued to converge, while the dispersion of bank lending rates decreased for firms and remained at levels reached the previous year for households.⁴⁹ In retail banking, however, the level of integration remained low.⁵⁰ Further risk sharing and risk reduction are both equally important, re-enforcing each other to strengthen and complete the banking union. A milestone-based approach that includes parallel steps of risk-reduction and risk sharing could support the upcoming political compromise.

⁴⁸ The Commission presented a [legislative proposal](#) in this regard on 20 December 2017.

⁴⁹ See Charts 12 and 13 in Chapter 1.

⁵⁰ See Charts 14 and 15 in Chapter 1.

Chart 1

Probability of default of two or more large and complex banking groups

(percentage probability)



Sources: Thomson Reuters, ECB and ECB calculations.

Notes: "Probability of default of two or more large complex banking groups" (LCBGs) refers to the probability of simultaneous defaults in a sample of 15 large and complex banking groups (LCBGs) over a one-year horizon.

During 2017 risks in the banking union reduced further and the banking system became more resilient.

The probability of two or more large and complex banking groups defaulting receded further during 2017 (see Chart 1). The ECB has contributed to this by continuing to exercise tough and fair supervision over euro area banks and by providing input into various legislative initiatives. Banks now hold significantly higher levels of capital, which is also of higher quality. Since 2014, those banks directly supervised by the ECB have increased their Tier 1 capital ratios by 3.4 percentage points (see the upper left-hand panel of Chart 2).⁵¹ This process continued throughout 2017. In the same time period, overall bank indebtedness fell by more than a quarter, with the average leverage ratio increasing from 4% to 5.3% (see the upper right-hand panel of Chart 2). Banks have also become more resilient to liquidity shocks. The liquidity coverage ratio (LCR) has increased by more than one tenth and now stands at 143% coverage for benchmark 30-day stress (see the lower left-hand panel). Long-term funding strength – the lack of which contributed to the failure of many banks during the global financial crisis – has increased by 11 percentage points as measured by the net stable funding ratio (NSFR; see the lower right-hand panel of Chart 2).

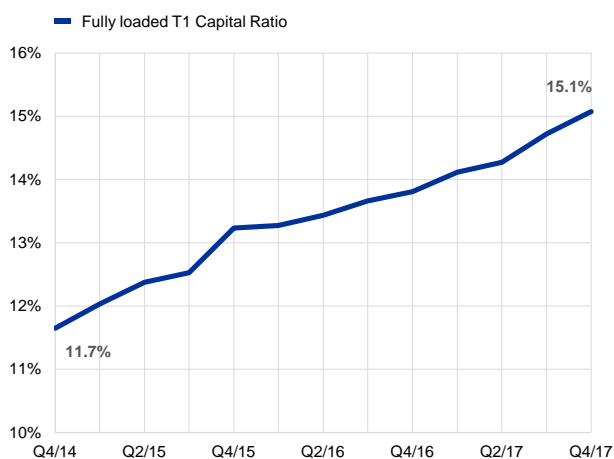
⁵¹ Figures refer to fully loaded capital which is calculated based on all final CRR/CRD IV provisions without applying transitional provisions.

Chart 2

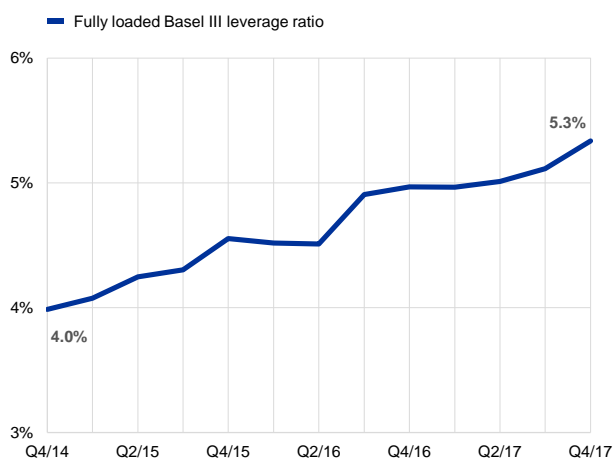
Evolution of key supervisory indicators for the euro area banking system

(quarterly data, percentages)

Capitalisation



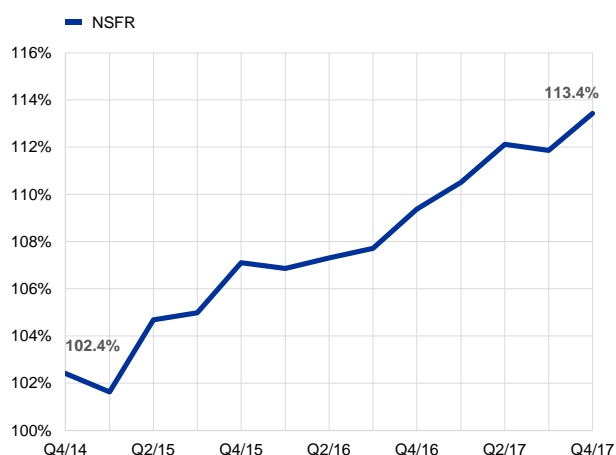
Indebtedness



Short-term funding strength



Long-term funding strength



Notes: All averages are weighted by the denominator. The analysis is based on a sample of 98 significant institutions (SIs) that reported RWA and total assets in all time periods.

Meaningful steps towards further risk sharing within the banking union should be taken in respect of the financing of the Single Resolution Fund and a European Deposit Insurance Scheme (EDIS).

In parallel with the reduction of risks within the banking union, it is necessary to achieve substantial progress towards more risk sharing. In this regard, during 2017 the ECB continued to support the establishment of an EDIS, as well as its fiscally neutral public backstop, as the third pillar of the banking union. Achieving the objective of a fully-fledged EDIS is key to ensuring a consistently high level of depositor confidence across the banking union – a precondition for a truly integrated banking system. At the same time, the effective financing of the Single Resolution Fund is particularly important for the credibility of the banking union and its effect on financial integration. The ECB therefore supports the implementation of a fiscally neutral common backstop to the Single Resolution Fund. A potential change to the regulatory treatment of sovereign exposures remains contentious. As part of its 2016 roadmap towards the completion of the banking

union, the Council agreed to await the outcome of the Basel Committee discussions and to consider possible next steps in the European context following those discussions.⁵² Meanwhile, the Basel Committee has not reached agreement over changing the regulatory treatment of sovereign exposures at this point in time so the matter is now once again under discussion at European level.

In addition, new ECB research suggests that improving financial literacy among citizens, as well as greater euro area cross-border penetration of national banking markets, would stimulate private financial risk sharing through credit markets. The results and conclusions of this research are summarised in Box 1 of Chapter 1. A special feature in last year's report discussed a series of policy directions that would facilitate euro area cross-border penetration of markets via mergers and acquisitions.⁵³

2.1 Review of the single rulebook

Further regulatory and supervisory convergence in 2017 supported the integration of banking markets and reduced risks stemming from regulatory arbitrage. In terms of legislation, the ECB has contributed to the ongoing reviews of the Capital Requirements Regulation (CRR), the Capital Requirements Directive (CRD), the Bank Recovery and Resolution Directive (BRRD) and the Single Resolution Mechanism Regulation (SRMR). This legislative package will introduce some important elements of further risk reduction, such as the leverage ratio requirement and the total loss absorbing capacity (TLAC), into Union law, and important changes to the minimum requirement for own funds and eligible liabilities (MREL). Limited action has so far been taken by legislators to harmonise options and discretions (O&Ds) or the regulatory and supervisory treatment of third-country branches in EU legislation. The ECB would like to see more ambition in these areas in support of a level playing field and in order to facilitate financial integration.

ECB Banking Supervision is targeting further risk reduction within the banking sector. This includes reviewing internal models to assess their adequacy and foster comparability between risk-weighted assets. ECB Banking Supervision has also continued with a project to level the playing field for banks by harmonising and, in some cases, reducing the timeframe for exercising O&Ds within the prudential regulatory framework available to competent authorities.

The ECB welcomes the fact that the co-legislators have reached swift agreement on changes to the bank creditor hierarchy and the regulatory treatment of IFRS 9. The new legislation governing the hierarchy of creditors requires Member States to establish a new class of non-preferred senior debt instruments that can count towards the new TLAC requirements. It will support the application of European bail-in rules in cross-border situations and will, therefore,

⁵² See [Council Conclusions on a roadmap to complete the Banking Union](#) of 17 June 2016.

⁵³ See Special feature "Cross-border bank consolidation in the euro area" in [Financial integration in Europe](#), ECB, May 2017.

facilitate financial integration. The absence of such harmonised legislation would have created uncertainty for both banks and investors. More generally, the ECB reiterates the importance of a thorough review of the macroprudential framework in order to enhance its effectiveness and coherence.

2.2 Non-performing loans

Efforts to reduce non-performing loans (NPLs) support financial integration in various ways. First, the presence of players with high levels of NPLs undermines trust between counterparties, leading to the fragmentation of banking markets within and across Member States. Second, measures that support the reduction of NPLs, such as transaction platforms, support financial integration through their data harmonisation and cross-border features. And last but not least, a reduction in NPLs can contribute to risk reduction – an important step towards the completion of the banking union.

ECB Banking Supervision has paid considerable supervisory attention to the problem of NPL stock since the inception of the SSM in 2014. A dedicated task force on NPLs was set up in July 2015. In March 2017, following an extensive public consultation process, the ECB issued its qualitative NPL guidance applicable to all significant institutions. This guidance, inter alia, asked banks with high levels of NPLs to improve their internal governance, and to define and implement an ambitious and realistic strategy for the timely reduction of NPLs. The supervisory initiative has started to show results across countries. Over the last year considerable efforts have been made by significant institutions to reduce the stock of NPLs across euro area Member States. In this period their stock of NPLs was reduced by 15%, implying a decrease in the ratio of NPLs over total loans from 6.61% to 5.48%. However, in many cases further work is required and the SSM's efforts to address this issue will continue. The joint supervisory teams will closely follow and challenge banks' NPL strategies and the way these strategies are implemented.

The ECB is looking into more potential solutions that could avoid a similar build-up of NPLs in the future. In addition to the work carried out on the resolution of the legacy stock of NPLs, ECB Banking Supervision is also focusing increasingly on new NPLs. The addendum to the NPL guidance, which was published on 15 March 2018, seeks to foster more timely provisioning practices for new NPLs in order to avoid a renewed build-up of NPLs in the future. The addendum informs credit institutions of the ECB's supervisory expectations for addressing new NPLs, aiming to provide transparency and a level playing field. However, the deliberate and determined reduction of NPLs requires concerted and consistent action from all stakeholders – including Member States, the Commission and the relevant EU fora. In this context the ECB welcomes the fact that European finance ministers agreed, in July 2017, on an action plan to tackle NPLs. Consistency among all the initiatives included in the action plan is key to preventing market uncertainty.

A common NPL transaction platform would support financial integration through its data harmonisation and cross-border features.⁵⁴ Since markets for impaired assets are still at very different levels of development across European countries and are not highly integrated, a common NPL transaction platform could be useful. With regard to data harmonisation, a transaction platform would offer investors transparency, and should address the level and scope of information, the degree of data harmonisation and standardisation, as well as data validation services. All of this would be facilitated by the collection of loan-level information through the platform, which would ideally go beyond purely financial data, allowing the platform to act as a data repository. However, a solution of this type would also need to take into account country-specific data needs related to differing insolvency regimes, data protection laws, servicing laws and, potentially, corporate laws. It should also prevent potential investors in a bank's equity or debt from using the platform with a view to gaining detailed insights into its asset quality.

An NPL transaction platform could act as a place where supply meets demand from within or outside the EU and where cross-border transactions are executed. Investors will be attracted to the platform as it will be a central distribution channel where they can easily access a wide range of NPLs. The platform will also reduce transaction costs. In addition, there may be economies of scale, since a platform would provide access to a larger volume of assets, resulting in lower transaction and due diligence costs per unit of NPL transacted. To reach its true cross-border potential, a cross-border platform would need to be supported by the relaxation of licencing requirements along with the facilitation of cross-border operations for loan servicers.⁵⁵

Box 1

Update on the application of cross-border waivers within the O&D framework

The EU legislative framework for banking includes a number of options and discretions (O&Ds) which grant competent authorities (CAs) and Member States some flexibility with regard to whether or how they apply specific rules. O&Ds relate to the definition of own funds and to capital requirements for credit, counterparty and market risks, as well as to large exposures, liquidity and governance arrangements. This box specifically focuses on O&Ds which affect cross-border bank lending within groups, i.e. existing liquidity waivers and proposed capital waivers. The box follows up on the initial discussion of the topic in the 2016 edition of this report.⁵⁶

Immediately after the entry into force of the SSM Regulation, the ECB launched a dedicated project to apply the O&Ds assigned by the legislator to the relevant competent authority in a consistent manner across the SSM as far as significant institutions are concerned. This harmonised application of O&Ds helps to ensure that domestic and cross-border banking groups are treated consistently, fostering a level playing field and promoting financial integration. For example, there

⁵⁴ See Special feature A "Overcoming non-performing loan market failures with transaction platforms" in [Financial Stability Review](#), ECB, November 2017.

⁵⁵ Loan servicing relates to the administration of a loan, including the collection of principal and interest payments on behalf of the creditor.

⁵⁶ The box updates the Special feature B "National options and discretions in the prudential regulatory framework for banks" in [Financial integration in Europe](#), ECB, April 2016.

are a range of benefits associated with banking integration, which include enhancing market discipline via cross-border competition, supporting private sector risk sharing (in particular via the credit channel; see Chapter 1), and harmonising monetary policy transmission across the euro area. At the same time, some channels of transmission of banking instability could be strengthened more than others, which should be reflected by prudential policies. For example, foreign subsidiaries that do not maintain sufficient prudential capital and liquidity levels at individual level are less protected against national shocks that emerge in their host country. Applying the prudential framework in a harmonised manner improves the comparability of disclosure by banks, thus reducing uncertainty concerning their capital and liquidity positions.

Free flow of funds is a precondition for several cross-border bank operations, including cross-border bank lending. This is affected, in particular by O&Ds covering liquidity requirements.⁵⁷ Liquidity requirements oblige an entity within a consolidated group to maintain, at an individual level, a sufficient stock of liquid funds within a Member State, and to have smaller asset/liability maturity mismatches. This constrains the ability of the group to move funds across borders (from one entity to another), while managing liquidity centrally. However, a waiver from such requirements (e.g. the O&D discussed in this update) would facilitate the free flow of funds within a consolidated group. O&Ds which affect cross-border bank lending within groups are increasingly important since intragroup cross-border lending has increased from 60% to 70% of total cross-border bank lending since 2015 (Chart A). This has been driven by a decrease in interbank cross-border lending in most jurisdictions (e.g. Belgium, Germany and Luxembourg), while intragroup cross-border lending has decreased to a lesser extent (e.g. Germany), remained broadly stable (e.g. Belgium) or has even increased in some jurisdictions (e.g. Ireland and the Netherlands) (see also Chart B, which shows the differences between euro area countries in intragroup cross-border lending as a share of interbank cross-border lending).⁵⁸

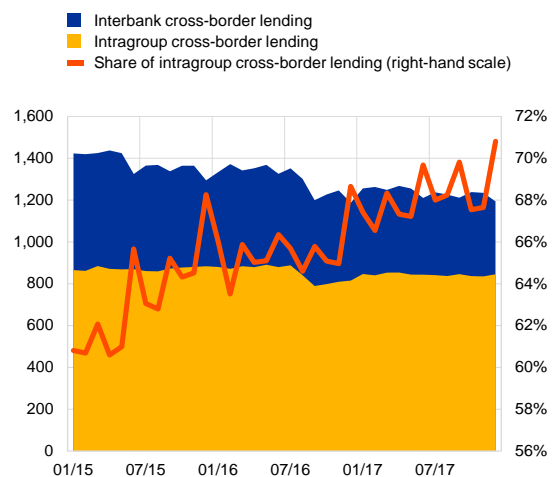
⁵⁷ Beyond liquidity requirements, cross-border operations can be affected by regulatory limits on intragroup large exposures.

⁵⁸ In Chapter 1, with regard to Chart 17, it is argued that the reduction in cross-border interbank lending (also relative to retail lending) makes banking markets more resilient to shocks, which should also produce financial stability benefits.

Chart A

Interbank and intragroup cross-border lending in the euro area

(monthly data, EUR billions and percentages)

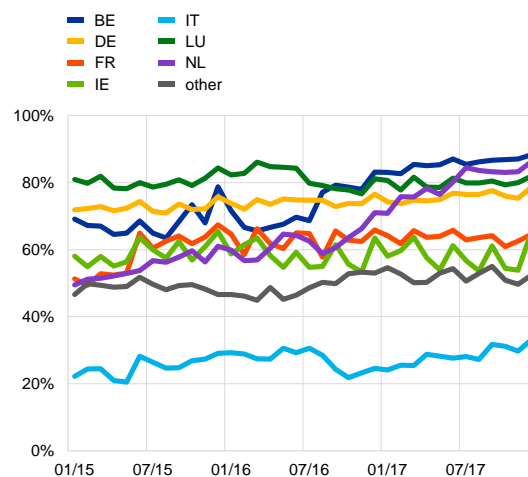


Source: ECB (BSI).

Chart B

Intragroup cross-border lending as a share of interbank cross-border lending by country in the euro area

(monthly data, percentages)



Source: ECB (BSI).

Liquidity requirements in the CRR could partially restrict the possibility of freely allocating liquidity within groups. In particular, the requirement to comply with the liquidity coverage ratio (LCR) at individual level could affect the efficiency of centralised liquidity management. Chart C shows the estimated amount of high-quality liquid assets (HQLA)⁵⁹ required to be held by subsidiaries of euro area global systemically important banks (G-SIBs)⁶⁰ where these subsidiaries are located in a different euro area Member State from their parent undertaking. This is the amount of liquidity that could potentially be freely allocated assuming there is a cross-border waiver of the requirement to comply with the LCR at individual level and that the free allocation of liquidity is not hindered by other parameters.⁶¹ Since December 2017, subsidiaries of euro area G-SIBs where these subsidiaries are located in a different euro area Member State from their parent have required an amount of approximately €130 billion to comply with a 100% LCR minimum requirement. This amount has remained broadly stable over time.

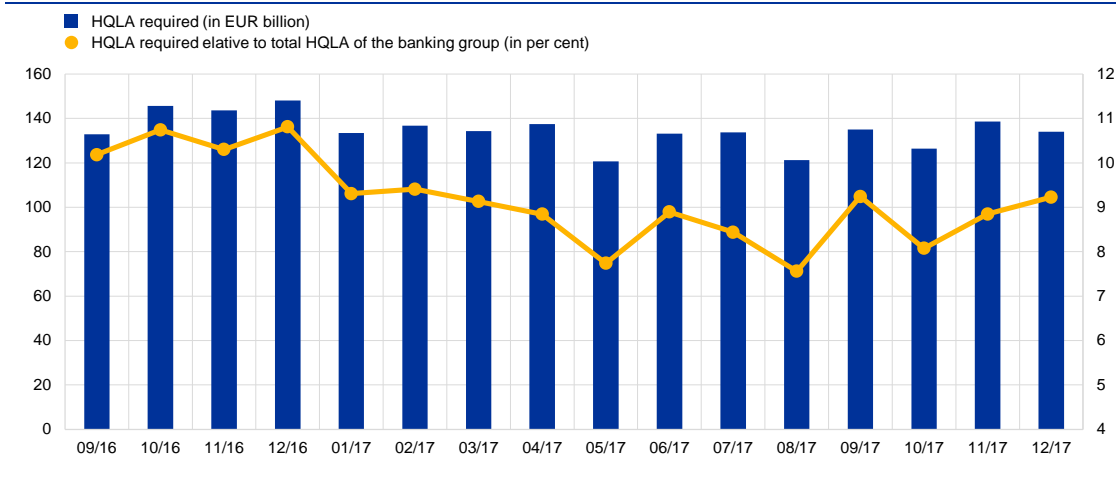
⁵⁹ The amount of liquidity that must be held at sub-consolidated level has been computed as the product of the net liquidity outflow and the LCR requirement.

⁶⁰ ING Groep N.V., Banco Santander, S.A., BNP Paribas, Deutsche Bank AG, Groupe BPCE, Groupe Cr dit Agricole, Soci t  G n rale, UniCredit S.p.A.

⁶¹ These values do not take into account the additional liquidity that each subsidiary keeps in excess of the minimum requirement at solo level to frontload potential future liquidity shortages, and which could be reduced in a centralised liquidity management system within the group.

Chart C

HQLA requirements: subsidiaries of euro area G-SIBs (subsidiaries located in a different euro area Member State from the parent undertaking)



Source: COREP and ECB staff calculations.

Notes: The estimated amount of liquidity required is the amount of liquidity that is needed to comply with a 100% LCR minimum requirement. Any liquidity in excess of the 100% LCR minimum requirement is not taken into account. The blue bars do not represent the actual liquidity required in 2016 and 2017 since credit institutions only had to comply with a 70% (80%) LCR minimum requirement in 2016 (2017).

The ECB has implemented a number of safeguards when applying cross-border liquidity waivers in order to mitigate concerns over the impact on host countries. Significant subsidiaries are required to hold high quality liquid assets (HQLA) at least equal to the lower of (a) the percentage of HQLA required at ultimate parent company level, or (b) 75% of the HQLA that would be required in order to comply with the fully-phased-in LCR requirements at solo or sub-consolidated level.⁶² In 2018 the ECB intends to reassess the specifications under (b) in the light of supervisory experience and the development of institutional mechanisms within the banking union, to ensure the safety and freedom of cross-border intragroup flows. The review will consider the possibility of setting the lower bound at 50%.

Although the policy covering liquidity waivers has been in place since March 2016, no individual supervisory decisions have thus far been taken to approve the application of such waivers on a cross-border basis. This may be due to a number of factors. Article 8(1) of the CRR, both at the national and at the cross-border level, requires institutions to draw up contracts to ensure that funds can move freely, which enables them to meet their individual and joint obligations. These contracts constitute off-balance sheet exposures and may therefore count towards risk-based capital and leverage ratio requirements, reducing the benefit of the application of cross-border liquidity waivers. Even though this safeguard is indispensable from a supervisory perspective, it could disincentivise banks from applying waivers.⁶³ The free flow of liquidity could also be constrained more generally

⁶² Significant subsidiaries are those entities that meet at least one of the numerical thresholds specified in Articles 50, 56, 61 or 65 of the SSM Framework Regulation on a solo basis. If more than one subsidiary is established in a Member State, but none of these subsidiaries comply with the thresholds at solo level, this condition should also apply if all entities established in that Member State, on the basis of either the consolidated position of the parent company in that Member State or the aggregated position of all subsidiaries of the same EU parent company that are established in said Member State, meet at least one of the above-mentioned numerical thresholds.

⁶³ At domestic level, competent authorities may authorise institutions to exempt certain intragroup exposures from the risk-based capital and leverage ratio requirements. However, to facilitate the prompt transfer of capital or the repayment of liabilities in the event that the losses of a group member exceed those covered by its capital, the waived capital must still also be available at group level, although it is freely allocable within the group.

by national large exposure limits. While the ECB O&D Regulation permits the full exemption of intragroup exposures from large exposure limits (though only if certain conditions for the application of a 0% risk weight are also met, other than the condition of being domestic), this option is not available to Member States that have also exercised their discretion to only partially exempt intra-group exposures from large exposures limits.⁶⁴

The ECB will continue to monitor potential impediments to the application of waivers. If any such impediments are not justified by prudential considerations, the ECB will suggest that they be removed. In particular, consideration should be given to removing the Member State option for large exposures requirements and assigning it instead to the supervisor, which would foster harmonised and prudent policy across the euro area. As part of its future review of its O&D policy, the ECB will also check for any impediments to the application of waivers that may be driven by the ECB's O&D policy itself.

Table A
ECB proposals on cross-border liquidity and capital waivers

	Liquidity	Capital
Legal basis	Available in the current framework: Article 8 CRR + ECB Guide on Options and Discretions	Not available in the current framework: ECB policy proposed in Opinion EN CON/2017/46 EU on CRR amendments
Scope	All subsidiaries ¹	Subsidiaries not exceeding a certain threshold (e.g. significance threshold in SSM Regulation) at a solo level and 100% owned by the parent providing the guarantee
Conditions ("Floor")	Significant subsidiaries should hold HQLA at least equal to the lower of (a) the percentage of HQLA required at ultimate parent company level, or (b) 75% of the HQLA that would be required in order to comply with the fully-phased-in LCR requirements at solo or sub-consolidated level	Waiver should be subject to a floor of 75%, e.g. the minimum own funds requirement could be reduced at most from 8% to 6% of the total risk exposure amount being waived for the eligible subsidiary
Review clause	Review by 2018, in the light of evolution of the banking union, with a view to possibly lowering the floor to 50%	Review within three years of entry into force of CRR, in the light of evolution of the banking union, with a view to possibly lowering the floor

1) In the context of a (cross-border) liquidity waiver, the individual requirement will also be waived for the top-level entity of the liquidity sub-group.

In the case of cross-border capital waivers, the ECB supports the introduction of waivers of prudential requirements on an individual basis for subsidiaries whose head offices are located in a different Member State from the parent. This approach is consistent with the establishment of the SSM and the banking union, and additional prudential safeguards and technical modifications could address any potential financial stability concerns. For example, a condition of eligibility for the waiver should be that the relevant subsidiary does not exceed certain thresholds in terms of significance, and the waiver should be subject to a floor of 75%, so that the minimum own funds requirement cannot be reduced by more than 25%.⁶⁵ In this regard, a guarantee from the parent would only be needed for the own funds requirements actually waived. The proposed amendments to the CRR should also clarify that a parent undertaking's guarantee to a subsidiary must be reflected appropriately as a credit risk. In particular, the parent undertaking should have 100% of the subsidiary's voting rights. Finally, the ECB recommends that appropriate transitional arrangements are put in place to implement the cross-border capital waiver, and that the conditions outlined above are reviewed three years after their entry into force. That would be a suitable

⁶⁴ See Article 493(3)(c) of the CRR. This possibility will remain open in practice until the enactment of any changes following a review by the European Commission of the application of exemptions from the large exposure requirement (see Article 507 of the CRR), or until the end of 2028 at the latest.

⁶⁵ See [Opinion of the European Central Bank \(CON/2017/46\)](#).

moment to assess whether the 75% floor should be lowered further in the light of the evolution of the banking union. The ECB's proposals on cross-border capital waivers, together with its policy on liquidity waivers, are summarised in Table A.

2.3 Common backstop to the Single Resolution Fund

A credible common backstop to the Single Resolution Fund (SRF), which is fiscally neutral over the medium term, is essential to safeguard financial stability and ensure a level playing field in the banking union. The SRF is financed by bank contributions and was established in 2016 to provide funding during resolution and to ensure the effective and uniform application of resolution tools across the banking union. As there may be situations where SRF funds and extraordinary ex post contributions are not sufficient to finance resolution, or are not immediately available, it is of paramount importance that a level playing field within the banking union also ensures equal conditions of resolution financing in these cases. A temporary solution, until the SRF is fully mutualised by 1 January 2024, is the system currently in place with national credit lines backing the respective national compartments of the SRF. However, this arrangement institutionalises a nexus between banks and their national sovereign that is not in line with the objectives of the banking union. As long as the relevant risk-sharing mechanisms are still national, liquidity and capital will not be fully fungible across the banking union and will continue to be liable to national ring-fencing.

The European Stability Mechanism (ESM) should be considered a credible and cost-effective candidate for providing a common backstop to the SRF. The ESM as backstop provider would help to break the bank-sovereign nexus and would instil confidence in the public that funds could be made available at short notice by drawing on the existing market presence of the ESM. In order to ensure a level playing field across all participating Member States, the common backstop should be used following the same rules and conditions as the SRF. This means, in particular, that the common backstop should be designed and calibrated in a manner that allows it to provide not only solvency but also liquidity support to a bank under resolution. The decision-making procedure followed to activate the common backstop should be as swift, automatic and efficient as possible to instil confidence at a time of already heightened uncertainty.

2.4 European Deposit Insurance Scheme

Establishing a European Deposit Insurance Scheme (EDIS) remains a key goal in completing the banking union and fostering financial integration and stability in Europe. The ECB is of the view that a European system of deposit protection is the necessary third pillar of the banking union.⁶⁶ As banking supervision

⁶⁶ See [Opinion of the European Central Bank \(CON/2016/26\)](#).

and resolution are now handled at the European level, this should also apply to deposit insurance. Bank deposit protection currently follows the same rules across the EU,⁶⁷ although it remains under national responsibility. Pooling resources within a European fund would enable the EDIS to withstand larger shocks, enable risk diversification and provide a stronger deposit guarantee system than existing national systems. Furthermore, a key benefit offered by the EDIS would be stronger and more resilient liquidity support, a crucial aspect of a deposit guarantee scheme's ability to make swift pay-outs to depositors in the event of a bank failure.

In order to reinvigorate the EDIS negotiations, the Commission has suggested a more gradual introduction. As part of its 11 October 2017 Communication on completing the banking union,⁶⁸ the Commission acknowledged that discussions in the European Parliament and the Council had revealed divergent positions on the legislative proposal of the Commission⁶⁹, particularly with regard to the last of the three implementation stages of the EDIS: re-insurance, co-insurance and full insurance. In order to break the deadlock, the Commission suggested a more gradual introduction of the EDIS, commensurate with the progress achieved in respect of risk reduction and the tackling of legacy issues. Conditions for moving from the re-insurance to the co-insurance phase could include an asset quality review (covering NPLs and level III assets) and a reduction in non-performing loans on banks' balance sheets. The European Parliament and the Council are discussing the way forward including the approach suggested in the Communication. The ECB continues to remain in favour of a fully-fledged EDIS in the steady state and moving forward with risk reduction and risk sharing in parallel. Any conditions proposed for moving forward on risk reduction should be precisely defined ex ante, objectively verifiable, realistically achievable and legally linked to the transitions between the phases in the EDIS proposal, in order to ensure steady and predictable progress.

2.5 Analytical credit dataset

The ESCB made further progress on establishing an analytical credit dataset (AnaCredit). On the basis of Regulation ECB/2016/13, adopted by the Governing Council on 18 May 2016, the ESCB continued its intensive methodological and technical work on the collection of granular credit and credit risk data. AnaCredit is an initiative that involves collecting and making available detailed information on individual bank loans in the euro area in a more harmonised manner, with the aim of analysing credit exposures of the financial sector and associated credit risks. The resulting dataset will be designed to support core central banking functions – notably the preparation and operation of monetary policy, e.g. by enabling the consistent analysis of information on the demand and supply of credit, risk management and macro and microprudential policies, as well as associated research and statistics. Data collection is scheduled to start in November 2018 for data referring to end-

⁶⁷ Directive 2014/49/EU of the European Parliament and of the Council of 16 April 2014 on deposit guarantee schemes.

⁶⁸ See [Communication on completing the banking union](#).

⁶⁹ See Commission Proposal to establish a European Deposit Insurance Scheme ([COM\(2015\) 586 final](#)).

September 2018. The initial focus of AnaCredit will be on information regarding credit granted by euro area credit institutions to legal entities (including NFCs). The standardisation of credit datasets that AnaCredit will bring, as well as the extended feedback loops which will be established in some participating Member States, is expected to become a catalyst for market integration and to facilitate cross-border banking activities, including lending. Given that it will cover substantial information on non-performing exposures, AnaCredit is also expected to contribute to a better understanding of NPLs.

The implementation of the AnaCredit Regulation includes a number of methodological work-streams to ensure that the statistical framework is applied consistently and effectively across the euro area. As is the case during the implementation of all statistical Regulations, several work streams were established in 2017 with the aim of helping the reporting agents and the participating national central banks (NCBs) to comply with ECB/2016/3. The AnaCredit Manual⁷⁰ seeks to provide detailed information and guidance on AnaCredit reporting requirements.⁷¹ In this context, the Manual (i) explains the general methodology and provides information on the reporting population and on setting up the reporting, including a general description of the underlying data model; (ii) describes all the datasets and data attributes of AnaCredit data collection in detail, and (iii) presents selected case studies and scenarios that require more in-depth explanation. The Manual is complemented by further explanations provided via a Q&A documentation process, the aim of which is to further support reporting by addressing the issues and questions raised by reporting agents on an ongoing basis as they prepare their systems to comply with the AnaCredit Regulation. Finally, the ECB performs validation checks to ensure that the data reported to AnaCredit are complete and consistent, in accordance with the requirements. To ensure standardisation, the ESCB has published on the ECB's website the main set of validation checks that will be performed.

The implementation of the AnaCredit Regulation also involved setting up legal and IT work-streams. With regard to legal work streams, the ESCB created the AnaCredit Guideline, which sets the legal basis for secondary reporting, i.e. the transmission of the reported data from NCBs to the AnaCredit system. It provides more detail on issues such as the organisation of derogations, reporting deadlines, the reporting of reference information, etc. With regard to IT, the ESCB worked intensively to prepare the AnaCredit IT platform, which will host the reporting information. This work included activities such as defining user requirements on data visualisation and testing the system in terms of performance and functionalities.

⁷⁰ See the [AnaCredit pages](#) on the ECB website.

⁷¹ The Manual does not contain any additional requirements and has no binding legal status. The AnaCredit Regulation is the sole legally binding act.

3 Establishing the capital markets union

The capital markets union (CMU) is a central policy initiative aimed at catalysing financial integration and development in the EU. Its goal is to ensure the completion of the single market for capital, thereby establishing the conditions for the development and deeper integration of capital markets through both regulatory and non-regulatory action. The CMU, if effectively designed and thoroughly implemented, could potentially complement the banking union and strengthen the Economic and Monetary Union. This would, in turn, support the smooth and homogenous transmission of monetary policy. The CMU could also contribute to enhanced financial stability by weakening the bank-sovereign link, creating deeper cross-border markets and, thereby, increasing private risk-sharing across the EU as well as the resilience of the financial system. No less importantly, the CMU agenda also seeks to reduce reliance on banks by encouraging alternative market-based sources of finance which may better suit the specific needs of SMEs, infrastructure projects or long-term financing.

ECB research has recently identified further directions that could render CMU more powerful in terms of risk-sharing benefits. These directions focus on the value of pension reforms and institutional investment, the value of stimulating financial literacy in the population, and the value of making further progress in enhancing the efficiency of European insolvency frameworks (see also subsection 3.3 below). Box 1 in Chapter 1 contains a more comprehensive summary of the research results and conclusions.

3.1 Capital markets union mid-term review

Since the publication of the 2015 CMU Action Plan, a number of new challenges to financial integration have arisen, imposing the need to strengthen and reframe the EU's CMU agenda. While the situation in terms of overcoming financial fragmentation and constrained access to finance has clearly improved recently, it has also become even more evident that more integrated capital markets can deliver increased private risk sharing across countries and reduce divergence in the effects of asymmetric shocks. This is especially relevant for the euro area. Furthermore, the planned departure of the United Kingdom from the European Union will change the economic, institutional and political landscape in Europe. In this regard, the ECB welcomes the Commission's communication on the Mid-term review of the CMU Action Plan and the new priorities identified, most notably: strengthening the effectiveness of the supervision of securities markets, fintech, and strengthening bank lending and stability. It should also be clear that convergence in regulation and supervision is simply a necessary condition for capital markets integration. Beyond that, market forces and innovation will apply.

A capital markets union requires strengthened supervision and oversight across financial sectors. While increased financial integration can facilitate more efficient risk allocation among private market participants, it may in some cases entail greater risks for financial stability, and it could exacerbate the scale and speed

of financial crisis contagion. Moreover, the 'push' towards market-based financing may also lead to risks building up in a part of the economy that is typically less regulated and where the availability of information is rather limited at times. Given the emerging systemic risks in the non-banking sector, macroprudential policy should be developed beyond banking to ensure that policy and enforcement are consistent across the EU.

A single rulebook for EU capital markets should be complemented by strengthened supervisory convergence. This will facilitate the consistent implementation and enforcement of rules. In this regard, the CMU will require the implementation and enforcement of rules to be strengthened, and will warrant an appropriate supervisory architecture, leading ultimately to a single European capital markets supervisor. Market-led initiatives to promote capital markets are important, although they will need to be combined with legislative action in targeted areas.

3.2 Securitisation

The new EU framework for securitisation has recently been approved by the co-legislators and will enter into force on 1 January 2019.⁷² The ECB welcomes this new framework and notes further that the new EU framework aligns generally with the international standards which have been developed⁷³, or are about to be finalised⁷⁴, by the BCBS and IOSCO, Securitisation provides originators with a useful tool for funding and for risk sharing, and the ECB, along with the Bank of England, has long been a supporter of initiatives to revive securitisation markets in the EU in for the purpose of preserving financial stability.⁷⁵

The new EU Securitisation framework has two objectives, focusing on both prudential requirements as well as the development of an EU market for securitisation. On the one hand, the framework implements the lessons learnt during the financial crisis by setting appropriate prudential requirements for securitisations (including well-calibrated capital charges for banks' holdings). On the other hand, the criteria for simple, transparent and standardised (STS) securitisations and the associated capital treatment will foster the development of a market for sustainable EU securitisations, in line with the broader objectives of the Commission's CMU Action Plan. As outlined in its March 2017 Opinion, the ECB considers that the proposed regulations strike the right balance between these two objectives.⁷⁶

⁷² See [European Parliament legislative resolution of 26 October 2017 on a European framework for simple, transparent and standardised securitisation](#) and [Council Securitisation Regulations](#).

⁷³ See [BCBS and IOSCO jointly adopted criteria for Simple, Transparent and Comparable \(STC\) securitisations](#) and [BCBS revisions to the securitisation framework](#).

⁷⁴ See [BCBS and IOSCO consultative document on criteria for short-term STC securitisations](#) and [BCBS consultative treatment for short-term STC securitisations](#).

⁷⁵ See [ECB-BoE joint discussion paper "The case for a better functioning securitisation market in the European Union" \(May 2014\)](#), and [ECB-BoE joint contribution to the COM consultation from 2015](#).

⁷⁶ See [Opinion of the European Central Bank \(CON/2016/11\)](#).

Further work may be needed to align STS criteria. Following the finalisation of the main EU framework, achieving these objectives would also call for STS criteria to be further aligned throughout the entire prudential regulatory framework, in particular in the case of solvency requirements for insurance companies (Solvency II) and the definition of liquid assets for the Liquidity Coverage Ratio (LCR). Finally, the EBA and ESMA will develop technical standards and guidelines that supplement the new securitisation framework, in order to offer originators and investors the necessary regulatory certainty that is required to revive sustainable EU securitisation markets. With regard to risk-sharing through securitisation, the ECB welcomes the recent publication of the EBA's discussion paper on significant risk transfer.⁷⁷ The paper builds on the monitoring of existing supervisory practices and seeks to further harmonise the assessment of credit risk transfer by supervisory authorities in the EU.

3.3 Insolvency frameworks

National bank insolvency frameworks differ significantly. This issue is not easy to overcome, given that these frameworks are strongly interconnected with commercial law, civil law and company law. However, the ECB considers that further work should be undertaken in order to achieve substantive harmonisation of insolvency laws, both for banks and for corporates. The current differences fragment the market, represent a major impediment to a well-functioning CMU, and hinder the proper functioning of the banking union, since they fail to create a level-playing field for banks operating in a cross-border context. In addition, inefficient insolvency frameworks that diverge across Member States could also jeopardise the effectiveness of euro area monetary policy. Weak insolvency frameworks can hamper the reduction of non-performing loans, discourage new lending and, ultimately, negatively impact the health of the banking sector. Stronger convergence in recovery rates across the banking union would also be conducive to its completion by reducing reliance on EDIS in insolvency procedures. While various insolvency reforms undertaken at the national level have sought to support court-led proceedings, court-led procedures are still often highly complex and costly owing to the time required for enforcement and the resources involved, thereby reducing recovery values. In the case of NPLs there are, in addition to inefficient insolvency proceedings, substantial delays in judicial proceedings that significantly affect recovery values and reduce offer prices, leading to situations of high bid-ask spreads and a general lack of NPL sales. Costly judicial proceedings may not be feasible for smaller SMEs, since they have low levels of capital and lack the financial resources needed to undertake restructuring via court-based proceedings. Out-of-court workouts are typically faster and more flexible, provide more confidentiality and, considering the overall costs that regular procedures entail, may also be less expensive. In Member States with overburdened and understaffed judicial systems, out-of-court restructuring could provide a valuable alternative. An EU-wide harmonised regime governing the framework for such out-of-court workouts could increase transparency and would create a level playing field. In comparison with

⁷⁷ See [EBA consultation on significant risk transfer in securitization](#).

national insolvency regimes, which are well established and often straddle commercial, civil and company law, out-of-court workout regimes are newer and are, therefore, more amenable to harmonisation. A harmonised EU approach in this area could, at the very least, establish non-binding guidelines for out-of-court restructuring or, which would be even more effective, create formal out-of-court regimes. These regimes could be oriented towards SMEs, while preserving the national insolvency regimes as a backstop.

On 23 November 2016, the Commission proposed an increase in the convergence of insolvency and restructuring procedures.⁷⁸ The proposed plan is an important step towards building a legally binding minimum common standard across the Union, particularly with regard to pre-liquidation procedures for businesses and corporate restructuring. In particular, it suggested establishing key principles related to effective preventive restructuring and second chance frameworks, as well as measures to make all types of insolvency procedures more efficient by making them shorter, reducing their associated costs and improving their quality. For example, insolvency rules do not always allow debtors in financial difficulty to restructure early. The Commission has therefore proposed lifting the obligation to file for insolvency while the debtor is still in the process of formal restructuring as filing might, otherwise, prevent the restructuring from attaining its goals. This proposal, if adopted, would increase legal certainty for cross-border investors, and would also allow the timely restructuring of viable companies in financial distress. Further improvements could also be made to insolvency frameworks by addressing shortcomings and diversity issues across countries in respect of reorganisation proceedings and creditor participation (see Box 1 in Chapter 1).

A second initiative in the field of insolvency was launched by the Commission as part of a broader set of legislative proposals aimed at amending the Union's financial services regulatory framework, i.e. the Capital Requirements Regulation, the Capital Requirements Directive, the Bank Recovery and Resolution Directive and the Single Resolution Mechanism Regulation.⁷⁹ The proposed amendments provide an additional means for credit institutions and certain other institutions to comply with the forthcoming total loss-absorbing capacity requirement and the minimum requirement for own funds and eligible liabilities.⁸⁰ However, the ECB considers that additional reforms could help to further harmonise insolvency regimes for credit institutions. In particular, a general depositor preference should be introduced based on a tiered approach, with a third priority ranking for deposits other than those covered by a deposit guarantee scheme and any further eligible deposits held by retail and SME depositors, which currently already have a preferred

⁷⁸ See Commission proposal on preventive restructuring frameworks, second chance and measures to increase efficiency of restructuring, insolvency and discharge procedures for amending Directive 2012/30/EU ([COM\(2016\) 723 final](#)).

⁷⁹ See Commission proposal on amending Directive 2014/59/EU with regard to the ranking of unsecured debt instruments in the insolvency hierarchy ([COM\(2016\) 853 final](#)).

⁸⁰ See [Financial Stability Board Principles on Loss-absorbing and Recapitalisation Capacity of G-SIBs in Resolution: Total Loss-absorbing Capacity \(TLAC\) Term Sheet](#).

insolvency ranking. Moreover, further harmonisation should be targeted for the treatment of supplementary capital instruments in insolvency and resolution.

3.4 The European Market Infrastructure Regulation

On 13 June 2017, the Commission published its proposal for a regulation reviewing the authorisation and supervisory processes for central counterparties (CCPs) established by the European Market Infrastructure Regulation (EMIR).⁸¹ This proposal would foster a more pan-European approach to the supervision of EU CCPs, aiming to achieve further supervisory convergence and to strengthen the Union's supervisory arrangements for third-country CCPs (i.e. CCPs located outside the EU). This would ensure that all CCPs which play a key systemic role in the Union's financial markets would be subject to safeguards provided by the Union's legal framework.

The Commission's proposal would also suggest significantly enhancing the role of central banks of issue, including the Eurosystem as the central bank of issue for the euro. It would allow them, inter alia, to review supervisory decisions relevant to their monetary policy tasks. As stated in the ECB Opinion on the proposal,⁸² the ECB strongly supports this initiative. It will enable the Eurosystem to play a more meaningful role in respect of EU and third country CCPs in the light of significant developments at both global and European level which are expected to increase the risks posed by CCPs to the smooth operation of payment systems. First, supervisory arrangements and the role of central banks of issue need to keep abreast of the increasing cross-border dimension and systemic importance of central clearing. Second, given the significant volumes of transactions cleared by CCPs established in the United Kingdom, including euro-denominated transactions, the withdrawal of the UK from the EU will pose significant challenges. The Eurosystem's ability to monitor and manage risks posed by UK CCPs, once they are no longer subject to the regulatory and supervisory framework for EU CCPs under EMIR, will be significantly impaired. The systemic importance of cross-border clearing activities therefore requires an overhaul of the third-country CCP recognition process, in order to address, inter alia, concerns related to the smooth operation of payment systems and the stability of the currency.

On 23 June 2017 the ECB submitted a recommendation for an amendment to Article 22 of the Statute of the ESCB⁸³. In order to carry out its role as the central bank of issue for the euro as envisaged by the Commission's proposal, it is of the utmost importance that the Eurosystem has the necessary powers under the Treaty and the Statute of the ESCB. The ECB should therefore be granted regulatory

⁸¹ See the Commission proposal for a Regulation amending Regulation (EU) No 1095/2010 establishing a European Supervisory Authority and amending Regulation (EU) No 648/2012 with regard to the authorisation of CCPs and requirements for the recognition of third-country CCPs ([COM\(2017\) 331 final](#)).

⁸² See [Opinion of the European Central Bank \(CON/2017/39\)](#).

⁸³ See [ECB recommendation for amending Article 22 of the Statute of the European System of Central Banks and of the European Central Bank](#).

competence over clearing systems for financial instruments, in particular CCPs, in accordance with the ECB recommendation. On 3 October 2017 the EU Commission issued an Opinion on the ECB recommendation. While supporting the ECB recommendation, the EU Commission proposed that the text be reworded to some extent, seeking to make it clear that the ECB should exercise its regulatory competence in accordance with the acts adopted by the European Parliament and the Council and with the measures adopted under these acts.

3.5 Stakeholder groups for integration of market infrastructures and payments

The Eurosystem established the Advisory Group on Market Infrastructures for Payments (AMI-Pay) and the Advisory Group on Market Infrastructures for Securities and Collateral (AMI-SeCo) as new advisory groups on market infrastructures.⁸⁴ In February 2017, the Eurosystem decided to review its market advisory groups by setting up two new groups on market infrastructures to counsel the Eurosystem. The AMI-Pay offers advice on payment issues while the AMI-SeCo offers advice on securities and collateral. Both groups are composed of market participants and both are chaired by the ECB. In order to also involve national stakeholders in the work of the AMI SeCo and AMI-Pay, national stakeholder groups (NSG) have been created. The aim of this is to establish a link between the AMI SeCo, AMI-Pay and the respective local markets, channelling information in both directions. The NSGs consist of the national central bank and representatives of users and other stakeholders.

The AMI-SeCo facilitates an active dialogue with market participants on issues related to the clearing and settlement of securities and to collateral management. It has taken on the responsibilities of the T2S Advisory Group and the Contact Group on Euro Securities Infrastructures (COGESI). The AMI-SeCo brings together representatives of banks active in the European Union in their role as T2S users, central securities depositories (CSDs), central counterparties (CCPs) and national central banks. In addition to its activities with regard to collateral management and T2S harmonisation and distributed ledger technology (DLT), the AMI-SeCo continued its work on promoting securities post-trade market integration and innovation. The issues covered by the AMI-SeCo relate closely to the integration of European capital markets in the post trade domain. These issues range from technical issues with regard to harmonising the way securities are settled on T2S to broader standardisation initiatives for post-trade settlement procedures (e.g. the execution of corporate actions, collateral management procedures, etc.). The AMI-SeCo also provides input to the European Commission to support its policy work on post-trade markets. In November 2017, it provided input to the Commission's consultation on post trade in the CMU, confirming the post-trade barriers identified by the European Post Trade Forum.

⁸⁴ See the [ECB website](#) for more information.

The AMI-Pay assists the Eurosystem in fostering payment innovation and integration across Europe. It also offers advice on the provision and modification of Eurosystem payment-related services. The AMI-Pay consists of representatives of banks active in the European Union as well as representatives of national central banks, while infrastructures, industry associations and the European Commission act as observers. The Eurosystem has participated in an active dialogue with the AMI-Pay members in the context of instant payments and preparations for the TARGET Instant Payment Settlement (TIPS)⁸⁵, as well as with regard to the TARGET2/T2S consolidation process. The AMI-Pay is therefore an important industry forum that fosters the integration of retail and wholesale payment services and provides a holistic view of the related issues. The specific topics covered by the AMI-Pay include liquidity management in relation to CLS⁸⁶, the cash aspects of collateral management, value-dating in an instant payment context and the industry preparations for TIPS and the SEPA instant payments scheme generally.

The Euro Retail Payments Board (ERPB) has become a key player in retail payments integration.⁸⁷ It brings together high-level representatives from both the supply and demand sides, with the objective of fostering the development of an integrated, innovative and competitive market for euro retail payments in the EU. Over its relatively short lifespan, the ERPB has taken a number of important steps towards achieving its objectives. In particular, in the field of instant payments, the SEPA Instant Payments Scheme (SCTinst) was launched by the European Payments Council in November 2017. The scheme was set up on the invitation of the ERPB, which is closely following its development. The scheme's launch, along with the launch of the supporting infrastructure, (see the reference to TIPS above) represents a major milestone in European retail payment integration, making it possible to execute retail credit transfers in euro in a matter of second across the EU, based on a harmonised set of rules. The ECB expects the SCTinst to serve as a key building block in further innovation and integration by retail payment service providers in a truly domestic and single pan-European payment services market.

3.6 TARGET2-Securities

TARGET2-Securities (TS2) migration was completed, marking a major milestone in the integration of the European securities post-trade landscape.

The migration to T2S was completed following the successful execution of its final wave in September 2017, with 20 European securities markets and 21 CSDs now operating on a single platform. As a result, T2S and its harmonised rules cover all national euro area markets as well as the settlement of the bulk of securities transactions (outright or cash transactions, repos, collateral movements, etc.) executed in euro denominated debt securities, equities and fund shares. This is a

⁸⁵ See the [ECB website](#) for more detail on TIPS and other Eurosystem initiatives.

⁸⁶ CLS is the name of a financial market infrastructure which provides settlement services to its members in the foreign exchange market.

⁸⁷ See the [ECB website](#) for more information and the reports and notes as discussed by the AMI-Pay and the AMI-SeCo.

major milestone from a financial integration perspective. The 21 CSDs use a single platform for securities settlement, following the same business and technical rules for settlement, settlement schedule (cut-off times) and calendar. By allowing central bank money DvP (delivery versus payment) settlement in euro (and from end-2018 in Danish kroner), the platform increases safety and efficiency and establishes a level playing field. T2S settles on average 550,000 transactions a day with an average total value of around €350 billion. T2S' settlement efficiency, i.e. the ratio of the number of settled transactions on a given day to the number of settlement instructions for intended settlement on the same day, is close to 99%.

T2S has contributed very significantly to the harmonisation of securities post-trade procedures beyond the settlement domain. The T2S Community (NCBs, CSDs, banks and other CSD participants, issuers and investors) has worked on a broad harmonisation agenda related to the launch of the platform. This agenda not only includes harmonisation directly related to securities settlement procedures but also extends over a wider area of post-trade services related to settlement. The defined and monitored standards (a total of 18 standards are being monitored by the AMI-SeCo and the T2S Community) range from settlement messaging to the execution of corporate actions and securities amount data. Following the completion of T2S migration, significant progress was also made on the compliance of markets, with the standards for these harmonisation activities reaching an estimated overall compliance of 83%.

3.7 Collateral management harmonisation

The harmonisation of collateral management is essential for the further integration of financial markets in Europe and also contributes to the development of CMU. The AMI-SeCo has identified harmonisation needs and activities and has begun to develop and implement collateral management harmonisation proposals. Aspects of this are relevant to financial markets in Europe and the Eurosystem. The work focuses on the operational side of collateral management, e.g. triparty collateral management, corporate action handling, etc., while the legal/regulatory side is expected to be covered mainly by other initiatives under the CMU. The implementation of the harmonisation proposals will require close market involvement.

3.8 Fintech

The ECB believes that distributed ledger technology (DLT), at its current stage of development, is not a suitable solution for central bank operated financial market infrastructures. The ECB's conclusions are based on the relative immaturity of the technology and derive from its own experimental work undertaken in collaboration with the Bank of Japan.⁸⁸ The ECB monitors developments in the

⁸⁸ See [joint project "Stella" by the ECB and the Bank of Japan](#).

area of fintech in collaboration with the Eurosystem and international standards-setting bodies. DLT has the potential to increase efficiency, but this needs to be achieved while ensuring harmonisation and standardisation in order to avoid potential re-fragmentation across different market solutions. A taskforce composed of market experts has been set up under the governance of the AMI-SeCo to explore the impact of DLT on the post-trade industry.⁸⁹ The first findings of such analysis were published by the AMI-SeCo in September 2017,⁹⁰ drawing conclusions as to the potential impact of DLT on harmonisation in the context of T2S and on the broader integration of financial markets in Europe. Many elements of a DLT-enabled financial market must be designed and assembled before DLT adoption may be considered to be a realistic possibility, including standards needed to allow technical interoperability between different DLT solutions and with non-DLT systems, as well as those needed to maintain the interoperability of business processes, such as the schedule of settlement processes, concepts of settlement finality and messaging standards.

The ECB also monitors fintech developments in the area of retail payments and notes significant activity in the growth of innovative payment products, especially by non-banks, in the areas of FX, e-commerce, point of sale, and person-to-person payment solutions. For the most part, new providers of retail payment solutions do not use new innovative technology like DLT, preferring instead to base their solutions on existing technologies such as bio-metrics, QR-codes,⁹¹ near field communication (NFC) and Bluetooth.⁹² New technologies are used in innovative ways to offer an enhanced customer experience. These solutions are usually offered nationally, so pan-European interoperability could become an issue if solutions expand to other jurisdictions and are not based on common standards. The ECB believes that application programming interfaces (APIs)⁹³ will facilitate enhanced payment account access for third-party providers as defined by the revised Payment Services Directive. This enhanced account access and the introduction of instant payments will foster the development of a new generation of fintech innovations in the area of retail payments. These innovations will contribute to more efficient and competitive means of payment, especially at the point of sale, for consumers in Europe.

⁸⁹ See [documentation on the AMI-SeCO HSG DLT Task Force](#).

⁹⁰ See [The potential impact of DLTs on securities post-trading harmonisation and on the wider EU financial market integration](#).

⁹¹ A code made of an array of black and white squares, typically used for storing URLs or other information for reading by the camera on a smartphone.

⁹² Near field communication (NFC) refers to a short-range wireless communication technology. The technology is designed to enable communication or information to be exchanged between devices separated by a few centimetres.

⁹³ An application programming interface (API) is a set of functions and procedures that allow applications to be created which access the features of another service.

Special feature A: Financial development, financial structure and growth: evidence from Europe

Prepared by Manfred Kremer and Alexander Popov

The global financial crisis prompted a reevaluation of the conventional wisdom concerning the impact of financial markets on real economic activity. The theory suggests that the financial system provides essential real services to the economy by mitigating frictions which deter firms and households from carrying out mutually-beneficial transactions with each other. Financial intermediaries and financial markets are alternative means of overcoming frictions between savers and investors, and both forms of finance have specific advantages and shortcomings. It cannot be argued, from a theoretical point of view, that one way of financing is better for economic growth than the other. According to the empirical literature, financial development has a broadly positive impact on economic growth, although this impact is not uniform across countries, and it becomes weaker at high levels of economic development. In addition, although the earlier literature failed to find convincing evidence that either banks or markets are better suited to finance economic growth, recent evidence indicates that markets make a relatively more important contribution.

Results from an original empirical analysis of a sample of 21 EU countries suggest that during the decade preceding the financial crisis, and controlling for the impact of the overall size of financial markets, the sectors depending on external finance and the sectors with better global growth opportunities grew faster in countries with relatively bigger stock markets. A positive impact from stock markets was also observed in those industries that represent the frontier of growth in modern economies, such as high-tech industries and patent-intensive industries. Moreover, the higher growth in value added was driven by faster growth in labour productivity than in capital accumulation, supporting the idea that equity markets play an important role in the financing of innovation and total factor productivity (TFP) growth. These effects are not present in the data recorded during the post-crisis period. There is also evidence suggesting that an expansion in household credit at the expense of credit to non-financial corporations (NFCs) could have negative consequences for industry growth. Overall, the results imply that the structure of financial markets is an important determinant of overall economic performance. As such, the results support the need to design and implement ambitious pan-European policies that would facilitate the further development of equity financing in Europe. Even though recent proposals by the EC to strengthen capital markets in Europe by reinforcing integrated supervision are a step in the right direction, more initiatives

may be needed in the future to support the financing of the real economy through public and private equity markets.⁹⁴

Despite the fact that the empirical finance-and-growth literature is now a quarter of a century old, opinion is still divided as to whether financial development stimulates economic development in a causal sense. While the majority of researchers have argued that, over the long sweep of history, the contribution of financial markets to economic growth has been “too obvious for serious discussion”,⁹⁵ others have objected that the importance of financial markets in economic development is severely exaggerated in academic discussion.⁹⁶ Moreover, the global financial crisis of 2008-09 reinforced the view that if left untamed finance could degenerate into a rent-seeking activity,⁹⁷ or even a powerful force for planting the seeds of future financial crises,⁹⁸ with adverse implications for long-term growth and social welfare. Consequently, in the wake of the crisis, finance was openly blamed for the Great Recession, the public’s trust towards bankers dissipated,⁹⁹ and policy makers on both sides of the Atlantic warmed to the idea that only through the tight regulation of financial activities could a crisis of this magnitude be prevented from wreaking havoc on the real economy in the future.

A related question is whether a country’s financial structure – or the mix of financial markets and intermediaries operating in an economy – affects economic growth. Putting this another way, are markets or banks better at promoting growth, and do their contributions to growth vary with a country’s degree of economic and financial development? Much of the earlier literature concluded that while both bank-based and market-based financial systems fostered growth, there was no general rule showing that either financial system was superior. It is particularly noteworthy that this conclusion was reached using aggregate, sectoral-level and micro-economic evidence.¹⁰⁰ However, more recent evidence has challenged this view. For a start, as per capita income rises, countries’ financial structures tend to move towards non-bank financing. Market-based intermediation has thus grown faster than bank-based intermediation, especially in advanced countries, due to a combination of advances

⁹⁴ See Box 1 entitled “Building a capital markets union – a leap towards more financial integration” and Chapter 3 “Eurosystem activities for financial integration” in [Financial integration in Europe](#), ECB, April 2016.

⁹⁵ Miller, M., “Financial markets and economic growth”, *Journal of Applied Corporate Finance*, Vol. 11, 1998, pp. 8-14.

⁹⁶ Lucas, R., “On the mechanics of economic development”, *Journal of Monetary Economics*, Vol. 22, 1988, pp. 3-42.

⁹⁷ Zingales, L., “Presidential address: Does finance benefit society?”, *Journal of Finance*, Vol. 70, No 4, 2015, pp. 1327-1363.

⁹⁸ Schularick, M. and Taylor, A., “Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008”, *American Economic Review*, Vol. 102, No 2, 2012, pp. 1029-1061; Mian, A. and Sufi, A., “House of Debt: How They (and You) Caused the Great Recession, and How we Can Prevent It from Happening Again”, University of Chicago Press, 2014.

⁹⁹ Sapienza, P. and Zingales, L., “A trust crisis”, *International Review of Finance*, Vol. 12, No 2, 2012, pp. 123-131; Hartmann, P., “Financial reform in transition”, in: Evanoff, D., Haldane, A. and Kaufman, G. (eds.), *The new international financial system: analyzing the cumulative impact of regulatory reform*, Hackensack: World Scientific Publishing, 2015, pp. 371-404.

¹⁰⁰ Beck, T. and Levine, R., “Stock markets, banks, and growth: Panel evidence”, *Journal of Banking and Finance*, 2004, pp. 423-442; Demirgüç-Kunt, A. and Maksimovic, V., “Funding growth in bank-based and market-based financial systems: Evidence from firm level data”, *Journal of Financial Economics*, Vol. 65, 2002, pp. 337-363.

in technology, greater availability and use of hard information, and more internationalised financial systems. A number of recent papers have shown that with economic development¹⁰¹ the marginal contribution of banks to economic growth declines, while that of capital markets increases. This appears to be due in particular to the fact that market finance is better at promoting innovation and productivity, as well as financing new sources of growth.¹⁰²

The issue of the impact of financial development and financial structure on economic performance is of first-order importance at this moment in history, both for Europe as a whole and for the euro area in particular. For reasons as disparate as comparative advantage, the industrial structure of the economy, and historical accident, Europe's financial system is considerably more bank-based than its US counterpart. There are both pros and cons with regard to this state of affairs. In terms of pros, higher reliance on banks protects the European corporate sector from the vagaries of investor sentiment. For instance, most European countries experienced a smaller economic shock when the dot-com bubble burst in the late 1990s than the US. At the same time, bank financing is, admittedly, less effective than market financing when it comes to promoting radical innovation or financing new sources of growth. This is because banks tend to take on less risky projects than market-based financiers such as venture capital or private equity firms. Hence, a financial system skewed towards bank financing may be putting Europe at a disadvantage at a time when most future growth is expected to come from the high-tech sector. The extant empirical literature provides little guidance one way or another, because most of the evidence in the literature on the impact of financial structure on growth derives from datasets dominated by developing countries and emerging markets.

This special feature seeks to provide a systematic analysis of whether, for a given size of financial sector, and focusing on European countries and industries, more market-based financial intermediation improves economic performance. Section 2 summarises the theoretical and empirical literature on the links between financial development, financial structures and growth. Section 3 presents, in three steps, estimates from an original empirical analysis of the impact of financial structure on economic performance in Europe, controlling for the impact of financial development. As a first step, the analysis replicates an empirical approach that is standard in the literature, whereby for a sample of 19 industries in 21 EU and in 11 Euro area countries, the impact of financial structure and of financial development on industry growth is estimated for industries that are technologically sensitive to changes in financing conditions, relative to industries that are not. As a second step, more granular measures of responsiveness to market finance are considered, such as the technological extent to which an industry relies on R&D investment, high-tech technologies, or patented innovation. Finally, the channels through which financial development and financial structure affect growth – i.e. capital accumulation and

¹⁰¹ Demirgüç-Kunt, A., Feyen, E. and Levine, R., "The evolving importance of banks and securities markets", *World Bank Economic Review*, Vol. 27, No 3, 2013, pp. 476-490; Gambacorta, L., Yang, J. and Tsatsaronis, K., "Financial structure and growth", *BIS Quarterly Review*, 2014, March, pp. 21-35.

¹⁰² Hsu, P., Tian, X. and Xu, Y., "Financial development and innovation: Cross-country evidence", *Journal of Financial Economics*, Vol. 112, No 1, 2014, pp. 116-135.

productivity improvements – are studied. Section 4 presents a few conclusions that emerge from the literature and from the reported regressions.

1 Survey of the theoretical and empirical literature

Financial systems perform functions which are essential for the real economy to run smoothly and grow at healthy rates over time. These functions aim at mitigating frictions created by information and transaction costs which may restrict firms and households, for instance, from transacting business with each other to their mutual benefit. Hence, by mitigating market frictions, financial systems naturally influence the allocation of resources across space and over time. For example, the emergence of banks improves the acquisition of information about firms, as well as the allocation of credit, while the development of liquid stock and bond markets means that people who are reluctant to relinquish control over their savings for extended periods of time can trade claims to long-term projects on a daily basis. The theoretical case for the positive impact of financial development is therefore clear, although it is not clear whether markets or banks are better at achieving this. The empirical literature broadly reflects this distinction. While the bulk of the historical evidence does indicate that, on average, financial development affects economic growth in a positive, monotonic way, more recent evidence has suggested that this monotonicity does not hold for all types of financial activity and at all levels of development. In addition, while most of the historical evidence concludes that financial structure does not have a first-order effect on economic performance, analyses of more recent periods and of more granular datasets have suggested that markets may be better at stimulating growth in more sophisticated economies. This section reviews current views and analyses regarding the growth benefits of financial development and financial structure, both from a theoretical and from an empirical perspective.

1.1 Why does finance matter for growth? A theoretical perspective

In a modern economy, millions of financial transactions are carried out every day, which involves a wide variety of financial products, institutions and market segments. This fact in itself could be taken as an argument supporting the claim that financial aspects play an important role in the effective functioning of the real economy, because otherwise this myriad of financial activities would be, in principle, redundant. But what are those specific real services that financial transactions can lead to, are they likely to have a bearing on economic growth, and does it matter whether such services are provided by financial institutions (in particular banks) or in the form of financial securities traded in liquid markets? This section summarises the main theoretical answers to these fundamental questions, drawing on the academic literature.¹⁰³

¹⁰³ For a thorough overview of the theoretical literature on finance and growth see Levine, R., “Finance and growth: theory and evidence”, in: P. Aghion and S.N. Durlauf (eds.), *Handbook of Economic Growth*, Vol. 1A, Elsevier, 2005, pp. 865-934.

In general, the financial system provides real services (value added) to the economy by overcoming frictions which hinder or hamper economic agents from carrying out mutually-beneficial transactions with each other. These frictions are commonly categorised into specific information and transaction costs, i.e. the costs of producing and processing relevant information, enforcing contracts and conducting transactions. Each cost or friction creates incentives for the emergence of particular types of financial arrangements, i.e. the specific financial institutions, markets or products which, together, represent the financial system. Over time, by helping to mitigate certain frictions, financial arrangements stimulate profitable and welfare-enhancing activity in the real economy. In this regard, the better the financial system performs, the better financial services can be remunerated. This, in turn, creates incentives to further deepen, broaden and apply innovation to financial activities, ideally setting in motion a virtuous circle of financial development and economic growth. However, each specific financial arrangement is subject to its own particular frictions, reflecting specific information asymmetries and transaction costs which must be taken into account when considering the relative pros and cons of various financial arrangements from a social welfare perspective.

The real services provided by a financial system can be discussed in terms of its five broad functions following Levine (2005)¹⁰⁴: (i) it makes the exchange of goods and services easier; (ii) it mobilises and pools savings; (iii) it facilitates the trading, diversification and management of risk; (iv) it produces information ex ante regarding possible investments and allocates capital; and (v) it monitors investments ex post and exerts corporate governance after the financing.

With regard to the first function, the conventional wisdom is that the use of money as a generally accepted medium of exchange and means of payment greatly facilitates the exchange of goods and services in a market economy. In fact, it has been clearly understood for a long time that activity in a pure barter economy would be stifled by prohibitively high information and transaction costs, restricting feasible trades to cases of a double coincidence of wants, e.g. a case of the “starving tailor” meeting the “shivering baker”.¹⁰⁵ By contrast, in a monetary economy agents accept money as a quid pro quo in economic transactions, thus severing the direct link between the tailor and the baker, while greatly reducing information costs and improving economic efficiency. Further efficiency gains accrue from the emergence of debt and equity contracts since these promote the intertemporal transfer of purchasing power, which is essential for capital accumulation and consumption smoothing.¹⁰⁶ Hence, money and “credit” make a modern economy possible in the first place, i.e. an economy characterised by widespread and complex forms of specialisation, capital accumulation and innovation in both the real and the financial sphere that are aimed

¹⁰⁴ Levine, R., “Finance and growth: theory and evidence”, op. cit.

¹⁰⁵ Niehans, J., “Money in a static theory of optimal payment arrangements”, *Journal of Money, Credit, and Banking*, Vol. 1, No 4, 1969, pp. 706-726.

¹⁰⁶ While lowering transaction costs, e.g. storage costs or forgone interest, credit also creates new information costs incurred during the screening and monitoring of borrowers.

at improving economic efficiency.¹⁰⁷ The remaining functions of a financial system are now introduced to discuss the comparative advantages of bank-based (or intermediary-based) versus market-based financial systems. For this purpose, functions (ii) and (iii) are discussed together, as are functions (iv) and (v).

1.1.1 Pooling of savings and risk management

The pooling of small funds by many dispersed savers so that these savings may be collectively invested in typically larger enterprises helps to reduce frictions caused by transaction costs, information asymmetries and investment indivisibilities. For instance, unless they formed “coalitions”, individual savers would not be able to invest directly in indivisible large-scale projects run by firms. In addition, search costs would be very high – in many cases prohibitively high – if savers had to search for potential co-investors themselves. Traditionally, the two main ways such pooling frictions may be overcome are first, the creation of corporations establishing multiple bilateral contracts with savers by issuing securities in public markets and, second, indirect investments through financial intermediaries in general and banks in particular.

With regard to market-based solutions, firms can raise funds to finance large-scale projects by issuing securities (such as bonds and equities) in small denominations on public markets (stock exchanges) to tap a larger pool of savers or other investors.¹⁰⁸ In this way, investors can focus principally on gathering information about the quality of the projects undertaken by the issuer, without having to worry about other investors in the firm.¹⁰⁹ This financial arrangement could not only solve the pooling issue but also addresses frictions associated with liquidity risk. It is often assumed that savers prefer to invest in instruments which can be converted into purchasing power at low cost and at high speed, in order to cover unforeseen liquidity needs. By contrast, however, firms investing in long-term projects prefer a long-term capital commitment from their financiers, since these projects can, typically, only be liquidated at high cost. Such differences in liquidity risk can pose severe constraints on the amount and the cost of funds available for long-term investments. However, if claims on the firm can be traded in liquid secondary markets, idiosyncratic liquidity risk can be well diversified across a large pool of small savers, thereby increasing the willingness of savers to relinquish their funds to long-term projects which, *ceteris paribus*, should lead to higher capital accumulation and

¹⁰⁷ On related points see King, R.G. and Plosser, C.I., “Money as the mechanism of exchange”, *Journal of Monetary Economics*, Vol. 17, 1986, pp. 93-115, and Greenwood, J. and Smith, B., “Financial markets in development, and the development of financial markets”, *Journal of Economic Dynamics and Control*, Vol. 21, 1996, pp. 145-181.

¹⁰⁸ The online peer-to-peer (P2P) lending market – which developed as part of the financial technology (fintech) movement – is a recent financial innovation that provides an alternative means of overcoming the pooling issue.

¹⁰⁹ However, under certain circumstances an investor might also value information about other investors. Such soft information could be important, in particular, for unsophisticated investors seeking signals about the quality of the security offered from the behaviour of other (in particular professional) investors. Such mechanisms play a role in some theories explaining herding behaviour in financial markets.

economic growth.¹¹⁰ If the denominations of the issued securities are small enough, and if the fixed costs of trading securities are sufficiently low, financial markets could, in principle, also offer small savers diversification gains from investing in a broad portfolio of assets, rather than being exposed to large idiosyncratic risk when obliged to invest in a small number of projects.

Financial intermediaries such as banks, mutual funds or insurance corporations offer an alternative way of solving pooling, liquidity risk and cross-sectional risk diversification issues.¹¹¹ Banks can be seen as coalitions of borrowers and lenders which benefit from economies of scale (and scope) in respect of transaction technologies and in the acquisition, processing and storage of information. This arises when they transform the funds collected from savers into short-term (liquid) and relatively safe bank deposits¹¹² and invest these funds in portfolios of more profitable long-term (illiquid) risky projects by granting loans to diverse firms. Economies of scale accrue in the form of lower fixed transaction (and information) costs and the excess return from liquidity transformation.¹¹³ Banks may also be better equipped than markets to offer intertemporal risk sharing to borrowers and lenders.¹¹⁴ Banks, as longstanding financial institutions, can diversify non-diversifiable macro risks across generations by investing in long-term projects and offering counter-cyclical returns paid out in bad times from banks' reserves built up in good times.

Mutual funds and insurance companies are other forms of financial intermediaries through which funds can be pooled, and through which liquidity can be insured and transformed into diversified asset portfolios. For instance, instead of directly investing in the stock market, it can be more efficient (due to economies of scale), in particular for smaller savers, to hold a diversified equity portfolio indirectly via the purchase of shares in mutual funds. However, from a financial structure perspective, mutual funds invested in tradable securities do not provide an alternative to financial markets but rely, instead, on the existence of liquid markets. They might, for example, even help securities markets to become more attractive to investors by improving price efficiency.

In summary, financial markets and financial intermediaries offer two possible ways to attract large groups of savers to invest jointly in longer-term and risky projects,

¹¹⁰ Levine, R., "Stock markets, growth, and tax policy", *Journal of Finance*, Vol. 46, pp. 1445-1465.

¹¹¹ Only in the ideal world of frictionless and complete financial markets would both investors and borrowers be able to diversify perfectly and obtain optimal risk sharing without financial intermediaries (Freixas, X. and Rochet, J.-C., 2008, op. cit.).

¹¹² Liquidity risk may be assumed to be higher for savers who hold tradable securities compared with those holding bank deposits since the former carry the risk of uncertain sales prices (liquidation values), while short-term bank deposits are usually redeemed at par and thus at an ex ante fixed price.

¹¹³ The law of large numbers provides quasi liquidity insurance to a large coalition of depositors with imperfectly correlated liquidity risks (Diamond, D.W. and Dybvig, P.H., "Bank runs, deposit insurance, and liquidity", *Journal of Political Economy*, Vol. 91, 1983, pp. 401-419). This means that at any moment in time a bank may expect only a fraction of savers to face liquidity shocks and withdraw their deposits accordingly, while the funds from the remaining fraction of depositors can be invested in more profitable illiquid projects, providing banks with excess returns from liquidity transformation (Freixas, X. and Rochet, J.-C., "Microeconomics of banking", MIT Press, 2008). The same logic applies to partial liquidity insurance provided to a diverse investor base holding an easily tradable security.

¹¹⁴ Allen, F. and Gale, D., "Financial markets, intermediaries, and intertemporal smoothing", *Journal of Political Economy*, Vol. 105, 1997, pp. 523-546.

thereby overcoming problems associated with project indivisibility. It can be argued that financial intermediaries, and in particular deposit-taking and loan-granting banks, enjoy comparative advantages vis-à-vis financial markets in reducing and managing certain investment risks for individual savers. The relative merits of intermediaries, in turn, hinge substantially on the level of fixed costs, the liquidity and price efficiency of trading in financial markets, so that continued technological progress might be expected to gradually erode the comparative advantages of financial intermediaries versus financial markets.

1.1.2 Screening, monitoring and corporate governance

Financial markets and banks also provide different ways of producing information about profitable investment projects ex ante, and monitoring and effectively incentivising firms to act in the interest of stakeholders ex post, i.e. after the funds have been paid out to the firm. The fixed costs associated with evaluating firms, managers, and market conditions can be high. High information costs could deter individual savers from collecting, processing and producing information regarding possible investments which could, in turn, prevent capital from flowing into the most productive uses.

One way of improving this situation is to set up banks (or other financial intermediaries) specialising in information production and to sell this information to a large number of investors by granting loans and taking deposits.¹¹⁵ Thanks to economies of scale, the implied costs of information acquisition for each deposit holder decline as the number of depositors increases. Depending on the cost savings and the information gains, banks may mobilise more savings and invest these in more profitable projects than in a world without intermediaries, thereby improving resource allocation and growth.¹¹⁶

Although banks may also accelerate the rate of technological progress in the economy by identifying innovative companies through their screening efforts,¹¹⁷ financial markets are still assumed to have a competitive edge in this regard. It has, in fact, been argued that markets are better at financing new technologies because they are better at collecting and aggregating investors' diverse opinions of uncertain innovations and new ideas.¹¹⁸ Banks, in turn, are well set to benefit from increasing returns to scale from processing more standardised information and from producing private information extracted as a result of their long-term relationships with borrowers. Financial markets may also stimulate the production of information about firms more generally. As markets become larger and more liquid, investors may have

¹¹⁵ Boyd, J.H. and Prescott, E.C., "Financial intermediary-coalitions", *Journal of Economic Theory*, Vol. 38, pp. 211-232.

¹¹⁶ Greenwood, J. and Jovanovic, B., "Financial development, growth, and the distribution of income", *Journal of Political Economy*, Vol. 98, 1990, pp. 1076-1107.

¹¹⁷ King, R.G. and Levine, R., "Finance, entrepreneurship, and growth: Theory and evidence", *Journal of Monetary Economics*, Vol. 32, 1993, pp. 513-542, and Acemoglu, D., Aghion, P. and Zilibotti, F., "Distance to frontier, selection, and economic growth", *Working Paper*, No 9066, National Bureau of Economic Research, 2003.

¹¹⁸ Alan, F. and Gale, D., "Comparing financial systems", MIT Press, 2000.

greater incentive to expend resources in researching firms because it is easier to profit from this information by trading in big and liquid markets.¹¹⁹ If this mechanism results in markets becoming more price efficient it may also improve resource allocation and growth.¹²⁰ However, atomistic markets may suffer from a free-rider problem during the production of information if any new information revealed by small investors to the market is very quickly absorbed into the prices of the underlying asset.¹²¹ Small investors might, therefore, prefer to rely on the information produced by other investors rather than incurring information costs themselves, with the end result that the market as a whole might underinvest in the acquisition of information, which would have potentially adverse macroeconomic effects.

Corporate governance is another source of financial frictions with a potentially large impact on savings, resource allocation and growth. Because of information asymmetries, conflicts of interest may arise between the financiers of a firm and its managers who might choose to act in their own private interests instead of in the interests of shareholders and creditors. This informational friction could divert resources away from their best uses from the point of view of firm owners and society at large.

Incorporating firms as joint stock corporations with diffuse shareholders could provide one market-based alternative which could address this inefficiency. If information costs are low and conflicts of interest are weak, diffuse shareholders could exert effective corporate governance directly by voting on investment projects and other major issues such as business strategies more generally. Shareholders may also influence a firm's managers indirectly by electing boards of directors as their representatives tasked to oversee decision-making within the firm. In addition, well-functioning stock markets facilitate takeovers of weakly performing firms, and by linking the compensation of a firm's managers to the efficient market price of the firm's equity help to align the interests of shareholders and managers.¹²²

However, it has been argued that smaller, diffuse equity is not likely to exert tight control over firms and their managers. One reason for this is the assumption that there are large information asymmetries between shareholders and managers, a situation which affords managers substantial discretion in their use of internal and external funds. In addition, small shareholders often lack the expertise and the incentives to control managers due to the complexity of this task and the large information costs that come with it. In addition, since each shareholder's stake in the capital of the firm is small, shareholders have an incentive to free-ride on the monitoring performed by other stakeholders, and there is, overall, insufficient

¹¹⁹ Holmstrom, B. and Tirole, J., "Market liquidity and performance monitoring", *Journal of Political Economy*, Vol. 101, 1993, pp. 678-709.

¹²⁰ Merton, R.C., "A simple model of capital market equilibrium with incomplete information", *Journal of Finance*, Vol. 42, 1987, pp. 483-510.

¹²¹ Stiglitz, J.E., "Credit markets and the control of capital", *Journal of Money, Credit, and Banking*, Vol. 17, 1985, pp. 133-152.

¹²² Jensen, M. and Meckling, W.R., "Theory of the firm, managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3, 1976, pp. 305-360; Scharfstein, D., "The disciplinary role of takeovers", *Review of Economic Studies*, Vol. 55, 1988, pp. 185-199; Diamond, D. and Verrecchia, R.E., "Optimal managerial contracts and equilibrium security prices", *Journal of Finance*, Vol. 37, 1982, pp. 275-287.

monitoring of the results of this strategic behaviour.¹²³ This friction may call for concentrated ownership since large investors have greater incentives to acquire information and to monitor managers more effectively. However, concentrated ownership suffers from its own informational frictions, since large investors may use their power to maximise private benefits by, for instance, expropriating the resources of the firm at the expense of minority shareholders.¹²⁴

Financial intermediaries may improve corporate governance by economising on monitoring costs. By placing their funds with a financial intermediary that, in turn, lends these funds on to firms, individual savers de facto delegate the monitoring function to the financial institution.¹²⁵ The intermediary can realise economies of scale in monitoring costs and may also eliminate the free-rider problem for individual savers because the intermediary performs monitoring for all savers. However, banks, as major stakeholders of firms, may become too powerful and may create agency problems with potentially adverse consequences in terms of resource allocation. For instance, banks as creditors may be excessively risk averse with regard to the investment behaviour of their firms' clients which might constrain corporate innovation and growth in economies with a bank-based financial system.¹²⁶ Moreover, when banks establish long-term lending relationships, they typically acquire valuable inside information about firms which they might use to extract rents, which would serve their own interests and not those of minority stakeholders. This argument hints at a broader issue, i.e. that corporate governance issues at bank level may hinder banks from performing socially valuable screening and monitoring functions in the case of firms seeking to finance profitable investments. For instance, if large banks are also incorporated as joint stock companies, the same informational frictions (namely asymmetric information and incentive distortions) will impair the effective monitoring of the banks' managers by the banks' shareholders. As a result, bank managers may collude with firm managers to extract private rents against the interests of other stakeholders of the firm.

1.1.3 What's better, banks or markets?

Financial intermediaries and markets are often presented as alternative, competing ways of overcoming frictions between savers and investors. By contrast, intermediaries and markets could also be viewed as complementing each other in the provision of financial services in order to achieve the best possible allocation of capital. This view is supported by the fact that both intermediaries and markets seem to offer specific comparative advantages, and that to some extent their smooth functioning is mutually interdependent. For instance, price efficiency in financial

¹²³ Grossman, S.J. and Hart, O., "Takeover bids, the free-rider problem, and the theory of the corporation", *Bell Journal of Economics*, Vol. 11, 1980, pp. 42-64.

¹²⁴ Shleifer, A. and Vishny, R.W., "Large shareholders and corporate control", *Journal of Political Economy*, Vol. 94, 1996, pp. 461-488.

¹²⁵ Diamond, D.W., "Financial intermediation and delegated monitoring", *Review of Economic Studies*, Vol. 51, 1984, pp. 393-414.

¹²⁶ Morck, R. and Nakamura, M., "Banks and corporate control in Japan", *Journal of Finance*, Vol. 54, 1999, pp. 319-340.

markets may depend greatly on the active participation of financial intermediaries both as market makers and as investors. On the other hand, banks rely on liquid securities markets to manage the asset and liability side of their balance sheet dynamically, e.g. in order to raise equity capital, obtain funding through wholesale debt markets, or hedge exposures using financial derivatives. To give another example, bank loans and bond financing can compete, as they do when they both provide external financing, but they can also complement each other, e.g. when firms use an optimal mix of instruments to overcome contracting and governance frictions. At institution level, given economies of scope some service bundles may be provided more cheaply than if they were provided individually. These examples support the argument that technological advances have enhanced the scope for and the benefits of market-based intermediation and the complementarities it shares with banking.¹²⁷

The main choice may not, therefore, be between either a bank-based or market-based financial system. Instead, the financial system should develop in a manner that allows it to offer savers and firms a broad array of standardised and tailor-made investment and financing options, which should serve savers' current and anticipated needs and challenges to best effect. To achieve this goal, the financial system needs to evolve constantly to find improved solutions that can mitigate financial frictions, which calls for a constant process of financial innovation embodied in new forms of financial intermediaries (such as the advent and growth of the venture capital and private equity business in the past), new business lines for existing intermediaries (e.g. exchange traded funds) or innovative ways of direct financing via securities markets (e.g. through the introduction of new financial instruments such as securitisation products or the introduction of new market segments such as those which facilitated the issuance and trading of high-tech stocks during the "dot-com" boom in global equity markets in the late 1990s). The current digital revolution offers new opportunities and poses challenges for all parts of the financial system, and it remains to be seen whether fintech will ultimately lead to a more intermediary-based or a more market-based system, or to hybrid forms¹²⁸ playing a greater role.

¹²⁷ Claessens, S., "The future of the international monetary and financial architecture", Regulation and structural change in financial systems: ECB Forum on Central Banking 2016, June.

¹²⁸ For instance, there has been significant growth in online P2P lending markets in economies like the United States and China which foster a process of disintermediation. P2P lending markets help overcome the pooling problem among small investors, and there is evidence for the US' suggestion that investors have been sufficiently able to jointly screen and assess the creditworthiness of borrowers in this market segment (see Iyer, R., Khwaja, A.I., Luttmer, E.F.P. and Shue, K., "Screening peers softly: inferring the quality of small borrowers", *Management Science*, 62(6), 2016, pp. 1554-1577). The long-run impact of fintech on the structure of the financial system and social welfare will also eventually depend significantly on its regulatory treatment (see Philippon, T., "The FinTech opportunity", *NBER Working Paper*, No 22476, 2016; and Huang, Y., Shen, Y., Wang, J. and Guo, F., "Can the internet revolutionise finance in China?", in Song, L., Garnaut, R., Fang, C. and Johnston, L. (eds.), *China's new sources of economic growth: reform, resources, and climate change*, Australian National University Press, 2016, pp. 115-138).

1.2 Empirical evidence on financial development, financial structure and growth

1.2.1 Cross-country studies

The idea of linking finance and growth conceptually goes back more than a century, to two seminal contributions. Bagehot (1873) argues that during the Industrial Revolution in England, finance played a crucial role by facilitating the mobilisation of capital for “immense works.”¹²⁹ Schumpeter (1912) contends that efficient financial intermediaries spur technological progress by reallocating investment funds to those entrepreneurs who have the best chance of successfully introducing innovative products, a process known as “creative destruction”.¹³⁰ More recently, Goldsmith (1969) has found evidence in support of a positive link between the total assets of financial intermediaries relative to GNP and economic growth.¹³¹

The literature spawned by these studies has sought to move beyond describing a statistical association towards establishing a causal link between the size of financial markets and economic growth. Cross-country studies have attempted to achieve this goal using many methods. Some studies have examined the impact of predetermined levels of financial development on subsequent growth. For example, King and Levine (1993) showed that financial depth measured in 1960 was a good predictor of subsequent rates of economic growth over the next 30 years, explaining about 60% of the overall variation in post-1960 growth.¹³² Similarly, Levine and Zervos (1998) showed that beginning-of-period levels of stock market liquidity were positively and significantly correlated with subsequent rates of economic growth, physical capital accumulation and productivity growth over the next two decades.¹³³

Others, following the influential papers by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)¹³⁴, have used the predetermined legal origin of countries – a plausibly exogenous factor that is not driven by economic or financial development – as an instrument for financial development. Based on this technique, Levine (1997) finds that the exogenous component of financial intermediary development is positively associated with economic growth.¹³⁵ Beck, Levine, and Loayza (2000a,b), after using dummies for British, French, German, Nordic, and Socialist legal origins as instruments, show that the finance-and-growth nexus remains statistically significant.

¹²⁹ Bagehot, W., “Lombard Street”, Irwin, Homewood, IL, 1873.

¹³⁰ Schumpeter, J., “Theorie der wirtschaftlichen Entwicklung”, Duncker & Humblot, Leipzig, 1912 (*The Theory of Economic Development*, translated by Opie, R., Harvard University Press: Cambridge, MA, 1934).

¹³¹ Goldsmith, R., “Financial structure and development”, Yale University Press, New Haven, CT, 1969.

¹³² King, R. and Levine, R., “Finance and growth: Schumpeter might be right”, *Quarterly Journal of Economics*, 108, 1993, pp. 717-737.

¹³³ Levine, R. and Zervos, S., “Stock markets, banks, and economic growth”, *American Economic Review*, 88(3), 1998, pp. 537-558.

¹³⁴ La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R., “Law and finance”, *Journal of Political Economy*, 106(6), 1998, pp. 1113-1155.

¹³⁵ Levine, R., “Financial development and economic growth: Views and agenda”, *Journal of Economic Literature*, 35(2), 1997, pp. 688-726.

This strengthens the argument for the causal effect of financial development on economic growth.¹³⁶

Still others have used time series and panel data techniques to support the causal argument. For example, Rousseau and Wachtel (2000) estimated vector autoregressions for a set of 47 countries with annual data for the period 1980-95, and find leading roles for stock market liquidity and the intensity of activity in traditional financial intermediaries in per capita output growth.¹³⁷ Using a similar methodology, Laeven, Levine, and Michalopoulos (2015) find that financial innovation boosts the rate of economic growth, especially for poorer countries.¹³⁸

A generally hybrid approach combines panel data techniques and instruments for financial development, based on policies that exogenously affect the extent of a country's financial development, such as the various types of financial liberalisation that open a country's economy to foreign direct or portfolio investment. Bekaert, Harvey, and Lundblad (2005) studied a sample of 95 countries, 47 of which had removed capital account restrictions during the period 1980-97, and find that stock market liberalisation resulted in an overall increase in annual per capita GDP growth of approximately a half to one percent.¹³⁹ A parallel study by Henry (2000, 2003) of 12 Latin American and East Asian countries that had liberalised their financial system during the 1980s suggests that this growth effect stemmed mainly from increased investment, rather than from Total Factor Productivity (TFP) growth.¹⁴⁰

1.2.2 Within-country studies

In further support of the causality argument, a growing number of studies have exploited two sources of within-country heterogeneity: an economy's industrial composition and a country's regional heterogeneity. As an example of the first approach, Rajan and Zingales (1998) proposed a cross-industry cross-country approach that addresses many of the limitations of purely cross-country studies.¹⁴¹ Specifically, the authors start from the hypothesis that more efficient financial intermediaries help to overcome the market frictions that drive a wedge between the prices of external and internal finance. For this reason, industries that rely more heavily on external finance for technological reasons – related to, for example, variations in the scale of projects, gestation period, the ratio of hard to soft

¹³⁶ Beck, T., Levine, R. and Loayza, N., "Finance and the sources of growth", *Journal of Financial Economics*, 58(1), 2000, pp. 261-300; Beck, T., Levine, R. and Loayza, N., "Financial intermediation and growth: Causality and causes", *Journal of Monetary Economics*, 46(1), 2000, pp. 31-77.

¹³⁷ Rousseau, P. and Wachtel, P., "Equity markets and growth: cross-country evidence on timing and outcomes, 1980-1995", *Journal of Business and Finance*, 24, 2000, pp. 1933-1957.

¹³⁸ Laeven, L., Levine, R. and Michalopoulos, S., "Financial innovation and endogenous growth", *Journal of Financial Intermediation*, 24(1), 2015, pp. 1-24.

¹³⁹ Bekaert, G., Harvey, C. and Lundblad, C., "Does financial liberalization spur growth?", *Journal of Financial Economics*, 77(1), 2005, pp. 3-55.

¹⁴⁰ Henry, P., "Do stock market liberalizations cause investment booms?", *Journal of Financial Economics*, 58, 2000, pp. 301-334; Henry, P., "Capital account liberalization, the cost of capital, and economic growth", *American Economic Review*, 93, 2003, pp. 91-96.

¹⁴¹ Rajan, R. and Zingales, L., "Financial dependence and growth", *American Economic Review* 88, 1998, pp. 559-586.

information, the ratio of tangible to intangible assets, follow-up investments, etc. – should benefit disproportionately from financial development in comparison with other industries. Using data on value added growth for 41 countries and 36 manufacturing industries during the 1980s, as well as a proxy for financial dependence derived from the balance sheets of listed US firms, Rajan and Zingales find strong evidence in favour of the “finance causes growth” hypothesis, for a number of empirical proxies for financial development (such as private credit, stock market capitalisation and accounting standards). Using the same methodology, Claessens and Laeven (2003) show that the differential effect of financial development on financially-dependent sectors robustly accounts for the effect of property rights institutions on intangible-intensive sectors.¹⁴² Braun (2003) shows that financial development is particularly useful for intangible-intensive and R&D-intensive sectors.¹⁴³ Fisman and Love (2007) take a step further and use sales growth data for large listed manufacturing firms in the US in the 1980s to construct an empirical proxy for “growth opportunities”.¹⁴⁴ Using the same dataset and the same time period as Rajan and Zingales (1998), they show that financially developed countries experience more rapid value added growth in faster-growing sectors in the United States. Wurgler (2000) finds that in financially developed countries, the reallocation of productive resources to “booming sectors” is faster.¹⁴⁵ In terms of Europe, Hartmann, Heider, Papaioannou, and Lo Duca (2007) show that certain aspects of corporate governance, the efficiency of legal systems in resolving conflicts in financial transactions, and some structural features of European banking sectors increase the size of capital markets and thereby enhance the speed with which the financial system helps to reallocate capital from declining to booming sectors.¹⁴⁶

As an example of the second approach, Jayaratne and Strahan (1996) exploited differences in the timing of the deregulation of local banking markets in the United States, in order to assess the impact of banking sector competition on growth.¹⁴⁷ As these changes were staggered they made it possible to control for unobserved state and year characteristics and trends. The authors' estimates indicate that state banking deregulation was associated with a 0.6-1.2% increase in real per capita state growth. Huang (2008) shows that this effect still applies if smaller geographic entities, such as counties, are compared across state borders.¹⁴⁸ Later research has concluded that banking deregulation impacts growth through a variety of

¹⁴² Claessens, S. and Laeven, L., “Financial development, property rights, and growth”, *Journal of Finance*, 58, 2003, pp. 2401-2436.

¹⁴³ Braun, M., “Financial contractability and asset hardness”, *Harvard University working paper*, 2003.

¹⁴⁴ Fisman, R. and Love, I., “Financial dependence and growth revisited”, *Journal of the European Economic Association*, 5(2-3), 2007, pp. 470-479.

¹⁴⁵ Wurgler, J., “Financial markets and the allocation of capital”, *Journal of Financial Economics*, 58, 2000, pp. 187-214.

¹⁴⁶ Hartmann, P., Heider, F., Papaioannou, E. and Lo Duca, M., “The role of financial markets and innovation in productivity and growth in Europe”, *ECB Occasional Paper*, No 72, 2007.

¹⁴⁷ Jayaratne, J. and Strahan, P., “The finance-growth nexus: Evidence from bank branch deregulation”, *Quarterly Journal of Economics*, Vol. 111, 1996, pp. 639-670.

¹⁴⁸ Huang, R., “Evaluating the real effect of bank branching deregulation: Comparing contiguous counties across US state borders”, *Journal of Financial Economics*, Vol. 87(3), 2008, pp. 678-705.

mechanisms, including higher rates of new business creation,¹⁴⁹ higher innovation,¹⁵⁰ and enhanced allocative efficiency.¹⁵¹

With regard to non-US evidence, Bertrand, Schoar, and Thesmar (2007) studied the French banking reforms of 1985, which eliminated subsidised loans and monthly ceilings on credit growth, unified banking regulation, and privatised a number of banks.¹⁵² Using detailed firm and industry-level data for the period 1978 to 1999 and covering all sectors of the French economy, they show that the reforms led to higher productivity at firm level, higher entry rates for firms into bank-dependent industries, and higher exit rates for the worst performing firms. Guiso, Sapienza and Zingales (2004) studied cross-regional differences in financial development in Italy, finding that regional financial development – measured by the probability of, ceteris paribus, a household in the region having no access to the credit market – promotes the entry of new firms and boosts regional growth.¹⁵³

1.2.3 Micro evidence

Arguably, the most significant development in the empirical finance-and-growth literature in recent years has been the proliferation of micro-level datasets which have allowed researchers to perform more precise tests on theoretical mechanisms. The micro-literature on access to finance starts from the simple premise that capital market imperfections which drive a wedge between the price of external and internal funds may prevent a firm from achieving efficient levels of investment. This wedge relates to theoretical mechanisms deriving from, for instance, information asymmetry or corporate governance. In this manner, credit or liquidity constraints hinder firms' growth. Conversely, any financial development which reduces the relative cost of external finance should promote firms' growth and, by extension, aggregate growth.

Fazzari, Hubbard and Petersen (1988) provide the first test of this theoretical mechanism.¹⁵⁴ The authors used a panel of 421 manufacturing firms for the period 1970 to 1984, grouping the firms into three categories according to how likely they were to be credit constrained. They find significantly larger coefficients for the cash-flow elasticity of investment for credit constrained firms. The cross-sectional differences in the cash-flow sensitivity of investment lead the authors to conclude

¹⁴⁹ Black, S. and Strahan, P., "Entrepreneurship and bank credit availability", *Journal of Finance*, Vol. 57(6), 2002, pp. 2807-2833; Cetorelli, N. and Strahan, P., "Finance as a barrier to entry: Bank competition and industry structure in local US markets", *Journal of Finance*, Vol. 61(1), 2006, pp. 437-461; Kerr, W. and Nanda, R., "Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship", *Journal of Financial Economics*, Vol. 94(1), 2009, pp. 124-149.

¹⁵⁰ Amore, M. D., Schneider, C. and Žaldokas, A., "Credit supply and corporate innovation", *Journal of Financial Economics*, Vol. 109(3), 2013, pp. 835-855.

¹⁵¹ Acharya, V., Imbs, J. and Sturgess, J., "Finance and efficiency: Do bank branching regulations matter?", *Review of Finance*, Vol. 15(1), 2011, pp. 135-172.

¹⁵² Bertrand, M., Schoar, A. and Thesmar, D., "Banking deregulation and industry structure: Evidence from the French banking reforms of 1985", *Journal of Finance*, Vol. 62(2), 2007, pp. 597-628.

¹⁵³ Guiso, L., Sapienza, P. and Zingales, L., "Does local financial development matter?", *Quarterly Journal of Economics*, Vol. 119(3), 2004, pp. 929-969.

¹⁵⁴ Fazzari, S., Hubbard, R. and Petersen, B., "Financing constraints and corporate investment", *Brookings Papers on Economic Activity*, 19(1), 1988, pp. 141-206.

that financing constraints are probably an important factor in firms' investment decisions. Others researchers later expanded on this methodology in an attempt to overcome the problem of the omitted variable relating to unobservable growth opportunities that could affect both investment and cash flows. As an example of this, Demirgüç-Kunt and Maksimovic (1998) used data on the largest publicly traded manufacturing firms in 26 countries to calculate the rate at which each firm would grow using only internal funds and/or short-term borrowing.¹⁵⁵ They find that the proportion of firms that grow faster than predicted by their internal resources is higher in countries with more developed banking systems, stock market liquidity, and efficient legal systems. Love (2003) also used firm-level data, finding that the sensitivity of investment to internal funds is greater in countries with more poorly developed financial markets.¹⁵⁶

Another strand of research has used micro-surveys to examine the impact of self-reported credit constraints in an attempt to establish a proper causal link between financing constraints and firms' financing and performance. For example, Beck, Demirgüç-Kunt and Maksimovic (2005) used survey data in which more than 4,000 firms in 54 countries were asked to report their own assessment of whether they are constrained by a variety of factors including financial markets, the working of the legal system, and the corruption of state officials.¹⁵⁷ The authors find that financial and institutional development lessens the constraining effects of financial, legal and corruption obstacles, and that small firms benefit the most. Using a similar methodology, Beck, Demirgüç-Kunt and Maksimovic (2008) confirm that small firms, as well as firms in countries with poor institutions, use less external finance – particularly bank finance – which severely limits their growth potential.¹⁵⁸ Ayyagari, Demirgüç-Kunt and Maksimovic (2012) used a sample of 19,000 firms in 47 countries and find that firms with better access to external finance are more likely to engage in innovative activities.¹⁵⁹ Popov (2014a) used a survey database of 8,265 firms from 25 transition economies and finds that a lack of access to finance in general, and to bank credit in particular, is associated with significantly lower investment in on-the-job training by SMEs.¹⁶⁰

A number of recent papers have used ingenious identification techniques aimed at isolating an exogenous component of a firm's cost of finance that is uncorrelated with its investment opportunities. For example, Lamont (1997) used changes in oil prices to study the investment behaviour of the non-oil segment of large firms. These firms needed to allocate resources away from potentially profitable opportunities in

¹⁵⁵ Demirgüç-Kunt, A. and Maksimovic, V., "Law, finance, and firm growth", *Journal of Finance*, Vol. 53(6), 1998, pp. 2107-2137.

¹⁵⁶ Love, I., "Financial development and financing constraints: International evidence from the structural investment model", *Review of Financial Studies*, Vol. 16(3), 2003, pp. 765-791.

¹⁵⁷ Beck, T., Demirgüç-Kunt, A. and Maksimovic, V., "Financial and legal constraints to firm growth: Does size matter?", *Journal of Finance*, Vol. 60, 2005, pp. 137-177.

¹⁵⁸ Beck, T., Demirgüç-Kunt, A. and Maksimovic, V., "Financing patterns around the world: Are small firms different?", *Journal of Financial Economics*, Vol. 89(3), 2008, pp. 467-487.

¹⁵⁹ Ayyagari, M., Demirgüç-Kunt, A. and Maksimovic, V., "Firm innovation in emerging markets: The role of finance, governance, and competition", *Journal of Financial and Quantitative Analysis*, Vol. 46(6), 2012, pp. 1545-1580.

¹⁶⁰ Popov, A., "Credit constraints and investment in human capital: Training evidence from transition economies", *Journal of Financial Intermediation*, Vol. 23(1), 2014, pp. 76-100.

order to prop up their oil segment in the wake of a decline in oil prices.¹⁶¹ Faulklender and Petersen (2012) used the temporary shock to the cost of firms' internal financing, brought about by the American Jobs Creation Act, which significantly lowered US firms' tax costs when accessing their unrepatriated foreign earnings, to examine the role of capital constraints in firms' investment decisions.¹⁶² These papers broadly confirm that shocks to financing constraints affect firms' investment, with material implications for subsequent growth. More recently, Chaney, Sraer, and Thesmar (2012), Corradin and Popov (2015), and Schmalz, Sraer, and Thesmar (2017) used the exogenous variation in regional changes in house prices, offering evidence that the rising value of residential collateral boosts business investment and new business creation.¹⁶³

1.2.4 Non-linearities in the finance-and-growth nexus

One of the most significant findings in the empirical finance-and-growth literature is that the positive relationship between finance and growth is not as close in more recent data as in the original studies.¹⁶⁴ This finding relates to earlier studies which found that the relationship between financial development and economic growth is not equally close for all levels of economic and financial development.¹⁶⁵ Arcand, Berkes and Panizza (2015) have recently tried to quantify the threshold beyond which financial depth no longer has any impact on economic growth.¹⁶⁶ Using data for 67 countries for the period 1970 to 2000, they show that financial depth starts to have a negative effect on output growth when credit to the private sector reaches 100% of GDP. Beck, Georgiadis and Straub (2014) find the threshold to be similar, i.e. around 109% of GDP.¹⁶⁷ Manganelli and Popov (2013) address the same issue using the Rajan and Zingales (1998) dataset and a cross-industry cross-country regression methodology.¹⁶⁸ They find that above a private credit-to-GDP ratio of around 0.7-0.74, further expansion of the financial sector is associated with a weaker

¹⁶¹ Lamont, O., "Cash flow and investment: Evidence from internal capital markets", *Journal of Finance*, Vol. 52(1), 1997, pp. 83-109.

¹⁶² Faulklender, M. and Petersen, M., "Investment and capital constraints: Repatriations under the American Jobs Creation Act", *Review of Financial Studies*, Vol. 25(11), 2012, pp. 3351-3388.

¹⁶³ Chaney, T., Sraer, D. and Thesmar, D., "The collateral channel: How real estate shocks affect corporate investment", *American Economic Review*, Vol. 102(6), 2012, pp. 2381-2409; Corradin, S. and Popov, A., "House prices, home equity borrowing, and entrepreneurship", *Review of Financial Studies*, Vol. 28(8), 2015, pp. 2399-2428; Schmalz, M., Sraer, D. and Thesmar, D., "Housing collateral and entrepreneurship", *Journal of Finance*, Vol. 72(1), 2016, pp. 99-132.

¹⁶⁴ Rousseau, P. and Wachtel, P., "What is happening to the impact of financial deepening on economic growth?", *Economic inquiry*, Vol. 49(1), 2011, pp. 276-288; Demetriades, P. and Rousseau, P., "The changing face of financial development", *Economics Letters*, Vol. 141(C), 2016, pp. 87-90.

¹⁶⁵ Deidda, L. and Fattouh, B., "Non-linearity between finance and growth", *Economics Letters*, Vol. 74(3), 2002, pp. 339-345; Rioja, F. and Valev, N., "Does one size fit all?: A reexamination of the finance and growth relationship", *Journal of Development Economics*, Vol. 74(2), 2004, pp. 429-447; Shen, C. and Lee, C., "Same financial development yet different economic growth: Why?", *Journal of Money, Credit and Banking*, Vol. 38, 2006, pp. 1907-1944.

¹⁶⁶ Arcand, J. L., Berkes, E. and Panizza, U., "Too much finance?", *Journal of Economic Growth*, Vol. 20(2), 2015, pp. 105-148.

¹⁶⁷ Beck, R., Georgiadis, G. and Straub, R., "The finance and growth nexus revisited", *Economics Letters*, Vol. 124(3), 2014, pp. 382-385.

¹⁶⁸ Manganelli, S. and Popov, A., "Financial dependence, global growth opportunities, and growth revisited", *Economics Letters*, Vol. 120(1), 2013, pp. 123-125.

effect on the growth of financially dependent industries and industries with high growth opportunities, and that a full 9 of the 41 countries in the dataset have credit markets which are larger than the estimated threshold.

There are three broad theory-based explanations for the non-linearities in the finance-and-growth nexus revealed by these studies. The first relates to the fact that at high levels of financial development, a further deepening of financial markets may be associated with a type of financial services with lower growth potential, such as mortgage finance. The second examines the hypothesis that there is a trade-off between economic development and macroeconomic risk, and that well-developed financial intermediaries exacerbate this trade-off. The third is that financial markets drain human capital from the real economy, reducing rates of innovation and growth.

The evidence from the years before the global financial crises suggests that at later stages of financial development, and in high-income economies, the composition of bank credit changes, shifting away from business credit towards household credit. It is therefore entirely possible that beyond a certain empirical threshold further credit expansion is associated with less productive use of financial resources. Beck, Büyükkarabacak, Rioja, and Valev (2012) explored the differential growth effects of enterprise and household credit.¹⁶⁹ In line with the theory, they find that the growth effect of financial deepening is due to enterprise rather than household credit. While household credit has also been shown to stimulate growth through higher entrepreneurship rates, mortgage lending tends to crowd out business credit. For example, Chakraborty, Goldstein and MacKinlay (2016) show that during the period 1988-2006, US banks which were active in strong housing markets increased mortgage lending and decreased commercial lending.¹⁷⁰ Firms (especially credit constrained firms) that borrowed from these banks showed significantly lower investment. Alternatively, banking markets may be too developed in comparison with the quality of corporate governance. For example, Levine, Lin and Xie (2016) used firm-level data from 36 countries for the period 1990 to 2011, finding that the adverse effects of banking crises on equity issuances, firm profitability, employment and investment efficiency are greater in countries with weaker shareholder protection laws. This suggests that too much finance coupled with poor corporate governance could result in a weaker association between financial development and long-run growth.¹⁷¹

Second, although an influential paper by Ramey and Ramey (1995) argues that stability breeds growth as it reduces investment uncertainty,¹⁷² there may be a trade-off between economic growth and macroeconomic risk which could be exacerbated by financial markets. The evidence is mixed on this front. Using different datasets

¹⁶⁹ Beck, T., Büyükkarabacak, B., Rioja, F. and Valev, N., "Who gets the credit? And does it matter? Household vs. firm lending across countries", *The B.E. Journal of Macroeconomics*, Vol. 12(1), 2012, pp. 1-46.

¹⁷⁰ Chakraborty, I., Goldstein, I. and MacKinlay, A., "Do asset price booms have negative real effects?", *Wharton School working paper*, 2016.

¹⁷¹ Levine, R., Lin, C. and Xie, W., "Spare tire? Stock markets, banking crises, and economic recoveries", *Journal of Financial Economics*, Vol. 120(1), 2016, pp. 81-101.

¹⁷² Ramey, G. and Ramey, V., "Cross-country evidence on the link between volatility and growth", *American Economic Review*, Vol. 85(5), 1995, pp. 1138-1151.

and methodologies, Stiglitz (2000) and Levchenko, Ranciere, and Thoenig (2009) argue that greater access to foreign capital increases volatility, both in domestic financial markets and in the real economy.¹⁷³ However, Beck, Lundberg and Majnoni (2006), and Larrain (2006) analysed finance-volatility patterns for large samples of countries, finding no evidence of a positive association between financial development and output volatility.¹⁷⁴ Ranciere, Tornell and Westermann (2008) studied the link between financial liberalisation, growth and crises, finding a close positive link between long-term growth and financial fragility in financially liberalised countries.¹⁷⁵ Popov (2014b) uses aggregate and sectoral data for a sample of 93 countries, finding that over the period 1973-2009 countries that had become financially open experienced a large increase in the negative skewness of GDP growth compared with otherwise similar countries that had remained closed to foreign portfolio investment. The skewness effect of financial openness is greater for countries which had experienced a banking crisis after liberalisation, suggesting that openness stimulated by financial development increases the risk of long-term growth-reducing banking crises.¹⁷⁶

The third potential explanation for the diminishing effect of finance on growth at high levels of development may be the absorption of talent into the financial sector. Tobin (1984) has suggested that "...we are throwing more and more of our resources, including the cream of our youth, into financial services remote from the production of goods and services, into activities that generate high private rewards disproportionate to their social productivity".¹⁷⁷ Philippon and Reshef (2012) have documented the transformation of the US financial sector into a high-skill high-wage industry and the emergence of economic rents in this sector in the 1980s.¹⁷⁸ They find that changes in the demand for skills and wages in the financial sector were mainly driven by financial regulation. Moreover, the attractiveness of a career in finance to the educated elite increased substantially over time, at least until before the recent financial crisis.¹⁷⁹ There is a clear theoretical explanation as to why rent-seeking activities such as legal services are able to reallocate productive talent away from the real economy.¹⁸⁰ Philippon (2010) studied the allocation of human capital in

¹⁷³ Stiglitz, J., "Capital market liberalization, economic growth, and instability", *World Development*, Vol. 28(6), 2000, pp. 1075-1086; Levchenko, A., Rancière, R. and Thoenig, M., "Growth and risk at the industry level: The real effects of financial liberalization", *Journal of Development Economics*, Vol. 89(2), 2009, pp. 210-222.

¹⁷⁴ Beck, T., Lundberg, M. and Majnoni, G., "Financial intermediary development and growth volatility: Do intermediaries dampen or magnify shocks?", *Journal of International Money and Finance*, Vol. 25(7), 2006, pp. 1146-1167; Larrain, B., "Do banks affect the level and composition of industrial volatility?", *Journal of Finance*, Vol. 61(4), 2006, pp. 1897-1925.

¹⁷⁵ Rancière, R., Tornell, A. and Westermann, F., "Systemic crises and growth", *Quarterly Journal of Economics*, Vol. 123(1), 2008, pp. 359-406.

¹⁷⁶ Popov, A., "Credit constraints, equity market liberalization, and growth rate asymmetry", *Journal of Development Economics*, Vol. 107(C), 2014, pp. 202-214.

¹⁷⁷ Tobin, J., "On the efficiency of the financial system", *Lloyds Bank Review*, Vol. 153(July), 1984, pp.1-15.

¹⁷⁸ Philippon, T. and Reshef, A., "Wages and human capital in the U.S. financial industry: 1909-2006", *Quarterly Journal of Economics*, Vol. 127(4), 2012, pp. 1551-1609.

¹⁷⁹ Goldin, C. and Katz, L., "Transitions: Career and family life cycles of the educational elite", *American Economic Review*, Vol. 98(2), 2008, pp. 363-369; Kedrosky, P. and Stangler, D., "Financialization and its entrepreneurial consequences", *Ewing Marion Kauffman Foundation Research Paper*, 2011.

¹⁸⁰ Murphy, K., Shleifer, A. and Vishny, R., "The allocation of talent: Implications for growth", *Quarterly Journal of Economics*, Vol. 106, 1991, pp. 503-530.

an economy with production externalities and career choices, showing that an inefficient allocation of agents across both the financial sector and the real sector can emerge if innovators face borrowing constraints and require the services of financiers in order to invest efficiently.¹⁸¹ Bolton, Santos and Scheinkman (2016) argue that, due to the negative externality of cream-skimming in financial markets, financiers can extract informational rents when buying assets, a mechanism that ends up attracting too much talent into financial services in comparison with the social optimum.¹⁸² Kneer (2013) lends empirical gravitas to this claim by showing that the relaxation of interstate branching restrictions in the US disproportionately reduced the labour productivity of skill-intensive manufacturing industries.¹⁸³

1.2.5 Banks versus markets

A question that naturally follows from the discussion of the effect of bank and non-bank financial intermediation on growth is: does the financial structure – or the mix of financial markets and intermediaries operating in an economy – affect economic growth?

Early research concluded that – depending on the quality of a country's legal, regulatory and general institutional systems – there was no general rule that either bank-based or market-based financial systems were better at fostering growth. It is particularly noteworthy that this conclusion was drawn using aggregate, sectoral-level and microeconomic evidence. For example, in a cross-country context Arestis, Demetriades and Luintel (2001) show that both types of finance stimulate growth.¹⁸⁴ Levine (2002) finds that after controlling for overall financial development, the data do not suggest that distinguishing between bank-based and market-based financial systems is a first-order concern in seeking to understand the process of economic growth.¹⁸⁵ Using industry-level data, Beck and Levine (2002) find that financial structure does not help to explain the differential growth rates of financially-dependent industries across countries.¹⁸⁶ Finally, Demirgüç-Kunt and Maksimovic (2002) show that the degree to which countries are bank or market-based does not help to explain excess firm growth.¹⁸⁷

More recent research – especially that focusing on the most recent financial crisis – has provided something of a reassessment of this view. For example, in a sample of

¹⁸¹ Phillipon, T., "Financiers vs. engineers: Should the financial sector be taxed or subsidized?", *American Economic Journal: Macroeconomics*, Vol. 2(3), 2010, pp. 158-82.

¹⁸² Bolton, P., Santos, T. and Scheinkman, J., "Cream-skimming in financial markets", *The Journal of Finance*, Vol. 71(2), 2016, pp. 709-736.

¹⁸³ Kneer, E. C., "Essays on the size of the financial sector, financial liberalization and growth", *Tilburg University Working Paper*, 2013.

¹⁸⁴ Arestis, P. Demetriades, P., and Luintel, K.B., "Financial development and economic growth: The role of stock markets", *Journal of Money, Credit, and Banking*, Vol. 33, 2001, pp. 16-41.

¹⁸⁵ Levine, R., "Bank-based or market-based financial systems: Which is better?", *Journal of Financial Intermediation*, Vol. 11, 2002, pp. 398-428.

¹⁸⁶ Beck, T. and Levine, R., "Industry growth and capital allocation: Does having a market- or bank-based system matter?", *Journal of Financial Economics*, Vol. 64, 2002, pp. 147-180.

¹⁸⁷ Demirgüç-Kunt, A. and Maksimovic, V., "Funding growth in bank-based and market-based financial systems: Evidence from firm level data", *Journal of Financial Economics*, Vol. 65, 2002, pp. 337-363.

48 countries, Shen and Lee (2006) find evidence showing that only stock market development has a positive effect on growth, while banking development has an unfavourable, or even negative, effect.¹⁸⁸ Focusing on the European experience, Langfield and Pagano (2016) report a negative association between growth and the ratio of bank to market-based intermediation.¹⁸⁹ While this result may be due to the excessive development of some European banking systems and the adverse effects of large-scale financing of housing, it appears that there is generally a more limited impact of banking on growth as income rises. One potential explanation for this is that although both bank-based and market-based financial systems support economic growth in general, their contribution varies according to the level of economic and financial development. For example, Demirgüç-Kunt, Feyen and Levine (2013) show that as countries develop economically, the link between increasing economic output and increasing bank development becomes weaker, and the link between increasing economic output and increasing securities market development becomes stronger.¹⁹⁰ Gambacorta, Yang and Tsatsaronis (2014) have documented the diminishing effects of banking and the increasing effects of securities markets at higher levels of development.¹⁹¹ Recent research has also found that capital markets induce greater productivity gains, innovation and technological change than banking markets. For example, Hsu, Tian and Xu (2014) used a large dataset including 32 developed and emerging countries, and show that industries that are more high-tech intensive exhibit a disproportionately higher level of innovation in countries with better developed equity markets.¹⁹² These findings are consistent with theories which predict that, as economies develop, the marginal contribution of banks to economic growth declines while that of capital markets increases, notably because market finance is better at promoting innovation and productivity, and financing new sources of growth.

2 New empirical evidence for Europe

The literature review in the previous section yields two broad conclusions. First, financial development has a broadly positive impact on economic growth, although this impact weakens at high levels of economic development. Second, although the early literature failed to find convincing evidence that either banks or markets are better suited to finance growth, recent evidence indicates that markets make a relatively greater contribution to innovation and productivity-enhancing activities.

¹⁸⁸ Shen, C. and Lee, C., "Same financial development yet different economic growth: Why?", *Journal of Money, Credit and Banking*, Vol. 38, 2006, pp. 1907-1944.

¹⁸⁹ Langfield, S. and Pagano, M., "Bank bias in Europe: Effects on systemic risk and growth", *Economic Policy*, Vol. 31(85), 2016, pp. 51-106.

¹⁹⁰ Demirgüç-Kunt, A., Feyen, E. and Levine, R., "The evolving importance of banks and securities markets", *World Bank Economic Review*, Vol. 27(3), 2013, pp. 476-490.

¹⁹¹ Gambacorta, L., Yang, J. and Tsatsaronis, K., "Financial structure and growth", *BIS Quarterly Review*, March, 2014, pp. 21-35.

¹⁹² Hsu, P., Tian, X. and Xu, Y., "Financial development and innovation: Cross-country evidence", *Journal of Financial Economics*, Vol. 112(1), 2014, pp. 116-135.

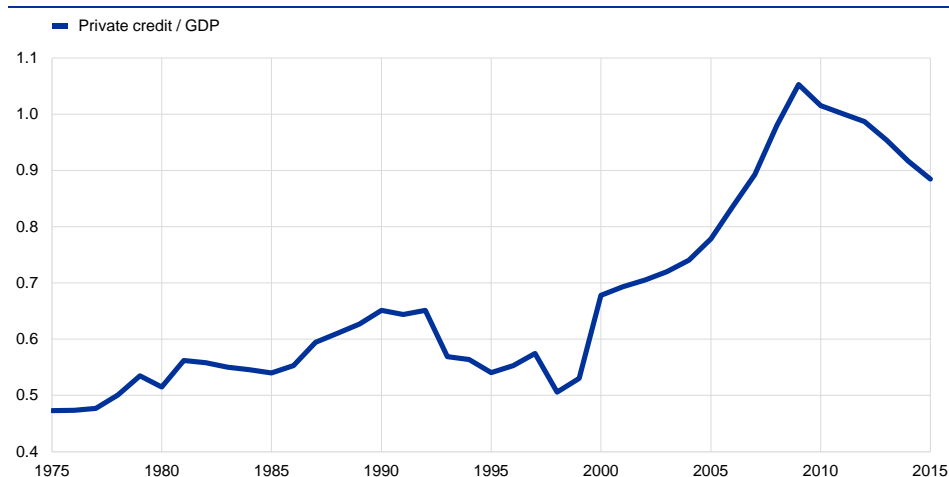
This section presents results from original empirical analysis where the question of the impact of financial structure on growth, controlling for financial development, is applied to the data, using a sample of European countries and industries.

2.1 The financial structure of European countries: some recent trends

Since the 1970s, financial markets have been steadily increasing in size throughout the world, both in absolute terms and relative to the rest of the economy. This trend is consistent with a number of mechanisms, ranging from rising demand for financial services by an ageing population to the gradual deregulation of the financial industry.¹⁹³

Chart 1

Private credit relative to GDP, 21 EU countries



Source: World Bank Financial Structure Database.

Notes: The chart plots the unweighted average, by year, of 21 EU countries ratio of credit to the private sector to GDP, over the period 1976-2015.

Chart 1 and **Chart 2** plot the evolution of credit markets and stock markets for 21 EU countries for the period 1976 to 2015. The data series plotted are unweighted annual averages of individual countries' credit to the private sector and stock market capitalisation, each normalised by the respective country's GDP.¹⁹⁴ Two distinct conclusions may be drawn from the charts. First, over the sample period both credit and stock markets increased relative to GDP, generally following the global trend. The increase was from 0.47 to 0.88 for credit markets, and from 0.18 to 0.49 for stock markets. Second, in both cases the process was uneven. Credit markets grew robustly until the early 1990s, after which they stagnated. They then more than doubled in size over the next decade or so, reaching a peak of 1.05 times GDP in

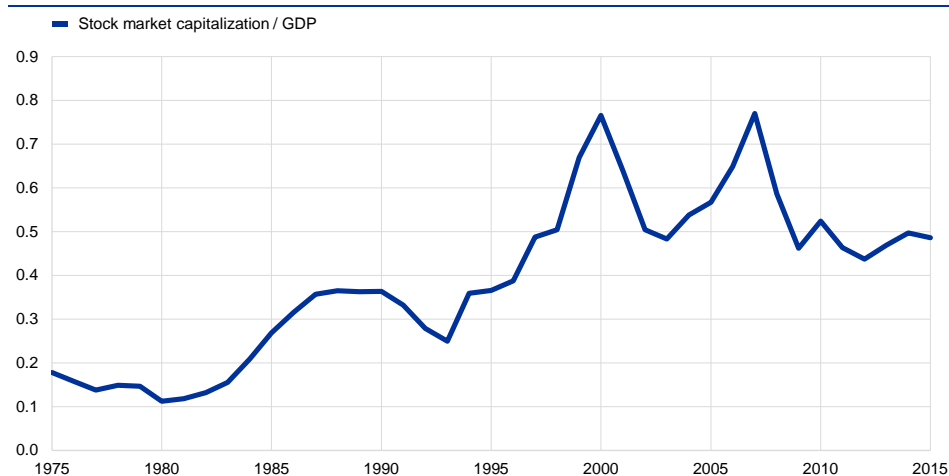
¹⁹³ Philippon, T. and Reshef, A., "Wages and human capital in the U.S. financial industry: 1909-2006", *Quarterly Journal of Economics*, Vol. 127(4), 2012, pp. 1551-1609.

¹⁹⁴ Data on domestic private credit to the real sector by deposit money banks are from the International Financial Statistics (*IFS*), line *FOSAOP/22D*, published by the International Monetary Fund (IMF). Data on stock market capitalisation are from the World Federation of Exchanges, and Standard and Poor's Emerging Market Database (and Emerging Stock Markets Factbook). See Beck, T., Demirguc-Kunt, A. and Levine, R., *Financial development and structure dataset*, 2017.

2009, but have been declining ever since. Stock market development has been even more volatile. Stock markets grew robustly until 2000, before declining rapidly in the wake of the bursting of the dot-com bubble. They then grew again, reaching a peak of 0.77 times GDP in 2007, after which they declined rapidly once again, settling at their current level of around 0.5 times GDP.

Chart 2

Stock market capitalisation relative to GDP, 21 EU countries



Notes: The chart plots the unweighted average, by year, of 21 EU countries' ratio of stock market capitalisation to GDP, over the period 1976-2015. Source: World Bank Financial Structure Database.

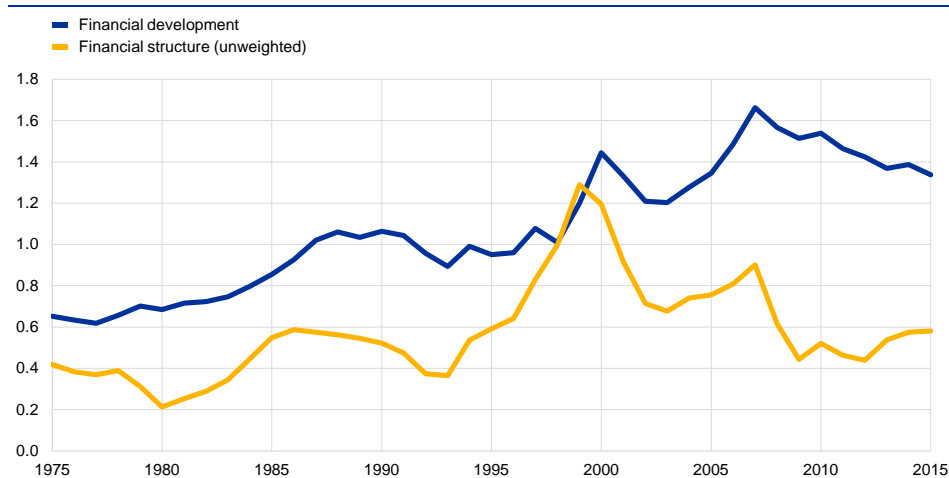
Chart 3 plots the evolution of what we refer to as “financial development” and “financial structure”. The former is the sum of credit to the private sector and stock market capitalisation, divided by GDP, while the latter is the ratio of stock market capitalisation to private credit.¹⁹⁵ The chart illustrates an important fact: while the overall size of financial markets has more than doubled over the past 40 years (from a ratio of 0.63 in 1976 to 1.34 in 2015), the relative importance of stock markets increased rapidly during the 1990s and again to a certain extent during the early-to-mid 2000s, although it is currently at exactly the same level it was at in 1986 (at 0.56, i.e. about half the size of credit markets).¹⁹⁶

¹⁹⁵ Arguably, this definition of “financial structure” is abstracted from other types of non-bank finance, such as bond market financing. However, these data are not consistently available over a sufficiently long period of time. Moreover, the proxy for stock market capitalisation may be affected by the behaviour of stock prices.

¹⁹⁶ The basic message of the charts does not change when the countries are weighted by their respective overall financial market size, rather than equally.

Chart 3

Financial development and financial structure, 21 EU countries



Source: World Bank Financial Structure Database.

Notes: The chart plots the unweighted average, by year, of 21 EU countries' sum of credit to the private sector and stock market capitalisation, divided by GDP ("Financial development"), and the ratio of stock market capitalisation to credit to the private sector ("Financial structure"), over the period 1976-2015.

2.2 Data and empirical setup

We now turn to analysing the impact of financial structure on growth, controlling for the independent impact of financial development. One immediate challenge in this line of research is that both financial development and financial structure on the one hand, and growth on the other, can be driven by any of a long common list of omitted variables that finance could merely be a proxy of. Alternatively, financial markets might predict economic growth simply because they anticipate future growth. Cross-country analyses could then suffer from endogeneity problems stemming from either reversed causality, or from omitted variable bias, or both.

To address this concern, we make use of the empirical method pioneered by Rajan and Zingales (1998).¹⁹⁷ The method relies on a cross-industry cross-country regression approach instead of a cross-country approach, thereby allowing the researcher to exploit the specific mechanisms through which financial markets affect economic growth, and strengthening the causality claim. Following this approach, Rajan and Zingales (1998) find that by alleviating problems related to adverse selection and moral hazard, financial markets exert a relatively stronger effect on growth in industries that are naturally dependent on external finance. To address concerns that local credit supply expands in anticipation of the growth of local finance-dependent industries, dependence on external finance is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures, for large listed US firms. In a complementary paper, Fisman and Love (2007) argue that financial development increases resource allocation to firms with good growth

¹⁹⁷ Rajan, R. and Zingales, L., "Financial dependence and growth", *American Economic Review*, Vol. 88, 1998, pp. 559-586.

opportunities.¹⁹⁸ They augment the original dataset by adding a measure of global growth opportunities, proxied by the sales growth of the same industry in the US, and find that financial development has a relatively greater effect on growth in industries with higher growth opportunities. In the empirical finance-and-growth literature it is therefore now common to test for both the external-dependence channel and the growth-opportunity channel through which the evolving properties of financial markets affect real economic activity. In both cases the proponents of this framework, widely quoted in the literature, justify the use of industrial benchmarks based on the activity of listed US firms. They argue that given deep and liquid financial markets and flexible labour and product market regulation, large US firms' choice of capital structure and ultimate growth is not likely to be affected by credit constraints or regulatory restrictions, and is therefore a reliable proxy for the industry's technological frontier.

In a simple extension of the framework, we ran a cross-industry cross-country regression where data on the growth of value added for each industry-country pair, and on financial development and financial structure for each country was averaged over three 10-year sample periods: 1986-95, 1996-2005, and 2006-15.¹⁹⁹ The regressions also control for each country-industry's beginning-of-period relative share, to account for growth convergence. They also include country dummies to account for the unobservable factors that are common to all sectors in a country, and industry dummies, to account for unobservable technological properties that are common to a particular sector in all countries.²⁰⁰ We later extend our analysis to include the impact of financial development and structure on investment growth as well as labour productivity growth. We also focus on the impact of financial markets on growth for industries that should, in theory, benefit disproportionately from an expansion in market finance, e.g. high-tech industries, R&D-intensive industries, and industries that rely intensively on patented innovation for technological reasons.

The data for the empirical tests come from various sources. Data on (real) growth in industry-level value added, investment, and labour productivity come from the STAN Dataset on Industrial Analysis.²⁰¹ Data on credit to the private sector and stock market capitalisation come from the World Bank Financial Structure Database. Finally, benchmark industry-level data on financial dependence, growth opportunities, high-tech intensity, patent intensity and R&D intensity come from Hsu,

¹⁹⁸ Fisman, R. and Love, I., "Financial dependence and growth revisited", *Journal of the European Economic Association*, Vol. 5(2-3), 2007, pp. 470-479.

¹⁹⁹ The sample periods are chosen to maximise the data content given the underlying data series which, for many countries, are at best patchy before the mid-1980s.

²⁰⁰ The country and industry dummies subsume the direct effect of financial development and structure and the effect of external dependence and growth opportunities, respectively. Only the interaction effect is therefore reported in the statistical tables.

²⁰¹ We calculate real growth variables and we winsorise these to be between -1 and 1.

Tiang and Xu (2014).²⁰² The intersection of the three data sources yields a final dataset which comprises 19 manufacturing industries in 21 EU countries.²⁰³

2.3 Empirical results

Table 1 summarises the main tests of the impact of financial development and structure on industry-level value added growth. It reports estimates from tests performed on the broader sample of 21 EU-member countries (EU-21) as well as those performed on the smaller sample of 11 euro area countries (EA-11).²⁰⁴

Table 1
Financial development, financial structure and value added growth

	Industry value added growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-1.933 (1.722)	0.358 (0.463)	1.153** (0.535)	0.245 (1.429)	-0.088 (0.469)	1.326 (1.340)
Financial development × Financial dependence	-0.389 (0.289)	-0.014 (0.071)	0.001 (0.036)	0.343 (0.468)	-0.026 (0.114)	0.175** (0.080)
Financial development × Growth opportunities	-0.287 (0.864)	-0.492** (0.220)	0.238* (0.126)	-3.596** (1.772)	-1.269*** (0.406)	0.269 (0.321)
Financial structure × Financial dependence	-0.111 (0.254)	-0.047 (0.076)	0.005 (0.080)	0.095 (0.392)	-0.034 (0.084)	-0.026 (0.092)
Financial structure × Growth opportunities	-0.019 (0.950)	0.523* (0.286)	-0.169 (0.280)	1.961 (1.519)	0.763** (0.348)	0.055 (0.310)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166	312	310	101	161	160
R-squared	0.51	0.61	0.52	0.41	0.39	0.38

Note: The table reports regressions of the growth of industry value added for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry value added growth" is the respective industry's growth in value added for a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "Growth opportunities" are proxied by the industry's value added growth; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

The table reports limited evidence of a positive impact of financial development on growth, a relationship that is commonly found in datasets dominated by developing

²⁰² "Financial dependence" is proxied by an industry's capital expenditures minus cash flows, normalised by capital expenditures. Data are for the US and are averaged over the period 1976-2006. "Growth opportunities" are proxied by an industry's value added growth. "High-tech intensity" is proxied by the extent of an industry's high-tech production. "Patent intensity" is proxied by an industry's number of patents filed to the USPTO. "R&D intensity" is proxied by an industry's share of R&D expenses of total output. Data are pooled averages across countries over the sample period.

²⁰³ The countries in the sample are: Belgium, Czech Republic, Denmark, Germany, Estonia, Greece, Spain, France, Italy, Latvia, Luxembourg, Hungary, The Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia, Finland, Sweden, and the United Kingdom. In the empirical analysis, all countries are weighted equally.

²⁰⁴ EA-11 consists of the original 12 euro area countries minus Ireland.

countries and emerging markets. A larger financial sector appears to have stimulated the growth of industries with better growth opportunities during the period 2006-15 in the larger sample, and the growth of financially dependent industries during the same period in the smaller sample. Most of the time, however, the effect is either statistically insignificant, or even negative. With regard to the impact of financial structure on growth, we find strong evidence that, during the period 1996-2005, industries with better growth opportunities grew faster in countries in which, controlling for the overall size of the financial industry, stock markets accounted for a relatively larger share of the financial sector. This also holds for the euro area sample and (although it is weakly significant) for the EU-21. It is also economically meaningful – for example, the point estimate in column (2) implies that, relative to an industry at the 25th percentile, an industry at the 75th percentile of growth opportunities would experience an increase in value added growth of 1.3 percentage points if it moved from a country at the 25th to a country at the 75th percentile of financial structure. This corresponds to one-fifth of a standard deviation. Outside these two periods, however, we find no evidence that either a more market-based or a more bank-based financial sector is more conducive to economic growth.

Table 2
Financial development, financial structure and value added growth: High-tech intensity

	Industry value added growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-1.643 (1.678)	0.421 (0.471)	1.118** (0.522)	0.177 (1.456)	0.164 (0.505)	1.471 (1.267)
Financial development × Financial dependence	-0.313 (0.225)	-0.061 (0.060)	-0.005 (0.033)	-0.093 (0.369)	-0.145 (0.120)	0.182** (0.075)
Financial development × High-tech	-0.562 (0.495)	-0.049 (0.143)	0.152* (0.077)	-0.479 (1.166)	-0.278 (0.312)	0.315 (0.196)
Financial structure × Financial dependence	-0.033 (0.220)	-0.053 (0.073)	-0.012 (0.079)	0.302 (0.316)	-0.034 (0.092)	-0.031 (0.093)
Financial structure × High-tech	-0.407 (0.559)	0.284* (0.169)	0.065 (0.207)	0.658 (0.958)	0.410* (0.227)	0.300 (0.249)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166	312	310	101	161	160
R-squared	0.52	0.60	0.52	0.38	0.34	0.41

Note: The table reports regressions of the growth of industry value added for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry value added growth" is the respective industry's growth in value added in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "High-tech" is proxied by the industry's extent of high-tech production; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

In the next three tables we use a different proxy for the responsiveness of industries to more market-based finance, replacing the proxy for growth opportunities. We employ, in turn, a proxy for the industry's high-tech intensity, the industry's patent

intensity, and the industry's R&D intensity. We find a marginally significant effect in that during the period 1996-2005 high-tech industries grew faster in countries with relatively larger stock markets (Table 2). This result holds for both the EU-21 and in the EA-11 samples. In Table 3, we find no evidence that R&D-intensive industries were affected one way or the other by changes in a country's financial structure. However, we do find a weakly significant effect in that in the euro area during the period 1986-95 patent-intensive industries grew faster in countries with relatively larger stock markets (Table 4). The impact of financial development in the three tables is ambiguous and is associated with both a positive and a negative overall effect on growth. The empirical tests therefore provide a certain amount of support to the notion that equity markets are better than credit markets at supporting growth in those industries that are at the forefront of growth and innovation in modern industrialised economies.

Table 3
Financial development, financial structure and value added growth: R&D intensity

	Industry value added growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-1.485 (1.709)	0.341 (0.470)	1.072** (0.535)	0.430 (1.467)	-0.152 (0.517)	1.356 (1.302)
Financial development × Financial dependence	-0.389* (0.197)	-0.070 (0.063)	0.027 (0.031)	-0.172 (0.411)	-0.188 (0.139)	0.217** (0.085)
Financial development × R&D intensity	-0.048*** (0.018)	-0.002 (0.005)	-0.001 (0.003)	-0.055 (0.038)	0.001 (0.007)	0.007 (0.006)
Financial structure × Financial dependence	-0.123 (0.190)	0.009 (0.064)	-0.012 (0.072)	0.467 (0.355)	0.044 (0.083)	0.008 (0.093)
Financial structure × R&D intensity	-0.005 (0.017)	0.001 (0.004)	0.001 (0.008)	0.052 (0.033)	-0.000 (0.005)	0.009 (0.008)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166	312	310	101	161	160
R-squared	0.53	0.60	0.51	0.40	0.30	0.39

Note: The table reports regressions of the growth of industry value added for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry value added growth" is the respective industry's growth in value added in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "R&D intensity" is proxied by the industry's share of R&D expenses of total output; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

Next we studied the channels via which financial structure affects industry-level value added growth. The theoretical literature on finance and growth argues that financial market development stimulates GDP growth not only by raising the funds available for capital accumulation, but also by fostering productivity growth. It is, however, likely that the effect on capital accumulation will be stronger at earlier stages of development, while the effect on productivity growth will be greater as both the financial market and the industrial structure become more sophisticated. In the literature on this a host of papers have provided empirical evidence of the strong

effect of financial development and integration on TFP growth, with only a tenuous impact on physical capital accumulation.²⁰⁵ In line with these arguments, we expect a more market-based financial sector to yield larger productivity and smaller investment benefits.

Table 4
Financial development, financial structure and value added growth: Patent intensity

	Industry value added growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-1.427 (1.695)	0.360 (0.469)	1.095** (0.537)	0.493 (1.418)	-0.071 (0.500)	1.414 (1.306)
Financial development × Financial dependence	-0.481** (0.219)	-0.078 (0.069)	0.027 (0.032)	-0.277 (0.436)	-0.195 (0.144)	0.238*** (0.089)
Financial development × Patent intensity	-0.110** (0.044)	-0.010 (0.013)	0.002 (0.007)	-0.163* (0.092)	-0.016 (0.021)	0.025 (0.017)
Financial structure × Financial dependence	-0.134 (0.192)	0.016 (0.064)	-0.006 (0.075)	0.531 (0.379)	0.049 (0.083)	0.025 (0.098)
Financial structure × Patent intensity	-0.027 (0.049)	0.011 (0.011)	0.003 (0.022)	0.140* (0.081)	0.010 (0.014)	0.021 (0.020)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166	312	310	101	161	160
R-squared	0.53	0.60	0.51	0.40	0.30	0.39

Note: The table reports regressions of the growth of industry value added for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry value added growth" is the respective industry's growth in value added in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "Patent intensity" is proxied by the industry's number of patents filed to the USPTO; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

In Tables 5 and 6, we apply these arguments to the data. We replaced the main dependent variable with a country-industry-specific measure of investment growth (calculated as the log difference in real physical capital between adjacent periods) and a measure of labour productivity growth (calculated as the log difference in real output per worker between adjacent periods).

In Table 5 we find that although the size of financial markets exerts no positive effect on investment growth, relatively larger stock markets are associated with faster capital accumulation in financially dependent industries during the period 2006-15. During the same period, sectors with better growth opportunities experienced faster capital accumulation in countries with relatively larger credit markets. The data

²⁰⁵ King, R. and Levine, R., "Finance and growth: Schumpeter might be right", *Quarterly Journal of Economics*, Vol. 108, 1993, pp. 717-737; Beck, T., Levine, R. and Loayza, N., "Finance and the sources of growth", *Journal of Financial Economics*, Vol. 58(1), 2000, pp. 261-300; Bonfiglioli, A., "Financial integration, productivity and capital accumulation", *Journal of International Economics*, Vol. 76(2), 2008, pp. 337-355.

therefore provide consistent evidence that neither bank-based nor market-based financial systems are more conducive to investment-based growth.

Table 5
Financial development, financial structure and investment growth

	Industry investment growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	1.566 (1.893)	0.655 (0.775)	1.189** (0.579)	-0.486 (1.402)	0.613 (0.875)	2.565*** (0.744)
Financial development x Financial dependence	0.038 (0.668)	-0.019 (0.095)	-0.023 (0.062)	0.342 (1.025)	0.032 (0.218)	0.131 (0.161)
Financial development x Growth opportunities	-1.347 (1.819)	-0.538* (0.307)	0.056 (0.167)	0.396 (5.419)	-0.302 (0.644)	0.070 (0.461)
Financial structure x Financial dependence	-0.422 (0.456)	-0.100 (0.096)	0.316** (0.143)	0.233 (0.576)	-0.092 (0.127)	0.286* (0.169)
Financial structure x Growth opportunities	2.019* (1.067)	0.281 (0.335)	-1.218*** (0.407)	-2.005 (2.710)	0.398 (0.463)	-0.942** (0.456)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	120	215	214	77	128	127
R-squared	0.77	0.62	0.47	0.46	0.44	0.58

Note: The table reports regressions of the growth of industry investment for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry investment growth" is the respective industry's growth in capital investment in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "Growth opportunities" are proxied by the industry's value added growth; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

In Table 6 we find that financial development, during different periods, stimulates labour productivity in both financially dependent sectors and in sectors with better growth opportunities (with the exception of the period 1996-2005 in EA-11, when the effect was negative and significant). Crucially, we also find strong evidence for the argument that, during the period 1996-2005, industries with better growth opportunities experienced faster labour productivity growth in countries with relatively larger stock markets. The data therefore provide some evidence that financial structure matters. As predicted by theory, there are signs that market-based finance is relatively better at financing productivity-based growth.

Table 6**Financial development, financial structure and labour productivity growth**

	Industry labour productivity growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-0.932 (1.902)	-0.236 (0.633)	0.649 (0.517)	0.304 (1.499)	0.146 (0.525)	1.621 (1.402)
Financial development × Financial dependence	-0.528 (0.373)	-0.065 (0.082)	-0.033 (0.041)	0.068 (0.562)	-0.050 (0.133)	0.177** (0.084)
Financial development × Growth opportunities	-0.793 (1.687)	-0.282 (0.247)	0.343** (0.159)	-3.102 (2.015)	-1.157*** (0.428)	0.298 (0.286)
Financial structure × Financial dependence	-0.144 (0.309)	0.011 (0.079)	-0.011 (0.086)	0.338 (0.466)	0.010 (0.085)	-0.030 (0.110)
Financial structure × Growth opportunities	-0.135 (1.174)	0.411 (0.302)	-0.095 (0.333)	2.243 (1.628)	0.693** (0.348)	0.291 (0.301)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	149	305	302	98	157	158
R-squared	0.34	0.41	0.38	0.32	0.26	0.30

Note: The table reports regressions of the growth of industry labour productivity for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Labour productivity growth" is the respective industry's growth in output per worker in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "Growth opportunities" are proxied by the industry's value added growth; data are pooled averages across countries over the period 1976-2006. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

Finally, we would like to confirm whether the results in the aforementioned paper by Beck, Büyükkarabacak, Rioja and Valev (2012) also hold for our setup. In other words, our main finding – that systems which are more equity-based are somewhat more conducive to growth than systems which are more bank-based – could be due to the fact that in some countries, particularly towards the end of the sample period, credit intermediation is dominated by household credit. In Table 7, we include the ratio of credit to non-financial corporations (NFCs) to household credit, interacted with financial dependence and with growth opportunities. We find weak evidence that a higher ratio of NFC credit to household credit is indeed associated with higher value added growth in financially-dependent sectors. However, this evidence is restricted to the period 1986-95. Crucially, the evidence that during the period 1996-2005 industries with better growth opportunities grew faster in countries in which stock markets accounted for a relatively large share of the financial sector still applies in this alternative specification.

Table 7

Financial development, financial structure and value added growth: Does the type of credit matter?

	Industry value added growth					
	EU-21			EA-11		
	1986-1995	1996-2005	2006-2015	1986-1995	1996-2005	2006-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Share value added	-1.777 (1.841)	0.825 (0.539)	1.740** (0.689)	0.498 (1.262)	0.060 (0.544)	2.170 (1.425)
Financial development x Financial dependence	-0.241 (0.249)	0.084 (0.113)	0.070 (0.064)	0.698 (0.488)	0.061 (0.161)	0.254** (0.120)
Financial development x Growth opportunities	-0.382 (0.719)	-1.037*** (0.360)	0.333 (0.209)	-3.823* (2.115)	-1.650*** (0.595)	0.237 (0.465)
Financial structure x Financial dependence	0.239 (0.283)	-0.031 (0.090)	-0.044 (0.103)	-0.318 (0.468)	-0.083 (0.116)	-0.142 (0.102)
Financial structure x Growth opportunities	0.360 (1.149)	0.858** (0.393)	-0.349 (0.348)	2.537 (1.941)	1.213** (0.510)	-0.171 (0.360)
Credit ratio x Financial dependence	0.126* (0.064)	0.027 (0.025)	0.108 (0.075)	0.262** (0.124)	0.078 (0.072)	0.157 (0.115)
Credit ratio x Growth opportunities	0.071 (0.346)	-0.124 (0.094)	0.086 (0.244)	0.007 (0.493)	-0.503* (0.297)	0.018 (0.311)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations,	154	227	226	101	151	150
R-squared	0.547	0.609	0.511	0.487	0.416	0.397

Note: The table reports regressions of the growth of industry value added for 21 EU countries (columns (1) to (3)) and for 11 EA countries (columns (4) to (6)). "Industry investment growth" is the respective industry's growth in value added in a country. "Share value added" is the respective industry's value added share of the total economy. "Financial development" is the sum of credit to the private sector and stock market capitalisation, both normalised by GDP. "Financial structure" is the ratio of stock market capitalisation to credit to the private sector. "Financial dependence" is proxied by the industry's capital expenditures minus cash flows, normalised by capital expenditures; data are for large listed US firms and are averaged over the period 1976-2006. "Growth opportunities" are proxied by the industry's value added growth; data are pooled averages across countries over the period 1976-2006. "Credit ratio" denotes the ratio of NFC credit to household credit. Standard errors adjusted for heteroscedasticity are reported in parenthesis, where *** denotes significance at the 1 percent, ** denotes significance at the 5 percent, and * denotes significance at the 10 percent statistical level.

Overall, our results provide tentative support to the idea that an ambitious CMU should place appropriate emphasis on non-bank financing of economic activity, particularly equity markets. The EC's Proposal of September 2017 is a step in the right direction, as it will strengthen capital markets and financial integration by reinforcing integrated supervision.²⁰⁶ However, more ambitious initiatives may be needed in the future to bolster the contribution of financial markets to the real economy through public and private equity financing. Furthermore, our results are also relevant to the current broader policy debate focused on how to enhance the prospects of European countries growing sustainably, given the challenges posed by, for example, ageing societies, globalisation and pervasive technological progress. Mastering these current and anticipated challenges will require, ceteris paribus, the European financial system to adjust flexibly, offering innovative and cost-efficient financial solutions to all sectors of the economy. Against this background, it seems that it will be a major political task to ensure that the regulatory treatment of financial

²⁰⁶ See [Reinforcing integrated supervision to strengthen Capital Markets Union and financial integration in a changing environment](#).

innovation (e.g. fintech) strikes an equitable balance between its growth-enhancing potential and its risks to financial stability and the financial health of unsophisticated investors.

Special feature B: Integrating euro area corporate bond markets: benefits and potential financial stability challenges

Prepared by Margherita Giuzio and Giulio Nicoletti

This special feature analyses the trends seen in the euro area non-financial corporate (NFC) bond market since the financial crisis and discusses the implications for financial integration and stability. Corporate bond markets have deepened over the last decade, not only in the euro area but also in other major advanced economies. This is also related to de-risking and de-leveraging in the banking sector following the crisis. Since loans became more difficult to obtain in the still bank-based European financial system, firms increasingly turned to issuing bonds. With the exception of France, however, the relative size of national NFC corporate bond markets still lags behind those of the US and the UK. The level of development of these markets still differs substantially across euro area countries.

This feature reports that in recent years the euro area corporate bond market has become more integrated – this holds for both bond holders and issuers. First, home bias has somewhat declined. A bond is now on average about one and a half times more likely to be held by a domestic investor than by a non-domestic euro area investor, whereas in 2014 this factor was closer to two. Second, compared with 2014, it is now easier for issuers to place their bonds across multiple euro area countries other than their own, instead of having a preferred investor country. This is another sign of further integration.

The sustained issuance of NFCs in most euro area countries paralleled the increased popularity of investment funds (IFs) – a global trend. IFs are the second largest holding sector (34% in 2017) of NFC bonds, after insurance corporations and pension funds (ICPFs, 42%) and ahead of banks (14%). IFs domiciled in Luxembourg and Ireland account for more than half the total net asset value of funds in the euro area. Corporate bond portfolios held indirectly by banks and ICPFs, i.e. via shares of investment funds, are, on average, more diversified than those held directly. In this sense IFs promote euro area financial integration.

The balanced growth and integration of the NFC bond market is desirable because a financial system in which borrowers can switch more easily between loans and bonds will generally lead to more stable financing. In this sense the further development of the corporate bond market can make a valuable contribution to the European Capital Markets Union. At the same time, however, the substitution of bank financing by market financing can give rise to new sources of risk and altered transmission channels that warrant careful monitoring from a financial stability perspective. For example, the network of corporate bond market issuers and

investors located in different euro area countries – as illustrated using visualisation techniques in this feature – will influence how potential financial instability might spread if corrections occurred in market segments with stretched valuations. Moreover, interactions between ICPFs and IFs in stressed scenarios require further analysis. For example, large redemption shocks to investment funds could trigger contagious fire sales that propagate instability between different intermediaries.

1 Introduction

Corporate bond issuance by non-financial corporations increased strongly in the euro area after the Global Financial Crisis. In the aftermath of the Lehman crisis, non-financial corporations turned to bonds rather than to loans as a source of financing. This was partly driven by a reduction in bank lending to the private sector following the crisis.

Bond-based finance can be more conducive to financial integration than bank-based finance. Loans are typically granted by banks located relatively close to firms. In bank-based systems, financial integration mainly involves branches or subsidiaries of foreign banking groups granting local loans by resorting to the group's internal liquidity. Alternatively, domestic banks can borrow in integrated interbank markets to grant loans domestically. However, bonds can more easily cross national borders than loans in order to reach international investors.

From the perspective of both firms and bond holders, bond market integration is beneficial and can enhance resilience to idiosyncratic shocks. Bond market integration gives issuing firms access to geographically diversified investors. Geographical diversification, in turn, makes issuers less vulnerable to the idiosyncratic shocks that can affect a number of specific countries and limit firms' ability to roll-over debt. By the same token, from an investor perspective, holding a diversified portfolio reduces exposure to idiosyncratic risks, including sector country-specific risks. Bond markets offer an alternative to bank financing, which can be a useful option, especially in periods of bank distress.

However, from a financial stability perspective, greater recourse to integrated bond markets may warrant enhanced macroprudential surveillance. The extent of the Global Financial Crisis and the ensuing European Sovereign Crisis showed that significant cross-border holdings can sometimes carry financial stability risks and might be prone to reversal under some conditions. Corporate bond markets should therefore be assessed both in relation to valuations and vis-à-vis the network of interconnections, which provide a potential propagation mechanism for shocks through both direct and indirect exposures.

This special feature investigates trends and financial stability issues relating to bonds issued by euro area non-financial corporations and held by euro area residents. The analysis excludes bonds issued by financial institutions, focusing instead on direct real economy financing. The special feature does not analyse the impact of repricing risks on the different sectors, and readers are referred to the

November 2017 ECB [Financial Stability Review](#) for an analysis of such risks. This special feature focuses mainly on bond markets, and as such does not include a comparison between bond and equity markets.

Home bias has decreased in recent years. The overall increase in issuance of euro area NFC bonds is reflected by changes in the portfolio holdings of different sectors of euro area countries. These developments have slightly reduced home bias.

Bond holdings constitute a network of interconnections across the financial system. Network visualisation techniques are used to describe the interconnections across countries and sectors which derive from direct and indirect bond holdings. This includes an analysis of the similarities between portfolios and community networks stemming from common holdings across different country sectors (“portfolio overlaps”).

The analysis covers developments over the last three years. The sample covers the period from Q4 2014 to Q2 2017, according to the availability of detailed bond-level data on outstanding bonds and holdings. In this period there were also important changes in monetary policy that influenced market expectations: the expanded Asset Purchase Programme (APP), which was announced in January 2015²⁰⁷, and the Corporate Sector Purchase Programme (CSPP), which was announced in March 2016. The internal ECB statistics used were the Security Holding Statistics Sector, a proprietary ESCB database containing the holdings of financial assets by sector and by country; and the Centralised Security Database, the corresponding database for issuance.

The outline of the special feature is as follows. Section 2 presents the main facts regarding issuance between Q4 2014 and Q2 2017. Section 3 discusses home bias. Section 4 presents the main developments from an investor perspective, while Section 5 discusses some financial stability considerations.

2 The issuer perspective

The outstanding amount of non-financial corporation (NFC) bonds in the euro area has increased over the last three years (Chart 1). The market value of outstanding non-financial corporate bonds reached €1.25 trillion in Q2 2017.²⁰⁸ Of the largest euro area economies, Spain showed the greatest increase in bonds outstanding (+60%), followed by Belgium²⁰⁹ and France. By contrast, the outstanding

²⁰⁷ On the effects on asset prices of the EAPP announcement, see Altavilla, C., Carboni, G. and Motto, R., “Asset purchase programmes and financial markets: lessons from the euro area”, *Working Paper Series*, No 1864, European Central Bank, 2015.

²⁰⁸ To make a comparison of the relative size of markets, banks, which dominate the market for euro area bond issuance, had an outstanding amount of about €9 trillion in 2017 (European Commission Expert Group on Corporate Bonds 2017).

²⁰⁹ The increase in net issuance observed in Belgium is concentrated in a few NFCs' bonds. In particular, in Q1 2016, ABInbev issued corporate bonds for €13 billion in the context of its takeover of SABMiller (i.e. 20% of the total outstanding amount of Belgian NFC bonds).

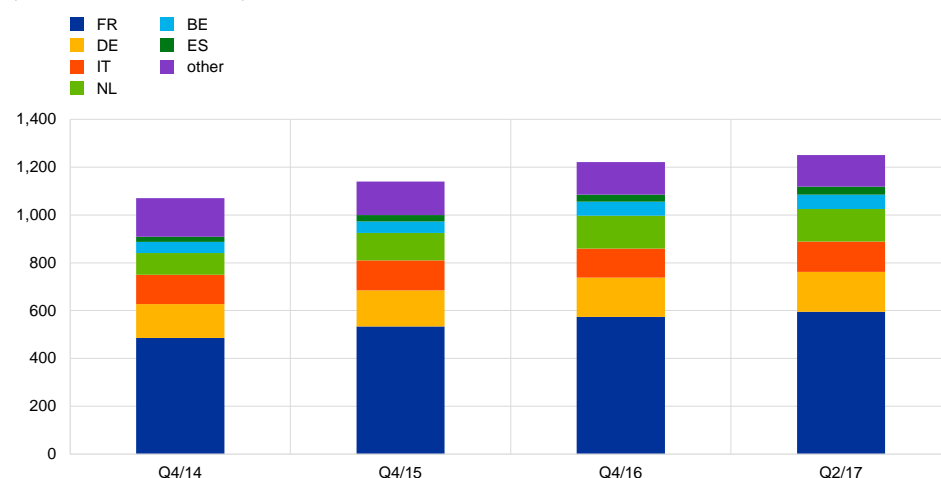
stock of NFC bonds in Austria, Finland and Italy in Q2 2017 was at practically the same level as it was in Q4 2014. Recent dynamics also reflect a later catch-up in bond issuance by some countries (e.g. Spain). Corporate bond growth in “early starter” countries (e.g. France) is roughly in line with the expansion for loans (Chart 2).

Chart 1

Bond issuance of non-financial corporations has increased over the last three years...

Changes in market value of outstanding amounts of NFC bonds in the euro area by country

(EUR billions, Q4 2014-Q2 2017)



Sources: CSDB, ECB internal database.

Notes: Data refer to the market value of outstanding amounts of non-financial corporation bonds. Using this measure the total outstanding amount increased by 16% between the fourth quarter of 2014 and the second quarter of 2017. Using nominal values of outstanding amounts (i.e. netting out the price impact), the increase is around 13% over the same period. Strips have been excluded from the definition of outstanding amounts.

Firms increased use of bond financing compared with bank financing is a global phenomenon that has affected most advanced economies since the Global Financial Crisis (Chart 2). Euro area NFCs have been substituting bank loans with bonds since 2008. This pattern has also been observed in the US and in the UK, although not in Japan. In contrast to the United States, however, the euro area is now well above pre-crisis levels in terms of recourse to bond financing.²¹⁰ On average across the euro area, bond financing accounted for over 20% of NFCs’ external funding in Q2 2017, up by 10% since 2008. There is, however, high heterogeneity across euro area countries in the use of NFC bonds. France is similar to both the US and UK, but firms in all other major euro area countries use bond financing less²¹¹. The sharp increase in outstanding NFC bonds contrasts with the

²¹⁰ In the US, recourse to bond financing is now at its highest level (bonds are 40% of total external funding), which is very close, however, to the level that prevailed towards the end of 2003 (39.5%).

²¹¹ Figures reported in Chart 2 do not include issuances through foreign subsidiaries, a significant phenomenon in Spain. The ratio of bonds to total credit was around 12% at the end of 2016 (about 5% in Chart 2), according to the BdE Annual Report 2016 (Panel 1 of Chart 2.11).

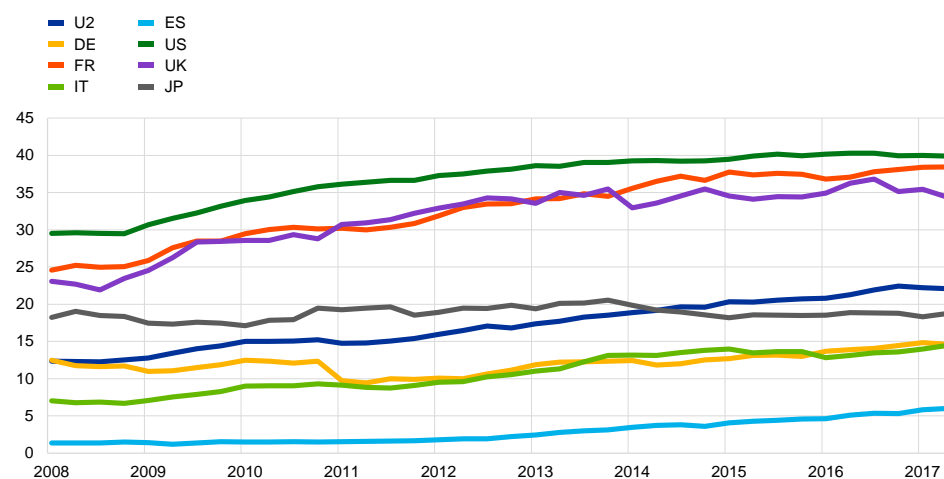
trend for financial corporations – not covered by this analysis – which has maintained a constant use of bonds over the last ten years²¹².

Chart 2

... in line with the trend for major advanced economies since 2008²¹³

NFC bond finance over total credit to NFCs

(percentages, Q1 2008- Q2 2017)



Sources: SEC and BSI accounts for euro area, Flow of Funds for UK, US and JP.

Notes: Ratio of bonds issued by NFCs over total of loans granted by MFIs and bonds issued by NFCs. The UK definition of loans excludes lending for direct investments and MMI instruments issued by foreign MFIs. The US definition of bonds excludes commercial paper.

Corporate issuance from France, Italy, Germany and the Netherlands covers about 80% of total outstanding amounts. French bonds alone account for almost 50% of total outstanding bonds in Q2 2017 (i.e. €600 billion). The shares of outstanding amounts of bonds issued by each country and measured at market value define a “benchmark portfolio” of euro area bonds.

The increased use of market-based finance was influenced by a weakening loan supply from banks. Disruptions in bank loan supply occurred mostly prior to Q4 2014 and contributed to the partial substitution of loans by bonds²¹⁴. This substitution was partial not only because smaller firms are typically unable to tap capital markets, but also because bonds and loans offer different services, with

²¹² See Figure 9 in “Analysis of European corporate bond markets” by the European Commission Expert Group on Corporate Bonds, November 2017, page 31.

²¹³ CSDB and SEC information has been used for Charts 1 and 2, respectively. Both describe the amount outstanding of bonds issued by non-financial corporations and exclude strips to avoid double counting. CSDB is based on security-by-security information and contains instruments with an ISIN code, while SEC is only available on aggregates and contains both ISIN and non-ISIN bonds. Hybrids have been excluded from this analysis.

²¹⁴ For an analysis of the euro area credit market, see Altavilla, C., Darracq Pariès, M. and Nicoletti, G., “Loan supply, credit markets and the euro area financial crisis”, *Working Paper Series*, No 1861, European Central Bank, 2015. For the United States, see Becker, B. and Ivashina, V., “Cyclicality of credit supply: Firm level evidence”, *Journal of Monetary Economics*, Vol. 62(C), 2014, pp. 76-93.

bonds being cheaper due to their lower intermediation costs, although they are also more difficult to renegotiate when firms are in distress²¹⁵.

In an environment of reduced loan supply, the bond market acted as a “spare tyre”. When credit supply from banks is limited, the availability of well-developed corporate bond markets is of particular importance to NFCs. In this regard, bond financing offers a “spare tyre” for non-financial corporations²¹⁶.

Recent experience has shown additional positive interactions between bank lending and bond issuance. Bank lending can become more effective when bond issuance is also developing, as shown by several contributions. In particular, a shift from bank to bond funding can relieve credit institutions’ balance sheet constraints, making it easier for them to lend to small and medium enterprises which, typically, rely uniquely on bank financing²¹⁷. Recent literature offers detailed evidence for Spain with regard to an increase in bond issuances after the announcement of the CSPP, bond-loan substitution by issuing firms, and the subsequent reallocation of credit by banks to non-issuing firms²¹⁸. Overall, firm financing may be more stable when borrowers are able to switch between bank lending and bond issuance.

Monetary policy measures may also have stimulated NFC bond issuance. The ECB CSPP directly stimulated corporate bond markets by increasing firms’ demand for bonds relative to loans²¹⁹. The CSPP indirectly fostered a rating migration from high yield to investment grade. In addition, the purchases of government bonds may have stimulated the issuance of corporate bonds to the extent that they “fill the gap” left by the purchases of expanded APP government bonds²²⁰; in this sense the compression of yields in government bond markets can spill over to corporate bonds.

3 Home bias

Home bias is the (empirical) observation that investors tend to hold a significantly higher amount of domestic assets than foreign assets. A lack of diversification and a disproportionate share of domestic assets in equity portfolios have been documented for most investors in the US, the UK and Japan for a long

²¹⁵ For a firm-level study, see Becker and Ivashina, 2014. For an analysis of the choice between bank and bond financing, see Crouzet, N., “Aggregate Implications of Corporate Debt Choices”, *Review of Economic Studies*, forthcoming (2018).

²¹⁶ The term “spare tyre” has been used in this context by Greenspan, A., in “Do efficient financial markets mitigate financial crises?”, Remarks by Chairman Alan Greenspan, 1999.

²¹⁷ For an analysis of how corporate bond purchases by central banks increase the effectiveness of the bank-lending channel, see Grosse-Rueschkamp, B., Steffen, S. and Streitz, D., “Cutting out the middleman - the ECB as corporate bond investor”, *Working Paper*, Centre for European Economic Research (ZEW), 2017.

²¹⁸ For a detailed study of the effects of ECB purchases of corporate bonds on the financing of Spanish NFCs, see Arce, O., Gimeno, R., and Mayordomo, S., “Making room for the needy: the credit-reallocation effects of the ECB’s corporate QE”, *Banco de Espana Working Paper*, 2017.

²¹⁹ Recent evidence is provided by Grosse-Rueschkamp, B., Steffen, S. and Streitz, D., “Cutting out the middleman - the ECB as corporate bond investor”, *Working Paper*, Centre for European Economic Research (ZEW), 2017.

²²⁰ For a discussion of the “Portfolio rebalancing” channel, see [Bernanke, 2012](#).

time.²²¹ Much of the literature has found similar results across several countries, sectors and asset classes²²². This consistent investment behaviour appears to be the result of investor choices, as well as institutional and regulatory constraints.

There may be several structural and economic reasons for home bias.

Informational advantages for individual companies or sectors may influence investment decisions in favour of domestic assets. In addition, some institutional investors may have a mandate to focus on specific countries, leading to a de facto bias in their holdings²²³. Other structural reasons which may prevent investors from entering foreign markets include differences in institutional settings and varying degrees of financial market development²²⁴.

From an issuer perspective home bias may increase the costs of corporate bond issuance. Access to a well-diversified source of financing as an alternative to bank loans and whose cost is stable and predictable represents an excellent opportunity for investors. However, the term “home bias” implies that issuers might not be able to place bonds outside their domestic country. As a result they would need to bear additional costs if domestic conditions determining the pricing of their bonds were less favourable than those prevailing in international markets²²⁵. In addition, home bias might make it more difficult for corporate bond markets to act as a spare tyre if domestic banking stress is accompanied by wider stress in domestic markets.

²²¹ The first empirical analysis of home bias in equity portfolios was in French, K. R and Poterba, J. M., “Investor Diversification and International Equity Markets”, *American Economic Review*, American Economic Association, Vol. 81(2), 1991, pp. 222-226.

²²² For an analysis of home bias in equity, bond and bank lending markets, see Courdacier, N. and Rey, H., “Home bias in Open Economy Financial Macroeconomics,” *Journal of Economic Literature*, Vol. 51(1), 2013, pp. 63–115. For a review of possible economic explanations of home bias, see Choi, N., Fedenia, M., Skiba, H. and Sokolyk, T., “Portfolio Concentration and Performance of Institutional Investors Worldwide,” *Journal of Financial Economics*, Vol. 123, 2017, pp. 189-208.

²²³ For an analysis on the impact of prudential regulations on the ability of institutional investors to diversify geographically across borders, see Darvas, Z. and Schoenmaker, D., “Institutional investors and home bias in Europe’s Capital Markets Union”, *Working Papers 19360*, Bruegel, 2017.

²²⁴ For the United States, see Forbes, J., “Why do foreigners invest in the United States?”, *Journal of International Economics*, Vol. 80, 2010, pp. 3-21. For the euro area, see Floreani, V.A. and Habib, M.M., “The euro area bias and the role of financial centres”, *International Journal of Finance and Economics*, 2018.

²²⁵ For a discussion of the effects of home bias on the cost of capital, see Lau, S.T., Ng, L. and Zhang, B., “The world price of home bias”, *Journal of Financial Economics*, Vol. 97(2), 2010, pp. 191-217.

Box 1

Measuring home bias in euro area NFC bond markets using a benchmark issuance portfolio

In line with the literature on international capital markets, home bias can be measured by comparing portfolio holdings against a euro area benchmark portfolio that is consistent with the International CAPM²²⁶.

In the case of bonds, the benchmark portfolio weights are proportional to the market value of outstanding amounts of NFC bonds issued. These are referred to as “benchmark issuance portfolio weights” or “benchmark portfolio weights” in formulas:

$$\text{Benchmark issuance portfolio weight} = \left(\frac{\text{outamount}_j}{\sum_j \text{outamount}_j} \right), \forall j \in (\text{euro area countries}), (1)$$

With regard to the euro area, the home bias indicator of country j can be measured as follows:

$$\text{home bias}_j = \left(\frac{\text{hold}_j}{\sum_j \text{hold}_j} / \frac{\text{outamount}_j}{\sum_j \text{outamount}_j} \right) - 1, j \text{ in (euro area countries)} (2),$$

where the numerator computes the domestic holdings of country j over its holdings vis-à-vis all countries, and the denominator captures the share of outstanding bonds issued by country j over the total outstanding bonds issued by all euro area countries. In other words, the indicator compares the share of the domestic portfolio held by country j with the corresponding share in the benchmark portfolio. The index (2) has a value equal to zero when there is no home bias, i.e. the portfolio holdings reflect the benchmark portfolio. A positive index indicates the presence of home bias, implying that the country's portfolio is overexposed to domestic bonds compared with the benchmark portfolio. By contrast, an index below zero shows how much the portfolio underweights domestic bonds, i.e. a negative home bias.

Formula (2) also generalises beyond the domestic dimension to assess how much each country issuer is (over/under-) exposed to specific non-domestic holders. This is shown in log terms in this special feature for easier visualisation:

$$\text{foreign bias}_{ij} = \log \left(\frac{\text{hold}_{ij}}{\sum_i \text{hold}_i} / \frac{\text{outamount}_i}{\sum_i \text{outamount}_i} \right), i \neq j, i, j \text{ in (euro area countries)} (3),$$

The average of index (3) over countries measures the average foreign bias, i.e. the propensity of different countries to hold a bond of a non-domestic issuer. This special feature uses both home bias and foreign bias (average) measures to proxy for financial integration in the NFC bond market. Home bias takes the holders' perspective while foreign bias takes the issuers' perspective. The two measures should therefore be seen as complementary and not as substitutes for one another (e.g. foreign bias need not necessarily decrease as home bias increases).

²²⁶ The methodology was introduced in Solnik, B., “An equilibrium model of international capital markets”, *Journal of Economic Theory*, Vol. 8, 1994, pp. 500-524. For recent applications to the euro area, see also Bhatta, B., Marshall, A. and Thapa, C., “Cost of sovereign debt and foreign bias in bond allocations”, *Journal of International Financial Markets, Institutions and Money*, Vol. 51(C), 2017, pp. 75-91, Floreani and Habib, 2018 and Fache Rousová, L., and Rodríguez Caloca, A., “Disentangling euro area portfolios: new evidence on cross-border securities holdings”, *ECB Statistics Paper Series*, 2018.

On average, a bond issued by a euro area NFC is about one and half times as likely to be held by domestic investors as by other euro area investors (Chart 3), which is down from the figure of approximately twice as likely in Q4 2014.

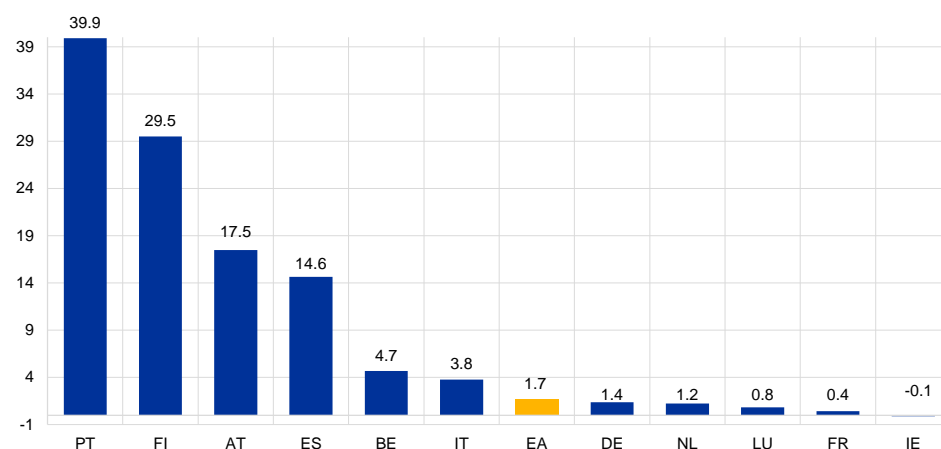
Home bias (see Box 1 in this chapter for definitions) is spread across the euro area. Investors in Spain, Austria, Portugal and Finland hold a portfolio which is more than ten times more exposed to bonds issued by domestic firms than the benchmark portfolio (see Box 1, formula 1), while those in Belgium and Italy only have a portfolio bias of about four times. The home bias indicator over the whole euro area is the average of individual home-biases weighted by the outstanding amounts issued by NFCs. In Q2 2017, this was equal to 1.7, suggesting that domestic bonds are, on average, overrepresented in euro area holdings by a fraction of about two compared to the benchmark portfolio. Most countries contribute positively to the indicator while negative contributions are relatively small: Chart 3 shows the largest contributors to euro area home bias. Home bias has reduced to some extent: the home bias index was 4.6 in Q4 2014.

Chart 3

A bond issued by a euro area NFC is about one and half times more likely to be held by domestic than by other euro area investors

Euro area average home bias and 12 top issuer countries

(pure number, Q2 2017)



Sources: CSDB and SHS and ECB calculation. 0 denotes no home bias. Positive (negative) numbers indicate a positive (negative) home bias.

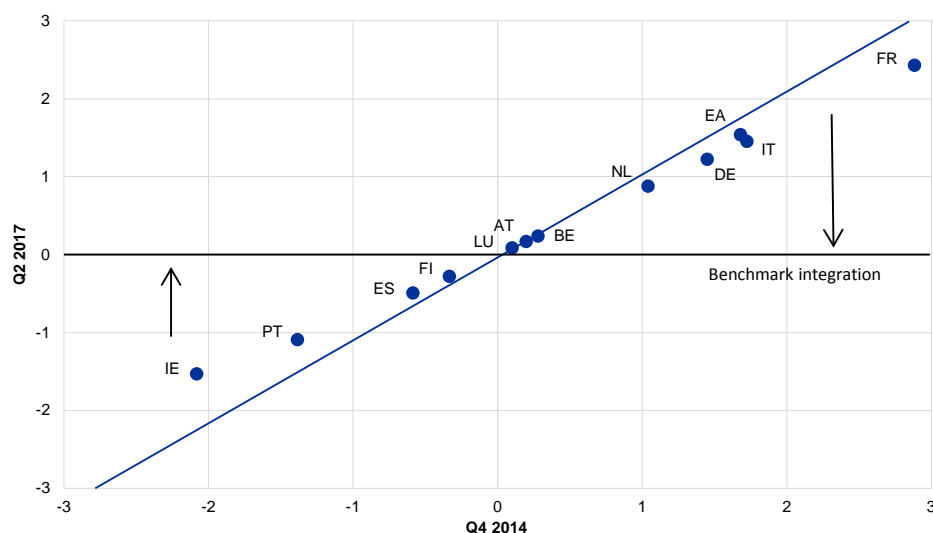
The extent to which issuers in different countries are able to place bonds in non-domestic markets tended to be more similar (Chart 4). Average foreign bias (see Box 1 in this chapter for definitions) indicates the ability of NFCs in one country to place bonds cross-border in the euro area. This is conceptually similar to the cross-border holding measures of financial integration used, for example, for bank loans. As Chart 4 shows, issuers in countries which already showed a strong ability to tap foreign markets (a foreign bias of above one) in Q4 2014 were less able to do so in Q2 2017. Conversely, issuers that were comparatively weaker in Q4 2014 (Ireland, Spain and Portugal) caught up with the others. In the euro area (i.e. weighted by the outstanding amount of country issuers), the indicator decreased slightly on average between Q4 2014 and Q2 2017 (EA in red in Chart 4).

Chart 4

The ability of euro area NFCs to place bonds in other euro area markets tended to converge across countries

Average log-foreign bias for selected issuers: Q4 2014 versus Q2 2017

(pure number)



Sources: CSDB and SHS and ECB calculations. Positive (negative) numbers indicate a positive (negative) foreign bias.

4 The holder perspective

Euro area NFC bonds are mostly held by non-money market investment funds (IFs), insurance corporations and pension funds (ICPFs) and, to a more limited extent, credit institutions (banks) (Chart 5). IFs increased their share of NFC holdings. The aggregated euro area holdings of NFC bonds amounted to €839 billion in Q2 2017, up by 13% since Q4 2014. In relative terms, ICPFs are the main sector holding euro area NFC bonds (42% of total euro area holdings in NFC bonds in Q2 2017), followed by IFs (34% in Q2 2017), and banks²²⁷ (14% in Q2 2017). In dynamic terms, IFs have increased their share of NFC holdings by 2% since Q4 2014.

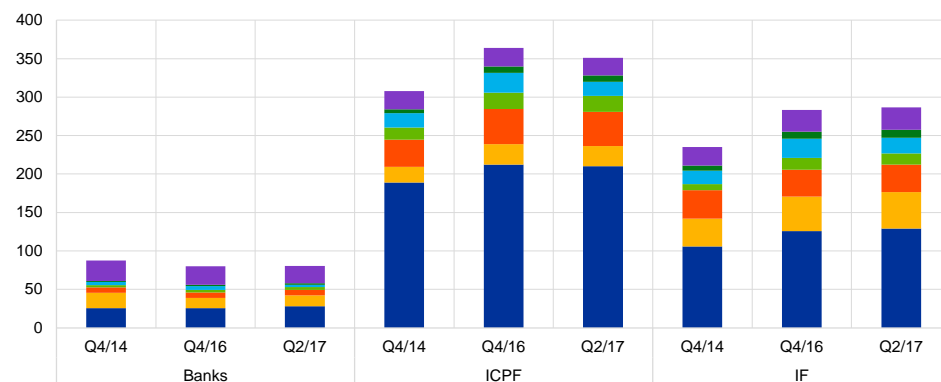
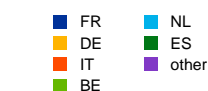
²²⁷ The banking sector includes all euro area deposit-taking corporations except the European Central Bank.

Chart 5

Among euro area private sectors Banks, ICPFs and IFs reached 90% of the total holdings of euro area NFC bonds

Composition of holdings by sector

(EUR billions, Q4 2014 - Q2 2017)



Sources: SHS, ECB calculation.

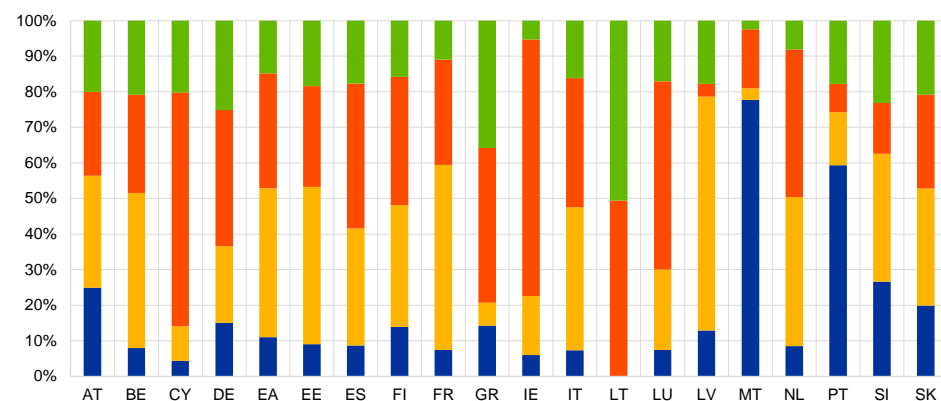
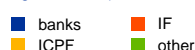
Major holding sector varies across countries (Chart 6). While ICPFs hold most of the NFC bonds issued in Belgium, Estonia, France and Latvia, IFs are particularly important for Ireland, Cyprus and Luxembourg. The banking sector plays a minor role in most of the euro area countries, with the exception of Malta and Portugal.

Chart 6

Major holding sector differs across euro area countries

Composition of holdings by country

(percentage, Q2 2017)



Sources: SHS, ECB calculation.

Investment fund portfolios have lower home bias than those of ICPFs and banks, reflecting different preferences and constraints (Chart 7). Looking at the geography of issuers, and dividing holdings into domestic and euro area excluding domestic, funds tend to hold more bonds issued outside their own domicile (about

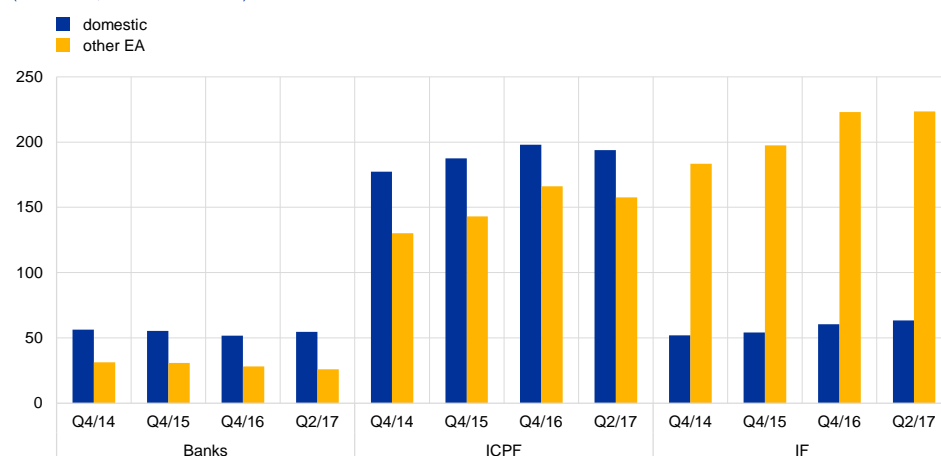
78%). Large funds are domiciled in Ireland and Luxembourg and show foreign bias, i.e. they tend to hold predominantly non-domestic bonds and bonds issued outside the euro area. By contrast, ICPFs and banks have a larger domestic component. With regard to ICPFs this might reflect regulatory constraints on the amount of geographical diversification that such institutions are able to achieve²²⁸. The dominance of domestic bonds in banks' portfolios might be due to their market making activities in the domestic markets. In dynamic terms, for all sectors and countries, both domestic and non-domestic euro area holdings increased for the sample, in line with the increase in overall NFC bond issuance.

Chart 7

Holdings of banks and ICPFs rely on domestic NFC bonds. IF portfolios are more foreign biased.

Domestic and foreign EA holdings by sector

(EUR billion, Q4 2014 - Q2 2017)



Sources: Security Holding Statistics, ECB own calculations.

IFs facilitate diversification (Chart 8). Investment funds in most individual countries are more geographically diversified than the corresponding bank and ICPF sectors (Chart 8). IF portfolios also tend to be more diversified than the benchmark (i.e. weights are proportional to euro area countries' outstanding bonds, yellow line in Chart 8). Only in the Netherlands do ICPFs have a more diversified portfolio than IFs, reflecting the global focus of Dutch ICPFs. In terms of absolute level, the diversification index (see Box 2 in this chapter for the construction of this measure) is low overall as it compares portfolios against a reference point for which each country has the same portfolio weight.

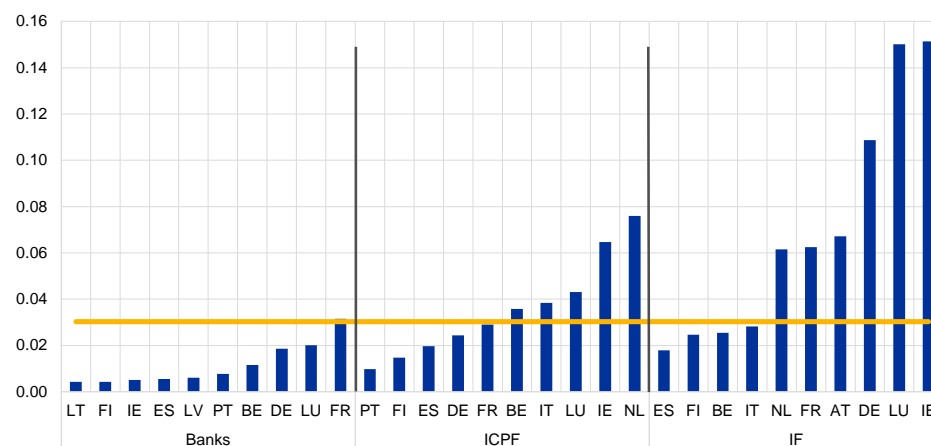
²²⁸ For a discussion of the impact of regulation on the ability of institutional investors to diversify, see Darvas, Z. and Schoenmaker, D., "Institutional investors and home bias in Europe's Capital Markets Union", *Working Papers 19360*, Bruegel, 2017.

Chart 8

Investment funds facilitate diversification of NFC bonds

Diversification index as at Q2 2017

(pure number, Q2 2017)



Sources: SHS, ECB calculation. The yellow horizontal line indicates the diversification level of a hypothetical benchmark portfolio whose weight is proportional to outstanding amount of bonds in the different countries.

At the level of individual security, the similarity of portfolios is low overall, while it is relatively higher between ICPFs and IFs (Chart 9). A useful indicator for comparing portfolios across sectors and countries is the cosine similarity indicator (see Box2 in this chapter)²²⁹. This measures the level of commonality between pairs of portfolios. The indicator equals zero if the portfolio weights of two country-sectors are uncorrelated and equals one if the portfolio weights are the same. Overall, the degree of similarity is limited if considered at individual security level, although it is much higher between ICPFs and IFs.

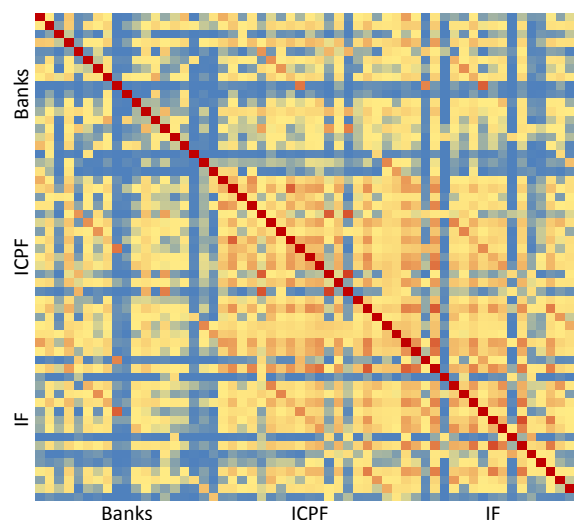
²²⁹ The cosine similarity indicator has recently been applied to insurers' portfolios in Getmansky, M., Girardi, G., Hanley, K. W., Nikolova, S. and Pelizzon, L., "Portfolio similarity and asset liquidation in the insurance industry", *Working paper*, SSRN, 2016.

Chart 9

ICPFs and IFs portfolios of NFC bonds are more similar to one another than banks' portfolios.

Similarity as at Q2 2017

(pure number, Q2 2017)



Sources: SHS, ECB calculation. Calculations at ISIN level, chart is symmetric. A blue cell indicates that the portfolio weights of two country-sectors are uncorrelated, while a red cell indicates that the portfolio weights are the same. Colours within this range quantify the degree of similarity.

Box 2

Measuring diversification and similarity in portfolios

This special feature refers to two measures – diversification and similarity indices – to characterise and compare portfolios.

The Diversification Index indicates how much a portfolio is diversified at the level of individual security (in number n), by examining how securities are weighted in investors' portfolios. The Diversification Index (DI) measures the level of diversification of portfolio weights (w). DI equals a minimum value of $1/n$ if a portfolio is totally concentrated in one asset; it equals one if all assets in the portfolio are equally weighted. Values within this range quantify the degree of diversification.

$$DI = \frac{1}{n \sum_{i=1}^n w_i^2}, i \in (\text{euro area NFCs}) \quad (3)$$

The Similarity Index (SI) measures the distance between two portfolio allocations. It is defined as the element-by-element product of two portfolio weight vectors (w). It is normalised by the length of the vectors, so that SI lies between zero and one.

$$SI_{i,j} = \frac{w_i \cdot w_j}{\|w_i\| \|w_j\|}, i, j \in (\text{euro area country – sector}) \quad (4)$$

The similarity indicator equals zero if the two portfolio allocations are uncorrelated and one if they are exactly the same. Values within this range quantify the degree of similarity.

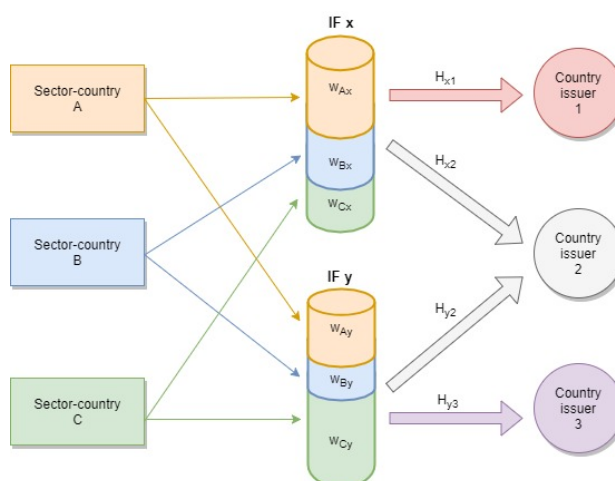
4.1 Indirect holdings of bonds via investment funds

Investment Funds are key holders of NFC bonds and offer a way for other sectors to hold NFC bonds indirectly (Chart 10). Euro area residents have shares in investment funds on their balance sheets. IFs, in turn, manage residents' assets by receiving a mandate from different agents and being paid through fees rather than by appropriating the proceeds of the underlying bonds in their portfolios. As such, euro area residents hold NFC bonds indirectly through investment funds. In the example in Chart 10, Sector-country A (e.g. the insurance sector of Country A) chooses its holdings of shares of funds x and y, while investment funds x and y hold bonds issued from three countries. Sector-Country A holds bonds of all three country issuers indirectly via investment fund shares.

Chart 10

Indirect holdings computed using a look-through approach.

Description of the “look-through” approach



Luxembourg and Ireland are the largest investment fund centres in Europe.

Luxembourg is the leading domicile for funds in the euro area, followed by Ireland. IFs domiciled in these countries account for 53% of the total net asset value of funds in the euro area (about €5.5 trillion).²³⁰ In many cases investment funds which issue their shares in other euro area countries are domiciled in Luxembourg and Ireland. These IFs benefit from favourable tax rates combined with specialised financial services and cost-efficient access to the European investor market.²³¹

Households and ICPFs held over 95% of indirect bond exposures at the end of 2016. The Lipper Investment Management (LIM database) is used to examine the balance sheets of more than 1,000 funds domiciled in Luxembourg and Ireland²³².

²³⁰ According to the ECB Register of Institutions and Affiliates Database data for IFs.

²³¹ With regard to the importance of financial centres to bond holdings, see also Floreani and Habib (2018).

²³² Funds included in the study are bond funds and mixed-asset funds (UCITS) domiciled in Luxembourg and Ireland, which invest in at least one NFC bond issued in the euro area. Furthermore, the shares of all these funds are held (at least partially) by other euro area residents.

Tracing investment fund shares back to their holders, households are the largest indirect holders of euro area NFC bonds (60%), followed by ICPFs (35%). With regard to geographical location, holders of the former are mostly resident in Italy and Germany and holders of the latter in France, Italy and Luxembourg.

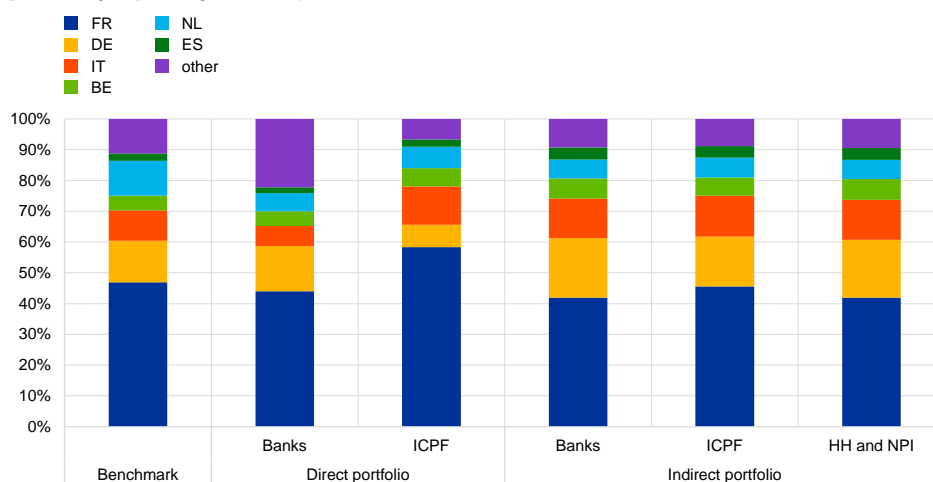
Indirect portfolios of euro area sectors are better diversified across countries than the corresponding direct portfolios and promote financial integration (Chart 11). Indirect portfolio weights of different sectors are at least as diversified as benchmark weights²³³. This section of the special feature considers bond and mixed-assets funds. These are suitable for sale to retail investors and, following the UCITS directives, result in portfolios that are highly diversified. The difference between direct and indirect holdings is particularly noticeable for ICPFs, whose direct portfolios are more home-biased, especially in France. Regulatory limits on the geographical diversification of ICPFs could be one reason for this, as could the more specialised asset management skills that are typical of IFs²³⁴. In the case of banks, direct holdings underweight Italian and Spanish bonds compared with indirect holdings. Indirect holdings promote financial integration in bond markets.

Chart 11

IFs are a means for investors to hold indirect exposures which are more diversified than direct exposures.

Benchmark portfolio and composition of direct and indirect portfolios as at Q4 2016

(portfolio weights, percentages, Q4 2016)



Sources: SHS, Lipper Investment Management, ECB own calculations. The chart compares the benchmark portfolio with the direct and indirect holdings of banks, insurance corporations and pension funds (ICPF), and households and non-profit institutions serving households (HH and NPI).

Indirect portfolios of different sectors have similar geographical allocations (Chart 12). Different sectors hold indirect portfolios with a relatively similar geographical composition, as shown by Chart 12. This is also due to the high level of

²³³ Both direct and indirect portfolios underweight Dutch bonds compared with the issuance benchmark (see Box 1 in this chapter for definition). Most of this is probably due to the relatively large share of Dutch bonds issued by multinational companies in USD.

²³⁴ On the effects of regulatory limits on geographical diversification, see Darvas, Z. and Schoenmaker, D., "Institutional investors and home bias in Europe's Capital Markets Union", *Working Papers 19360*, Bruegel, 2017.

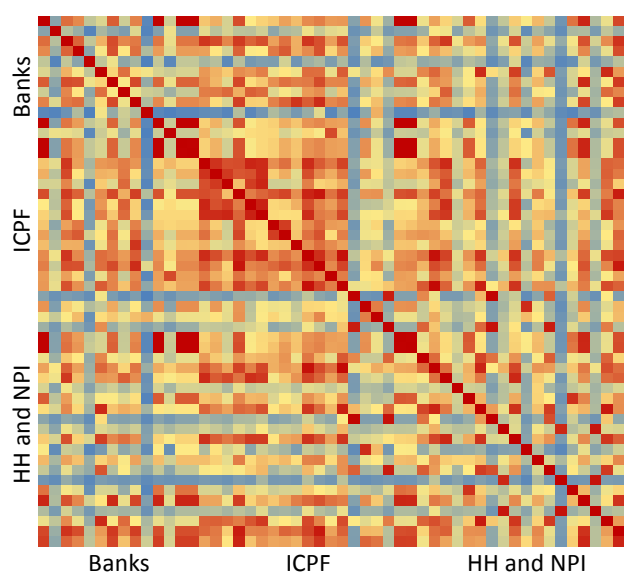
diversification of investment funds' portfolios. Looking at specific sectors, the indirect portfolios of ICPFs are more similar to each another from a geographical point of view. By contrast, households display more heterogeneity.

Chart 12

The geographical similarity of indirect holdings is very high, partly due to the high level of diversification of IF portfolios.

Similarity of indirect portfolios by country sector

(pure number, Q4 2016)



Sources: SHS, Lipper Investment Management, ECB own calculations. The holders are divided into sectors: households and non-profit institutions serving households (HH and NPI), insurance corporations and pension funds (ICPF), and banks. The chart is symmetric. A blue cell indicates that the portfolio weights of two country-sectors are uncorrelated, while a red cell indicates that the portfolio weights are the same. Colours within this range quantify the degree of similarity.

5 Financial stability considerations

Greater deepening and integration is beneficial for firms to the extent that it provides a spare tyre in respect of bank loans, although it also changes the way vulnerabilities can affect the euro area financial system.²³⁵ A financial stability assessment of vulnerabilities rests on two main elements: the potential triggers of stress and their propagation through the financial system. With regard to triggers, bonds are constantly evaluated by financial markets, which can make them more vulnerable than loans to sharp risk repricing in financial markets or changes in risk-free interest rates. Looking at historical examples around the world, in 1994 the yields on 10-year US Treasury Bonds increased by more than 100 basis points over a very short period of time. In 2003, the rebalancing of banks' portfolios in Japan sent the 10-year JGB yields to a high level – well above any estimate of Value at

²³⁵ Recent literature provides evidence that a more diversified financial structure, implying more market-based debt financing, reduces systemic risk (see Bats, J. and Houben, A., "Bank-based versus market-based financing: implications for systemic risk", *Working Paper*, Danmarks Nationalbank, 2017).

Risk bounds. With regard to potential propagation mechanisms, the substitution of bank loan financing by market-based financing through bonds has helped to reduce corporate exposures of banks, potentially making them safer by moving this risk onto the balance sheets of other institutions, primarily ICPFs and IFs. These institutions have specific preferences and resilience in respect of shocks: how such characteristics can affect the financial system as a whole and contribute to systemic risk is still a key area for analysis.

Debt-based financial integration can make countries more vulnerable than equity-based financial integration, at the same level of integration. Cross-border equity investments (i.e. foreign direct and portfolio equity flows) allow foreign investors to fully share risks with nonfinancial companies. When a firm is in distress, dividends decrease and shareholders bear the losses. When financial integration occurs via debt instead, a firm will need to borrow in the bad times and repay the debt after the storm has been weathered. In systemic crises, involving a whole country and/or sector, companies might not be able to issue debt. The burden of adjustment is left to private savings, which might lead to rapidly declining consumption and a deepening recession.²³⁶

A key trigger can be an abrupt and sizeable repricing of risk premia in global financial markets, leading to a tightening of financial conditions. Recent reports by the ECB explain that a current key financial stability risk is that potential financial imbalances, which currently manifest themselves in high bond market prices and compressed financial spreads, might unwind abruptly²³⁷. Policy actions, such as the exit from highly accommodative monetary policy, would play a role in contributing to such a market correction. For example, the “Taper Tantrum” experience of 2013 demonstrates how policy can contribute to common responses by asset managers to a sell-off of assets²³⁸. The impact of risk repricing on the different sectors might also depend on the different regulations and valuation rules for bond holdings. The degree of financial integration can also affect how such triggers are transmitted in that it enhances the similarity of portfolios, as derived further below.

A second trigger can be dislocations in specific bond markets on a geographical basis. Firms which rely on a few specific markets in which to place their bonds (i.e. a form of concentration risk) can be negatively affected by bond market dislocations in those countries or by some institutions deciding to hoard liquidity in a precautionary manner, thereby reducing their support to firms. In this case, further financial integration, which supports diversification of issuance, can improve financial stability.

How a new system with greater market-based finance might respond to large shocks remains untested. The size and risk appetite of IFs are highly dependent

²³⁶ For a discussion of the implications of equity versus debt integration, see Kalemli-Ozcan, S., 2016 in Vox “The EZ Crisis: What went wrong with the European financial integration?”

²³⁷ See [Financial Stability Review](#), ECB, November 2017.

²³⁸ For an analysis of how unconventional monetary policies can encourage risk-taking, see Feroli, M., Kashyap, A. K., Schoenholtz, K. L. and Shin, H., “Market Tantrums and Monetary Policy”, *Chicago Booth Research Papers*, No 14-09, 2014.

on the economic cycle²³⁹, mainly due to their collective schemes, which can produce common responses across IFs to shocks. Fragility could arise from a sudden rebalancing of IFs' portfolios: following large shocks in one or a in group of countries, IFs might isolate such countries and concentrate their holdings in other countries to protect their investors. This could occur more quickly than for retail investors²⁴⁰. So, while diversification offers protection in the case of small idiosyncratic shocks, the system might behave differently when hit by large systemic shocks²⁴¹.

Box 3

Using networks to measure connections between issuers and holders

This special feature uses network analysis to understand how holders are interconnected via overlapping portfolios. The “overlap network” measures the amount of common holdings between different country sectors. Nodes represent different country sectors and each link measures the sum of common holdings (computed at ISIN level) of two different country-sectors. The network is undirected. The matrix representation of the network is called “overlap-matrix”. Recent studies show that under an assumption of proportional selling of portfolios in distress, the overlap matrix, weighted by a liquidity measure for each asset class, summarises some key financial stability properties such as the vulnerability of the market to fire sales²⁴².

A network community is a subset of nodes which are more strongly interconnected by common holdings.

Common NFC bond holdings show a relatively sparse network (Charts 13-14).

Investment funds and ICPFs are linked in a network by holding common assets (“asset overlap network”): interconnectedness in such a network represents one potential channel for contagion to propagate through the financial system. Shocks may originate either from the corporate or the financial sector. In either case the trigger is a situation of distress which forces a large sell-off of bonds. This negatively affects the market value of bonds on the balance sheets of all institutions with common exposures, which suffer losses and might be forced (either by regulation or by market pressure) to meet some constraints on their balance sheets (e.g. leverage ratios, liquidity, etc.). An initial spark in one institution can then force other institutions to sell assets, exerting additional downward pressures on prices and finally igniting a fire sale.

²³⁹ See Rajan, R.G., “Has Financial Development Made the World Riskier?”, *NBER Working Papers*, No 11728, National Bureau of Economic Research, Inc, 2005.

²⁴⁰ For an analysis of the dynamics of portfolio rebalancing by retail investors, see Calvet, L. E., Campbell, J. Y., and Sodini, P. “Fight or flight? Portfolio rebalancing by individual investors,” *The Quarterly Journal of Economics*, Vol. 124(1), 2009, pp. 301–348.

²⁴¹ For a discussion of the potential effects of diversification on systemic risk, see Haldane, A., “[Rethinking the financial network](#)”, Speech delivered at the Financial Student Association, Amsterdam, The Netherlands, April 2009.

²⁴² For a study of the impact of fire sales in a network of financial institutions with common asset holdings, and leverage or capital constraints, see Cont R. and Schaanning, E., “[Fire sales, indirect contagion and systemic stress-testing](#)”, *Norges Bank Working Paper*, 2017,

A subset of countries and sectors are more strongly interconnected as they share more similar portfolio holdings. This defines a “network community” which includes both IF and ICPF in Germany, France, Ireland, Italy, Luxemburg and the Netherlands as denoted in black in the charts. The overlapping holdings between these country sectors increased slightly between Q4 2014 and Q2 2017.

Chart 13

Network of overlaps shows a community...

Matrix of overlaps in Q4 2014

(EUR billions)

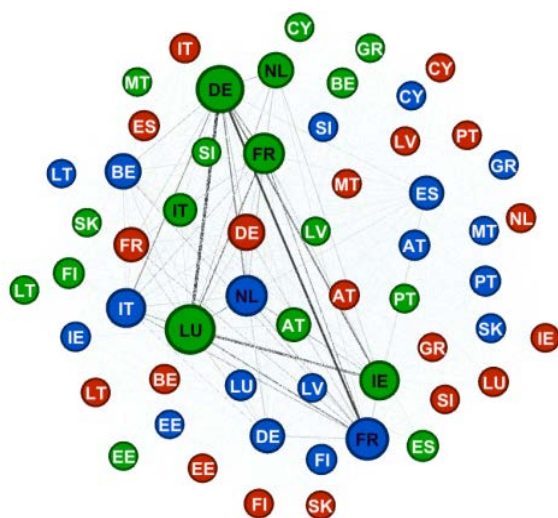
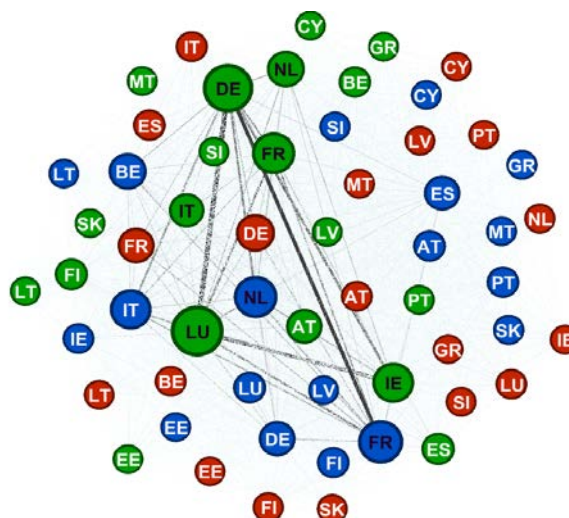


Chart 14

...which intensified over time.

Matrix of overlaps in Q2 2017

(EUR billions)



Sources: SHS and ECB own calculations.

Notes: Each node represents a country sector. Red denotes Banks, Green IFs and Blue ICPFs. Community is denoted in black. The size of the node is proportional to its total holdings of NFC bonds. A link between a pair of nodes represents the sum of their common holdings.

Additional factors beyond overlaps are probably necessary to spark contagion, also given the existing relatively sparse network. Overall, the network of common holdings (Charts 13-14) does not appear to be particularly strongly connected. However, the amplification of shocks in the network is conditional on a number of factors. First, the larger the initial shock, the higher the probability of transmission. This may hinge on changes in the properties of the network itself: when shocks intensify beyond a certain threshold the network may become fragile²⁴³. Second, contagion is more likely to emerge in an environment of reduced bond market liquidity. Recent reports by the ECB stated that a key financial stability risk was “Liquidity risks in the non-bank financial sector with potential spillovers to the broader financial system”²⁴⁴. IFs might display volatile behaviour, depending on how market shocks and the liquidity of underlying bonds²⁴⁵ influence

²⁴³ Interconnections can propagate shocks and act as amplifiers as losses cascade. See Haldane (2009), for an explanation of the “robust-yet-fragile” property of connected networks.

²⁴⁴ See, for example, [Financial Stability Review](#), ECB, November 2017.

²⁴⁵ The liquidity of corporate bond markets is not the object of this special feature. A recent [study](#) sponsored by the European Commission uses new types of data (MIFID I, clearing data from Euroclear, transaction data from prominent Electronic Trading platforms) to shed some light on the drivers of liquidity in bond markets.

customer funds' redemptions²⁴⁶. As a result, IFs might come under pressure from both sides of the balance sheet²⁴⁷. Under specific conditions, a shock could propagate via fire sales across the network, depending on institution specific characteristics (e.g. how sensitive their balance sheet is to changes in prices), the level of interconnectedness, diversification of the portfolios and market liquidity²⁴⁸.

Well-developed bond and loan markets are important in the context of appropriate monitoring and effective regulatory and supervisory setup. The further integration of bond markets is on the agenda of the Capital Market Union and other connected initiatives. Also in this context, the European Commission has recently published [a report](#) on a number of potential regulatory actions aimed at favouring further developments. At the same time, there is a need for macroprudential monitoring of the deepening of such markets, as well as further analysis on both ICPFs and IFs, also in the context of an effective regulatory and supervisory setup.

²⁴⁶ For an empirical study of corporate bond mutual funds, see Goldstein, I., Jiang, H. and Ng, D.T., 2017, "Investor flows and fragility in corporate bond funds", *Journal of Financial Economics*, Vol. 126(3), 592-613.

²⁴⁷ See Feroli et al. 2014, and Chen, Goldstein, Jiang, 2010, for an analysis on amplified asset sales arising from strategic complementarities in IFs.

²⁴⁸ For a deeper analysis on liquidity risk in a network of financial institutions, see Cifuentes, R., Shin, H.S. and Ferrucci, G., "Liquidity Risk and Contagion," *Journal of the European Economic Association*, MIT Press, 3(2-3), 2005, pp. 556-566.

Special feature C: An empirical assessment of the Feldstein-Horioka's saving-retention coefficient as a measure of financial integration in the euro area

Prepared by Michele Lenza

Feldstein and Horioka (1980)²⁴⁹ conjectured that, if capital is mobile, investment in a specific country should not be restricted by domestic saving and, hence, the correlation between these two variables should be low. This idea underpins the use of the saving-retention coefficient, a regression-based measure of the correlation between domestic saving and investment as a measure of capital mobility and, by consequence, of the degree of financial integration across a set of countries. This Special feature assesses whether this methodology can be used to measure financial integration in the euro area.

Cross-country panel estimations over the last three decades suggest that the saving-retention coefficient in Feldstein-Horioka type regressions is quite small for the euro area, reflecting a high degree of capital mobility. However, in reaching this conclusion it is important to control for the effects of global shocks, whose omission biases the saving-retention coefficient in an upward direction.

The saving-retention coefficient can be estimated in a time-varying manner in order to continuously monitor the process of financial integration. For example, estimations of the coefficient for “rolling” data windows of five or 15 years seem to be consistent with a pre-crisis increase in capital mobility and a temporary post-crisis retrenchment across euro area countries.

The time-varying measures, however, show significant volatility, which makes them difficult to interpret in order to reveal financial integration trends. Moreover, they illustrate an important trade-off in the use of the Feldstein-Horioka methodology for ongoing surveillance. The shorter the rolling data windows are, the more representative the estimated coefficients of the situation will be at a given point in time, although trends will be identified less clearly. The longer the data windows are, the more clearly medium-term trends will emerge, although the interpretation of the coefficients will be less timely. In conclusion, the strong volatility of estimated Feldstein-Horioka saving-retention coefficients seems to make it challenging to use this methodology for regular financial integration assessments in the euro area over time.

²⁴⁹ Feldstein, M. S., and Horioka, C. Y., “Domestic saving and international capital flows”, *Economic Journal*, Vol. 90, 1980, pp. 314-329.

1 The Feldstein-Horioka puzzle

The “saving retention coefficient” in Feldstein and Horioka (1980) measures the degree to which domestic saving and investment ratios to GDP are correlated, for a panel of countries. A high value (i.e. positive and statistically significant) of the saving-retention coefficient would signal that capital is immobile internationally and would, therefore, indicate a low degree of international financial integration. The idea is that if capital is mobile domestic investment will not be restricted by domestic saving, so there will be a low correlation between investment and saving.

In Feldstein and Horioka (1980), the coefficient was estimated using cross-country regressions (for OECD countries) of long-run averages of investment and saving to GDP ratios. Feldstein and Horioka found that the coefficient was high and positive for a panel of OECD countries and concluded that capital mobility was low at that time. Although Feldstein and Horioka, even then, were puzzled by their findings, it could be argued that the sample in their paper was characterised by a relatively low degree of capital mobility.

However, the finding that the saving-retention coefficient is high has been replicated in other more recent studies – using different samples, country coverage and estimation methods – over the last four decades, with only minor modifications. It is to some extent puzzling that the correlation between domestic saving and investment remained stubbornly high in the decades following the publication of Feldstein and Horioka’s paper, even though interest parity studies and casual empiricism have revealed a very high degree of international capital mobility. Indeed, over the last four decades advanced economies have experienced widespread deregulation of financial markets, removing impediments to the cross-border trading of financial instruments, as well as information and communication technology (ICT) advances which facilitate the international transfer of capital.

To give an idea of the prominence of the Feldstein-Horioka puzzle in the international economics literature, Obstfeld and Rogoff (2000) classified it as one of the six major puzzles in international macroeconomics and, of these, the “mother of all puzzles”.²⁵⁰

2 The major lines of criticism and interpretation of the puzzle

The Feldstein-Horioka puzzle stimulated several different reactions, which tended either to challenge it on methodological grounds or to suggest interpretations de-emphasising the relationship between the saving-retention coefficient and capital mobility and financial integration. There now follows an

²⁵⁰ Obstfeld, M. and Rogoff, K., “The six major puzzles in macroeconomics: Is there a common cause?”, in Bernanke, B.S. and Rogoff, K. (eds.), *NBER Macroeconomics Annual 2000*, Vol. 15, 2000, pp. 339-412.

attempt to provide a succinct survey of the most prominent debates.²⁵¹ One line of criticism has focused on the fact that saving is endogenous, so the FH-type regressions would be plagued by simultaneity bias. It has also been noted that it is not clear whether the FH finding, particularly for panel regressions, captures permanent or transitory effects, the latter being less relevant to an assessment of capital mobility. Moreover, government policy or market discipline might constrain the dynamics of the current account, implying a correlation between saving and investment which does not reveal anything about capital mobility per se. Finally, inaccuracies in OECD saving and investment data were also invoked as a possible reason for the puzzling correlation.

In the end, none of the above-mentioned lines of criticism was able to solve the Feldstein-Horioka puzzle. Many studies have accepted the empirical finding and have, instead, raised doubts as to whether the saving-retention coefficient can be interpreted as a measure of international capital mobility. It has been argued that it is, in practice, not entirely clear what structural parameters are captured by the regression coefficient in the Feldstein-Horioka regression, so the latter should not be viewed as a method for assessing capital mobility. More recently, a number of studies have emphasised that the Feldstein-Horioka puzzle might also mainly reflect the lack of international mobility of goods rather than capital, revealing the existence of trade frictions rather than imperfect international capital markets.²⁵²

3 A general equilibrium explanation of the Feldstein-Horioka puzzle

Giannone and Lenza (2010)²⁵³ have advanced an explanation for the Feldstein-Horioka puzzle based on what is probably the most intuitive reason for the empirical failure of the FH logic: the FH reasoning is based on partial equilibrium considerations. Specifically, it disregards the fact that economic fluctuations are also driven by global shocks and that the world as a whole is a closed economy. If, therefore, in response to global shocks, all countries wished to invest more, no country would be able to invest more than it can save and, instead, the world interest rate would increase to re-balance world saving and desired world investment.

An economic argument based on more sophisticated general equilibrium considerations implies that the saving-retention coefficient can be a

²⁵¹ For two extensive surveys of the criticism and the explanations of the puzzle, see Coakley, J., Kulasi, F. and Smith, R., "The Feldstein-Horioka Puzzle and Capital Mobility: A Review", *International Journal of Finance and Economics*, Vol. 3, No 2, 1998, pp. 169-188 and Apergis, N. and Tsoumas, C., "A survey of the Feldstein-Horioka puzzle: What has been done and where we stand", *Research in Economics*, Vol. 63, No 2, 2009, pp. 64-76.

²⁵² See, Ford, N. and Horioka, C., "The 'real' explanation of the Feldstein-Horioka puzzle", *NBER Working Papers*, No 22081, National Bureau of Economic Research, Cambridge, MA, 2016, and Eaton, J., Kortum, S. S. and Neiman, B., "Obstfeld and Rogoff's international macro puzzles: A quantitative assessment", *NBER Working Papers*, No 21774, National Bureau of Economic Research, Cambridge, MA, 2015.

²⁵³ Giannone, D. and Lenza, M., "The Feldstein-Horioka Fact", *NBER International Seminar on Macroeconomics*, University of Chicago Press, Vol. 6(1), 2010, pp. 103-117.

meaningful measure of financial integration, but only to the extent that studies control for the effects of global shocks in the regressions of investment over saving ratios. This economic argument was one of the first to be put forward to interpret the high saving-retention coefficient in OECD countries. It also reflects the idea that some OECD countries are large so an increase in, for example, their desire to invest would lead to an offsetting change in the world interest rate.

In common with most of the lines of interpretation of the Feldstein-Horioka puzzle surveyed in the previous section, an economic argument based on general equilibrium considerations also initially failed to settle the issue. A number of researchers attempted to control for the effects of global shocks after the seminal FH paper was published, but their results were similar to the original FH results.²⁵⁴

However, Giannone and Lenza (2010) show that the methods generally used to control for global shocks crucially imply that the effects of global shocks are homogeneous over all countries under analysis. This assumption appears to be extremely restrictive and very likely to lead to a miss-specification of the regressions (consider, for example, the differential effects of shocks to the oil price on oil exporters and oil importers).

The paper therefore proposes a novel panel regression method which controls for global shocks that have potentially heterogeneous effects across countries. In practice, the first step is to derive a measure of global shocks. Instead of assuming a number of specific global shocks, the paper extracts a measure of global sources of fluctuations from saving and investment ratios themselves. This is in the form of a few factors that explain the bulk of the global fluctuations in the variables. Next, it augments the traditional panel regressions of investment to GDP ratios on saving to GDP ratios by the estimated factors, allowing the latter have country-specific effects.

The saving-retention coefficient estimated in the augmented regressions measures the relationship between investment and saving ratios, conditional on shocks that do not have a global nature such as, for example, purely country-specific shocks. In response to those shocks and in the presence of perfect capital mobility, individual countries should be able to, for example, finance desired excess investment on international financial markets, breaking the link with domestic saving.

The main result of the paper is that the saving-retention coefficient estimated in the augmented regression described above for OECD countries was high in the 1970s, before monotonically decreasing over subsequent decades (almost reaching zero in the 2000s). This path reconciles the dynamics in the coefficient with the view that financial integration has increased over time and has been high in most recent decades.

²⁵⁴ For an illustration of this point, see Ventura, J., "Towards a Theory of Current Accounts", *World Economy*, Vol. 26, 2003, pp. 483-512.

4 Empirical evidence for the euro area

This section presents the results of an application of Giannone and Lenza (2010)'s methodology to a panel of 11 euro area countries (the 12 countries of the euro area after Greece's entry, excluding Luxembourg), for a sample covering the period 1978-2015. As in the original OECD application, the data are at annual frequencies. The empirical results refer to two panel regressions with fixed effects.

The first panel regression (Baseline FH panel regression) estimates the relationship between the investment to GDP ratio for country i in year t , $\frac{I_{i,t}}{Y_{i,t}}$, to the saving to GDP ratio for country i in year t , $\frac{S_{i,t}}{Y_{i,t}}$:

$$\frac{I_{i,t}}{Y_{i,t}} = a_i + b * \frac{S_{i,t}}{Y_{i,t}} + a_{i,t}$$

As argued in the previous section, this regression may be affected by a sort of “omitted variable” bias due to a correlation between saving and investment deriving from global shocks.

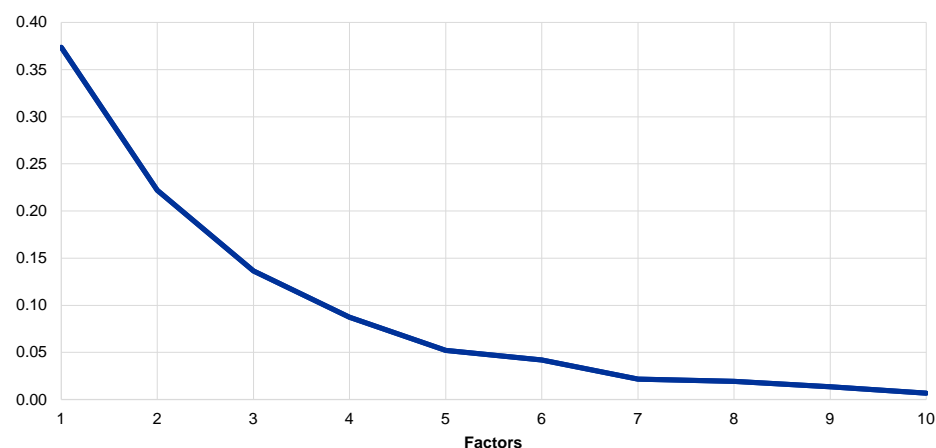
For this reason, additional regressors are included in the second panel regression, with country-specific coefficients, to control for the effects of global shocks. These regressors are derived ex ante from the panel of investment and saving ratios using standard factor model techniques, as per Giannone and Lenza (2010). Intuitively, the estimation strategy used to capture the effects of the global shocks is to compute aggregates of the investment and saving ratios, which “wash out” the effects of idiosyncratic (e.g. country-specific or regional) shocks. These estimated “factors” are therefore reduced form measures of the global shocks and, as such, do not lend themselves to any easy economic interpretation. Still, they fully reflect the impact of global shocks in the saving and investment ratios of the euro area countries and, for this reason, allow us to control for the effects of those shocks by including the estimated factors in the regressions.

In practice, the factors are the first and the second principal components of the data. Chart 1 shows the share of the total panel variance explained by the ten most relevant factors. The decision to include two factors in the regressions is justified by the fact that two factors alone explain a sizeable share of the variance in the variables – specifically more than 20% of the panel variance.

Chart 1

Percentage of panel variance explained by the first ten common factors

(share of total panel variance explained)



Notes: Share of the total panel variance (vertical axis) explained by the first ten factors (horizontal axis). The ten factors are estimated by means of principal components of the saving and investment to GDP ratios of the eleven countries in the sample for the period 1978-2015.

The factor-augmented panel regression adds the vector of the estimated factors (f_t), with country-specific coefficients (g_i to capture the possibly heterogeneous effects of global shocks) to the baseline FH panel regression:

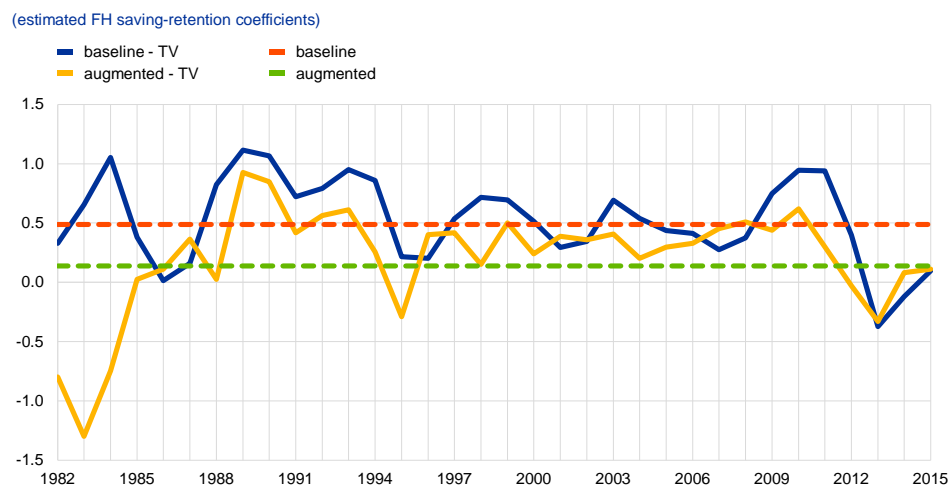
$$\frac{I_{i,t}}{Y_{i,t}} = c_i + d * \frac{S_{i,t}}{Y_{i,t}} + g_i * f_t + u_{i,t}$$

Both regressions are run in two modes, over the full sample and over consecutive rolling windows. The regression over the full sample (1978-2015) is run to investigate whether it is important to control for global factors in the euro area panel.

However, monitoring the progress of financial integration in the euro area requires a more timely assessment of the FH measures and, therefore, the two panel regressions above are also run over rolling windows to investigate to what extent the FH coefficients provide a useful indication of the evolution of financial integration over time. Chart 2 reports the results. The dashed, time-invariant lines (red for baseline and blue for the factor augmented regression) represent the coefficient estimates in the full sample. The solid lines show the estimates in rolling windows of five years (following the same colour convention as that used for the two regression lines). The dates on the horizontal axis refer to the last year in the rolling window.

Chart 2

Results of a factor-augmented panel regression on full sample and five-year rolling windows



Notes: The solid lines refer to the time-varying estimates (five-year rolling regressions) while the dashed lines refer to the full sample (1978-2015). The red colour is used for the baseline panel equations, in which investment ratios are regressed over saving ratios, while the blue colour is used for the factor augmented regressions, in which two common factors of investment and saving ratios are also included among the regressors. The dates on the horizontal axis refer to the end of the rolling window (i.e. the coefficient estimated for 1985 is estimated over the period 1981-85). TV stands for time-varying.

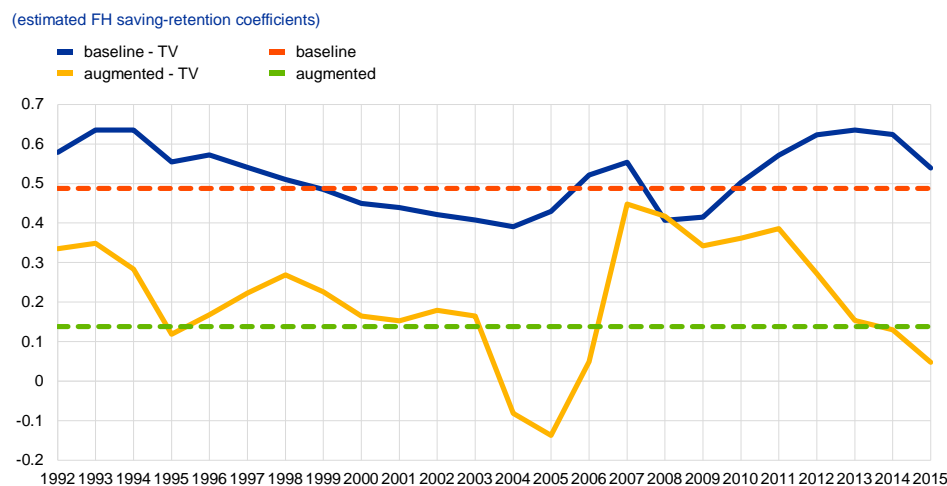
A comparison of the dashed lines illustrates the point that the baseline FH coefficient may be upwardly biased, due to the relevance of global shocks. The baseline FH regression suggests that the saving-retention coefficient in the euro area is about 0.5, while after controlling for the effects of global shocks it drops significantly, reaching 0.13. However, the time-varying evidence shows that it is difficult in practice to operationalise a solution of controlling for global shocks with the aim of continuously monitoring the status of capital mobility in the euro area.

In fact, the rolling estimates, while broadly consistent with the average (time-invariant) estimates, show significant volatility, which makes their interpretation more difficult. For example, the rolling estimation sometimes produces point estimates with negative values for the saving-retention coefficient that are extremely difficult to interpret and should be seen as only showing that the sample period is too short to provide a reliable assessment of the FH coefficient. It is generally very difficult to relate the occasionally large oscillations in the coefficients to economic events that mark a significant advance or retreat in financial integration in the euro area.

One possible way of smoothing out the estimates (which is more aligned with the view that financial integration refers to structural developments and therefore changes at a relatively low pace) is to increase the size of the rolling windows. Chart 3 presents the same output as Chart 2, for rolling windows of 15 years. Obviously, increasing the size of the windows represents an important trade-off, as it also delays the assessment since, at any given time, the rolling-window FH coefficient represents the average assessment for the previous 15 years, which is a quite long period of time.

Chart 3

Results of factor-augmented panel regression on full sample with fifteen-year rolling windows



Notes: The solid lines refer to the time-varying estimates (five-year rolling regressions) while the dashed lines refer to the full sample (1978-2015). The red colour is used for the baseline panel equations, in which investment ratios are regressed over saving ratios, while the blue colour is used for the factor augmented regressions, in which two common factors of investment and saving ratios are also included among the regressors. The dates on the horizontal axis refer to the end of the rolling window (i.e. the coefficient estimated for 1995 is estimated over the period 1981-85). TV stands for time-varying.

Chart 3 shows that increasing the size of the rolling windows has the expected effect of smoothing out the changes in the estimates, and a pre-crisis trend of increasing financial integration seems to be evident, with a possible temporary retrenchment associated with the crisis sample. However, the main difficulties in interpreting the FH coefficients are likely to remain. Some excessive volatility is still displayed that is difficult to interpret and, at the same time, the coefficients are much less timely in the way they characterise the status of financial integration, due to the wider window over which they are estimated.

Statistical annex:

Financial integration indicators 2018

1 Composite indicators of financial integration in Europe

The price and quantity-based financial integration composite indicators aggregate the data from a selection of market-specific indicators, thereby offering a comprehensive overview of financial integration in the euro area.

1.1 How the price-based financial integration composite indicator is constructed

The price-based financial integration composite indicator is constructed from a selection of price-based indicators that cover the four main segments, i.e. the money, bond, equity and banking markets.

As a first step the indicators to be aggregated are homogenised by the application of a transformation based on an indicator's empirical cumulative distribution function (CDF), which involves the computation of order statistics. For a time series of T observations of an indicator $x = (x_1, x_2, \dots, x_T)$, the data are ranked in ascending order, i.e. $x_{[1]} \leq x_{[2]} \leq \dots \leq x_{[T]}$, where $x_{[1]}$ represents the sample minimum ($\min(x)$) and $x_{[T]}$ the sample maximum ($\max(x)$). The transformation of the series requires the calculation of the empirical CDF, $F(x)$, which is equal to the number r of observations not exceeding a particular value x , divided by the total number T of observations in the sample:

$$F(x) := \begin{cases} \frac{r}{T} & \text{for } x_{[r]} \leq x < x_{[r+1]}, \quad r = 1, 2, \dots, T-1 \\ 1 & \text{for } x \geq x_{[T]} \end{cases}$$

If a value for x occurs more than once, the ranking number assigned to each of the observations is set to the average for the ranks covered.

All the input series used for the price-based financial integration composite indicator measure price dispersion, with higher values of price dispersion tending to indicate a lower degree of financial integration. The transformation of $1 - F(x)$ is also applied in order to ensure that higher values of the indicator indicate a higher level of financial integration. After transformation, all input series are unit free and are, approximately, uniformly distributed within a range of zero to one.

The problem still remains as to how to relate the transformed input series to a theoretical state of perfect integration – each indicator can only provide information concerning the relative degree of financial integration achieved over its specific period of observation. For instance, a (transformed) indicator might display an increasing trend for its data sample, signalling that financial integration has

improved. However, despite this trend, the actual state of integration might still be low in comparison with other market segments or with a state of perfect integration.

Next, a theoretical (ideal) benchmark value of zero is defined for all dispersion measures of financial integration and a sample-dependent scaling factor is constructed:²⁵⁵

$$\theta^P(x) := \frac{\max(x) - \min(x)}{\max(x) - 0},$$

where the superscript p differentiates the price-based scaling factor from that applied to the quantity-based financial integration composite indicator.

The above factor scales down each transformed series by the percentage representing the realised range of dispersion (the historical maximum minus the minimum dispersion) over the ideal dispersion range (the historical maximum minus the theoretical benchmark of zero). Since there is no theoretical upper bound for price dispersion, its highest observed value is set as the benchmark for the lowest degree of financial integration. The series $1 - F(x)$ is multiplied by $\theta^P(x)$ to produce the final indicator z^P , which is used as an input series in the computation of the price-based financial integration composite indicator:

$$z_t^P = [1 - F(x_t)]\theta^P(x).$$

All available indicators z^P are aggregated into sub-indices s_i^P for the four markets. The sub-index for each market segment is computed as the arithmetic average of its N_i constituent integration indicators after transformation:

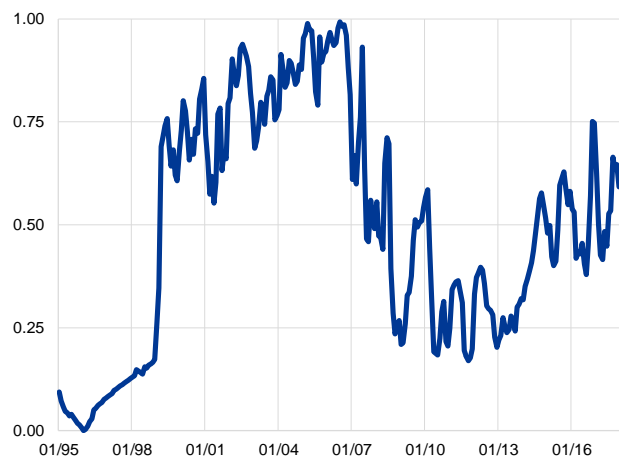
$$s_{i,t}^P = \frac{1}{N_i} \sum_{n=1}^{N_i} z_{n,t}^P, \quad \text{for } i = 1, \dots, 4.$$

²⁵⁵ A theoretical benchmark of zero price dispersion is an extreme case that can only hold true under ideal conditions. For instance, a zero dispersion benchmark implicitly assumes cross-country convergence in all fundamental factors driving equilibrium risk premia embedded in asset prices. However, cleaning asset prices from risk premia is a notoriously difficult exercise. In addition, the rank-based transformation of raw dispersion measures provides some robustness to risk-related price differentials as demonstrated in Hoffmann, P., Kremer, M. and Zaharia, S., "Financial integration in Europe through the lens of composite indicators", mimeo, 2015.

Chart S1

Sub-index for the money market

(monthly data, Jan. 1995 – Dec. 2017)



Sources: ECB and ECB calculations.
 Notes: The indicator aggregated into the sub-index is the cross-country standard deviation of unsecured interbank overnight lending rates. Data for Greece are excluded to preserve the information content of the indicator.

Chart S2

Sub-index for the bond market

(monthly data, Jan. 1995 – Dec. 2017)



Sources: ECB and ECB calculations.
 Notes: The indicators aggregated into the sub-index are the cross-country standard deviations of two and ten-year sovereign bond yields (Greece excluded), and the cross-country standard deviation of the bond yields of uncovered corporate bonds issued by non-financial corporations (data are aggregated at country level).

Chart S3

Sub-index for the equity market

(monthly data, Jan. 1995 – Dec. 2017)



Sources: ECB and ECB calculations.
 Notes: The indicators aggregated into the sub-index are the segmentation index and the absolute value of the difference between the cross-sectional dispersions in sector and country index returns. Data for Greece are included.

Chart S4

Sub-index for the banking market

(monthly data, Jan. 1995 – Dec. 2017)



Sources: ECB and ECB calculations.
 Notes: The indicators aggregated into the sub-index are the cross-country dispersions of interest rates on new loans to households (for consumer credit and total loans) and non-financial corporations, and the cross-country dispersions of deposit rates for households and non-financial corporations on deposits with agreed maturity. Data for Greece are included.

The sub-indices are further aggregated into the price-based financial integration composite indicator by computing weighted averages using size weights that reflect the relative size of the underlying financial market segment:

$$I_t^P = \sum_{i=1}^4 w_i^P s_{i,t}^P$$

Chart S5

Price-based financial integration composite indicator

(monthly data, Jan. 1995 – Dec. 2017)



Sources: ECB and ECB calculations.

The size weights are computed as the relative average amounts outstanding (taken from the aggregated euro area financial accounts) for the base period 1997-2014, producing the following constant weights w_i^P : money markets 17%, bond markets 36%, equity markets 15% and banking markets 32%.

1.2 How the quantity-based financial integration composite indicator is constructed

The quantity-based financial integration composite indicator is constructed in a manner similar to that used for the price-based composite indicator described above – the main differences are the definition of the input indicators and the scaling factor. The indicators used are intra-euro area cross-border holdings expressed as a percentage of total holdings for the euro area.²⁵⁶ A simple portfolio perspective is adopted to derive the scaling factor, which is based on the theoretical benchmark for the share of cross-border securities holdings. To this end it is assumed that in a perfectly integrated market all agents invest in the market portfolio, which implies that all investors should hold a portfolio whose assets are proportional to the total supply of assets in the economy. Accordingly, each country's share of the total amount outstanding is computed for the relevant market segment. If a country k represents a share $\omega_{k,t}$ of the total amount outstanding of a given asset class at a time t , the portfolio of domestic investors should have a cross-border share of $1 - \omega_{k,t}$. Therefore, a time-varying benchmark can be computed for a given market segment with K countries as:

$$BM_t = \sum_{k=1}^K \omega_{k,t}(1 - \omega_{k,t}) \text{ for } t = 1, \dots, T.$$

²⁵⁶ The total is calculated as the sum of intra-euro area cross-border and domestic amounts.

This yields the following sample-dependent, time-varying scaling factor:

$$\theta^Q(x_t) := \frac{\max(x)}{BM_t},$$

where $\max(x)$ represents the sample maximum for the time series of an indicator $x = (x_1, x_2, \dots, x_T)$.

The transformed and scaled indicators z^Q are defined as:²⁵⁷

$$z_t^Q = F(x_t)\theta^Q(x_t).$$

These are further aggregated into three sub-indices: interbank markets (which include the money and banking markets), bond markets and equity markets:

$$s_{i,t}^Q = \frac{1}{N_i} \sum_{n=1}^{N_i} z_{n,t}^Q, \quad \text{for } i = 1, \dots, 3.$$

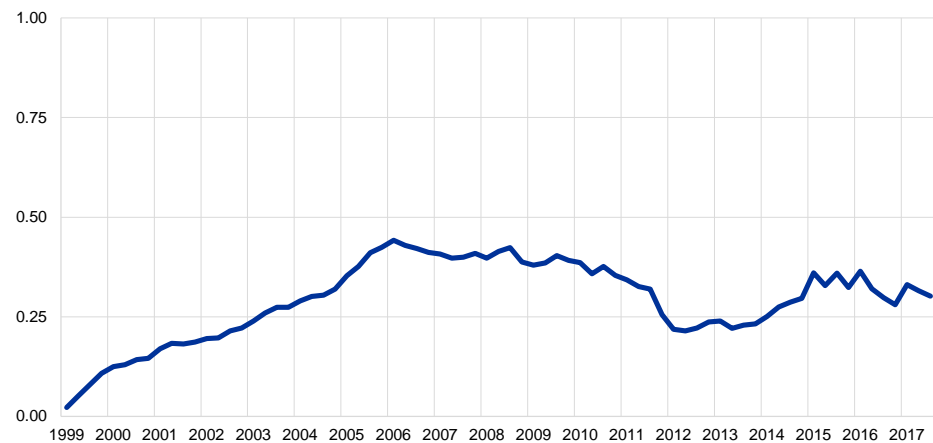
Finally, the quantity-based financial integration composite indicator is calculated as the weighted average²⁵⁸ of the sub-indices:

$$I_t^Q = \sum_{i=1}^3 w_i^Q s_{i,t}^Q$$

Chart S6

Quantity-based financial integration composite indicator

(quarterly data, Q1 1999 – Q3 2017)



Sources: ECB and ECB calculations.

Notes: The raw indicators are the share of cross-border lending among MFIs of the euro area, MFIs' and investment funds' shares of cross-border holdings of debt securities of all maturities issued by euro area governments and non-financial corporations, and MFIs' and investment funds' cross-border holdings of equity issued by euro area residents. The raw indicator on the share of cross-border lending among MFIs has been adjusted to exclude loans and deposits to the Eurosystem. Holdings of debt securities and equities by investment funds from Luxembourg are excluded.

²⁵⁷ For the quantity-based indicators, higher values of $F(x)$ indicate higher levels of integration.

²⁵⁸ As is the case for price-based indicators, the weights are determined using aggregated euro area financial accounts. Given that they represent the largest share of interbank markets, only money markets are considered in the weighting. It is, therefore, the initial shares of the money, bond and equity markets that are used to recalculate weights that add up to 100%. This produces the following weights w_i^Q : interbank markets 23%, bond markets 54% and equity markets 23%.

1.3 References

The analysis is based on Hollo, D., Kremer M. and Lo Duca, M., “CISS – A composite indicator of systemic stress in the financial system”, *Working Paper Series*, No 1426, ECB, March 2012; and Hoffmann, P., Kremer, M. and Zaharia, S., *Financial integration in Europe through the lens of composite indicators*, mimeo 2015.

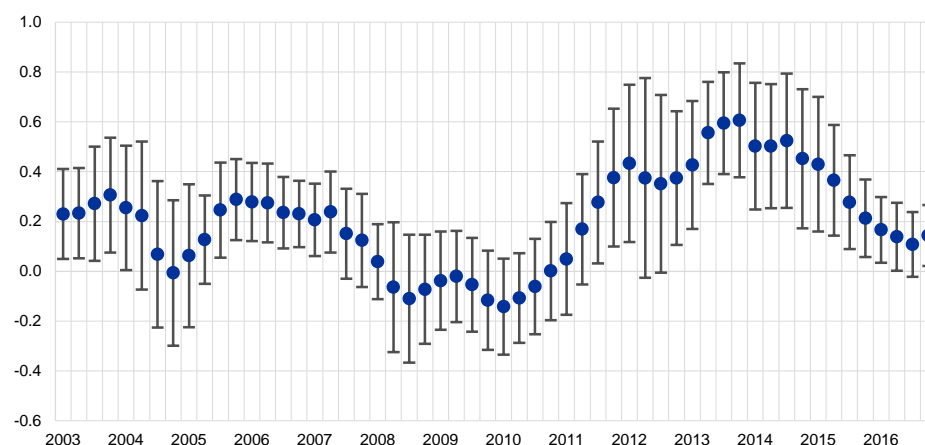
2 Indicator of risk sharing

This indicator measures the extent to which changes in domestic consumption co-move with changes in domestic GDP, thus gauging the level of risk sharing. Under a hypothesis of perfect risk sharing, domestic consumption would not correlate with domestic output; the indicator controls for changes in relative prices.

Chart S7

Correlation between consumption and output across euro area countries

(quarterly data, Q4 2003 – Q3 2017)



Sources: ECB and ECB calculations.

Notes: The chart plots point estimates (dots) and confidence intervals (whiskers) from a panel regression of changes in country per capita consumption on changes in country per capita GDP, controlling for changes in relative prices (the ratio of the respective country consumer price index to the euro area consumer price index), and using a twelve-quarter rolling window. The data sample comprises the euro area EA-12 countries excluding Ireland. Each dot and whisker is estimated for data from the twelve quarters preceding the time indicated on the horizontal axis (rolling window). Ireland is excluded from the calculation of the indicator owing to the unusually large revisions to the country's GDP growth figure for 2015 that were made in July 2016.

2.1 How the indicator of risk sharing is constructed

The indicator is estimated using the following regression:

$$\Delta \log C_{it} = \beta_y \Delta \log Y_{it} + \beta_{rer} \Delta RER_{it} + \varphi_i + \eta_t + \varepsilon_{it}$$

where $\Delta \log C_{it}$ is the percentage change in domestic consumption for each country i and each quarter t , $\Delta \log Y_{it}$ is the percentage change in domestic GDP for each country i and each quarter t , ΔRER_{it} is the percentage change in relative prices for each country i and each quarter t , expressed as the ratio of the relevant country

consumer price index to the euro area consumer price index, while φ_i and η_t are country and time-fixed effects respectively.

Under a hypothesis of perfect risk sharing, domestic consumption does not co-move with domestic output, and the coefficient for the change in domestic output should be equal to zero: $\beta_y = 0$.

2.2 References

The approach is based on Lewis, K., "What can explain the apparent lack of international risk-sharing?", *Journal of Political Economy* 104, 1996, pp. 267-297, and has been augmented to account for the role of relative price adjustments across countries.

3 Standard indicators

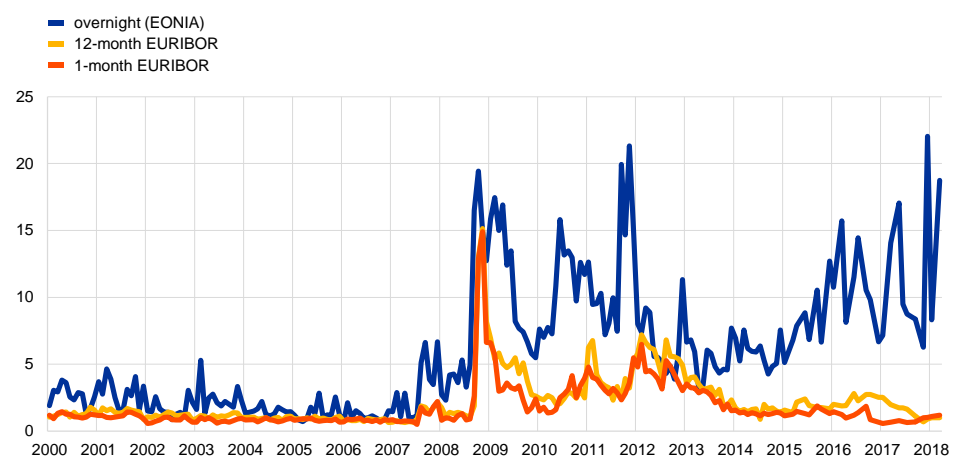
3.1 Money market indicators

3.1.1 Price-based indicators

Chart S8

Interquartile range of euro area countries' average unsecured interbank lending rates

(average interquartile range per maintenance period, in basis points, Jan. 2000 – Mar. 2018)



Sources: European Money Market Institute (EMMI) and ECB calculations.

Economic rationale

This indicator provides an approximation of the cross-country dispersion of interest rates in the euro money market for different maturities. In this regard, lower (higher)

dispersion is indicative of higher (lower) money market integration. In order to interpret the indicator various interfering factors, such as credit risk differences for the banks reporting the rates in different countries, must be taken into account. This is particularly the case for longer maturities.

Technical description

The indicator is constructed as follows:

$r_{t,c}$ is an average money market rate for a given maturity calculated for reporting banks located in country $c=1,\dots,C$, on day t (for EONIA the average is weighted by the reporting banks' turnover while for EURIBOR a simple average is used). The quartile rate $Q_{x,t}$ is the $(x/4) * (C + 1)$ -th term among the ascendingly ranked $r_{t,c}$ terms for countries C at date t . The money market rate dispersion indicator IQR_j is then defined as the average daily interquartile range for a given ECB reserve maintenance period j covering days $t=1,\dots,T$: $IQR_j = \frac{1}{T} \sum_{t=1}^T Q_{3,t} - Q_{1,t}$. A point on the curves in Chart S8 is thus the average interquartile range over the maintenance period calculated on the basis of daily observations.

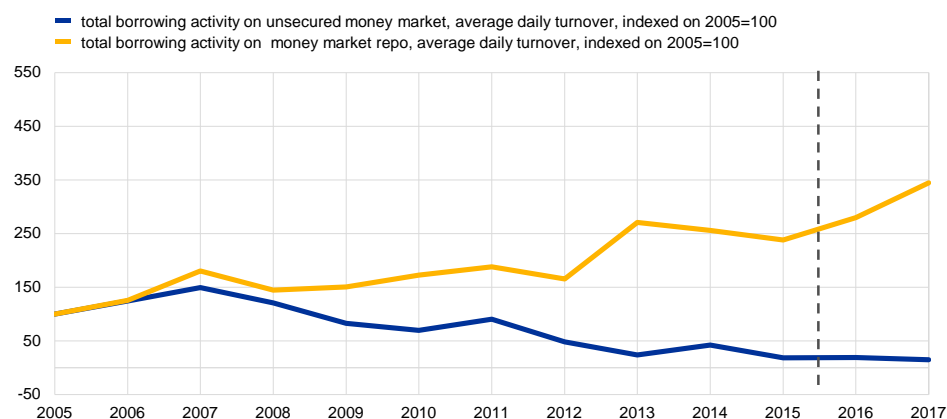
Note that the available data do not make it possible to ascertain whether a reported money market rate derives from a domestic or a cross-border transaction. Since the rates of cross-border transactions may be reported twice, the indicator may provide a lower bound of cross-border money market rate dispersion.

3.1.2 Quantity-based indicators

Chart S9

Borrowing activity in euro area secured and unsecured markets

(average daily turnover, 2005 = 100, annual data, 2005 – 2017)



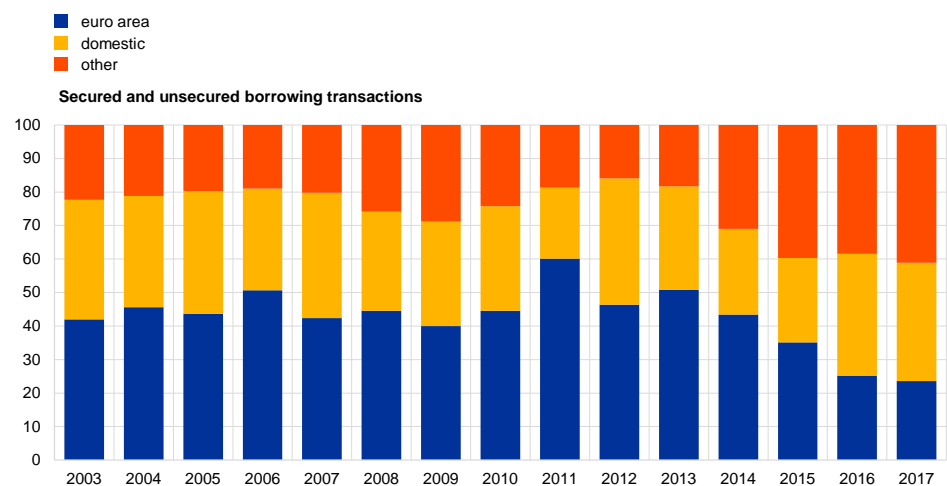
Sources: ECB's Euro Money Market Survey (EMMS) until end-2015 and ECB money market statistical reporting (MMSR) subsequently.

Notes: Data from 2016 are taken from the ECB MMSR²⁵⁹ for those reporting banks that were also part of the ECB Money Market Survey panel. The vertical dotted line indicates the transition to MMSR data.

Chart S10

Geographical counterparty breakdown for secured and unsecured transactions

(percentages of total transactions, annual data, 2003 – 2017)



Sources: ECB's Euro Money Market Survey (until end-2016) and MMSR (subsequently).

Notes: Data from 2016 are taken from the MMSR for those reporting banks that were also part of the Money Market Survey panel. They are shown as a percentage of total transactions for the second quarter for each year, except for 2016 when third quarter data were taken following the transition to MMSR data.

Economic rationale

The indicator reflects the degree of financial integration in money markets by considering the geographical location of the counterparties (domestic, euro area and

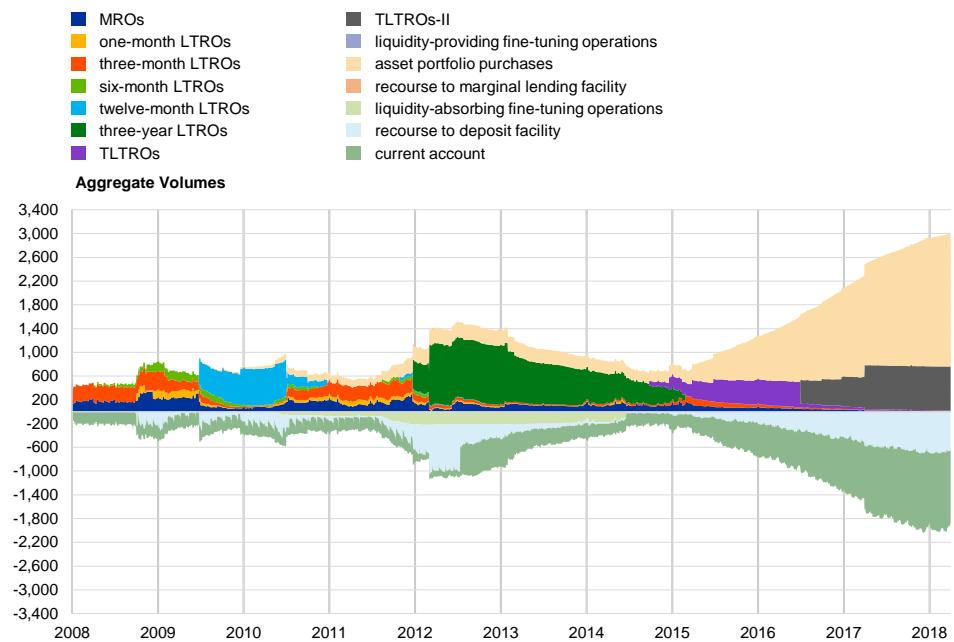
²⁵⁹ More information is available on the [ECB website](#).

other). The higher the share of transactions with non-domestic counterparties, the higher the level of financial integration. Transactions representing secured and unsecured borrowing are combined, although the trend is mainly driven by secured transactions, given that this market segment is larger than the unsecured market segment.

Chart S11

Recourse to the ECB's market operations and standing facilities

(EUR billions, daily data, Jan. 2008 – Mar. 2018)



Source: ECB.

Note: The marginal lending facility (MLF) is excluded.

Economic rationale

Greater recourse to Eurosystem refinancing operations, together with a significant degree of concentration with regard to central bank liquidity and a higher use of domestic collateral in Eurosystem refinancing operations, could provide evidence of money market dysfunction and fragmentation.

Chart S12

Use of cross-border collateral in Eurosystem monetary policy operations

(percentages of total collateral use, daily data, Dec. 2007 – Mar. 2018)



Source: ECB.

Economic rationale

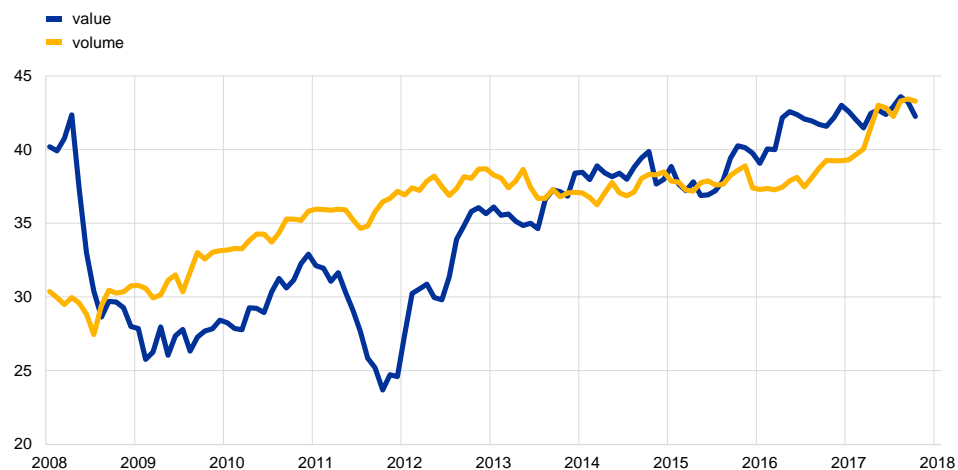
The trend towards greater use of domestic rather than cross-border collateral in Eurosystem liquidity-providing operations, which started with the financial crisis and has intensified since the onset of the euro area sovereign debt crisis, may be a sign that financial integration has regressed. In particular, until 2013 greater use of domestic collateral may have been the result of an increasing home bias among investors as well as an elevated use of self-originated marketable assets as collateral.

3.1.3 Other indicators

Chart S13

Share of cross-border activity in TARGET2

(percentages of total payments (values and volumes), monthly data, Jun. 2008 – Mar. 2018)



Sources: TARGET2 data and ECB calculations.

Notes: T2S and technical transactions are excluded. Cross-border activity is defined as a payment made between institutions holding accounts at different NCBs. Data for euro-denominated cross-border transactions are aggregated on a monthly basis.

Economic rationale

TARGET2²⁶⁰ is the real-time gross settlement system for the euro, operating on a single shared platform. Since its launch in May 2008, TARGET2 has offered banks further opportunities to centralise their euro-denominated payments in central bank money, thereby contributing to financial integration in Europe.

²⁶⁰ More information is available on the [ECB website](#).

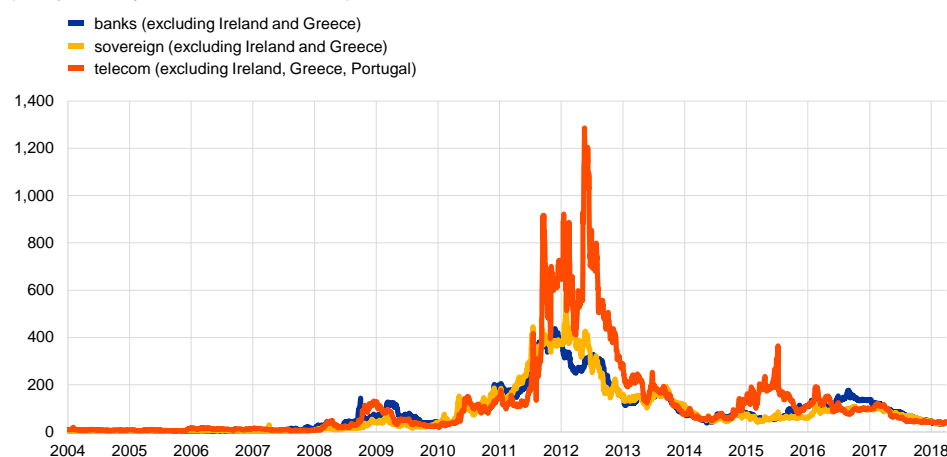
3.2 Securities market indicators

3.2.1 Price-based indicators

Chart S14

Five-year CDS premia dispersion across the euro area

(basis points, daily data, Jan. 2004 – Mar. 2018)



Sources: Thomson Reuters and ECB calculations.

Notes: The indicators are simple standard deviations of the country averages. The sovereign and bank CDS premia data do not include Ireland and Greece, given the very high premia for these countries. Ireland and Portugal are excluded from the telecommunications data owing to the very high CDS premia of their telecommunications companies.

"Sovereign" includes Germany, Spain, France, Italy, the Netherlands, Austria and Portugal.

"Banks" include ABN AMRO (NL), Banca Monte dei Paschi di Siena (IT), Banca Popolare di Milano (IT), Banco Comercial Português (PT), Banco Sabadell (ES), Novo Banco SA (PT), Banco Santander Central Hispano (ES), Erste Bank der österreichischen Sparkassen (AT), Bayerische HypoVereinbank (DE), BNP Paribas (FR), Deutsche Bank (DE), Commerzbank (DE), Crédit Agricole (FR), Dexia Group (BE), Fortis NL (NL), Intesa Sanpaolo SPA (IT), Mediobanca (IT), Natixis (FR), Nordea Bank (FI), Société Générale (FR) and UniCredito Italiano (IT).

"Telecoms" include Deutsche Telekom (DE), Orange (FR), Hellenic Telecommunications Organization (GR), KPN (NL), Telecom Italia (IT), Telefónica (ES) and Telekom Austria (AT).

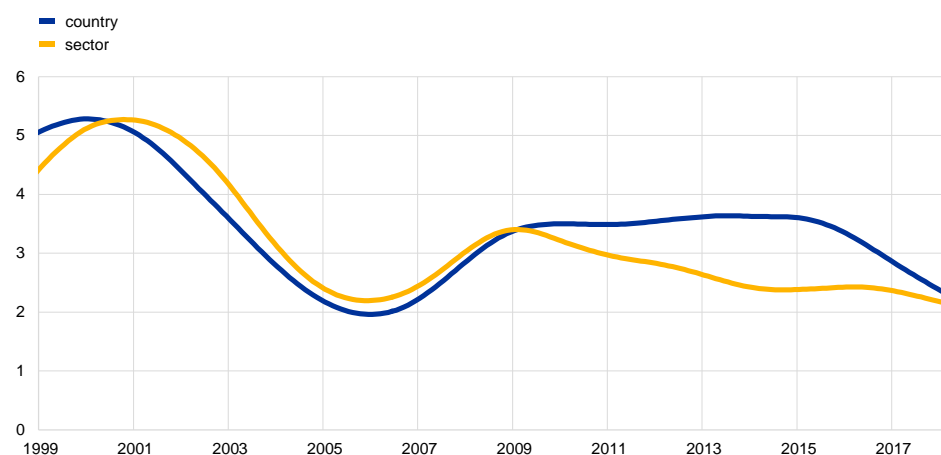
Economic rationale

The dispersion of credit default swap (CDS) premia for different sectors is considered to indicate the degree of dispersion of the cost of funding. Although a CDS premium primarily reflects the cost of insuring debt against default, it may also be regarded as a proxy for the cost of funding. Lower industry-level dispersion across the euro area (after excluding possible country-specific factors that could skew the dispersion) correlates with a higher level of integration in the financing of these entities (sovereigns, banks and telecommunications companies).

Chart S15

Country and sector dispersion in euro area equity returns

(percentages, monthly data, Jan. 1999 – Mar. 2018)



Sources: Thomson Reuters Datastream and ECB calculations.
Note: Euro-denominated (reinvested) dividends are included.

Economic rationale

The chart shows the dispersion in equity returns, across sectors and across countries, in the euro area, which reflects structural changes in the aggregate euro area equity market. Under conditions of full financial segmentation, the limited diversification opportunities lead to investors demanding high returns for holding shares in undiversified firms, so cross-country dispersion (which reflects not only cross-border fragmentation, but also the different sectoral composition of each country's economy) should be higher than cross-sectoral dispersion (which also reflects the differing performance of the underlying sectors). In contrast, in an integrated financial market there is no financial premium on sectoral or geographical diversification, so greater specialisation is affordable. This should reduce the gap between cross-country and cross-sectoral dispersion.

Technical description

The cross-sectoral dispersions are filtered using the Hodrick-Prescott smoothing technique, which provides a smooth estimate of the long-term trend component of the series. The smoothing parameter λ is equal to 14,400.

References

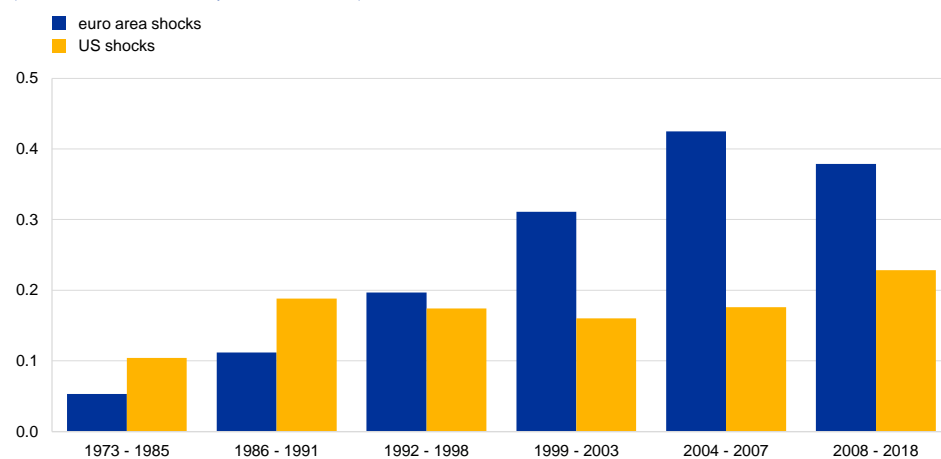
The indicator is based on an approach first presented by Adjaouté and Danthine; see Adjaouté, K. and Danthine, J.P., "European Financial Integration and Equity Returns: A Theory-based Assessment", in Gaspar, V. et al. (eds.), *Second ECB Central*

Banking Conference: The transformation of the European financial system, ECB, May 2003.

Chart S16

Proportion of the volatility of euro area country equity returns accounted for by euro area and US stock market shocks

(calculations based on weekly data, 1973 – 2018)



Sources: Thomson Reuters Datastream and ECB calculations.

Note: Calculations are based on weekly equity market indices (1973 – 2017).

Economic rationale

The chart shows the proportion of the total domestic volatility of country equity returns accounted for by euro area and US shocks. Following Baele et al. (2004): “An important implication of integration is that asset prices should only react to commonly-shared news. If there are no barriers to international investment, purely local shocks can generally be diversified away by investing in assets from different regions. Local shocks should therefore not constitute a systematic risk.”

“For the purpose of examining integration in local euro area equity markets, we need to distinguish between global and euro area-wide effects on equity returns in the euro area. To this end, the return on US stock markets is used as a proxy for world news, while the return on a euro area-wide stock market index, corrected for US news, is used as the euro factor.”

Technical description

The variance ratio is obtained by assuming that country-specific shocks are uncorrelated across countries and, similarly, that they do not correlate with euro area and US benchmark indices. The influence of euro area shocks may have been greater over the last few years.

In order to compare the relevance of euro area and US shocks to average changes in country returns, the indicators report the variance ratios, i.e. the proportions of

total domestic equity volatility explained by euro area and US shocks respectively. The model-based indicator is obtained by assuming that the total variance of individual country-specific returns is expressed by:

$$\sigma_{c,t}^2 = h_{c,t} + (\beta_t^{eu})^2 \sigma_{eu,t}^2 + (\beta_t^{us})^2 \sigma_{us,t}^2$$

where $h_{c,t}$ is the variance of the local shock component. The euro area variance ratio is then expressed by:

$$VR_{c,t}^{eu} = \frac{(\beta_t^{eu})^2 \sigma_{eu,t}^2}{\sigma_{c,t}^2}$$

and the US variance ratio by a corresponding equation. The conditional variances are obtained using a standard asymmetric GARCH (1,1) model.

For each period, the indicators report the unweighted average of the relative impact of euro area-wide factors, excluding US equity market fluctuations, on the variance of individual euro area countries' equity market indices (the "variance ratio"), and the unweighted average of the relative impact of US equity market fluctuations on the variance of euro area equity markets.

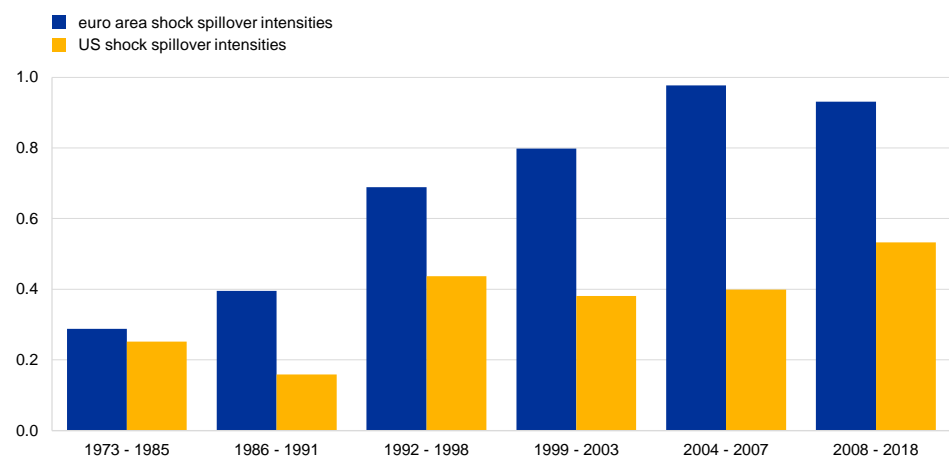
References

Baele, L., Ferrando, A., Hördahl, P., Krylova, E. and Monnet, C., "Measuring financial integration in the euro area", *Occasional Paper Series*, No 14, ECB, April 2004.

Chart S17

Euro area and US shock spillover intensity in individual euro area countries

(calculations based on weekly data, 1973 – 2018)



Sources: Thomson Reuters Datastream and ECB calculations.

Note: Calculations are based on weekly equity market indices (1973 – 2017).

Economic rationale

This chart compares the extent to which local euro area equity markets are sensitive to US market shocks and euro area-wide shocks.

Technical description

Empirical evidence suggests that equity returns are driven mostly by global factors. For this reason, both euro area-wide shocks and US shocks (a proxy for global factors) are included in the assessment of commonly shared news. To distinguish between global shocks and purely euro area shocks, it is assumed that euro area equity market developments are partly driven by events in the US market. It is also assumed that the proportion of local returns not explained by common factors is entirely attributable to local news.

In order to calculate the relative impact of euro area-wide and US stock market fluctuations on local stock market returns, the stock market returns of individual countries are modelled to include both an expected and an unexpected component, $\varepsilon_{c,t}$. The unexpected component is then broken down into a purely local shock ($e_{c,t}$) and a reaction to euro area news ($\varepsilon_{eu,t}$) and world (US) news ($\varepsilon_{us,t}$):

$$\varepsilon_{c,t} = e_{c,t} + \beta_{c,t}^{eu} \varepsilon_{eu,t} + \beta_{c,t}^{us} \varepsilon_{us,t}$$

The expected return is obtained by relating euro area and US returns to a constant term and to the returns in the previous period. The conditional variance of the error terms is governed by a bivariate asymmetric GARCH (1,1) model.

Coefficient β represents the country-dependent sensitivity (of the unexpected component) to euro area or US market changes. The analysis was performed over the periods 1973-1985, 1986-1991, 1992-1998, 1999-2003, 2004-2007 and 2008-2017. The reported indicator is the cross-country unweighted average of country-specific sensitivities (betas). A reported beta close to one on the chart indicates that, on average, all euro area countries respond to the corresponding shock (from either the euro area or the US). In a well-integrated euro area, the beta associated with the euro area shock should be close to one.

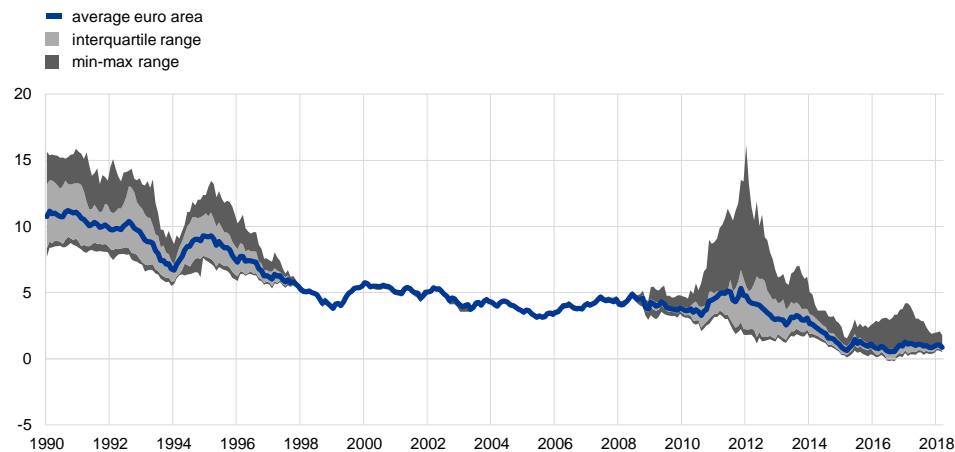
References

See Chart S16.

Chart S18

Dispersion of euro area ten-year sovereign bond yields

(percentages, monthly data, Jan. 1990 – Mar. 2018)



Sources: Bloomberg and ECB calculations.

Notes: The shaded areas represent the minimum-maximum range and the interquartile range of benchmark bond yields for the euro area countries. The yields for Estonia, Greece, Cyprus, Latvia, Lithuania, Malta, Slovenia and Slovakia are excluded owing to infrequent or even non-existent observations.

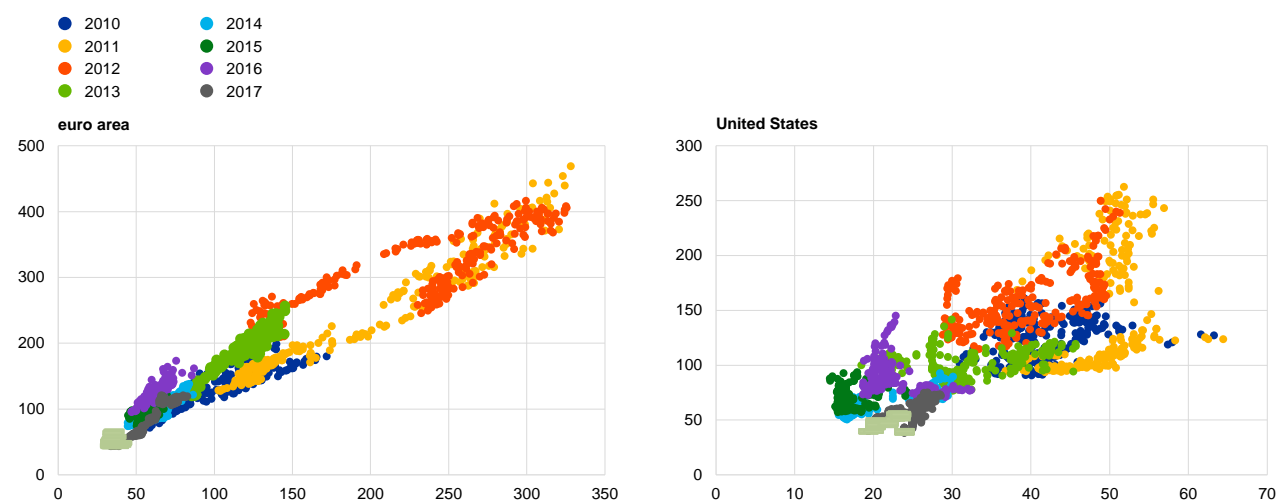
Economic rationale

Dispersion should be lower in a well-integrated market, as investors will not demand as high a premium to compensate for the risk of idiosyncratic shocks, while dispersion should be higher in a fragmented market.

Chart S19

Sovereign and bank CDS premia – euro area and the United States

(basis points, weighted average and median for US, daily data, Jan. 2010 – Mar. 2018)



Sources: Thomson Reuters and ECB calculations.

Notes: The euro area bank CDS premium is calculated as the weighted average of CDS premia for the main euro area banks (one bank per country weighted by the national capital key), while the euro area sovereign CDS premium is calculated as the weighted average of national sovereign CDS premia. For the US, the bank CDS premium is the median of the CDS premia for the eight largest US banks, while the sovereign CDS premium is the CDS premium for the US sovereign. CDS premia refer to five-year maturity senior debt.

Economic rationale

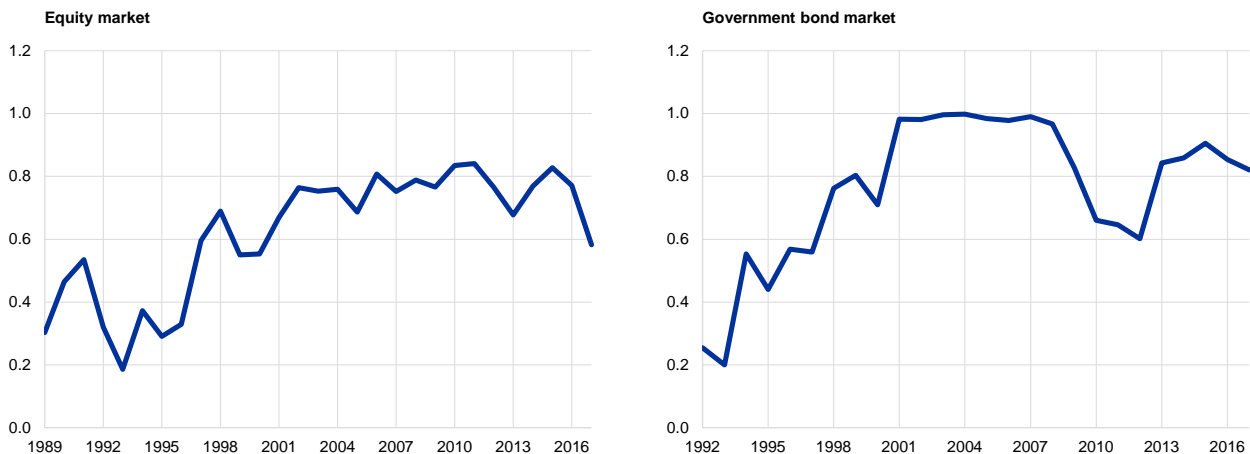
The close link between sovereign and bank creditworthiness is clearly shown by the high degree of correlation between sovereign CDS premia and bank CDS premia in euro area countries. This high correlation shows that there is a self-reinforcing loop between sovereign and bank risks, with doubts over the solvency of sovereigns feeding doubts over the solvency of banks and vice versa. These dynamics are much weaker in the United States, where the CDS premia of sovereigns and banks are less correlated.

The self-reinforcing loop between bank and sovereign risks, characterised by tight bank-sovereign linkages, could be one of the causes of the increasing heterogeneity of sovereign bond yields. This phenomenon impacts bond market integration in the euro area (and consequently the integration of the funding markets for corporates and banks).

Chart S20

Equity and government bond market integration based on common factor portfolios

(annual data, 1989 – 2017)



Sources: Thomson Reuters and ECB calculations.

Economic rationale

The indicator measures integration in the euro area equity and government bond markets, harnessing the explanatory power of common factor portfolios. For each calendar year, these portfolios are formed on the basis of a principal component analysis and are used in a simple regression framework to explain equity and bond market returns for each country. The measure is then computed as an average (median) R-squared across countries. In general, a higher figure indicates a more integrated market, where 1 implies perfect integration and 0 implies no integration.

Technical description

This measure of financial market integration for calendar year t is computed as the cross-sectional mean (median) R^2 that is obtained by estimating the following regression separately for each country i :

$$R_{i,t,\tau} = \alpha_{i,t} + \sum_{k=1}^K \beta_{i,t}^k \theta_{i,t}^k + \varepsilon_{i,t,\tau}$$

where $R_{i,t,\tau}$ is the market return in country i on trading day τ in year t , and $\theta_{i,t}^k$ is the return on the k^{th} common factor portfolio on the same day. The K common factor portfolios are obtained via principal component analysis, and it is assumed throughout that $K=3$. The weights (eigenvectors) for the factor portfolios in year t are calculated using data from year $t-1$.

In order to obtain a measure that is comparable across years, daily return data (on broad equity market indices and ten-year benchmark bonds) must be available from the beginning of the sample.

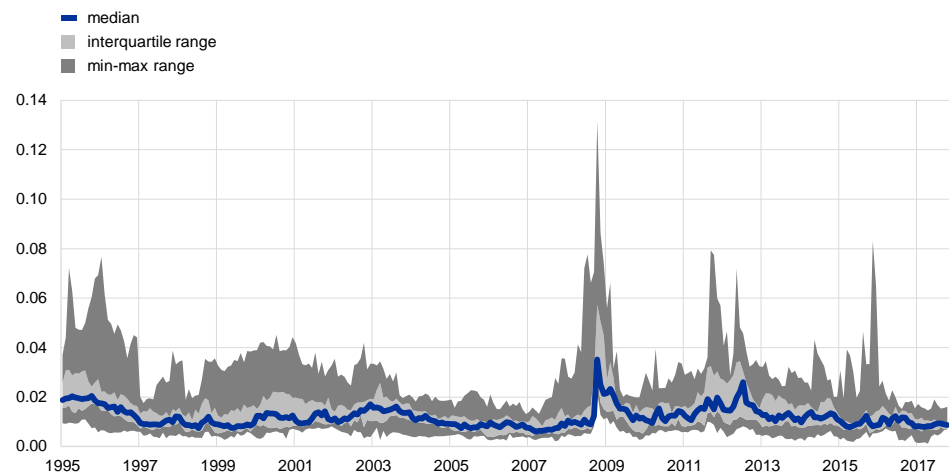
References

The analysis is based on Pukthuanthong, K. and Roll, R., "Global market integration: An alternative measure and its application", *Journal of Financial Economics*, Vol. 94, No 2, November 2009, pp. 214-232.

Chart S21

Equity market segmentation

(monthly data, Jan. 1995 – Dec. 2017)



Sources: Thomson Reuters and ECB calculations.

Economic rationale

This indicator measures the segmentation (the opposite of integration) of euro area equity markets via industry-level valuation differentials across countries.

Technical description

For each calendar month and industry sector, the absolute difference is calculated between the stock market valuation (based on analyst forecasts) of a specific sector for a given country, and the euro area average for that sector. The first step is to aggregate these absolute differences by calculating, for each country, the average of absolute differences, weighted by the share of each industry in the country's total stock market capitalisation. A higher value indicates a higher level of market segmentation (i.e. a lower level of market integration), because industries in different countries in an integrated market may be expected to have similar business prospects and, therefore, similar valuations. A measure of zero implies perfect integration.

The segmentation measure for country i is computed as:

$$Seg^i = \sum_{k \in K} \omega_k^i |EY_k^i - \overline{EY}_k|$$

where EY_k^i is the average earnings yield (the inverse of the price/earnings ratio) based on analyst forecasts for industry sector k in country i , \overline{EY}_k is the respective euro area average, and ω_k^i is the share of sector k in the stock market capitalisation of country i .

References

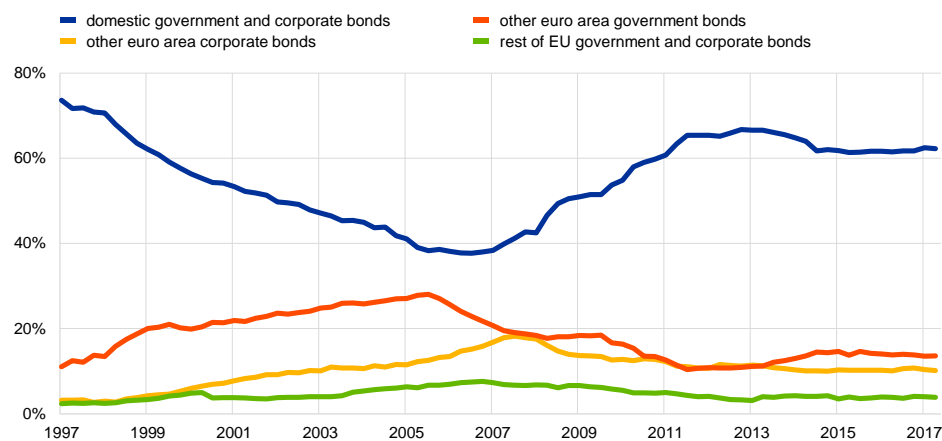
The analysis is based on Bekaert, G., Harvey, C.R., Lundblad, C.T. and Siegel, S., "What segments equity markets?", *Review of Financial Studies*, Vol. 24, No 12, October 2011.

3.2.2 Quantity-based indicators

Chart S22

Share of MFI holdings of debt securities issued by euro area and EU corporates and sovereigns

(percentages of total holdings, excluding the Eurosystem, monthly data, Sep. 1997 – Dec. 2017)



Source: ECB.

Economic rationale

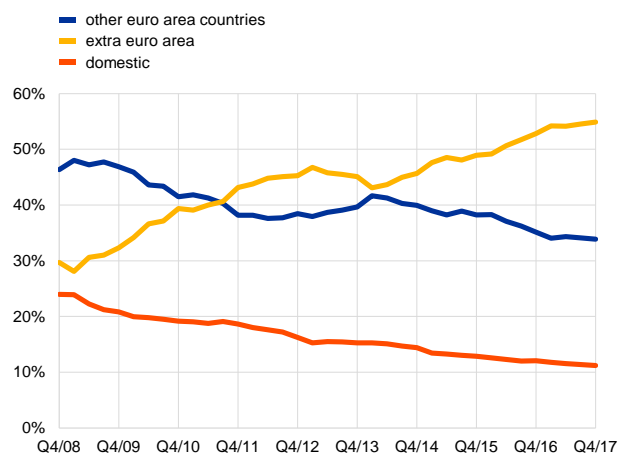
Cross-border holdings by euro area MFIs of debt securities issued by non-financial borrowers (sovereign and corporate) of other euro area countries are a relevant quantity-based indicator of financial integration. The indicator is constructed on the basis of the MFI balance sheet statistics²⁶¹.

²⁶¹ More information is available on the [ECB website](#).

Chart S23

Investment funds' holdings of debt securities

(percentages of total holdings of debt securities, quarterly data, Q4 2008 – Q4 2017)



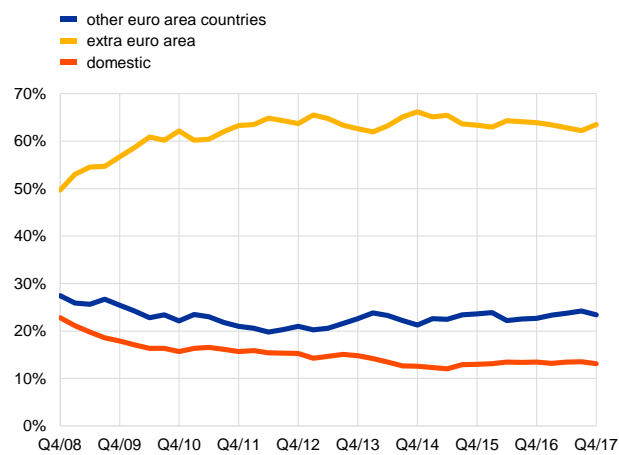
Source: ECB.

Notes: Debt securities exclude shares and include money market paper held by investment funds located in the euro area. A complete list of investment funds is available from the ECB website.

Chart S24

Investment funds' holdings of equity

(percentages of total holdings of equity, quarterly data, Q4 2008 – Q4 2017)



Source: ECB.

Note: The equity category includes shares and other equity (but excludes investment fund shares/units).

Economic rationale

These two indicators are used to assess the contribution of institutional investors to financial integration in the euro area.

Technical description

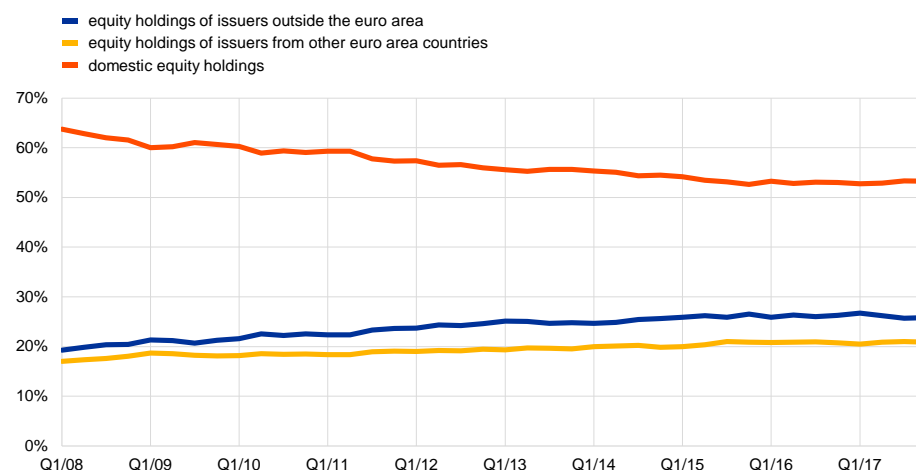
The indicators are constructed based on the balance sheets of euro area investment funds (excluding money market funds, which are included in the MFI balance sheet statistics)²⁶².

²⁶² A complete list of euro area investment funds, as well as further information on investment fund statistics, is available on the [ECB website](#).

Chart S25

Euro area holdings of equity (including investment fund shares and other equity) by geographical issuer counterparty

(percentages of total euro area holdings of equities, quarterly data, Q1 2008 – Q4 2017)



Source: ECB.

Note: Equity holdings include listed and unlisted shares, investment fund shares (of any type of investment fund) and other equities including, among other things, participations in international organisations (e.g. the ECB or the European Stability Mechanism) and holdings of real estate outside the domestic economy.

Technical description

The financial integration indicator for cross-border equity holdings is calculated using Balance of Payments (b.o.p.) and International Investment Position²⁶³ (i.i.p.) statistics and euro area accounts data for the entire euro area economy. Equity holdings in b.o.p. and i.i.p. statistics data are broken down by functional category (type of investment): foreign direct investment (FDI), portfolio investment (PI), other investment (OI) and reserve assets (RA). The equities included under RA are all issued by countries outside the euro area and the relevant amounts are not particularly significant in comparison with those included in the other three types of investment.

Balance of payments statistics provide a geographical breakdown for extra and intra-euro area issuers. The total for equities held by the euro area (including domestic issuers) is obtained from the euro area accounts. B.o.p. and i.i.p. statistics and euro area accounts definitions and coverage are consistent, enabling the euro area holdings for domestic issuers to be derived as the residual.

²⁶³ More information is available on the [ECB website](#).

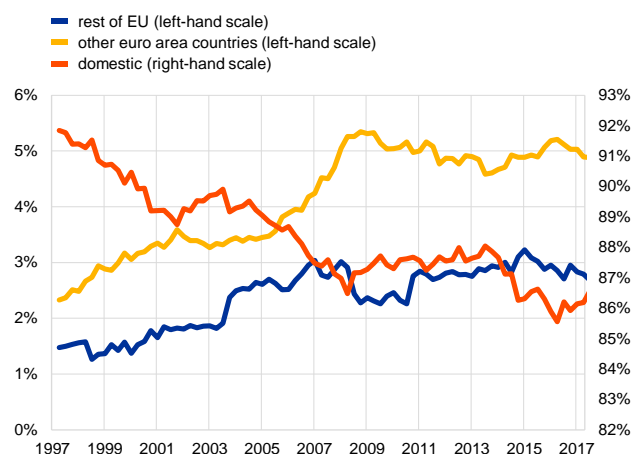
3.3 Banking market indicators

3.3.1 Quantity-based indicators

Chart S26

MFI loans to non-MFIs: outstanding amounts by residency of counterparty

(percentages of total lending excluding the Eurosystem, quarterly data, Q3 1997 – Q4 2017)



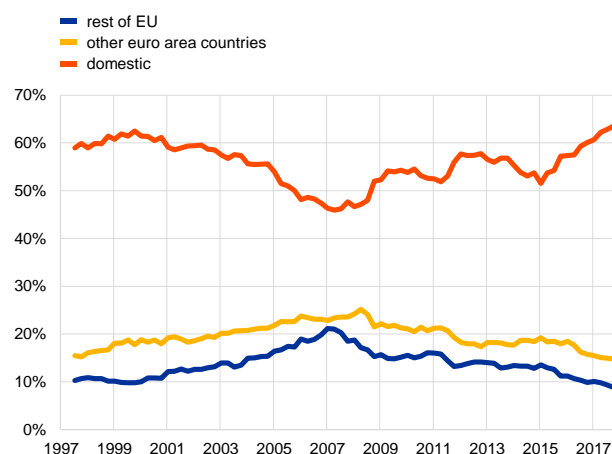
Source: ECB.

Notes: Underlying data refer to the national aggregated MFI balance sheet data reported on a non-consolidated basis to the ECB at monthly and quarterly frequencies. These data cover the MFI sector excluding the Eurosystem, and include data on money market funds (MMFs). Consequently, as MMFs typically invest in inter-MFI deposits and short-term securities, the indicators providing data for these assets are, to some extent, affected by the MMFs' balance sheet items. Balance sheet positions with foreign counterparties include those with foreign branches and subsidiaries.

Chart S27

MFI loans to MFIs: outstanding amounts by residency of counterparty

(percentages of total lending excluding the Eurosystem, quarterly data, Q3 1997 – Q4 2017)



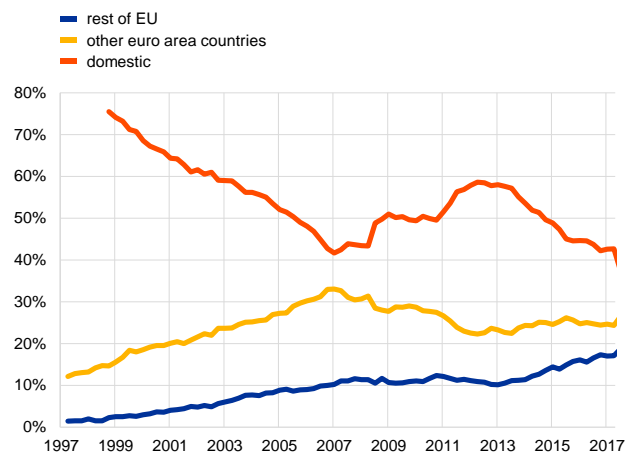
Source: ECB.

Note: see Chart S26.

Chart S28

MFI holdings of securities issued by MFIs: outstanding amounts by residency of counterparty

(percentages of total holdings, quarterly data, Q3 1997 – Q4 2017)

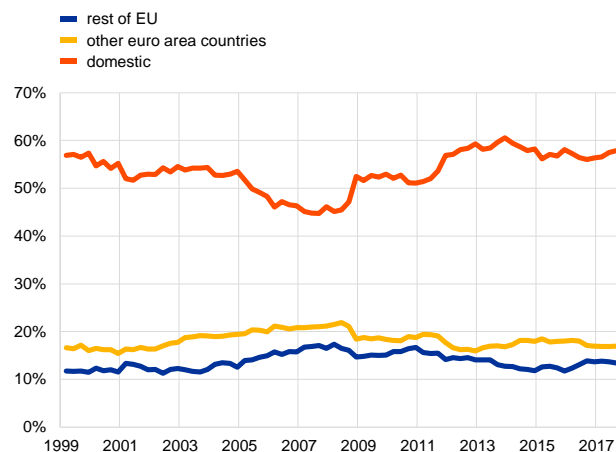


Source: ECB.

Chart S29

MFI deposits from MFIs: outstanding amounts by residency of counterparty

(percentages of total deposits excluding the Eurosystem, quarterly data, Q1 1999 – Q4 2017)



Source: ECB.

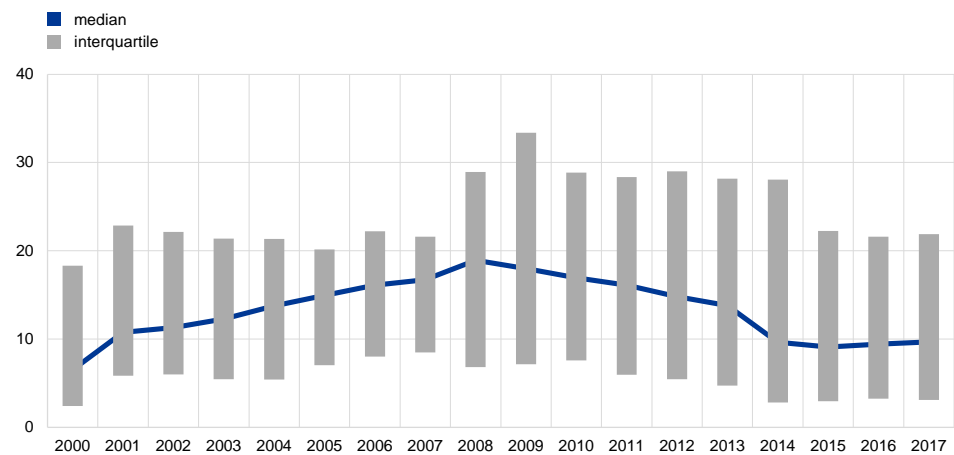
Economic rationale

This set of indicators (S25 – S28) demonstrates the significance of cross-border balance sheet connections for euro area MFIs. The indicators are based on MFI Balance Sheet Statistics²⁶⁴, and show that euro area wholesale banking markets are far more integrated than retail markets.

Chart S30

Dispersion of the total assets of foreign branches and subsidiaries of euro area banks across euro area countries

(percentages of the total assets of the euro area banking sector, yearly data, 2000 – 2017)



Sources: ECB and ECB calculations.

Notes: Dispersion across countries for which shares are calculated.

Economic rationale

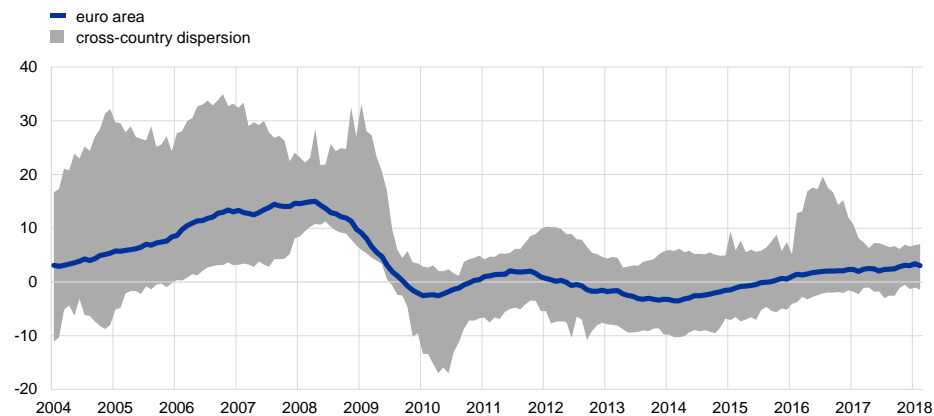
The indicator shows the level of financial integration measured by the total assets of foreign branches and subsidiaries.

²⁶⁴ Further information is available on the [ECB website](#).

Chart S31

MFI loans to non-financial corporations

(annual loan growth; percentages, monthly data, Jan. 2004 – Feb. 2018)



Sources: ECB and ECB calculations.

Notes: The cross-country dispersion shown in the chart is the difference between the maximum and minimum calculated for a fixed sample of 12 euro area countries (Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxemburg, the Netherlands, Austria, Portugal and Finland). Underlying data are adjusted for loan sales, securitisation and cash pooling activities. Annual growth rates are calculated based on an index of notional stocks.

Economic rationale

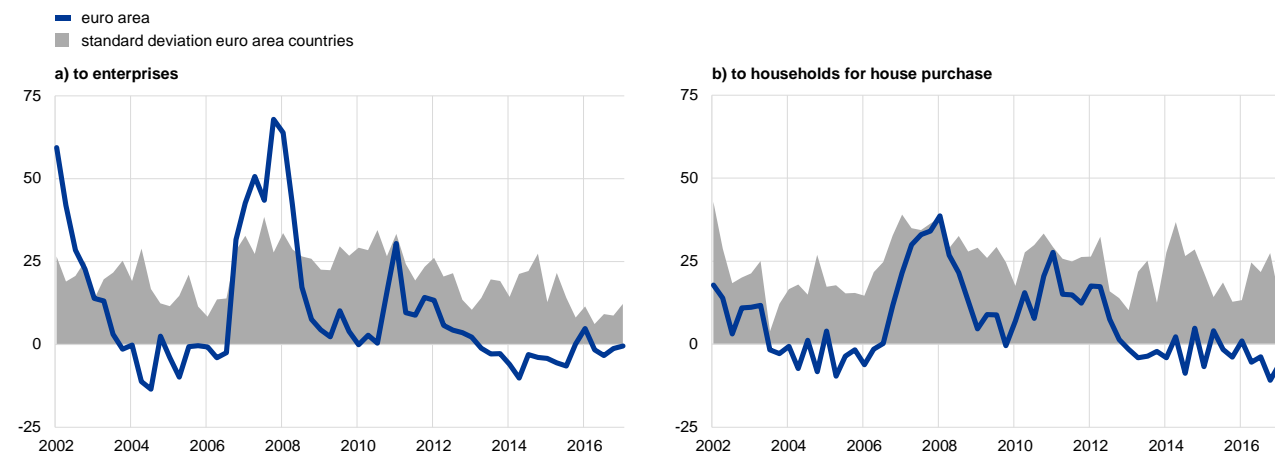
The indicator of annual loan growth shows that developments in retail loan markets are heterogeneous.

3.3.2 Survey-based indicators

Chart S32

Changes in credit standards

(net percentages of banks indicating a tightening of standards, quarterly data, Q4 2002 – Q4 2017)



Sources: Euro area bank lending survey and ECB calculations.

Notes: Changes in credit standards are given as net percentages of replies, i.e. the percentage of banks indicating a tightening of credit standards minus the percentage of banks indicating an easing of credit standards. Euro area results are weighted by the outstanding amounts of loans to the non-financial private sector.

Economic rationale

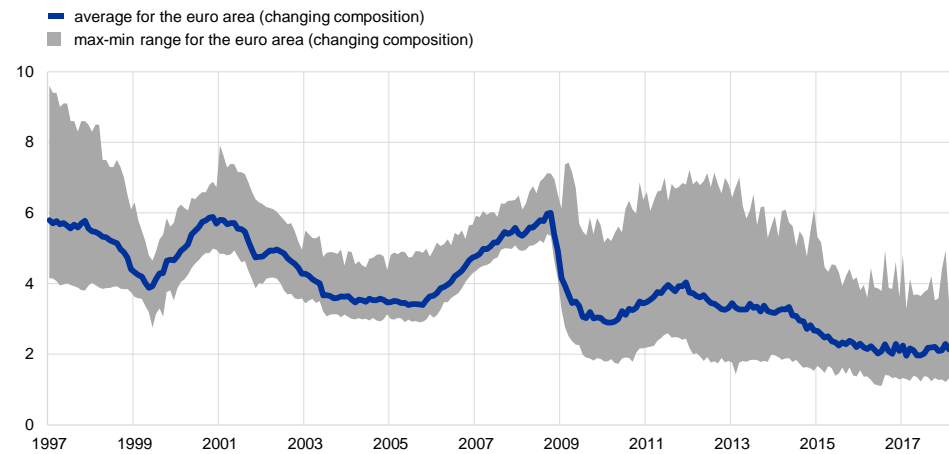
A divergence in the level of credit standards between countries would suggest disparities in borrowers' access to loans across euro area countries.

3.3.3 Price-based indicators

Chart S33

Interest rates on new loans to euro area non-financial corporations

(average of MFI interest rates (MIRs), percentages, monthly data, Jan. 1997 – Feb. 2018)



Sources: ECB and ECB calculations.

Notes: All euro area countries, changing composition. MFI interest rates (MIRs) refer to new business.

Economic rationale

The convergence of retail interest rates charged/paid by banks on loans and deposits to/from non-financial corporations and households may be seen as demonstrating the degree of integration in the retail banking market. Bank interest rate dispersion should be lower when instruments are more homogeneous across countries. Nevertheless, note that differences in bank interest rates may be due to other factors, including differing conditions in national economies (credit and interest rate risk, firm size, industrial structure, degree of capital market development), institutional factors (taxation, regulation, supervision) and financial structures (degree of bank/capital market financing, competitiveness, etc.).

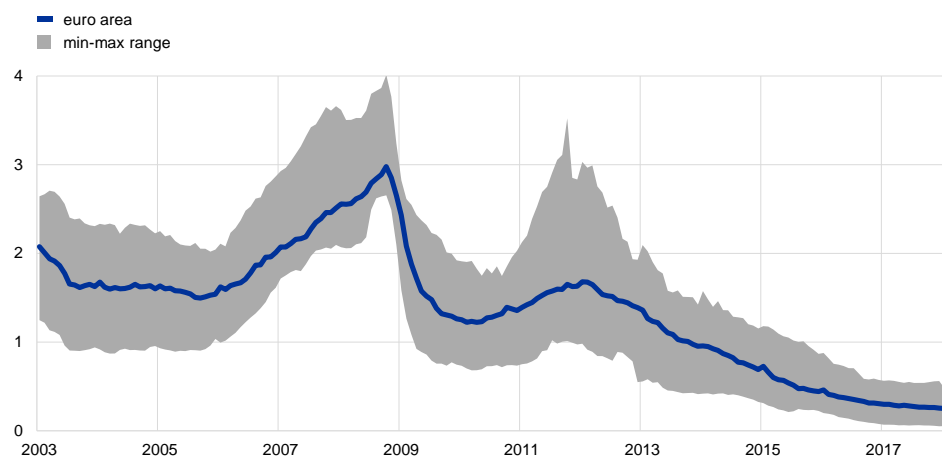
The indicator is based on Euro area bank interest rate statistics²⁶⁵.

²⁶⁵ More information is available on the [ECB website](#).

Chart S34

Interest rates on MFI deposits from households in the euro area

(percentages, monthly data, Jan. 2003 – Feb. 2018)



Sources: ECB and ECB calculations.

Notes: The deposit rates are aggregated using outstanding amounts. The cross-country dispersion displayed in the chart is the difference between the maximum and minimum calculated for a fixed sample of 12 euro area countries (Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxemburg, the Netherlands, Austria, Portugal and Finland), excluding extreme values.

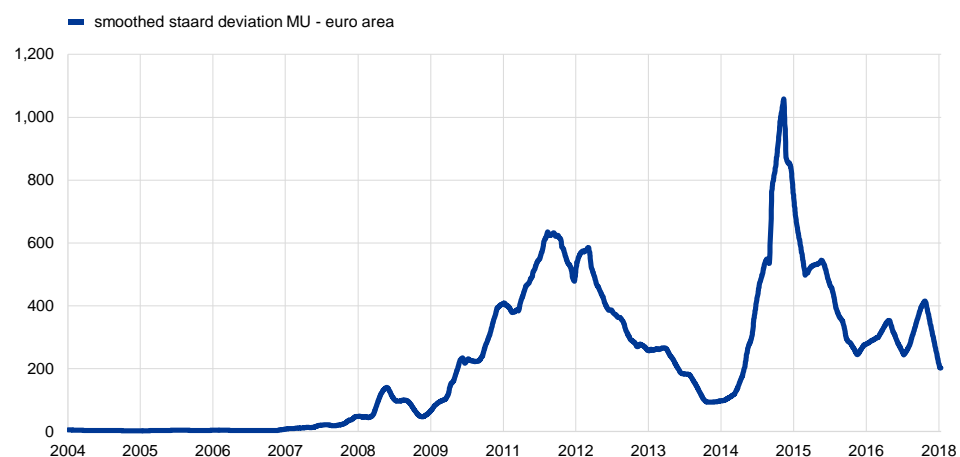
Economic rationale

See chart S33.

Chart S35

Standard deviation of banks' CDS premia by country group

(basis points, daily data, Jan. 2004 – Feb. 2018)



Sources: Bloomberg, Thomson Reuters, Credit Market Analysis Ltd (CMA) and ECB calculations.

Note: Based on CDS data available for banks in the EONIA panel.

Economic rationale

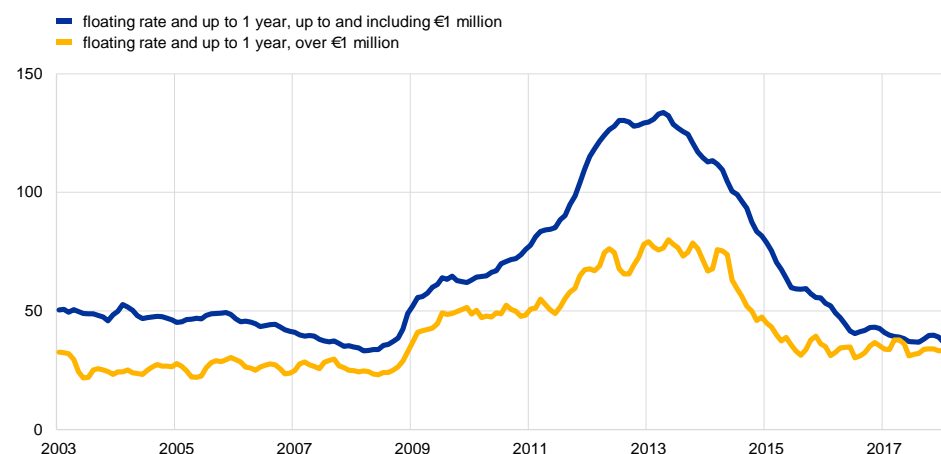
Lower cross-country variance of CDS premia charged by investors for bank debt indicates increased financial integration. It must, however, be borne in mind that

CDS premia also depend on a range of other factors including credit risk, liquidity, and the correlation between CDS premia for banks and sovereigns.

Chart S36

Cross-country standard deviation of MFI interest rates on new loans to non-financial corporations

(basis points, monthly data, Jan. 2003 – Feb. 2018)



Sources: ECB and ECB calculations.

Economic rationale

See Chart S33.

Technical description

The following general notation is used for each of the above categories of loan:

$r_{c,t}$ = the interest rate prevailing in country c in month t

$b_{c,t}$ = the business volume in country c in month t

$w_{c,t} = \frac{b_{c,t}}{B_t}$ is the weight of country c in the total euro area business volume B in month t where:

$$B_t = \sum_c b_{c,t}$$

MFI interest rates in the euro area are computed as the weighted average of country interest rates $r_{c,t}$, using the country weights $w_{c,t}$:

$$r_t^* = \sum_c w_{c,t} r_{c,t}$$

The euro area weighted standard deviation is expressed as:

$$M_t = \sqrt{\sum_c (r_{c,t} - r_t)^2 w_{c,t}}$$

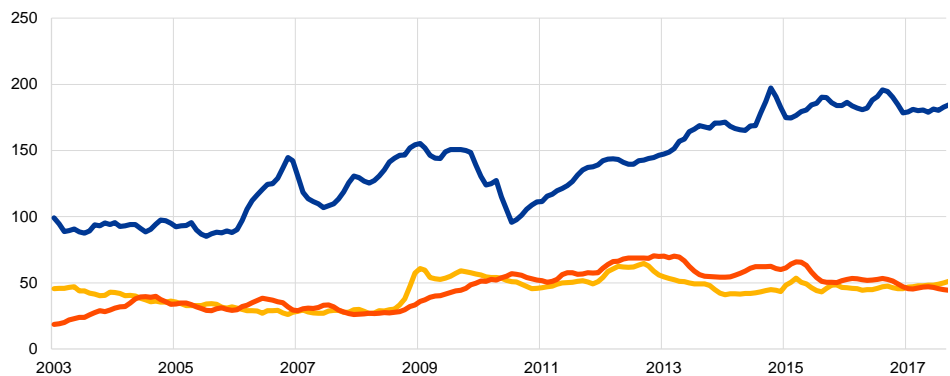
The monthly data are smoothed by calculating a three-month centred moving average of the standard deviation.

Chart S37

Cross-country standard deviation of MFI interest rates on loans to households

(basis points, monthly data, Jan. 2003 – Feb. 2018)

- consumer credit: over 1 year and up to 5 years
- house purchase: with floating rate and initial rate fixation up to 1 year
- house purchase: with initial rate fixation over 5 years and up to 10 years



Sources: ECB and ECB calculations.

Economic rationale

See Chart S33.

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