

## CHANGES IN BANK FINANCING PATTERNS APRIL 2012





### EUROSYSTEM







In 2012 all ECB publications feature a motif taken from the €50 banknote.

## CHANGES IN BANK FINANCING PATTERNS

## APRIL 2012

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ISSN 978-92-899-0833-7 (online)



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## **EXECUTIVE SUMMARY**

The recent financial crisis has led to changes in banks' funding patterns at the global level which have been widely discussed in policy and academic fora. This report aims at identifying and documenting the main changes in the funding patterns of euro area banks. Using statistics for monetary financial institutions (MFIs) domiciled in the euro area from 1999 to the end of 2011 on an unconsolidated basis, the report documents changes in five broad categories of bank funding: interbank, customer deposits, debt securities, central bank funding and capital. The analysis identifies a break in the trend of most indicators in the third guarter of 2008, supported by an econometric time-series exercise. The main conclusions are reported below.

- Interbank funding: Interbank liabilities as a proportion of banks' total assets fell substantially from the third quarter of 2008. This was accompanied by a rise in the share of domestic bank liabilities in total interbank liabilities in the largest euro area economies. Evidence from survey data for the euro area confirms that, in the secured market, there has been a considerable increase in activity cleared through CCPs, with a corresponding decline in the unsecured money market. Rising wholesale funding costs include increasing spreads between unsecured and secured transactions with respect to the pre-crisis period.
- ٠ Customer funding: The overall share of deposit liabilities in total assets started to increase, after declining gradually in the years to 2008. At the same time, loan-todeposit ratios decreased from their peak in the third quarter of 2008. A broad shift towards deposits at longer maturities can be observed at aggregate level and across countries, marking a clear change in pattern with respect to the pre-crisis period. The growing reliance on retail funding sources led to increased competition, especially in household deposits, rendering them relatively more expensive than corporate deposits.

- Debt securities: The decline in the ratio of debt securities to assets started in 2007 i.e. before the outbreak of the financial crisis. In 2011, gross issuance of debt securities by euro area banks roughly halved from its peak observed in 2006, with securitisation also falling sharply after 2008. Despite the decline in debt issuance, the overall average maturity of debt issued by banks (which was on a declining path before the crisis) has been increasing since the third quarter of 2008. The costs of funding through debt securities increased substantially from 2008 across all types of securities, including covered bonds.
- Central bank funding: Recourse to central bank funding increased considerably with respect to the pre-crisis period on account of severe constraints in access to wholesale market funding, which led to the introduction of non-standard Eurosystem refinancing measures. In particular, it increased on account of banks domiciled in countries under financial assistance and in other countries experiencing sovereign tensions. The composition of collateral also changed, reflecting tensions in debt markets, with a sharp decline in unsecured bank bonds and a rise in non-marketable securities with respect to pre-crisis levels.
- Capital: The proportion of capital and reserves as a share of assets remained broadly unchanged in the pre-crisis period, pointing to growth in capital and reserves being proportional to the growth in assets. The capital-to-assets ratio started growing at the beginning of 2009 on account of both the increase in capital and the decline in banks' assets.

On the basis of these findings for the euro area as a whole, some preliminary considerations on the implications that changes in banks' funding patterns may have for financial stability – driven by market or regulatory forces – are raised in the final section. These include, among others: (i) the increasing importance of secured (or collateralised) funding for both wholesale



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and central bank funding; (ii) the impact this may have on the composition of assets on banks' balance sheets; (iii) the limits collateralisation can pose to bank lending activity and overall bank balance sheet growth; (iv) the effects of greater reliance on retail funding, notably through increased competition; and (v) amid market and regulatory constraints, the extent to which the share of central bank funding in overall funding could return to pre-crisis levels.

### EXECUTIVE SUMMARY



## I INTRODUCTION

In the four years to August 2007 macro-financial conditions were very favourable on the surface. Economic growth was strong and stable, liquidity in capital markets was abundant, profitability in the financial sector was high, and the prices of a range of assets were rising. In financial markets, implied volatilities in equity markets, bond markets, credit markets and foreign exchange markets were low by historical standards, as were risk premia. The financial market turmoil emerged in the summer of 2007 as the deterioration in the US housing market intensified. The complex interplay of valuation and liquidity problems that had been unearthed led to the collapse of Lehman Brothers in September 2008, setting in motion a severe global financial crisis. In the euro area in particular, the unfolding of the financial crisis and the negative interplay between vulnerabilities in the public sector finances, the financial sector and the weak economic growth that emerged thereafter further intensified strains in the banking sector and in sovereign debt markets.

These developments have led to changes in bank funding practices and inspired a vast range of studies of an academic and empirical nature. The Financial Stability Committee (FSC) of the European System of Central Banks (ESCB) conducted an analysis on the specific topic of changes in bank financing patterns in the euro area from a structural perspective, which is presented in this report.

The report identifies a number of stylised facts observed at global level, in the form of changes in bank funding patterns. It assesses the extent to which they apply to the euro area banking system at large and possible differences with respect to system-wide developments. The analysis is conducted with a view to contributing to a better understanding of the possible implications of these developments for overall stability in the financial system.

The report uses official Eurosystem statistics for MFIs over the 1999 to 2011 period to identify and document developments concerning the main bank liabilities: interbank, customer deposits, debt securities, central bank funding and capital. Given the relatively short time span of the study, findings are stated with caution and do not allow for views to be formed about possible trends.

A selected set of indicators is used to identify the main changes in the liability structure of banks' balance sheets and to capture stylised facts observed at the global level. More than 100 indicators were built on this dataset with a view to obtaining a comprehensive and consistent picture of the trends in bank funding in the euro area over time. While the focus is on the euro area as a whole, the database includes a breakdown by country. The cross-country dimension is traced, reviewing median statistics along with movements in distributions over time. The indicators selected for the analysis cover developments in the composition of bank liabilities, the composition and maturity of bank debt, and developments in equity and overall leverage, as well as the costs of funding.

The report is organised in four sections. A short review of the relevant literature is presented in section 2. Section 3 is the core empirical section, where the main findings on the changes in bank funding patterns are identified and interpreted. Section 4 concludes, tentatively pointing to durable changes that are likely to affect the future financial landscape and related financial stability considerations.



## **2 MOTIVATION AND LITERATURE SURVEY**

As argued in the literature, the financial crisis has its roots in the transformation of the banking system over the years,1 involving changes in banks' funding patterns and in their overall business model. Prior to 2007 the abundance of liquidity underpinned the build-up of leverage in the financial system. Repurchase agreements (repos) and other forms of secured financing gained considerably in importance. Financial innovation and in particular two important changes played a critical role in this process: (i) the exponential growth in derivatives markets and (ii) the movement of large amounts of loans into capital markets through securitisation and loan sales. Developments in derivatives markets generated a large demand for collateral as a means of offsetting counterparty credit risk. At the same time, securitisation activities created a range of assets that were increasingly used as collateral in repo transactions, while freeing other classes of assets (e.g. government bonds) for use as collateral in derivatives and other transactions, such as those in payment and settlement systems. Securitised products and tranches of structured products increasingly became used in repo transactions, explaining the rise in this market.

The crisis developed when the deterioration of subprime fundamentals and related assets progressively led to widespread uncertainty about the solvency of counterparties, the preference for liquid assets, and a general decline in the value of collateral. The resulting protracted malfunctioning of the interbank markets required a considerable deleveraging of the financial system through asset sales in response to a steady increase in haircuts. In the euro area, the unresolved situation in impaired funding markets deteriorated further as concerns about sovereign debt sustainability in some countries engulfed the respective banking sectors, leading to the complete closure of wholesale markets for some countries.

Since the start of this crisis the central banking and supervisory community has conducted important fact-finding work on changes and trends in bank financing patterns from an empirical perspective. The Banking Supervision Committee report "EU banks' funding structures and policies" (2009) provides an initial assessment of the impact of the crisis on bank funding, including the views of the industry that were expressed in a survey at a time when the crisis was still unfolding. The Committee on the Global Financial System (CGFS) has made a series of relevant contributions from which this report distils broad stylised facts, and against which developments in the euro area subsequent to the default of Lehman Brothers in 2008 are assessed.

The CGFS paper "Funding patterns and liquidity management of internationally active banks" (2010) identifies an increased reliance on retail funding and more expensive wholesale funding as significant changes in banks' funding models. Furthermore, it underlines a greater decentralisation of funding in line with a less wholesale-oriented approach, whereby banks tend to move towards local sourcing or a greater reliance on local deposit bases as opposed to intra-group funding. In addition, the related CGFS paper "The function and resilience of cross-border funding markets" (2010) describes how the difficult conditions in the unsecured market led financial institutions to turn increasingly to secured funding sources. In this regard, it discusses the growing importance of central counterparties (CCPs) in secured funding by allowing market participants to reduce the level of counterparty risk and create a common level, as well as allowing the multilateral netting of exposures. The greater use of CCPs is also documented in the report.

The importance of anticipating the new regulatory environment – notably the introduction of Basel III liquidity rules – in shaping changes in banks' funding practices by requiring stronger liquidity buffers, as well as more diversified funding sources, is noted in most papers. Adding to market pressures, the regulatory-driven preference for liquid assets

1 See, for example, Gordon, G., *Slapped by the Invisible Hand*, Oxford University Press, 2010.

### 2 MOTIVATION AND LITERATURE SURVEY



and requirement for stronger capital buffers require a reduction in bank leveraging, and pose limits to balance sheet growth. In this respect, the CGFS paper "Long-term issues in international banking" (2010) points to the recently expanded role of international capital markets as a source of corporate financing in relation to some banking sector retrenchment in the provision of credit and higher funding costs. Another CGFS paper, "The impact of sovereign credit risk on bank funding conditions" (2011), looks at the rising concerns about the deterioration in public finances across advanced economies and its impact on funding markets. It finds that the share of funding derived from short-term wholesale debt, cross-border liabilities and retail deposits has generally fallen for banks headquartered in countries with acute sovereign debt concerns. It also underlines the rising wholesale funding costs for European banks at large and discusses the channels through which the deterioration in sovereign creditworthiness may adversely affect banks' funding conditions. Losses on banks' sovereign portfolios, the reduction in the value of collateral that can be used for wholesale funding, and rising funding costs (through banks' credit ratings after downgrades of the sovereign rating) are found to be important in explaining developments in euro area aggregated data observed over the past two years.

The financial crisis has also stimulated an important wave of academic research on liquidity and the effects of the lack of it on banks' financing conditions and lending behaviour. Recent theoretical work generally distinguishes between funding and market liquidity. Funding liquidity refers to the liability side of banks' balance sheets and their ability to raise new external finance, whereas market liquidity relates to the ease with which assets on banks' balance sheets are traded in the market or sold, thereby generating cash.

While the focus of the report is primarily on funding liquidity – and it is structured along the broad liability components of banks' balance – market liquidity issues are clearly intertwined when considering secured (collateralised) borrowing, e.g. via repo operations and securitisation activities (funding through debt securities). Brunnermeier and Pedersen (2008) explore the links between market and funding liquidity in a unified framework which is able to explain stylised facts, e.g. the fact that market liquidity can suddenly dry up, the co-movement in the market illiquidity of securities, and the flight-to-quality phenomena when funding becomes scarce.

Tirole (2011) reviews recent literature on liquidity and proposes modelling approaches to analyse banks' demand for liquidity, determinants of aggregate liquidity and market liquidity breakdowns. This analysis is motivated by stylised facts, such as the sharp increase in financial institutions' reliance on wholesale funding and vulnerabilities stemming from maturity mismatches. Market liquidity breakdowns in the securitisation and interbank markets are also explained in Dang et al. (2009) using information theory. Financing through debt instruments (and securitisation) can be carried out smoothly as long as returns on debt claims are relatively insensitive to additional information (there are no incentives to acquire private information). This is the case when underlying assets pay off as expected, and when borrowers' solvency is not in question. Negative news about the quality of assets is not only likely to lower their resale price, but also lead to a fear of adverse selection in secondary markets and their possible freeze. Such mechanisms can explain the rapid switches from a liquid to a freezing market as observed in the financial crisis, as well as the duration of the impaired functioning (e.g. in the repo market and collateralised markets at large) over time. These issues are relevant for the section in the report on bank funding through debt securities.

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## 3 IDENTIFICATION OF CHANGES IN BANK FUNDING PATTERNS

This section contains the main body of the report. It reviews the main components of banks' liabilities with a view to identifying changes in euro area bank funding patterns over time.<sup>2</sup> The findings are largely supported by an econometric time-series analysis which confirms that there is a significant break in the statistical properties of almost all selected indicators in the third quarter of 2008 (see Annex 1 for a short description and results). Given the consistency of the econometrical evidence, the reference to it is generally omitted except when the break in the time series is of a weaker significance. At the same time, in order to illustrate the overall developments both on average in the euro area and across euro area countries, a number of charts are provided. These plot the weighted and unweighted averages, as well as distributional values of selected aggregated indicators over time

The next section (3.1) starts with a short description of the database, its coverage and properties. The remainder of this chapter is organised in five sections along the main components of bank liabilities: (3.2) wholesale funding through the interbank market; (3.3) customer deposits; (3.4) debt securities; (3.5) central bank funding and (3.6) equity capital, with an analysis on bank leverage and its main drivers. Developments related to the cost of funding and the maturity profile of securities are also discussed in the relevant sections.

### 3.1 DATA DESCRIPTION AND SET-UP OF THE DATABASE

A centralised database was created and a number of indicators (e.g. structural, growth) were constructed to support the analysis in this report, also with a view to making the data suitable for other projects and easily accessible to third parties. Only a selected subset of the data is discussed in the main body of this report. The main sources of information are:

• MFI balance sheet statistics – harmonised statistics of MFIs<sup>3</sup> resident in the euro area.

For the purpose of this analysis and throughout the report, the MFI sector excludes the ESCB. Credit institutions (including money market funds) form the largest part of the sector.<sup>4</sup> The data are compiled for the euro area and at a country level at a quarterly frequency. The reporting population consists of the MFIs resident in the territory of the participating Member States. MFIs' balance sheet statistics consolidate the business of all banking offices located within the same national territory (the "host" principle), but without consolidation of non-bank subsidiaries or across national boundaries. These data therefore differ from the financial reporting and supervisory data, which typically require the availability and disclosure of consolidated accounts at the group level (across countries and across sectors) in accordance with international financial reporting standards. Moreover, financial accounting consolidation involves the netting out of transactions and positions between all units within a reporting group.5 Differences related to the use of unconsolidated or consolidated data should therefore be expected, namely when analysing interbank funding. Discrepancies between statistical and financial (supervisory) reporting also exist with respect to rules concerning the valuation and netting of assets and liabilities (e.g. in MFI statistics, deposits and loans are reported at nominal value without a netting or deduction of provisions), the timing of the recording of transactions, and the recording or not of

- 2 For a description of the balance sheet structure of monetary financial institutions, see "The Supply of Money: Bank behaviour and the implications for monetary analysis", *Monthly Bulletin*, ECB, October 2011.
- 3 The legal basis for the collection of the statistics is laid down in *Regulation* ECB/2008/32, which is complemented by *Guideline* ECB/2007/9.
- 4 For the purpose of this analysis, the MFI sector excludes the European System of Central Banks.
- 5 Consolidated banking data (CBD) on the banking systems of all EU Member States are compiled by the ESCB on a cross-border (data on branches and subsidiaries located outside the domestic market are consolidated with the data reported by the parent institution) and cross-sector basis (branches and subsidiaries of banks that can be classified as other financial institutions are included). Insurance companies, however, are not included.

### 3 IDENTIFICATION OF CHANGES IN BANK FUNDING PATTERNS



certain items on the balance sheet.<sup>6</sup> For the purpose of this report, the richness of the data (breakdowns along bank liabilities), length of the available time series and cross-country consistency favoured primarily using MFI data.

- MFI interest rate statistics<sup>7</sup> that cover interest rates that resident MFIs apply to euro-denominated deposits and loans (both outstanding amounts as well as new business) to residents of the euro area. These statistics are reported on a monthly basis.
- Market data<sup>8</sup> that are mainly used to assess the issuance of debt securities by euro area banks and costs of funding. Dealogic and Bloomberg served as the main data sources on these statistics, which are collected monthly.

The selected indicators constructed on MFI statistics are depicted using the euro area series, which corresponds to a weighted average that mostly reflects the developments of the largest countries, as well as unweighted average and median values across euro area countries. In addition, to account for changes in distributions over time, the min-max values and interquartile ranges are displayed in bars. A vertical black line marks the third quarter of 2008.

### 3.2 INTERBANK FUNDING

### 3.2.1 DEVELOPMENTS IN THE INTERBANK FUNDING MARKET

The malfunctioning of the interbank market is generally mentioned as the first symptom of the financial crisis. The rise in counterparty credit risk, as well as heightened uncertainty in money and capital markets, led to liquidity hoarding and affected banking systems in euro area countries, in line with developments at the global level. Chart 1 below depicts developments in the share of interbank liabilities in the total assets of MFIs domiciled in the euro area. A sharp rise in the median values from the end of 2007 to the third quarter of 2008 – where interbank liabilities stood at around 30% of total assets, and over 35% for some countries – was followed by a steady drop in this ratio from the fourth quarter of 2008, which came to an sudden halt in the second quarter of 2010. From mid-2010, all series depicted were below the levels observed in the pre-crisis period. Chart 2 is a graphical illustration of the statistical test for the significance of the changes in the intercept and trend of the values before and after the third quarter of 2008, for which the results of all the series reviewed are reported in Annex 1.

Using survey data to distinguish between secured and unsecured interbank transactions, it can be observed that, after years of continuous growth, total activity in the unsecured market began to fall in 2008, with the first signs of improvement being seen in 2011(see Chart 3).<sup>9</sup> After the onset of the crisis, the average daily turnover in unsecured cash borrowing dropped steadily from a peak in 2007 to half this level by 2009. Heightened credit risk concerns directed banks' lending towards borrowers with high credit ratings, who tend to be less active in the interbank market.

At the same time, developments were smoother in unsecured lending, possibly since it includes lending by euro area banks to counterparties outside the euro area (see Chart A.3). The preference for lending to shorter maturities (typically one week or less), which carry relatively less risk for the lender, has also persisted since 2008 (see Charts 3 and A.3).

- 6 See Bridging the reporting requirements methodological manual, second edition, ECB, 2012 (available on the ECB's website at www.ecb.europa.eu), for the links between the MFI statistics and the supervisory reporting requirements.
- 7 The legal requirements for MFI interest rate statistics are laid down in *Regulation* ECB/2001/18.
- 8 The ECB coordinates a centralised securities database (CSDB), which holds complete and consistent information on individual securities relevant for the statistical purposes of the ESCB. However, this database could not have been used for this analysis given the lack of its sufficient time series dimension.
- 9 See Euro Money Market Study, ECB, December 2010, and Euro Money Market Survey, ECB, September 2011.



The decline in unsecured funding was to some extent offset by an increase in secured funding. The increasing trend resumed in 2009 after a drop in 2008. Secured transactions enabled banks to limit credit risk exposure, while also alleviating regulatory constraints, such as those resulting from capital adequacy requirements.

Although the tightening of conditions in the repo market had started well before the peak of the crisis, it became even more severe in the autumn of 2008. After an expansion of the collateral used in these operations in the four years to the crisis, as soon as uncertainty spread about collateral values, securitised products and tranches of structured products ceased to be used in repo transactions, and there was a shift back to government bonds. Volumes in the euro credit repo market remained at levels that were 80-90% below the period before September 2008. In addition to the exclusion of eligible collateral, specific counterparties were also being excluded by means of larger haircuts and margin requirements.



A subsequent move was the increased use of electronic platforms and, in particular, trading facilities with CCPs for secured transactions (see Chart 4). Activity in the secured market cleared through CCPs has increased steadily since the financial crisis emerged and in 2011 accounted for about half of total secured market turnover (including bilateral and trilateral repos). The greater use of CCPs can be justified by the wish to further limit counterparty credit risk, the ability to carry out anonymous trading in a risk-averse environment and

### 3 IDENTIFICATION OF CHANGES IN BANK FUNDING PATTERNS





the introduction and consolidation of repo platforms across Europe.

Banks could easily gain access to major European fixed-income CCPs (such as the British London Clearing House (LCH) and the German Eurex Repo), either as members or through intermediaries. The use of government bonds as eligible collateral for repo operations in these CCPs further contributed to alleviating banks' funding pressures.

Before the crisis, banks increasingly operated across the euro area as if it were an integrated domestic market. Increasing integration in the banking sector was noticeable via extensive cross-border linkages, cross-border investments, mergers and acquisitions, expansion of businesses and consolidation. Nonetheless, as liquidity dried up in the market, a tendency for a "home bias" in interbank lending arose. Solvency concerns about banks and uncertainty about the quality of their assets, followed by the negative interplay between banks and sovereign sector strains, came to the fore and intensified for banks domiciled in euro countries facing greater public finance challenges. The nationally based



government support schemes may have played, and continue to play, a role in this phenomenon.

The evolution of interbank funding in terms of the geographical distribution of counterparties is depicted in Charts 5 and 6, with a view to investigating a potential home bias. The size of the interbank funding very much depends on how developed the domestic interbank market is, as well as on the ownership structure of the banking system and on the level of integration of the domestic banks with banks in other countries (i.e. cross-border banking groups, etc.). Chart 5 shows that, after a steady decline since the end of 2004, the share of domestic interbank liabilities in interbank liabilities started rising in the first half of 2008. The unweighted average of the ratios across euro area countries later fluctuated around the same levels, though this masks some crosscountry differences. The weighted average share of domestic interbank liabilities in total interbank liabilities in the euro area (factually driven by the largest countries) stood in the upper quartile of the distribution and followed an upward path after the end of 2008. On the other hand, a reduction in domestic interbank funding occurred in a few other countries, as reflected in the dispersion of



ranges and in the median values. There is no evidence that the latter changes are particularly related to the fiscally distressed countries.



Regarding the cross-border interbank liabilities, the share coming from other euro area countries remained broadly stable from the third quarter of 2008 (see Chart 6), with a somewhat more noticeable fall in the last quarter of 2008. Interbank liabilities coming from non-euro area countries showed a more pronounced tendency to decrease (see Chart A.1 in Annex 2).<sup>10</sup> This may be related to the dynamic of the cost of interbank funding, since the cost of obtaining information about domestic counterparties may be lower than for foreign ones.

### **3.2.2 INTERBANK FUNDING COSTS**

Conditions in interbank markets are measured by various money market aggregates. Typically, and EURIBOR-OIS spreads LIBOR-OIS indicate the relative stress in the money markets. They can be viewed as signals of banks' perception of the creditworthiness of other financial institutions and the general availability of funds. EONIA, EURIBOR and EUREPO and their spreads reflect the costs of funding, as well as tensions in, respectively, unsecured overnight and term funding and collateralised (typically by sovereign debt) term funding in euros. It is noteworthy, though, that these rates do not automatically imply accessibility of funds at these costs. Significant amounts of interbank lending occur over the counter, while the interbank market has been restricted since the onset of the crisis.

The outbreak of the financial turmoil in mid-2007 severely affected the interbank market and the market rates, which inevitably led to a growth in banks' costs, with restricted financing in the interbank market overall. Before the crisis, banks were able to fund their activities in the interbank market at rates close to the overnight indexed swap (OIS), with reliance on this type of financing consistently growing. However, the outbreak of the US subprime crisis

10 In the case of the euro area aggregated series, the statistical tests for a significance of the break in the mean (intercept) are weaker. They are, however, fully supported in the case of a break in the trend, as well as both trend and intercept.

### 3 IDENTIFICATION OF CHANGES IN BANK FUNDING PATTERNS



changed the pattern. In the second half of 2007 interbank market funding started to be provided at a higher cost, owing to the increased uncertainty about the borrower's creditworthiness.<sup>11</sup> Nonetheless, the worst spike in the spreads occurred a few weeks after the Lehman Brothers default. By the end of September 2008 conditions in the euro area interbank money market became extremely tense (see Charts 7, A.5 and A.6). Banks were increasingly dependent on ECB liquidity operations and overnight borrowing. The Eurosystem took measures to support short-term liquidity, such as extending maturities for the refinancing facilities, providing foreign currency funding and broadening the range of eligible counterparties and collateral, as well as conducting its main refinancing operations in fixed rate tender procedures with full allotment.

The unsecured segments of the interbank market rates were impaired in particular. The general aversion to credit risk came about in the reduced amounts of unsecured lending and borrowing, with the secured interbank market being less affected and having higher interest rates. All in all, unsecured transactions became much more costly than collateralised ones (see Chart 8). Central banks reacted by cutting interest rates, and this entailed interbank rates being at lower levels. In May 2009 the policy of enhanced credit support enacted by the ECB contributed to market stabilisation, while spreads narrowed. Nevertheless, spreads between unsecured and secured transactions remained far above pre-crisis levels.

Finally, the intensification of concerns about the soundness and sustainability of public finances in some euro area countries prompted high tensions in the interbank markets from May 2011 onwards. BOR-OIS spreads, as well as spreads between unsecured and secured lending, again widened. Nonetheless, from a funding perspective, the situation during the first semester of 2011 was not as severe as in 2008, since the interbank market had not dried up.

Increased spreads between unsecured and secured transactions changed banks' strategies for interbank funding. Secured transactions

11 See Angelini, P. et al. (2011) for an analysis of the changes in the interbank market, and determinants of the cost of funds.





became much more sought following the crisis, while the role of central counterparties as a way to reduce counterparty risk and manage collateral has increased. The sovereign debt crisis has impacted on the value of collateral that banks hold. Unlike bank disclosure on subprime exposures, there is more transparency with respect to banks' holdings of sovereign debt. This reduced the uncertainty surrounding banks' conditions, and may thus far have helped to avoid spreads increasing to the record levels reached after the default of Lehman Brothers, despite the size of sovereign exposures. Nevertheless, the recognition of a system-wide liquidity crisis led the Eurosystem to introduce non-standard central bank refinancing operations offering ample liquidity at a predictable and low cost, which in turn led to an overall increase in the funding of banks by the Eurosystem (see section 3.5). While regarded as a temporary effect of the crisis, on account of the nature of these extraordinary liquidity measures, it may take a considerable amount of time before the secured, and especially unsecured, interbank markets start to function normally again.

To sum up, the analysis over time points to clear changes in banks' funding via the interbank market: (i) it confirms a substantial fall in interbank liabilities as a proportion of banks' total assets, which began in the third quarter of 2008; (ii) this is accompanied by a rise in the share of domestic bank liabilities in total interbank liabilities in the largest euro area economies. The latter was mirrored by a decline in crossborder interbank liabilities, with a more pronounced decrease in interbank liabilities coming from non-euro area countries. In line with a global trend, the evidence from survey data for the euro area confirms the increase in activity in the secured market and the corresponding decline in the unsecured money market. Furthermore, the activity in the secured market cleared through CCPs has increased, representing about half the total secured market turnover in 2011. The outbreak of the financial turmoil in mid-2007 severely affected market rates, leading to an increase in interbank funding costs.

The changes in banks' funding strategies reflect the restricted financing conditions overall in the interbank market and the increased spreads between unsecured and secured transactions.

### **3.3 CUSTOMER DEPOSITS**

### **3.3.1 DEVELOPMENTS IN CUSTOMER DEPOSITS**

As documented in the literature, the financial crisis broke a broad global funding trend characterised by a strong reliance in wholesale funding sources in favour of more stable retail sources of funding.<sup>12</sup> This implies that bank funding strategies needed to be adjusted quickly in order to expand the customer deposit<sup>13</sup> base and reduce the share of wholesale funding. At the same time, the new regulatory framework proposed under Basel III and its anticipation by market participants may also have an impact on funding patterns after the crisis – notably by providing incentives to increase customer and other stable types of funding – which are likely to be durable.

The share of non-bank deposit liabilities has been on a slightly downward trend ever since the euro was introduced, but started picking up as of the third quarter of 2008 (see Chart 9) in almost all euro area countries. Median values increased from 38% in the third quarter of 2008 to stand at 43.5% at the end of 2011. At the same time, cross-country differences in terms of the share of non-bank funding have also become more evident, as reflected by the widening dispersion. Clearly, domestic non-bank deposits account for the largest proportion of banks' total deposit liabilities in

### 3 IDENTIFICATION OF CHANGES IN BANK FUNDING PATTERNS



<sup>12</sup> Stable funding sources can be defined as comprising the deposit holdings of the non-financial private sector and longer-term debt securities held by non-MFIs, as well as capital. In turn, volatile funding sources refer primarily to short-term debt securities and short-term deposits provided by financial intermediaries, where cross-border deposits obtained from other banks tend to be an important component.

<sup>13</sup> For the purpose of this analysis, customer deposits are all deposit liabilities except interbank liabilities and liabilities to the Eurosystem. Deposits from other non-monetary financial institutions (OFIs), insurance corporations, pension funds and central government are included in customer deposits.



the euro area and on average more than 30% of total liabilities (see Chart 10). Banking systems in euro area countries vary widely, however, in terms of the overall size of the customer deposit



base, and dispersion increased over time, as observed by the widening of the interquartile ranges of the euro area distribution.

Greater efforts to expand the customer deposit base after the third quarter of 2008, generally implying higher funding costs (see next section), led to slowly decreasing loan-to-deposit ratios. These developments derive not only from an expansion of deposits, but also partly from an overall reduction in lending activity. Chart 11 indicates that, after years of gradually rising loan-to-deposit ratios, the euro area unweighted average value stood at 138% in the autumn of 2008 and then decreased considerably to levels around 130%. In general, this fall was to a large extent led by a relatively faster growth in deposits than in lending (with growth in lending even being negative in some countries). Interestingly, the median<sup>14</sup> and unweighted average values in Chart 11 also indicate that the loan-to-deposit ratio started growing again in some countries in 2010, with the latter change being driven by slow or negative growth in deposits.15

A closer look at the composition of (domestic) deposits points to a significant increase in the share of private non-financial deposits with an original maturity of over one year as a share of total term deposits (i.e. all deposits with agreed maturity). Assessed by developments in median values, the shift towards longer term deposits is reflected by an increase in the ratio from just over 15% in mid-2008 to around 35% from mid-2010. The behaviour of the euro area series strongly driven by developments in large countries reflects this pattern even if lying outside the interquartile range (see Chart 12). This is due to the structurally large proportion of longer term deposits (i.e. those with a maturity

<sup>14</sup> A break in the median of the ratio in the third quarter of 2008 is statistically significant only when testing for a joint change in an intercept and a slope (see Annex 1).

<sup>15</sup> Loans in MFI statistics are reported gross of provisions, whereas loan-to-deposit ratios compiled on the basis of supervisory data also reflect the changes in the loan portfolios due to provisioning (i.e. deleveraging through the provisioning). Differences in loanto-deposit ratios may also derive from adjustments on account of securitisation. MFI loan series exclude securitised loans.





between one and two years, and those with an original maturity of over two years) in total term deposits.

In terms of banks' activities, in line with restricted wholesale funding markets, some refocusing on domestic markets is perceived, especially for banking sectors in countries facing more challenges on account of sovereign debt strains. Market intelligence<sup>16</sup> also points to a tendency towards decentralisation of funding by banks with a significant presence abroad. Banks would aim towards achieving local self-sufficiency with respect to funding – with foreign subsidiaries raising funding in each host country to fund local assets. They would thereby reduce their overall reliance on intra-group liquidity. However, the degree of decentralisation varies widely across jurisdictions in the euro area.

### **3.3.2 RETAIL FUNDING COSTS**

Banks' funding costs in the retail market are reflected in the interest rates that banks pay on new deposits from households or non-financial corporations. Banks typically set deposit rates somewhat below their reference market rates to operate with positive deposit margins. Therefore, retail market interest rates reasonably reflect the developments in the interbank market with the additional effects stemming from competitive pressures among the banks.

The financial turmoil forced banks to turn to retail funding,<sup>17</sup> leading to increased costs due to enhanced competition for deposits.<sup>18</sup> Even though the low levels of retail funding costs currently observed coincide with both low policy rates and extremely low market rates, retail funding became relatively more expensive over time. In the euro area, retail funding costs started to grow in late 2005. At the same time, the spreads

- 16 Interviews and roundtables with market participants (primarily banks) provided input to the CGFS paper "Funding patterns and liquidity management of internationally active banks" (2010).
- 17 The terms "retail funding" and "customer funding" are used interchangeably.
- 18 In a few countries experiencing sovereign tensions, prudential authorities have implemented measures to mitigate excessive competitive pressures in the retail deposits market.

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of interest rates for new deposits over the interbank market rates were falling (see Chart 13), in particular for sight deposits. As the subprime crisis hit in the second half of 2007, this decline in the spreads came to a halt. After the Lehman Brothers default in autumn 2008, the spreads went up sharply, since access to the wholesale market became highly restricted and banks' preferences shifted towards retail funding.

The positive differential in overnight rates of deposits from non-financial corporations over deposits from households was growing up to late 2008 and then practically disappeared (see Chart 14). This was preceded by the slightly higher rate on term deposits of non-financial corporations with respect to households reversing in the first half of 2008, with household deposits being priced more expensively ever since.

In addition, the dispersion in the rates of term deposits increased substantially across the euro

area from early 2009 onwards, with higher competition for retail market funding among banks being apparent, in particular in countries subject to sovereign tensions (see Chart 15 and Chart 16). Again, the cross-country differences in household deposit pricing appear to be larger than in the case of deposits from non-financial corporations.

The general trend in the overall share of deposit liabilities has changed as a result of the financial crisis. After years of gradual decline, non-bank deposit liabilities in total assets have started to increase – a change that may persist, reflecting a preference for stable funding sources. To some extent, this is also being driven by the new regulatory framework (Basel III). Loan-todeposit ratios decreased considerably from their peak in the third quarter of 2008. At the same time, a broad shift towards deposits at longer maturities can be observed at aggregate level and across all countries, marking a clear change in pattern with respect to the pre-crisis period.





(January 2003 – December 2011; maximum, minimum and interquartile distribution across euro area countries)



The growing reliance on the customer deposits point to increased competition, in particular in euro area countries experiencing sovereign tensions, possibly implying pressure on banks' net interest margins and overall profitability. The increasing positive differential in rates of deposits from households over deposits from



non-financial corporations may point to growing competition in the retail market, especially as regards the more stable household deposits. This phenomenon has led to a wide dispersion in deposit rates across the euro area since early 2009.

### 3.4 **DEBT SECURITIES**

### 3.4.1 DEVELOPMENTS IN FUNDING THROUGH DEBT SECURITIES

While funding through debt securities is an integral part of most banks' funding strategies, its importance in aggregate terms varies substantially across banking systems in the euro area. As Chart 19 shows, financing in the form of debt securities in the euro area accounted for, on average, 16% of total assets at the end of 2011, albeit with a wide distribution across countries. The euro area median and unweighted average are considerably lower, reflecting a less representative proportion of debt securities in the balance sheets of banks domiciled in the smaller countries. Funding through debt securities is traditionally negligible in the banking sectors of a few small euro area countries, whereas it has represented almost a quarter of the funding structure (all liabilities) in a number of larger countries over the last decade. Banking sectors in larger countries can more easily finance their activities through issuance of debt instruments on account of having more developed debt markets. In addition, banks in these countries are primarily domestically owned, and debt securities are more often issued at group level. These considerations explain the large min-max ranges.

A decline in the ratio of debt securities to assets (see Chart 19) started in 2007, i.e. before the outbreak of the financial crisis. Median values show a larger fall, which is also due to smaller countries joining the euro from 2008. The weighted euro area average, which predominantly reflects developments in the largest euro area countries, was more stable over time, although it has also remained on a gradual downward path since 2007.

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A closer look at the composition of securities issued by euro area banks over time is provided in Chart 17, using data from Dealogic, a private market data source.19 Bank funding through debt securities rose rapidly in the four years before the crisis, peaking in 2006. Bonds and medium term notes (MTNs) were the largest contributors to issuance growth, benefiting from the prevailing abundant liquidity and optimistic assessment of the creditworthiness of borrowers. At the same time, issuance of asset-backed securities (ABS) and mortgage-backed securities (MBS) gained momentum given banks' willingness to ease the pressures on capital buffers and enhance the capacities to expand assets and profits.

In line with other segments of wholesale funding, the financial turmoil adversely affected unsecured and secured funding markets, leading to an overall decrease in the issuance of bank debt securities. In 2007 banks' bonds and MTNs represented around half of total medium and long-term securities issued by euro area banks. At the end of 2008 net issuance of bonds and MTNs turned negative, with the overall share of bonds and MTNs in total issuance dropping to one third (see Chart 17).

To address the liquidity problems and safeguard euro area banks' access to funding, governmentguaranteed debt schemes were launched in some countries in 2008. The proportion of guaranteed bank bonds represented more than 20% of the total debt securities issued in 2009 but, their relevance abated over time as schemes expired (see Chart 17). At the end of 2011 government-guaranteed bank liability schemes were re-introduced by some EU countries, so the importance of guaranteed bank debt among total medium and long-term securities could be expected to increase again. In the same chart, it can be seen that the issuance of covered bonds has been remarkably resilient over the last decade. Covered bonds emerged as an increasingly attractive alternative for bilateral repo operations, especially as euro area banks could often waive the haircut applied in operations with the Eurosystem. The intensification of the sovereign debt crisis in the euro area led banks



to offer larger over-collateralisation, thereby shrinking the unencumbered asset pool and further reducing investors' appetite for unsecured bank bonds. Several large euro area banks could benefit from the reopening of the covered bond market in August 2011.

Prior to the crisis, off-balance sheet items have offered both important additional shortterm (e.g. asset-backed commercial paper) and long-term (securitisation) sources of funding for banks. As shown in Chart 18, securitisation increased considerably in Europe between 2003 and 2008. Securitisation volumes fell from more than EUR 700 billion in 2008 to about EUR 230 billion in the first three quarters of 2011. As these developments are intimately linked with the current banking and sovereign debt strains in the euro area, it would appear premature to discuss them as trends. It would be expected that securitisation activity



<sup>19</sup> It should be noted that the Dealogic data refer to overall issuance of debt securities by banks (including securitised assets), whereas MFI statistics exclusively record on-balance-sheet bank debt securities.



# Chart 19 Debt securities in total assets



would resume, through covered bonds, ABS and MBS structures, even if this were primarily for use in central banking operations at first.

### 3.4.2 DEBT SECURITIES' MATURITY PROFILE AND COST OF FUNDING

The average maturity of bank bonds could normally be interpreted as an indication of the funding situation: the longer it is, the higher the confidence of the market in the banking sector. However, both accounting and technical aspects must be considered to avoid misinterpretations. In 2007, for example, many banks were required to consolidate their special purpose vehicles (SPVs) which were short-term funded entities. Furthermore, the average remaining maturity of outstanding bonds rises when banks are completely cut off from bond financing, because bonds with lower initial maturity become due first.

MFI statistics point to a slight decrease in the maturity profile of debt securities issued by euro area banks in the few years before the crisis, followed by an increase from the third quarter of 2008. This is in line with a general preference for stable funding sources, both market and regulatory-driven (presumably in anticipation of the introduction of the Basel III liquidity rules, to some extent), as debt securities with long maturities constitute stable

### Chart 20 Debt securities with an original maturity of over two years in total debt securities (Q1 2004 – Q4 2011; percentages; maximum, minimum and interquartile distribution across euro area countries) — median … unweighted average … weighted average 90 80



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funding, e.g. term deposits or capital. This is implicit in Chart 20, which depicts the share of debt securities with maturities higher than two years in total securities. Dispersion has varied considerably over the years, but the interquartile range indicates lower dispersion across euro area countries since the onset of the crisis.

The maturity profile over time clearly differs depending on the type of security in question. In the case of bank bonds and MTNs, the declining path in average maturity came to a halt in 2007, and was followed by an increase in 2008 and stabilisation in the five years or so since then (see Chart 21). In the case of covered bonds, the average maturity remained broadly around its longer-term average of six years, after reaching a peak in 2007. The average maturity of ABS/MBS has grown steadily since 2000 and peaked in 2010, subsequently falling abruptly, as depicted in Chart 21. Maturity profiles of classes of securities other than bonds and MTNs are not directly comparable with MFI statistics, only referring to debt securities on the liability side of banks' balance sheets.

Chart 22 depicts bank bond spreads over swap rates, showing a massive increase in funding costs as of 2008. Note that the jump in the spreads of bonds and MTNs was accompanied by a significant increase in covered bond spreads, which continued until 2011. While a diminishing trend can be discerned in the MTN spreads as of 2010, no such observations can be made as regards the other two types of bank bonds.

To conclude, the importance of funding through debt securities varies substantially across banking systems in the euro area. In aggregate terms, a decline in the ratio of debt securities to assets started in 2007 i.e. before the outbreak of the financial crisis. Median values show a larger fall, which is also due to smaller countries joining the euro from 2008. The unweighted average for euro area countries dropped from levels above the 14% observed in the pre-crisis period to just above 10% in the period since the third quarter of 2008, albeit with less significant changes in the largest countries' banking sectors. In 2011, the gross issuance of debt securities by banks









Note: Data includes bonds, MTN, covered bonds, ABS, MBS issued by euro area banks and their SIV (with maturity over 1 year). Bonds guaranteed by governments are not included.

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euro area banks roughly halved from the peak observed in 2006, with securitisation activity also falling sharply after 2008. Despite the decline in debt issuance, the overall average maturity of debt issued by banks (which was on a declining path before the crisis) has been increasing since the third quarter of 2008. The costs of funding through debt securities increased considerably from 2008 across all types of securities, including covered bonds.

### 3.5 EUROSYSTEM FUNDING

As expected, a greater recourse to central banking funding by euro area banks has been observed, following the turbulence in financial markets in mid-2007 and the onset of the financial crisis in the third quarter of 2008. Concerns about public sector finances have engulfed the banking sector in countries on the periphery, leading to further substantial increases in Eurosystem funding. Tensions in the wholesale market led banks to replace interbank funds with central bank funds. With the ECB's full-allotment policy, these banks were able to replace interbank funds with central bank funds. Chart 23 shows that, at the end of 2008, the Eurosystem funding (as a share of total deposit liabilities) to banks in some euro area countries increased considerably (also marked in the distribution), reflecting a general search for liquidity.<sup>20</sup> The mild improvement in the euro area money market in the second half of 2010 is reflected in a decline in recourse to the ECB's funding in this period. Mid-2011 was again marked by increased borrowing from the Eurosystem, owing to the intensified sovereign debt crisis.

At the end of 2011 average recourse to central bank funding by euro area banks in total deposit liabilities stood at roughly 5%, around the level observed after Lehman's default. Dispersion increased significantly after mid-2010 as sovereign tensions intensified gradually in several countries, ultimately leading to a request for EU/IMF financial assistance programmes by three euro area countries in 2010 and 2011.



Banks domiciled in other countries under sovereign strains also experienced difficulties in accessing wholesale market funding and faced severe constrains in obtaining secured funding.

The measures introduced by the Eurosystem on 8 December 2011 with the view to alleviating banks' funding pressures and supporting bank lending may lead to a further rise in the increase in the recourse to Eurosystem funding going forward as long as sovereign tensions persist.

The transmission channels of sovereign risk to bank funding are numerous. First, losses on sovereign bond portfolios weaken the banks' balance sheets, with negative repercussions for funding costs and availability. Such losses also reduce the value of collateral that banks can use in obtaining wholesale funding and central bank liquidity. Moreover, sovereign downgrades

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<sup>20</sup> The econometric analysis (see Annex 1) points out that a break in the mean and trend of the time series of the unweighted average and median of the ratio, if considered separately, is not statistically significant. This is largely because the share of the Eurosystem funding in banks' liabilities is rather volatile and linear trends poorly fit the actual developments from 1999-2008.

generally feed through (or represent a cap) to banks' own ratings, thereby further constraining their funding costs and market access. Finally, sovereign stress reduces the value of both implicit and explicit government guarantees.

The higher demand for central bank funding has also increased banks' attention to their collateral management practices. Since the onset of the crisis, euro area banks have been securitising loan portfolios for the purpose of using them as collateral in refinancing operations with the ECB. As a result of the broadening of the collateral eligibility criteria for central bank financing, banks had incentives to reserve the highest quality assets for repo transactions in the wholesale markets. This trend is evident in Chart 24: the pre-crisis period saw increasing use of unsecured bank bonds and ABS as collateral for repo operations with the ECB, mainly at the expense of government securities and covered bank bonds. In recent years, however, the proportion of government bonds has been on the rise again, as has that of covered bank bonds.

## Chart 24 Use of collateral in ECB monetary policy operations by asset type



At the same time, the share of unsecured bank bonds in the total collateral pool is at roughly half of its pre-crisis level. Their place has apparently been taken up by non-marketable securities when comparing 2007 figures with those of 2011.

To sum up, constraints and higher costs in interbank market funding, as well as in funding through debt securities, have led banks to increase their recourse to central banking funding substantially with respect to the pre-crisis period. Changes reflect the use of non-standard Eurosystem refinancing measures and the recourse to funding by banks domiciled in countries under financial assistance and in other countries experiencing sovereign tensions. The composition of collateral also changed, reflecting tensions in debt markets, with a sharp decline in unsecured bank bonds and a rise in non-marketable securities with respect to pre-crisis levels.

### 3.6 CAPITAL AND BANK LEVERAGE

A component of banks' stable funding sources is also equity, which comprises preferred and common shares, reserves and other securities. This section looks at the ratio of capital over assets akin to the concept of leverage. It should be noted that the ratio computed on the basis of MFI (unconsolidated) statistics is not comparable to the ratio computed on the consolidated data of banks' financial reports. Nevertheless, broad trends in the relationship of bank equity to assets are aligned. This section includes a box discussing the drivers of banks' leverage ratios (defined as assets over equity) using consolidated bank-level data.

In terms of consolidated bank financial reporting, the expansion of banks' balance sheets while equity levels were broadly maintained (thereby increasing leverage) in the run-up to the crisis is well documented (see chart B.1 and B.2 in Box 1). With reference to the MFIs' statistical definition of capital, its

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(Q1 2004 – Q4 2011; percentages; maximum, minimum and interquartile distribution across euro area countries) median unweighted average weighted average 50 50 40 40 30 30 20 20 10 10 0 0 -10 -10 -20 -20 -30 -30

Chart 26 Annual growth of total assets

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share of total assets remained broadly stable in the pre-crisis period, suggesting that the growth of capital and reserves was broadly proportional to that of assets. In mid-2008 both the median and unweighted average of capital to asset ratios were at 6.5%, while the weighted average for the euro area stood at 5.6% (see Chart 25), owing to the relatively lower level of capital in some large euro area countries.

Growth in the capital-to-assets ratio became more apparent from the beginning of 2009 and was largely driven by an increase in capital and a slower increase in assets (see Chart 26). This movement is in line with the shift towards higher bank capitalisation levels in response to market pressures, and possibly to anticipation of the changes in regulatory requirements ahead of the implementation of Basel III. An increase in dispersion reflects developments in banking sectors domiciled in countries experiencing sovereign tensions, as well as higher ratios for countries joining the euro area in recent years. Deleveraging pressures coming from the funding side also contributed to the decline in asset growth in the post-crisis period.

2009

2010 2011

2004 2005 2006 2007 2008

Source: ECB.

The proportion of capital and reserves as a share of assets remained broadly unchanged in the pre-crisis period. It reached a low in the fourth quarter of 2008. This was to a large extent because of the strong growth in total assets. In the post-crisis phase, the capital-to-assets ratio started growing at the beginning of 2009 on account of both the increase in capital and the decline in banks' assets.



### Box

### THE DRIVERS OF LEVERAGE IN THE EURO AREA

There is ample evidence on the pro-cyclicality of leverage, defined as the ratio of total assets to equity, and the drivers behind that phenomenon (see Adrian and Shin (2010), and Geanakoplos (2009)). Adrian and Shin argue that commercial banks in the United States target a constant leverage ratio over the cycle, while investment banks seem to have a pro-cyclical relationship. Giordana and Schumacher (forthcoming) find a positive feedback between a measure of economic sentiment and stock prices on the one hand, and banks' assets on the other, in the pre-crisis period, as well finding that real interest rate changes have a positive impact on equity and asset growth.<sup>1</sup> On the basis of this preliminary evidence, euro area basic macroeconomic and bank-specific variables are tracked at an annual frequency, with the objective of describing leverage behaviour, mostly over the periods covering 2003 and 2010.<sup>2</sup> Differently from the main data source used in this report (MFI unconsolidated statistics), the analysis in this Box is based on consolidated data at individual bank level.

The drivers of leverage over the business cycle can be classified into macroeconomic variables and bank-specific variables.<sup>3</sup> For euro area banks, macroeconomic drivers seem to play an important role. The main contemporaneous co-movement – correcting for sample size – is found between leverage and a proxy for funding liquidity risk, the Euribor-OIS spread (see Chart A).<sup>4</sup> Low and declining funding costs correlate well with the increase in leverage, while the reduction in leverage correlates well with the drying-up of funding and the increased liquidity risk after Lehman's collapse.

Other macroeconomic factors that correlate well with leverage (albeit lagged one year) are the EuroStoxx 50 Index and an index of economic sentiment in the euro area, in that order of importance (see Chart A).<sup>5</sup> Stock market performance and economic confidence seem to precede developments in the euro area leveraging and deleveraging process, a feature consistent with the literature mentioned above. Economic activity, as measured by GDP growth, is correlated significantly with leverage when it is lagged two years.<sup>6</sup>

A look at bank-specific variables that co-move with banks' leverage helps to understand how leverage changes over time as the state of the economy evolves. Several points are noteworthy. First, as stated above, the most significant variable associated with leverage seems to be funding liquidity risk. Loans to financial and non-financial firms consistently increased when funding liquidity risk was low and vice versa.<sup>7</sup> These two balance sheet items seem to have been the most

- 1 Giordana, G. and Schumacher, I., "Macroeconomic Conditions and Financial Sector Leverage in Europe", *Working Paper Series*, Banque centrale du Luxembourg, forthcoming. In Luxembourg, there is evidence that banks exhibit pro-cyclical leverage behaviour in the sense of a pro-cyclical relationship between asset growth and leverage growth, despite the fact that their balance sheet structure is more in line with that of US commercial banks.
- 2 Data restrictions in terms of data frequency, banks' coverage and the available granularity of banks' financial statements make thorough econometric work difficult, although some prima facie illustrations of leverage behaviour in the euro area can be made.
- 3 The leverage ratio (defined as the ratio of total assets to equity) is calculated on a sample of EU banks using consolidated data as reported by BankScope.
- 4 Significant at the 5% level.
- 5 Significant at the 5% and 10% levels, respectively.
- 6 Significant at the 10% level. Giordana and Schumacher (2011) find that Luxembourg banks' leverage exhibits pro-cyclical behaviour, and that the Euribor-OIS spread is a major driver of it. As Luxembourg is the residence of major European banking group affiliates, the strong correlation between interbank loans and the Euribor-OIS spread suggest that, in times of liquidity constraints, banking groups increase liquidity demand from their respective Luxembourg subsidiaries. In contrast, the authors find no significant role for Luxembourg GDP growth.
- 7 Significant at the 5% and 10% levels, respectively.





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Sources: Bankscope, Bloomberg and Datastream. Note: All series were normalised except bank leverage.

important means by which banks changed their leverage during the sample period. This is likely to be a reflection of banks' asset-liability management activities.

Second, consistent with the first observation, the size of the interbank market co-moved with leverage in the euro area during the sample period. Statistically, the co-movement between leverage and loans, or leverage and lending, in the interbank market (see Chart B) is highly significant in the euro area.

Third, it is often noted that increases in banks' leverage are associated with an increase in the maturity mismatch of banks' portfolios. Using the ratio of loans to deposits as a proxy for portfolios' maturity mismatch, there is some indication that it may also be the case for euro area banks (see Chart B).8

Fourth, banks' deposits are another key funding source which is clearly correlated with leveraging and deleveraging. As stated above, the Euribor-OIS spread is the most important variable associated with leverage; and the same spread seems an important driver of deposits. The contemporaneous correlation between banks' leverage and an index of deposits illustrates the point (see Chart B).9

Fifth, liquid assets are associated with banks' leverage given that one of the largest components of liquid assets is securities. While not statistically significant, there seems to be a noticeable positive co-movement between leverage and cash plus financial assets held for trading, and a noticeable negative co-movement between leverage and financial assets available for sale.

8 Significant at the 5% level.



<sup>9</sup> Significant at the 10% level.

The role of liquid financial assets in asset-liability management for leveraging/deleveraging purposes – which is likely to be important – would deserve further analysis, but it is beyond the scope of this box.

Finally, a lack of reliable and sufficiently extensive data on off-balance sheet positions prevents analysis of what may yet be another important bank-specific variable by which banks adjust their leverage levels. It is expected that banks which extended large amounts of commitments and guarantees during the upturn, i.e. showing large off-balance sheet items at the start of the downturn, will need to expand their balance sheets relatively more given that these contingent liabilities are likely to be exercised during the downturn. Data restrictions prevented a descriptive look at whether changes in off-balance sheet items were counter-cyclical in the euro area during the sample period, but this is clearly an important area of research.



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## **4 FINANCIAL STABILITY CONSIDERATIONS**

In line with global developments and as documented in this report, the recent financial crisis has led to significant changes in banks' funding patterns with respect to the pre-crisis period (from 1999 to 2008 in this study). The sovereign debt crisis has further conditioned banks' funding strategies in some countries. While changes can be substantial, it appears premature to try to distinguish between changes of a durable and of a temporary nature as long as sovereign debt strains, and malfunctioning in some funding markets, have not been overcome. At the same time, the recent crisis has set in motion a number of regulatory initiatives - aiming in particular at avoiding a repeat of the crisis episode - that are likely to condition banks' funding patterns in a durable way. The changes in banks' financing identified in the report may give rise to financial stability considerations, a number of which are raised in a tentative way below.

Decreasing reliance on interbank and wholesale funding, and a shift towards more stable funding sources would appear to contribute to overall stability. Policy concerns could, however, arise on account of the increasing importance of secured as opposed to unsecured funding. A predominance of secured or collateralised funding for both wholesale funding and central bank refinancing may pose limits to bank lending activity and have an impact on the composition of assets on banks' balance sheets going forward. A revival of the securitisation market is essential, especially if this change were to be permanent. These considerations would probably affect the speed and extent to which the share of central bank funding in overall funding can return to pre-crisis levels.

The growing importance of CCPs is generally seen as contributing to enhancing financial stability by limiting counterparty credit risk, thereby promoting transparency and efficiency by allowing exposures to be netted multilaterally. Yet CCPs could potentially also concentrate counterparty risk in a systemic credit event (e.g. in the case of deficient management of margins) and should therefore be subject to robust risk management. Greater reliance on retail funding sources (notably customer deposits) appears as a positive factor in increasing banking sector resilience and overall financial stability. thereby For internationally active banking groups, greater focus on retail funding sources may be coupled with a trend towards increased reliance on local sources with a view to decentralising funding. The financial autonomy of subsidiaries is to be welcomed, as it can promote self-sufficiency and facilitate control and monitoring by local entities and supervisors, in spite of the fact that its effectiveness in limiting intra-group contagion has not been fully tested in a European context. This development appears to be accompanied by a trend towards the centralisation of liquidity management for internationally active banking groups and would not, in principle, raise concerns relating to financial market integration. Increased competition in retail funding markets should be perceived as positive, contributing to greater efficiency, although excessive competition could negatively affect stability in the banking sector.21

Turning to the impact of regulation, important drivers of changes in banks' funding behaviour are the regulatory changes foreseen in respect to capital and liquidity. Basel III liquidity rules aim to ensure that banks rely on their own capacity to build liquidity buffers and raise stable funding, thereby reducing funding liquidity risk (and the reliance on central bank funding) in times of crisis. To some extent, the marked-led move towards liquid assets is reinforced by a regulatory-driven preference for liquid assets that would persistently affect banks' asset holdings and their funding strategies. The possible impact of the proposed liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) on bank funding patterns and on banks' behaviour towards central bank financing and the money market is unknown. In particular, regarding unsecured funding, it is uncertain how

### 4 FINANCIAL STABILITY CONSIDERATIONS



<sup>21</sup> For a survey on this topic, see, for example, Carletti, E. et al. "Competition and stability: what's special about banking?" in Mizen, P. (ed.) *Monetary History, Exchange Rates and Financial Markets: Essays in Honour of Charles Goodhart*, Vol. 2, 2003.

the new regulation will impact on the longerterm segment of the money market (since banks will need to substitute short-term funding for longer-term funding in order to comply with the LCR as of 2015).<sup>22</sup>

Regulatory constraints, greater reliance on stable funding sources and higher funding costs are all likely to limit the potential for balance sheet growth to a greater extent than prior to the crisis. In the euro area, both in the 2007-2008 financial turmoil and in the 2010-2011 crisis period – as reported in the bank lending survey – banks justified the tightening in credit standards by a combination of pure supply-side factors, i.e. the need to strengthen their capital position, challenging access to financing markets and liquidity positions, and a deteriorating risk assessment due to the economic outlook.

The changes in the US regulation on money market funds (MMF) established by the SEC in February 2010 imposed severe restrictions on the maturity profile of MMFs (e.g. by setting shorter maturity limits for securities held by MMFs and other liquidity requirements). This played an important role in explaining the USD shortages in Europe and will have a durable effect on the USD funding conditions for European banks going forward.<sup>23</sup>

The financial crisis has alerted banks and supervisors to the importance of robust liquidity management frameworks and close monitoring of the liquidity situation (taking into account currency and maturity mismatches), which should contribute to stability. More importance may be given to regular reviews of banks' collateral situation, e.g. by assessing the impact on single or multiple downgrades on their funding situation, or by assessing banks' ability to generate collateral eligible for central banking operations. These elements should contribute to greater resilience in the banking sector going forward.

Finally, the financial stability and monetary policy functions of central banks need to adjust to trends in bank funding that prove to be of a persistent nature. Regarding financial stability surveillance activities, these already follow more closely vulnerabilities in bank liquidity management frameworks, central bank refinancing-related indicators and indicators of aggregate liquidity, for example. As long as markets remain impaired, cost of funding indicators such as the reference rates EONIA (unsecured overnight), EURIBOR (term funding) and EUREPO (collateralised, typically by sovereign debt) term funding in EUR, as well as their spreads, need to be assessed critically with respect to the accessibility of funds at these costs. The same is true for reference rates for longer-term funding. In particular, should the lower level of activity in unsecured money markets prove to be a persisting trend, the monitoring of this market for both financial stability and monetary policy purposes would be of limited relevance. At the same time, the increase in importance of the repo market, were it to remain so, would require greater efforts in understanding its functioning and thorough enhanced surveillance activities to examine potential risk factors and inform policy decisions. The increase in importance of the repo market will, furthermore, raise important questions for monetary policy implementation.



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<sup>22</sup> Notably, the Basel Committee on Banking Supervision (BCBS) and the Bank of International Settlements (BIS) Committee on the Global Financial System (CGFS) are investigating potential unintended consequences of the new liquidity risk regulation on central bank operations, as well as its possible system-wide implications, respectively.

<sup>23</sup> While breakdowns by currency are not analysed in the report, they are captured in the database. The currency mismatches building up in euro area banks' balance sheets between 2000 and mid-2007 created vulnerabilities in the funding of long USD positions.

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### REFERENCES

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## ANNEXES

### I TEST FOR SIGNIFICANCE OF A BREAK IN TRENDS

To support the analysis on the changes in bank financing patterns, an econometric test was conducted to substantiate the hypothesis that means and possibly trends in indicators broke with the onset of the financial crisis. To that end, selected indicators from this report were subjected to an econometric test procedure on the entire sample period (from the beginning of 1999 to the end of 2011), which provides evidence for/against the hypothesis that a break in trend occurred in the third quarter of 2008.

The underlying model allows an indicator to have a conditional mean as well a linear trend, either of which is allowed to switch, i.e. be distinct, before as opposed to after the third quarter of 2008. A Wald test serves to test the hypothesis that 1) the mean, 2) the trend and 3) the combined mean and trend experienced a significant break at the crossing of the two regimes in the third quarter of 2008. The main outcome from the test procedure is a set of probabilities that are summarised in the table below. It shows the results for the tests, referring to breaking mean, trend, and the combined mean and trend. The results are provided separately for the weighted euro area averages, unweighted euro area averages and euro area medians. The closer a p-value reported in the tables is to zero, the stronger the evidence against the hypothesis that a break did not occur in the third quarter of 2008. Low p-values therefore indicate that a break was likely to occur.

The results suggest that the means and trends of the vast majority of the indicators (irrespective of whether weighted or unweighted euro area averages or medians were employed) experienced a significant break around the third quarter of 2008. For a few series – such as the median of domestic interbank liabilities in total interbank liabilities and of the loan-to-deposit

Test	for significance	of break in	mean and	trend in the	third quarter	of 2008

Chart	Indicator	n values											
No	mulcator	Br	eak in mean		R	p-values eak in trend		Break i	n trend and i	d and mean			
			Unweighted	Median	Weighted	Unweighted	Median	Weighted	Unweighted	Median			
		average	average	Wieulan	average	average	witculaii	average	average	Wieulan			
1													
1	Interbank liabilities in total	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00			
5	Domestic interbank liabilities	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00			
5	in total interbank liabilities	0.08	0.07	0.57	0.00	0.01	0.39	0.00	0.00	0.06			
6	Other euro area interbank												
	liabilities in total interbank												
	liabilities	0.28	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.00			
9	Non-bank deposit liabilities												
	in total assets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
10	Domestic non-bank deposit												
	liabilities in total assets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
11	Loan-to-deposit ratio	0.00	0.02	0.15	0.00	0.00	0.38	0.00	0.00	0.02			
12	Domestic private												
	non-financial deposits with												
	an original maturity of over												
	total domestic term denosits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
19	Debt securities in total assets	0.05	0.12	0.00	0.01	0.00	0.00	0.00	0.00	0.00			
20	Debt securities with an												
	original maturity of over												
	two years in debt securities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
23	Eurosystem funding in total												
	deposit liabilities	0.01	0.34	0.01	0.02	0.58	0.03	0.00	0.00	0.00			
25	Capital and reserves in total												
	assets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

### ANNEXES



ratio, the unweighted average and median of Eurosystem funding in total deposit liabilities – econometric tests suggested that the mean and trend, if considered separately, were not significantly different after the crisis, compared with before the crisis. Nonetheless, the joint test for a simultaneous break in mean and trend indicated that only the median of domestic interbank liabilities in total interbank liabilities did not change significantly in the third quarter of 2008.



### **SUPPLEMENTARY CHARTS** 2

### Chart A.I Non euro area interbank liabilities in interbank liabilities (Q1 2004 – Q4 2011; percentages; maximum, minimum and interquartile distribution across euro area countries) median ····· unweighted average weighted average 90 90 80 80 70 70 60 60 50 50 40 40 30 30 20 20 10 10 0 0 2004 2005 2006 2007 2008 2009 2010 2011 Source: ECB.



## Chart A.3 Maturity breakdown for average daily turnover in unsecured lending

(2002 - 2011; index: cash lending volume in 2002 = 100)



# Chart A.4 Maturity breakdown for average daily turnover in secured lending and borrowing

### (2003 – 2011; percentages)

- over one year
- over three months and up to twelve months .....
- over one month and up to three months
- tomorrow/up to one month overnight



## ANNEXES

ECB



### Chart A.6 Twelve-month BOR - OIS spreads (July 2007 - January 2012; basis points) twelve-month EURIBOR – OIS spreads twelve-month USD LIBOR – OIS spreads July Jan. July Jan. July Jan. July Jan. 2008 2009 2010 2011 July Jan. Source: Bloomberg.

