EUROPEAN CENTRAL BANK

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NO 151 / AUGUST 2013

CORPORATE FINANCE AND ECONOMIC ACTIVITY IN THE EURO AREA

STRUCTURAL ISSUES REPORT 2013

Task Force of the Monetary Policy Committee of the European System of Central Banks

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EXECUTIVE SUMMARY

This report analyses and reviews the corporate finance structure of non-financial corporations (NFCs) in the euro area, including how they interact with the macroeconomic environment. Special emphasis is placed on the crisis that began in 2007-08, thus underlining the relevance of financing and credit conditions to investment and economic activity in turbulent times. When approaching such a broad topic, a number of key questions arise. How did the corporate sector's capital structure, internal and external financing sources, and its tendency to leverage, evolve in the euro area over the last decade and in the run-up to the financial crisis in particular? Did these developments contribute to and/or exacerbate the financial crisis? Did the corporate sector's response to various shocks and vulnerabilities support or encumber the euro area economy, both during the financial crisis and in its aftermath?

This report attempts to shed light on these and other key issues: first, through an analysis of firms' internal and external financing and their financial situation based on euro area accounts data (Chapter 2); second, by analysing key corporate finance decisions based on granular firm-level data (Chapter 3); and third, by connecting corporate sector developments to developments in the economy as a whole (Chapter 4). While primarily empirical, the assessment relies on insight and models taken from economic and corporate finance theory as a means of interpreting facts and evidence. The data available for this report generally cover the period 1999-2012, and the cut-off date for the statistics is 30 April 2013. When drawing comparisons with previous historical crises, the data go back to the 1960s.

The main findings of the report can be summarised as follows.

ACCUMULATION OF DEBT IN THE RUN-UP TO THE CRISIS

In the years leading up to the crisis there was an intense accumulation of corporate debt in the euro area, with very large disparities across euro area countries (see Section 2.4). The rise in euro area indebtedness was, in general, more pronounced than in most of the financial crises in recent history (see Section 4.2). A number of economic factors contributed to the formation of such a debt overhang. Within a global context of subdued uncertainty and widespread under-pricing of risk, there is evidence that loose financing conditions in some countries had created a self-reinforcing feedback loop, in which macroeconomic imbalances (including excessive borrowing by the corporate sector and over-investment in some euro area economies) built up. As discussed in Section 2.4, the accumulation of debt masks important differences across sectors; for instance, the construction and real estate services sector has experienced an extreme rise in leverage over the last decade, largely reflecting booming housing markets in a number of euro area countries. In addition, firm-level evidence collected for the report points to a significant correlation between the size of a firm and its leverage. In the sample period about one third of firms did not have any financial debt. However, among indebted firms, leverage decreases as firms become larger and older. This evidence, together with the high percentage of young and small firms without any financial debt, suggests that young and small companies mainly rely on equity financing but, once they begin to borrow, they rely heavily on debt to finance their business (see Section 3.2).

ROLE OF CORPORATE DEBT IN CORPORATE INVESTMENT

The surge in leverage sowed the seeds of the financial crisis and has had a significant effect on the nature, severity and persistence of the downturn at both the country and sectoral levels. While debt can, in general, improve economic welfare and spur economic growth if it remains at moderate levels, when it reaches excessive levels it creates the conditions for financial instability and hampers

investment and economic growth. As discussed in Chapter 4, a formal assessment of euro area countries provides evidence to support the theory that debt accumulation increases the probability of a financial crisis. In addition, the data show that reduced investment (and output) during the recession has, in general, reflected the intensity of corporate debt accumulation prior to the crisis. The fact that excessive corporate sector indebtedness may have become a drag on private sector investment (and economic activity) is underpinned by firm-level evidence in a number of euro area economies. This is in line with the evidence presented in Section 3.4 of the report, which shows that firms with higher levels of debt reduce their investment, indicating that the drain on future cash flows from debt repayments weighs negatively on firms' current spending and investment decisions when the macroeconomic outlook deteriorates. Lower cash holdings and higher interest payment ratios (large firms aside), together with high indebtedness, are associated with sharper declines in investment levels during crisis periods.

BANK LENDING CONDITIONS AND ALTERNATIVE SOURCES OF FINANCING

In the months after September 2008, global financial panic, liquidity shortages in the interbank markets and mounting losses led to banks tightening credit conditions in order to repair their balance sheets and deleverage. Indeed, the same mechanisms that had contributed to fuelling corporate sector imbalances in the run-up to the crisis worked in reverse, but in an amplified manner, in the subsequent downturn. Overall, on the basis of selected quantitative assessments described in Section 4.1, credit supply conditions accounted for almost one third of the contraction in real GDP at the peak of the crisis in the first half of 2009. At the same time, in such periods of restricted bank lending, one mitigating factor was the ability of corporations to replace bank credit with alternative sources of financing, as internal and external financing instruments increased in importance relative to bank loans. Depending on the financing environment, the effect of seeking alternative sources of financing differed markedly across euro area countries (see Section 2.3). On the one hand, companies replaced bank loans with market-based financing or financing via unquoted equity during the crisis. In this respect, the relevance of debt securities increased, especially in some countries, such as France. On the other hand, inter-company loans temporarily became more significant in other countries, such as Germany. To a certain extent, trade credit appears to have acted as a buffer in some euro area countries. At the same time, in some countries, NFCs' external financing was exceptionally weak during the crisis, reflecting very subdued economic activity, high risk aversion on the part of lenders, a decline in firms' creditworthiness and constraints in the supply of external funds, in particular bank financing.

MATURITY STRUCTURE OF FINANCIAL ASSETS AND FIRMS' CASH MANAGEMENT

During the crisis period firms increased their holdings of short-term financial assets relative to long-term ones, probably as a precaution, and relied to a larger extent on their most liquid assets to cover short-term liabilities (see Section 2.1). As documented in Section 3.3, cash management generally differed according to the size of the firm, as smaller firms tended to hoard larger amounts of cash, potentially as a result of their more limited access to external financing. During the crisis, this common trend became even more pronounced.

DELEVERAGING PROCESS AND FINANCING GAPS

Corporate indebtedness ratios only started falling in the later stages of the recession, and also relatively gradually; this lag was to be expected in the aftermath of a severe financial crisis. Firm-level evidence presented in Sections 3.2 and 4.2 points to heterogeneous developments across firms as, despite the overall deleveraging trend, firms with low leverage levels have been increasing their leverage, irrespective of the size of the firm. Firms' financing gaps narrowed during the crisis (see Section 2.2) – this can be linked to lower capital formation and higher gross saving in some

euro area countries, which was partly due to cost cutting measures and cuts in dividend payments. Overall, the decline in debt financing and the narrowing of financing gaps has been stronger in those euro area countries that had accumulated large amounts of debt in the run-up to the crisis, and where the pressure to deleverage is higher as a result. At the same time, the decline in leverage ratios during the crisis was partly impeded by valuation losses in equity (see Section 2.4). Corporate debt vulnerabilities diminished during the crisis, owing to falling interest payment burdens associated with lower key monetary policy interest rates. Nonetheless, as discussed in Section 4.1, lending rate developments in the euro area have, at times, masked diverging patterns across countries, in particular in connection with heightening tensions in some euro area sovereign debt markets. Overall, as also shown in Section 2.4, the fact that short-term debt only accounts for a limited proportion of total debt meant that corporations' refinancing risks remained contained. At the same time, NFCs were exposed more severely to interest rate risks, which, on average, increased marginally at the euro area level, while varying considerably across countries.

FUTURE ADJUSTMENT PROCESS

A number of indicators presented in the report signal that further deleveraging of NFCs is expected in the euro area, and specifically in selected countries. This process will take place within the general context of banks being more prudent in granting new loans, and firms attempting to mitigate balance sheet vulnerabilities in an environment of subdued aggregate demand. Notably, deleveraging pressures on euro area NFCs mask significant differences between sectors, according to how highly leveraged they were in the past. For instance, the assessment in Section 2.4 shows that in some sectors, such as construction and real estate services, it is of paramount importance (and also desirable from a welfare perspective) that imbalances be unwound. The assessment also shows, however, that in services other than real estate this is far less important, or even unimportant. Overall, the extent to which the corrective adjustments will be a drag on the economy depends primarily on the macroeconomic channels through which the adjustment process occurs. Reduced indebtedness caused by banks' constraints on the provision of new credit or by corporations scaling back investment could be costly for the economy at large.

MAIN POLICY IMPLICATIONS

The crucial role played by bank credit prior to and during the crisis confirms the notion that it is better to assess risks to price and macroeconomic stability within a broad-based analytical framework that pays specific attention to monetary and financial conditions. Such an assessment should focus on the medium term, acknowledging the fact that imbalances, which often accumulate in an environment of subdued volatility and under-pricing of risk, ultimately generate sizeable macroeconomic instability with variable and uncertain time lags (see Section 4.2).

Through its standard and non-standard monetary policy measures, the European Central Bank (ECB) has contained the intense pressures leading to disorderly deleveraging in both the financial and non-financial private sector during the crisis. In addition to the conventional interest rate instrument, the ECB's Governing Council has adopted a series of non-standard measures, which were exceptional in nature, scope and magnitude, and yet commensurate to the severity of the circumstances. These measures were, to a large extent, aimed at the monetary financial institution (MFI) sector, taking into account the importance of bank loans in the financing of NFCs in the euro area. These interventions have significantly reduced the downside pressures on price stability by avoiding an abrupt credit crunch stemming from sudden shortages of liquidity and funding for banks. However, at times, the effectiveness of monetary policy itself has been hindered by financial fragmentation, in particular against the backdrop of the sovereign debt crisis in some euro area

countries. As a result, the accommodative monetary policy stance set by the Governing Council has had an uneven effect on firms, depending on their geographical location and, often, the sector they are in.

Structural policies designed to develop a financial system that offers a broader range of financing alternatives and instruments can contribute to creating improved corporate capital structures that have more diverse financing sources and thus are, crucially, more resilient to abruptly changing bank lending conditions. Specifically, raising the proportion of risk capital in the financial structure of firms, in particular small and medium-sized enterprises (SMEs), via measures that improve their access to equity and debt markets, could encourage more moderate and stable recourse to loans. In addition, a more balanced and harmonised fiscal treatment of firms' debt and equity financing could strengthen their capital bases, enhance their internal financing capacity and also improve their creditworthiness, a crucial element for their access to external financing. Finally, measures enhancing the level of competition in the product and factor markets are instrumental in reallocating resources towards better performing firms and thus increasing the overall competitiveness of the euro area.

The theoretical insights and historical episodes described in Section 4.2 suggest that, in the future, policy-makers face a challenging balancing act in accompanying the necessary adjustment toward more sustainable economic patterns. First, policy interventions should prevent a disorderly and disruptive deleveraging process, the effects of which are typically amplified by various sectors attempting to reduce their leverage levels simultaneously. In this context, monetary policy has proved effective in containing deleveraging pressures on banks stemming from liquidity shortages and mounting losses, thereby mitigating knock-on effects in terms of a forced unwinding process in the corporate sector. Conversely, economic policies should avoid contributing to a delay in the balance sheet adjustment process, which would ultimately increase the economic costs of the deleveraging process. For example, concerns over the adverse short-term consequences of their interventions (e.g. aggravating a credit crunch) may lead banking supervisors to tolerate banks delaying loss recognition or even to be lenient with banks in terms of their management of corporate loan risk. In such an environment, excessive and overly protracted monetary accommodation may end up making it easier for ailing and inefficient institutions to continue operating. Overall, in order to strike a balance, economic policies need to firmly encourage an orderly restructuring process in the non-financial and financial sectors that is consistent with sustainable long-term economic growth trends. Previous crises have highlighted the importance of measures aimed at strengthening banks' balance sheets; doing so allows financial institutions to withstand potential loan losses associated with the deleveraging process of the non-financial private sector and, at the same time, to continue providing credit to the economy.

1 INTRODUCTION AND MOTIVATION[1]

The euro area corporate sector's capital structure, internal and external financing, and leverage have followed a clear pattern over the last decade, notably prior to and during the economic crisis. The corporate sector's indebtedness increased substantially in the years preceding the crisis, on the back of subdued global uncertainty and loose financing conditions in selected countries. The rapid increase in leverage not only fuelled the accumulation of macroeconomic imbalances in the run-up to the crisis, it also sowed the seeds of the financial crisis and strongly influenced the nature, severity and duration of the downturn. Against this background, it is crucial to investigate in detail firms' financing choices and the changes in corporate financing and levels of indebtedness in the run-up to and during the financial crisis. The ability of the euro area's corporate sector to replace bank credit with alternative sources of financing can help to mitigate the dampening impact of the crisis on the economy as a whole. In addition, firms' characteristics, such as their size, as well as their balance sheet structure (characterised, for instance, by the amount of tangible assets they hold, their cash holdings or their levels of indebtedness), should play an important role in their decision-making, in particular regarding investment. Finally, in the light of the ongoing costly adjustment process, it is important to compare the current crisis with previous crises of a similar magnitude. The report will shed some light on this, while also considering other aspects related to corporate financing and economic activity in the run-up to and during the financial crisis.

The report is divided into three chapters.

Chapter 2 analyses the developments in corporate balance sheets and firms' internal and external financing based on euro area accounts data for the period 2000-2012. In doing so, emphasis will be placed on comparing developments across countries and sub-periods, notably before and during the crisis. The assessment begins by reviewing the maturity structure of assets and liabilities, before assessing firms' internal financing and how their financing gaps have developed across euro area countries. This chapter specifically focuses on corporate financing characterised by sustained debt accumulation prior to the crisis, and a subsequent unwinding process that began later in the downturn. The changing composition of corporate financing during the crisis reflects the replacement of bank credit with alternative sources of financing, a fact that has helped to mitigate the adverse effects of tightening bank lending conditions. Chapter 2 complements the assessment with two boxes. Box 1 reviews loan financing from the perspective of NFCs' creditors, as well as the balance sheet position of firms' main creditor sectors. Box 2 investigates the use of trade credit by NFCs.

Chapter 3 investigates differences between firms in order to better understand the different degrees of intensity with which financing problems and uncertainty have affected individual firms during the recent crisis. After highlighting the critical information provided by firm-level data, which also complements traditional macroeconomic analysis, this chapter provides a brief overview of the theoretical discussions concerning the contributing factors in firms' capital structure decisions (Box 3). An econometric analysis confirms the relevance of most determinants of leverage identified by the economic literature. Some of these factors are firm specific, such as profitability, age or size. Other factors are common to firms in the same sector, or depend on the characteristics of the institutional and financial environment in which they operate. The assessment then investigates cash holding policies in relation to firms' size. Traditionally, small firms keep more cash on their balance sheets and are more cautious than large firms. The crisis has exacerbated this phenomenon,

1 Prepared by Giacomo Carboni, Annalisa Ferrando and Petra Köhler-Ulbrich.

and small firms' cash holdings have become more dependent on (volatile) cash flows and the availability of collateral. In addition, the analysis focuses on firms' investment decisions and how they are related to their financial situation. During the crisis this seems to have become a more influential factor in deciding whether to invest, in particular for smaller firms. Finally, data from surveyed firms is used to focus on the dynamics of their financing gaps. In this context, Box 4 investigates whether the recent lending policies across euro area countries have been justified by the deterioration in the financial situation of firms.

Chapter 4 explores how firms' financing conditions and indebtedness interact with the macroeconomic environment, placing special emphasis on the crisis period. Focusing primarily on short-term developments, the first part of Chapter 4 acknowledges the relevance of banks' intermediation processes in determining the terms and conditions for corporate sector financing. The fact that this was both a financial and banking crisis has led to credit institutions suffering from impaired balance sheets and capital positions, leading to a restriction in the provision of bank credit to the economy on the supply side. The adverse macroeconomic impact of tightening conditions governing the supply of credit has partly been mitigated by the replacement of bank credit with alternative sources of financing and, more importantly, by the ECB's policy measures. Box 5 discusses alternative theoretical explanations for the replacement of bank loans with debt securities that was observed during the crisis. The second part of Chapter 4 focuses primarily on the corporate sector's debt cycle from a medium-term perspective. The assessment begins by considering the latest euro area crisis within the broader international and historical context of crisis periods, with the aim of deriving a set of empirical constants, drawing lessons from them, and inferring policy prescriptions that can be applied in today's circumstances. The focus then turns to the relationship between how the euro area corporate sector's indebtedness came about, and selected aspects of the macroeconomic environment. Finally, the assessment investigates plausible possibilities for further deleveraging in the euro area, in particular in selected countries.

2 CAPITAL STRUCTURE, FINANCING AND LEVERAGE OF NON-FINANCIAL CORPORATIONS IN THE EURO AREA[2]

How did the corporate sector's capital structure, internal and external financing, and leverage evolve in the euro area over the last decade, and notably in the run-up to and during the financial crisis? Was the corporate sector capable of finding ways to replace bank financing, which became scarce during the crisis? Did companies' financial positions become more or less vulnerable during the crisis? The second chapter of this report reviews these questions and puts forward an analysis, largely based on the euro area accounts for the period 2000-2012, which primarily compares the period before the financial crisis with the crisis period.[3] The analysis shows that there have been significant changes in the financing structure of NFCs during the crisis.[4]

The analysis in this chapter relies largely on euro area accounts data, as they allow for a broad analysis of the financing and financial positions of NFCs at market prices and following the principle of residency across countries[5] and time (see Annex 1 for a brief overview of some methodological issues). At the same time, the aggregate view provided by macroeconomic data has some limitations, especially with respect to analysing distributional aspects of firms' financing.[6] The analysis of firm-level data in Chapter 3 therefore complements the analysis based on macroeconomic data.

Section 2.1 reviews the corporate balance sheet structure and its heterogeneity across countries, with a special focus on changes in the maturity structure of assets and liabilities and in the importance of financing instruments. Section 2.2 focuses on the development of firms' internal financing in the run-up to and during the financial crisis, and on how firms' financing gaps have developed across euro area countries. In Section 2.3, the analysis is centred on the external financing of NFCs. It describes strong corporate debt financing up to the crisis and its subsequent decline during the crisis. It looks in particular at firms' ability to replace bank loans with alternative sources of financing during the crisis. This appears to have helped mitigate the adverse effects of the financial crisis on corporate financing and can thus be seen as one of the ways in which NFCs cope with periods of financial stress. Finally, Section 2.4 investigates the intense accumulation of corporate debt in the period prior to the financial crisis, with high dispersal across euro area countries and sectors of economic activity, as well as the dynamics of the deleveraging process during the crisis, and corporate debt vulnerability indicators. Chapter 2 includes two boxes. Box 1 reviews loan financing from the perspective of NFCs' creditors, as well as the balance sheet position of firms' main creditor sectors. Box 2 investigates the use of trade credit by NFCs.

2 Coordinated by Petra Köhler-Ulbrich.

3 In this report, the pre-crisis period refers to the period from the first quarter of 2000 to the second quarter of 2008, and the crisis period refers to the period from the third quarter of 2008, when the financial crisis intensified, to the fourth quarter of 2012 (i.e. the latest available data for the euro area accounts).

4 See also European Central Bank (2007a) and European Central Bank (2007b). Compared with the 2007 Structural Issues Report, there has been a significant improvement in the availability of quarterly harmonised data from the financial and non-financial accounts at the euro area level, and across euro area countries, regarding, for instance, the range of corporate financing instruments available and the availability of non-financial accounts. These data can be used to analyse corporate balance sheets with a view to determining the availability of internal funds. Additional data which have become available since the last Structural Issues Report also include loans broken down by creditor sector, loans across different sectors of economic activity and more detailed data for assessing the debt sustainability of NFCs. Thus, overall, a substantially more detailed analysis of corporate finance and leverage was possible, compared with the situation at the time of the last Structural Issues Report, when a large part of the analysis was based on annual (as opposed to quarterly) data up to 2005.

5 Therefore, the analysis presented in this report refers to the set of firms residing in a given country, irrespective of the nationality of the owner. An analysis of differences according to firm nationality requires alternative data sources, such as market data. This type of data is, however, less readily available than national accounts data.

6 The main differences between national accounts data and firm-level data, as used in Chapter 3 of this report, relate to how representative the data is, the country coverage and the valuation of balance sheet items (see Box 6 in Annex 3 for details).

2.1 BALANCE SHEET STRUCTURE OF NON-FINANCIAL CORPORATIONS[7]

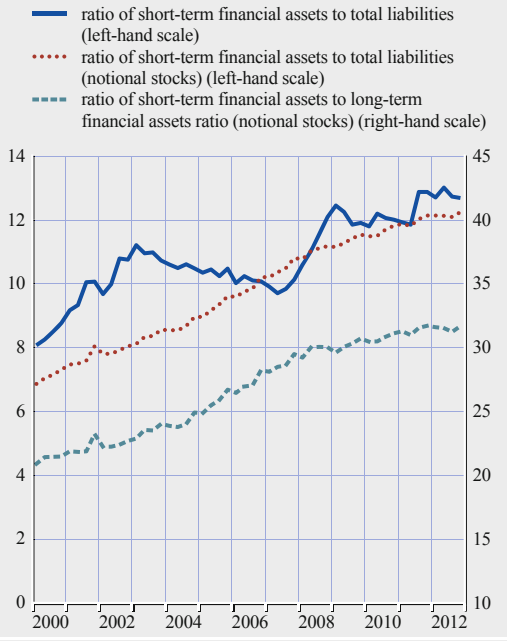
NFCs generally need external financing, in addition to their internal funds, in order to finance their real and financial investment. Their decision on external financing may be influenced by the availability of funds, as well as by their intention to reach certain (long-run) targets or optimum levels of debt or equity, in particular so as to balance the tax advantages of debt versus bankruptcy costs (see Box 3 for a discussion of the main theoretical hypotheses underlying capital structure decisions). This, in turn, determines their corporate balance sheet structure. NFCs' choices concerning both sources of funds and the way funds are employed have important implications for their future profitability and stability, and can have repercussions for the stability and performance of the wider economy. In order to set the scene for the subsequent analysis contained in this report, it is useful to examine the proportional distribution of the main components of NFCs' assets and liabilities prior to the outbreak of the financial crisis, as well as during it.[8]

MATURITY STRUCTURE OF NON-FINANCIAL CORPORATIONS' ASSETS AND LIABILITIES

While corporate holdings of short-term financial assets have been limited compared with long-term financial and fixed assets, their relative importance compared with their long-term counterparts increased in the run-up to the crisis (see Chart 1). This may have partly resulted from increasing corporate profitability in times of sound economic growth. During the crisis, despite the pronounced declines in profitability (see Chart 5), short-term financial assets on firms' balance sheets have continued to increase in importance (see Table 1). Firms may have tried to reduce the impact of financial turbulence by relying on their most liquid assets to a greater extent, in order to cover existing short-term liabilities. This pattern is largely confirmed when looking at the cross-country data in Chart 2, and Table A1 in Annex 2, where an increase in the ratio of short-term to long-term financial assets has been recorded in most euro area countries. At the same time, while the increase in the proportion of short-term assets was very pronounced for Greek corporations, in general no typical pattern can be found for countries that were greatly affected by the crisis compared with other countries. This is also true when valuation changes are excluded.[9]

Chart 1 Importance of short-term financial assets of euro area non-financial corporations

(percentages)



Source: ECB.
Notes: Total assets are the sum of fixed and financial assets. Long-term financial assets include long-term loans, long-term debt securities, shares and other equity, and pension fund reserves. Short-term financial assets include currency and deposits, short-term loans and short-term debt securities. Notional stocks are calculated (from a base period) as the change in the amounts outstanding accounted for by transactions. Data are based on the amounts outstanding.

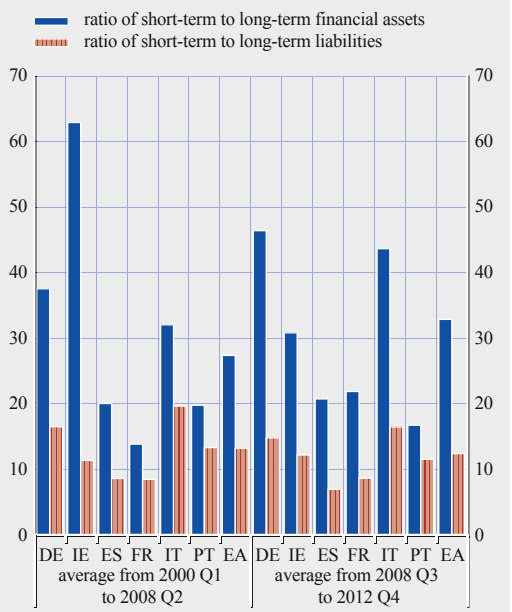
7 Prepared by Alexander Karšay.
8 See also the ECB Monthly Bulletin (October 2011).
9 Valuation changes can be calculated by taking the difference between the change in the amounts outstanding (based on market values) and the change in the notional stocks. Notional stocks are calculated (from a base period) as the change in the amounts outstanding accounted for by transactions. While most of the other changes are due to valuation effects, some changes may also have occurred because of reclassifications or improved coverage of financial institutions (or financial instruments).

The various liquidity indicators in Table A2 in Annex 2 also suggest that NFCs' ratios of short-term assets to liabilities have increased across euro area countries during the crisis. The increase is relatively large for most indicators in Cyprus, the Netherlands, France and Finland, while there has been a decline in all the liquidity measures in Slovakia, Slovenia, Ireland and Greece. The countries that consistently achieved relatively high liquidity ratios within these indicators include Estonia, Cyprus, Luxembourg and the Netherlands, while the opposite is the case for Italy, Portugal and Slovenia.

Compared with short-term financial assets, NFCs' proportion of short-term liabilities has been smaller and has changed little over the past decade, particularly when looking at notional stocks (see Table 1, Chart 2, and Table A6 in Annex 2). Long-term sources of funding were dominant during the two observed periods. Some moderate shifts in favour of short-term funding can be seen in Estonia, Ireland, France, Slovenia and Slovakia, while movements in the opposite direction have been recorded in Belgium, Germany, Italy, Cyprus, Luxembourg, Austria and Portugal.

Chart 2 Maturity composition of non-financial corporations' financial assets and liabilities

(percentages)



Source: ECB.
Notes: Total assets are the sum of fixed and financial assets. Long-term financial assets include long-term loans, long-term debt securities, shares and other equity, and pension fund reserves. Short-term financial assets include currency and deposits, short-term loans and short-term debt securities. Data are based on amounts outstanding. EA denotes euro area.

In all euro area countries, the dominant component of short-term liabilities is loans (see Table A7). For long-term liabilities, shares and other equity is the largest component (see Table A8),

Table 1 Composition of assets and liabilities of non-financial corporations in the euro area

a) Type of asset as a percentage of total assets

	Fixed assets	Long-term financial assets	Short-term financial assets	Other financial assets
Average from Q1 2000 to Q2 2008	40.9	35.1	9.6	14.4
Average from Q3 2008 to Q4 2012	40.4	35.0	11.5	13.2
Q4 2012	39.7	36.0	11.8	12.5

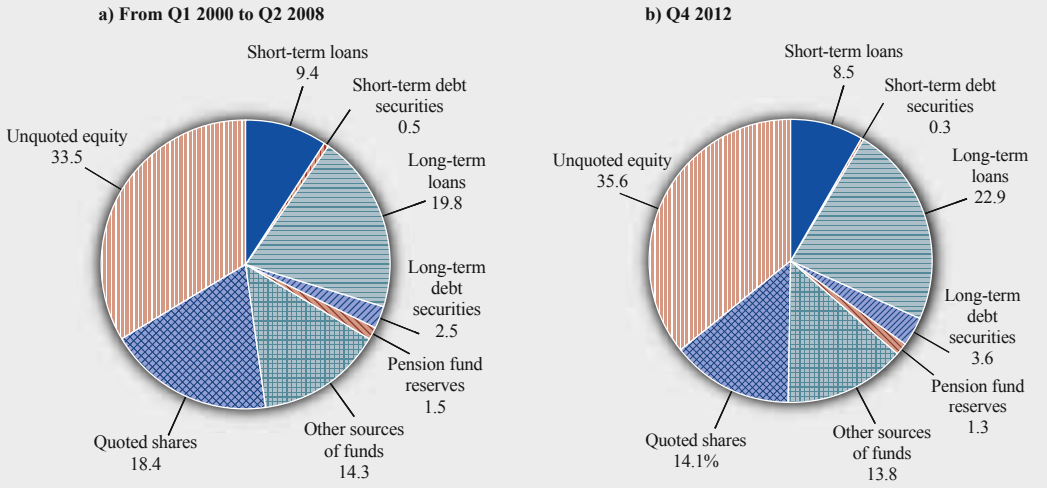
b) Type of liability as a percentage of total liabilities

	Shares and other equity	Debt	Short-term debt	Long-term debt	Other liabilities
Average from Q1 2000 to Q2 2008	51.9	33.8	10.0	23.8	14.3
Average from Q3 2008 to Q4 2012	48.5	37.4	9.4	27.9	14.1
Q4 2012	49.6	36.6	8.8	27.8	13.8

Source: ECB.
Notes: Total assets are the sum of fixed and financial assets. Long-term financial assets include long-term loans, long-term debt securities, shares and other equity, and pension fund reserves. Short-term financial assets include currency and deposits, short-term loans and short-term debt securities. Debt is defined as loans, debt securities and pension fund reserves. Other financial assets (liabilities) include other accounts receivable (payable), i.e. mainly trade credit, and financial derivatives.

Chart 3 Capital structure of euro area non-financial corporations

(percentage of total liabilities)



Source: ECB.
Note: Other sources of funds comprise trade credit payable, derivatives, and currency and deposits.

representing more than half of the total in all countries (except for Greece during the crisis period), with unquoted equity the largest individual component (see Chart 3). The second most important long-term liability of NFCs was long-term loans, which, on average, represented a larger proportion of total liabilities during the crisis than during the pre-crisis period. This change, which can also be seen when valuation changes are excluded, has been most pronounced in Greece, Spain, Ireland and Luxembourg.

IMPORTANCE OF DEBT VERSUS EQUITY

As far as the composition of firms' capital structure[10] is concerned, in the pre-crisis period equity was, on average, the largest component of corporate liabilities in all euro area countries, but especially in Belgium, France and Luxembourg (see Chart 3 and Table A4 in Annex 2). During the crisis it has remained the largest component, albeit proportionally smaller than in the pre-crisis period, and still accounts for nearly half of firms' total liabilities. It also presents a measure of the underlying value (net wealth) of corporations. While quoted shares are mainly used by larger enterprises, unquoted equity is not traded on financial markets and very heterogeneous across euro area countries. In all euro area countries (except for the Netherlands and Finland), unquoted equity accounted for more than 50% of the total equity of NFCs, on average, over the past decade. During this period, in most euro area countries there was a general shift away from equity and towards debt, related to the build-up of debt in the period prior to the financial crisis, and to the weak growth of quoted shares and the valuation losses that have occurred during the crisis. The increase was most pronounced in Greece, Spain, Slovenia and Ireland, taking into account the pronounced negative valuation effect in equity that has occurred during the crisis. This is evident from the changes in notional stocks, i.e. disregarding valuation effects.

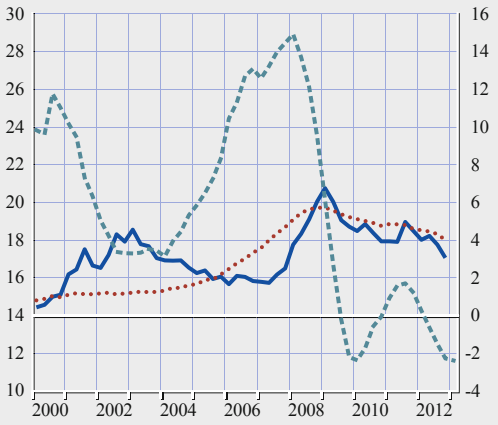
10 In this report, capital structure is defined as the way corporations divide their sources of funds between debt and equity.

IMPORTANCE OF BANK FINANCING[11]

Loans from MFIs represent a key source of debt funding for euro area NFCs, and especially for SMEs (see Chapter 3). Specifically, they make up about half of the total NFC debt in the euro area (see Table A5 in Annex 2). They accounted for around 17% to 19% of total liabilities over the last decade. The countries where MFI loans to NFCs accounted for the largest proportion of liabilities, on average, over the period under review were Greece, Spain, Italy, Cyprus, Austria and Slovenia. The countries where MFI loans made up the smallest proportion of liabilities over the past decade were Belgium, France, Luxembourg and Finland.

Chart 4 Loans from monetary financial institutions to euro area non-financial corporations

(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Notional values of external financing are derived by adding the quarterly flows of external financing to the stock of external financing outstanding in the first quarter of 2000.

The proportion of euro area NFCs' total liabilities accounted for by MFI loans (based on market values) rose in the periods 2000-02 and 2007-08, and fell afterwards, but not below the lowest point of the preceding cycle (see Chart 4). When excluding valuation effects, the proportion of MFI loans rose constantly from 2000 to 2008 until, in the course of the financial crisis, it shrank because of the exceptionally weak annual growth of MFI loans. Again, there was substantial cross-country heterogeneity. From the middle of 2008 to the fourth quarter of 2012, the proportion of the total liabilities of NFCs accounted for by MFI loans (excluding valuation changes) fell in 12 euro area countries, most strongly in Ireland.

2.2 NON-FINANCIAL CORPORATIONS' INTERNAL FUNDS AND FINANCING GAPS[12]

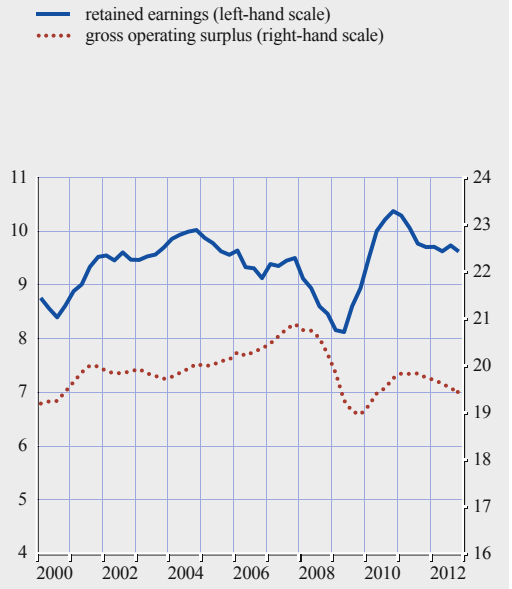
FIRMS' INTERNAL FINANCING CAPACITY

Internal funds are a major source of financing for NFCs. According to the "pecking order" theory, internal funds are preferred over external financing as they do not require the payment of any risk premia related to, in particular, asymmetric information between borrowers and lenders (see Box 3).[13] Several macroeconomic measures provide information about the internal funds of the NFC sector. The gross operating surplus measure captures firms' operating income, i.e. gross value added minus the cost of production, in particular the cost of employees (see Chart 5). The latter constitutes the bulk of the cost to be deducted, accounting, on average, for 60% of NFCs' gross value added over the past decade (see Chart 6). Corporate saving (retained earnings) is equal to the operating surplus and the financial income of NFCs, after interest payments, dividends, rents and corporate taxation.[14]

11 Prepared by Paul Metzemakers and Walter Waschiczek.
12 Prepared by Petra Köhler-Ulbrich and Marie-Denise Zachary.
13 See Myers (1984), and Fama and French (2002).
14 Unlike in business accounting, here gross savings are calculated after dividend payments. Corporate saving is therefore broadly equal to retained earnings.

Chart 5 Internal funds of euro area non-financial corporations

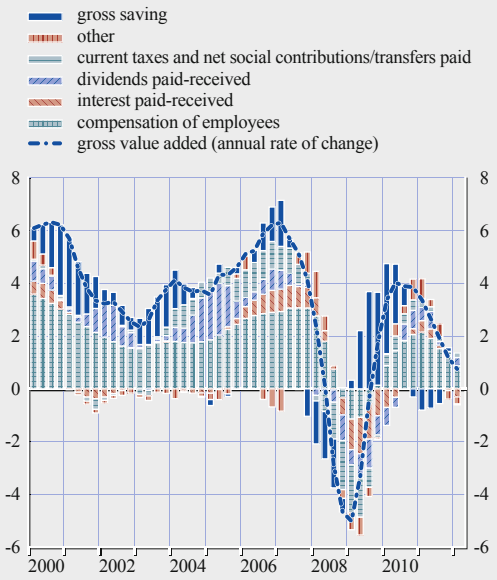
(percentages of GDP; four-quarter moving sums)



Sources: ECB and Eurostat.

Chart 6 Annual rate of change in gross value added of euro area non-financial corporations and growth contributions

(percentages; based on annual transactions)



Sources: ECB and Eurostat.
Note: "Other" includes taxes and subsidies on production, other net property income paid and net equity adjustment paid.

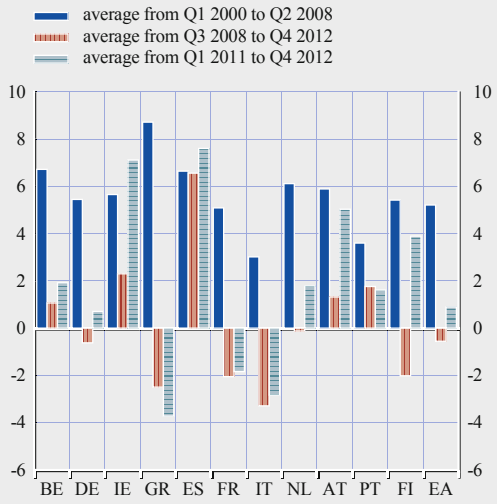
At the euro area level, since 2000 there have been several distinct periods in terms of firms' generation of internal funds. The first period (2000-07) ran until the beginning of the financial crisis and was characterised by an increase in the gross operating surplus of NFCs (from 19.2% of GDP in the first quarter of 2000 to 20.9% of GDP in the fourth quarter of 2007), mainly as a result of the economic boom during these years. During most of this period, retained earnings fluctuated between 9% and 10% of GDP. Following the onset of the crisis, and mainly during 2008 and 2009, a sharp reduction in gross operating surplus and gross saving was observed, related to weaker activity as a result of the impact of the financial crisis on the real economy. Relative to GDP, the gross operating surplus reached its lowest level in the first quarter of 2009 (19.0%) and gross savings dropped to 8.1% in the second quarter of 2009. As a consequence, during this period corporations reduced their liquidity buffers and cut the cost of their employees and their dividends paid, which prevented an even steeper decline in corporate profits.

In the course of 2010 and 2011, improved business cycle conditions contributed to a rebound in profitability, as indicated by the gross operating surplus and retained earnings of NFCs. Gross operating surplus rebounded to 19.8% of GDP in the period from the first quarter to the third quarter of 2011, before stabilising at 19.4% in the fourth quarter of 2012, whereas retained earnings reached 10.4% of GDP in the fourth quarter of 2010 and declined thereafter to 9.6% of GDP in the fourth quarter of 2012.

Across euro area countries, the average rate of growth in the gross operating surplus of NFCs was positive for all countries from 2000 to the second quarter of 2008, varying from 8.7% in Greece, 6.7% in Belgium and 6.6% in Spain to 3.0% in Italy and 3.6% in Portugal (see Chart 7). During

Chart 7 Annual rate of change in the gross operating surplus of non-financial corporations across euro area countries

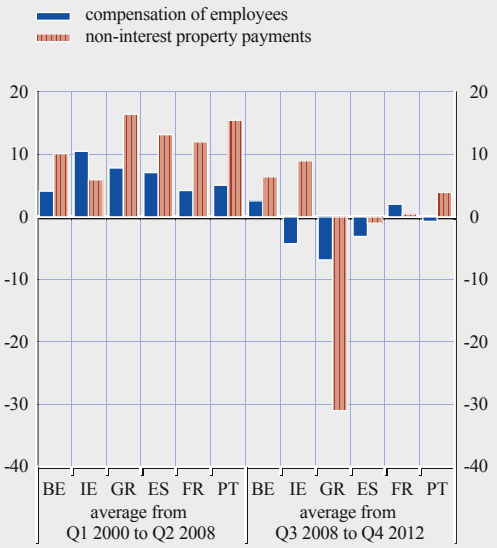
(percentages)



Sources: ECB and Eurostat.
Notes: Quarterly data for Estonia, Cyprus, Luxembourg, Malta, Slovenia and Slovakia are not available. EA denotes euro area.

Chart 8 Annual rate of change of factors that have an impact on the internal funds of non-financial corporations across selected euro area countries

(percentages)



Sources: ECB and Eurostat.
Note: Non-interest property payments are mainly dividend payments.

the crisis period, in an environment of subdued economic activity, the annual growth rate of the gross operating surplus has been negative in most of the larger euro area countries, in particular in Italy.[15] At the same time, in most countries the growth in the gross operating surplus was higher, on average, during the period 2011-12 than during the period from the third quarter of 2008 to 2012, with the notable exception of Greece and Portugal.

Growth in retained earnings has also decreased, on average, in the crisis period for euro area NFCs as a whole, whereas the picture is mixed at the country level. While retained earnings growth has decreased compared with the average pre-crisis period, especially in France, it has increased in other euro area countries, in particular in Spain, Ireland and Portugal. This may be partly related to cost-cutting measures and lower dividend payments (see Chart 8).

FINANCING GAPS

NFCs' external financing gaps can be assessed based on the ratio of net lending/net borrowing to GDP, which broadly measures the excess of corporate revenues over capital expenditure, in relation to nominal GDP.[16] If corporate investment in financial assets is also taken into account, this provides an extended measure for gauging the size of the financial gap that includes the external financing needs for both real and financial investment. The financing gap is typically negative for NFCs that need to finance their investments with external funds.

15 For Spain, national accounts data do not point to a decline in the gross operating surplus of NFCs during the crisis, whereas alternative data sources, such as data from the Spanish Central Balance Sheet Data Office, point to more unfavourable developments.

16 In this report, net lending (+)/net borrowing (-) from non-financial accounts broadly equals gross saving and net capital transfers minus gross capital formation. The net lending/net borrowing figure is also available from the financial accounts, where it measures the balance between transactions in financial assets and transactions in liabilities. For some countries, important statistical discrepancies between the two concepts exist.

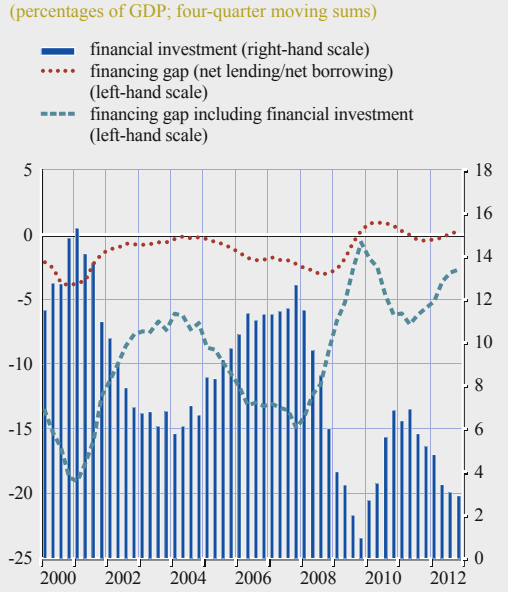
After the bursting of the "dot-com" bubble in 2001 and a period of balance sheet consolidation, NFCs increased their borrowing and expanded their balance sheets from 2005 until the end of 2008. Chart 9 shows the increase in NFCs' net borrowing during that period, arising from elevated capital formation in a favourable macroeconomic environment and moderating retained earnings. The financing gaps of euro area NFCs widened from approximately 0% in the middle of 2004 to -3.1% in the third quarter of 2008. In the context of the financial crisis, the increase in corporate gross saving relative to GDP, mainly during 2010, combined with a severe decline in capital formation relative to GDP from the fourth quarter of 2008 to the first quarter of 2010, implied that euro area NFCs' financing gaps narrowed substantially during this period, and even turned into a financial surplus from the fourth quarter of 2009 until the second quarter of 2011, and again in the second half of 2012.

Corporate investment in financial assets also decreased during the financial crisis, in contrast to a strong increase from 2004 to the fourth quarter of 2007 that was related to an intense increase in mergers and acquisitions activity. The financing gap including financial investment shows the same general trend as the financing gap excluding financial investment. However, the curve shows a sharper improvement from 2008 to 2010 owing to weaker investment in financial assets. Compared with the average for the period from 2000 to the second quarter of 2008, the financing gap narrowed by 5.5 percentage points, on average, from the financial crisis until the fourth quarter of 2012.

Chart 10 shows firms' net lending/net borrowing across euro area countries. First, it shows some structural heterogeneity, where three groups of countries can be identified. The first group appears to have a structural net lending position, before as well as during the financial crisis. This group includes

Chart 9 Financing gap of euro area non-financial corporations

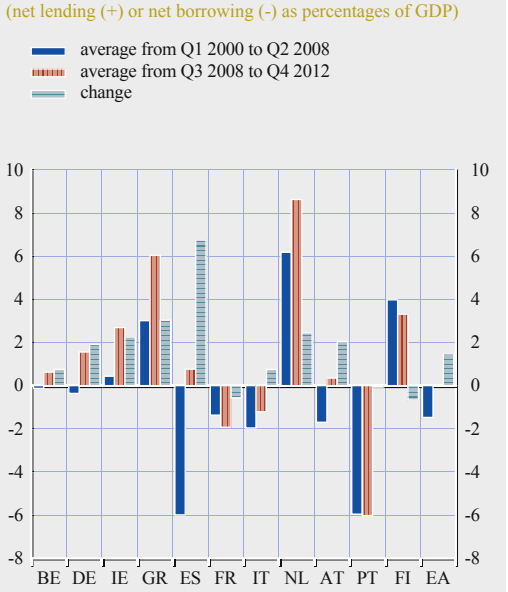
(percentages of GDP; four-quarter moving sums)



Sources: ECB and Eurostat.
Notes: The financing gap is defined as the net lending/net borrowing of NFCs on the non-financial side of the euro area accounts, in relation to GDP.

Chart 10 Financing gap of non-financial corporations across euro area countries

(net lending (+) or net borrowing (-) as percentages of GDP)



Sources: ECB and Eurostat.
Notes: The financing gap is defined as the net lending/net borrowing of NFCs on the non-financial side of the euro area accounts, in relation to GDP. Quarterly data for Estonia, Cyprus, Luxembourg, Malta, Slovenia and Slovakia are not available.

Greece[17], Ireland, the Netherlands and Finland. The second group includes countries that have a net borrowing position over time, such as France, Italy and Portugal, whereas the third group, which includes Belgium, Germany[18] and Austria, appears to have a broadly balanced position over time. During the financial crisis, firms' financing gaps have narrowed in most euro area countries, owing to lower capital formation and, in some countries, higher gross saving, cost-cutting measures and cuts in dividend payments, but also to higher corporate profitability in the period 2010-11, against the backdrop of improving economic activity. The most pronounced change in NFCs' net lending/net borrowing positions occurred in Spain and Greece, where it swung from an average of -6.0% and 3.0% of GDP respectively before the crisis, to a surplus of 0.8% and 6.0% of GDP respectively in the crisis period. In these two countries, debt accumulation had, on average, been most intense in the pre-crisis period (see Chart 14). In the countries with a net borrowing position over time, the impact was similar, although much less pronounced, for example in Italy (on average -1.2% during the crisis, compared with a pre-crisis average of -2.0%). Portuguese firms have maintained a strong financing gap, on average, during the crisis (at -6.0%), but were showing a decreasing trend up to the fourth quarter of 2012 (-3.0%). By contrast, firms in France have increased their financing gap during the crisis (from a pre-crisis average of -1.4% to a crisis average of -1.9%).

Compared with the period 2000-07, on average, a reduction of financial investment relative to GDP occurred in all euro area countries during the crisis, except in Belgium, probably owing to the importance of corporate treasury centres. Firms in Greece (with a reduction of 9.0% in the amounts outstanding, excluding valuation changes, of firms' financial assets in the fourth quarter of 2012 compared with the second quarter of 2008), but also in Spain (-2.1%) and Luxembourg (-6.0%) have reduced their overall investment in financial assets during the crisis period, likely because of liquidity needs. These developments have led to a considerable narrowing of the average financing gap including financial investment between the pre-crisis and crisis periods, in particular in Greece, Spain, Austria and Portugal.

2.3 EXTERNAL FINANCING OF NON-FINANCIAL CORPORATIONS[19]

EXTERNAL VERSUS INTERNAL FINANCING

The use of internal and external financing by NFCs should vary according to firms' characteristics such as profitability, following the "pecking order" theory (see Box 3), investment opportunities and financing conditions. Broadly in line with economic theory, there is a slight negative correlation between euro area firms' external financing and their retained earnings (see Chart 11). In addition, at the beginning of an economic upswing, where uncertainty surrounding the business climate is high, firms often finance the bulk of their investment with retained earnings, before increasing their external financing. Across the larger euro area countries, the relative importance of external and internal financing has varied during the past decade. While firms' reliance on external financing was strong in many euro area countries before the crisis, their reliance on internal funds has become higher than their reliance on external financing in most of the larger euro area countries during the crisis (with the exception of France). On average, NFCs in some euro area countries, in particular in Spain, even redeemed (in net terms) their external financing during the crisis. Firms in Germany,

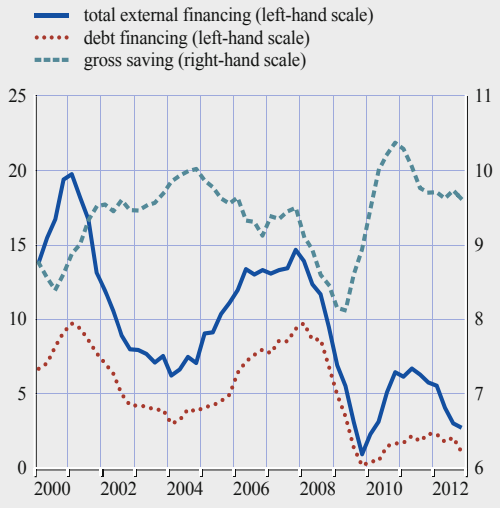
17 At the same time, the financing gap of NFCs in Greece, calculated based on the financial accounts, shows a net borrowing position, on average, in both the pre-crisis and crisis periods.

18 The balanced (positive from 2004) net lending/borrowing position of NFCs in Germany before 2008 was related, inter alia, to the transfer of internal resources (as equity investment) to foreign affiliates of German enterprises, which moved parts of their supply chain to eastern Europe, in particular after EU enlargement. See Deutsche Bundesbank (2012).

19 Prepared by Petra Köhler-Ulbrich.

Chart 11 Internal and external financing of euro area non-financial corporations

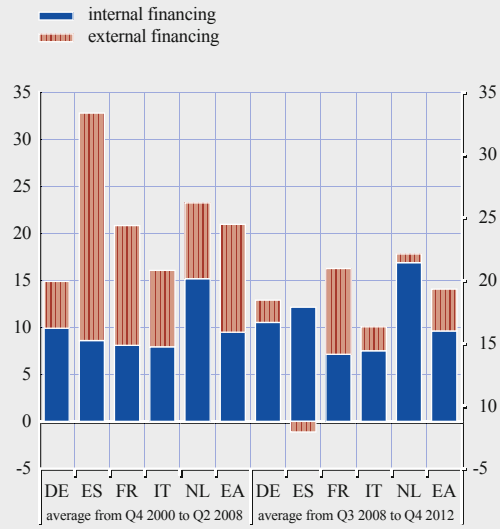
(percentages of GDP; four-quarter moving sums)



Sources: ECB and Eurostat.
Notes: Internal financing is defined as gross saving (retained earnings). External financing includes total liabilities of NFCs. Debt financing is defined as loans, debt securities and pension fund reserves. EA denotes euro area. In Chart 12, the calculation of averages is based on the data ranges shown in the chart.

Chart 12 Non-financial corporations' internal and external financing across euro area countries

(percentages of GDP; four-quarter moving sums)



Sources: ECB and Eurostat.
Notes: Internal financing is defined as gross saving (retained earnings). External financing includes total liabilities of NFCs. Debt financing is defined as loans, debt securities and pension fund reserves. EA denotes euro area. In Chart 12, the calculation of averages is based on the data ranges shown in the chart.

the Netherlands, Austria and Finland relied more on internal than on external financing in both the pre-crisis and crisis periods, albeit to a larger extent during the crisis (see Chart 12).

SUBSTITUTION EFFECTS IN NON-FINANCIAL CORPORATIONS' FINANCING DURING THE FINANCIAL CRISIS

Firms can choose from a range of external financing instruments, in particular equity, bank loans, debt securities, inter-company loans and trade credit. This provides them with some flexibility in their financing of working capital and investment, although smaller firms are generally more restricted in their financing options.

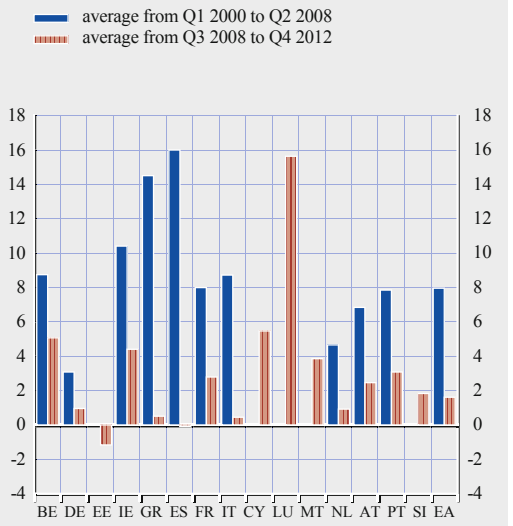
In the pre-crisis period, at the euro area level and in most of the larger euro area countries (with the exception of Germany[20]), debt financing contributed strongly to firms' external financing. Among the larger countries, this was especially the case for firms in Italy and Spain. During the financial crisis, euro area NFCs' external financing growth and, in particular, debt financing growth, declined substantially. Average corporate debt financing growth declined particularly strongly between the pre-crisis and the crisis periods in the countries where debt financing had been booming up to the financial crisis, such as Spain and Greece, but also Ireland and Italy (see Chart 13).

As a result of financial turmoil, and in the context of reduced bank credit availability and higher uncertainty, firms across countries, to a varying extent, replaced bank loans with other sources of

20 In Germany, the pre-crisis average of equity financing was strongly influenced by one large-scale transaction in 2000 related to the acquisition of a German telecommunications enterprise by a non-resident firm, and the related establishment of a German subsidiary.

Chart 13 Annual rate of change in debt financing of non-financial corporations across euro area countries

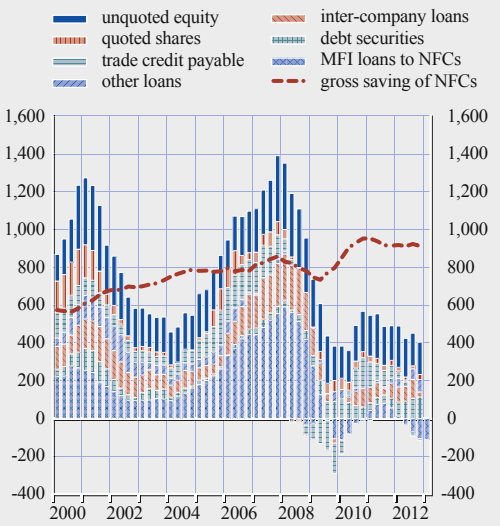
(percentages)



Source: ECB.
Notes: Debt financing is defined as loans, debt securities and pension fund reserves. Data for Ireland are available from 2002; for Estonia from the fourth quarter of 2004; for Cyprus, Slovenia and Slovakia from 2005; and for Luxembourg and Malta from 2006. Therefore, with the exception of Ireland, the average of the first quarter of 2000 to the second quarter of 2008 is not shown for these countries.

Chart 14 Financing instruments used by euro area non-financial corporations – Evidence on substitution effects

(annual transactions; EUR billions)



Sources: ECB and Eurostat.
Notes: "Other loans" mainly comprise loans from other financial intermediaries. For the first quarter of 2013, data are only available for MFI loans.

financing.[21] This has helped to mitigate the adverse effects of the financial crisis on corporate financing, and can thus be seen as a way in which NFCs coped with financial tensions.[22]

At the euro area level, unquoted equity, inter-company loans (most of which remain intragroup) and debt securities played an important role in the external financing of NFCs, when MFI lending declined and annual transactions were negative (see Chart 14). The latter was the case during two distinct periods: in the first phase of the financial crisis when economic activity was very subdued (2009-10) and, following a slight increase in bank lending in 2011, again in 2012 and early 2013.

The proportion of euro area NFCs' debt financing accounted for by debt securities issuance increased remarkably between the pre-crisis period, when it stood at 8% (based on annual transactions), and the crisis period, when it accounted for 50%. In particular, in the period 2009-10 and again in 2012, the annual growth of debt securities issued by NFCs was relatively strong, suggesting that, in some cases, this was replacing bank loans, presumably mainly for large enterprises. The increased importance of debt securities in corporate financing probably resulted mainly from an adverse shock to bank credit supply, and despite the fact that the cost of market-based debt financing was higher than the cost of bank lending (see Box 5 in Chapter 4). The proportion of the annual debt financing transactions of euro area NFCs accounted for by inter-company loans also increased, from a pre-crisis average of 26% to a crisis period average of 38%. This may be partly related

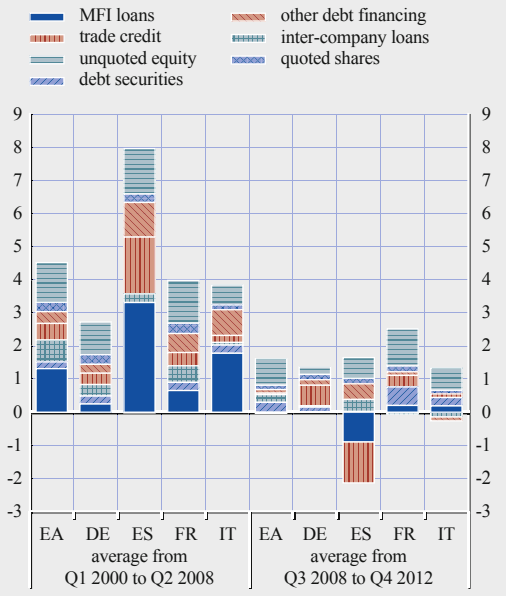
21 While selling assets can also be a source of financing, this source is not considered here in the discussion of external financing. See Section 2.2 regarding disinvestment in financial assets.

22 Evidence concerning the effects of firms replacing bank loans, based on the euro area accounts, is also presented in Bonci (2011).

to a longer-term trend, as large international enterprises often conduct centralised liquidity and finance management within the group.[23] Trade credit and loans granted by other (i.e. non-MFI) financial intermediaries played a role in the move away from MFI lending, following negative annual transactions since the third quarter of 2008, from the second quarter of 2010 to the second quarter of 2012, and from the second quarter of 2011 to the fourth quarter of 2012.

Chart 15 External financing instruments used by non-financial corporations – evidence on substitution effects across euro area countries

(annual transactions; percentages of the amounts outstanding of external financing)



Source: ECB.
Notes: "Other debt financing" includes other loans, in particular loans from other financial intermediaries, and pension fund reserves. The calculation of annual transactions is based on the data ranges shown in the chart.

Across euro area countries (see Chart 15), MFI lending to NFCs has contracted strongly during the crisis in Spain, Ireland and Greece, as well as in Italy, Portugal and Slovenia in the period 2011-12. By contrast, in Germany, France, Austria and Finland, annual MFI lending to NFCs mainly fell in the period 2009-2010, when economic activity was very subdued, and became positive again in 2011-12. In Cyprus, Malta and the Netherlands, MFI lending to NFCs has remained mostly positive during the crisis period. Differences in the decline in MFI lending reflect heterogeneous developments in the demand for bank loans in an environment of weak economic activity, unfavourable housing market developments in some countries, heterogeneity in bank lending rates across countries, and supply-side factors affecting the provision of bank lending, such as the heightened risk aversion of banks that needed to consolidate their own balance sheets.

The way in which MFI lending has been replaced with other sources of funding during the financial crisis has differed across countries (see Chart 15, and Table A10 in Annex 2). Besides the mostly circumstantial factors already mentioned, this is related to a number of structural factors that vary across euro area countries, such as the importance of small firms with limited access to market financing, the importance of financial linkages between firms (possibly implying the financing of subsidiaries), and differences in traditional corporate financing patterns.

First, enterprises have replaced bank loans with market-based financing or financing via unquoted equity, i.e. equity that is not traded on financial markets, such as limited liabilities of unincorporated companies. During the financial crisis, enterprises in France in particular have relied on equity (especially unquoted equity) for their external financing, to a larger extent than before the crisis. They have also relied on debt securities, reflecting the relatively high importance traditionally placed on market-based corporate finance in France. In addition to France, financing via unquoted equity[24] has been relatively important during the crisis for NFCs in Belgium and the Netherlands,

23 See Deutsche Bundesbank (2012).
24 Financing via unquoted equity is measured as the proportion of NFCs' total annual external financing accounted for by annual unquoted equity.

but also in Spain and Italy, whereas financing via debt securities has become important for firms in the Netherlands and Austria.

During the financial crisis, intra-sectoral financing between firms has become important in some countries, as the centralised funding of firms may have allowed easier access to external financing and more attractive financing conditions, compared with the individual financing of subsidiaries. In 2010-11, firms in Germany in particular relied, to a larger extent, on inter-company loans than in the pre-crisis period, whereas this was less the case in other euro area countries. In Belgium, inter-company loans generally play an important role in firm financing owing to the presence of corporate treasury centres, which benefit from an advantageous fiscal status. Moreover, in 2005 Belgium introduced the risk capital allowance[25], which encourages enterprises to expand their equity capital to optimise the use of the tax advantage. This makes Belgium an attractive location for multinational groups to set up their finance companies.

Other loans mainly include those from other financial intermediaries to NFCs and reflect, for example, lending by leasing companies to NFCs or financial subsidiaries set up to issue debt securities on behalf of the enterprise group (see Box 1). These loans have displayed a very heterogeneous picture across euro area countries. While they have declined considerably during the financial crisis in the Netherlands, they have remained relatively stable in Spain. In Ireland, other loans weakened considerably before the financial crisis (in 2005), but had already recovered by 2009 and therefore contributed to replacing declining MFI loans. By contrast, in a number of countries, such as Germany, Greece and France, other loans to NFCs only began to recover in 2011, possibly playing a role in the replacement of bank loans from that point onwards.

As regards trade credit, which is directly linked to the exchange of goods and services, developments are closely related to the economic cycle (see Box 2). While in 2009 annual trade credit transactions were negative in a number of euro area countries, owing to the deep recession in the first phase of the financial crisis, trade credit has become more important in corporate financing in some euro area countries since 2010, suggesting that it can act as a buffer.[26] From the euro area countries for which data are available, trade credit payable relatively gained strength in particular in Germany, France and Austria. By contrast, in line with the weakness in economic activity, annual trade credit payable transactions have remained mostly negative during the financial crisis in Spain, Portugal and Slovenia, and turned negative in Italy in 2012.

Finally, in some countries, NFCs' external financing has been exceptionally weak during the crisis, indicating very subdued economic activity, high risk aversion of lenders in an environment of heightened uncertainty, a decline in firms' creditworthiness and constraints in the supply of external funds, in particular bank financing. These constraints relate to higher bank funding costs in an adverse macroeconomic environment, where banks needed to consolidate their balance sheets. On average during the crisis, annual total external financing transactions have been negative in Spain, indicating redemptions in net terms. In Greece, Estonia and Ireland, external financing (both in terms of annual transactions and annual growth rates) of NFCs has also been negative

25 The risk capital allowance, more commonly known as the "notional interest deduction", allows companies liable for corporation tax to deduct a notional amount of interest from their tax base, calculated on the basis of their equity capital. This arrangement is unique in the sense that no other European Union Member State applies a general system of this type, making Belgium an attractive location for multinational groups to set up their finance companies. Such finance companies are funded mainly by equity stakes of the parent company, and provide loans to affiliated companies based in Belgium or abroad, while benefiting from the risk capital allowance for the whole of their equity capital.

26 When consolidating trade credit payables with trade credit receivables, the volume of net trade credit financing of the NFC sector is limited.

for a number of quarters during the crisis. It remained subdued in Greece up to 2012, whereas it started to recover in Estonia and Ireland from the third quarter of 2010 and the first quarter of 2012 respectively. By contrast, in Italy, Portugal and Slovenia, firms' external financing declined substantially in 2012, indicating a deteriorating macroeconomic environment in these countries.

Overall, the external financing composition of euro area NFCs has been deeply affected by the crisis. While MFI loans to NFCs have become less important, unquoted equity, other loans (in certain cases), debt securities issuance and, in 2010-11, inter-company loans and trade credit, gained importance, with considerable heterogeneity across countries.

Box 1

LOANS TO NON-FINANCIAL CORPORATIONS BROKEN DOWN BY CREDITOR SECTOR – THE INTERPLAY BETWEEN MONETARY FINANCIAL INSTITUTIONS, OTHER FINANCIAL INSTITUTIONS AND LOANS BETWEEN NON-FINANCIAL CORPORATIONS[1]

NFCs receive loans not only from monetary financial institutions (MFIs), such as banks, but also from insurance companies and pension funds, other financial institutions, other NFCs, governments and creditors resident in the rest of the world.[2] This box compares developments concerning loans granted by banks to loans from other creditor sectors, in particular the other financial intermediaries sector, and within the NFC sector.

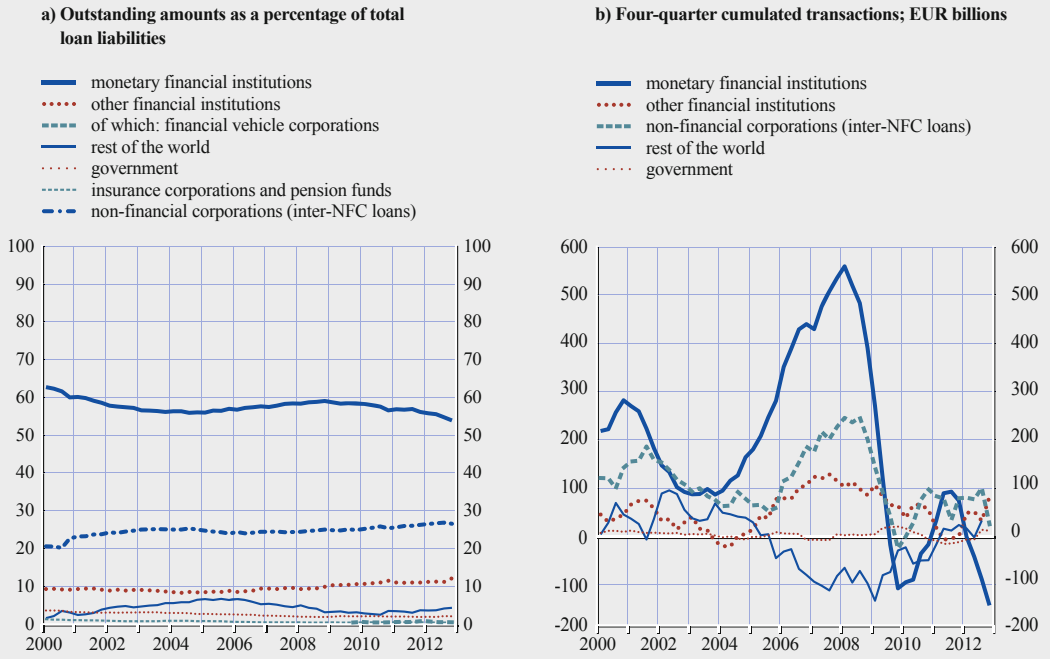
Loans to non-financial corporations, broken down by creditor sector

While loan financing in the euro area can still be described as "bank-dominated", the proportion of all outstanding loans granted to NFCs accounted for by bank loans decreased from 61% in 2000 to 55% in 2012 (see Chart A).[3,4] During the financial crisis, MFI lending to NFCs has fallen continuously since the first quarter of 2008 (see Chart A), becoming negative in the third quarter of 2009. This development followed a significant increase in MFI lending to NFCs in the period prior to the financial crisis. After the fourth quarter of 2009, the net loan transactions recovered modestly, turning positive in the first quarter of 2011 but then negative once more in the first quarter of 2012.[5]

The proportion of NFCs' total loan financing accounted for by inter-NFC loans (loans between NFCs resident in the euro area) increased from 20% in 2000 to 27% in 2012. Inter-NFC loans consist largely of loans between NFCs belonging to the same enterprise group ("intra-group" loans), whereas there is little evidence of loans between unrelated NFCs. Intra-group loans occur owing to the redistribution of cash flows. Obtaining debt financing from outside an enterprise group may also be centralised through the enterprise that has the best access to capital markets. Specifically, the issuance of securities may be undertaken by one

1 Prepared by Andreas Hertkorn.
2 Data on loans to NFCs by creditor sectors are available in the euro area accounts.
3 For households, the proportion of bank loans has also decreased (from 87% in 2010), but was still above 85% in the first half of 2012.
4 In the euro area accounts data used in this report (as in monetary statistics), sectors are defined for the euro area as a whole. In other words, loans granted to an NFC by MFIs, other financial institutions, or other NFCs resident in a different euro area country are recorded as MFI, other financial institution, or NFC loans, respectively, rather than a loan from a non-resident.
5 The quarterly values for the net granting (transactions) of loans are smoothed for the analysis by four-quarter cumulated sums, as these quarterly transactions are relatively volatile.

Chart A Loans to non-financial corporations, broken down by creditor sector



Sources: Euro area accounts and ECB.

enterprise, which then distributes the funds within the group in the form of loans. During the financial crisis, inter-NFC loans fell strongly after the third quarter of 2008 but have remained positive, dampening the decline in MFI loans. Since 2010 inter-NFC loans have recovered as NFCs have regained access to capital markets (for example, debt security issuance by NFCs had already started to recover in 2009) as their cash flows improved, allowing intra-group financing to alleviate the reduction in MFI financing.

The proportion of total loans to NFCs accounted for by other financial institutions increased from 8% in 2000 to 11% in 2012. The other financial institutions sector consists of a relatively diverse group of institutions that are engaged in financial intermediation but do not take deposits from the public or provide insurance services. Loans from this sector to NFCs are mostly granted by financial subsidiaries, which are set up to issue debt securities on behalf of the enterprise group. These loans are relatively important for some countries (e.g. Germany), where corporate bonds are often issued by other financial institutions resident in other euro area countries.[6] Other financial institutions also include leasing companies and financial vehicle corporations engaged in securitisation.[7] The availability of data for the individual sub-categories is still limited, except for investment funds.[8] Developments are thus analysed

6 For the financial accounts data used in this report, the sector and residence of the legal issuer (the financial subsidiary) are recorded. Other data sources based on the nationality of the indirect beneficiary of the securities issuance (e.g. the parent company) show that German NFCs' total issuance of debt securities is much higher.

7 Loans by financial vehicle corporations (not retained on MFI balance sheets) accounted for 1.4% of the total loans granted to NFCs in the first half of 2012. The securitisation of loans to NFCs thus accounts for only a small proportion of loans from other financial institutions to NFCs.

8 Separate data are now available for investment funds and financial vehicle corporations engaged in securitisation. For these corporations, data are available from the fourth quarter of 2009 onwards.

based on the other financial institutions sector as a whole, but excluding investment funds, as they typically do not grant loans to NFCs.[9] Loans from other financial institutions that are resident in the same country account for more than half of the total loans from other financial institutions. During the financial crisis, the total number of loans granted by other financial institutions fell, from a relatively high level in the third quarter of 2007 until the second quarter of 2011. The increase in these loans in recent quarters has helped to lessen the impact of the decline in MFI loans.

The proportion of total loans to NFCs accounted for by loans from outside the euro area ("rest of the world") decreased from 6% in 2000 to 4% in 2012. These loans comprise direct investment loans and loans from non-resident banks and other financial intermediaries. However, no exact breakdown exists.[10]

The proportion of total loans to NFCs accounted for by government loans decreased from 4% in 2000 to 2% in 2012. Loans granted by insurance companies and pension funds accounted for less than 0.5% of total loans to NFCs in 2012, down from 1.2% in 2000.

Balance sheet developments of the main financial creditor sectors: MFIs and other financial institutions

Before the financial crisis MFI loans to NFCs, as well as MFIs' total financial assets, grew broadly in line with their capital and reserves (see Chart B).[11] Until 2008 their capital-to-assets ratio was thus fairly stable, in line with the regulatory requirements. Other financial institutions (excluding investment funds), not being subject to the same regulatory requirements as banks, expanded their financial assets at a similar pace to that of banks, but did not increase their capital and reserves to the same extent (see Chart B). Data concerning capital and reserves are not available for the other financial institution sector but may be approximated by (notional) net assets, which are assets minus liabilities excluding shares (and excluding changes other than transactions, in order to abstract from valuation changes). The decline in the notional net assets-to-assets ratio, from 2000 until the third quarter of 2008, indicates that other financial institutions increased their leverage substantially.

During the financial crisis, MFIs increased their capital-to-assets ratio from 6.2% in the second quarter of 2008 to 8.3% in the fourth quarter of 2012 (see Chart B). This was the result of bank assets broadly stagnating from 2009 (also evident in loans to NFCs), whereas MFI capital increased continuously. The main reason behind this development is that banks were forced, both by market and regulatory pressure, to increase their capital-to-assets ratio owing to the perceived increased riskiness of bank assets, which was partly linked to the increased leverage of less-regulated institutions, both in the euro area other financial institution sector, as well as in the rest of the world.

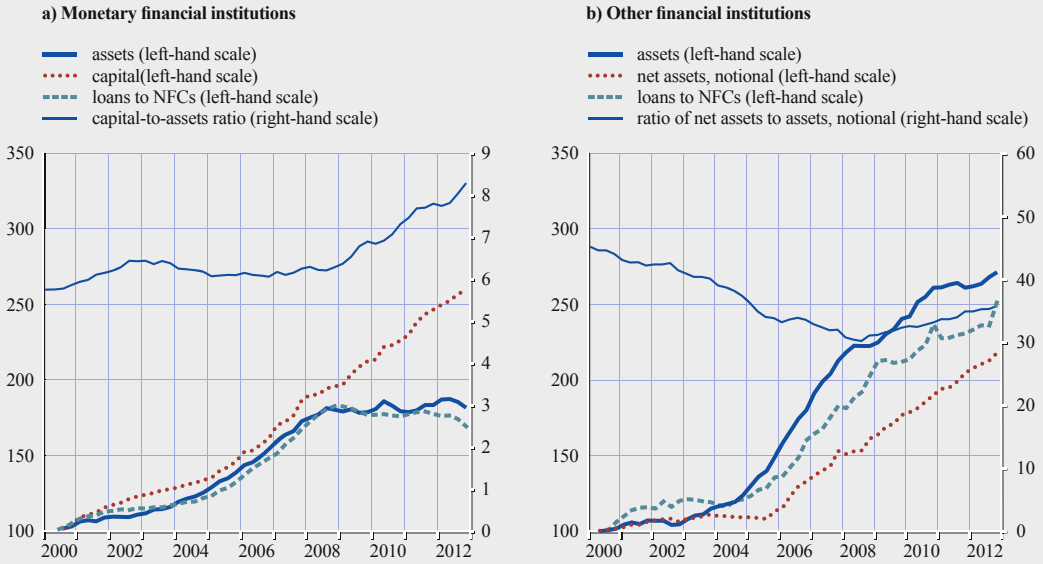
9 At the same time, while investment funds typically do not grant loans to NFCs, they do finance firms via investment, for example in corporate bonds.

10 Loans from the rest of the world to euro area NFCs can only be approximated, as the international investment position only identifies the non-government non-MFI sector, but not the NFC sector specifically.

11 Capital and reserves from the MFI balance sheet item statistics are used here, as they are directly available for this sub-sector. For other (sub-)sectors, capital and reserves data are not available, but can be approximated by net financial assets. Taking the market value of shares and other equity (excluding mutual funds' shares/money market funds' shares), or alternatively net assets, from the euro area accounts yields similar results, although these are also affected by valuation changes.

Chart B Balance sheet developments of creditor sectors

(Index Q1 2000 = 100; percentages)



Sources: Euro area accounts, MFI balance sheet statistics and ECB.
Notes:
1) MFIs do not include the Eurosystem and money market funds.
2) Other financial institutions do not include investment funds. Notional assets are based on Q1 2000 stocks plus accumulated transactions.

Box 2

ROLE OF TRADE CREDIT AND PAYMENT DELAYS[1]

Trade credit granted to euro area NFCs by their creditors – mainly other enterprises in the euro area and in the rest of the world, but also the public sector – accounted for the third largest portion (10.5%) of NFCs' total external financing in the fourth quarter of 2012. At the same time, when consolidating NFCs' trade credit payables with their trade credit receivables, the proportion of their total external financing[2] accounted for by net trade credit is close to zero, indicating that this type of financing largely takes place between euro area NFCs. Over the past five years the relative weight of trade credit remained fairly close to the euro area average in France, and always exceeded the euro area average in Spain and Italy. In Germany, the relative importance of trade credit rose above the euro area average in 2011-12, from close to the euro area average prior to this period. The situation varied across the smaller economies. In particular, trade credit remained an important source of external financing in Cyprus, Malta, Slovakia and Slovenia. At the same time, it always played a minor role in Belgium, the Netherlands and Luxembourg.

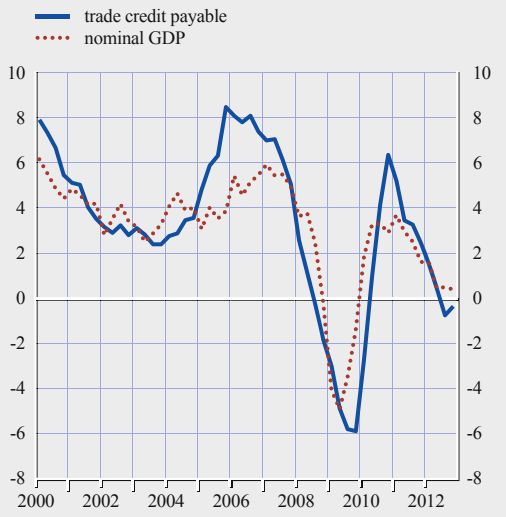
As a key element of NFCs' working capital, trade credit transactions are closely linked to economic activity (see Chart A). In a recession, firms systematically reduce their purchases and inventories

1 Prepared by François Servant and Vasileios Georgakopoulos.
2 For this purpose, total external financing liabilities were netted with trade credit receivables.

and try to offset the collapse of their sales. As a consequence, trade credit payable quickly declines. When the situation is reversed, trade credit increases. This link between trade credit and the economic cycle is apparent in most euro area countries. After a period of significant growth prior to the financial crisis, trade credit contributed negatively to the annual growth of euro area NFCs' debt[3] from the third quarter of 2008 to the first quarter of 2010. Between the middle of 2010 and the middle of 2012 its contribution rose again, to an average of approximately 30% of the annual growth rate of NFCs' debt, but turned negative again in the second half of 2012.

Chart A Trade credit of euro area non-financial corporations compared with GDP

(annual growth rates in percentages)



Sources: ECB and Eurostat.

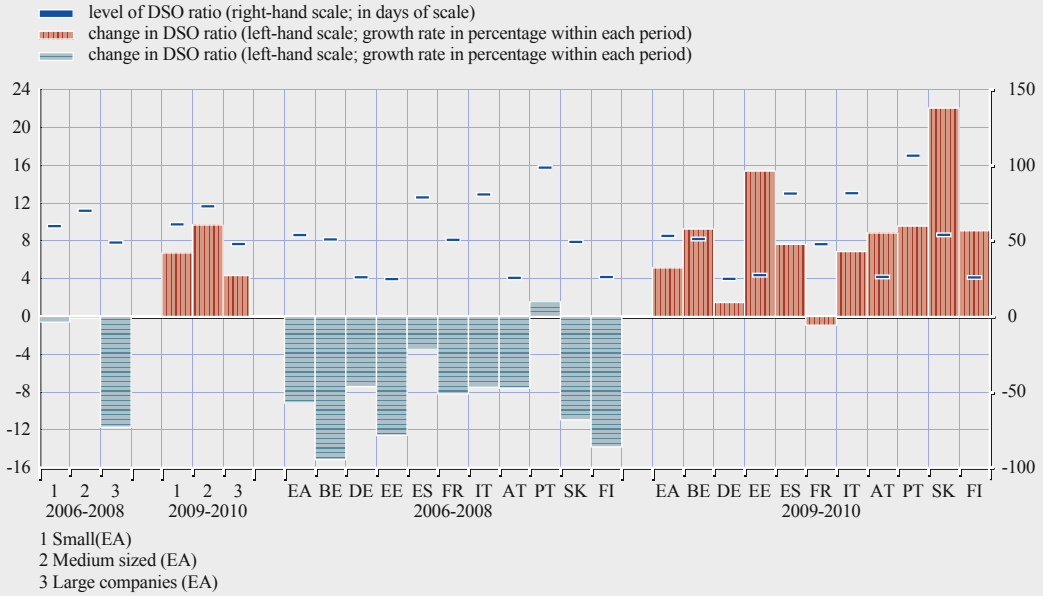
From the microeconomic point of view, trade credit can be considered a supply of credit, as well as a demand for credit. Both sides contribute to the final impact of trade credit on a company.[4] When granting a payment period to its customers (for example 45 days after invoice issuance), the firm offers them short-term financing. During that period the customer is allowed to postpone a cash flow that should normally have been paid out earlier. Similarly, a firm looking for short-term financing can postpone its own payments to suppliers or negotiate longer payment periods with them. Trade credit thus appears to be an easily obtained and relatively informal form of short-term credit, compared with classic forms of bank credit. At the same time, by postponing a payment that is falling due, the firm waives the discount that it could have obtained, in some cases, if it had paid immediately.

At the firm level, trade credit is commonly expressed as a duration. The simplest valuation method consists of measuring the time period between the date of a transaction and the date of its final payment. This method can be easily implemented at the firm level, but not on a larger scale. By calculating duration indicators such as the Days Sales Outstanding (DSO) ratio or the Days Payable Outstanding (DPO) ratio[5] based on accounting data, situations can be compared at an aggregated level. Empirical data provided by the Bureau Van Dijk Orbis database highlight that the DSO ratios of euro area NFCs developed very differently when comparing the period before the crisis with the crisis period itself (see Chart B). According to these data, DSO ratios decreased in euro area countries by 9% (i.e. five days) between 2006 and 2008, except in Portugal

3 Debt is defined in this box as the sum of loans, debt securities issued by NFCs, pension fund reserves of NFCs and trade credit payable.
4 For the role played by accounts receivable and payable, see Ferrando and Mulier (2013).
5 It has to be noted that these data are approximations based on accounting information. They are useful for analysing changes and the trend in average periods, but cannot be taken as a reference point for verifying the degree of compliance with the legal limits set for these periods. For a given firm, the DSO ratio corresponds to the average of its customers' payment periods. It is therefore a charge, i.e. a financing need. The DSO ratio is calculated as follows: accounts receivable outstanding divided by sales (including VAT), multiplied by 360. Conversely, a firm's DPO ratio corresponds to the duration of the payments owed, on average, to suppliers. The DPO ratio is calculated as follows: accounts payable outstanding divided by total purchases (including VAT), multiplied by 360. The DSO ratio is expressed in terms of days of sales and the DPO ratio in terms of days of purchases. Both indicators can be calculated as a weighted average (by the size of each company), or as a non-weighted average (this method gives a better insight into individual behaviour). The first method is applied in this report.

Chart B DSO ratios in Europe, broken down by size and country, 2006-10

(percentages; days of sales)



Sources: Bureau Van Dijk Orbis database and ECB calculations.
Notes: DSO ratio calculated as a weighted ratio. EA denotes euro area. A large company has operating revenue of at least €10 million, total assets of at least €2 million, and at least 150 employees. A medium-sized company has operating revenue of at least €1 million, total assets of at least €2 million, and at least 15 employees. A small company is any company not covered by the previous two definitions. Number of companies in 2010 (in legal units): euro area – 1,593,000; Austria – 2,000; Belgium – 11,000; Germany – 20,000; Estonia – 27,000; Spain – 376,000; Finland – 67,000; France – 555,000; Italy – 350,000; Portugal – 152,000; Slovakia – 22,000.

where the ratio remained considerably above the euro area average. At the end of 2008, the crisis interrupted this positive trend and DSO ratios significantly increased in the period 2009-10, with only two exceptions – France and Germany. In Germany, firms remained in a position to benefit from a renewed shortening of their DSO ratios in 2009. The ratio rose slightly in 2010, but only by one day of sales. In France, the Law on the Modernisation of the Economy came into force in 2008 and put a ceiling on payment periods, preventing any increase in the DSO ratios of NFCs during the crisis.

DSO ratios are often subject to an unequal balance of power between firms. Large firms are often in a position to negotiate better terms of payment than small or medium-sized ones. By contrast, small firms may lose important contracts if they demand shorter payment periods than their competitors. In other words, trade credit leads to small firms financing large ones, despite have more limited access to bank credit. This disparity has continued to increase in recent years: the weighted DSO ratio of large companies decreased by 12% between 2006 and 2008, and rose by just 4% (or two days) from 2009 to 2010. At the same time, small companies' DSO ratios barely changed between 2006 and 2008, and rose by 7% (or four days) between 2009 and 2010. This advantage in favour of large firms was particularly distinct between 2006 and 2010 in France, Finland and Italy, and also to a certain extent in Germany. In Belgium, Estonia, Portugal and Slovakia, the change in DSO ratios benefited large firms until 2008, but not in the period 2009-10.

In this context, the entry into force of Directive 2011/7/EU of the European Parliament and of the Council of 16 February 2011 on combating late payment in commercial transactions may have a

visible impact on disparities, as the Law on the Modernisation of the Economy has had in France since 2008. Henceforth, in accordance with the directive, Member States have to ensure that, in transactions between firms, the creditor is entitled to interest for late payment (Article 3(1)), and that the payment period fixed in the contract does not exceed 60 calendar days[6] (Article 3(5)). In addition, in the case of late payment, the creditor is entitled to obtain from the debtor a fixed sum of at least €40 (Article 6(1)). Member States had to implement regulations to comply with the directive by 16 March 2013.

6 Unless otherwise explicitly agreed in the contract and provided it is not grossly unfair to the creditor.

2.4 LEVERAGE OF NON-FINANCIAL CORPORATIONS[27]

CORPORATE INDEBTEDNESS AND LEVERAGE MEASURES

Analysing balance sheet structures gives potential lenders valuable information about the creditworthiness of borrowers (firms). From a macroeconomic perspective, indicators are typically produced by comparing selected debt positions of the sectoral balance sheet with a given income stream (e.g. the GDP or gross operating surplus of the respective sector), in order to evaluate to what extent the corporate sector is able to repay its debt when it falls due and, consequently, how vulnerable it is to the volatility of the generated income stream.[28] Other indicators compare debt with (financial and non-financial) assets to assess corporate indebtedness. This is important because assets can be sold by a firm in order to generate funding liquidity. In addition, they can serve as collateral and, hence, contribute positively to firms' available financing.[29] Debt can also be analysed with reference to the equity position of corporations. The debt-to-equity ratio at market value can be used as a measure of corporate debt relative to the expected income stream generated by a firm, giving shareholders a picture of the perceived market value of a firm. Finally, the interest environment and the maturity profile of firms' balance sheets also contribute to lenders' assessments of the perceived sustainability of borrowers' debt management decisions.

The debt-to-GDP ratio of the euro area NFC sector increased rapidly over the period under review, from 69% in 1999 to 104% in the second quarter of 2010 (see Chart 16). Since then it has only changed slightly, standing at 103% in the fourth quarter of 2012. The increase in debt was marked by several phases, with the first phase mirroring the build-up of debt during the "new economy" boom. After a period of relatively stable levels of indebtedness up to 2004, corporate debt increased significantly, peaking in 2010. The data show that the debt-to-GDP ratio of euro area NFCs has been broadly similar to the ratio of non-financial firms in the United States, and somewhat lower than that of NFCs in the United Kingdom (see Chart A1 in Annex 2).[30]

The data also show a wide variation in the debt-to-GDP ratio of individual euro area countries (see Chart 16, and Table A11 in Annex 2). Both the interquartile range[31] and the maximum and

27 Prepared by Felix Geiger and Manuel Rupprecht.

28 In simplified terms, the solvency of borrowers is typically measured according to the net present value approach, which is calculated at the individual firm level as the sum of all expected net cash flow streams generated by the firm. It should be noted that most macroeconomic indicators rely on a concept that measures the current income stream (e.g. GDP or gross operating surplus) rather than the expected income stream. Based on a dividend discount model, the current market price of equity can be used as an alternative to approximate the expected income stream for shareholders.

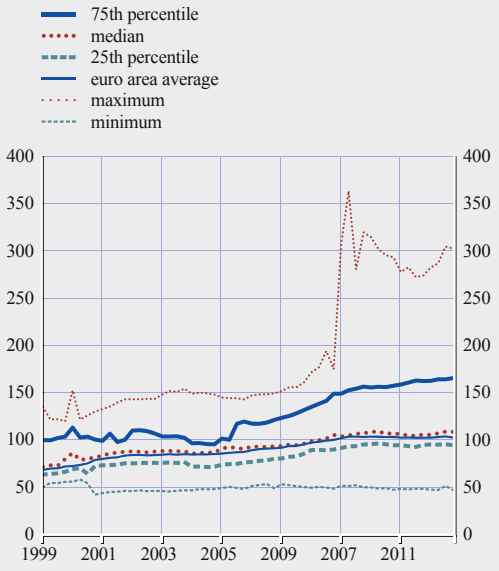
29 However, it can be difficult to generate liquidity with certain assets. While non-financial assets are typically relatively illiquid, it may also become difficult to use financial assets, such as loans or even debt securities, as a means of generating liquidity, depending on overall market conditions (in particular market liquidity).

30 For an international comparison, see Chapter 4 of this report. See also European Central Bank (2009), and European Central Bank (2012).

31 The interquartile range is defined as the difference between the 75th percentile and the 25th percentile.

Chart 16 Euro area NFCs' debt-to-GDP ratio

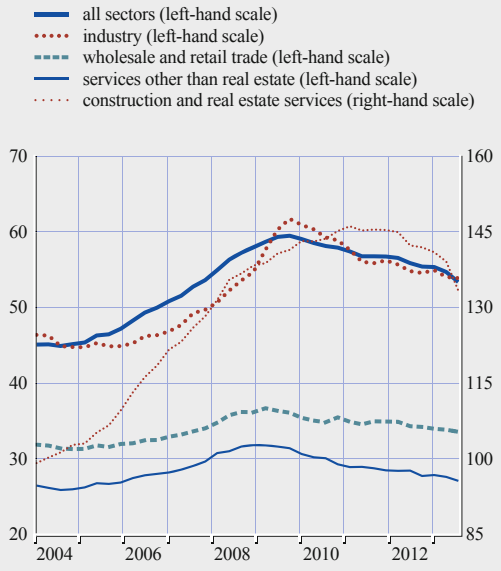
(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Debt includes loans, debt securities and pension fund reserves. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

Chart 17 Ratio of MFI loans to gross value added across euro area sectors of economic activity

(percentages)



Source: ECB.
Notes: Sectors are defined according to the NACE rev.2 classification. Data are based on the amounts outstanding MFI loans and the four-quarter moving sum of the gross value added.

minimum figures widened across countries during the last decade. In particular, from the first quarter of 2005 onwards, there has been substantial dispersion in the 75th percentile of the distribution of euro area countries, mainly mirroring debt dynamics in Luxembourg, Belgium (largely due to inter-company loans), Spain, Ireland, Cyprus, and Portugal. In Germany, France, Italy, Slovakia, and the Netherlands, the increase in the debt-to-GDP ratio was rather subdued. In the fourth quarter of 2012, the NFC sector in Luxembourg recorded the highest debt-to-GDP ratio (303%), whereas the value was lowest in Slovakia (47%). Similar dynamics can be observed when comparing the indebtedness of NFCs with gross operating surplus, which is a more appropriate measure of the income generated by the NFC sector (see Chart A2 in Annex 2).[32]

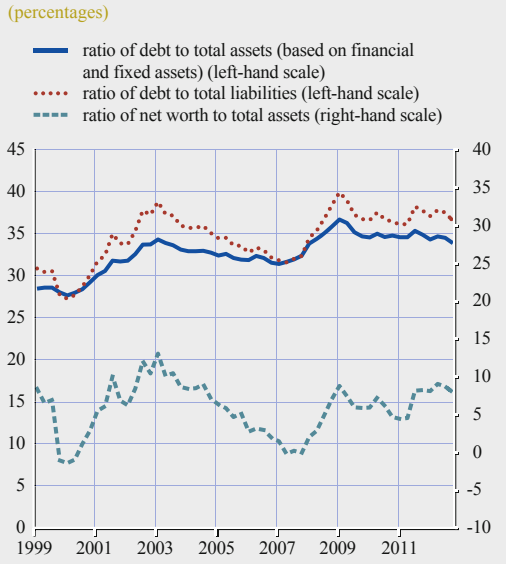
In order to analyse levels of indebtedness across different sectors of economic activity, bank loans, i.e. the main debt component, are compared with the sector's gross value added (see Chart 17, and Table A12 in Annex 2).[33] At the euro area level, the ratio of MFI loans to gross value added increased for most of the main sectors until the period 2008-09, and has since subsided. Firms in the construction and real estate services sector owed more money to banks, on average, than firms in other sectors. This was a result of both higher indebtedness ratios in 2003 (the starting point of the data series) and the intense accumulation of debt during the past decade in an environment of

32 Although the ratio of debt to gross operating surplus is more informative than the debt-to-GDP ratio, at least from an economic point of view, the former indicator is available less frequently than the latter at the level of individual countries. Therefore, both measures are taken into account in the analysis.

33 Information on bank loans represents the only available data concerning the leverage of firms across different sectors of economic activity. Sectors are defined following the NACE rev.2 classification, see http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)/de.

booming housing markets in a number of euro area countries. In the construction and real estate services sector, euro area NFCs' ratios of MFI loans to value added only began to fall in 2010, owing to the bursting of the housing market bubble in some euro area countries and exceptionally weak value-added growth in the period 2009-10. Nevertheless, the decrease in the ratio was more pronounced in this sector than in other sectors from its peak until the end of 2012.

Chart 18 Ratios of debt to total assets and debt to total liabilities of euro area NFCs



Source: ECB.
Note: Data are based on amounts outstanding.

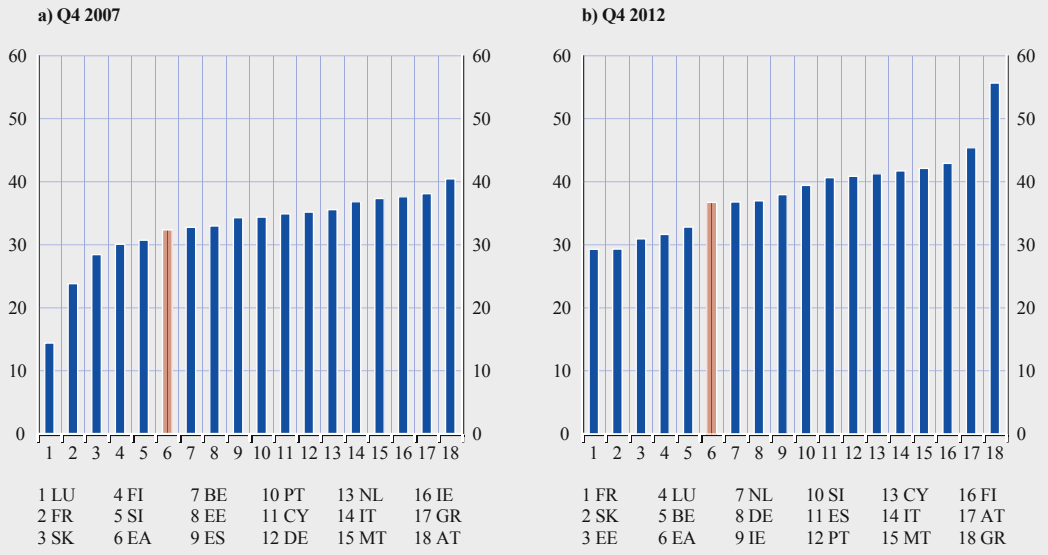
The accumulation of debt in the construction and real estate services sector was particularly strong, up to its peak, in Ireland, Cyprus and Malta and, to a somewhat lesser extent, in Spain, Luxembourg, the Netherlands and Slovenia. Similarly, the peak in the ratio of MFI loans to value added in this sector was highest in Ireland and Luxembourg, but it was also very high in Spain, Cyprus, Malta, the Netherlands and Portugal. In turn, the decrease in the ratio of MFI loans to value added in the construction and real estate services sector from its peak until 2012 was strongest in Ireland, but was also considerable in Estonia, Spain, Luxembourg, Malta and Portugal. By contrast, indebtedness ratios in this sector remained at moderate levels in Germany (even falling slightly from the pre-crisis period to the crisis period), as well as in Belgium, Greece and Slovakia. In the industry sector, the ratio of bank loans to value added was considerably above the euro area average in Spain and Italy, but the increase during the past decade remained relatively contained and the ratio has since declined from its peak. By contrast, during the period under review the ratio of MFI loans to value added was lowest in the industry sector in Germany and Ireland. Compared with the industry and construction sectors, in all euro area countries there have, in general, been lower levels of indebtedness in the wholesale and retail trade sectors, as well as in the services sectors.

When comparing corporate debt with the asset side of NFCs' balance sheets, further information about firms' leverage emerges. In the euro area, the ratio of debt to total assets (total assets are defined as financial assets plus fixed assets) reveals periods when firms' leverage increased, and also periods of significant deleveraging (see Chart 18). After a prolonged period of consolidation between 2003 and 2007, the ratio increased during the financial crisis, reaching a peak of 38%. Since then some slight deleveraging has been observed, but the ratio has remained high. As the amount of fixed assets outstanding is not available on a quarterly basis for most euro area countries, the ratio of debt to total liabilities can be used as an approximation of the ratio of debt to total assets.[34] Across euro area countries, a degree of heterogeneity was already evident before the financial crisis, but the amount of variation increased from the second quarter of 2008 onwards, at least for some countries (see Chart 19, and Chart A3 in Annex 2). The increase in leverage from

34 Compared with the ratio of debt to total assets, the ratio of debt to total liabilities does not cover the net worth of firms, defined as total assets (including both financial and fixed assets) minus total liabilities. However, at the euro area level, the ratio of debt to total liabilities mostly reveals a similar pattern to that shown by the ratio of debt to total assets during the period under review.

Chart 19 Ratio of debt to total liabilities of NFCs across euro area countries

(percentages)



Source: ECB.
Notes: Debt includes loans, debt securities and pension fund reserves. Data are based on amounts outstanding. EA denotes euro area.

2007 onwards was particularly evident in Greece, Slovenia and Luxembourg whereas, during the same period, the leverage ratio fell in Estonia.

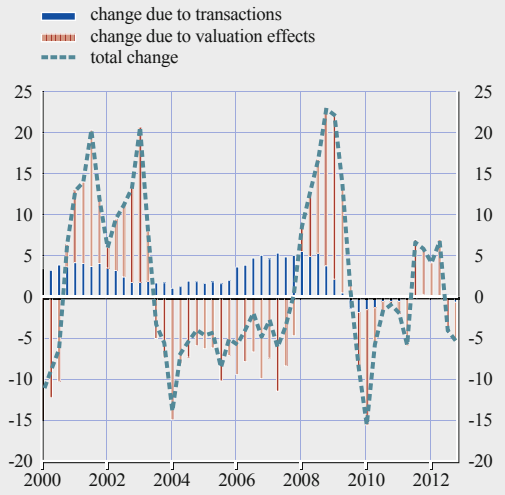
NFCs' debt-to-equity ratios are closely related to the composition of their capital structure (see Chart A4 and Table A11 in Annex 2). In this respect, similar developments can be observed for this leverage measure as for the ratio of debt to total assets. Across countries, debt-to-equity ratios differed widely within the period under review (see Chart A5 in Annex 2).[35] Among the larger euro area countries, leverage ratios were relatively moderate in 1999. In 2007 the ratios of Germany, Spain, Italy and the Netherlands were between 65% and 80%, while they were significantly below the euro area average in France, Belgium and Luxembourg, reflecting differences in the capitalisation of NFCs across countries. In the context of the financial crisis, heterogeneity among the countries substantially increased against the background of macroeconomic rebalancing in some euro countries. In the fourth quarter of 2012, Greece recorded the highest leverage ratio among euro area countries, at 152% (resulting from substantial losses on equity), whereas Luxembourg recorded the lowest, at 50%.

Given that the financial accounts are based on the market valuation principle, fluctuations in leverage can either be a reflection of transactions in the form of net equity issuance and changes in debt financing, or they can stem from valuation effects on the outstanding amount of debt and/or equity (holding gains or losses owing to changes in market prices or other changes, e.g. write-downs in debt positions). In order to disentangle both components, the calculation of "notional" amounts outstanding makes it possible to derive a "notional" debt-to-equity ratio that reflects cumulated debt and equity transactions based on an initial debt-to-equity ratio. Chart 20 depicts this decomposition for the euro area average by displaying the contribution of valuation effects and transactions to leverage dynamics.

35 The comparison of debt-to-equity ratios across countries is affected by differences in the valuation of unquoted equity.

Chart 20 Changes and contribution to changes in the debt-to-equity ratio of euro area NFCs

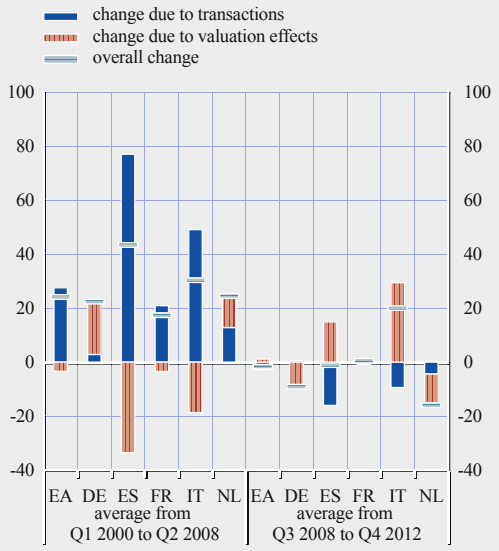
(percentage points)



Source: ECB.
Notes: Data are based on amounts outstanding and notional stocks. Notional stocks are compiled by adding transactions to the amounts outstanding of a base period (the first quarter of 2000).

Chart 21 Changes and contribution to changes in the debt-to-equity ratio of NFCs at the country level

(percentage points)



Source: ECB.
Notes: Data are based on amounts outstanding and notional stocks. Notional stocks are compiled by adding transactions to the amounts outstanding of a base period (the first quarter of 2000).

It becomes clear that the spikes in the debt-to-equity ratio in 2003 and 2009 resulted from large equity price drops. Moreover, the consolidation period between 2003 and 2007 is the result of holding gains rather than an active attempt by NFCs to increase their equity relative to their debt. Indeed, an inspection of the contribution of transactions to changes in the debt-to-equity ratio suggests that a "leverage cycle" exists, with leverage ratios increasing between 2004 and 2007 and falling afterwards. Between the third quarter of 2009 and the third quarter of 2011, a gradual deleveraging process can be observed that was based on the net impact of transactions, i.e. debt redemption and equity issuance.

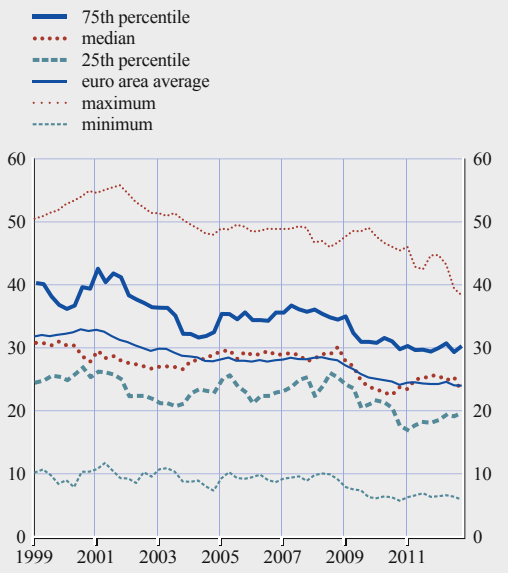
The existence of a leverage and credit cycle can also be examined at the country level. Among the larger euro area countries, the build-up of debt based on "active" leverage is clearly evident in Spain and Italy (see Chart 21). For the smaller countries (in particular Greece and Ireland), a high build-up of debt occurred, largely owing to transactions (see Table A13 in Annex 2). Interestingly, this increase in leverage was accompanied by holding gains in equity in some countries, which limited the overall increase in leverage in the run-up to the financial crisis. The trend reversed in 2008 when NFCs cut spending and debt financing because of the substantial downturn in economic activity and the tightening of lending conditions by funding suppliers, in particular banks. However, deleveraging in terms of net equity issuance and debt redemption was hampered by an environment of falling equity prices (see the examples of Spain and Italy in Chart 21). Leverage has continued to increase since 2008 for many euro area countries, except Ireland.

ASSESSING THE VULNERABILITY OF NON-FINANCIAL CORPORATIONS' DEBT

The maturity structure of assets and liabilities on NFCs' balance sheets provides valuable information about their vulnerability to shocks, in particular changes in financing conditions (see Table A11 in Annex 2). Weaker firms tend to depend on short-term funding. If short-term

Chart 22 Ratio of short-term debt to total debt of NFCs

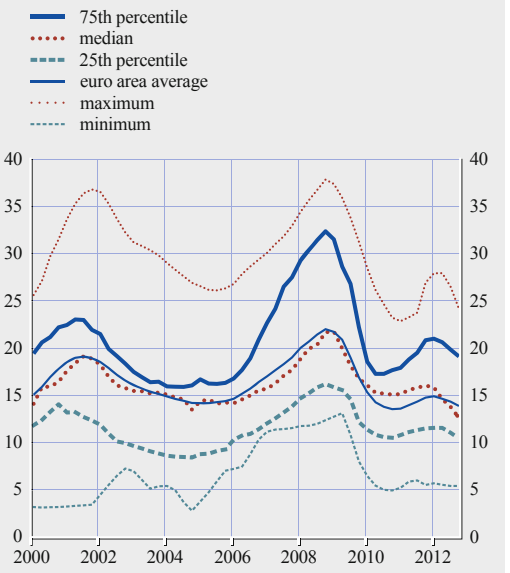
(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Debt includes loans, debt securities and pension fund reserves. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

Chart 23 Interest payment burden of NFCs

(percentages; ratio of gross interest payments to gross operating surplus)



Source: ECB.
Notes: Data are based on annual transactions. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

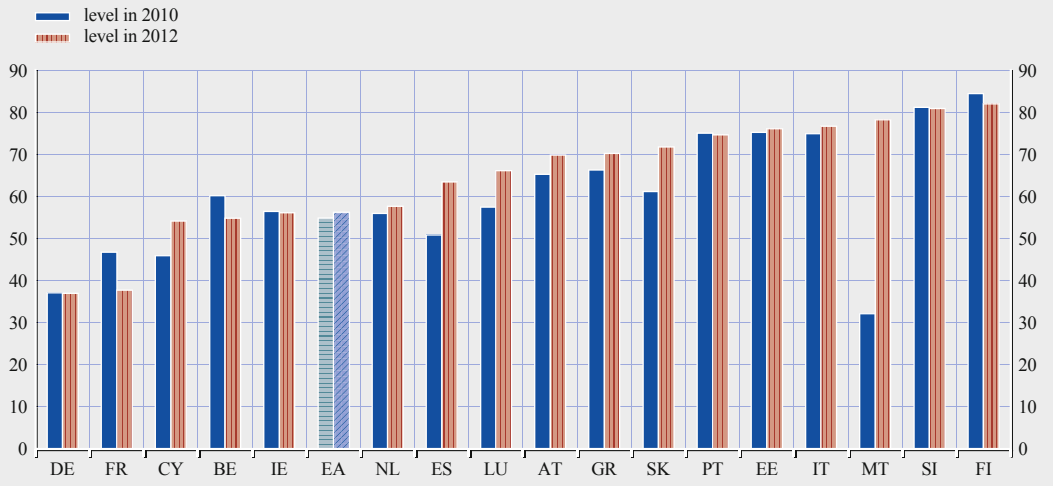
funding accounts for a large proportion of total funding, it may be difficult to renew this funding in a stressed market environment and may give rise to liquidity shortages (refinancing risk). At the euro area level, the proportion of NFCs' total debt accounted for by short-term debt has remained relatively stable, at between 33% and 24% in the period 1999-2012 (see Chart 22). From this perspective, NFCs appear to be relatively well protected against sudden changes in short-term financing conditions. In addition, across euro area countries, both the interquartile range and the distance between maximum and minimum values narrowed over time. The most recent data (from the fourth quarter of 2012) show that Belgian NFCs are the most dependent on short-term funding (38% of total funding), largely owing to inter-company loans which are most likely not subject to changes in financing conditions, followed by firms in Greece, Malta, Slovakia and Slovenia (all 30% to 31%). Companies in Finland are the least dependent on short-term funding (6% of total funding).

Another important factor for an assessment of the sustainability of debt is the debt service burden of NFCs, which reveals the proportion of their income that needs to be used for servicing debt (i.e. interest payments and debt repayments).[36] In the euro area, the interest payment burden of NFCs, i.e. the ratio of NFCs' gross interest payments to gross operating surplus, rose from 15% in the first quarter of 2000 to 22% in the fourth quarter of 2008, before falling back to 13.9% in the fourth quarter of 2012 (see Chart 23). Again, there is substantial variation across euro area countries; this variation became more pronounced in the run-up to the financial crisis in an environment of

36 Owing to data limitations, measures of debt repayments are not included in the calculations.

Chart 24 Proportion of MFI loans at variable rates in total MFI loans to NFCs

(percentages; ranking following 2012 values)



Source: ECB.
Notes: Data are based on amounts outstanding. MFI loans at variable rates refer to short-term MFI loans and long-term MFI loans at floating rates. Owing to data limitations, only loans granted by the MFI sector are considered in the calculations. The average value for each year is shown. EA denotes euro area.

rising interest rates. Firms in Belgium, France, Spain, Ireland and Portugal, as well as in other euro area countries, had to deal with an increase in the percentage of their income that had to be used for interest rate payments in the period 2006-08, whereas the interest rate burden for firms in Germany, Italy, Ireland and Greece remained subdued. Between 2009 and 2010 the burden declined markedly again for most countries.

Despite the fact that short-term funding continues to account for a moderate percentage of total funding, interest rate risks prevail if long-term debt is financed at floating rates rather than at fixed rates. This limits firms' ability to act when the market environment changes. Conversely, a larger proportion of debt at variable rates has allowed companies to benefit from the decline in market reference rates (such as the EURIBOR) during the crisis. Chart 24 depicts the proportion of total outstanding bank loans accounted for by short-term and long-term MFI loans at floating rates. Between 2010 (the start of the data series) and 2012 the euro area average only increased marginally, from 55% to 56%.[37] Across euro area countries in 2012, NFCs in Germany and France were the least exposed to interest rate risks, with short-term loans accounting for 37% and 38% of total loans, respectively. By contrast, in Finland and Slovenia this figure was slightly more than 80% – significantly higher than the euro area average in the period under review, making firms in those countries particularly vulnerable to (unexpected) interest rate changes. Between 2010 and 2012 the change in the proportion of total outstanding bank loans accounted for by short-term loans and long-term MFI loans at floating rates was most pronounced in Malta (a 46 percentage point increase) and Spain (a 13 percentage point increase).

Overall, corporate debt vulnerability indicators have shown some improvement during the crisis, as the interest payment burden of NFCs has declined from its peak in the period 2008-09 and

37 The rise in the amount of short-term loans and loans at floating rates (as a percentage of all MFI loans to NFCs) is confirmed when looking at new business volumes of loans.

their refinancing risk has remained contained owing to the fact that short-term debt accounts for a relatively small proportion of total debt. However, firms have been more exposed to the risk of potential interest rate increases than to refinancing risks, because of the fact that MFI loans financed at variable lending rates have accounted for a higher percentage of total outstanding bank loans; this percentage increased marginally during the crisis at the euro area level, but varied considerably across countries.

3 FIRMS' FINANCING ENVIRONMENT AND DETERMINANTS OF THEIR FINANCIAL DECISIONS[38]

The previous chapter provided an in-depth analysis of country-level differences over the past decade in the euro area corporate sector's capital structure, internal and external financing, and leverage. The country-level differences that have emerged mask, however, important heterogeneities across firms. Focusing on these heterogeneities is crucial to a better understanding of the different degree of intensity with which financing problems and uncertainty have affected individual firms during the recent crisis, and of the lingering vulnerabilities that stem from corporate financing challenges.

This chapter highlights firms' decisions regarding their capital structure, cash management and investment. Many theories suggest a number of firm-specific characteristics, such as firm size, age and business specialisation, which could play a role in their decision-making. Additionally, certain characteristics of the institutional and financial environment are also relevant. These are related to country-level factors, such as the development of financial markets, the types of relationship between firms and investors, the tax burden and the enforcement of creditors' and shareholders' rights.

The assessment of the effectiveness of policy measures aimed at enhancing access to credit has to take into consideration the high levels of heterogeneity that currently exist among firms, as firms may react very differently to shocks depending on their characteristics. From this perspective, policies that foster the internal growth of firms via more efficient product and factor markets (inter alia, by reducing financial constraints and providing better access to capital) are instrumental in reallocating resources towards better performing firms and thus increasing the aggregate level of competitiveness of the euro area.

The analysis in this chapter relies largely on a dataset based on information from the balance sheets and profit and loss accounts of a large number of NFCs in the euro area. The period under analysis is 2000-2010. Section 3.1 provides several reasons as to why firm-level data provide critical information on firms' behaviour that complements traditional macro analysis. The section contains a brief overview of the theoretical discussions concerning the determinants of firms' capital structure decisions (see Box 3). Section 3.2 presents an econometric analysis that confirms the relevance of most firm-specific determinants of leverage identified by the economic literature; it also highlights the effects of the financial and institutional environment on firms' decisions about their financial structure. Section 3.3 investigates cash-holding policies across firms of different sizes. Traditionally, small firms keep larger cash buffers on their balance sheets, and are more cautious than large firms. The crisis has exacerbated this phenomenon, and small firms' cash holdings have become even more dependent on volatile cash flows and the availability of collateral. Section 3.4 provides an overview of the investment decisions of firms, and of how these decisions are linked to their financial position. During the crisis, their financial position seems to have become a more significant factor for investment, especially for smaller firms. Section 3.5 describes the dynamics of an indicator of financing gaps (defined as the gap between a firm's external financing needs and how much external financing it actually has access to), as derived from recent firm survey data. In this context, Box 4 investigates whether the recent lending policies across euro area countries have been justified by the deterioration in the financial situation of firms.

38 Coordinated by Annalisa Ferrando.

3.1 ANALYSING THE DETERMINANTS OF FIRMS' FINANCIAL DECISIONS[39]

Empirical analyses of firms' financial structure and of the determinants of their financial decisions usually rely on micro data, which mainly include individual firms' balance sheets and profit and loss accounts. Micro data can be used to take into account differences related to firm-specific characteristics and evaluate their role in firms' financial decisions, whereas individual features are hidden when aggregate figures are considered (and macro data are mainly influenced by larger firms).[40] In this sense, micro data need to be used to consider the effect of heterogeneity among firms, and also to test certain theoretical models (see Box 3).

In particular, size, age and economic sector are likely to play a key role in determining firms' corporate finance decisions, while the financial and institutional environment of the country where a firm is located is also a key determinant of its behaviour. Moreover, some firms' financial decisions (e.g. level of leverage, cash management and investments) are influenced by the development of their profitability ratios or by other characteristics of their balance sheets.

Micro data also make it possible to evaluate the importance of firms' characteristics and balance sheet data to these indicators. For example, micro data show the percentage of firms with no leverage, which is relevant to an evaluation of the role played by firm- and country-level characteristics on the amount of leverage a firm has. Another important aspect in analysing firms' cash management decisions is the role played by firms' size. Finally, balance sheet data are useful when comparing firms' financial structure and the development of their financial flows with their investment decisions, which represent the main contribution of NFCs to GDP growth.

The analysis presented in this chapter is based on the information contained in the Bureau van Dijk Amadeus database (see Annex 3). The main advantage of this data source is that it includes comparable financial information for public and private companies in different countries. The information consists of the main components of firms' balance sheets and their income statements; it also includes other characteristics that are relevant to the analysis, like a firm's sector, age, number of employees, and whether it is listed or not.

39 Prepared by Antonio De Socio.
40 The main differences between the national accounts data used in Chapter 2 and the firm-level data are listed in Box 6 of Annex 3.

Box 3

WHY DOES THE CORPORATE CAPITAL STRUCTURE MATTER? A BRIEF OVERVIEW OF THE THEORETICAL DISCUSSIONS[1]

The starting point for all analyses of the capital structure of corporations is the thesis by Modigliani and Miller (1958), which suggests that, given perfect capital markets and a neutral tax system, capital structure has no influence on a firm's value and the cost of capital. If the restrictive assumptions on which this theory is based are loosened, one can identify those factors that influence corporate financing structures. For instance, the "trade-off" theory stresses that companies set a target level of leverage at which the tax advantages resulting from the additional

1 Prepared by Alexander Karšay and Walter Waschiczek.

debt just offset the costs arising from potential financial distress. The "pecking order" theory (Myers and Majluf (1984); Myers (1984)) highlights the influence that asymmetrical information between investors or lenders and company management can have on capital structure. Because asymmetrical information increases financing costs, companies prefer internal financing to external financing, and because debt financing entails lower costs and no outside shareholders, companies prefer debt to equity if external funds are necessary. The above theories suggest a number of firm-specific characteristics that should play a role in determining a corporation's capital structure. Empirical studies tend to find that leverage[2] is affected negatively by firm-level profitability and growth opportunities, and positively by firm size (e.g. book value of assets) and asset tangibility. Industry effects also play a role, as firms' debt ratios differ according to their respective industries. Whereas most of these effects are roughly in line with the trade-off theory, the profitability effect is suggestive of a pecking order in financial decisions. Studies also often find that firms converge towards a target debt ratio, which corresponds with the trade-off theory.

From a stability perspective, one aspect to consider is the relationship between leverage and the probability of default. With rising indebtedness, borrowers' ability to repay becomes progressively more sensitive to drops in income and sales and, especially in the case of floating-rate debt, increases in interest rates (Cecchetti et al. (2011)). Moreover, in an economic downturn, the pressure of debt service costs is likely to cause highly leveraged firms to cut back investment (and, possibly, production and employment) more severely than less-leveraged firms; thus high leverage may make the economy less stable (Bernanke and Campbell (1988)). From a conjunctural point of view, high leverage might lead to a debt overhang (Myers (1977)). If a firm has taken on too much debt, it might find itself in a situation where it cannot take on additional debt to finance future projects, even if these projects could generate a positive net present value, because the profit to be expected from them would be used to service existing liabilities. For the economy as a whole, the ensuing investment cuts might lead to a dampening of economic growth.

Recent studies (for example De Jong et al. (2011); Almeida and Campello (2010)) stress that verifying capital structure theories should focus on joint tests of various theories that are able to discriminate between the different theoretical predictions. De Jong et al. (2011) establish that the pecking order theory better explains debt issuance, whereas the trade-off theory is better at predicting debt repurchase decisions. However, Byoun (2008) finds that, as firms approach their target leverage ratios, the speed of adjustment is faster when there is a financing deficit at below-target leverage and a financing surplus at above-target leverage. In addition, adjustment speeds are higher when firms have above-target leverage levels than when they have below-target levels. Moreover, firms facing a financial deficit (surplus) tend to increase (decrease) debt regardless of its level relative to the target. Thus both theories' elements appear to be valid. Finally, Lemmon and Zender (2010) provide evidence in favour of the pecking order theory. After distinguishing financially constrained from unconstrained firms, they show that the latter fill their financing deficits almost entirely with debt, while the former (typically smaller firms) resort to a larger extent to equity issuance, owing to debt capacity concerns and their pronounced growth prospects.

The above results can be complemented by survey evidence on managerial views (Brounen et al. (2006)) of capital structure considerations. Elements of both main theories receive some support. In line with the trade-off theory, volatility of earnings is an important factor, as are

2 Leverage is usually defined as a ratio of long-term/total debt to assets, where a market or book value of assets might be applied.

the tax advantages of debt, potential costs of bankruptcy and reputation effects. Firms also have a target debt-to-equity ratio in most cases. However, the preference for internal finance is also clearly confirmed, as firms tend not to issue debt when recent profits are high (and vice versa). Indeed, the most important factor in debt decisions is financial flexibility (i.e. restricting debt and the debt service burden so that enough internal funds are available for new projects), which is also in line with the findings of Fama and French (2002) – that firms set leverage and dividend pay-outs below optimum values in order to reduce the likelihood of having to issue risky securities or forego profitable investments. However, there is a lack of decisive conclusions regarding the trade-off between external equity and debt or the role of asymmetric information. Nevertheless, some additional vital determinants of capital structure can be identified. When shares are overvalued, the owners of the company can obtain a relatively large amount of finance (which can be used profitably) for only a small share of their business. Industry leverage ratios are probably seen as a benchmark, in that firms in a given industry do not prefer to be seen by investors or banks as too different/risky compared with their competitors. Furthermore, company owners also pragmatically analyse how much of their profits they will have to forego when they give up part of their ownership by issuing additional shares, i.e. they do not automatically take the net present value of capital expansion into account when deciding whether to issue new equity.

Since the mid-1990s there has been an increase in the amount of literature that investigates the influence of country-specific institutional factors on corporate capital structure.[3] Several studies (Fan et al. (2010); Rajan and Zingales (1995)) have found that tax regimes significantly determine the costs associated with equity and debt. When the tax gain from leverage is positive, firms tip their capital structures towards more debt. In those taxation systems where firms are taxed on their profits and individuals are taxed on their personal income, it is cheaper for both firms and investors to finance with debt than with equity. A number of comparative analyses have highlighted the importance of legal factors. For example, cross-country differences in the legal origin (that is, from which traditions the laws in a country are derived) may influence the capital structure of the corporate sector (Bancel and Mittoo (2004); Fan et al. (2010)). In general, commercial laws come from two broad traditions: common law, which is English in origin, and civil law, which derives from Roman law. Companies in countries whose legal system is based on common law tend to have more equity. Similarly, the quality of law enforcement is also correlated with a higher equity ratio (De Jong et al. (2008); Giannetti (2003)). One aspect that has been consistently significant is the differing legal position of creditors in the event of a company's insolvency (Fan et al. (2010); De Jong et al. (2008)). In countries where the bankruptcy law provides strong incentives to maintain the activity of the bankrupt firm, the leverage ratio is usually lower than where the law supports creditor rights. The legal position of lenders is also partly linked to the structure of the financial system (or, more generally, the capital supply), which can also influence financing policies. While no systematic difference in the level of leverage in bank- or market-oriented countries has been found (Fan et al. (2010); Rajan and Zingales (1995)), Fan et al. (2010) point out that the volume of bank deposits and the existence of a deposit insurance scheme are positively correlated with leverage. Concerning the size of capital markets, Giannetti (2003) found a positive correlation between firm leverage and the size of the bond market, but a negative relationship with stock market size. Finally, De Jong et al. (2008) have demonstrated that country-specific factors can also influence corporate capital structure indirectly, through their impact on the effect of firm-specific factors.

3 Given the scope of this report, the ensuing discussion of institutional determinants concentrates on the findings concerning developed countries.

3.2 DETERMINANTS OF FIRMS' LEVERAGE[41]

The aim of this section is to analyse the considerable degree of heterogeneity in euro area firms' decisions regarding one key aspect of their capital structure, namely the proportion of their assets to be financed with debt. The economic literature on firms' capital structures identifies a large number of factors that can explain the different levels of leverage among firms (see Box 3). Some of these factors are firm specific, such as profitability, the volatility and predictability of internal funds, the types of asset that should be financed and the willingness of entrepreneurs to accept new equity investors that could claim control rights. Other factors are common to firms of the same sector, such as the amount of working capital and fixed assets required to run the firm's productive processes. Finally, the firm's degree of leverage could also depend on the characteristics of the institutional and financial environment, including typically country-level factors such as the development of financial markets, the types of relationship between firms and investors, the tax burden and structure, and the strength of the enforcement framework for creditor and shareholder rights.

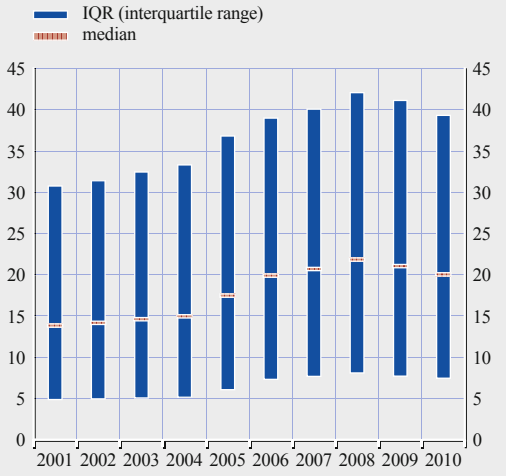
The analysis is based on firm-level balance sheet data from the Bureau van Dijk Amadeus database. The sample used in this section has approximately 12.6 million annual observations of 2.4 million firms in 17 countries between 2001 and 2010.[42]

Salient features about firm-level leverage in this dataset are as follows. Throughout the sample period, about one third of firms do not show any financial debt; micro firms[43] and young firms account for 38% and 40% of these firms, respectively. The median level of leverage[44] for indebted firms, mirroring the dynamics of the aggregate data described in the previous chapter, increased steadily between 2001 and 2008, by 8 percentage points to 22%, as a consequence of favourable conditions in credit and financial markets. During the crisis the indicator declined to 20%, primarily reflecting the weak dynamics of MFI loans (see Chart 25).

Around the median levels the dispersion of firms' leverage increased over time: in 2008 the quartile of least-indebted firms had a leverage ratio of less than 8% (3 percentage points higher than in 2001), whereas for the most indebted firms the leverage ratio was higher than 42% (11 percentage points higher than in 2001).

Chart 25 Leverage of euro area non-financial corporations

(percentages)



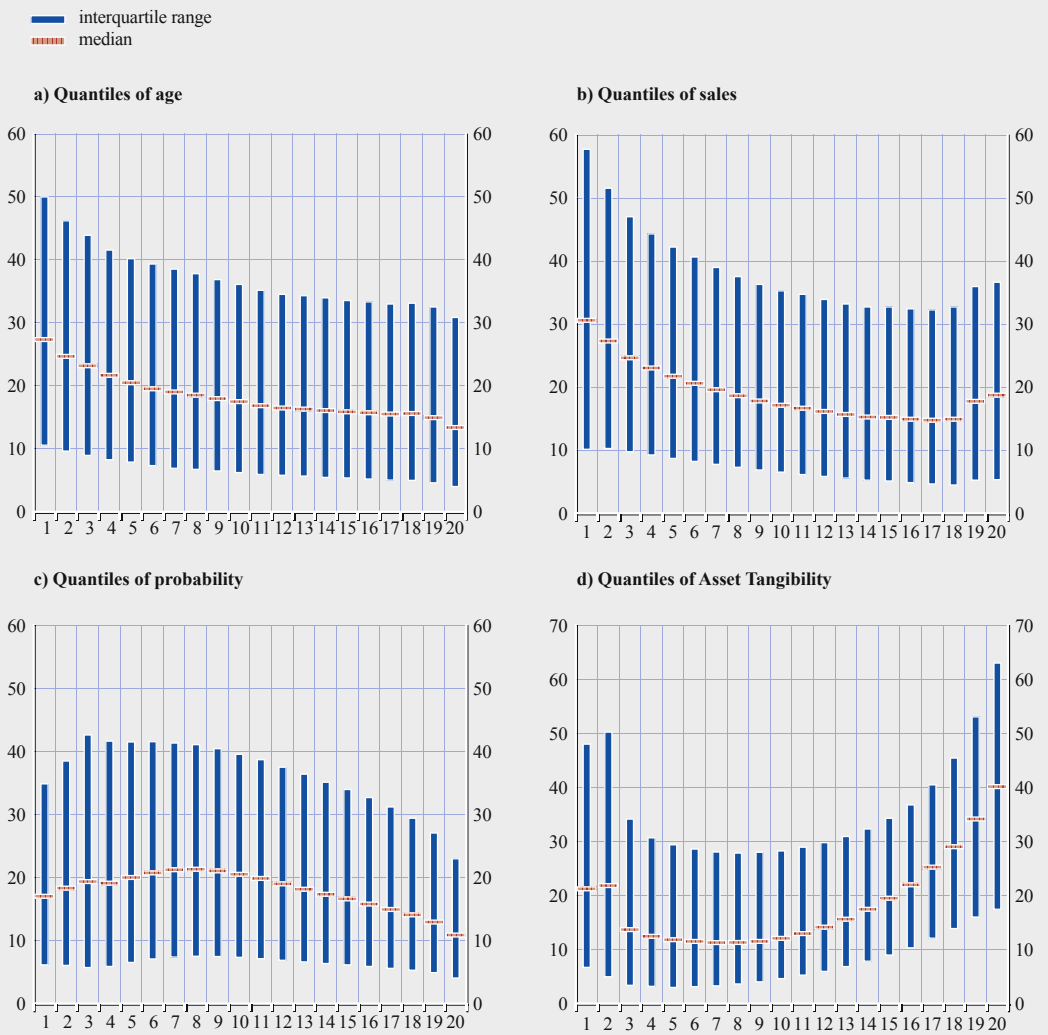
Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: Leverage is defined as the sum of short- and long-term debt, divided by total assets. Firms without financial debt are excluded.

41 Prepared by Juan Carluccio, Antonio De Socio, Annalisa Ferrando, Paolo Finaldi Russo and Guillaume Horny.
42 See Annex 3 for a description of the database and for methodological notes.
43 The size classification is derived from the European Commission's definition, and includes four categories of firm: micro, small, medium and large. For a detailed description, see Annex 3. Young firms are firms that are less than three years old.
44 Leverage is defined as the sum of short- and long-term financial debt, divided by total assets. Another measure of leverage, calculated as the ratio between financial debt and the sum of financial debt and shareholder equity, has been used as a robustness check, and the results presented hereafter remain substantially unchanged. See Annex 3 for a detailed description of the variables used in this section.

Among indebted firms, the median level of leverage decreases with firms' age and sales[45] (see Charts 26a and 26b). This evidence, taken together with the high proportion of young and small firms without any financial debt, confirms the commonly held view that young and small companies face larger obstacles to borrowing funds and that, once they borrow, they rely heavily on bank debt to finance their business. Firms with low or high operating profitability tend to be less leveraged than firms with intermediate operating profitability, pointing to the presence of a non-linear relationship between indebtedness and profits[46] (see Chart 26c). Chart 26d shows that leverage increases with the proportion of tangible assets, which may be explained by the use of

Chart 26 Leverage of euro area non-financial corporations, broken down by firms' characteristics

(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: Leverage is defined as the sum of short- and long-term debt, divided by total assets. Firms without financial debt are excluded.

45 Very similar results have been found using the distribution of firms' total assets instead of sales. See Chart A6 in Annex 3.
46 The change in the slope is around the eighth quantile, where the profitability indicator is worth about 7%.

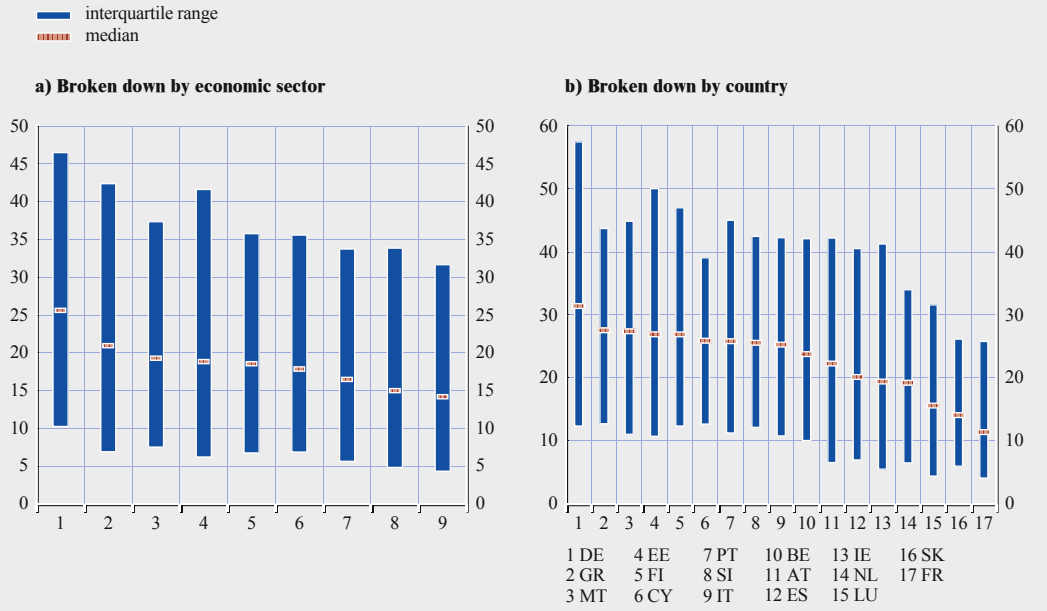
these assets as collateral or, more broadly, because tangible assets make borrowing firms more attractive to external investors; in this case too there are signs of a non-linear relationship between the two variables.[47]

In all these cases, even if the association between leverage and observed firm characteristics is fairly robust, the dispersion around the central values of the distribution is always high, especially for the youngest firms and micro firms, as well as for firms with low levels of tangible assets, suggesting that none of these factors, when taken individually, could be considered sufficiently indicative of leverage decisions.

Looking at the sectoral distribution of leverage among indebted firms, Chart 27a shows that the median level is higher for accommodation and food services and retail trade firms. The highly leveraged sectors are typically characterised by a large number of micro firms. The ranking is relatively constant throughout the period, but the differences between industries increased immediately before and during the crisis. A notable exception is the construction and real estate sector, whose leverage increased during the decade under analysis (see Chart A7 in Annex 3). The increase is particularly marked in Spain and Greece (13 percentage points and 9 percentage points between 2001 and 2008, respectively), but there is also a more general increase in leverage at the country level.

Chart 27 Leverage of euro area non-financial corporations

(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The sectors are: 1 – manufacturing; 2 – electricity, gas and water; 3 – construction and real estate; 4 – wholesale trade; 5 – retail trade; 6 – accommodation and food; 7 – transportation and storage; 8 – information, communication, and research and development; and 9 – other services. Leverage is defined as the sum of short- and long-term debt, divided by total assets. Firms without financial debt are excluded.

47 The change in the slope is around the seventh quantile, where the proportion of tangible assets is about 6%.

Overall, differences in firms' leverage patterns between countries seem more important than those between industries. In this sample, considering only indebted firms, the median level of leverage in the countries with highly leveraged firms, such as Germany, Greece and Malta, is double the median level of leverage of countries with less-leveraged firms, such as France, Slovakia and Luxembourg (see Chart 27b).[48] The countries' rankings changed somewhat throughout the period, as the impact of the leveraging and deleveraging process was felt during the period under examination. The ranking among the largest countries, such as Germany, France and Italy, remained fairly stable, whereas Spanish and Greek firms showed a substantial increase in leverage over time, in line with the aggregate data, while leverage levels decreased in Germany and the Netherlands.

The heterogeneity of firms' leverage choices was further assessed through a decomposition of the total variance of leverage by pooling all countries' data together. This analysis shows that leverage varies more across different sectors (75% of the total variance) than over time (25%).[49] A further analysis of variance, in which industry, country, size and year dummies are considered, provides two main insights: first, the leverage variation explained by these factors accounts for little more than 10% of the total variance; and second, country dummies are the most relevant, accounting for more than two thirds of the explained variance.[50]

Overall, these results indicate that several different factors influence firms' leverage choices, and that the institutional or financial environment plays an important role. In the next paragraph, a multivariate econometric analysis is presented, with the aim of identifying the most significant factors and providing a better understanding of the reasons behind the structural differences between countries.

AN EMPIRICAL ANALYSIS OF FIRMS' LEVERAGE

The econometric approach followed in this section encompasses micro and macro data, as both are relevant for firms' leverage decisions. First, the analysis presented over the previous pages confirms that some individual characteristics identified by corporate finance theory are also important for unlisted companies. Second, a link should be made between the relevance of the institutional and financial environment summarised in Box 1, and the importance of country differences shown in Chart 27b.

On the basis of the data used in the analysis, the econometric model should deal with two different issues: a) the dependent variable (individual firms' leverage) is equal to zero for approximately one third of firms, as a significant number of firms have no financial debt; and b) some of the explanatory variables are measured at the country level, and are therefore not unique among firms in the same country.[51] Several methods are available to manage these issues. In line with Angrist and Pischke (2009) and applied works in the literature on wages,[52] a two-step estimation approach was taken, where the first step is based on a pooled Tobit model that covers the lack of leverage for many

48 This descriptive analysis of the distribution considers only indebted firms; a further difference between countries stems from the number of corporations with positive leverage. See Box 6 in Annex 3 for a detailed comparison between country-level debt indicators based on individual financial statements and financial accounts.

49 Graham and Leary (2011) achieve similar results by decomposing the total variance of leverage using "between industries", "within industries" and "within firms" components.

50 The results are similar even if the analysis is run on a sub-period (2005-10) in which changes in the sample composition of some small countries are less relevant.

51 When variables defined at different levels are mixed, the usual procedures used to compute the standard errors in independent observations underestimate the true standard deviations (Moulton (1986)). The computation of the standard errors must, therefore, be adjusted to yield a correct assessment of the statistical significance of the coefficients.

52 A similar procedure is used by Solon et al. (1994) and Card (2001), among others.

firms,[53] and the second stage focuses on country-level variables.[54] The first step is a pooled Tobit model for the period 2001-10,

$$y_{it} = \begin{cases} y_{it}^{*} = X_{it}'\beta + \varepsilon_{it} & \text{if } y_{it}^{*} > 0 \\ 0 & \text{if } y_{it}^{*} \leq 0 \end{cases} \qquad X_{it} = (X_{i}^{0}, X_{it}^{1}, X_{c(i)t}^{2})$$

where the covariates are a vector of variables defined at different levels:

X_{i}^{0} are time constant or nearly time invariant dummies (size, age and industry);

X_{it}^{1} are firm-level time-varying firm characteristics[55] (profitability, asset tangibility, growth, liquidity), which have a one-year lag to reduce endogeneity problems;

$X_{c(i)t}^{2}$ include time-varying country dummies, each one indicating a given country for a given year.[56]

The estimated coefficients of these country-year dummies represent the dependent variable of the second stage of this analysis, which aims to identify the determinants of cross-country heterogeneity. The rationale for this approach is that, in order to assess the impact of institutional and financial country-level characteristics, a measure of leverage comparable at the macro level must be obtained, by cleaning the leverage dynamic from the heterogeneity at the micro level (i.e. owing to differences in the industry composition, profitability and growth opportunities). The estimated coefficients of the country-year dummies of the first step provide a corrected measure of the differences of leverage among countries, filtering out the influence of all the micro variables included in the estimated equation. The second stage is based on an ordinary least squares regression, which includes year dummies (T_t) and characteristics of the institutional, economic and financial environment of each country (W_{it}).[57]

$$\hat{\beta}[X_{c(i)t}^{2}] = W_{it}'\gamma + T_t + u_{it}$$

The results of this analysis are reported in the first three columns of Table 2, and in Table 3.[58] The first step shows that, conditional on all other covariates and in relation to micro firms, small firms have approximately 3.5% more leverage, medium firms have 6.0% more, and large firms have 7.9%

53 Ordinary least squares (OLS) estimators are inconsistent in such a setting (Cameron and Trivedi (2005)). The existing approaches to managing unobserved heterogeneity in Tobit models employ standard random effects or Chamberlain-like transformation (see Wooldridge (2002)). Including fixed effects similar to those used in linear models is still an active research area. In order to assess how robust the results reported in this report are to firm-level unobserved characteristics, linear models were estimated for chart data with fixed effects. The results are in line with those reported in the tables.

54 Alternatively, a model could be estimated that involves both the micro and macro variables. The direct estimates of the standard errors of the coefficients associated with variables defined at the macro level would, however, be biased. Several methods exist to adjust the estimated standard errors, such as cluster methods. However, here a two-step approach was preferred, for two reasons. First, it yields unbiased estimates, and second, it is more transparent than cluster procedures, whose behaviour in applied work is currently a matter of debate in the econometric literature. It must be emphasised that the two-step approach described in this analysis is not related to instrumental variable procedures aimed at handling endogeneity problems, such as two-stage least squares.

55 See Annex 3 for a description of these variables and for some additional descriptive statistics.

56 The interactions are only included if, for each country and year, there are at least 50 firms with positive leverage.

57 As a preliminary evaluation of the role played by country characteristics, two pooled Tobit models were also estimated. The first included time-varying and constant firm-level characteristics and year dummies, and the second also included country dummies. The Akaike information criterion (AIC) and the Bayesian information criterion (BIC) were used to test how well the two models fit the data. The latter model fits the data better, because both AIC and BIC are lower.

58 Sector dummies are not included in Table 2, but they are significant; the econometric analysis confirms that the most leveraged corporations are in the construction and accommodation and food sectors. Even if lagged variables and missing values entail a loss of a large number of observations, the sample used in the estimation (about 7.5 million observations) does not differ significantly from the whole sample in terms of composition and debt weight. The mean leverage is 0.8 percentage points lower than in the whole sample; no single country, industry, firm size or year causes a difference in the mean leverage of more than 1.9 percentage points.

Table 2 Leverage and firm characteristics: econometric results

	Model for the whole period		Model before and during the crisis				
	Full sample (2001-10)	Effect of one standard deviation	Before the crisis (2001-08)	Effect of one standard deviation	During the crisis (2009-10)	Effect of one standard deviation	Change in the effect
Size							
Micro	Ref.		Ref.		Ref.		
Small	0.035***		0.035***		0.037***		+
	(0.000)		(0.000)		(0.001)		
Medium	0.079***		0.083***		0.057***		-
	(0.001)		(0.001)		(0.001)		
Large	0.060***		0.062***		0.050***		-
	(0.001)		(0.001)		(0.002)		
Age							
Less than two years	0.069***		0.062***		0.092***		+
	(0.001)		(0.001)		(0.002)		
Between two and five years	0.071***		0.061***		0.102***		+
	(0.001)		(0.001)		(0.001)		
Between five and ten years	0.042***		0.039***		0.055***		+
	(0.001)		(0.001)		(0.001)		
Between ten and 25 years	0.021***		0.020***		0.027***		+
	(0.001)		(0.001)		(0.001)		
More than 25 years	Ref.		Ref.		Ref.		
Tangibility	0.231***	0.056	0.234***	0.049	0.207***	0.023	-
	(0.001)		(0.001)		(0.001)		
Profitability							
Positive	-0.162***	-0.020	-0.165***	-0.017	-0.135***	-0.007	-
	(0.001)		(0.001)		(0.003)		
Negative	0.315***	0.016	0.316***	0.014	0.313***	0.007	=
	(0.003)		(0.003)		(0.006)		
Operating surplus growth	0.016***	0.007	0.018***	0.002	0.004***	0.001	-
	(0.000)		(0.000)		(0.001)		
Cash to total assets	-0.369***	-0.076	-0.362***	-0.085	-0.424***	-0.039	+
	(0.001)		(0.001)		(0.002)		
Industry dummies	YES		YES		YES		
Observations	7,496,446					7,496,446	

Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: Standard errors are corrected for clustering at the firm level. *** p < 0.01, ** p < 0.05, * p < 0.1. The column entitled "Model before and during the crisis" reports the results of a model where the explanatory variables interact with pre-crisis and crisis indicators. The model is estimated with the sample covering the whole time period.. The column "Change in the effect" indicates significant increases (+) or decreases (-) in the absolute values of the coefficients during the crisis. (=) indicates no statistically significant change. Comparisons have been performed at the 5% level.

more. This finding is in line with the empirical evidence that smaller firms might have less access to external sources of finance (either in terms of bank loans or financial market instruments), which is reflected in the high proportion of these firms without any debt. The conditional relationship between a firm's age and its leverage indicates a five-year threshold. Firms that have existed for fewer than five years are more leveraged than older ones, with those that have existed for more than 25 years being the least leveraged. This confirms the descriptive results that show that young firms rely more on external financing and their leverage is approximately four percentage points higher than that of older firms.

Since continuous variables are expressed as percentages, their coefficients directly indicate the relationship between leverage and firm characteristics. All of the characteristics of firms that vary over time are significant. Firms with a higher proportion of tangible assets (which can be used as collateral) on the balance sheet, and with higher growth in terms of operating revenues (a proxy for firms'

financing needs for investment and working capital), have higher levels of leverage.[59] Leverage is lower for firms with a higher proportion of liquid assets (which can be used for financing expenses in place of debt). In order to deal with the non-monotonic relationship between leverage and profitability mentioned in the descriptive analysis, two variables were included: the first takes the value of the ratio between operating profits and assets if positive, and is otherwise equal to zero; the second, on the other hand, takes the value of the ratio if it is negative, and is otherwise equal to zero.

The results confirm the presence of asymmetries in the effect of firms' profitability on their leverage: the indicator tends to be smaller both for firms with higher operating profits (confirming the hypothesis of the pecking order theory – that profitable firms prefer to use internal funds) and for firms with higher operating losses (which are more likely to be subject to credit rationing by financial intermediaries).[60] The third column in the table reports a standardised measure of the economic relevance of each explanatory variable expressed as the effect on the leverage of a shift by one standard deviation. The most economically relevant variables seem to be firms' liquidity and tangibility of assets: an increase of one standard deviation is related to a decrease (increase) of 8 (6) percentage points in leverage.

The country-year fixed effects (not reported in the table) are all statistically significant. The relative ranking of the countries is similar to that derived using the simple mean of leverage at the country level for each year. This suggests that heterogeneity in firms' characteristics is not the only source of differences in leverage across countries, thus confirming the importance of an analysis of the effect of country characteristics on leverage.

The main results of the second-step estimation are presented in Table 3. The values of the dependent variables are the coefficients of the macro time-varying dummies obtained from the first step, which can be seen as corrected measures of the difference in leverage among countries for a given year, once firms' characteristics are controlled for. The explanatory variables are specific country characteristics: corporate statutory tax rate, development of the equity market (measured by the ratio between the value of listed shares and GDP), legal rights protection (measured by the "Strength of legal rights" index) and ease of bankruptcy (measured by the time limit, in years, for a creditor to recover debt).[61] As further

Table 3 Relationship between leverage and country characteristics

Variables	Dependent variable: Country-year fixed effects from step 1	Effect of one standard deviation
Taxation	0.539***	0.041
	(0.126)	
Quoted Shares to GDP (average)	-0.065***	-0.032
	(0.014)	
Legal rights index (average)	0.017***	0.032
	(0.005)	
Insolvency years index (average)	-0.036**	-0.029
	(0.015)	
Constant	0.008	
	(0.112)	
Observations	116	
Adjusted R^2	0.291	

Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The control variables are bank lending rates, nominal GDP growth and time dummies.

59 Unlike in the case of profitability, once firms without debt are taken into account, the relationship between leverage and the share of tangible assets is strictly linear; robustness checks aimed at investigating whether a non-linear relationship exists confirm this evidence.

60 The results are not influenced by collinearity; even if the correlation between some variables (e.g. profitability and liquidity) is positive, it is never above 25%.

61 The sources of data are the European Commission (taxation), financial accounts (development of equity market), the World Bank, and the "Doing Business" project (legal system). Apart from taxation, the mean of these variables over time is used, in order to evaluate the effect of structural differences. Since World Bank data are only available from 2004 onwards, the mean is also extended to previous years. Other variables were tested, including the development of bond markets and the relevance of bank loans, but they were not always significant. As an alternative to legal rights protection, protection of investors was used, providing similar, but less robust, results.

controls, year dummies were included to take into account the dynamics over time, and nominal GDP growth and interest rates on bank loans were included to control for economic and financial development across countries.[62]

The outcome of this second step confirms that institutional characteristics influence firm leverage at the country level. A higher corporate tax rate (a measure of the debt tax shield – the fiscal advantage of an increase in debt owing to interest deductibility) and stronger protection of legal rights (a measure of the protection of creditors rights) are positively related to leverage. The development of equity markets (which provides a source of funds from shareholders) and a longer bankruptcy process (which makes it more difficult for creditors to recover their funds) are negatively related to leverage.[63] The third column in the table presents a standardised measure of the economic relevance of each explanatory variable, expressed as the effect on the leverage of a shift by one standard deviation. The most economically relevant variable seems to be taxation, hence the fiscal incentives toward debt, as an increase of one standard deviation is related to an increase of four percentage points in the dependent variable (a corrected measure of the differences in leverage across countries).[64] The absolute value of the effect of the other variables is around three percentage points; since they only change across countries, this measure of variation is only influenced by structural differences.

IMPACT OF THE CRISIS

In order to evaluate the possible impact of the crisis on firms' levels of leverage, in this section the analysis is replicated using a slightly different specification. In both the first and second steps, the explanatory variables were accompanied by dummy variables indicating whether the observation is before or during the crisis. This allows the covariates to have different levels of influence on the level of leverage before the end of 2008 and afterwards, while not altering the set of country-time dummies.

The results are reported in Table 2 from the fourth column onwards. While the indicators of all the coefficients of the Tobit analysis remain unchanged in the two sub-periods, the strength of the impact of firms' characteristics shows some differences. For example, the results indicate a wider discrepancy between the leverage of firms of different ages during the crisis. On the contrary, differences owing to firm size seem to become smaller during the crisis, and the coefficients of the time-varying firm characteristics show that almost all of these variables had a more limited impact after 2008. To sum up, the coefficients of the variables measuring profits, growth and tangibility are closer to zero during the crisis, and so provide less information about firms' leverage. Cash is a notable exception, however. Indeed, the coefficient of firms' liquidity increases, indicating a higher negative influence on leverage; it is possible that the reduced availability of liquid assets during the crisis made their effects on leverage relatively more important.

62 The estimated coefficients are not reported in the table. Both GDP growth and interest rates are positively related to leverage, and confirm that it is pro-cyclical. The positive relation with GDP confirms the pro-cyclical nature of debt, as in periods of higher growth leverage increases. The coefficient of interest rates, which is related to the risk of borrowers, probably captures the positive correlation between firms' indebtedness and risk of bankruptcy. Additionally, real GDP growth and real interest rates on bank loans were tested, but they were not significant. Real interest rates are only significant when inflation is added, which is the same as including nominal interest rates. Also, the spread between bank lending rates and the EURIBOR was considered, but this had little effect on the results.

63 These results are robust to several checks. They do not change if Cyprus is not included (because estimated values are only available for the period 2008-10, and are based on fewer than 105 firms per year), if the value of equity market developments is allowed to change over time, or if only disposable values for World Bank data are used.

64 The importance of taxation confirms the results found by Bartholdy and Mateus (2008), and Pfaffermayr et al. (2008), who used data about manufacturing firms from a similar dataset. More generally, the findings for taxation and other institutional factors are in line with the results of De Socio and Nigro (2012).

3.3 FIRMS' CASH MANAGEMENT POLICIES[65]

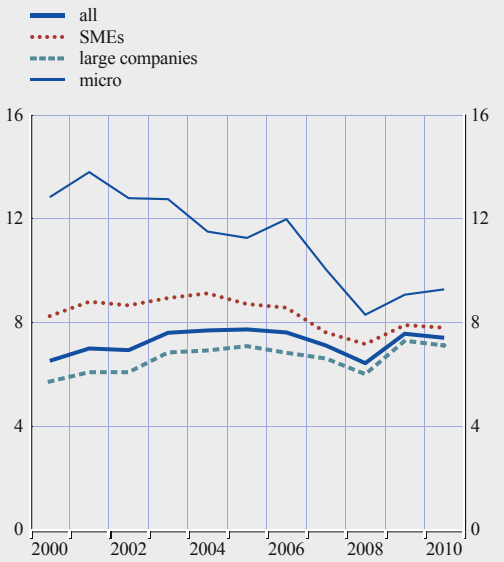
This section looks at the determinants of a firm's cash holdings. Like households, firms hold cash for two main reasons. First, they need cash to carry out transactions, i.e. to make payments without incurring the costs involved in converting non-cash assets into cash. Second, and perhaps more importantly, firms hold cash as a precautionary measure, to cover against the risk of potential cash shortfalls; this ties in with the "pecking order" theory which explores firms' decision-making with regard to their sources of financing (see Box 3).

Within this framework, firms' cash holding decisions have provided the basis for many recent studies, which serve as tools for analysing financing constraints. If a firm does not face financing constraints, it has no need to hold cash for future investment needs; hence, its cash holdings should not depend on either cash flow or cash flow volatility. However, if firms do face financing constraints, they can decide to hold more cash to hedge against the possibility of falling short of cash in the future and, hence, not being able to engage in valuable investment projects.

Chart 28 illustrates the development of the aggregate cash holdings ratio, calculated using a large sample of euro area firms observed between 2000 and 2010.[66] It shows that euro area NFCs hold a non-negligible part of their assets in the form of liquid assets, in spite of the associated opportunity costs. Over the past decade, the cash holding ratio for euro area firms has fluctuated somewhat, increasing in the early 2000s and subsequently decreasing, only to increase again in the late 2000s, in the context of high uncertainty and difficulties in accessing external financing.

Chart 28 Euro area non-financial corporations' cash holding ratio, broken down by size

(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Note: The cash holding ratio is defined as cash and cash equivalents to total assets.

By breaking down firms by size,[67] differences in the level and the development of cash holdings can be seen. Large firms' cash holdings are substantially lower, suggesting that these firms have easier access to external financing and use cash more efficiently. The steep decline in micro firms' cash holdings before the crisis could be related to improvements in their access to credit. More recently, in the context of continued weak economic activity, firms might have increased

65 Prepared by Luísa Farinha, Annalisa Ferrando and Carmen Martínez-Carrascal.

66 These figures are based on the Bureau van Dijk Amadeus database, which has already been used in the previous section to analyse leverage. After data filtering, an unbalanced panel of approximately 1.5 million firms was obtained. See Annex 3 for the description of the database and the methodological notes.

67 In line with the European Commission definition, firms can be classed as micro, small, medium or large, according to the number of employees, turnover and total assets. See Annex 3 for the precise definition used in this report. Approximately 72% of the observations correspond to micro firms, while approximately 26% correspond to small and medium sized firms, with large firms comprising only 1.5% of all observations.

their cash balances in response to more difficult access to external financing or as a result of a decision to defer their investment projects, unrelated to the existence of financing constraints.

A DESCRIPTIVE ANALYSIS OF THE LINK BETWEEN SIZE, CASH HOLDINGS AND CASH HOLDING DETERMINANTS

The need to hold cash as a precaution suggests that cash holdings are positively linked to cash flow volatility for firms that have a more limited access to external financing (see, for example, Opler et al. (1999) or Han and Qiu (2007)).[68] Nevertheless, there are other theoretical hypotheses which can be used to identify additional factors affecting firms' cash holding decisions: financial leverage (linked to the opportunity cost of holding cash); net working capital (a cash substitute); tangible assets (a measure of access to external financing); and the sales growth rate (a measure of growth opportunities). The main focus of this section is then analysing the relationship between cash holdings, cash flow and cash flow volatility, as these factors can help to identify potential difficulties in firms' access to external financing.

Table 4 presents the mean values of the firm-level variables used in the analysis, broken down by firm size. These figures suggest that cash holdings and cash flow volatility decrease with firm size.[69]

The level of net working capital held by micro firms and small firms tends to be higher than that of medium-sized and large firms, while the opposite can be said of financial leverage. The ratio between cash flow and total assets, and the sales growth are not likely to differ significantly across firm size. The proportion of total assets accounted for by tangible assets is slightly higher in the case of large firms. At the firm level, there is also wide dispersion in the cash holding ratio, and its distribution appears to be strongly positively skewed (i.e. a few firms have a large cash holding ratio, but most are more moderate), which is also reflected by the fact that the mean is almost twice the median. This distribution is shifted towards higher values for smaller firms.

In order to assess the relationship between cash holdings and several indicators of a firm's financial situation, it is useful to perform a bivariate analysis. The chosen indicators are among those

Table 4 Means of the firm-level variables, by firm size

(percentages)

	Cash/TA	CF/TA	CFV	NWC/TA	FINLEV	TANG/TA	Sales growth
Micro	19.3	8.6	6.5	15.4	16.6	22.3	7.9
Small	12.8	7.7	4.0	12.8	16.6	22.0	9.7
Medium	9.1	7.2	3.4	6.6	19.9	23.1	9.5
Large	7.9	7.9	3.3	9.4	19.3	25.5	9.1
Total	**17.5**	**8.3**	**5.6**	**14.4**	**16.8**	**22.3**	**8.4**

Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: "Cash/TA" is the ratio of cash and cash equivalents to total assets; "CF/TA" is the ratio of cash flow to total assets; "CFV" is the cash flow volatility, measured by dividing the standard deviation of a firm's cash flows in the four previous years by the average cash flow over the same period; "NWC/TA" is the net working capital, defined as the ratio of current assets, other than cash and cash equivalents, minus the accounts receivables, to total assets; "FINLEV" is the financial leverage defined, as in the previous section, as the ratio of short-term and long-term debt to total assets; "TANG/TA" is the fixed tangible assets divided by total assets; and "Sales growth" is the rate of growth of operating revenues.

68 For a review of recent studies analysing the impact of financial frictions on corporate cash holdings, see also Denis (2011).

69 The variables described in this section are: cash holdings, defined as the ratio of cash and cash equivalent to total assets; cash flow volatility, measured by dividing the standard deviation of a firm's cash flows in the four previous years by the average cash flow over the same period; net working capital, defined as the ratio of stocks, accounts receivable and other current assets, minus accounts payable, cash and cash equivalents to total assets; financial leverage, defined, as in the previous section, as the ratio of short-term and long-term debt to total assets; and sales growth, the rate of growth of operating revenues.

Chart 29 Relationship between firms' cash holding ratio and its determinants

(median values, percentages)

Notes: For each of the financial indicators considered, the charts show the median cash holding ratio for firms for which this indicator shows a high value (above the 90th percentile), an intermediate value (between the 45th and the 55th percentiles) and a low value (below the 10th percentile).

presented in Table 4: cash flow, cash flow volatility, net working capital, leverage and tangible assets. Charts 29a-29e compare the median cash holding ratio for different corporate groupings, defined on the basis of alternative variables that are expected to influence cash holding levels. Each chart presents the median cash holding ratio for firms with low, medium and high levels of the chosen financial indicator.[70] Starting with net working capital, Chart 29a shows that firms with high levels of short-term assets, other than cash and its equivalents, have substantially lower cash holding ratios than firms with intermediate or low levels of short-term assets, which can be seen as close substitutes for cash holdings. At the disaggregated level, this is also observed in all firm sizes, but there are some differences in the relationship between cash holdings and net working capital; the link between them seems to be non-linear in micro firms and small firms, but this is not the case for medium and large firms (see Chart A8 in Annex 4).

Similarly, the descriptive analysis points towards there being a positive relationship between cash holdings and cash flow (see Chart 29b), although the relationship seems stronger for SMEs than for large firms (see Chart A9 in Annex 4). As cash flow correlates with growth opportunities, this positive link could partly reflect the impact of growth opportunities on cash holdings, which might be greater for SMEs (see, for example, Ferreira and Vilela (2004) or Han and Qiu (2007)).

By contrast, there is a negative relationship between cash holdings and leverage, a financial indicator which increases the opportunity cost of holding cash,[71] for all firm sizes (see Chart A29c, and Chart A10 in Annex 4). Cash holdings are also negatively related to the ratio of tangible assets to total assets. Again, the link seems stronger for micro firms and small firms (see Chart A29d, and Chart A11 in Annex 4), which suggests that their access to external financing is more strongly linked to collateral availability than is the case for large firms (as a result, firms with lower levels of assets eligible to be used as collateral might have higher cash holdings for precautionary reasons).

Finally, this descriptive analysis points towards a clear relationship between cash holdings and cash flow volatility (see Chart 29e). When the analysis is carried out separately for each firm size, the link appears to be particularly strong for micro and small firms (see Chart A12 in Annex 4).

THE LINK BETWEEN CASH HOLDINGS AND CASH HOLDING DETERMINANTS: AN ECONOMETRIC ANALYSIS

The determinants of cash holdings can also be analysed using regression analysis. The following equation is estimated, in line with the available literature:[72]

$$\begin{aligned} Cash_{it} = {} & \beta_1 CF_{it} + \beta_2 CF_{it} * Dcrisis_t + \beta_3 spread_{ct} + \beta_4 spread_{ct} * Dcrisis_t + \beta_5 CFV_{it-1} + \\ & \beta_6 CFV_{it-1} * Dcrisis_t + \beta_7 NWC_{it-1} + \beta_7 NWC_{it-1} * Dcrisis_t + \beta_7 TA_{it-1} + \beta_7 TA_{it-1} * Dcrisis_t + \\ & \beta_8 SalesGrowth_{it-1} + \beta_8 SalesGrowth_{it-1} * Dcrisis + \\ & \beta_9 FDebt_{it-1} + \beta_9 FDebt_{it-1} * Dcrisis_t + \alpha_i + \theta_t + S_c + \varepsilon_{it} \end{aligned} \quad (1)$$

70 For example, Chart 29a depicts the median cash holding ratio for firms within the top, median and bottom deciles of net working capital (the closest substitute for cash holdings). The median decile (which includes firms between the 45th and 55th percentiles) can be regarded as representative of the behaviour of an average firm of that size, in terms of net working capital, while the top (bottom) decile includes the 10% of firms with the highest (lowest) value of this ratio.

71 On the other hand, higher leverage increases the probability of bankruptcy; hence, firms might try to reduce the probability of experiencing financial distress by holding more cash. The negative link between cash holdings and leverage tends to remain when only short-term and long-term liabilities, rather than total indebtedness, are considered.

72 See, for instance, Martínez-Carrascal (2010).

where *Cash* is the ratio between a firm's holdings of cash and cash equivalents, and total assets; s*pread* is the difference between the average lending rate to NFCs[73] and the market interest rate, measuring, at the country level, a firm's opportunity cost of holding cash; *CF* is the ratio between a firm's cash flow and total assets; *CFV* is a firm's cash flow volatility, measured by dividing the standard deviation of a firm's cash flows in the four previous years by the average cash flow over the same period; *NWC* is the ratio between net working capital and total assets; *FDebt* is the ratio between a firm's financial debt and total assets; *TA* is the proportion of a firm's total assets accounted for by tangible fixed assets; *SalesGrowth* is the growth rate of a firm's sales, which captures a firm's growth opportunities; α_i, θ_t and S_c are a firm specific effect, a time effect, a sector effect and a country effect respectively; ε_{it} is the error term; *Dcrisis* is a dummy that takes the value 1 from the year 2008 onwards and, otherwise, is equal to 0.

Table 5 presents the results of the econometric analysis. These results were obtained with a fixed effects generalised least squares (GLS) estimator that takes unobservable firm-level heterogeneity into account. Since the role of cash holding determinants may have changed during the crisis (for example, determinants linked to liquidity constraints may have become more relevant), the specification is carried out allowing for the fact that determinants may have a differential impact on cash holdings during the crisis period 2008-10.

The first two columns of Table 5 show the estimated coefficients and respective p-values obtained when estimating equation (1) using information on all firms in the sample. In these estimates, dummy variables, that take the value of 1 where the firm belongs to the size class being modelled, and 0 for all other size classes (micro firms are omitted), were added as regressors. The coefficients associated with these dummies are negative and statistically significant. The absolute value of the magnitude of these coefficients decreases with firm size, suggesting that, all other factors being equal, cash holdings decrease with firm size. This, together with the descriptive evidence presented above, was the main reason behind the use of separate models for each firm size.

Cash flow and cash flow volatility positively affect cash holdings. Given that precaution constitutes a reason for holding cash, this may indicate that some firms have restricted access to external financing. The results also suggest that this link has strengthened during the financial crisis, as the incremental effects of these financial variables – given by the estimated coefficient – are positive and statistically significant. Leverage is negatively related to cash holdings, and its impact has intensified during the crisis, increasing by almost 30%. This may be related to the increasing pressure for firms to deleverage. In the case of the spread, a negative and significant coefficient was also obtained, but the results suggest that the negative link between both variables has diminished during the crisis, as firms have been holding increasingly less cash. Nevertheless, as the spread is measured at the aggregate level and a distinction is only made between small and large loans, it might not entirely capture the heterogeneity across firms; therefore, its effect should be interpreted with caution. As expected, the estimated coefficient for the ratio of tangible assets to total assets is negatively related to cash holdings, suggesting that the access to external financing is strongly linked to the availability of collateral. The effect of this variable has been more significant during the crisis (it has increased by 7%), underlining the increasingly important role that collateral availability has had in recent years in promoting access to external financing. In line with expectations, firms holding a higher level of assets which can be considered as cash substitutes (and, therefore, those with a higher net working capital), hold less cash.

73 For each country and year, a different lending rate for small (less than €1 million) and large loans (more than €1 million) was used. The latter was used as the opportunity cost of holding cash for large firms, and the former the cost for all other firms.

Table 5 Cash holdings and firm characteristics (econometric results)

	All		Large firms		SMEs (excluding micro)		Micro firms		Statistical difference Large firms compared with SMEs	Statistical difference SMEs compared with micro firms
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value	p-value	p-value
CF/Total assets$_{it}$	0.162	0.00	0.075	0.000	0.157	0.000	0.163	0.000	0.000	0.005
CF/Total assets$_{it}$* Dcrisis	0.043	0.00	0.006	0.582	0.033	0.000	0.045	0.000	0.004	0.000
Spread$_{it}$	-0.445	0.00	0.113	0.460	-0.745	0.000	0.068	0.231	0.000	0.000
Spread$_{it}$* Dcrisis	0.172	0.00	0.925	0.000	0.298	0.000	-0.080	0.057	0.000	0.000
CFV$_{it}$	0.095	0.00	0.066	0.001	0.100	0.000	0.087	0.000	0.023	0.017
CFV$_{it}$* Dcrisis	0.046	0.00	0.015	0.527	0.020	0.010	0.052	0.000	0.217	0.000
NWC/Total assets$_{it-1}$	-0.024	0.00	-0.043	0.000	-0.028	0.000	-0.020	0.000	0.001	0.000
NWC/Total assets$_{it-1}$*Dcrisis	-0.016	0.00	-0.002	0.555	-0.018	0.000	-0.014	0.000	0.000	0.000
Financial debt/ Total assets$_{it-1}$	-0.036	0.00	-0.023	0.000	-0.030	0.000	-0.036	0.000	0.018	0.000
Financial debt/ Total assets$_{it-1}$*Dcrisis	-0.010	0.00	0.005	0.144	-0.003	0.015	-0.016	0.000	0.008	0.000
Tangible asssets/ Total assets$_{it-1}$	-0.123	0.00	-0.085	0.000	-0.101	0.000	-0.129	0.000	0.007	0.000
Tangible asssets/ Total assets$_{it-1}$*Dcrisis	-0.008	0.00	0.001	0.840	-0.008	0.000	-0.006	0.000	0.004	0.033
Sales growth$_{it-1}$	0.005	0.00	-0.004	0.010	0.002	0.000	0.006	0.000	0.000	0.000
Sales growth$_{it-1}$*Dcrisis	-0.006	0.00	0.000	0.969	-0.004	0.000	-0.007	0.000	0.040	0.000
Dummy small firms	-0.0005	0.09								
Dummy medium-sized firms	-0.0027	0.00								
Dummy large firms	-0.0115	0.00								
Dummy small* Dcrisis	-0.0078	0.0000								
Dummy medium sized* Dcrisis	-0.0102	0.0000								
Dummy large*Dcrisis	-0.0095	0.0000								

Notes:Estimations by random-effects GLS regressor with robust standard errors; all equations include time, economic sector and country dummies.
Spread$_{it}$: opportunity cost of holding cash measured by the difference between the average lending rate to NFCs in each country and a market interest rate.
CF/Total assets$_{it}$=Cash-Flow$_{it}$/(0.5*Total assets$_{it}$+0.5*Total assets$_{it-1}$).
CFV$_{it}$: standard deviation of firms' cash-flows in the four previous years divided by the average cash-flow over the same period.
The null hypothesis of the test of the statistical difference between coefficients of different sizes is that the coeeficients are equal.

The remaining columns of Table 5 show the results of a separate estimation of the model for micro firms, SMEs and large firms. In line with expectations, the results indicate that the cash holdings of SMEs and micro firms are more affected by cash flow and cash flow volatility than those of large firms.[74] The positive relationship between cash holdings and cash flow and cash flow volatility for SMEs indicates that the cost of a cash shortage is higher for firms with better investment opportunities. During the crisis, the link has intensified for smaller firms, while it has remained unchanged for large firms. More specifically, the impact of cash flow volatility on cash holding ratios has increased by 20% for SMEs and by 60% for micro firms. These results suggest that, for large firms, access to external financing has not been significantly affected by the crisis, while concerns over a more restricted access to finance may have been leading smaller firms to accumulate

74 Note that, in the case of large firms, the positive effects of cash flow are more likely to be the result of existing correlation between cash flow and investment opportunities, as a negative relation between sales growth and cash holdings is estimated.

more cash in response to higher cash flow volatility or cash flow levels. The positive link between growth opportunities (proxied by sales growth) and cash holdings has diminished during the crisis, both for SMEs and micro firms.

The results also indicate that higher levels of leverage, brought about by increasing the opportunity cost of holding cash, are negatively related to cash holdings for all firm sizes, the link being stronger in the case of smaller firms. Surprisingly, the estimated coefficient for the spread measuring the opportunity cost of holding cash is negative and significant only in the case of SMEs. The estimated coefficient for the ratio of tangible assets to total assets is larger, in absolute terms, for micro firms and SMEs. This may suggest that smaller firms' access to external financing is more strongly linked to the availability of collateral than that of large firms, in line with the evidence found in Coluzzi, Ferrando and Martínez-Carrascal (2012). According to these results, the link between cash holdings and collateral has strengthened during the crisis period for SMEs and micro firms (it has increased by 7.7% and 4.4% respectively), while it has not changed significantly for large firms. Finally, in line with expectations, firms of all sizes holding a higher level of assets which can be considered as cash substitutes (and, therefore, those with a higher net working capital) hold more cash.

3.4 FIRMS' INVESTMENT DECISIONS[75]

In this section, the focus is on the link between the financial positions of firms, as described in the previous sections, and their investment plans. In particular, the role of indebtedness, the debt servicing burden, cash flow and cash holding in explaining a firm's capital formation is analysed, along with the extent to which this role depends on firm size.

In recent years, a large body of literature has provided evidence that credit market imperfections, such as asymmetric information problems, result in a wedge being created between the cost of funds raised externally (by issuing equity or debt) and funds generated internally (i.e. retained earnings). This wedge (the "external finance premium") depends on the borrower's financial position, meaning that a firm's financial situation is relevant to its investment decisions.[76] In particular, higher debt servicing payments or leverage, or lower cash flow or cash holdings will have a negative impact on a firm's creditworthiness and, everything being equal, will increase the external finance premium and reduce the demand for external financing.

The financial crisis led to an unprecedented drop in aggregate investment in the euro area in 2009; gross fixed capital formation declined by 13% in real terms between 2008 and 2009. A strand of the analysis of the latest financial crisis indicates that supply-driven credit contraction, not linked to decreased borrower creditworthiness, had a real effect on firms, forcing them to reduce investment.[77] However, additional adverse developments in the real economy may have brought about reductions in credit, largely driven by a contraction in demand. A second strand of the analysis focuses more on the detection of the demand shocks that led to the decreased cash flows, loss of investment opportunities and weakened balance sheets.[78]

75 Prepared by Annalisa Ferrando and Carmen Martínez-Carrascal.

76 See Martínez-Carrascal and Ferrando (2008) for a review of the literature.

77 Buca and Vermeulen (2011) find, in particular, that the drop in bank credit has brought about real effects for private euro area firms and has not simply led to a weakening of firms' balance sheets. Gaiotti (2013) then finds that the impact of bank credit availability on a firm's investment is time dependent and most significant in periods of contraction in economic activity, particularly at the beginning of a recession.

78 This is the result of Kahle and Stulz (2011) who argued that demand shocks and increased uncertainty were the major causes of the reduction in investment for public US firms in 2009.

While the issue of whether the collapse of investment in 2009 was caused mostly by cyclical supply or demand factors, or by an abnormal decline in credit supply – unlinked to credit fundamentals – is still open to debate, it is recognised that a firm's financial position affected its real decisions.

In this section, the focus is on four indicators of a firm's financial position: cash flow, cash holdings, leverage and debt servicing payments. Their relationship with investment has been analysed at length, notably in the seminal work of Fazzari et al. (1988) on the cash flow sensitivity of investment as an indicator of financially constrained firms; that of Meyers (1977) on debt overhang models predicting that a debt burden may be so large that a company cannot take on additional debt to finance future projects, even those that are profitable enough to enable the firm to reduce its debt levels over time; and, finally, that of Whited (1992), who found that firms with higher leverage and a higher ratio of interest expenses to cash flow have a higher investment cash flow sensitivity. Finally, as explained in Section 3.3, firms that face financing constraints may decide to increase their financial cushion, or cash holdings, in order to hedge future investment.

The section particularly focuses on differences in the link between the financial position and investment ratio of firms of varying sizes. There are compelling reasons as to why the external finance premium increases as firm size decreases and, hence, as to why financial factors appear to have a large impact on investment decisions – this is mainly due to the specificities of their financing. First, small firms are often believed to be more opaque and to have a higher risk of failure than large firms. Second, small firms are often young and have not had the time to build up a track record and reputation. Small firms more frequently have recourse to banks for their external financing needs, although from the bank's perspective (i.e. on the supply side), the costs involved in assessing and setting appropriate risk premia, and the relatively high costs involved in monitoring risk, may hinder the flow of funds to small firms. This all then suggests that small firms' credit sources tend to dry up more rapidly during economic downturns than those of large firms (Fazzari et al. (1988), Duchin et al. (2010)), thereby more severely hampering small firms' investment.

THE LINK BETWEEN INVESTMENT AND FINANCIAL PRESSURE INDICATORS

The descriptive analysis in this section is based on the same firm-level dataset, derived from the Bureau van Dijk Amadeus database, used previously in the analyses of the determinants of leverage and cash holdings. The final sample used here is relatively small owing to the fact that the investment ratio – defined as the change in tangible fixed assets plus depreciation divided by total assets – is not always available for all the firms in the sample.

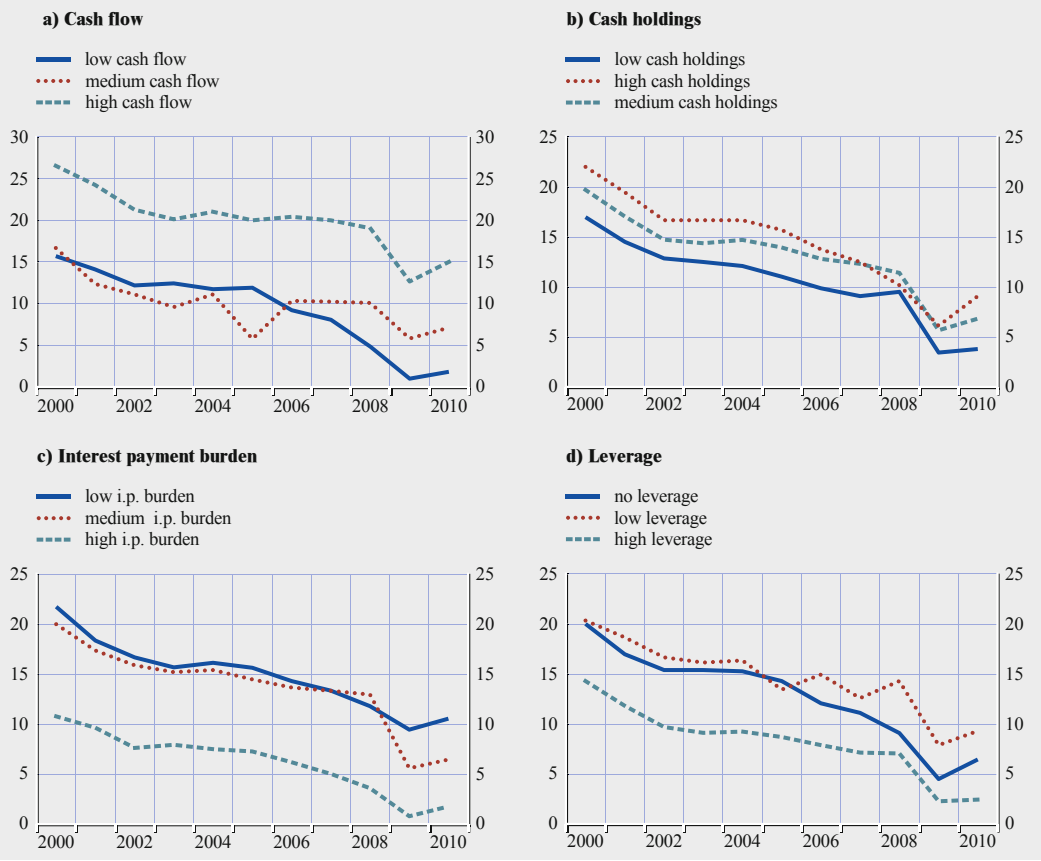
A simple way to obtain evidence of how a firm's financial position affects its investment is to plot how the investment rate varies across firms facing different degrees of financial pressure. For this purpose, Charts 30a-d compare the median level investment ratio for three corporate groupings, which are defined on the basis of firms' financial positions.

Chart 30a shows the development of the median investment rate for firms with high cash flow to asset ratios (above the 90th percentile), medium cash flow (firms for which this ratio stands between the 45th and the 55th percentiles) and low cash flow (lower decile).[79] There is a clear relationship between cash flow and a firm's demand for capital, as firms with a higher level of cash flow with respect to their assets show higher investment rates. Chart 30b shows that firms with higher levels of liquidity on their balance sheets at the start of a given year show higher investment rates in the same year.

79 In order to reduce any possible endogeneity, the comparison is made between investment rates and measures of the indicators lagged one period.

Charts 30 Development of investment ratio and measures of financial position

(median values; percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: In Chart 30c, "i.p." stands for "interest payment". The charts depict the median investment ratio for firms with high cash flow, cash holdings and interest payment burden (above the 90th percentile); medium cash flow, cash holdings and interest payment burden (between the 45th and 55th percentiles); and low cash flow, cash holdings and interest payment burden (lower decile). Given that over 50% of companies show zero leverage, the groupings in Chart 30d are defined as follows: no leverage, low leverage (25% of indebted companies with the lowest leverage) and high leverage (25% of indebted companies with the highest leverage).The investment ratio is defined as the change of tangible fixed assets plus depreciation divided by total assets. Cash flow is the ratio of post-tax profits plus the depreciation of fixed assets to total assets; cash holdings are defined as the ratio of cash and cash equivalents to total assets; the interest payment burden is defined as the ratio of interest payments to earnings before interest, taxes, depreciation and amortisation plus financial revenues to total assets; and leverage is defined as financial leverage divided by total assets.

Although debt may have some desirable properties in that it allows projects to be financed in the absence of internal resources, the repayment commitment may have an overall negative influence on firms' spending decisions and their ability to raise new funds. The descriptive evidence shown in Charts 30c and 30d seems to point in this direction: firms that have high levels of debt or high interest payment ratios have the lowest investment rates. In addition, there is a non-linear relationship between financial pressure and fixed capital formation; firms with low leverage or interest payment burdens have similar investment ratios, while highly leveraged firms or those that bear a high interest payment burden have much lower investment ratios. This may suggest that there is a threshold above which financial pressure becomes more relevant in that it conditions firms' investment decisions in a more significant manner, and below which financial pressure is less relevant as a determinant of fixed capital formation decisions. Interestingly, this non-monotonic relationship between investment and the ratio of interest payments to earnings may be weakening

during the crisis as, from 2009 onwards, the investment rates of firms with a low and medium interest payment burden also differ.

In Annex 5, the differences in the investment rates of firms facing different degrees of financial pressure in the major euro area countries (Charts A13-A17) and across firm size (Charts A18-A22) are reported.

THE IMPACT OF THE CRISIS ON INVESTMENT RATES AND FIRMS' FINANCIAL SOUNDNESS

In the recent context of higher risk aversion and greater difficulties for credit institutions in raising funds, a firm's financial position is likely to have played a more relevant role in determining its access to external financing and in explaining both the recent decline in investment rates and the historic magnitude of the collapse in investment in 2009.

In an effort to explore the role played by a firm's financial position, Charts A23-A26 in Annex 5 compare the development of investment rates of firms that showed a high degree of financial pressure in 2008, i.e. just before the strong decline in investment. Chart A23 shows the investment rates for the micro, small, medium and large firms that, in 2008, had a high, medium or low cash flow. For all firm sizes, the percentage decline in investment rates in 2009 was the highest for firms facing higher financial pressures, although it was more marked for smaller firms. Moreover, the investment rate of micro companies in the highest decile of the ratio of interest payment to earnings distribution showed an 88% (2.4 percentage points) decline in 2009 while, for those in the lowest decile, the decline was more moderate (33% or 2.8 percentage points). For large firms, the reduction was more evenly distributed, although the decline was sharper for those bearing a higher interest payment burden (i.e. 45% as opposed to 31%, where the decline was of 10 percentage points as opposed to 9.3 percentage points respectively). The decline in investment rates was larger for the micro and small companies that showed lower shares of trade credit on their balance sheets before the collapse (i.e. 85% and 71%, showing a decline of 2.6 percentage points and 11.8 percentage points respectively). This was not the case for medium and large firms, and therefore suggests that smaller firms may have used trade credit as a substitute for bank lending during the crisis, in order to avoid more substantial declines in their investment rates at a time when access to bank loan financing was more difficult (see Chart A27 in Annex 5[80]).

Interestingly, the evidence in the charts also indicates that the thresholds above which firms' financial positions become relevant determinants of their investment rates could have changed during the crisis. This increases their relevance as a factor conditioning fixed capital formation in the case of smaller firms. While small firms with low and medium debt levels and interest payment ratios had similar investment ratios in the years prior to the crisis, the decline in investment rates has been more acute for firms under an intermediate level of financial pressure. Hence, financial pressures seem to have become a more discriminatory factor with regard to investment for smaller firms during the crisis, as their relationship now seems more monotonic.

Table 6 presents non-parametric results for the relationship between investment and financial pressure in 2008. In line with the descriptive exercise above, firms are grouped into three subsets, depending on whether they show a low, intermediate or high level of financial pressure, according to a given indicator, before the investment collapse in 2009. For each of these corporate groupings, a cross-sectional average of the investment rate in the period 2007-08 is computed and subtracted from the investment rate in 2009. A test is then performed to check whether there are differences in

80 Chart A28 in Annex 5 shows the impact of the crisis on the link between investment and a firm's financial position across countries.

the decline of investment rates across firms with different financial positions before the investment collapse. The results in Table 6 indicate that, for micro firms and small firms, the decline was more significant for those with lower cash holdings, lower cash flow and a higher interest payment burden. The results were similar for medium firms, except in the case of interest payment burdens, where the decline was less significant for firms with a high interest payment burden. The decline in investment rates for large companies was not statistically different for firms facing different degrees of financial pressure, according to these indicators. For all corporate groupings, more indebted companies have adjusted their investment rates to a greater extent. Similarly, in the case of micro firms and small firms, the decline in investment rates was greater for firms with lower shares of trade credit on their balance sheets; this was not the case for medium and large firms. This may well signal that, in a context of increasingly difficult access to external financing, smaller firms relied on trade credit to a greater extent in order to avoid sudden adjustments in their spending levels.

3.5 ANALYSIS OF FIRMS' FINANCING DECISIONS USING SURVEY DATA[81]

Two main approaches to identifying financially constrained firms can be found in the literature. As in Fazzari et al. (1988), many papers use data from balance sheets and financial statements, together with a priori assumptions to distinguish financially constrained and unconstrained firms. These assumptions typically rely on arguments related to information asymmetries and information costs, implying that smaller and younger firms are more likely to be financially constrained. Such a classification, however, is rough and imperfect (Beck et al. (2006)). A second strand of the literature uses firms' answers to specialised surveys in which firms directly report their perception of financing constraints and/or the outcome of their application for external financing. In particular,

Table 6 Test on the mean decline in investment rates for different corporate groupings, broken down by size

	Firms with low cash holding in 2008	Firms with high cash holding in 2008	Probability that both means are equal	Firms with low cash flow in 2008	Firms with high cash flow in 2008	Probability that both means are equal
micro	-0.08	-0.04	0.00	-0.10	-0.09	0.02
small	-0.14	-0.06	0.00	-0.15	-0.12	0.00
medium	-0.17	-0.09	0.00	-0.18	-0.14	0.00
large	-0.11	-0.09	0.24	-0.12	-0.14	0.26
	Firms with zero leverage in 2008	**Firms with high leverage in 2008**	**Probability that both means are equal**	**Firms with low interest payment burden in 2008**	**Firms with high interest payment burden in 2008**	**Probability that both means are equal**
micro	-0.06	-0.09	0.00	-0.06	-0.08	0.00
small	-0.08	-0.15	0.00	-0.07	-0.13	0.00
medium	-0.12	-0.16	0.00	-0.11	-0.15	0.97
large	-0.11	-0.14	0.00	-0.11	-0.13	0.77
	Firms with low trade credit in 2008	**Firms with high trade credit in 2008**	**Probability that both means are equal**			
micro	-0.09	-0.07	0.00			
small	-0.17	-0.09	0.00			
medium	-0.14	-0.13	0.20			
large	-0.09	-0.08	0.23			

81 Prepared by Ladislav Wintr, Annalisa Ferrando and Fergal McCann.

data on credit applications allow credit demand to be disentangled from supply-side considerations. Moreover, when cross-country survey data are available, their use can greatly improve the identification of credit supply restrictions in one particular country, by using neighbouring countries as benchmark cases. Beck et al. (2006, 2008) show that age, size and ownership structure are indeed important predictors of a firm's financing obstacles. Moreover, financial, economic and institutional developments seem to alleviate financing constraints. Coluzzi et al. (2012) find significant sectoral differences, with firms in the manufacturing and construction sectors being the most constrained. However, the importance of the economic sector and firm size varies substantially across studies and countries.[82]

In this section, the information derived from the survey on the access to finance of SMEs in the euro area (SAFE) is considered. The survey has been conducted every six months since 2009, covering a sample of more than 7,000 firms in the euro area.[83] First, the cross-country differences in external financing needs and availability in the euro area are assessed. Second, following Ferrando et al. (2013), firms' responses to the change in financing needs and availability are combined in order to construct an indicator of the financing gap.[84] Third, focusing more on the influence of credit supply on the availability of external financing for SMEs, the issue of whether changes in lending policies during the latest financial crisis were justified by a worsening of demand factors is investigated more extensively.

FINANCING NEEDS AND AVAILABILITY

To assess changes in financing needs and availability, questions 5 and 9 of the SAFE survey respectively are used. These questions ask firms to assess whether their financing needs for various financing instruments and the availability of the respective instruments have increased, remained unchanged or decreased during the previous six months. Since the third wave, which covered the period from March 2010 to September 2010, six financing instruments have been considered, among which the three most popular (bank loans, bank overdrafts and trade credit) have been chosen.[85]

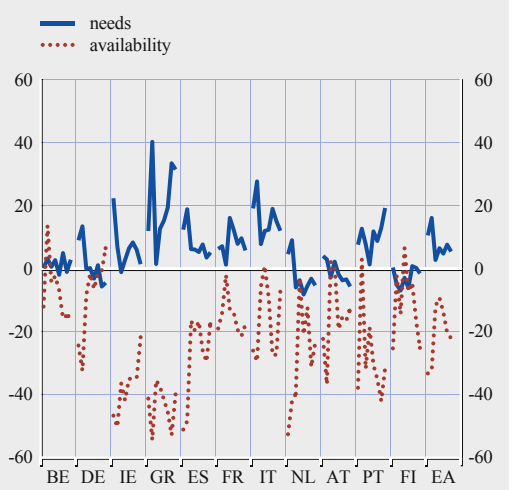
Charts 31-33 show the net percentages[86] of changes in financing needs and availability in terms of bank loans (see Chart 31), bank overdrafts, credit lines and credit card overdrafts (see Chart 32), and trade credit (see Chart 33). As regards bank loans, Chart 31 shows a declining trend in the net percentage of firms reporting an increase in financing needs over the previous six months, for the euro area as a whole, since 2010. In some countries, however, needs remained high (as in Greece and Italy) or were rising (as in Portugal). As for bank overdrafts (see Chart 32), firm needs slightly increased over the survey period at the euro area level, masking higher needs in Italy, Greece and France. In the case of trade credit (see Chart 33), the net percentage of firms reporting an increase in their needs remained broadly unchanged in the sample period.

Charts 31-33 also show whether the increasing financing needs coincide with an improved supply of external finance. It appears that, while the external financing needs have followed an upward trend at the euro area level since 2010, the availability of all three types of external financing has

82 See Ferrando and Griesshaber (2011), and Ferrando and Mulier (2013).
83 Although the survey was only started in 2009, it conveys useful information about the impact of the financial and economic crisis on the access to finance, as seen by SMEs. For further details see: http://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html
84 The financing gap indicator based on the SAFE survey differs from the financing gap indicator based on the euro area accounts, as presented in Section 1.2.
85 The remaining financing instruments, i.e. equity and debt securities, among others, are considered as inapplicable by a large number of firms.
86 Net percentages are defined as the difference between the percentage of firms reporting an increase and those reporting a decrease in a specific instrument over the six months preceding the moment in which the survey was carried out.

Chart 31 Need for and availability

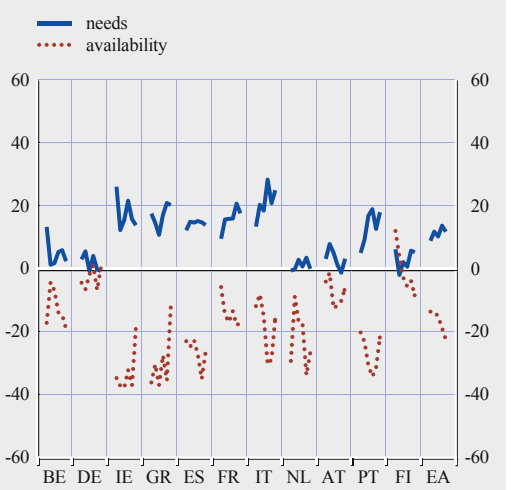
(net percentages)



Sources: SAFE survey and ECB.
Notes: Data refer to SMEs only. Net percentages are defined as the difference between the percentage of firms reporting an increase for a given instrument and those reporting a decrease. The period represented is 2010-12 and all data refer to the six months preceding the moment in which the survey was carried out. Data for bank overdrafts are available from 2010. EA denotes euro area.

Chart 32 Need for and availability of bank

(net percentages)



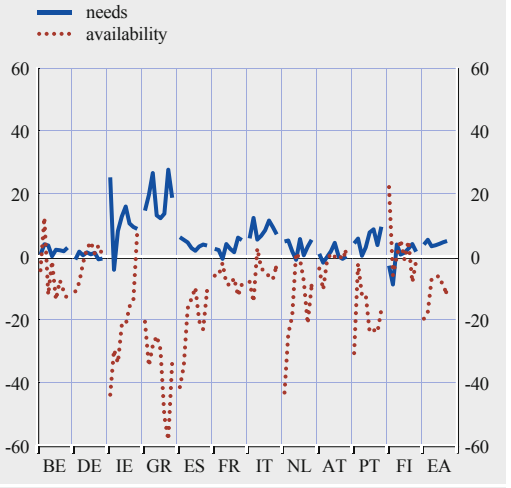
Sources: SAFE survey and ECB.
Notes: Data refer to SMEs only. Net percentages are defined as the difference between the percentage of firms reporting an increase for a given instrument and those reporting a decrease. The period represented is 2010-12 and all data refer to the six months preceding the moment in which the survey was carried out. Data for bank overdrafts are available from 2010. EA denotes euro area.

been decreasing. Greece, Portugal and Ireland stand out as the countries showing the largest decline in the availability of external financing in the last survey wave between October 2012 and March 2013. The availability of external financing has also been worsening significantly in Italy and the Netherlands since 2011; although, a slight recovery can be seen in the period since the last quarter of 2012.

The evidence presented so far suggests potentially large financing mismatches, although it is not clear whether firms reporting increasing financing needs considered the availability of external finance to be increasing or decreasing. To avoid any potentially biased conclusions, the indicators of both financing need and availability at the firm level have been combined and an indicator of financing gap changes, in line with Ferrando et al. (2013), has been constructed. For each of the three financing instruments considered, the indicator of a perceived financing gap change takes the value of 1 (-1) if the need increases (decreases) and availability

Chart 33 Need for and availability of trade credit

(net percentages)



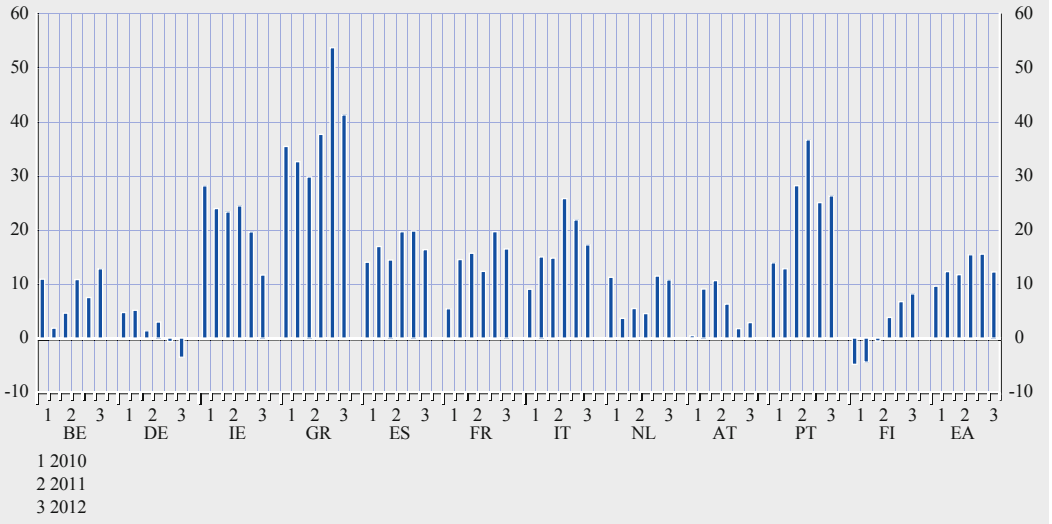
Sources: SAFE survey and ECB.
Notes: Data refer to SMEs only. Net percentages are defined as the difference between the percentage of firms reporting an increase for a given instrument and those reporting a decrease. The period represented is 2010-12 and all data refer to the six months preceding the moment in which the survey was carried out. Data for bank overdrafts are available from 2010. EA denotes euro area.

decreases (increases). If firms perceive only a one-sided increase (decrease) in the financing gap, the variable is assigned a value of 0.5 (-0.5).[87] A positive value suggests an increasing financing gap.

Chart 34 depicts changes in the composite financing gap indicator, which is the average change in the financing gap for the instruments relevant to each firm.[88] It shows that the financing gap for the euro area generally increased throughout the sample period. However, it increased by a smaller amount in the last quarter of 2012.[89] After the third quarter of 2010, there was an increasing mismatch between financing needs and availability in most countries, except in Germany, Austria and Ireland.[90] However, the results have to be interpreted with caution as, first, they reflect firms' perceptions and, second, countries with the largest financing gap were among those showing the fastest growth in credit given to NFCs before the crisis. While the perceived financing gap in these countries may reflect a healthy adjustment process and a move towards sustainable credit growth rates, the survey shows a deterioration of banks' willingness to supply loans to SMEs. The results support the view that small corporations have found access to bank credit more difficult, especially in Greece, Portugal and Italy throughout the crisis.

Chart 34 Changes in the composite financing gap indicator

(weighted average; percentages)



Sources: SAFE survey and ECB.
Notes: Data refer to SMEs only and exclude firms for which the respective instrument is not applicable. Data for bank overdrafts are available from 2010; hence, the values of the composite indicator start in 2010. EA denotes euro area.

87 For more details on the construction of the financing gap indicator, see Ferrando et al. (2013).

88 The composite measure $FinGap_i$ of the perceived change in the overall gap in the external financing of an individual firm i is the average of the financing gap indicators taken across instruments relevant to the respective firms (i.e. those with previous experience with the specific financing instrument):

$$FinGap_i = \frac{1}{k}\sum_{j=BL}^{OvD} InstrGap_{j,i}$$

where k equals the number of relevant external financing instruments and j includes bank loans, trade credit, equity, debt securities and bank overdrafts, where relevant.

89 Changes in the financing gap indicator cannot be readily cumulated because the SAFE survey does not have a panel structure and the possible answers to the questions are fixed (increase/decrease/no change).

90 Ireland still records relatively large increases in the financing gap change indicator. Results for small countries should be interpreted with caution owing to the small number of firms in the survey sample.

As the SAFE survey does not provide information about the quality of potential borrowers, the issue of whether these banking practices went beyond justified credit risk considerations cannot be assessed. In the box below, the issue of whether the recent lending policies across euro area countries were justified by the deterioration in firms' financial situations and, hence, in demand is examined.

Box 4

IDENTIFYING RESTRICTIVE LENDING PRACTICES IN THE EURO AREA USING DATA FROM THE SAFE SURVEY

Survey data has enjoyed a prominent role in the literature on financial constraints as it provides direct information on the credit constraints faced by firms. In particular, data on credit applications allows credit demand to be disentangled from supply-side considerations in that if, when controlling for a set of borrower-side explanatory factors, the likelihood of credit restrictions in one country remains positive and significant, it is said that there is evidence of supply-side credit tightening. In this box, the biannual SAFE data for four waves of the survey, covering the period between September 2010 and September 2012, are used to identify credit supply restrictions across eleven euro area countries.[1] The dependent variable (*bank rejection*) in the analysis is a dummy which takes the value 0 when a firm has successfully applied for a bank loan or an overdraft, or has received more than 75% of the desired amount, and the value of 1 when a firm has applied for a bank loan but its application has been rejected. Rejected firms include those rejected outright, those offered less than 75% of the desired amount, and those which refuse the loan offer owing to unfavourable attached conditions.

There are then two stages to the methodology.[2] In stage one, the dependent variable (*bank rejection)* is used in a probit regression of the form:

Pr(*bank rejection* ijkt) = fn(firm size, turnover, subsidiary dummy, age dummy, change in internal funds, change in capital position, change in credit history, sector dummies, Φ_jt) (1)

Where *bank rejection ijkt* is the credit condition response of firm *i* in country *j* in sector *k* at time *t*.

The explanatory variables are categorical and found in the SAFE survey data. The sector dummies are: mining, construction, industry, wholesale and retail, transport, real estate and services. *Φ_jt*, the key variable in the equation, is a vector of the country-time specific dummies. The probit model in (1) is estimated with standard errors clustered within each country-time period, and the coefficients of each of the *Φ_jt* variables relative to Germany, from March 2010 to September 2010, are retrieved. These can be thought of as the probability of a firm's request for credit being rejected in a given country-time period, when controlling for a set of proxies for firm performance and riskiness. Table A reports the estimated results from stage one. Firms with fewer employees have a higher probability of having their application for a bank loan rejected in the period under consideration. At the same time, the availability of capital, and improvements

1 The 11 euro area countries are: Belgium, Greece, Germany, Ireland, Spain, France, Italy, the Netherlands, Austria, Portugal and Finland. The first three waves of the survey (from 2009 to mid-2010) are not used, owing to a large increase in the sample size in the smaller countries from the fourth wave onwards.
2 See Holton et al. (2012).

Table A Marginal effects from the firm-level stage one probit regression. Dependent variable: bank rejection dummy

Ln(Employment)	-0.012**	Unchanged internal funds	-0.043***
	(0.005)		(0.011)
Turnover under 2m	-0.030*	Improved credit history	-0.129***
	(0.017)		(0.012)
Turnover 2-10m	-0.055***	Unchanged credit history	-0.128***
	(0.021)		(0.012)
Turnover 10-50m	-0.068**	Improved capital position	-0.059***
	(0.033)		(0.015)
Subsidiary dummy	0.014	Unchanged capital position	-0.060***
	(0.025)		(0.013)
Age > 10 years	-0.001*		
	(0.000)		
N	*6,565*	Pseudo R^2	*0.1233*

The vector of 44 country-wave fixed effects and seven sector fixed effects are included in the specification.
Notes: *t* statistics are given in parentheses; * p<0.05, ** p<0.01, *** p<0.001. "m" stands for million. The dependent variable is the bank rejection dummy.

in a firm's credit history, reduce the likelihood of a rejection. The country-wave fixed effects are highly statistically significant in all but two cases.

It is plausible that borrower characteristics are not representative of the full information set held by a bank making a lending decision. The broader economic prospects are also likely to impact on bank lending, above and beyond the SME characteristics identified in (1). Stage two of the procedure takes the coefficients for each Φ_jt variable and relates them to the following set of macro-factors:

Φ_jt = Domestic demand, the ratio of private debt to GDP, ten-year government bond yields, expected default frequency, credit standards, credit standards reasons.[3] (2)

These variables should depict the macroeconomic environment faced by SMEs in each country between 2010 and 2012. They should control for economic factors ("domestic demand") and the impact of leveraged individuals and firms on the overall willingness of banks to lend ("the ratio of private debt to GDP"), as well as banks' funding costs (related to sovereign costs, ten-year government bond yields,). "Expected default frequency" (EDF) is a measure of the forward-looking probability of default of large companies in each country, which translates into an implied risk of default. "Credit standards" is a measure of the increasingly tightened credit standards taken from the bank lending survey, while banks' responses to the impact of the "risk on collateral demanded" and the "industry-specific outlook", also taken from the bank lending survey, are used as proxies for macroeconomic prospects.

Table B shows the results of the ordinary least squares (OLS) estimation. Countries with domestic economies that are performing better are associated with lower probabilities of rejection, while

3 "Domestic demand" is equal to the sum of consumption, government expenditure on goods and services, and gross domestic fixed capital formation. "Private debt" is the total indebtness of the private sector and comprises loans and debt securities. Data on "ten-year government bonds" are taken from Thomson Reuters, while the "expected default frequency" (EDF) is the median value of the distribution provided by Moody's KMV. "Credit standards" is a variable derived from the ECB's bank lending survey; when this variable is increasing, it shows that banks are reporting an increased tightening of credit standards. Banks also reported, again in the bank lending survey, that both "risk on collateral demanded" and the "industry-specific outlook" have an impact on credit tightening; when these two variables are increasing, the impact is greater. All figures are taken from the end of the six-month period.

Table B Impact of macro variables on the probability of bank rejection, Φ_{jt}

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Domestic demand change	-0.146***							-0.0971**
	(-5.30)							(-2.49)
Ratio of private debt to GDP		0.522***						0.407***
		(6.64)						(3.74)
Ten-year government bond			0.0475***					-0.0289
			(4.39)					(-0.83)
Expected default frequency				0.0795***				0.0395
				(3.65)				(0.66)
Credit standards					0.00262			-0.000005
					(0.96)			(-0.00)
Risk on collateral demanded						0.0113***		0.00345
						(3.68)		(0.76)
Industry-specific outlook							0.00491*	-0.00345
							(1.84)	(-0.77)
Constant	0.189***	-0.856***	-0.0571	0.0928	0.181*	0.0259	0.0904	-0.483**
	(3.23)	(-5.21)	(-0.62)	(1.18)	(1.91)	(0.29)	(0.83)	(-2.11)
N	40	40	43	43	43	43	43	40
R^2	0.4254	0.5371	0.3197	0.2450	0.0222	0.2485	0.0762	0.6682

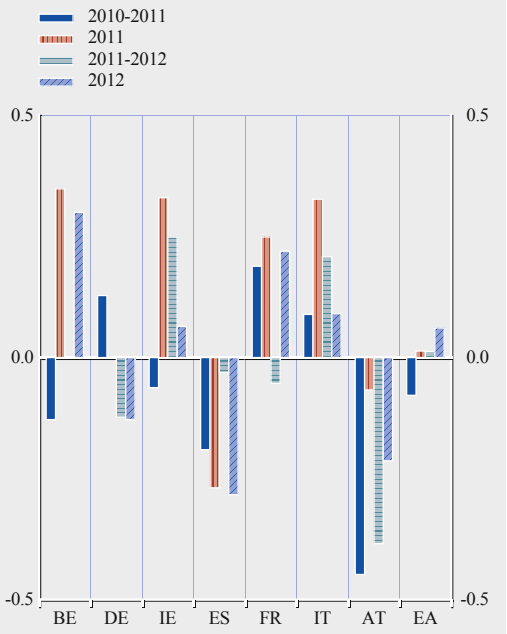
Notes: *t* statistics are given in parentheses; * p<0.05, ** p<0.01, *** p<0.001. The sample size is smaller in columns (1), (2) and (8) owing to missing information for Greece.

countries with a more leveraged private sector are associated with higher probabilities of rejection. In the univariate estimation, government bond yields, EDF, the "risk on collateral demanded" and tightening owing to the "industry-specific outlook" also increase the probability of bank rejection, as predicted. When all factors are included in a single model (see column (8) in Table B), the only macro variables with a significant expected coefficient are domestic demand and the ratio of private debt to GDP.

The residuals from the OLS estimation are plotted in order to show that a tightening of bank lending policies can be inferred from the survey data. These residuals represent bank rejection unexplained by relevant macroeconomic factors, once borrower characteristics have been taken into account, and are plotted in Chart A. The country waves with a positive residual are the markets in which rejection remains higher than predicted by the model.

Chart A Bank rejections at the country level unexplained by borrower and macroeconomic factors

(residuals from OLS estimation)



Sources: SAFE survey and ECB calculations.

4 FIRMS' FINANCING CONDITIONS, INDEBTEDNESS AND THE MACROECONOMIC ENVIRONMENT[91]

How did financing conditions and debt patterns for the corporate sector interact with the macroeconomic environment, prior to and during the financial crisis? To what extent did this interaction add to instability? Has the corporate sector's behavioural response to various shocks been a mitigating factor or a fiscal drag for the euro area economy during the financial crisis?

In attempting to shed light on these issues, the assessment in this chapter is centred on two distinct, yet interrelated, parts. In Section 3.1, the relevance of the intermediation process in the banking system in determining the terms and conditions for corporate sector financing is acknowledged. The emphasis is on economic activity in the broad sense and the fact that the latest financial crisis serves as a stark reminder of the importance of financing and credit frictions for investment decisions. Banks' balance sheet and capital positions, and borrower credit risk are considered to be relevant supply-side factors in the provision of bank credit during the crisis. In particular, credit supply factors are found to account for almost one-third of the contraction in real GDP at the peak of the crisis. At the same time, in such periods of tightening bank lending conditions, the substitutability of bank credit with alternative sources of financing (see Chapter 1) appears to have prevented an even more pronounced contraction in investment and, hence, in economic activity. More importantly, the ECB's monetary policy has proved to be effective in containing any disorderly deleveraging of banks and thus in avoiding an even more abrupt credit crunch.

In Section 3.2, the focus is primarily on the corporate sector's debt cycle from a medium-term perspective. The latest euro area crisis is first contextualised with regard to broader international and historical crisis episodes. The result shows that the key aspect to understanding the severity of the crisis and future economic patterns is the particularly intense accumulation of debt in some euro area economies. A number of economic factors played a role in the formation of such a debt overhang. Subdued uncertainty, widespread under-pricing of risk and loose financing conditions in some countries appear to have created a self-reinforcing feedback loop in which macroeconomic imbalances (in the form of excessive borrowing in the corporate sector and over-investment in selected euro area economies) built up. As predicted by theoretical insights and empirical evidence, the excessive rise in leverage sowed the seed for the financial crisis and conditioned the severity of the downturn; investment (and output) losses were generally commensurate with the intensity of corporate debt accumulation prior to the crisis. Indebtedness ratios began to decline only later on in the recession, and the decline has been sharper in those euro area countries which had experienced intense debt accumulation in the run-up to the crisis. Nonetheless, there is significant heterogeneity across countries in terms of the level of indebtedness and also in the pace of deleveraging during the crisis. Further deleveraging of NFCs is expected in the future in the euro area, specifically in selected countries, as firms attempt to repair their balance sheet vulnerabilities. The extent to which the corrective adjustments represent a drag on the economy in the transition towards more sustainable debt levels depends primarily on the macroeconomic channels through which the adjustment process may occur. Reduction of indebtedness brought about by bank constraints on the provision of new credit or corporate decisions to scale back investments could prove to be very costly for the economy at large.

91 Coordinated by Giacomo Carboni.

4.1 FINANCING CONDITIONS AND THE MACROECONOMIC ENVIRONMENT

In this section, the focus is on the role of the banking system as an intermediary and its importance in determining the terms and conditions for corporate sector financing. This is particularly the case for the euro area, where bank-based financing is the predominant source of external debt financing. The recent banking crisis has led to tight credit supply restrictions which, in turn, have weighed heavily on economic activity. At a time of tight bank credit conditions, a firm's ability to shift from bank credit to other financing instruments has helped to mitigate disruptions to corporate investment patterns, and economic activity more broadly.

BANK INTERMEDIATION AND THE GREAT RECESSION[92]

When characterising bank intermediation and lending activity, the latest financial crisis is of particular relevance, given the importance of financing and credit frictions for investment decisions and economic activity more broadly. Financial frictions, in their multifaceted forms, make credit market conditions key drivers of the business cycle, not merely a reflection of changing economic dynamics, as implied by the standard Modigliani-Miller paradigm (1958). In the literature on credit market frictions, two distinct and yet complementary perspectives are typically identified: the bank lending channel and the balance sheet channel.[93] This distinction is based on the premise that financial frictions are situated primarily on the side of financial institutions or borrowers (i.e. firms or households), with both affecting credit supply decisions. This theoretical distinction is used here in organising selected empirical evidence on the euro area. The investigation focuses on the extent to which credit supply factors, determined by the balance sheets of lenders or borrowers, affect the provision of bank credit and, hence, economic activity.

THE BANK LENDING CHANNEL

When examining credit market frictions through the bank lending channel, it holds that banks' balance sheet conditions have a substantial influence on the volumes, price and non-price conditions for bank credit. A standard formalisation of the bank lending channel focuses on the perceived creditworthiness of financial institutions in relation to their capital base. Intuitively, more capitalised banks are perceived to have stronger incentives to carefully monitor loans and, hence, face a lower cost for non-deposit funding and a smaller external finance premium. As banks are highly leveraged institutions, adverse shocks to funding and capital positions are magnified on the asset side of their balance sheets, which may lead to a sharp contraction in credit, which subsequently has an adverse impact on economic activity. The central role played by banks' capital with regard to lending behaviour is reflected in the regulatory requirements that stipulate that banks must operate with a minimum amount of capital (and liquid assets). Moreover, changing risk perceptions and the increasing tolerance towards bearing borrower risk may amplify these credit supply shifts. The relevance of these types of transmission channel has emerged as a result of the latest financial crisis, in which liquidity has dried up, the interbank market collapsed and losses mounted, significantly impairing the intermediation process. Market measures of default probabilities of euro area and international banks increased substantially immediately after Lehman Brothers went bankrupt in autumn 2008, as did stock market volatility; financial stock market indices plummeted. In the case of euro area banks, the EDF then climbed in the second half of 2011, as the European sovereign debt crisis escalated in the large euro area economies. This (perceived) increase in risk has brought about increasingly adverse financing conditions for euro area banks. On the price side, the cost of

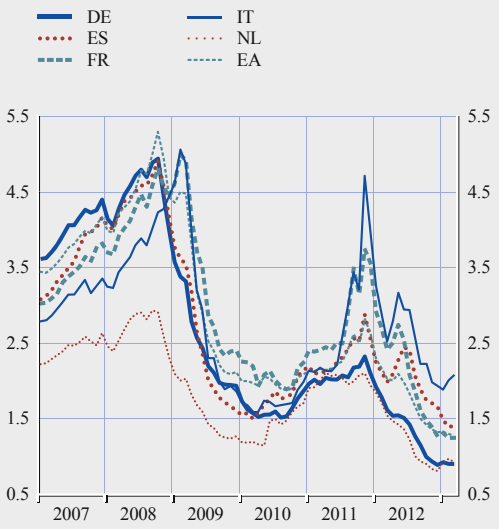
92 Prepared by Giacomo Carboni, Elaine Caruana and Demetris Kapatais.
93 See, for instance, the seminal work by Bernanke and Gertler (1995) on the bank lending and balance sheet channels.

private financing for euro area banks reached a record high in the post-Lehman period, receding again until the beginning of 2010, only to then mirror the fluctuations in the European sovereign debt crisis (see Chart 35).[94] Crucially, the rise in risk aversion and the decline in confidence in bank assets have, at times, impaired the transmission of monetary policy rate impulses to the funding costs of banks. It is precisely to ensure the effectiveness of the monetary transmission mechanism, by alleviating liquidity and funding tensions for banks, that, during the crisis period, the ECB has complemented its existing interest rate instrument with a wide range of non-standard measures, as analysed at the end of this section.

The financial crisis has led to significant changes in banks' funding patterns (see Chart 36): interbank liabilities, as a proportion of a bank's total assets, have fallen substantially since the third quarter of 2008, as has the issuance of debt securities. By contrast, the recourse to central bank funding has increased considerably with respect to the pre-crisis period. Overall the introduction of non-standard Eurosystem refinancing measures largely compensated for severe constraints in access to wholesale market funding.

Chart 35 Composite cost of deposit Funding and non-secured market debt Funding for banks

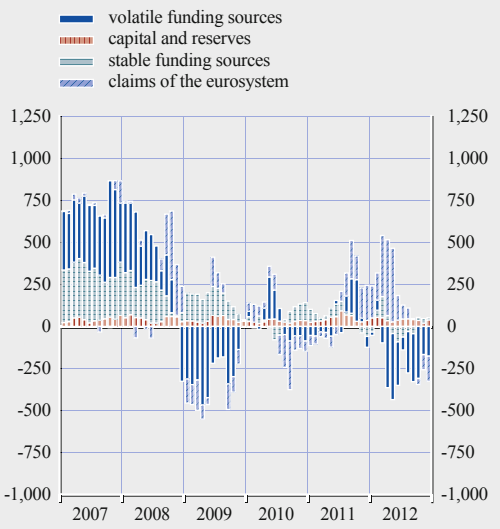
(percentages per annum; monthly data)



Sources: Merrill Lynch Global Index and ECB calculations.
Notes: The data comprise the weighted average of deposit rates on new business and the cost of market debt funding. The outlier (2008-09) has been smoothed out. The most recent data are taken from November 2012. EA denotes euro area.

Chart 36 Main liabilities of euro area credit institutions

(three-month flows in EUR billions; adjusted for seasonal and calendar effects)



Sources: Balance Sheet Items statistics and ECB calculations.
Notes: The reporting sector comprises MFIs, excluding the Eurosystem. Stable funding sources include deposits from the nonfinancial sector, excluding central government; longer-term deposits from non-monetary financial intermediaries; non-resident non-bank deposits; and MFI debt securities with a maturity of more than one year. Volatile funding sources include MFI deposits excluding the Eurosystem; short-term deposits of non-monetary financial intermediaries; central government deposits; non-resident bank deposits; and MFI debt securities with a maturity of up to one year. The most recent data are taken from November 2012.

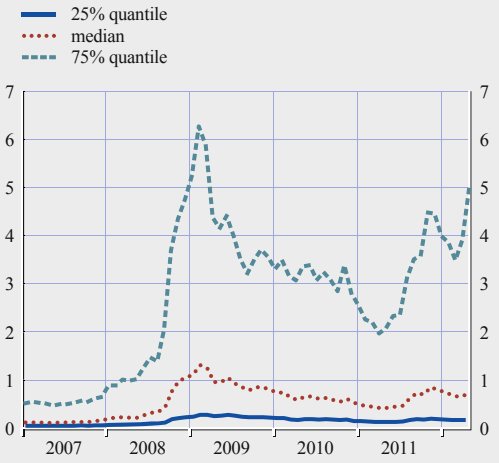
94 The cost of private financing for banks includes financing via both deposits and the issuance of debt securities, but excludes Eurosystem financing, which is not shown in the chart. Given that banks pay a lower interest rate for credit provided by the Eurosystem, the increasing recourse to Eurosystem financing has partly compensated for the increase in the cost of private financing.

THE BORROWER BALANCE SHEET CHANNEL

The borrower balance sheet channel is based on a situation in which lenders are not able to assess borrowers' creditworthiness, properly monitor their investments and/or fully enforce their debt repayments. In such an environment, sounder borrower balance sheet conditions, in the form of greater net worth, may mitigate credit market frictions by enhancing borrowers' creditworthiness, bringing more "skin in the game", more valuable pledgeable collateral and, hence, lowering the external finance premium. An amplification mechanism is set in motion, whereby initial adverse shocks to borrowers' balance sheets, via their effects on the cost of external financing, constrain investment (and consumption) and thus, in a self-reinforcing loop, cause the next-period value of collateral to deteriorate. This amplification mechanism is commonly referred to as the "financial accelerator".[95]

Chart 37 Expected default frequency of listed euro area non-financial corporations

(percentages)



Sources: Moody's KMV and ECB calculations.
Notes: The chart shows the probability of default within the next twelve months. The data are based on a sample of listed euro area non-financial firms. The latest observation is for December 2012.

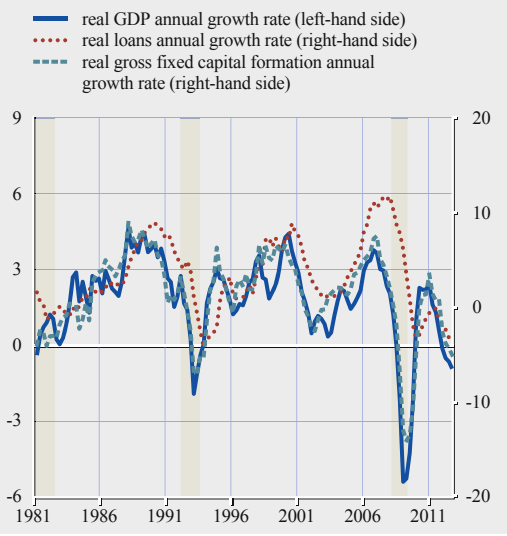
Amplification mechanisms that build on real financial interactions have been operating during the latest financial crisis, triggered by borrowers' soaring credit risk. Since the onset of the crisis, the median probability of default for euro area NFCs has increased significantly, and the high quantile has been trending upwards very strongly (see Chart 37). In particular, peaks in the probability of corporate sector default were recorded during the post-Lehman period, and in concomitance with the intensification of sovereign debt tensions, particularly from the second half of 2011. Overall, developments in the default probability have been mirrored by a marked deterioration in the net worth and profitability of euro area NFCs. As documented in Chapter 1, euro area NFCs' debt-to-equity ratio increased substantially during the crisis as a result of significant equity valuation losses; this was most pronounced in Greece, Spain and Ireland.

BANK-BASED FINANCING AND THE IMPACT OF SUPPLY-SIDE AND DEMAND-SIDE FACTORS

As outlined above, banks' balance sheet and capital positions, and borrowers' credit risk affect banks' decisions regarding credit provision. Nonetheless, making a conceptual distinction between supply-side and demand-side factors in credit markets is often difficult; for instance, banks' perception of the risks associated with potential borrowers can lead to credit rationing. At the same time, borrower-specific situations, also associated with creditworthiness, can influence the demand for loans, as borrowers may address their balance sheet problems by reorganising and/or scaling down their operations in a way that reduces their need for external financing. In addition to borrower-specific situations (such as their balance sheets and income), the general macroeconomic conditions and availability (i.e. access to and price of) of alternative financing sources, such as market debt and internal financing, are crucial factors affecting the demand for loans.

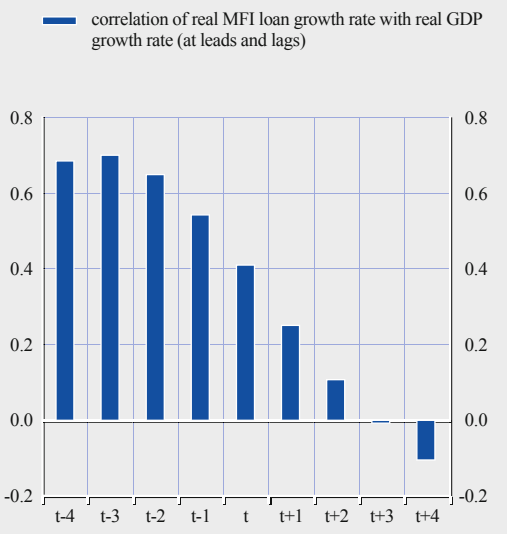
95 See Bernanke and Gertler (1989), and Bernanke, Gertler and Gilchrist (1999). Note that the financial sector as such is not central to the balance sheet channel, nor is monetary policy, despite the fact that the balance sheet channel is often explained on the premise that a monetary policy shock hits the economy. In fact, any disturbance affecting borrowers' net worth can give rise to such a propagation mechanism.

Chart 38 Bank credit given to the corporate sector, and economic activity



Sources: ECB and ECB calculations.

Chart 39 Correlation between the growth rate of real MFI loans and of real GDP at different lead/lag shifts



Sources: ECB and ECB calculations.
Note: Period "*t*" represents the contemporaneous correlation.

The empirical distinction between supply-side and demand-side factors in credit markets is even more challenging to define; nevertheless, it is crucial. Indeed, economic policy implications tend to differ depending on whether loan developments remain subdued because of impairments on the side of banks, or because of weak demand owing to limited spending and investment opportunities.

The stylised facts, or historical regularities, of the business cycle provide a useful reference point for the assessment of loan developments. Between 1980 and 2012, loans to the corporate sector tended to be closely aligned with GDP and real gross capital formation (see Chart 38). In the sample under consideration, real bank credit growth is positively correlated with real GDP growth, with the strongest correlation (70%) emerging when the loan growth rate lags the economic cycle by, on average, three quarters (see Chart 39).[96] This lag suggests the relevance of aggregate demand in determining loan developments across regular business cycles. More specifically, the lagging pattern of loans around the troughs in economic activity may reflect a situation in which firms first turn to internal funds during the recovery phase, and only subsequently become more reliant on external financing.

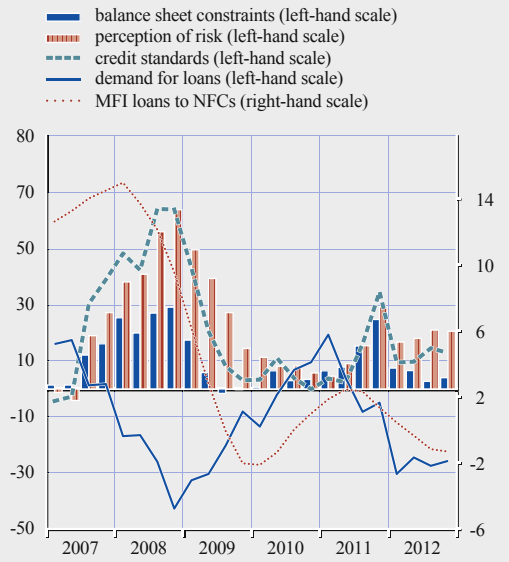
However, the relevance of supply-side and demand-side factors in determining loan developments varies over time according to the shocks to the economy. Moreover, feedback loops arise whereby, for instance, deleveraging pressures on banks – caused by the erosion of their capital base – may lead to credit constraints, which, in turn, weigh negatively on investment and output. This then has an adverse effect on the corporate sector's demand for external financing. This streamlined typology of the propagation channel shares some features with the developments observed during the latest crisis in the euro area and, more broadly, in all advanced economies to varying degrees.

96 A similar correlation between real bank credit and real GDP emerges when considering the series' deviation from their respective long-term trends, as estimated by the Hodrick-Prescott filter. Moreover, empirical evidence for Germany suggests that various measures of the dynamics of credit given to the NFC sector significantly lag real GDP growth by two-to-three quarters (see Deutsche Bundesbank (2011)).

A significant contraction in bank lending to NFCs has been seen during the crisis, with the annual growth rate of loans to NFCs (adjusted for sales and securitisation) falling from a peak of 15% in the first quarter of 2008 to 2.8% in the second quarter of 2009, before turning negative and bottoming out at -2.1% in the first quarter of 2010 (see Chart 40). Despite recovering slightly thereafter, loan growth has remained weak in the majority of euro area countries.

Chart 40 MFI loans to non-financial corporations, and related survey indicators during the crisis

(left-hand scale axis is the net percentages of banks contributing to tightening credit standards; right-hand scale axis is percentage)



Sources: ECB and the Eurosystem's bank lending survey.

In attempting to disentangle the contribution of supply-side and demand-side factors, relevant information can be extracted from surveys, such as the ECB's bank lending survey and the SAFE survey. On the supply side, an important indicator, as seen in the bank lending survey, is the net tightening of credit standards, which is made up of three components: "perception of risk", "balance sheet constraints" and "competition".[97] At the onset of the crisis, and particularly in 2008, the role of balance sheet constraints in the net tightening of credit standards was the greatest it had been since the creation of the bank lending survey, reflecting the importance of bank vulnerability in shaping the terms and conditions of bank lending activity. The impact of the "perception of risk" factor on the net tightening of credit standards was also greater at the peak of the crisis. These two factors have become closely aligned during the crisis. Between 2009 and mid-2011, the tightening of credit standards gradually diminished, as did the role of balance sheet constraints. However, as the sovereign debt crisis in Europe intensified during the second half of 2011, the role of balance sheet constraints rose once again. The relevance of supply-side factors is further shown by the increased recourse to market-based funding sources during the crisis, often with unfavourable conditions, as documented in the next section. In addition, on the basis of the investment behaviour of manufacturing industries in six euro area economies,[98] Buca and Vermeulen (2011) find that firms which are more dependent on bank finance reduced investment to a much larger extent than those which were less dependent on bank finance.

At the same time, the results of the bank lending survey point to the fact that the demand for loans has also plummeted since the start of the crisis and has weighed heavily on loan development. Demand for loans remained negative until early 2010, then turned positive and remained so until the second quarter of 2011, before declining again thereafter as a result of diminishing economic prospects and an intensification of the European sovereign debt crisis. Factors weighing negatively on loan demand include an uncertain economic environment, contracting economic activity,

97 The "perception of risk" factor summarises banks' assessment of the impact of macroeconomic conditions on borrowers' risk profiles and creditworthiness; the "balance sheet constraints" factor proxies the bank lending channel of monetary policy transmission; and the "competition" factor includes competition from other banks, non-banks and market financing.

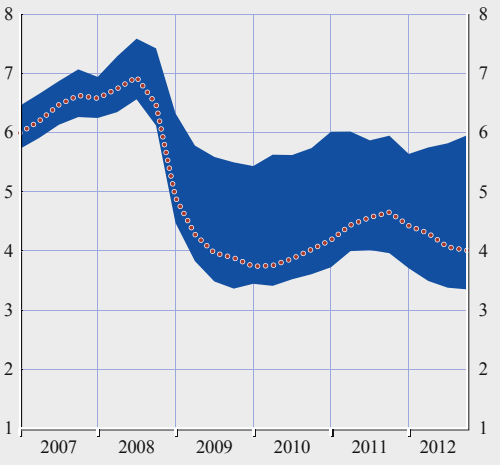
98 The euro area countries considered in the assessment are Belgium, Germany, Spain, France, Italy and Portugal. Using data on US firms, Becker and Ivashina (2011) also find that the contractionary effects of loan reduction are larger for firms which are excluded from bond markets.

and a higher propensity among firms to retain earnings. Notably, weak demand for loans also showed the need for the corporate sector to repair its balance sheet after the excessive leverage accumulated in the run-up to the crisis, a pattern explored in more details in the next section.

According to the SAFE survey, the main factor affecting bank loan availability for SMEs in most euro area countries was the general economic and firm-specific outlook. Purely supply-side factors (i.e. those related to the willingness of banks to provide loans) are also considered to be important. The significant role played by both supply-side and demand-side factors in determining credit developments during the crisis is consistent with the findings of Del Giovane et al. (2010), which are based on the Eurosystem's bank lending survey, as well as on micro data on loan quantities and prices for the participating Italian banks.[99]

Chart 41 Cost of lending indicator on loans to non-financial corporations in the euro area

(percentages)



Sources: ECB and ECB calculations.
Notes: The cost of lending indicator is calculated by aggregating short-term and long-term rates using a 24-month moving average of new business volumes. The latest data are for December 2012. The shaded area denotes the interquartile range, while the solid line denotes the euro area average.

Despite the marked tightening of credit standards, lending rates on loans to NFCs declined substantially between autumn 2008 and mid-2010 (see Chart 41). This was the result of various key ECB interest rate cuts, as well as the launch and implementation of non-standard monetary policy measures during the crisis period. Aggregate bank retail rates generally responded sluggishly to changes in monetary policy rates in euro area countries. From mid-2010 to the end of 2011, in a general context of re-pricing of risk, composite euro area lending rates for NFCs increased, largely owing to the impact of the sovereign debt crisis on benchmark interest rates and banks' funding conditions. It was only at the beginning of 2012 that composite euro area lending rates for NFCs started to recede gradually, reflecting the cuts in the key ECB interest rates in November 2011 and December 2011, and the non-standard monetary policy measures announced by the ECB. Nonetheless, the decline in corporate lending rates in 2012 masks the existence of diverging patterns across countries, as shown by the wide interquartile range in Chart 41. These developments primarily reflect the emergence of financial fragmentation associated with the sovereign debt crisis in some euro area jurisdictions.

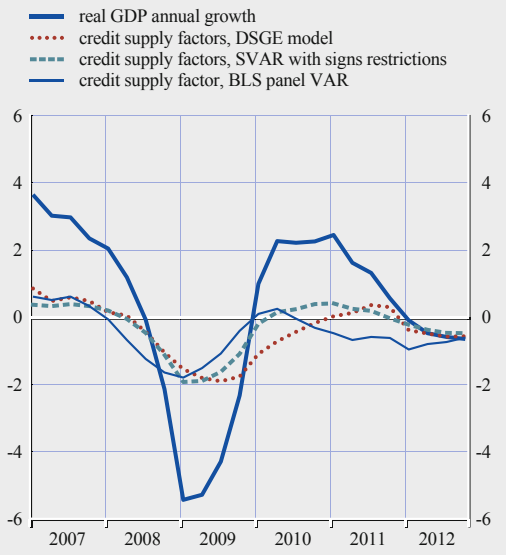
As mentioned throughout the section, the Eurosystem has adopted a variety of policy measures in line with the severity of the circumstances in the different phases of the crisis. It has complemented the standard interest rate instrument with a set of non-standard measures, exceptional in nature, scope and magnitude. The guiding principle behind these policy interventions was to safeguard the effectiveness of the monetary transmission mechanism, so as to maintain price stability over the medium term. When the interbank market was not functioning correctly, unlimited liquidity was provided in an effort to mitigate the risk that shortages of liquidity and funding for banks would have triggered an abrupt deleveraging process and, hence, a credit crunch. At a time of financial

99 Del Giovane et al. (2010) find that a quarter of the total supply effect can be attributed to costs related to the banks' balance sheet position, and the rest to their perception of credit risk.

fragmentation, the adoption of the Outright Monetary Transaction (OMT) programme has addressed the excessive risk premia in some sovereign debt markets associated with the (perceived) risk of a euro area break-up.

Chart 42 Impact of credit supply factors on real annual GDP growth rates across model estimates

(percentages)



Source: ECB.

The question then arises regarding the extent to which credit supply factors, of the types discussed so far, have an impact on real economic activity during the crisis. To address this issue, three macroeconomic models are considered: a theory-driven dynamic stochastic general equilibrium (DSGE) model, a data-driven structural vector autoregressive (VAR) model, and a model which makes direct use of survey information contained in the bank lending survey (BLS panel VAR). The DSGE model formalises the financial frictions within the structural relationships using a relatively large set of variables, as dictated by the economic theory.[100] The structural vector autoregressive (VAR) model identifies credit supply shocks, as well as shocks to aggregate demand and supply, by imposing sign restrictions based on economic theory.[101] The BLS panel VAR model quantifies the impact of credit supply factors by relying on the cross-sectional information generated by the BLS results for the individual euro area country.[102] Overall, the three models suggest that credit supply factors had a limited impact on economic activity between 2007 and the first quarter of 2008. However, by the fourth quarter of 2008, the impact had become much more significant. At the peak of the crisis, in the first half of 2009, the models predict that credit supply factors accounted for a contraction of almost 2 percentage points in real GDP growth, and for approximately one-third of the overall contraction.[103]

THE SUBSTITUTABILITY OF CORPORATE DEBT INSTRUMENTS, AND THE MACROECONOMIC ENVIRONMENT[104]

Developments in bank credit are intrinsically linked to firms' ability to diversify in their alternative sources of financing, as a way of gaining some financial flexibility, as documented in Chapter 1.

100 See Darracq-Pariès et al. (2011). The DSGE model comprises the following set of financial frictions: the bank capital channel (with capital accumulated from retained earnings, and adjustment costs related to the bank capital structure which are dependent on the regulatory regime); imperfect interest rate pass-through on lending rates for households and NFCs; and the financial accelerator mechanism for household loans for house purchases (housing wealth used as collateral) and for NFC loans (capital stock used as collateral), which allows for endogenous default rates. The model is estimated for euro area data using Bayesian likelihood methods. We consider 15 key macroeconomic factors over a quarterly time series, from the first quarter of 1986 to the second quarter of 2008. The factors are: output, consumption, non-residential fixed investment, hours worked, real wages, CPI inflation rate, three-month short-term interest rates, residential investment, real house prices, mortgage loans, NFC loans, households deposits, bank lending rates on mortgage loans and on NFC loans, and deposit rates on household deposits.

101 Specifically, the SVAR model is estimated on real GDP, the GDP deflator, loans to NFCs, the EURIBOR and the bank lending spread for the euro area as a whole, using quarterly data from the first quarter of 1980 to the third quarter of 2012.

102 The BLS Panel VAR follows the methodology suggested by Darracq-Pariès and De Santis (2013), which itself draws on Ciccarelli, Maddaloni and Peydró (2010).

103 For a detailed description of a model-based methodology of this type, see the box entitled "Analysis of the impact of credit supply factors on economic activity using structural models", *Monthly Bulletin*, ECB, January 2011.

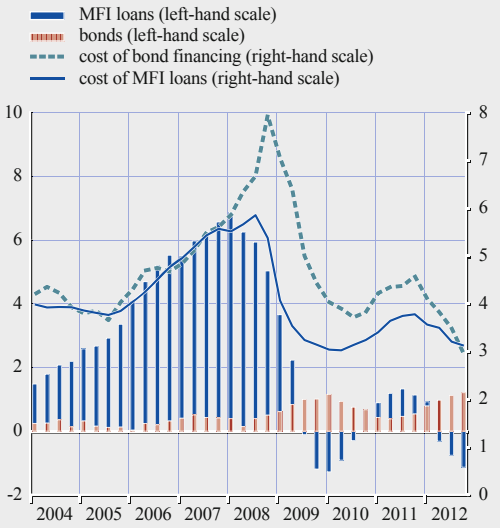
104 Prepared by Felix Geiger and Manuel Rupprecht.

As bank credit conditions tighten, substituting bank credit with other sources of financing could be seen as a tool for mitigating the financial constrains restricting investment, as investigated in Box 1 and supported by the evidence in Buca and Vermeulen (2011), as briefly illustrated above.[105] The first issue to be addressed is then whether the observed degree of substitution in the euro area during the crisis is in line with the predictions made on the basis of historical regularities.[106] Limiting the analysis to debt instruments, flows of loans and debt securities can be compared with the counterfactual of the same variables, as predicted by a reduced-form model and conditioning on real GDP developments from the fourth quarter of 2008 onwards.[107] The conditional forecasts are intended to capture "normal" developments in loan and debt security flows, in line with past financing patterns. The main finding is that the degree of substitution appears larger than that predicted by historical regularities from 2010 onwards, namely during the period of sovereign debt market tensions in selected euro area economies. However, during the first stage of the crisis, the substitution of loans with debt securities seems to be in line with historical regularities.

Interestingly, since the beginning of 2008, the recorded substitution of bank credit with bond issuance by NFCs has gone hand in hand with a widening spread between the cost of bond issuance and that of bank financing. Moreover, this spread persisted both when the two cost indicators first increased and when they subsequently declined (see Chart 43).[108] A similar pattern is observed for the majority of euro area countries. Moreover, a negative relationship between changes in bond transactions and bond financing costs for NFCs can be seen across euro area countries. Countries with the lowest rise in financing costs were those with the highest increase in net bond transactions (see Chart 44). Viewed through the lens of substitutability, Chart 45 documents the change in the reliance on bond financing relative to MFI financing, and the change between the spread of bond financing costs and MFI loan rates. Substitution was most pronounced in those countries where the difference between the cost of corporate bond financing and MFI lending rates on loans increased. In Ireland and Spain particularly, the relative importance of bond financing gained prominence as MFI loans were redeemed during the sample period

Chart 43 Comparison of bank financing and bond financing, and the nominal cost of financing

(percentage points)



Sources: Balance Sheet Items statistics, Merrill Lynch Global Index, ECB and ECB calculations.

105 In addition, in bypassing the intermediation process of banks, the substitution of bank credit with alternative sources of financing has clear implications for the functioning and assessment of the monetary policy transmission mechanism.

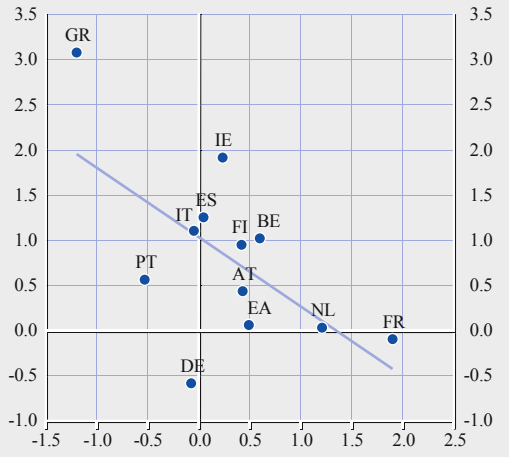
106 Notably, euro area developments should be interpreted with caution, as they may mask cross-country heterogeneity, as illustrated in Chapter 1. Throughout 2012, for instance, euro area bond financing was largely influenced by the large bond issuance in France, while weak bank credit at the euro area level primarily resulted from adverse developments in Italy and Spain.

107 The model specification is a dynamic factor model estimated from the first quarter of 1992 to the third quarter of 2008, using a large set of quarterly macroeconomic, financial and flow-of-fund variables for the euro area. The adopted model is described in Giannone et al. (2012).

108 The increase in debt financing costs was also reflected in the widening spreads between riskier loans and bonds with different investment grades. Bond investors, like banks, were hit by the macroeconomic shock caused by the financial crisis. Losses on their capital position then meant that they needed additional risk premia in order to absorb the measured default risk (see Gilchrist and Zakrajšek (2012)).

Chart 44 Change in bond financing and associated change in the nominal cost of market debt

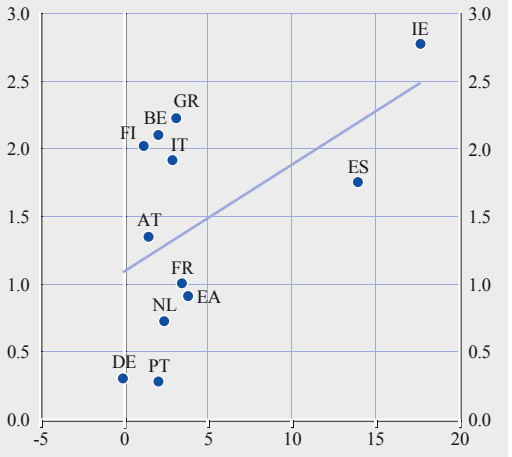
(x-axis: change of average annualised bond transactions between the period 2004Q1-2008Q2 and 2008Q3-2012Q4; y-axis: change of average nominal cost of bond financing between the period 2004Q1-2008Q2 and 2008Q3-2012Q4)



Source: ECB calculations.

Chart 45 Substitution of bank financing in the euro area

(x-axis: change of average annualised bond transactions between the period 2004Q1-2008Q2 and 2008Q3- 2012Q4; y-axis: change of average nominal cost of bond financing between the period 2004Q1- 2008Q2 and 2008Q3- 2012Q4)



Source: ECB calculations.

between the third quarter of 2008 and the second quarter of 2012. In Germany and Portugal, however, substitution between bond and bank financing was moderate and accompanied by a subdued increase in the spread between bond financing costs and MFI loan rates.[109]

109 In terms of equity financing during the financial crisis, the link between price and cost is less clear. In most euro area countries, net equity transactions did not change significantly after the third quarter of 2008, with the exception of firms in Belgium, Finland and Ireland.

Box 5

MACROECONOMIC IMPACT OF THE SUBSTITUTABILITY OF CORPORATE DEBT INSTRUMENTS[1]

This box discusses some alternative theoretical explanations of the corporate debt instrument behaviour shown in Chart 43, namely the substitution of bank loans with debt securities, and the concomitant widening in the gap between the cost of market finance and the cost of bank finance.[2] It also provides an assessment of the implications of debt substitutability for aggregate activity and financial stability.

The evidence on corporate debt observed during the crisis is surprising when considered in conjunction with the well-established literature that captures the endogenous choice between bank finance and market finance (e.g. Holmstrom and Tirole (1997), and Repullo and Suarez (2000)). In these models, firms differ in their available net worth and are able to divert resources

1 Prepared by Fiorella De Fiore (ECB).
2 Substitution between bank finance and bond finance emerges as a noticeable feature of the financial crisis, as is the case when looking at the experience of the United States (Becker and Ivashina (2011), and Adrian et al. (2012)).

away from projects and towards private activities. Assuming that bank finance is more intensely monitored than bond finance, these models deliver a distribution of financing choices such that firms with large levels of net worth raise bond finance, firms with intermediate levels of net worth raise bank finance, and firms with little net worth do not obtain credit. One implication is that a contraction in net worth, as observed during the crisis, leads to a shift from bond finance to bank finance, which contradicts the evidence.

In recent literature, alternative arguments to explain the facts observed during the financial crisis have been put forward. One explanation is that the shift from loans to bonds was the result of NFCs optimal financing choices in the face of a negative bank supply shock (De Fiore and Uhlig (2011)). The mechanism is described in a model where firms differ in their productivity and in their risk of default on debt, and where they optimally choose the external financing instrument (i.e. loans or bonds). Loans differ from bonds because banks are able to acquire information on a firm's productivity prospects, while dispersed bond holders are not. As information acquisition is costly, bonds are cheaper – although riskier – than loans. The model produces a distribution of firms' financing choices (i.e. the choice between cash or debt) and choice of debt instruments (i.e. loans or bonds), which changes endogenously over time. Firms with a relatively high risk of default choose not to raise external finance. Firms with a relatively low risk choose to issue bonds. Only firms with an intermediate risk approach banks, as they value the further information banks can provide before deciding whether to obtain loans and produce. A shock which reduces the efficiency of banks as financial intermediaries relative to the market increases the cost of banking and induces a shift from loans to bonds. A larger proportion of firms with a high risk of default find the cost of external financing too high and choose not to produce. A larger proportion of firms with intermediate levels of risk find it optimal to shift to bonds. Bond finance then becomes more costly, as the average risk of default for the larger pool of market-financed firms is higher. The cost of bank finance rises owing to higher bank costs and a composition effect in the average risk of bank-financed firms. Overall, as in the data, the average increase in bond yields exceeds that in lending rates.

An alternative explanation builds upon the observed pro-cyclical behaviour of bank leverage. Adrian et al. (2012) propose a model where banks follow a "Value-at-Risk" approach, i.e. banks choose the composition of their assets and liabilities in such a way as to ensure that the probability of default never exceeds a certain desired level. Under this constraint, a bank's optimal choice is to deleverage sharply during a financial crisis, when the default risk of NFCs rises, and thus to contract lending. Given that the demand for credit from NFCs has limited elasticity, risk-averse bond investors need to be encouraged to increase their credit supply. This requires an increase in the spreads on corporate bonds.

These alternative theoretical channels differ not only in the mechanisms at work but also in their assessment of the macroeconomic implications of an adverse bank supply shock. In De Fiore and Uhlig (2012), such a shock has a minimal effect on investment and output owing to the possibility for NFCs to shift promptly between the two sources of external financing, leaving leverage largely unchanged. Adrian et al. (2012) use a partial equilibrium approach, which is not suitable for quantifying the aggregate implications of the shock on real activity. Nonetheless, in their model, small variations in the default risk lead to large movements in spreads because these also reflect the investors' changing valuation of risk.

A flexible financial system in which NFCs can easily substitute one debt instrument for another can help to mitigate the adverse effects of financial shocks on economic activity. In the model proposed by De Fiore and Uhlig (2012), the effects of a bank supply shock on investment and output are greatly amplified when NFCs cannot move from bank finance to bond finance. These results are consistent with evidence obtained by Becker and Ivashina (2011) using data on US firms. The effects of a reduction in loan supply on investment are found to be statistically positive and significant for firms that raise debt finance and have access to both the bond and loan markets. For firms excluded from bond markets, the contractionary effect is even greater. Some supporting evidence also exists for the euro area, as illustrated above with the findings by Buca and Vermeulen (2011).

Changes in the composition of corporate debt also have implications for financial stability. Aoki and Nikolov (2012) use a simple model with bank and bond finance to examine the effects of debt substitutability on the likelihood and real effects of financial crises caused by large banking sector losses. They argue that, in a bank-dominated economy, loan market competition is low and the profitability of safe activities is high. Banks do not find it attractive to invest in risky assets, since more traditional activities have a high return. Finance is expensive but the banking system is stable. When capital markets expand, (safe) loan spreads decline, loan volumes expand and output grows. However, there is a darker side to credit expansion: returns from risky assets become more attractive, bank risk-taking increases and the chances of a financial crisis increase.

The theory and evidence discussed in this box suggests two main conclusions with regard to corporate debt structure. First, it plays an important role in determining the response of investment and real activity to bank supply shocks. Second, it changes the incentives for banks to take on risk and thus affects the probability of boom/bust cycles and financial crises.

4.2 CORPORATE SECTOR INDEBTEDNESS AND MACROECONOMIC PATTERNS: A MEDIUM-TERM PERSPECTIVE

In this section, an attempt is made to shed light on the debt cycle of the corporate sector from a medium-term perspective, with specific emphasis on the latest financial crisis. The approach will be threefold. First, the latest euro area crisis is placed within the broader international and historical context of crisis episodes; the aim is to derive a set of empirical regularities, draw lessons from them, and infer policy responses which are also valid in today's circumstances. Second, the run-up to the latest euro area crisis is analysed in terms of debt accumulation, identifying selected propagation channels and describing the emergence of macroeconomic imbalances. Third, the corrective adjustments needed in the future are investigated, deleveraging pressures identified and alternative typologies of deleveraging patterns explored. While the section is primarily empirical, both theoretical and empirical literature is used as a guide, providing facts and evidence.

INDEBTEDNESS AND THE MACROECONOMICS OF CRISIS EPISODES: THE EURO AREA CRISIS FROM AN INTERNATIONAL AND HISTORICAL PERSPECTIVE[110]

In terms of severity, duration and scale, the recession experienced in the euro area, and in most advanced economies, in the late 2000s was the major downturn in several decades. The global financial panic that followed the failure of several major financial institutions resulted in the severe malfunctioning of financial markets and heightened global uncertainty, which, in turn, led to

110 Prepared by Giacomo Carboni.

a deep and sharp downturn in real economic activity, with falling consumption and investment, and a marked decline in trade. When placing the latest episode within the broader international and historical context of major economic downturns a main consideration stands out. While many factors may well have contributed to the emergence and severity of these episodes, both theoretical insights and empirical evidence appear to point to the role played by debt accumulation in the run-up to the crisis. While improving welfare when at moderate levels, debt does add to instability when excessive, and hence weighs negatively on the economy. Indeed, literature dating back to the seminal contributions from, for instance, Fisher (1933), Kindleberger (1978) and Tobin (1989), has identified leverage, in the form of excessive credit, as a major source of macroeconomic instability and financial fragility. More recently, a number of empirical papers have focused on the role of debt accumulation and debt levels in shaping macroeconomic performance, by considering a pool of countries across a number of decades.[111] As a result of these considerations, some evidence on indebtedness and other selected macroeconomic variables affecting crisis episodes is briefly illustrated, with particular emphasis on developments in the corporate sector. The general idea is to investigate economic regularities associated with severe economic downturns, draw lessons from them, and infer possible policy responses of some validity in the current circumstances. The assessment considers recessions in 15 advanced economies between 1960 and 2012, drawing extensively on a dataset compiled by Schularick and Taylor (2012). Notably, Schularick and Taylor (2012) analyse the behaviour of money, credit and macroeconomic indicators over a remarkably long time period from 1870 to 2008. The countries considered are Australia, Canada, Denmark, France, Finland, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States.[112]

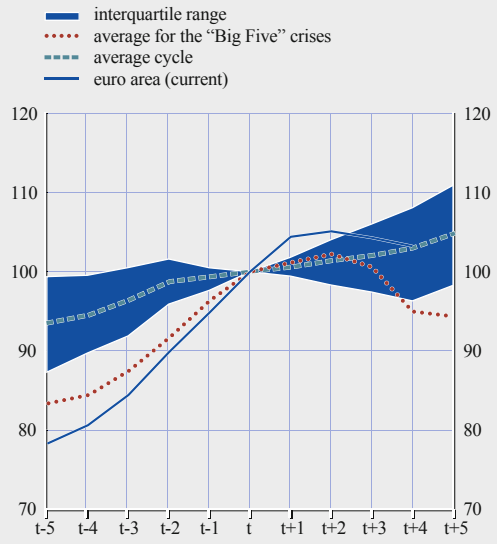
In considering financial crises from a broader comparative perspective, the analysis distinguishes between normal business cycle recessions, milder financial crisis recessions and systemic financial crises. The classification of these episodes, as well as the determination of the associated turning points, draws on the works by Jorda et al. (2012), Laeven and Valencia (2008), Reinhart and Rogoff (2009b) and Kamisky and Reinhart (1999). Overall, 54 recessions are identified in the dataset, of which 40 normal business cycle episodes, nine milder financial crises, and five severe (systemic) financial crises (the "Big Five" crises identified by Reinhart and Rogoff (2009)).[113] Owing to the limited availability of data on historical episodes, two main limitations arise. First, as data for bank credit to the corporate sector are not always readily available, the assessment will consider first bank credit given to the non-financial private sector as a whole. Bank credit to the corporate sector are considered for selected historical episodes for which the data series are available. Second, as data on sources of financing, other than bank credit, are often unavailable, debt is represented by bank credit.[114]

Chart 46 portrays the increase in the ratio of bank credit to GDP around the peaks in economic activity identified above. Together with the developments in the latest euro area crisis, the chart shows the "average cycle", obtained by taking the average of all identified downturns, which include normal recessions, systemic financial crises ("Big Five" crises), and milder financial crises. The grey area shows the interquartile range, a measure of the dispersion around the "average cycle". While the run-ups to crises have often been characterised by rising debt levels, the extent of debt accumulation in the latest euro area crisis has been remarkable. This is evident by the fact that the current debt build-up in the euro area is outside the inter-quartile range and is, in fact, more

111 See, for example, Jorda et al. (2012), Reinhart and Rogoff (2009), and Cecchetti et al. (2011).
112 Relative to the country sample considered by Schularick and Taylor (2012), the present assessment also includes Finland.
113 The crisis episodes are listed in Table 1 of Annex 6.
114 Nonetheless, the relevance of other sources of financing for past crisis episodes may be limited.

Chart 46 Ratio of bank credit given to the private sector to GDP across cycle peaks

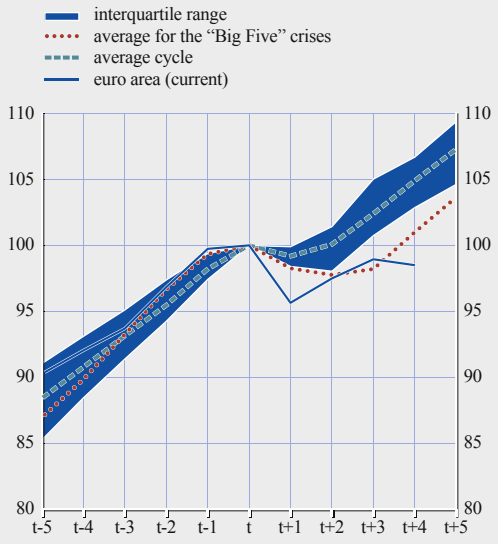
(as a percentage relative to the level recorded at the GDP peak)



Sources: ECB, national sources and ECB calculations.
Notes: The data for historical episodes are taken from the dataset compiled by Schularick and Taylor (2012). Period *t* represents the year of the peak in GDP prior to the crisis episodes. The level of indebtedness is normalised at 100 in the same year.

Chart 47 Real GDP level across cycle peaks

(as a percentage relative to the GDP peak)



Sources: ECB, national sources and ECB calculations.
Notes: The data for historical episodes are taken from the dataset compiled by Schularick and Taylor (2012). Period *t* represents the cycle peak.

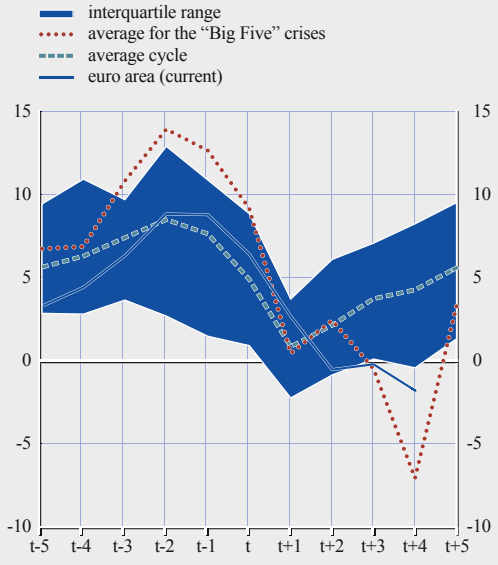
intense than the average developments across the "Big Five" financial crises. Provided that historical similarities can be used as a guide, further downward adjustment of the credit-to-GDP ratio is to be expected for the euro area, as investigated in the following sections.

Chart 47 depicts the level of real GDP before and after major economic downturns. The striking point emerging from the chart is the severity of the latest euro area recession, even when measured against a wide range of historical and international crises. First, euro area real GDP has declined sharply during the latest recession, by around 5.6% from the pre-crisis peak to the trough. Second, the euro area economy levelled off only modestly after the trough and still stands around 2.8% below the pre-crisis peak.

The growth rates for real loans in the euro area have developed broadly in line with the pattern of systemic financial crises (see Chart 48). Notably, the subdued loan dynamics seen in

Chart 48 Real loan growth rates across cycle peaks

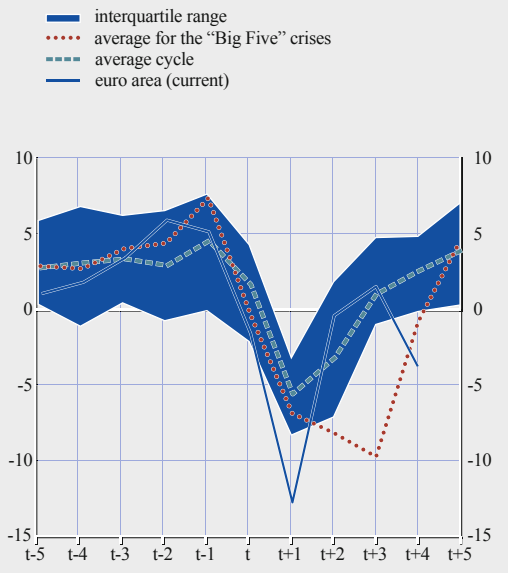
(percentages)



Sources: ECB, national sources and ECB calculations.
Notes: The data for historical episodes are taken from the dataset compiled by Schularick and Taylor (2012). Period *t* marks the peak in economic activity.

Chart 49 Real investment growth rates across cycle peaks

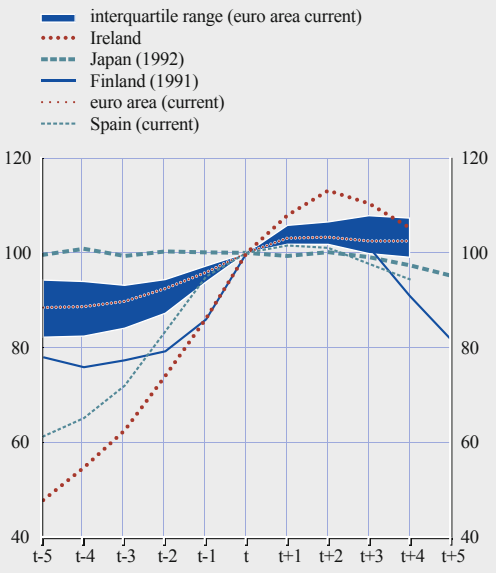
(percentages)



Sources: ECB, national sources and ECB calculations.
Notes: The data for historical episodes are taken from the dataset compiled by Schularick and Taylor (2012). Period *t* represents the start of a crisis.

Chart 50 Ratio of bank loans to the corporate sector to GDP across cycle peaks

(as a percentage relative to the level recorded at the GDP peak)



Sources: ECB and ECB calculations.

the euro area after the trough are consistent with the average of the "Big Five" financial crises. Similarly, the real investment growth rate for the euro area has developed broadly in line with the average of the "Big Five" financial crises in the run-up to the crisis (see Chart 48). Nonetheless, the drop in euro area investment immediately after the start of the crisis is very severe (see Chart 49). While the subsequent rebound was somewhat quicker than in previous crises, more recent evidence suggests that the levelling off will not continue.

Chart 50 focuses more specifically on the indebtedness of the corporate sector, where indebtedness is measured by bank loans, and relates the latest experience of euro area economies to the financial crises in Finland and Japan in the 1990s. These countries are among the "Big Five" for which data on bank credit to the corporate sector are available. Interestingly, Finland and Japan are polar opposite cases of post-crisis adjustment and the deleveraging process, as documented in the following sections. To emphasise the cross-country relevance of the latest euro area crisis, the interquartile range is shown for euro area countries. Finally, the patterns for Spain and Ireland are also included, as they represent cases of the largest sustained pre-crisis debt accumulation in the corporate sector among euro area economies, especially when compared with Finland.

4.3 DEBT ACCUMULATION AND MACROECONOMIC IMBALANCES IN THE RUN-UP TO THE EURO AREA GREAT RECESSION[115]

This section attempts to shed light on the connection between the pattern of corporate sector indebtedness and the emergence of macroeconomic imbalances. Theory and evidence point to

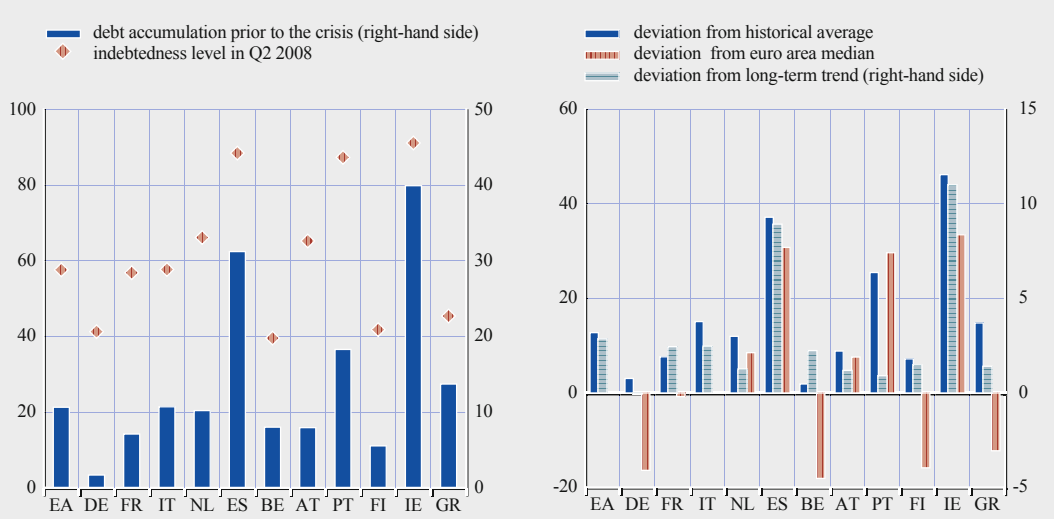
115 Prepared by Giacomo Carboni and Uroš Herman.

the fact that debt accumulation may not be problematic per se. In fact, by transferring resources across time, individuals and states of nature, debt accumulation can improve welfare when kept at sustainable levels. However, when excessive and used to finance less profitable investments, debt adds to financial instability. As a guide through the latest euro area crisis, the assessment draws on the theoretical insights provided by, for instance, Kindleberger (1978) and Minsky (1992). In all such work, the boom phase is characterised by a large accumulation of credit, and excessive investment; it is fuelled by a sizeable over-valuation of financial and real assets, and often associated with periods of moderate volatility and low pricing of risk.

DEBT VULNERABILITY PRIOR TO THE GREAT RECESSION

While remaining broadly stable between 2001 and 2004, corporate sector indebtedness rose markedly in the euro area and in many advanced economies in the years preceding the financial crisis, as documented in Chapter 1 (see also Chart 51 below). Such debt accumulation was primarily in the form of bank credit, while debt issuance remained broadly stable.[116] As is often the case, such a build-up of bank credit was preceded by, or went together with, a process of financial innovation in the banking industry.[117] This process was characterised by a rapid expansion of securitisation and increasing reliance on market-based funding, which allowed banks to offload risk and increase their leverage. At the same time, the heterogeneous pattern across euro area countries suggests that country-specific developments did play an important role in fuelling credit expansion and, hence, led to excessive debt levels. These excessive debt levels are illustrated in Chart 51 for the year 2008 by means of three alternative indicators: the deviation from the historical average, from the euro area median, and from the long-term trend, as estimated by applying the Hodrick-Prescott filter.

Chart 51 Corporate sector indebtedness indicators at the outbreak of the crisis



Sources: ECB and ECB calculations.
Notes: The historical average is calculated using data from the first quarter of 1995 to the second quarter of 2008. The underlying long-term trend has been extracted using the Hodrick-Prescott filter and annual data from the sample period 1995-2011 (where the smoothing parameter is set at 100). EA denotes euro area.

116 Credit accumulation prior to the crisis was not confined to the euro area corporate sector alone; it was in fact common across sectors and advanced economies.

117 The Nordic crises of the early 1990s are an example of systemic crises preceded by financial innovation and liberalisation, as briefly illustrated in the following sections.

Positive sizeable deviations for the three benchmarks are recorded for Ireland, Spain and, to a lesser extent, Portugal, thus indicating excessive indebtedness. A more formal test, based on Mendoza and Terrones (2008), confirms the evidence of a credit boom in Spain and Ireland.[118]

Overall, such excessive debt levels at the outset of the crisis clearly rendered these economies particularly vulnerable to adverse feedback loops during the downturn. By contrast, firms in Germany, Belgium and Finland appear to be in a sound position with regard to indebtedness.

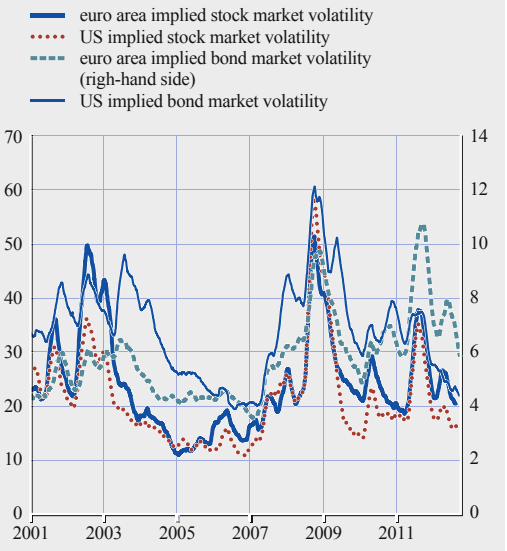
SUBDUED VOLATILITY AND EMERGING MACROECONOMIC IMBALANCES IN THE RUN-UP TO THE CRISIS

As noted above, theoretical insights and narrative evidence on financial crises characterise the expansionary phases preceding periods of financial instability as times of subdued uncertainty and low pricing of risk, in which there is a certain euphoria with regard to real and financial asset prices, and over-optimism with regard to income and wealth prospects, which again fuels the provision of credit and investment. Some of these aspects appear to be confirmed by evidence from the latest euro area financial crisis.

In the years leading up to the crisis, volatility in financial markets was particularly subdued both domestically and internationally, by historical standards (see Chart 52). The euro area implied stock and bond market volatilities plateaued at a low level between the end of 2004 and the beginning of 2007, before following a fluctuating upward trend thereafter. Similarly, in the United States, the implied stock market volatility declined from mid-2002 to a historic low at the beginning of 2005, and remained broadly constant until the bubble burst. US implied bond market volatility lagged stock market volatility. Such subdued financial market volatility was accompanied by low-cost debt issuance for the euro area corporate sector; between 2005 and the second quarter of 2007, euro area corporate bond spreads remained, on average, at around 60 basis points. This was substantially below the average of 100 basis points recorded between 2001 and 2004, and below the level prevailing during the financial crisis.[119]

Chart 52 Subdued volatility in the run-up to the financial crisis

(percentages per annum)



Source: Bloomberg.
Notes: The implied government bond market volatility is a measure of uncertainty surrounding the German short-term (up to three months) and US ten-year government bond prices. It is based on the market values of related traded options contracts. Bloomberg uses the implied volatility of the closest at-the-money strike prices for both puts and calls, on the basis of near-month expiry futures. The implied stock market volatility series reflects the expected standard deviation of percentage changes in stock prices over a period of up to three months, as implied in the prices of options on stock price indices. The equity indices to which the implied volatilities refer are the Dow Jones EURO STOXX 50 for the euro area, and the Standard & Poor's 500 for the United States.

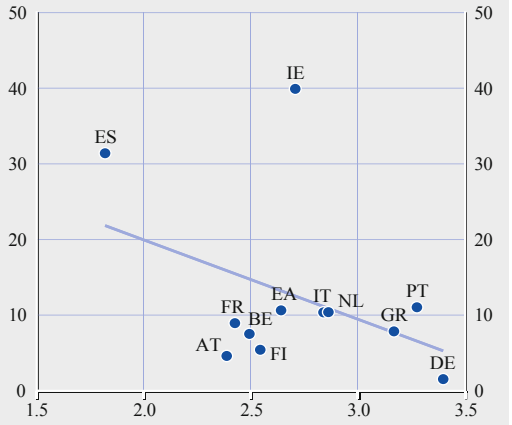
Although beginning to rise from the end of 2005, the real cost of bank credit also remained at rather favourable levels in the years leading up to the crisis. Simple cross-country evidence from euro area economies points to a link

118 Mendoza and Terrones (2008) define a credit boom as the period in which the credit ratio exceeds its long-term trend by a certain threshold. The long-term trend is calculated using the Hodrick-Prescott filter, where the smoothing parameter is set at 100, as is typical for annual data. The threshold value is calibrated at 1.75.

119 The underpricing of risk and its effect on financial pro-cyclicality is discussed in Borio and Zhu (2012).

Chart 53 Change in the bank credit-to-GDP ratio compared with the real cost of bank credit in the run-up to the financial crisis

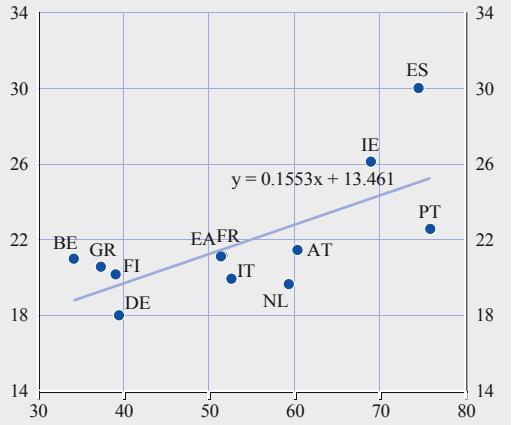
(x-axis: real cost of bank credit in percentage; y-axis: change in the bank credit-to-GDP ratio in percentage points)



Sources: ECB and ECB calculations.
Notes: The real cost of bank credit is derived from the composite MFI interest rates on loans to NFCs, deflated by the HICP; it indicates the average for the period between the first quarter of 2005 and the second quarter of 2008. The change in the bank credit-to-GDP ratio is calculated for the period between the first quarter of 2005 and the second quarter of 2008.

Chart 54 Investment share compared with the debt-to-GDP ratio prior to the crisis

(x-axis: debt-to-GDP ratio in percentages; y-axis: investment share as a percentage of GDP)



Sources: ECB and ECB calculations.
Notes: The investment share is the average of the ratio between real gross fixed capital formation and real GDP, calculated over the period between the first quarter of 2005 and the second quarter of 2008. The debt-to-GDP ratio prior to the crisis is the average of the ratio between corporate debt and nominal GDP over the period between the first quarter of 2005 and the second quarter of 2008. Debt is defined as the sum of MFI loans and market-based debt.

between the subdued real cost of bank credit and credit accumulation in the run-up to the crisis (see Chart 53).[120] By reducing interest rate burdens for borrowers, low lending rates imply a lower probability of default in the short term. As a result, in searching for yield, banks are tempted to extend credit and soften lending standards to borrowers with uncertain prospects, which are possibly less creditworthy. While low lending rates may decrease the credit risk evaluation in banks' portfolios in the short term, and thereby encourage the extension of credit, they may raise credit risk in the medium and longer term.

Together with credit patterns, developments in investment are another key factor to consider when assessing the emergence of potential macroeconomic imbalances which are closely associated with the corporate sector. Evidence shows that countries which experienced a high debt-to-GDP ratio (and high levels of debt accumulation) in the three years prior to the crisis were also characterised by a high investment-to-GDP ratio (see Chart 54).[121] In essence, this evidence appears to point to a pattern of excessive borrowing associated with over-investment, often concentrated in the real estate sector. During the latest crisis in euro area countries such as Ireland and Spain, the surge in real estate sector investment interacted with, and was fuelled by, rising housing demand, and financed itself with soaring household debt. Since bank credit was financing both corporate sector investments in the real estate sector and household mortgages, the subsequent housing bust translated into a banking crisis.

120 However, the strength of such a link is primarily influenced by the observations for Spain and Ireland.

121 This is consistent with the econometric evidence described in Chapter 4 of the October 2009 World Economic Outlook (Abiad (2009)); in essence, this evidence links high investment shares prior to the crisis with the severity of the output loss during the crisis, when looking at several banking (and currency) crisis episodes across high-, middle- and low-income economies.

DEBT ACCUMULATION AND THE SEVERITY OF THE DOWNTURN

The reversal of artificially subdued uncertainty and low perception of risk began with the outbreak of the US subprime mortgage crisis in 2007. Subprime mortgage defaults started to increase at the very start of 2007, and so did the cost of insuring mortgage portfolios. The "Minsky moment" happened, with over-indebted households facing increasing challenges in refinancing their mortgages, on the back of declining house prices and the rising cost of borrowing, in a general context of slowing economic activity. The resulting sell-off of mortgage-backed securities led to a sharp drop in their value, and raised serious concerns about the soundness of major banks around the world, which are widely exposed to these types of structured product. The resulting global financial panic and the dramatic re-pricing of risk then led to a severe slowdown in economic activity, falling consumption and investment, and a marked decline in trade. The severity is shown by the development of investment as illustrated in Chart 55.

At the peak of the contractionary period, the investment loss amounted to 14%, where the investment loss is measured as the difference between the actual level of real gross fixed capital formation and the level that would have prevailed by projecting the pre-crisis trend forward (see Chart 55).[122] Moreover, the investment pattern displays modest signs of recovery thereafter. This severe drop in investment, and in economic activity more broadly, is a common feature across advanced economies, possibly reflecting the concurrent financial source, and global scale, of the latest crisis. Indeed, as documented above, recessions associated with major financial crises tend to be more severe than other types of recession. In addition, synchronised downturns across countries, of the kind experienced in the global recession of the late 2000s (marked by the grey shaded area in Chart 55), cannot rely on the alleviating force of the external environment and, in fact, are characterised by adverse feedback loops among various economies. A question then arises: to what extent did debt accumulation prior to the crisis pave the way to such severe downturns for euro area economies, as predicted by the vast available literature on financial crises?[123] Intuitively, excessive debt jeopardises borrowers' ability to honour their debts, either because of shocks to the cost of debt repayment or to their income or wealth. Even seemingly small shocks can set a number of adverse feedback loops in motion, which ultimately exert sizeable and long-lasting effects on the economy at large. Moreover, the larger the balance sheets, the stronger the amplification mechanism is likely to be, both in the run-up to the crisis and during the inevitable downturn. A formal analysis provides supporting evidence of the impact of debt accumulation on the probability of a financial crisis episode in the

Chart 55 Euro area real gross fixed capital formation before and after the Great Recession

(as a percentage relative to the level in Q2 2008)

Sources: ECB and ECB calculations.
Notes: The shaded areas denote euro area recessions, as defined by the Euro Area Business Cycle Dating Committee of the Centre for Economic Policy Research. Data are taken from March of each year.

122 More specifically, the trend considered here is a linear trend extracted over the period between 1995 and 2004; the exclusion of the three years preceding the crisis is intended to avoid unsustainable boom-period dynamics affecting the estimation of a long-term trend.

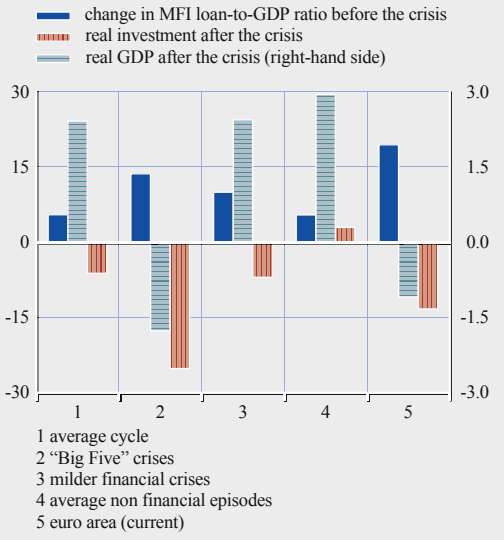
123 See, for example, Kindleberger (1978), Tobin (1989), and Brunnermeier and Oehmke (2013).

17 euro area countries, using quarterly data over the period from the first quarter of 1980 to the second quarter of 2012. More specifically, a logit model with country fixed effects is employed, where the variable of interest (i.e. the crisis dummy) takes the value of 1 in the case of a crisis episode and 0 in all other cases. Notably high debt accumulation, in the form of past real loan growth, is statistically significant across various model specifications which control for real and financial variables and their interactions.[124]

Not only does the intensity of debt accumulation appear to increase the likelihood of financial instability, but it also weighs on the severity of the downturn.[125] By drawing on the historical international crises illustrated above, Chart 56 displays the accumulation of debt during the four years prior to the specific crisis, and the level of real investment and real GDP three years after the crisis period. Two key conclusions can be drawn from the chart. First, large accumulation of debt prior to a crisis is associated with subdued development of real GDP and investment in the aftermath of the crisis. Second, and consistent with what is illustrated above, there are some similarities between the pattern for the latest euro area crisis and the most severe financial crises (the "Big Five" crises): the large accumulation of debt prior to the crisis continues to weigh on the economy three years after the crisis, with real GDP and investment levels remaining below pre-crisis peaks.

The link between pre-crisis debt accumulation and the severity of the contraction is confirmed by developments across euro area countries, as can be seen in Chart 57; for instance, investment loss in 2009, at the peak of the contraction, was more pronounced in those economies that had experienced a sustained accumulation of debt in the years leading up to the crisis. As in Chart 55, the investment loss is defined as the percentage deviation of the actual level from the level that

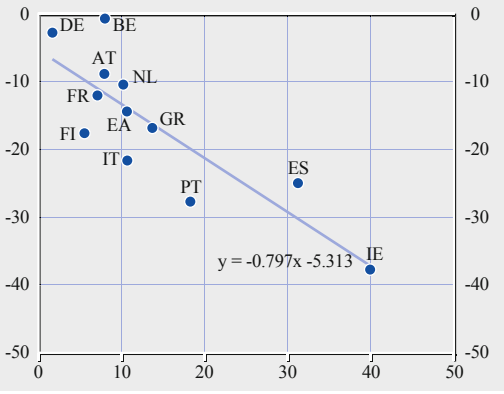
Chart 56 Credit accumulation prior to recessions and subsequent recovery



Sources: ECB and ECB calculations.
Notes: The green bars represent changes in percentage points, and the blue and red bars represent the percentage deviations from pre-crisis levels. "Before the crisis" refers specifically to the four years before the crisis, and "after the crisis" refers specifically to the three years following the crisis period.

Chart 57 Pre-crisis debt accumulation compared with investment loss during the crisis for euro area economies

(x-axis: pre-crisis debt accumulation in percentage points; y-axis: investment loss in percentages)



Sources: ECB and ECB calculations.
Notes: Investment loss is defined as the deviation of the real gross fixed capital formation from the pre-crisis trend. The trend considered here is linear, extracted over the period from 1995 to 2004. The exclusion of the three years preceding the crisis is intended to avoid unsustainable boomperiod dynamics affecting the estimation of the long-term trend.

124 See Table 2 in Annex 6. The variables controlled for by the model are stock prices, real investment and the credit-to-GDP ratio.
125 The connection between the intensity of credit accumulation in the expansionary phase and the severity of subsequent recessions has been recently documented by a number of empirical studies, which review historical episodes; see, in particular, Jorda et al. (2012).

would have prevailed by projecting the pre-crisis trend forward. In addition, rising corporate sector indebtedness during the years preceding the crisis was particularly pronounced in those euro area countries that also saw large residential investments. Some evidence, primarily based on the US experience, suggests that the link between housing busts and financial crises is an important factor in explaining weak post-recession recovery.[126]

CORPORATE SECTOR DELEVERAGING AND THE MACROECONOMIC IMPLICATIONS[127]

In this section, the connection between the process of balance sheet adjustment and the macroeconomy at large is explored. At the forefront of the assessment is the acknowledgement that excessive accumulation of debt calls for a subsequent unwinding process. While necessary, reducing debt is often a long and painful process. The extent to which such adjustment weighs on the economy, beyond the short term, has varied widely across historical episodes. Focusing on the "Big Five" crises, Table 7 illustrates the build-up of corporate sector debt in a ten-year window before and after the peak. On average, the ratio of bank credit to GDP rose by 21 percentage points and 29 percentage points in the five years and ten years prior to the crisis respectively, while the subsequent deleveraging process is of half the magnitude. Notably, while the increase in bank credit was sizeable in the run-up to virtually all severe financial crises, the subsequent retrenchment tended to vary in size and timing across crisis episodes. In Finland for instance, the reduction in bank credit is of comparable magnitude to the pre-crisis rise. As emphasised in the next section, this deleveraging process has accompanied, and been facilitated by, a sharp and persistent recovery in economic activity. By contrast, debt reduction in Japan was delayed in the first decade after the outbreak of the crisis. Such reluctance to undergo the necessary balance sheet adjustment turned out to be costly, in that it led to stagnant economic activity for approximately a decade, as analysed in the next section. Overall, post-crisis deleveraging appears to be a lengthy process, often taking the form of an unwinding of a large fraction of pre-crisis debt accumulation.

Chart 50 has summarised the changes in the debt-to-GDP cycle for selected euro area corporate sectors around the latest crisis episode. The lagging pattern of bank credit around turning points in economic activity, together with a sharp contraction in GDP, meant that the debt-to-GDP ratio continued to rise during the early stages of the recession, beginning to decline only later, when economic activity had rebounded somewhat. Such lagging adjustment of indebtedness is common

Table 7 Ratio of bank credit given to the non-financial private sector to gdp, before and after severe financial crises

(percentage points)

Country	Run-up to the crisis		Post-crisis adjustment	
	Maximum debt ratio around the crisis minus the minimum in the ten years prior to the crisis	Maximum debt ratio around the crisis minus the minimum in the five years prior to the crisis	Minimum debt ratio in the five years after the crisis minus the maximum around the crisis	Minimum debt ratio in the ten years after the crisis minus the maximum around the crisis
Spain (1978)	20	15	-10	-10
Norway (1987)	37	34	-8	-8
Sweden (1991)	20	19	-10	-10
Finland (1991)	37	28	-31	-39
Japan (1992)	33	7	-3	-9
Average for the five episodes	29	21	-12	-15

Sources: ECB and ECB calculations.

126 See, for instance, Bordo and Haubrich (2012).
127 Prepared by Giacomo Carboni, Annalisa Ferrando, Felix Geiger, Carmen Martínez-Carrascal and Manuel Rupprecht.

Table 8 Leverage ratios before and after the crisis, broken down by firm size

(percentages)

Indebtedness of firms in 2007, broken down by firm leverage	2007	2008	2009	2010
Aggregate				
zero leverage	0.0	3.6	4.7	5.4
low leverage	9.6	11.0	11.3	11.1
high leverage	44.6	37.6	34.2	30.1
SMEs				
zero leverage	0.0	3.6	4.8	5.4
low leverage	9.7	11.0	11.3	11.1
high leverage	44.7	37.6	34.2	30.0
Large companies				
zero leverage	0.0	2.6	2.7	4.0
low leverage	8.7	10.4	10.9	11.4
high leverage	41.3	37.9	35.7	35.1

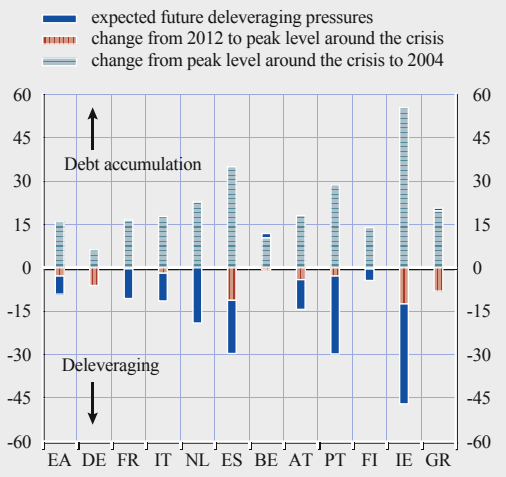
Sources: AMADEUS and ECB calculations.
Notes: Leverage is defined as the sum of short-term debt plus long-term debt divided by total assets. Firms with low leverage in 2007 are those that in 2007 had positive leverage below the median leverage (amongst indebted companies) in the corresponding sector and country in which the firm operates. Firms with high leverage in 2007 are those that in 2007 had leverage above the median leverage (amongst indebted companies) in the corresponding sector and country in which the firm operates. The size of companies is defined as in chapter 2 based on the European Commission definition. For detail see Annex 3.

in most euro area economies. To assess the extent to which such a pattern is also common across firms, Table 8 shows the leverage ratios of the sample of NFCs used in the analysis in Chapter 2, broken down by firm size. It is interesting to note that the aggregate deleveraging pattern is similar to the one experienced by firms with "low leverage" levels, irrespective of the size of the firm. Indeed, the average leverage of firms which initially had zero or low levels of debt has continued to increase during the crisis, while firms with initially high levels of leverage began a deleveraging process almost immediately. All firms with high ratios of debt to total assets, irrespective of their size, have undergone a deleveraging process. At the same time, this process has been more pronounced for SMEs than for large firms.

Deleveraging pressures for euro area NFCs also conceal important differences across sectors, depending on the excesses accumulated in the past. For instance, as discussed briefly in Sections 1.4 and 2.2, firms in the construction and real estate services sector have experienced a significant rise in debt over the last decade, largely reflecting booming housing markets in a number of euro area countries. Therefore, the need to unwind past imbalances in this sector is greater, and more desirable from a welfare perspective, than in others.

Chart 58 Ratio of corporate sector debt to GDP in euro area economies

(in percentage points)



Sources: ECB and ECB calculations.
Notes: Corporate sector debt is defined as the sum of MFI loans and market-based debt. The "expected deleveraging pressures" are calculated as the simple average of three statistical benchmark estimates: the deviation of corporate debt to GDP at the end of 2012 from the historical average, from the pre-boom 2004 level, and from the euro area median at the end of 2012. EA denotes euro area.

Overall, compared with the sizeable surge before the outbreak of the crisis, the subsequent retrenchment in the debt-to-GDP ratio has, so far, been rather contained. If history is any guide, further significant deleveraging is expected, in particular in those countries that had experienced a pre-crisis boom. A tentative quantification of the deleveraging pressures for euro area corporate sectors is illustrated by the blue bars in Chart 58; it is derived on the basis of three distinct statistical benchmarks, namely the deviation of the corporate debt-to-GDP level at the end of 2012 from historical average, from the pre-boom 2004 level and from the euro area median.[128] All three benchmarks identify deleveraging pressures for euro area firms in Ireland, Spain, Portugal and the Netherlands. The main caveat is that the equilibrium debt levels can differ across countries and vary over time. Structural change in the economy and sectoral composition, as well as developments in financial markets and economic patterns, among other factors, may explain the differences in the long-term equilibrium levels of debt.

MACROECONOMIC PATTERNS IN THE DELEVERAGING PROCESS

Theory and historical evidence show the deleveraging process to be long and potentially painful; the extent to which this is the case depends on a number of factors, primarily related to the alternative macroeconomic channels through which the deleveraging process may occur.

In an attempt to identify various deleveraging patterns, the assessment first draws on the historical episodes of debt reduction in the Nordic countries and in Japan during the 1990s. An extensive body of comparative research often portrays these episodes as polar opposite cases of post-financial crisis adjustment, in the form of banking system restructuring, regained internal and external competitiveness and economic recovery. The following brief review of these episodes provides a historical anchor for a more stylised account of the deleveraging process in the aftermath of financial crises.

The Nordic countries in the 1990s

The financial crises in Sweden and Finland, and to a lesser extent Norway, during the 1990s were largely a case of a credit-led boom/bust cycle.[129] A process of financial deregulation had paved the way to a sustained lending boom, following a lack of responsible financial behaviour within a changing environment. In addition, specific rules within the tax system, combined with sustained inflation, meant that the after-tax real interest rates were low and often negative, thus providing an incentive to borrow, both domestically and abroad.[130] The surge in bank lending fuelled asset prices, primarily in real estate and on the stock market, which caused collateral values and financial wealth to rise, and this led to further credit expansion. The bust began with an increase in the real after-tax interest rate, as Finnish and Swedish central banks raised nominal interest to defend their fixed exchange rate, and the tax deductibility of mortgage rates was limited. The resulting fall in asset prices revealed the fragility of the private sector's balance sheets, in the form of climbing losses and soaring corporate sector bankruptcies, which led to severe banking crises. Amplified by the tight monetary policy stance aimed at defending the fixed exchange rate, the severe recession consisted in a drop in consumption and investment, particularly in the construction sector, and an explosion of public deficits. The abandonment of the exchange rate peg to the European Currency Unit in late 1992, and the subsequent fall in nominal interest rates, stimulated the recovery, which was supported by a sharp rebound in exports. At the same time, governments intervened promptly and boldly in order to rebuild their banking systems. Such interventions involved creditors being

128 The estimate of the expected deleveraging pressures is the simple average of the three benchmark estimates.
129 For a detailed assessment of the financial crisis in Finland and Sweden, see, for instance, Jonung et al. (2008), and Honkapohja (2009).
130 Flows of foreign capital played a crucial role both in the accumulation of debt prior to the crisis and in the subsequent downturn.

guaranteed by the government, liquidity support being provided by the central bank, various institutions being restructured in the form of mergers and acquisitions, business models being reshuffled, bad assets being transferred to separate management companies, and finally a capital injection of public funds being provided. The long-lasting economic and export performance was also related to a major industrial restructuring undertaken in Sweden and Finland in favour of more dynamic and competitive sectors, such as information and communication technologies.

Japan during the 1990s

The Japanese economy also underwent a process of capital market deregulation and financial liberalisation in the mid-1980s which led to a sharp increase in consumer and housing-related lending. The credit-led boom was then fuelled by self-reinforcing feedback loops involving climbing real estate prices, rising collateral values and loosening credit standards. The subsequent bursting of stock and real estate price bubbles, together with the resulting economic slowdown, weakened banks' balance sheets, raising the number of non-performing loans, and exerting pressures on their capital base. The reluctance of regulators to force banks to deal promptly and effectively with non-performing loans left the banking system in a fragile situation; this was not the case in the Nordic crises. Some evidence points to the emergence of an equilibrium in which vulnerable banks opted for a policy of "evergreening" loans, whereby credit was extended to fragile firms, so as to avoid them having to recognise further losses on their balance sheets.[131] This process is consistent with the evidence of subdued, yet not contracting, extension of bank credit to the private sector in the aftermath of the bubble burst, which prevented corporate sector debt retrenchment. It was only after almost a decade of having a stagnant economy in Japan (the "lost decade"), and after banks had cleaned their balance sheets and raised capital, that the process of reducing corporate sector debt could begin; it then extended well into the 2000s.

ALTERNATIVE DELEVERAGING PATTERNS AND THE IMPLICATIONS FOR THE EURO AREA

Drawing on the historical episodes presented above, this section focuses on stylised economic patterns associated with deleveraging in the aftermath of financial crises. These distinct patterns primarily differ on issues such as corporate balance sheet adjustment strategies, the interaction among deleveraging processes in various sectors, and the role played by policy. While deleveraging processes do not necessarily call for direct policy interventions per se, historical evidence shows that the design of policy measures to tackle structural corporate finance issues and investment decisions represents a challenging balancing act.

Policy interventions should, in general, avoid disorderly or abrupt deleveraging processes that, in an extreme scenario, could take the following form: banks address their liquidity and funding needs in a disorderly manner, triggering an abrupt deleveraging process through quantitative constraints being imposed on the provision of loans, and associated tightening lending standards. At the same time, the resulting heightened uncertainty and fragile balance sheet conditions lead firms to scale back on investments. Finally, the collective effort by corporations to address debt overhangs by selling assets may trigger falling asset prices which, in turn, reduce a firm's net worth and aggravate balance sheet weaknesses. In such circumstances, both supply-side and demand-side factors have a strong and self-reinforcing adverse impact on the economy. Similarly, household balance sheets can be particularly vulnerable, as a result of the high levels of debt accumulated in the run-up to the crisis, and the bleak labour market prospects. Overall, the synchronised efforts of various sectors

131 For an investigation of the misallocation of credit in Japan in the aftermath of the financial crisis, see, for instance, Peek and Rosengren (2008).

to reduce their leverage then end up being self-defeating, in the context of adverse feedback loops in the economy and sizeable downside risks to price stability. In such an extreme scenario, timely monetary policy interventions may be effective in containing deleveraging pressures that stem from a shortage of liquidity and the associated funding for banks. In addition, these policy measures are conducive to a broader mitigation of macroeconomic risks as they alleviate some of the pressures on the economy. Governments may also provide support to households via the social security net; however, such room for fiscal manoeuvre might be limited by the need to adjust past excesses.

However, some types of policy intervention aimed at preventing an abrupt credit crunch may, when misguided, contribute to delaying the necessary adjustment and, ultimately, increase the economic costs of the deleveraging process. Concerned by the adverse short-term consequences of their interventions on bank lending policies, banking supervisors may be tempted to exercise forbearance towards banks. In this context, excessive and overly protracted monetary accommodation could end up contributing to the masking of underlying balance sheet problems, in ways that make it easier for troubled and inefficient institutions to continue operating. Bank intermediation also becomes durably impaired, and the provision of new credit remains constrained. In addition, it is not only these subdued credit flows that weigh on the recovery process, but also their inefficient allocation. Indeed, in such a context, the risk is the emergence of a situation of the type experienced in Japan during its "lost decade". Fragile banks have an incentive to continue financing troubled and inefficient firms, so as to avoid recognising further losses. In this scenario, the unwinding process can become a long-lasting drag on the economy, and is likely to be curbed by subdued output dynamics.[132] In this constant balancing act, policy interventions should, therefore, avoid delaying the necessary adjustment process.

Balancing the risks described above means encouraging a steady, controlled and ordered restructuring process in the financial and non-financial sectors, consistent with sustainable long-term patterns. These interventions are centred on an early recognition of losses and write-downs on the part of creditors, thereby acknowledging that some lending is no longer viable. An overly indebted non-financial corporate sector puts particular strain on the banking sector. If creditors' balance sheet capacity is also restricted, a prompt recapitalisation of the banking system is of utmost importance, as part of a general effort to reduce excess capacity and improve efficiency in the banking sector.[133] Once the balance sheets of credit institutions have been strengthened, corporate defaults as such may have a much more contained impact on the economy than a banking crisis. Indeed, the typical accelerator mechanisms associated with credit and collateral, inherent to the banking sector, are likely to have a limited role in the case of corporate default. In addition, a firm's default could take the form of a broader cleansing process, in which resources are ultimately reallocated to more productive sectors.[134] Structural reforms aimed at increasing competitiveness and reducing unemployment are a crucial part of crisis resolution, much like exports. Historical evidence and theoretical insights suggest that, in a context of weak domestic demand associated with internal balance sheet adjustments, regaining external competitiveness is crucial for stimulating exports and, hence, sustaining economic recovery.

132 In this context, where the burden of existing debt is relatively large, even otherwise profitable opportunities are not taken up.

133 Private burden-sharing should be used as far as possible. Only if this redistribution does not allow the private sector to fully absorb losses, should the public sector support reparation and strengthen particular segments of the private sector's balance sheets. See the box entitled "Towards a new EU framework for bank recovery and resolution", *Monthly Bulletin*, ECB, August 2012. In this respect, public creditworthiness and the need to build "buffer stocks" in times of more favorable macroeconomic dynamics are of crucial importance.

134 See Giesecke et al. (2012).

Overall, within a comprehensive and in-depth set of policy tools and structural reforms, the process of unwinding excessive debt may have an adverse macroeconomic impact in the short run. At the same time, as fundamentals improve again over the medium term (bolstered by structural and sustainability-enhancing reforms), this process should proceed together with, and be reinforced by, sustained recovery and long-lasting economic growth.

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ANNEXES

I METHODOLOGICAL ISSUES

USING EURO AREA ACCOUNTS TO ANALYSE NON-FINANCIAL CORPORATIONS – METHODOLOGICAL CONCEPTS EXPLAINED[135]

This report uses national financial and non-financial sector accounts data and, for the euro area, the "euro area accounts" (EAA), as these are the most comprehensive data sources for the NFC sector. The EAA report data according to the residence of the respective unit (e.g. an enterprise, independent of whether this unit is controlled by a non-resident unit). The EAA cover non-financial transactions ranging from production and income generation to the use of entrepreneurial income for dividend payments and internal financing. The non-financial transactions are integrated with the financial accounts to provide a full view of internal and external financing together with non-financial and financial investment. Furthermore, transactions are combined with "other changes" (i.e. changes which are not due to transactions) in assets to derive a complete presentation of balance sheet developments. The EAA, as well as the national financial and non-financial accounts, are compiled according to the same international statistical standard.[136] Financial and non-financial accounts data are thus comparable between countries, and the data for NFCs are consistent with data for the other sectors, which are financial corporations, households, governments and the rest of the world. At the same time, the aggregate view provided by macroeconomic data has some limitations, especially with regard to analysing distributional aspects of firms' financing.

Financial accounts data differ from business accounting and other data sources, in particular regarding the valuation of financial assets and liabilities, and the presentation of financial transactions and positions between entities of the same enterprise group. These differences are explained below.

MARKET VALUATION

Financial assets and liabilities are generally valued at current price, which, in the case of debt securities and quoted shares, is equal to the market price.[137] It is worth noting that market valuation applies not just to assets but also to liabilities. In particular, the outstanding amount of equity issued by NFCs may thus vary substantially because of valuation changes. The total change in the market value of NFC equity may be broken down into transactions, i.e. changes owing to the issuance or redemption of new shares, and non-transaction changes, which are generally due to price changes.[138]

INCLUSION OF FINANCIAL POSITIONS BETWEEN NON-FINANCIAL CORPORATIONS

The financial accounts data used in this report are non-consolidated with respect to institutional sectors (loans between resident NFCs are included, for example). Therefore, financial positions

135 Prepared by Andreas Hertkorn.

136 "The European System of Account, 1995" (ESA 1995) defines the accounting rules for the national accounts to be compiled by EU Member States. It is the methodological annex of an EU Regulation, see http://forum.europa.eu.int/irc/dsis/nfaccount/info/data/esa95/en/titelen.htm

137 For unquoted shares, the current price must generally be estimated based on market prices of similar corporations for which market prices are available. Other equity generally has to be valued at own funds (equity and reserves) at book value.

138 Changes in the amounts outstanding can also be the result of other volume changes or reclassifications. These changes, however, occur rather infrequently and scarcely affect the overall picture of the underlying dynamics. In the case of financial assets other than equity, e.g. debt securities and loans, other changes also include write-downs/offs (owing to corporate default, for example).

between NFCs also include assets and liabilities between NFCs belonging to the same enterprise group (intragroup positions). Non-consolidated financial accounts thus differ from the consolidated accounts in business accounting (where intragroup positions are consolidated out). Comprehensive "group-consolidated" data are, however, not available for the NFC sector in the financial accounts or other internationally comparable data sources. Furthermore, consolidated data are, in principle, less comparable for countries of different sizes, as in large countries there tends to be a higher proportion of financing between resident NFCs, i.e. consolidation tends to have a relatively larger effect for bigger economies. In addition, unconsolidated data are informative in that they provide a detailed picture of firms' interconnectedness, which, especially in times of crisis, may also contain refinancing or credit risks.

2 INDICATORS OF FIRMS' CAPITAL STRUCTURE AND FINANCING

Table A1 Maturity of financial assets held by NFCs in the euro area and across countries

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Ratio of short-term to long-term financial assets																		
Average Q1 2000-Q2 2008	49.2	37.5	47.8	61.7	61.7	20.0	13.8	32.1	52.8	23.1	61.7	68.8	29.9	19.8	30.2	67.6	13.1	27.4
Average Q3 2008-Q4 2012	51.2	46.4	76.7	30.8	122.4	20.7	21.9	43.7	74.6	24.8	63.0	52.3	23.8	16.7	37.7	64.5	14.3	32.9
Q4 2012 only	37.7	44.3	76.2	36.9	90.3	19.9	24.5	45.3	64.5	8.0	60.9	46.4	23.7	15.9	38.4	68.2	14.4	32.7

Source: ECB.
Notes: Data are based on market valuation. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A2 Selected liquidity indicators for euro area NFCs

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Net working capital as a percentage of total liabilities																		
Average Q1 2000 – Q2 2008	5.3	1.9	6.1	6.4	-0.8	0.5	0.1	-6.5	5.7	12.0	2.9	8.3	-0.9	-2.7	-2.5	4.3	1.4	0.1
Average Q3 2008 – Q4 2012	10.0	5.6	7.6	5.1	-1.7	2.0	3.0	-3.6	12.5	12.6	3.7	13.1	3.4	-2.3	-3.8	3.4	3.1	2.8
Q4 2012 only	7.8	6.8	9.1	9.1	-4.9	3.2	4.4	-3.3	9.2	3.8	4.8	13.1	4.8	-2.0	-2.8	5.1	3.7	3.9
Ratio of short-term financial assets to short-term liabilities (percentages)																		
Average Q1 2000 – Q2 2008	128.8	117.2	180.4	192.2	96.4	107.9	101.0	53.1	157.1	336.3	118.8	176.3	96.0	72.3	76.7	149.1	151.3	101.6
Average Q3 2008 – Q4 2012	163.2	155.5	195.8	164.7	91.3	138.6	145.8	69.6	242.0	365.6	125.0	236.8	144.2	73.8	71.0	136.8	213.1	130.6
Q4 2012 only	162.0	173.6	229.0	215.5	72.2	171.3	168.0	72.7	205.0	273.0	134.2	240.0	167.9	74.4	76.6	154.4	245.8	144.6
Cash ratio 1 (expressed as a percentage)																		
Average Q1 2000 – Q2 2008	36.9	73.5	103.5	158.4	96.4	107.6	58.4	44.6	151.0	319.2	46.6	123.3	76.2	71.3	49.9	137.0	150.5	66.9
Average Q3 2008 – Q4 2012	45.4	98.9	109.2	80.1	91.3	136.8	83.2	60.6	235.1	336.1	54.5	176.1	100.7	71.4	36.6	110.2	212.7	84.4
Q4 2012 only	48.5	115.7	130.4	81.1	72.2	165.7	101.2	65.0	198.0	194.4	65.8	169.9	116.2	73.1	40.6	119.5	245.7	95.7
Cash ratio 2 (expressed as a percentage)																		
Average Q1 2000 – Q2 2008	33.9	69.1	100.5	153.2	93.5	102.8	52.9	44.4	147.5	318.5	46.3	117.5	75.4	70.0	48.2	133.4	124.8	64.1
Average Q3 2008 – Q4 2012	41.8	97.7	107.9	78.5	85.4	131.1	75.9	60.4	233.3	335.2	54.5	168.5	100.1	70.7	36.0	107.6	190.4	80.6
Q4 2012 only	45.2	114.9	129.1	80.0	69.5	157.4	94.6	64.9	194.4	193.2	65.8	162.5	115.4	72.2	40.2	117.9	229.9	92.3

Source: ECB.
Notes: Data are based on market valuation. Net working capital is calculated as the difference between short-term financial assets and short-term liabilities (equal to the sum of short-term loans and short-term debt securities). Cash ratio 1 = (currency and deposits + short-term debt securities)/short-term liabilities. Cash ratio 2 = (currency and deposits)/short-term liabilities. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A3 Capital structure indicators for euro area NFCs

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Debt-to-equity ratio (percentages)																		
Average Q1 2000 – Q2 2008	60.7	90.6	60.1	109.4	64.2	63.8	44.9	71.5	73.0	16.0	94.1	78.6	108.7	70.5	59.6	54.0	52.2	65.6
Average Q3 2008 – Q4 2012	55.0	93.1	63.8	94.3	190.4	100.6	52.9	94.0	96.7	40.5	98.1	75.7	89.2	84.9	94.0	63.4	86.0	77.2
Q4 2012 only	49.2	83.7	58.6	86.3	151.8	89.6	51.6	103.2	93.7	50.4	119.7	67.8	92.6	94.3	92.3	58.7	90.5	73.7
Debt-to-equity ratio (using long-term debt, percentages)																		
Average Q1 2000 – Q2 2008	29.8	63.4	45.5	88.5	37.5	50.9	33.5	43.4	52.3	9.7	56.6	56.4	83.2	50.5	39.1	35.7	47.2	46.3
Average Q3 2008 – Q4 2012	30.0	68.1	48.1	73.2	130.0	87.6	40.7	66.6	76.4	33.0	60.6	56.6	73.3	65.9	63.1	43.3	80.1	57.7
Q4 2012 only	30.3	62.8	45.1	68.2	103.4	79.7	40.2	72.8	73.7	46.9	80.0	50.6	78.2	75.7	64.3	40.0	85.2	56.0
Change in the debt-to-equity ratio between the pre-crisis and the crisis period, based on notional stocks (in percentage points)																		
	4.1	1.0	9.2	62.7	49.5	29.6	10.2	20.1	23.7	15.2	-10.0	3.2	1.9	17.0	31.2	12.9	21.7	13.8
Change in the debt-to-equity ratio (using long-term debt) between the pre-crisis and the crisis period, based on notional stocks (in percentage points)																		
	4.9	3.2	6.9	42.5	42.2	29.3	8.2	21.4	24.0	19.0	-7.7	3.9	5.1	16.6	21.3	9.7	20.7	12.4

Source: ECB.
Notes: Data are based on market valuation unless otherwise noted. Notional stocks have been calculated as the change in the amounts outstanding (taking the first quarter of 2000 as the base period (or a later starting point depending on data availability)) owing to transactions, i.e. excluding valuation changes. "Equity" corresponds to shares and other equity as defined in financial accounts. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A4 Capital structure indicators for euro area NFCs, as a percentage of total liabilities

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Debt																		
Average Q1 2000 – Q2 2008	36.7	38.6	32.0	42.1	36.1	31.3	26.6	34.4	35.4	13.1	39.0	38.2	49.4	34.4	29.7	26.6	31.0	33.8
Average Q3 2008 – Q4 2012	35.0	38.5	32.7	40.5	61.3	42.1	29.6	40.3	41.9	27.1	39.1	38.1	44.5	39.0	39.1	30.4	41.0	37.4
Q4 2012 only	32.7	36.8	30.8	37.8	55.4	40.5	29.2	41.6	41.1	31.5	42.0	36.6	45.2	40.7	39.3	29.2	42.7	36.6
Shares and other equity																		
Average Q1 2000 – Q2 2008	61.0	43.3	53.3	39.6	58.6	49.3	60.1	48.5	48.7	81.6	41.4	49.2	46.8	48.9	50.1	49.4	60.4	51.9
Average Q3 2008 – Q4 2012	63.9	41.5	51.2	43.1	32.6	42.0	56.1	43.0	43.4	67.7	40.0	50.6	49.9	46.0	41.6	47.9	47.9	48.5
Q4 2012 only	66.4	44.0	52.6	43.8	36.5	45.2	56.5	40.3	43.9	62.5	35.1	54.0	48.8	43.2	42.5	49.7	47.2	49.6
Other liabilities																		
Average Q1 2000 – Q2 2008	2.3	18.1	14.8	18.2	5.3	19.4	13.3	17.1	15.9	5.4	19.6	12.7	3.8	16.8	20.1	23.9	8.6	14.3
Average Q3 2008 – Q4 2012	1.1	20.0	16.1	16.4	6.2	15.9	14.4	16.6	14.7	5.1	20.9	11.4	5.6	15.0	19.4	21.7	11.0	14.1
Q4 2012 only	0.9	19.2	16.6	18.4	8.1	14.3	14.3	18.2	15.0	6.0	23.0	9.4	6.0	16.1	18.2	21.1	10.1	13.8
Change in the proportion of debt between the pre-crisis and the crisis period, based on notional stocks (in percentage points)	1.8	-0.1	2.8	13.5	13.1	10.5	4.8	6.8	6.5	8.8	-3.7	2.3	1.0	6.0	9.3	4.7	7.2	5.0
Change in the proportion of shares and other equity between the pre-crisis and the crisis period, based on notional stocks (in percentage points)	-1.8	-0.7	-5.4	-15.4	-12.6	-8.0	-3.4	-4.4	-5.3	-8.9	0.2	0.9	0.0	-3.4	-9.3	-3.0	-9.1	-3.7
Change in the proportion of other liabilities between the pre-crisis and the crisis period, based on notional stocks (in percentage points)	0.0	0.8	2.6	1.8	-0.6	-2.6	-1.4	-2.4	-1.2	0.2	3.6	-3.1	-1.0	-2.5	0.0	-1.7	1.9	-1.3

Source: ECB.
Notes: Data are based on market valuation unless otherwise noted. Notional stocks have been calculated as the change in the amounts outstanding (taking the first quarter of 2000 as the base period (or a later starting point depending on data availability)) owing to transactions, i.e. excluding valuation changes. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A5 MFI loans in euro area NFCs' capital structure, as a percentage of total debt and total liabilities

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Proportion of MFI loans in total debt (percentages)																		
Average Q1 2000 – Q2 2008	21.4	50.2	45.2	42.3	70.6	58.3	39.6	60.4	47.5	20.6	43.5	47.5	62.7	45.7	57.7	25.5	25.7	49.1
Average Q3 2008 – Q4 2012	16.2	46.9	42.3	39.3	72.9	59.6	39.2	62.2	76.3	13.1	43.4	56.7	45.2	42.9	59.3	46.1	28.5	49.9
Q4 2012 only	14.4	45.5	37.4	28.2	79.4	51.5	37.0	62.8	76.0	9.9	37.8	58.1	43.2	38.5	55.6	44.6	28.9	46.7
Proportion of MFI loans in total liabilities (percentages)																		
Average Q1 2000 – Q2 2008	7.9	19.4	15.0	17.5	25.4	18.2	10.5	20.8	17.1	2.7	16.9	18.1	31.6	15.7	17.2	7.1	8.1	16.6
Average Q3 2008 – Q4 2012	5.7	18.0	13.9	16.0	44.8	25.1	11.6	25.1	32.0	3.4	16.9	21.6	20.1	16.7	23.2	14.0	11.7	18.7
Q4 2012 only	4.7	16.8	11.5	10.6	44.0	20.9	10.8	26.1	31.2	3.1	15.9	21.3	19.5	15.7	21.8	13.0	12.3	17.1
Change in the proportion of MFI loans in total liabilities between the pre-crisis and the crisis period, based on notional stocks (in percentage points)																		
	-1.5	-1.3	-1.4	3.4	4.6	7.1	1.4	4.3	14.9	0.9	-0.3	4.5	-3.8	1.1	5.7	7.0	2.8	2.6

Source: ECB.
Notes: Data are based on market valuation unless otherwise noted. Notional stocks have been calculated as the change in the amounts outstanding (taking the first quarter of 2000 as the base period (or a later starting point depending on data availability)) owing to transactions, i.e. excluding valuation changes. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A6 Maturity structure of NFCs' liabilities

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Ratio of short-term to long-term liabilities (percentages)																		
Average Q1 2000 – Q2 2008	23.7	16.5	10.0	11.4	19.2	8.6	8.4	19.6	13.6	5.7	23.9	14.1	13.6	13.3	14.7	13.5	3.3	13.2
Average Q3 2008 – Q4 2012	19.2	14.8	10.6	12.2	26.2	6.9	8.6	16.5	11.5	5.7	23.4	12.2	9.2	11.5	19.0	14.0	3.3	12.4
Change in the ratio of short-term to long-term liabilities between the pre-crisis and the crisis period, based on notional stocks (in percentage points)																		
	-1.4	-1.7	1.2	8.7	-1.2	-0.9	1.1	-3.4	-2.0	-3.9	-0.2	-0.8	-2.2	-1.0	4.7	1.4	0.2	-0.1

Source: ECB.
Notes: Data are based on market valuation unless otherwise noted. Notional stocks have been calculated as the change in the amounts outstanding (taking the first quarter of 2000 as the base period (or a later starting point depending on data availability)) owing to transactions, i.e. excluding valuation changes. Short-term liabilities comprise short-term loans and short-term debt securities. Long-term liabilities comprise shares and other equity, long-term loans, pension fund reserves and long-term debt securities. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A7 composition of NFCs' short-term liabilities

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Short-term loans																		
Average Q1 2000 – Q2 2008	96.9	94.8	98.5	100.0	99.9	97.7	88.8	98.2	100.0	88.8	100.0	99.8	99.4	78.9	99.0	97.0	59.5	94.9
Average Q3 2008 – Q4 2012	97.0	96.1	99.2	100.0	99.9	99.1	94.8	98.8	99.5	94.1	100.0	99.8	99.4	60.3	99.3	99.4	63.7	96.3
Short-term debt securities																		
Average Q1 2000 – Q2 2008	3.1	5.2	1.5	0.0	0.1	2.3	11.2	1.8	0.0	11.2	0.0	0.2	0.6	21.1	1.0	3.0	40.5	5.1
Average Q3 2008 – Q4 2012	3.0	3.9	0.8	0.0	0.1	0.9	5.2	1.2	0.5	5.9	0.0	0.2	0.6	39.7	0.7	0.6	36.3	3.7

Source: ECB.
Notes: Data are based on market valuation. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A8 Composition of NFCs' long-term liabilities

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Long-term loans																		
Average Q1 2000 – Q2 2008	21.5	29.2	29.5	44.6	22.1	32.8	19.0	23.3	33.8	7.0	30.4	31.1	38.4	30.9	27.3	23.8	28.7	26.2
Average Q3 2008 – Q4 2012	21.7	29.7	30.2	40.8	49.0	46.2	22.0	32.3	41.2	20.5	32.7	32.0	34.0	36.1	37.5	29.2	39.3	30.9
Long-term debt securities																		
Average Q1 2000 – Q2 2008	1.1	2.4	1.8	1.4	4.6	0.6	5.9	2.1	0.4	1.7	5.8	4.7	6.5	2.1	0.7	2.5	3.1	3.3
Average Q3 2008 – Q4 2012	1.3	3.4	2.2	1.4	7.3	0.4	6.8	3.4	2.1	3.9	5.0	4.0	8.3	2.9	1.1	1.0	5.1	3.9
Shares and other equity																		
Average Q1 2000 – Q2 2008	77.1	61.5	68.8	54.0	73.3	66.5	75.1	69.9	65.7	91.1	63.9	64.2	55.1	66.5	71.9	73.7	68.2	68.5
Average Q3 2008 – Q4 2012	76.9	59.5	67.6	57.8	43.7	53.4	71.1	60.1	56.7	75.5	62.4	63.9	57.7	60.4	61.4	69.8	55.6	63.4
Pension fund reserves																		
Average Q1 2000 – Q2 2008	0.2	7.0	0.0	0.0	0.0	0.2	0.0	4.7	0.0	0.2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	2.0
Average Q3 2008 – Q4 2012	0.0	7.4	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.2	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.8

Source: ECB.
Notes: Data are based on market valuation. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A9 Composition of the total debt of NFCs, broken down by maturity

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Short-term loans																		
Average Q1 2000 – Q2 2008	49.2	28.5	23.9	20.2	42.0	20.1	22.5	39.0	28.4	34.9	39.8	28.3	22.9	22.4	33.8	32.9	5.7	28.0
Average Q3 2008 – Q4 2012	43.9	25.6	24.5	22.2	31.7	12.8	21.8	28.8	20.9	18.4	38.3	25.2	17.8	13.6	32.8	31.5	4.4	24.3
Short-term debt securities																		
Average Q1 2000 – Q2 2008	1.6	1.5	0.4	0.0	0.0	0.5	2.9	0.7	0.0	4.4	0.0	0.1	0.1	6.0	0.3	1.0	3.8	1.5
Average Q3 2008 – Q4 2012	1.4	1.0	0.2	0.0	0.0	0.1	1.2	0.4	0.1	1.2	0.0	0.1	0.1	8.9	0.2	0.2	2.5	0.9
Long-term loans																		
Average Q1 2000 – Q2 2008	46.3	53.0	71.5	77.3	48.2	77.4	57.2	46.8	70.7	47.7	50.6	62.3	65.8	66.0	64.1	59.8	81.6	58.7
Average Q3 2008 – Q4 2012	51.6	53.8	70.1	75.2	59.3	86.2	58.7	57.3	75.1	67.2	53.6	66.4	66.1	70.6	65.1	66.1	82.4	63.1
Long-term debt securities																		
Average Q1 2000 – Q2 2008	2.4	4.3	4.3	2.5	9.7	1.5	17.5	4.2	0.9	11.8	9.6	9.3	11.2	4.6	1.7	6.3	8.8	7.3
Average Q3 2008 – Q4 2012	3.1	6.1	5.1	2.6	8.9	0.8	18.3	5.9	3.9	12.5	8.1	8.4	16.1	5.7	1.9	2.2	10.7	8.1
Pension fund reserves																		
Average Q1 2000 – Q2 2008	0.5	12.8	0.0	0.0	0.0	0.4	0.0	9.4	0.0	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0	4.5
Average Q3 2008 – Q4 2012	0.1	13.4	0.0	0.0	0.0	0.0	0.0	7.6	0.0	0.6	0.0	0.0	0.0	1.2	0.0	0.0	0.0	3.6

Source: ECB.
Notes: Data are based on market valuation. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. EA denotes euro area.

Table A10 Overview of the external financing growth of non–financial corporations across euro area countries

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Annual rate of change across financing instruments (percentages)																		
Total external financing (total liabilities)																		
Average Q1 2000 – Q2 2008	5.9	2.7	13.4	7.0	7.3	8.9	3.9	4.0	15.7	14.5	10.5	3.2	7.8	5.9	8.8	13.4	2.9	4.7
Average Q3 2008 – Q4 2012	5.6	1.4	2.2	0.8	0.9	–0.3	2.6	1.1	5.5	–1.7	4.7	0.4	1.3	2.0	0.6	2.2	2.0	1.6
Shares and other equity																		
Average Q1 2000 – Q2 2008	3.9	2.9	5.9	2.5	3.6	4.0	2.8	1.6	14.3	15.1	14.5	2.7	9.0	5.5	0.6	11.3	0.6	3.0
Average Q3 2008 – Q4 2012	5.8	1.0	3.4	–4.6	2.1	1.9	2.4	1.8	5.4	–7.7	2.5	1.8	0.1	1.9	0.8	2.1	1.8	1.9
Debt financing (loans, debt securities issued, pension fund reserves of NFCs)																		
Average Q1 2000 – Q2 2008	8.7	3.1	20.2	10.4	14.5	16.0	8.0	8.7	19.4	16.0	4.0	4.7	6.8	7.9	20.7	18.5	7.0	8.0
Average Q3 2008 – Q4 2012	5.1	1.0	–1.2	4.4	0.5	–0.1	2.8	0.4	5.5	15.6	3.9	0.9	2.5	3.1	1.8	2.1	2.9	1.6
Trade credit payable*																		
Average Q1 2000 – Q2 2008	3.5	2.9	4.1	8.1	N.A.	10.3	3.8	1.6	9.4	N.A.	20.9	3.7	11.2	4.8	13.0	16.6	5.0	4.7
Average Q3 2008 – Q4 2012	69.1	4.8	5.4	3.5	N.A.	–8.0	3.1	1.0	7.0	N.A.	11.3	–2.1	5.9	–0.3	–1.3	3.0	–0.8	0.5
Debt financing, of which:																		
Loans																		
Average Q1 2000 – Q2 2008	8.7	2.4	19.7	10.7	12.7	16.8	8.6	8.6	18.0	19.4	4.2	4.9	6.2	7.2	20.7	20.0	6.7	8.1
Average Q3 2008 – Q4 2012	4.7	0.4	–1.8	4.3	1.0	–0.1	1.1	–0.1	7.3	13.1	3.7	0.3	0.6	2.8	1.6	2.2	1.9	0.9
Debt securities issued																		
Average Q1 2000 – Q2 2008	12.1	13.2	32.5	–0.4	41.4	–3.5	5.8	19.6	N.A.	1.8	2.1	4.0	11.8	13.4	25.4	6.7	10.1	8.3
Average Q3 2008 – Q4 2012	14.3	5.3	11.4	8.8	–4.2	4.8	11.0	11.5	–36.8	38.4	5.3	9.5	13.8	4.9	20.3	0.8	10.5	9.5
Pension fund reserves																		
Average Q1 2000 – Q2 2008	0.7	4.1	N.A.	N.A.	N.A.	–11.8	N.A.	5.7	N.A.	9.2	N.A.	N.A.	N.A.	12.5	N.A.	N.A.	N.A.	4.3
Average Q3 2008 – Q4 2012	97.3	2.1	N.A.	N.A.	N.A.	N.A.	N.A.	–1.6	N.A.	–9.3	N.A.	N.A.	N.A.	–0.3	N.A.	N.A.	N.A.	0.9
Loans, of which:																		
MFI loans (domestic)																		
Average Q1 2000 – Q2 2008	2.6	1.3	N.A.	24.5	13.2	18.8	6.3	8.9	21.7	12.9	3.9	6.5	3.8	8.9	25.3	23.4	7.6	8.0
Average Q3 2008 – Q4 2012	–1.1	0.1	–3.4	–6.7	–2.7	–3.5	1.8	0.8	6.2	–2.9	2.8	3.3	1.4	–0.6	–0.8	1.2	3.8	–0.2
Inter–company loans**																		
Average Q1 2000 – Q2 2008	13.2	10.3	2.3	N.A.	N.A.	5.7	9.7	6.1	N.A.	29.5	N.A.	N.A.	35.1	8.5	17.8	11.4	3.6	10.3
Average Q3 2008 – Q4 2012	3.1	1.0	–3.1	N.A.	N.A.	7.8	–0.9	–12.2	N.A.	24.1	N.A.	N.A.	0.1	10.0	9.1	21.5	2.4	2.8

Table A10 Overview of the external financing growth of non–financial corporations across euro area countries (cont'd)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Other loans (mainly from other financial institutions)																		
Average Q1 2000 – Q2 2008	6.9	4.7	15.6	5.2	6.5	20.1	15.3	3.2	10.2	8.5	5.8	3.7	8.5	9.1	7.3	16.4	12.0	6.2
Average Q3 2008 – Q4 2012	12.4	1.0	2.2	14.5	18.5	4.3	1.9	–0.9	13.0	15.8	4.6	–4.2	0.9	4.3	4.0	2.1	0.6	1.8
Annual rate of change across maturities (in percentages)																		
Short–term debt financing (short–term loans, short–term debt securities issued)																		
Average Q1 2000 – Q2 2008	7.5	3.1	15.5	18.5	11.2	12.0	8.4	3.4	14.1	19.0	6.6	4.5	2.9	7.2	27.0	22.1	11.4	6.4
Average Q3 2008 – Q4 2012	1.8	–3.5	–2.6	4.1	–2.2	–10.7	1.3	–3.0	5.8	–13.2	5.1	1.1	–3.5	–3.0	–3.8	–0.4	–4.3	–1.6
Long–term debt financing (long–term loans, long–term debt securities issued, pension fund reserves)																		
Average Q1 2000 – Q2 2008	10.1	3.1	22.1	9.1	17.0	17.3	7.9	12.7	21.7	14.5	2.4	4.8	8.2	8.2	17.5	16.7	6.7	8.7
Average Q3 2008 – Q4 2012	7.9	2.8	–0.3	5.1	2.0	1.7	3.3	2.1	5.4	30.6	3.2	1.0	3.9	5.0	5.2	3.3	3.6	2.8
Long–term external financing (shares and other equity, long–term loans, long–term debt securities issued, pension fund reserves)																		
Average Q1 2000 – Q2 2008	5.3	3.0	10.9	5.2	7.1	8.3	4.0	4.8	16.6	15.0	10.0	3.3	8.5	6.3	5.2	12.6	2.3	4.7
Average Q3 2008 – Q4 2012	6.3	1.7	2.1	–0.6	1.8	1.8	2.6	1.8	5.4	–1.5	2.8	1.5	1.6	3.0	2.4	2.4	2.5	2.3
Short–term debt financing, of which:																		
Short–term loans																		
Average Q1 2000 – Q2 2008	7.4	2.4	15.1	18.5	11.2	12.6	10.4	3.3	14.1	21.5	6.4	4.5	3.0	3.8	27.2	22.5	11.4	6.5
Average Q3 2008 – Q4 2012	1.9	–2.6	–2.0	4.1	–2.2	–10.5	1.3	–3.0	5.8	–12.6	5.7	1.1	–3.6	–6.1	–3.9	–0.4	–6.4	–1.4
Short–term debt securities																		
Average Q1 2000 – Q2 2008	16.7	23.1	132.9	N.A.	30.8	–3.7	–6.2	19.0	N.A.	1.8	N.A.	202.3	–8.6	21.1	19.1	237.0	13.6	4.9
Average Q3 2008 – Q4 2012	0.9	–10.2	–44.6	N.A.	N.A.	–11.3	3.9	–2.6	45.6	–18.5	N.A.	170.5	62.3	2.0	19.8	–1.1	1.1	–4.2
Long–term debt financing, of which:																		
Long–term loans																		
Average Q1 2000 – Q2 2008	10.2	2.4	21.8	9.3	14.4	18.2	7.9	13.6	19.7	18.7	2.5	5.2	7.5	8.3	17.3	18.8	6.5	8.9
Average Q3 2008 – Q4 2012	7.1	2.0	–1.4	5.0	3.3	1.6	1.0	1.7	7.8	28.4	2.4	0.1	1.8	4.7	4.8	3.5	2.5	1.9
Long–term debt securities																		
Average Q1 2000 – Q2 2008	12.1	11.4	30.2	0.4	42.1	–2.4	8.4	20.3	N.A.	1.8	1.3	4.2	12.3	6.5	35.9	0.3	9.1	9.2
Average Q3 2008 – Q4 2012	22.3	12.2	14.9	8.8	–4.2	14.0	12.0	12.6	–37.5	50.8	8.2	9.5	13.7	9.9	22.7	1.3	14.6	12.1

Source: ECB.
Notes: The calculation of average annual growth rates is based on the respective data ranges shown in the table. Data are only available for Estonia from the fourth quarter of 2003; for Cyprus, Slovenia and Slovakia from the first quarter of 2004; and for Luxembourg and Malta from the first quarter of 2005. Trade credit data are published quarterly for Germany, Estonia (from 2007 onwards), Spain, France, Italy, Austria (from 2006 onwards), Portugal, Slovenia (from 2004 onwards), Slovakia (from 2004 onwards) and Finland; trade credit data for the other euro area countries are based on annual data and available until 2011. Averages based on annual data refer to the periods 2000–08 and 2009–2011. Inter–company loan data are available for Belgium, Germany, Estonia, Spain, France, Italy, Luxembourg, Austria, Portugal, Slovenia, Slovakia and Finland. EA denotes euro area.

Table A11 Selected balance sheet indicators for NFCs across euro area countries

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Debt-to-GDP ratio																		
Average Q1 2000 - Q2 2008	145	70	86	115	54	97	88	73	108	134	133	97	83	120	68	51	93	86
Average Q3 2008 - Q4 2012	179	69	102	185	67	139	103	90	172	285	147	94	104	157	96	49	115	103
Debt-to-gross operating surplus ratio																		
Average Q1 2000 - Q2 2008	736	316	N.A.	408	256	568	563	337	N.A.	N.A.	N.A.	437	384	691	439	N.A.	378	428
Average Q3 2008 - Q4 2012	862	299	N.A.	711	331	732	694	476	N.A.	N.A.	N.A.	423	483	906	607	N.A.	544	523
Debt-to-total liabilities ratio																		
Average Q1 2000 - Q2 2008	37	39	32	42	36	31	27	34	35	13	39	38	49	34	30	27	31	34
Average Q3 2008 - Q4 2012	35	38	33	40	61	42	30	40	42	27	39	38	44	39	39	30	41	37
Debt-to-equity ratio																		
Average Q1 2000 - Q2 2008	61	91	60	109	64	64	45	71	73	16	94	79	109	71	60	54	52	66
Average Q3 2008 - Q4 2012	55	93	64	94	190	101	53	94	97	40	98	76	89	85	94	63	86	77
Interest rate payment burden																		
Average Q1 2000 - Q2 2008	26	13	N.A.	9	10	19	31	10	N.A.	N.A.	N.A.	18	11	20	14	N.A.	16	17
Average Q3 2008 - Q4 2012	22	12	N.A.	14	9	20	28	9	N.A.	N.A.	N.A.	16	13	25	19	N.A.	23	16
Debt maturities (percentage of total debt)																		
Average Q1 2000 - Q2 2008																		
short-term loans	49	28	24	20	42	20	22	39	28	35	40	28	23	22	34	33	6	28
short-term securities	2	2	0	0	0	0	3	1	0	4	0	0	0	6	0	1	4	2
long-term loans	46	53	71	77	48	77	57	47	71	48	51	62	66	66	64	60	82	59
long-term securities	2	4	4	3	10	2	17	4	1	12	10	9	11	5	2	6	9	7
pension funds	0	13	0	0	0	0	0	9	0	1	0	0	0	1	0	0	0	4
Average Q3 2008 - Q4 2012																		
short-term loans	44	26	25	22	32	13	22	29	21	19	39	25	18	14	33	31	4	24
short-term securities	2	2	0	0	0	0	3	1	0	4	0	0	0	6	0	1	4	2
long-term loans	46	53	71	77	48	77	57	47	71	48	51	62	66	66	64	60	82	59
long-term securities	2	4	4	3	10	2	17	4	1	12	10	9	11	5	2	6	9	7
pension funds	0	13	0	0	0	0	0	9	0	1	0	0	0	1	0	0	0	4
Ratio of short-term assets to short-term debt (percentages)																		
Average Q1 2000 - Q2 2008	129	117	180	192	96	108	101	53	157	336	119	176	96	72	77	149	151	102
Average Q3 2008 - Q4 2012	163	156	196	165	91	139	146	70	242	366	125	237	144	74	71	137	213	131

Source: ECB.
Notes: Data are based on market valuation. Debt is defined as the sum of loans, debt securities issued and pension fund reserves of NFCs. Short-term debt is defined as debt with an original maturity of up to one year, while long-term debt is defined as debt with an original maturity of over one year. EA denotes euro area.

Table A12 Ratio of MFI loans to gross value added, and MFI loan growth across sectors of economic activity

(percentages)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Ratio of MFI loans to gross value added across sectors of economic activity																		
All sectors																		
Average Q1 2003 – Q2 2008	34.7	39.5	N.A.	87.5	41.1	77.1	40.9	52.8	102.9	146.0	85.2	54.4	55.8	68.2	51.0	27.0	30.6	49.5
Average Q3 2008 – Q4 2012	35.8	40.5	49.8	89.3	57.1	90.8	48.6	63.5	156.7	157.4	97.4	67.5	61.2	79.2	66.2	25.7	38.8	56.8
Industry																		
Average Q1 2003 – Q2 2008	37.2	24.0	N.A.	30.7	78.7	75.2	35.2	91.7	120.4	196.2	76.7	36.0	46.6	62.6	53.8	23.3	27.5	47.2
Average Q3 2008 – Q4 2012	43.9	30.0	40.9	27.2	105.7	94.8	44.4	108.1	219.7	304.0	125.3	48.0	47.1	78.2	96.8	26.6	39.0	57.0
Construction and real estate services																		
Average Q1 2003 – Q2 2008	78.1	91.0	N.A.	318.0	39.0	181.1	108.4	95.6	213.7	390.9	249.6	119.2	126.7	195.4	46.5	48.4	86.4	115.5
Average Q3 2008 – Q4 2012	92.0	88.5	142.4	474.7	53.8	237.1	135.9	127.4	376.4	470.9	324.6	223.8	180.5	220.1	124.9	52.4	105.5	142.8
Wholesale and retail trade																		
Average Q1 2003 – Q2 2008	35.3	28.9	N.A.	46.7	41.8	33.3	27.5	38.9	105.0	110.2	65.3	30.4	30.5	44.9	61.8	29.7	19.7	32.8
Average Q3 2008 – Q4 2012	33.4	26.8	27.6	48.7	52.5	34.5	28.3	44.5	121.3	101.3	75.5	40.4	30.9	42.9	77.0	25.4	23.1	34.7
Services other than real estate																		
Average Q1 2003 – Q2 2008	16.1	31.9	N.A.	36.9	28.4	46.3	17.5	18.4	37.4	70.0	60.3	38.0	47.6	38.0	47.0	19.6	11.0	28.0
Average Q3 2008 – Q4 2012	15.0	30.8	23.6	33.9	46.6	55.3	18.2	20.0	67.9	64.5	55.6	32.9	36.9	51.2	22.5	12.4	14.6	28.9
Annual rate of growth of MFI loans across main sectors of economic activity																		
All sectors																		
Average Q1 2003 – Q2 2008	5.5	1.4	N.A.	27.0	10.8	22.5	8.3	8.8	22.4	8.0	12.7	8.2	1.9	6.7	29.4	23.4	10.1	9.2
Average Q3 2008 – Q4 2012	–1.6	–0.4	–5.2	–15.0	3.0	–4.6	1.5	0.5	7.0	–4.9	3.1	3.5	2.4	–1.4	–0.9	1.0	3.7	–0.7
Industry																		
Average Q1 2003 – Q2 2008	3.5	2.4	N.A.	13.2	4.1	12.1	5.7	5.0	3.2	6.0	12.8	7.6	–0.1	2.3	20.8	22.9	6.2	5.7
Average Q3 2008 – Q4 2012	–1.6	1.6	–1.3	–13.4	13.7	–3.1	–0.5	–2.3	25.5	–4.8	6.6	5.2	0.2	1.3	6.4	4.1	–0.5	–0.6
Construction and real estate services																		
Average Q1 2003 – Q2 2008	9.1	1.1	N.A.	37.0	22.4	32.9	10.6	15.0	34.3	10.2	22.7	8.3	7.0	9.6	108.3	24.6	11.4	13.6
Average Q3 2008 – Q4 2012	1.2	0.3	–6.3	–16.4	–3.9	–6.6	3.4	2.5	2.4	–3.1	–1.4	13.2	3.4	–4.4	5.1	5.9	6.9	–0.2
Wholesale and retail trade																		
Average Q1 2003 – Q2 2008	4.3	–0.9	N.A.	18.8	9.3	15.8	4.1	7.0	4.5	5.0	4.3	5.0	1.2	5.0	14.5	22.6	11.4	5.9
Average Q3 2008 – Q4 2012	–4.0	–1.9	–7.7	–12.5	–3.5	–3.0	1.0	0.4	4.7	–6.2	6.4	9.3	–0.1	–4.2	3.0	–2.3	–0.7	–0.6
Services other than real estate																		
Average Q1 2003 – Q2 2008	4.6	1.9	N.A.	16.7	14.3	18.6	8.6	7.6	40.7	7.4	8.5	11.1	–2.4	6.0	33.9	23.6	11.5	7.6
Average Q3 2008 – Q4 2012	–0.5	–2.5	–5.8	–12.2	10.9	–1.9	–2.3	2.2	14.0	–7.8	4.7	–7.6	3.6	3.2	–12.9	–5.3	5.4	–2.0

Source: ECB.
Notes: Data are available from the first quarter of 2003. Data are only available for Malta from the first quarter of 2005; for Cyprus and Slovenia from the fourth quarter of 2005; for Slovakia from the first quarter of 2006; and for Estonia from the first quarter of 2009. EA denotes euro area.

Table A13 Change in the debt-to-equity ratio of NFCs across euro area countries

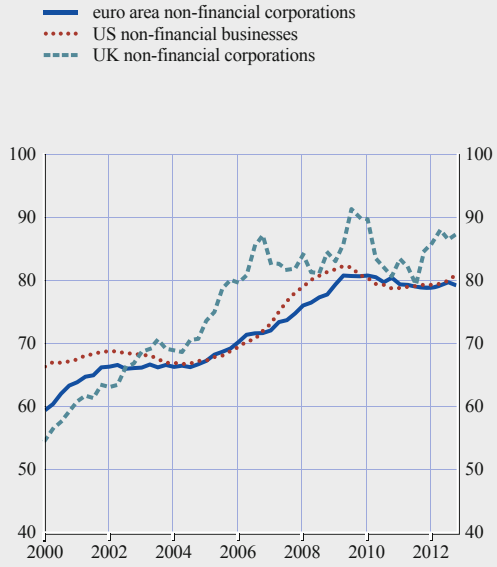
(percentage points)

	BE	DE	EE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK	FI	EA
Average Q1 2000 - Q2 2008																		
Overall change	2.2	22.4	1.0	23.8	91.2	43.3	17.3	30.3	22.6	4.2	-10.1	24.5	-53.1	16.1	28.1	14.7	41.9	24.1
Change owing to transactions	17.3	2.8	41.1	77.6	47.9	77.0	20.9	49.0	22.6	1.3	-21.9	12.8	-28.3	16.2	56.1	65.7	33.5	27.5
Change owing to valuation effects	-15.1	19.6	-40.1	-53.8	43.3	-33.6	-3.5	-18.7	0.0	2.9	11.8	11.7	-24.7	-0.1	-28.0	-51.0	8.4	-3.4
Average Q3 2008 - Q4 2012																		
Overall change	-12.7	-9.1	-6.2	-14.7	5.9	-1.1	0.5	20.0	-2.6	28.5	25.8	-16.0	4.6	17.7	8.6	-7.9	13.3	-1.7
Change owing to transactions	-6.1	0.6	-22.2	129.2	-1.8	-16.0	-0.9	-9.4	-2.6	21.0	14.7	-4.4	11.0	3.7	0.6	-0.3	3.9	-2.8
Change owing to valuation effects	-6.6	-9.7	16.0	-143.9	7.8	14.9	1.3	29.4	0.0	7.5	11.2	-11.5	-6.4	14.0	8.0	-7.6	9.4	1.1

Source: ECB.
Notes: Data are based on amounts outstanding at market valuation and on notional stocks. Notional stocks have been calculated as the change in the amounts outstanding (taking the first quarter of 2000 as the base period (or a later starting point depending on data availability)) owing to transactions, i.e. excluding valuation changes. EA denotes euro area.

Chart A1 Debt-to-GDP ratio of NFCs in the euro area, United States and United Kingdom

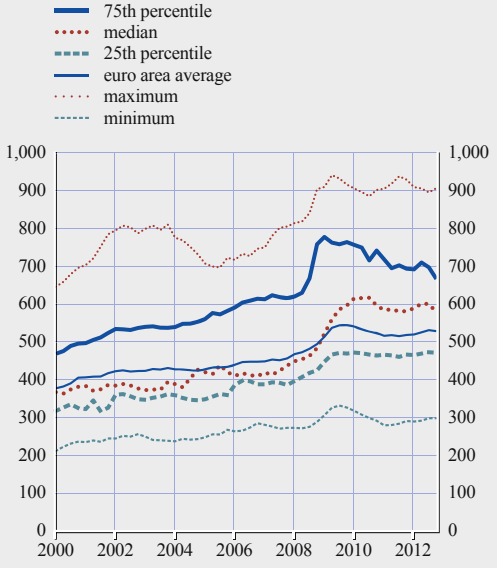
(percentages)



Sources: ECB and Board of Governors of the US Federal Reserve System.
Notes: Data are based on consolidated outstanding amounts. For data comparability reasons, debt is defined as loans (excluding inter-company loans), debt securities and, for the euro area, pension fund reserves.

Chart A2 Debt-to-gross operating surplus ratio of NFCs across euro area countries

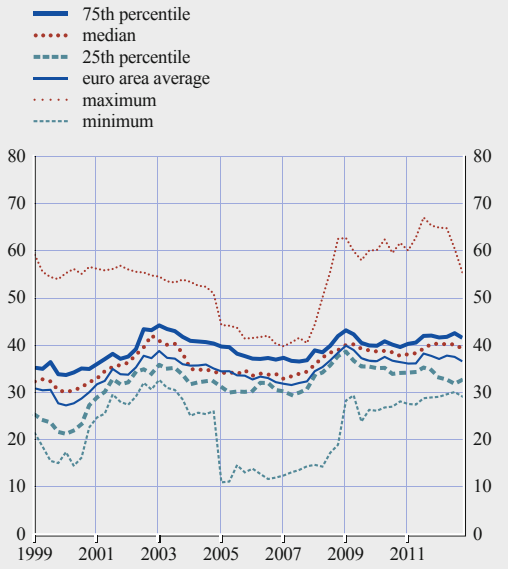
(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Debt includes loans, debt securities and pension fund reserves. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

Chart A3 Debt-to-total liabilities ratio of NFCs across euro area countries

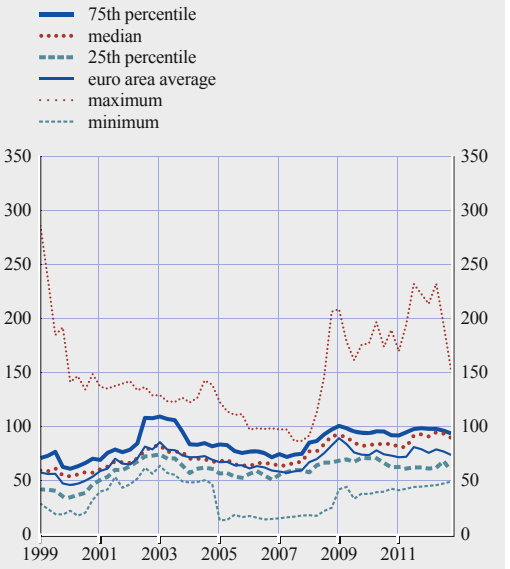
(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Debt includes loans, debt securities and pension fund reserves. Total assets are proxied by total liabilities. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

Chart A4 Debt-to-equity ratio of NFCs across euro area countries

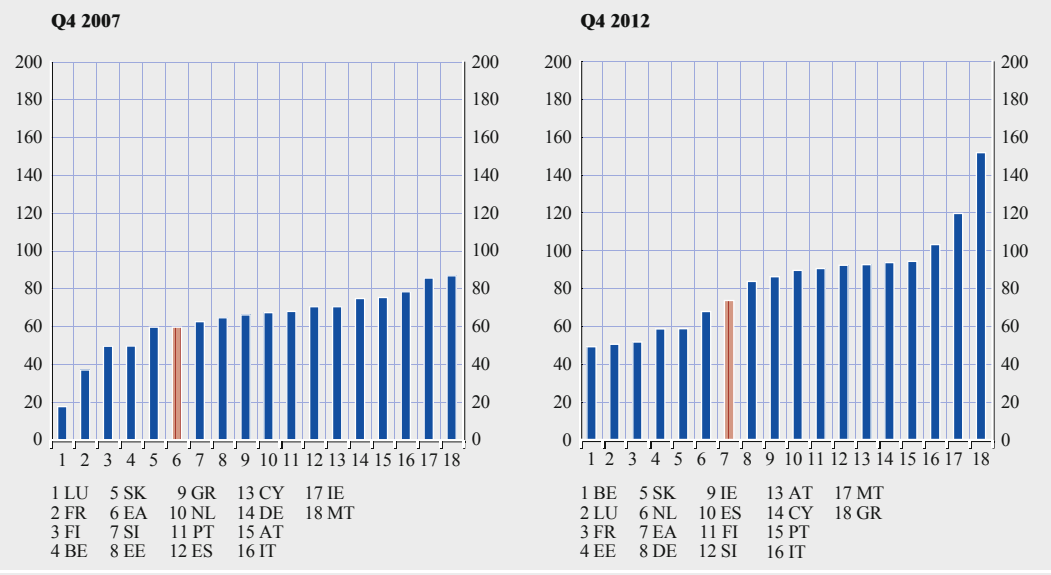
(percentages)



Source: ECB.
Notes: Data are based on amounts outstanding. Debt includes loans, debt securities and pension fund reserves. Total assets are proxied by total liabilities. The 75th, 50th (median) and 25th percentiles denote the values below which 75%, 50% and 25% of the observations can be found, respectively.

Chart A5 Debt-to-equity ratio of NFCs across euro area countries

(percentages)



Source: ECB.
Note: Data are based on outstanding amounts. Debt includes loans, debt securities and pension fund reserves. EA denotes euro area.

3 DATASET OF FIRM-LEVEL DATA[139]

SAMPLE BASED ON THE BUREAU VAN DIJK AMADEUS DATABASE

The source of firm-level data is the Bureau van Dijk Amadeus database, which includes comparable financial information for public and private companies. In particular, the information consists of the main components of the balance sheet (i.e. current assets (including liquidity), fixed assets (including tangible assets), short- and long-term liabilities, and shareholders' funds) and of the income statements (i.e. turnover, operating income and profit). Other characteristics included in the information are the sector in which the company operates, the age of the company, the number of people it employs and whether or not it is listed.

The observations included in the database cover the period from 1993 to 2010. The database includes firms located in all 17 euro area countries, even if the coverage is different in terms of the starting point from which data are recorded and the number of corporations included.[140]

Having obtained the data from the database, a number of processes had to be followed to prepare them for this report. At a preliminary stage, data quality controls were used to eliminate firms with missing or unreliable data for the variables of interest, such as negative assets or debt, and outlier values for selected financial indicators. As a further step, the values of variables of interest were winsorised at the first and 99th percentiles; the cut-off points were calculated for each sector, country and year in order to take into account differences in these three categories.

Since this report mainly focuses on the past decade, and owing to a widespread increase in the number of observations across all countries since 2000, in particular for smaller firms, the final dataset includes data from 2001 to 2010. As a final step, and in order to calculate certain variables

Table A14 Number of observations, broken down by country and year

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Austria	1,231	221	324	609	715	657	797	736	0	0	5,290
Belgium	42,935	48,394	54,467	51,625	48,052	45,327	45,387	40,038	31,350	8,285	415,860
Cyprus	50	52	53	54	140	161	200	216	165	78	1,169
Germany	5,293	10,141	16,331	24,422	82,277	119,166	129,201	128,276	102,957	82,072	700,136
Estonia	10,627	10,822	11,883	16,184	17,858	20,151	22,200	23,409	19,921	15,644	168,699
Spain	314,696	358,335	381,562	407,177	422,621	427,927	406,418	370,816	288,892	234,928	3,613,372
Finland	37,658	41,316	44,956	43,816	46,823	52,356	64,761	70,082	61,284	51,115	514,167
France	363,543	420,939	443,703	478,720	507,256	535,360	559,472	563,979	465,413	381,992	4,720,377
Greece	17,746	18,881	19,932	20,171	21,076	20,885	19,428	17,123	8,395	6,973	170,610
Ireland	818	925	1,237	1,845	2,352	2,701	2,873	2,789	1,956	1,424	18,920
Italy	106,335	157,566	163,859	308,747	338,003	378,670	393,484	357,341	209,543	164,066	2,577,614
Luxembourg	231	233	341	434	563	680	690	535	310	164	4,181
Malta	46	19	155	197	238	263	282	336	302	230	2,068
Netherlands	3,197	3,983	4,457	4,889	5,189	5,602	5,712	5,388	4,374	3,476	46,267
Portugal	19,327	27,703	40,128	49,953	153,069	162,188	167,057	152,780	64,714	49,103	886,022
Slovenia	4,900	6,490	6,964	8,113	8,650	9,021	8,518	7,284	5,191	3,887	69,018
Slovakia	345	1,206	2,116	2,961	3,951	5,435	6,946	6,727	5,681	4,089	39,457
TOTAL	928,978	1,107,226	1,192,468	1,419,917	1,658,833	1,786,550	1,833,426	1,747,855	1,270,448	1,007,526	13,953,227

139 Prepared by Antonio De Socio.

140 Austria provided a dataset from national sources (Supervisory Statistics, Models and Credit Quality Assessment Division, Oesterreichische Nationalbank) in order to increase the number of firms included.

that required lagged observations and to increase the reliability of firms' data, companies were only considered if they had been monitored for at least three consecutive years.

As a result of this process, the dataset includes around 14 million observations (see Table A14). Most of these observations are of companies located in France, Spain and Italy. Among the largest euro area countries, there are fewer firms observed in Germany or the Netherlands than in Portugal. The number of observations is lowest for Cyprus, Malta, Luxembourg and Austria.[141]

More than 2.5 million firms are included in the dataset. Table A15 presents some of their characteristics. In general, most of the companies included are relatively small and young, and nearly all of them are unlisted: micro and small[142] firms represent 94% of the total, whereas public companies only account for 0.1%.

The details of the breakdown of the sample by sector are reported in Table A16.[143] Most of the companies are in the construction and real estate sector (25%), the manufacturing sector (18%) or the retail trade sector (17%) – this distribution can also be linked to the size of firms included in the dataset.

Table A15 Main characteristics of firms

Country	Number of firms	Number of observations	Size (percentage of total)				Size	Age	Percentage
			micro	small	medium	large	Real total assets (EUR thousands)	(years)	listed
Austria	5,290	27,431	13.3	22.7	43.8	20.2	53,214	21	n.a.
Belgium	77,719	415,860	74.0	15.8	7.8	2.4	15,056	16	0.2
Cyprus	241	1,169	16.4	40.1	31.5	12.0	142,348	23	40.8
Germany	155,769	700,136	75.4	12.7	6.7	5.2	40,854	17	0.6
Estonia	30,297	168,699	82.1	14.0	3.4	0.6	1,088	7	0.0
Spain	627,686	3,613,372	73.9	22.0	3.4	0.7	3,777	11	0.0
Finland	87,461	514,167	84.1	11.7	3.0	1.2	5,572	15	0.2
France	777,568	4,720,377	83.9	12.6	2.8	0.8	5,544	13	0.1
Greece	27,657	170,610	45.2	42.5	10.2	2.1	9,337	16	1.0
Ireland	4,416	18,920	76.2	9.6	9.7	4.6	41,657	12	0.5
Italy	499,115	2,577,614	71.8	21.6	5.3	1.2	7,202	14	0.1
Luxembourg	1,037	4,181	44.2	26.0	20.6	9.2	86,054	23	1.1
Malta	413	2,068	42.8	28.4	20.8	7.9	13,395	18	1.0
Netherlands	8,865	46,267	19.5	15.7	34.3	30.4	221,403	28	1.9
Portugal	190,468	886,022	82.4	14.3	2.7	0.5	2,425	13	0.0
Slovenia	12,102	69,018	61.5	25.4	9.9	3.2	5,550	12	0.5
Slovakia	8,738	39,457	43.5	31.2	19.7	5.6	3,941	9	1.3
Total	**2,514,842**	**13,975,368**	**77.0**	**17.0**	**4.0**	**1.3**	**8,076**	**13**	**0.1**

141 The representativeness of the sample, in terms of the number of firms, can be tested by comparing the number of firms in the dataset with those in Eurostat data. We have chosen to make a comparison across firm size, as the Bureau van Dijk Amadeus dataset is considered more representative for large companies. However, Eurostat only groups firms according to the number of employees, while this report follows the European Commission's method that takes into account turnover and total assets, as well as the number of employees. For this reason, the results of the comparison have to be approached with caution. The results show that the Eurostat dataset has a very low coverage (less than 30%) of large firms in Austria, Cyprus and Ireland. The representativeness in other countries is high (above 50%) for large firms in Germany, Luxembourg and the Netherlands), for medium and large firms in Belgium, Italy, Slovenia and Slovakia, and for small firms in Estonia, Spain, Finland, France, Portugal and Greece. Eurostat data for Malta are not available.

142 See below for details on size classification.

143 See below for details on sector classification.

Table A16 Distribution of firms across sectors

(percentages)

Country	Sector								
	manufacturing	Electricity, gas and water	Construction and real estate	Wholesale trade	Retail trade	Accommodation	Transportation and storage	Information, communication, and research and development	Other services
Austria	37.0	3.1	15.5	3.5	22.7	1.8	5.2	2.6	8.6
Belgium	12.3	0.7	22.8	11.3	21.0	5.8	5.4	4.4	16.4
Cyprus	26.3	0.3	5.5	14.6	35.8	9.5	3.5	2.3	2.3
Germany	19.3	2.3	23.0	7.8	18.2	1.6	4.5	5.2	18.2
Estonia	12.0	1.4	22.1	11.6	17.1	3.9	8.9	5.0	18.0
Spain	17.9	0.7	28.5	11.6	18.4	6.1	4.2	2.5	10.1
Finland	13.6	2.1	27.2	8.5	14.2	4.1	7.6	5.3	17.3
France	13.2	0.6	23.6	15.4	15.9	10.2	3.7	3.8	13.6
Greece	26.0	0.6	9.7	6.6	30.6	13.0	3.5	3.8	6.2
Ireland	8.5	0.9	53.0	2.9	5.4	1.1	2.0	4.9	21.3
Italy	25.8	1.0	26.2	8.1	16.9	4.8	4.2	4.5	8.4
Luxembourg	18.4	2.2	18.9	10.2	19.9	2.2	6.0	4.0	18.2
Malta	29.5	0.4	8.0	10.5	23.3	8.7	5.7	8.9	5.0
Netherlands	22.3	2.5	16.2	3.4	25.2	1.5	7.1	6.2	15.6
Portugal	17.5	0.5	18.6	17.1	18.4	8.7	7.3	1.8	10.3
Slovenia	31.8	0.9	9.2	8.1	29.7	1.3	9.4	3.0	6.5
Slovakia	25.7	2.9	17.0	9.8	23.8	2.1	4.5	3.6	10.5
Total	**17.6**	**0.9**	**24.9**	**12.1**	**17.4**	**7.1**	**4.5**	**3.6**	**11.9**

SIZE AND SECTOR CLASSIFICATION

The size classes are defined using information on turnover, assets and the number of employees (if recorded). In order to control for differences in inflation, the values of turnover and assets are calculated in real terms, using the GDP deflator (the reference year is 2000). The classification is based on the ceilings defined by the European Commission.[144] Micro firms have fewer than ten workers and turnover or assets of less than €2 million. The corresponding figures for small firms are 50 workers and turnover or assets of less than €10 million, and for medium-sized firms 250 workers, turnover of less than €50 million and assets of less than €43 million. Above these cut-off points, firms are classified as large.

The sector classification is based on NACE 2 codes. Firms whose code is not available are excluded from the dataset. Furthermore, firms operating in agriculture, fishing, mining, financial activities, public sector, education, health, entertainment, and other services (sections A, B, K, O, P, Q, R, and S) are excluded. The detailed sectoral classification used in the report is as follows.

1. Manufacturing: section C, divisions 10-33.

2. Electricity, gas and water supply: sections D and E, divisions 35-39.

3. Construction and real estate: section F, divisions 41-43, and section L, division 68.

4. Wholesale trade: section G, divisions 45-46.

144 See http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

5. Retail trade: section G, division 47.

6. Transportation and storage: section H, divisions 49-53.

7. Accommodation and food: section I, divisions 55-56.

8. Information, communication and R&D: section J, divisions 58-63, and section M, division 72.

9. Other services: section M, divisions 69-71 and 73-74, and section N, divisions 80-82.

LIST OF INDICATORS USED IN THE REPORT

The indicators derived from the Amadeus data and used in the analysis are as follows.

- Cash holdings or liquidity: (cash and cash equivalent) / total assets.
- Asset tangibility: tangible fixed assets / total assets.
- Net working capital: (stocks + debtors + other current assets – cash and cash equivalent – creditors) / total assets.
- Investment: (change in tangible fixed assets + depreciation) / tangible fixed assets of the previous year.
- Leverage: (long-term debt + loans) / total assets.
- Growth: yearly rate of growth of turnover.
- Profitability: operating profit / total assets.
- Cash flow: (profit + depreciation) / total assets.
- Interest payment burden: interest paid / (operating profit + depreciation).

Table A17 presents descriptive statistics concerning these indicators at the country level.

Table A17 Summary statistics, broken down by country

Country		Liquidity	Tangibility	Net working capital	Investment	Leverage	Growth	Profitability	Cash flow	Interest payment burden
Austria	Mean	0.08	0.30	0.41	0.26	0.17	0.05	0.19	0.10	0.13
	Median	0.02	0.24	0.40	0.16	0.00	0.03	0.11	0.09	0.06
	Standard deviation	0.13	0.27	0.26	0.35	0.26	0.33	0.36	0.12	0.40
Belgium	Mean	0.17	0.34	0.27	0.26	0.27	0.06	0.12	0.10	0.54
	Median	0.08	0.25	0.23	0.10	0.22	0.02	0.11	0.08	0.40
	Standard deviation	0.20	0.30	0.28	0.41	0.24	0.41	0.17	0.15	0.47
Cyprus	Mean	0.09	0.33	0.28	0.11	0.28	0.08	0.42	0.01	0.46
	Median	0.04	0.28	0.27	0.05	0.26	0.06	0.07	0.05	0.55
	Standard deviation	0.12	0.25	0.24	0.42	0.20	0.35	0.89	0.32	0.32
Germany	Mean	0.17	0.22	0.52	0.31	0.27	0.06	0.13	0.10	0.28
	Median	0.09	0.12	0.54	0.18	0.18	0.00	0.11	0.08	0.16
	Standard deviation	0.20	0.24	0.29	0.40	0.29	0.29	0.16	0.13	0.34
Estonia	Mean	0.28	0.29	0.23	0.14	0.17	0.09	0.13	0.15	1.72
	Median	0.15	0.18	0.15	0.02	0.02	0.00	0.11	0.12	2.06
	Standard deviation	0.30	0.30	0.31	0.52	0.25	0.75	0.29	0.33	1.07
Spain	Mean	0.15	0.29	0.47	0.23	0.19	0.10	0.07	0.06	0.41
	Median	0.08	0.20	0.48	0.08	0.08	0.03	0.07	0.05	0.22
	Standard deviation	0.18	0.27	0.30	0.42	0.23	0.54	0.16	0.13	0.45
Finland	Mean	0.23	0.31	0.29	0.26	0.22	0.08	0.17	0.14	0.35
	Median	0.14	0.20	0.23	0.09	0.14	0.02	0.15	0.13	0.14
	Standard deviation	0.24	0.31	0.27	0.44	0.25	0.48	0.23	0.18	0.42
France	Mean	0.24	0.15	0.27	0.29	0.14	0.07	0.12	0.10	0.28
	Median	0.16	0.08	0.25	0.13	0.05	0.02	0.11	0.09	0.11
	Standard deviation	0.23	0.19	0.26	0.47	0.19	0.38	0.19	0.16	0.36
Greece	Mean	0.13	0.29	0.27	0.27	0.21	0.09	0.09	0.07	0.37
	Median	0.07	0.20	0.27	0.13	0.16	0.04	0.08	0.06	0.22
	Standard deviation	0.16	0.27	0.31	0.39	0.22	0.45	0.13	0.12	0.41
Ireland	Mean	0.37	0.25	0.36	0.12	0.22	0.11	0.13	0.06	0.83
	Median	0.27	0.13	0.33	0.05	0.12	0.02	0.05	0.06	1.10
	Standard deviation	0.34	0.29	0.36	0.38	0.27	0.53	0.52	0.21	0.64
Italy	Mean	0.10	0.21	0.44	0.32	0.15	0.07	0.08	0.04	0.39
	Median	0.04	0.11	0.44	0.17	0.01	0.02	0.07	0.04	0.21
	Standard deviation	0.14	0.25	0.33	0.47	0.21	0.50	0.13	0.10	0.47
Luxembourg	Mean	0.16	0.20	0.42	0.32	0.10	0.13	0.10	0.09	0.67
	Median	0.09	0.11	0.43	0.19	0.00	0.05	0.09	0.08	0.37
	Standard deviation	0.19	0.24	0.32	0.50	0.18	0.50	0.16	0.14	0.70
Malta	Mean	0.11	0.26	0.31	0.22	0.23	0.11	0.10	0.06	0.87
	Median	0.03	0.17	0.33	0.09	0.17	0.03	0.06	0.05	0.93
	Standard deviation	0.17	0.27	0.33	0.35	0.23	0.48	0.22	0.14	0.72
Netherlands	Mean	0.14	0.26	0.41	0.29	0.07	0.07	0.10	0.09	0.43
	Median	0.06	0.17	0.40	0.19	0.00	0.03	0.09	0.09	0.21
	Standard deviation	0.19	0.26	0.28	0.39	0.15	0.38	0.17	0.14	0.46

Table A17 Summary statistics, broken down by country (cont'd)

Country		Liquidity	Tangibility	Net working capital	Investment	Leverage	Growth	Profitability	Cash flow	Interest payment burden
Portugal	Mean	0.17	0.24	0.40	0.22	0.19	0.08	0.08	0.06	0.39
	Median	0.07	0.16	0.39	0.06	0.08	0.00	0.08	0.06	0.18
	Standard deviation	0.21	0.24	0.31	0.42	0.24	0.50	0.18	0.16	0.46
Slovenia	Mean	0.07	0.37	0.13	0.29	0.25	0.14	0.14	0.12	0.19
	Median	0.03	0.35	0.14	0.14	0.21	0.06	0.11	0.09	0.07
	Standard deviation	0.10	0.25	0.31	0.43	0.22	0.47	0.14	0.13	0.30
Slovakia	Mean	0.17	0.33	0.21	0.32	0.09	0.16	0.14	0.11	0.22
	Median	0.09	0.28	0.18	0.21	0.00	0.09	0.11	0.09	0.09
	Standard deviation	0.22	0.28	0.31	0.47	0.14	0.59	0.20	0.17	0.30
TOTAL	**Mean**	**0.18**	**0.22**	**0.37**	**0.27**	**0.17**	**0.08**	**0.10**	**0.08**	**0.37**
	Median	**0.09**	**0.12**	**0.35**	**0.12**	**0.06**	**0.02**	**0.09**	**0.07**	**0.18**
	Standard deviation	**0.21**	**0.25**	**0.31**	**0.45**	**0.22**	**0.47**	**0.18**	**0.15**	**0.44**

DIFFERENT MEASURES OF LEVERAGE

The measure of indebtedness included in Chapter 3 only includes financial debt[145] (leverage = loans + long-term debt), in order to exclude the role played by other liabilities that could be structurally different across countries, such as provisions or tax deferral. In the main analysis, leverage is calculated as the ratio between financial debt and total assets.

A possible alternative specification of leverage would only include equity, in order to present a more precise relationship between these two sources of firms' funding. More specifically, the alternative measure is: leverage cap = (long-term debt + loans) / (long-term debt + loans + shareholders' funds).

The only difference between these two measures is the inclusion of assets or equity. If the balance sheets of the firms were such that assets = financial debt + equity, they would provide the same ranking of firm indebtedness. However, there are other items on the balance sheets that could be structurally different across countries or sectors (e.g. trade credit or tax credit), so that these two measures of leverage may not be perfectly correlated. A possible advantage of the second measure is that it only relies on the two main components of liabilities, so it is not influenced by structural differences in the composition of assets (or liabilities). However, it does not always monotonically increase along with leverage; in fact, if equity is negative and also greater than financial debt, a firm would have a negative value and appear as having low levels of leverage.[146]

The presence of firms with negative equity is also a problem for the first measure of leverage, which is not able to detect them, as the measure is always positive.[147] To avoid this problem, and

145 Financial debt is not perfectly identified in the Bureau van Dijk Amadeus database. In particular, some long-term financial debt may be included under "Other non-current liabilities". This category also contains different items, for example provisions, which could differ among countries.

146 Firms with negative equity represent around 9% of the dataset; the majority of them are micro firms. The mean values over time remain almost unchanged across all countries, sectors and class sizes.

147 By way of an example, consider two different firms, whose balance sheets are as follows. Firm A: assets = liabilities = 50, financial debt = 30, other debt = 70, shareholders' funds = -50. Firm B: assets = liabilities = 50, financial debt = 30, other debt = 10, shareholders' funds = 10. The first firm is more leveraged than the second, as it has a negative capital. However, the first measure of leverage would show 3/5 for both of them, while the second would show -5/3 for firm A and 1/3 for firm B. Hence the first measure would consider them to be equal, while the second would classify firm A as less leveraged than firm B.

also because the report focuses on how firms decide to structure their finances, firms with negative equity have been eliminated from the analysis so the two indicators are similar (the correlation is above 0.8 at the firm level and around 1 at the country level). The second measure has been used to check the results.

The report contains several indicators of leverage derived from different sources. In Chapters 2 and 4 the measures of leverage are derived from financial accounts, while in Chapter 3 leverage is constructed using balance sheet information at the firm level. Box 6 illustrates some of the most relevant differences between the two datasets and shows that the country ranking is very similar, once some of these differences are controlled for.

Box 6

DIFFERENCES BETWEEN INDIVIDUAL FINANCIAL STATEMENTS AND FINANCIAL ACCOUNTS, IN THE CASE OF LEVERAGE

This report mainly uses two different data sources. The first is the national financial and non-financial sector accounts data and, for the euro area, the "euro area accounts". The second is the Bureau van Dijk Amadeus database. The two sources have been described at length in Annex 1 and at the beginning of Annex 3. This box illustrates the differences between these two data sources, taking as an example the definition of leverage as used in the report.

One difference is the coverage: financial accounts data include all NFCs, while the Amadeus database only includes those firms whose balance sheet information is available, with the result that the two data sources are not equally representative. Moreover, as summarised above, the coverage for each country is not the same.

A second relevant difference is the valuation of balance sheet entries, which are valued at market prices in the financial accounts and at book price in the Amadeus database.

Further differences could be related to the components of assets or debt. In the indicators derived from the financial and non-financial accounts, debt also includes pension fund reserves, and total assets are proxied by total liabilities at the country level, as total assets are only available at the euro area level. However, the definition of debt on the basis of balance sheet information only includes financial debt, and the ratio is calculated using total assets.

Another difference with the indicators described in Section 3.2 is due to the fact that firms without debt are excluded for analytical purposes, as the objects of interest are the determinants of firms' leverage.

A final difference is linked to the aggregation method used to combine granular information. While macro data can be considered as weighted averages[1], statistics used from individual data

1 The ratio of two totals (e.g. total debt to total assets) is equal to a weighted average of the ratios of its components (e.g. firms), where the weight for each firm is the ratio between its denominator (e.g. firm assets) and the total denominator (e.g. total assets). In fact:

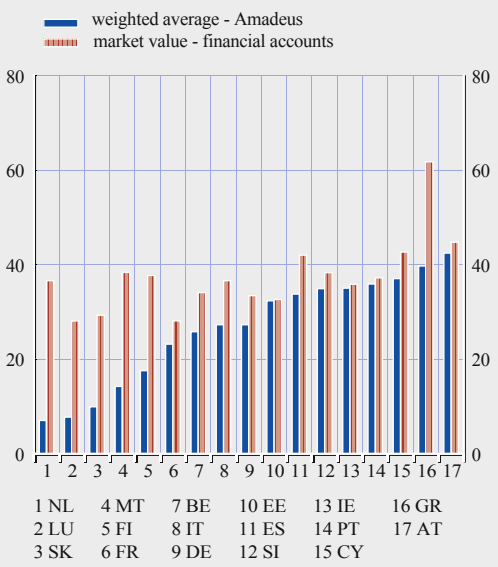
$$\frac{\sum_i X_i}{\sum_i Y_i} = \sum_i \frac{y_i}{\sum_i Y_i} * \frac{x_i}{y_i}$$

are simple averages. This last point is strictly related to the advantage of using micro data: even if they do not provide extensive coverage, they can offer a more detailed insight into more specific aspects, such as firm size, and also provide an idea of the heterogeneity among firms.

Some of these differences can be taken into account in order to compare more homogeneous aggregates. The results show that the leverage ranking is similar among countries; apart from valuation effects, larger differences can be linked to the change in coverage for a given country. Chart A presents a comparison across countries when the ratio of debt to total assets has been calculated as follows: (a) using weighted averages from Amadeus balance sheet data; and (b) only including loans and debt securities in the numerator of the macroeconomic financial and non-financial sector accounts dataset (i.e. excluding pension fund reserves), and only including total liabilities (as a proxy for total assets) in the denominator. These two ratios are similar for most countries, even if the comparison is still influenced by valuation effects (since liabilities, which include equity, are valued at market value) and different coverage across countries.[2]

Chart A Leverage across countries

(percentages)

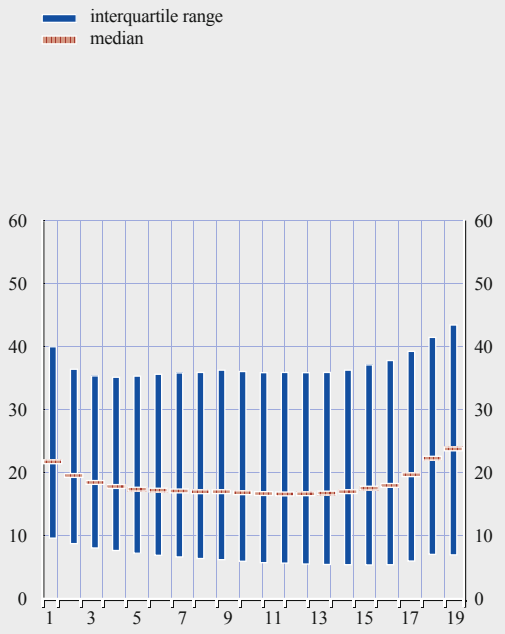


Sources: Bureau van Dijk Amadeus database and ECB calculations.
Note: Leverage is defined in the Amadeus database as the sum of short- and long-term debt divided by total assets, whereas in the national financial and non-financial sector accounts data it is defined as loans plus debt securities.

2 Another possible way of making ratios more comparable could be to use notional values from financial accounts, so that the impact of market evaluation is eliminated. However, the ratios would depend on the reference period. Similar results are obtained when using notional values and the first quarter of 2000 as the reference period.

Chart A6 Leverage of euro area non-financial corporations, broken down by quantiles of size

(percentages)



Note: Data are based on median values.

Chart A7 Leverage of euro area non-financial corporations, broken down by economic sector over time

(percentages)

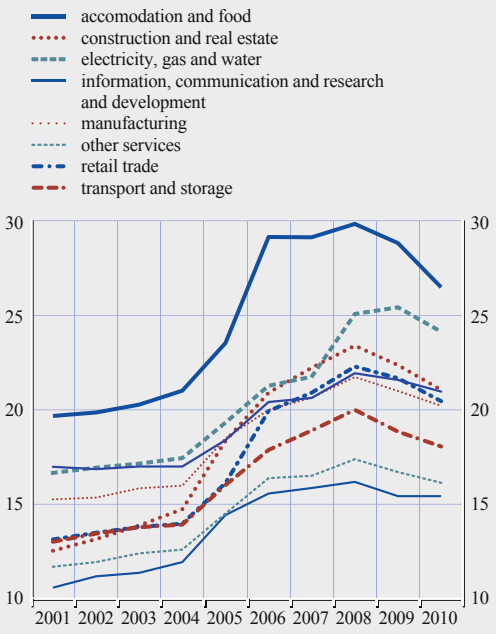
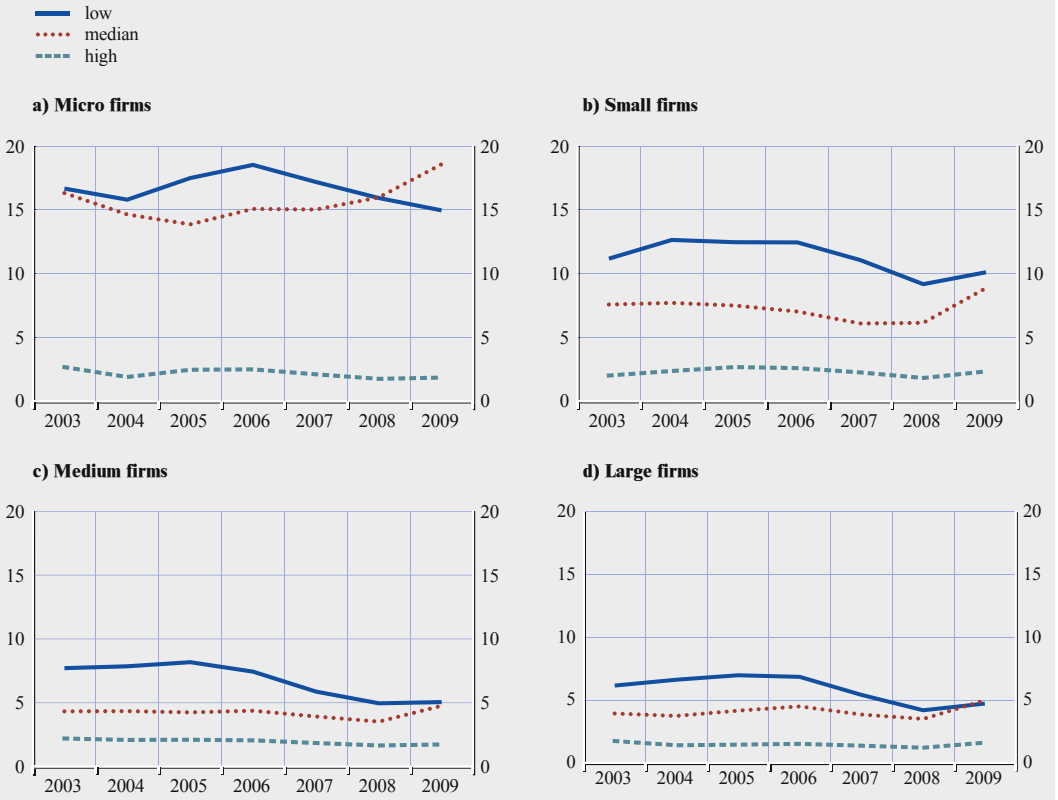


Chart A8 Cash holding ratio and net working capital, broken down by firm size

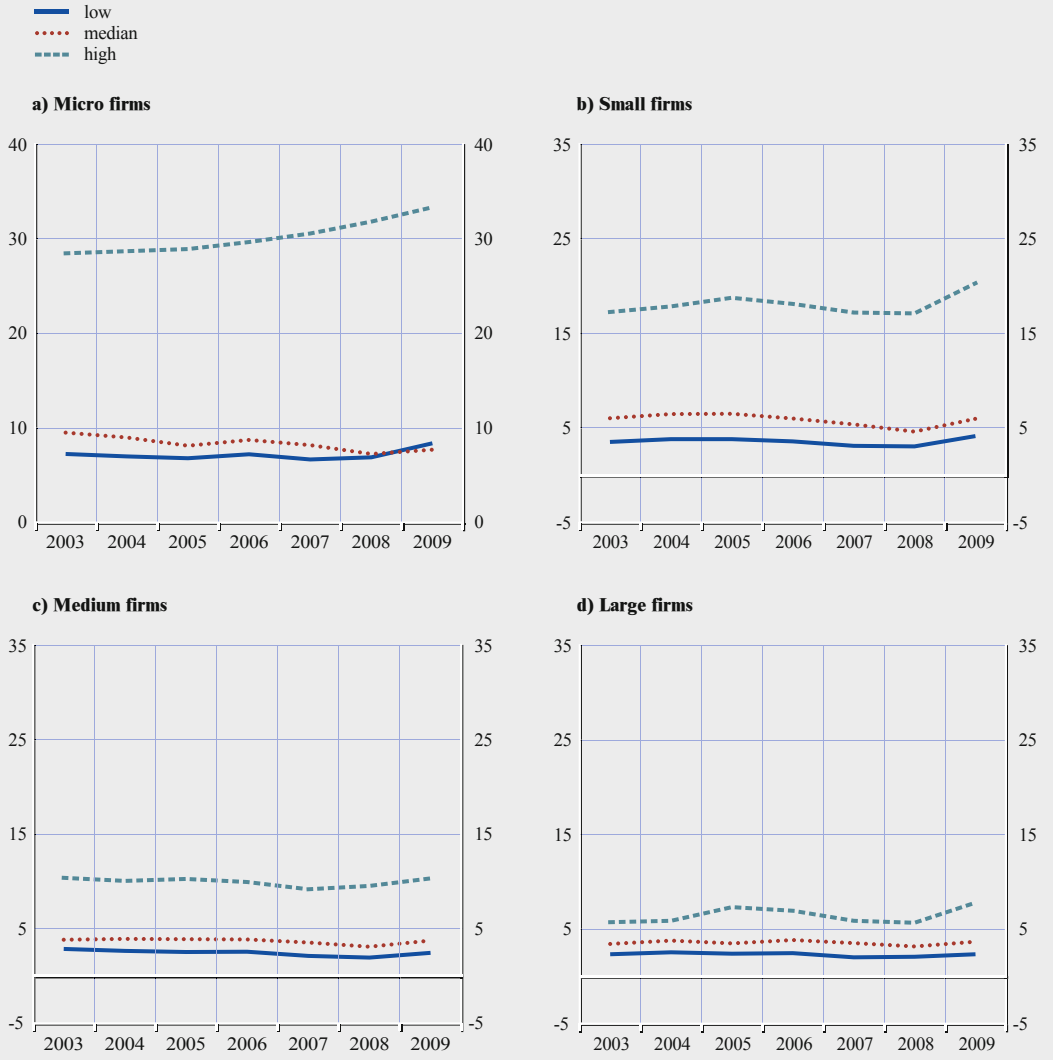
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median cash holding ratio for firms with high net working capital (above the 90th percentile), medium net working capital (between the 45th and 55th percentiles) and low net working capital (lower decile). The cash holding ratio is defined as the ratio of cash and cash equivalents to total assets, and net working capital is defined as the ratio of short-term assets other than cash net of accounts receivable to total assets.

Chart A9 Cash holding ratio and cash flow, broken down by firm size

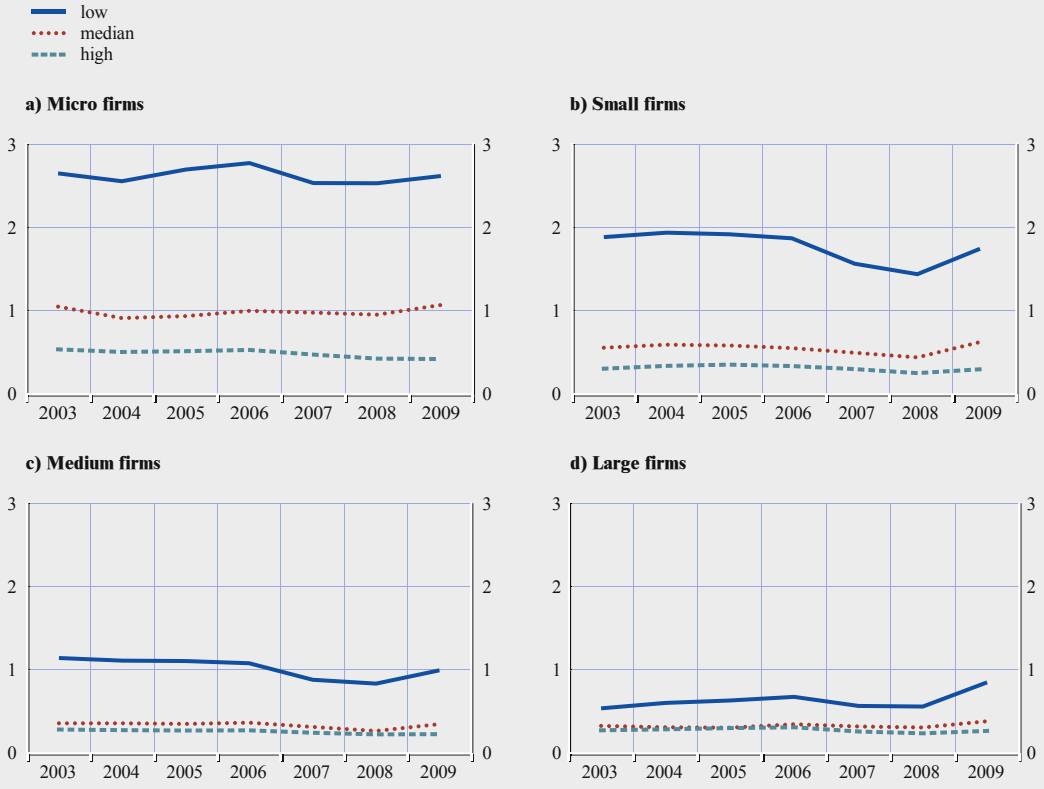
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median cash holding ratio for firms with high cash flow (above the 90th percentile), medium cash flow (between the 45th and 55th percentiles) and low cash flow (lower decile). The cash holding ratio is defined as the ratio of cash and cash equivalents to total assets, and cash flow is normalised by the average amount of total assets in the period.

Chart A10 Cash holding ratio and indebtedness, broken down by firm size

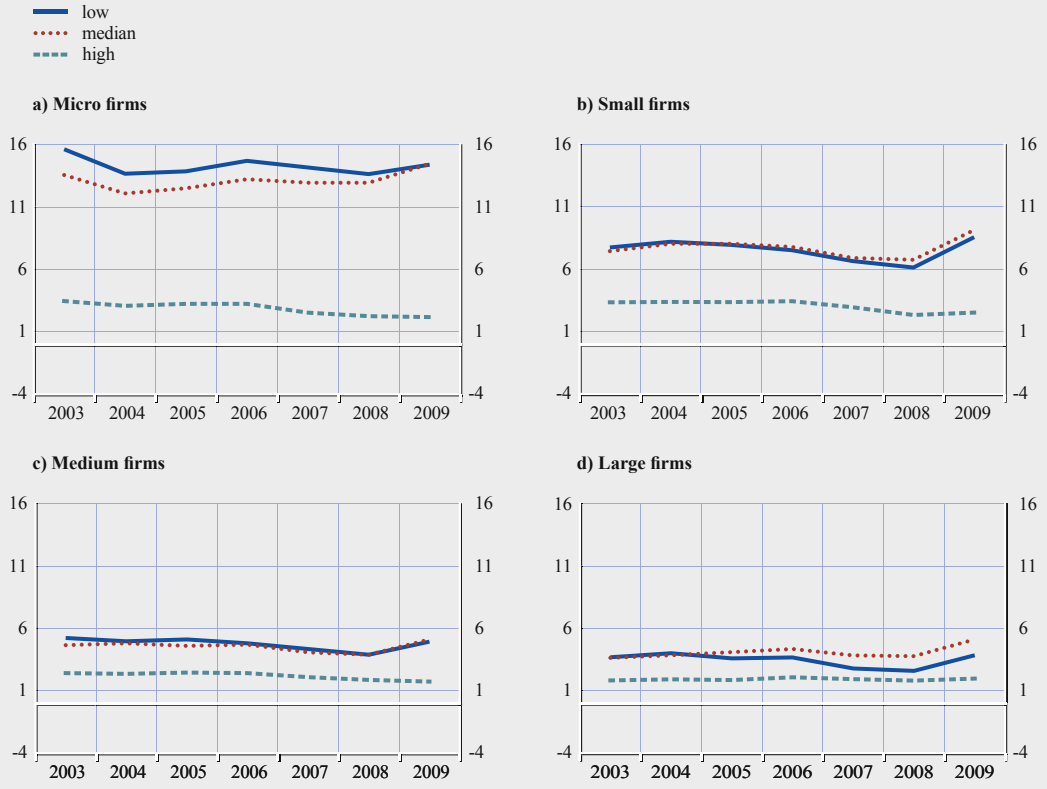
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median cash holding ratio for firms with high financial debt (above the 90th percentile), medium financial debt (between the 45th and 55th percentiles) and low financial debt (lower decile). The cash holding ratio is defined as the ratio of cash and cash equivalents to total assets, and indebtedness is the ratio of short-term and long-term debt to total assets.

Chart A11 Cash holding ratio and tangible fixed assets, broken down by firm size

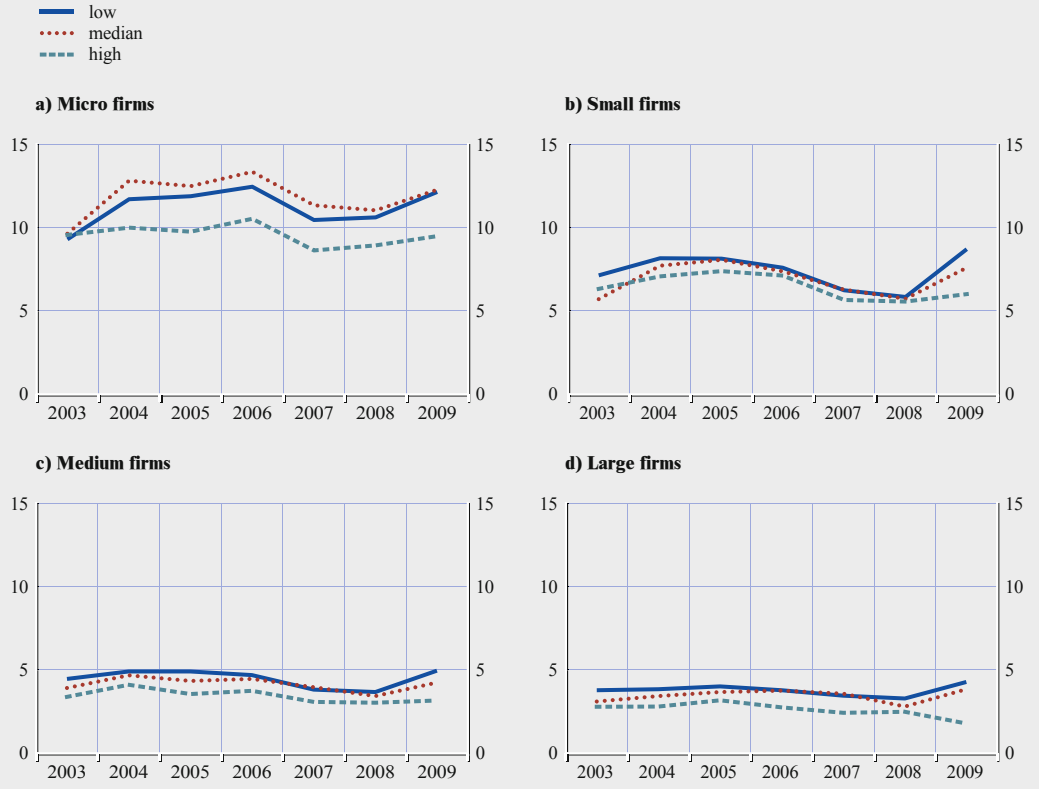
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median cash holding ratio for firms with high tangible assets (above the 90th percentile), medium tangible assets (between the 45th and 55th percentile) and low tangible assets (lower decile). The cash holding ratio is defined as the ratio of cash and cash equivalents to total assets, and tangible assets are defined as the ratio of tangible fixed assets to total assets.

Chart A12 Cash holding ratio and firms' cash flow volatility, broken down by firm size

(percentages)

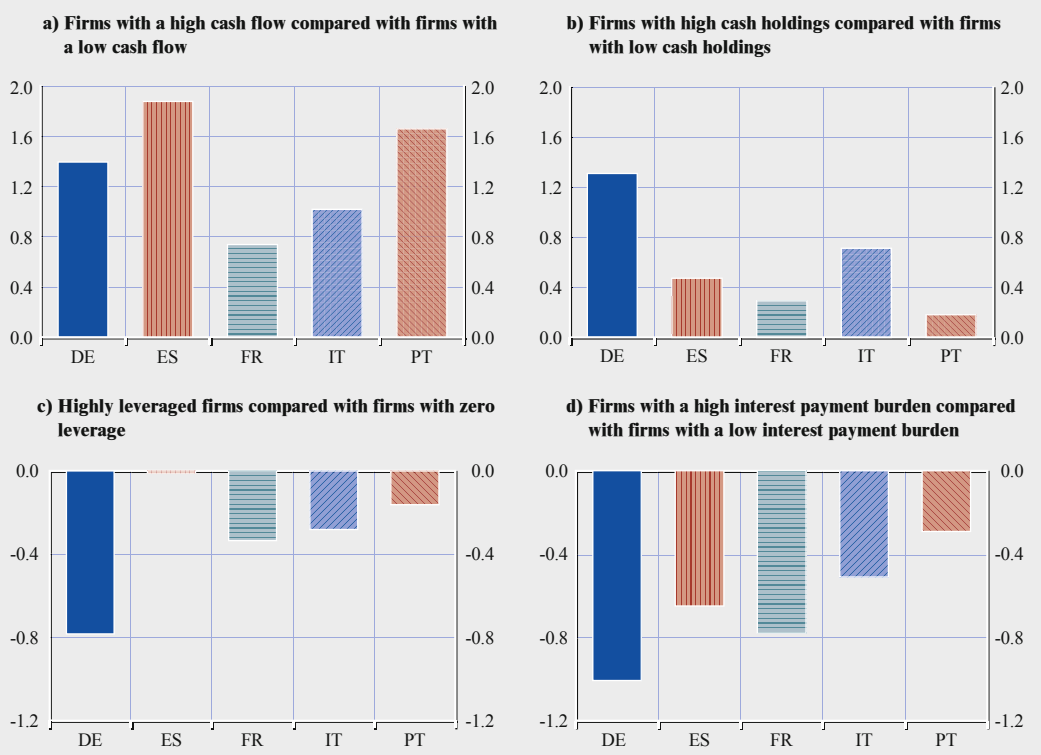


Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median cash holding ratio for firms with high cash flow volatility (above the 90th percentile), medium cash flow volatility (between the 45th and 55th percentiles) and low cash flow volatility (lower decile). The cash holding ratio is defined as the ratio of cash and cash equivalents to total assets, and a firm's cash flow volatility is measured by dividing the standard deviation of that firm's cash flows from the last four years by the average cash flow over the same period.

5 INVESTMENT

Chart A13 Investment ratios and the financial position of firms at the country level

(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: For each of the financial indicators considered, the charts show the average difference in the sample period between the median investment rates for firms for which this indicator shows a high value (above the 90th percentile) and the median investment rate for firms for which this indicator shows a low value (below the 10th percentile), normalised by the median investment rate for firms for which this indicator stands at intermediate levels (between the 45th and the 55th percentiles).

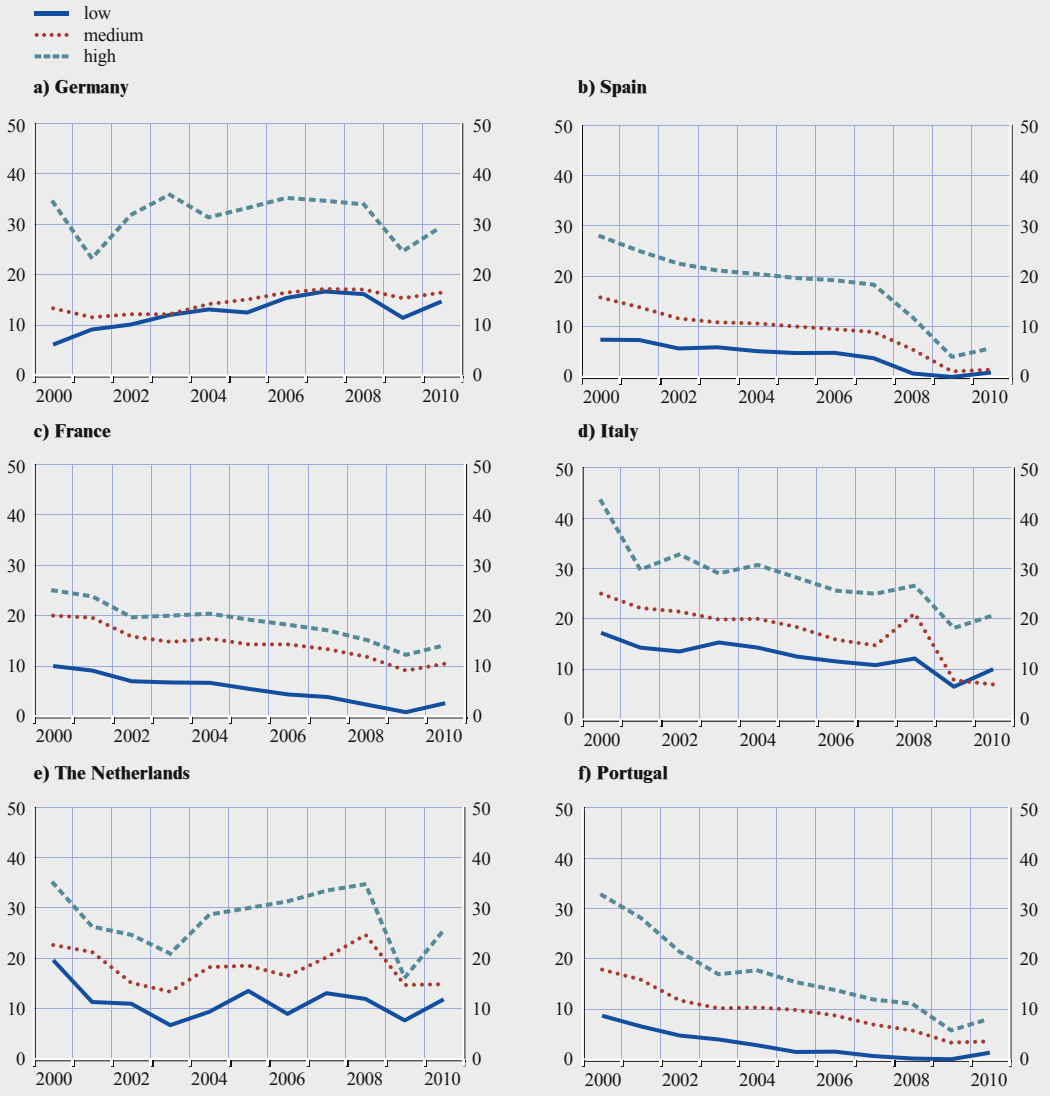
Charts A13-17 show the difference in investment rates of firms facing different degrees of financial pressure in selected euro area countries. These differences are presented as levels (usually low, median and high), expressed in relative terms based on the difference between the highest and lowest deciles, and normalised by the median.[148] For the countries under consideration, it can be seen that firms under higher financial pressure generally invest less, and their investment decisions seem to be affected most significantly by profitability and interest payment burdens. As for the investment dynamics across countries, the impact of the crisis on investment rates is evident irrespective of a firm's profitability, although this can be seen more clearly in countries such as Spain and the Netherlands. Leverage has a negative relationship with investment for firms based in Germany and in Italy while, for firms located in the Netherlands, France and Spain, there seem to be some threshold effects. The demand for capital from Dutch firms with medium or high levels of leverage is slightly lower than that of firms with low levels of debt, while for firms in France

148 More precisely, for each of the financial indicators considered, Charts A13 and A22 show, for the sample period, the average difference between the median investment rates for firms for which this indicator shows a high value (above the 90th percentile) and the median investment rate for firms for which this indicator shows a low value (below the 10th percentile), normalised by the median investment rate for firms for which this indicator stands at intermediate levels (between the 45th and the 55th percentiles).

and Spain the differences are blurred for those with medium to low levels of leverage. Finally, the relationship between cash holdings and investment is quite different across countries; according to this descriptive analysis, the link appears to be positive and monotonic in Italy, while, in Germany and the Netherlands, it seems to be non-linear. In other countries, such as Spain and Portugal, the relationship is not as clear, as firms with medium cash holdings invest slightly more than the others.

Chart A14 Investment ratio and cash flow for the median firm

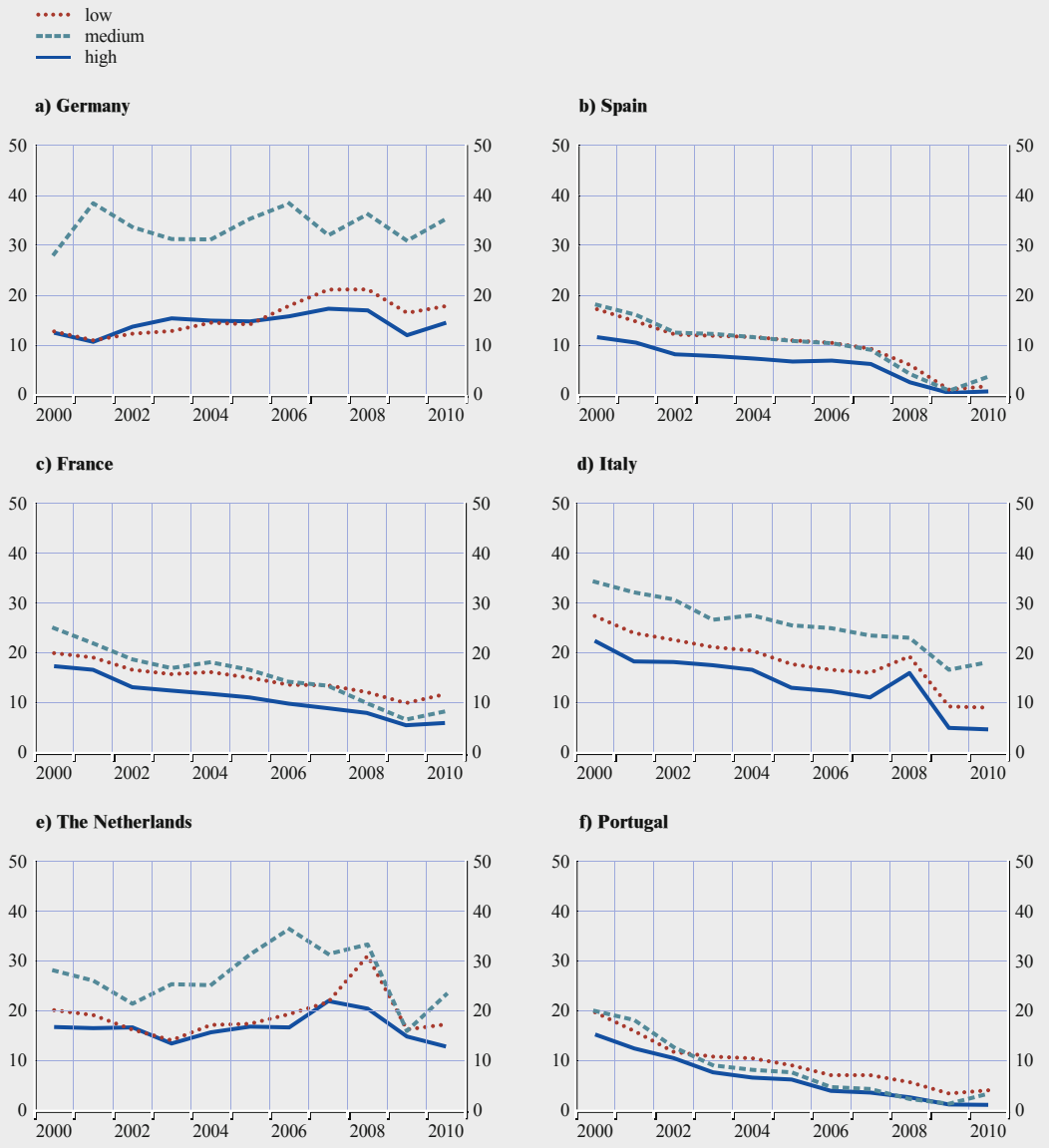
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with a high cash flow (above the 90th percentile), a medium cash flow (between the 45th and 55th percentile) and a low cash flow (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and cash flow is defined as the ratio of post-tax profits plus the depreciation of fixed assets to total assets.

Chart A15 Investment ratio and cash holdings for the median firm

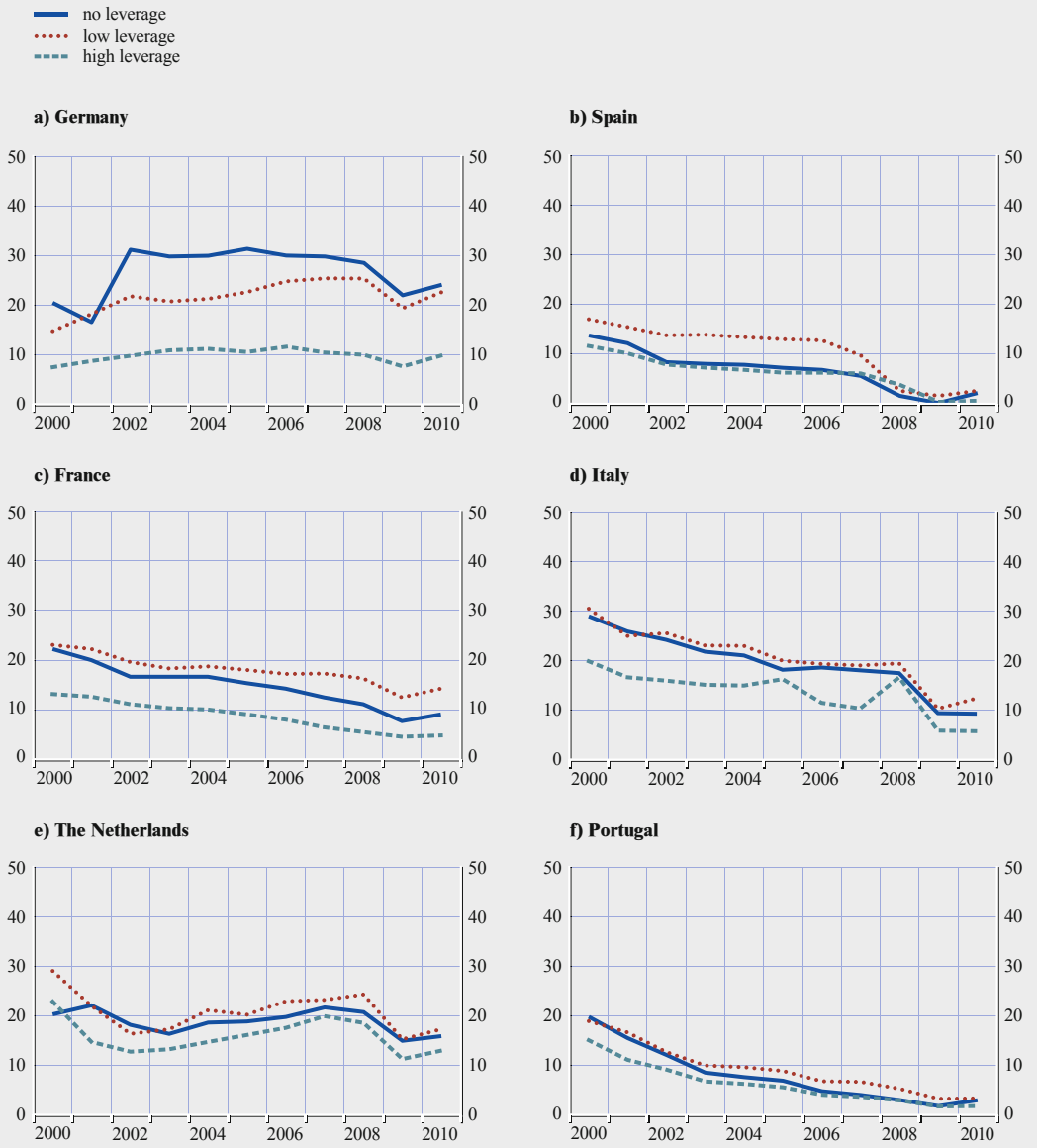
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with high cash holdings (above the 90th percentile), medium cash holdings (between the 45th and 55th percentiles) and low cash holdings (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and cash holdings are defined as the ratio of cash and cash equivalents to total assets.

Chart A16 Investment ratio and leverage for the median firm

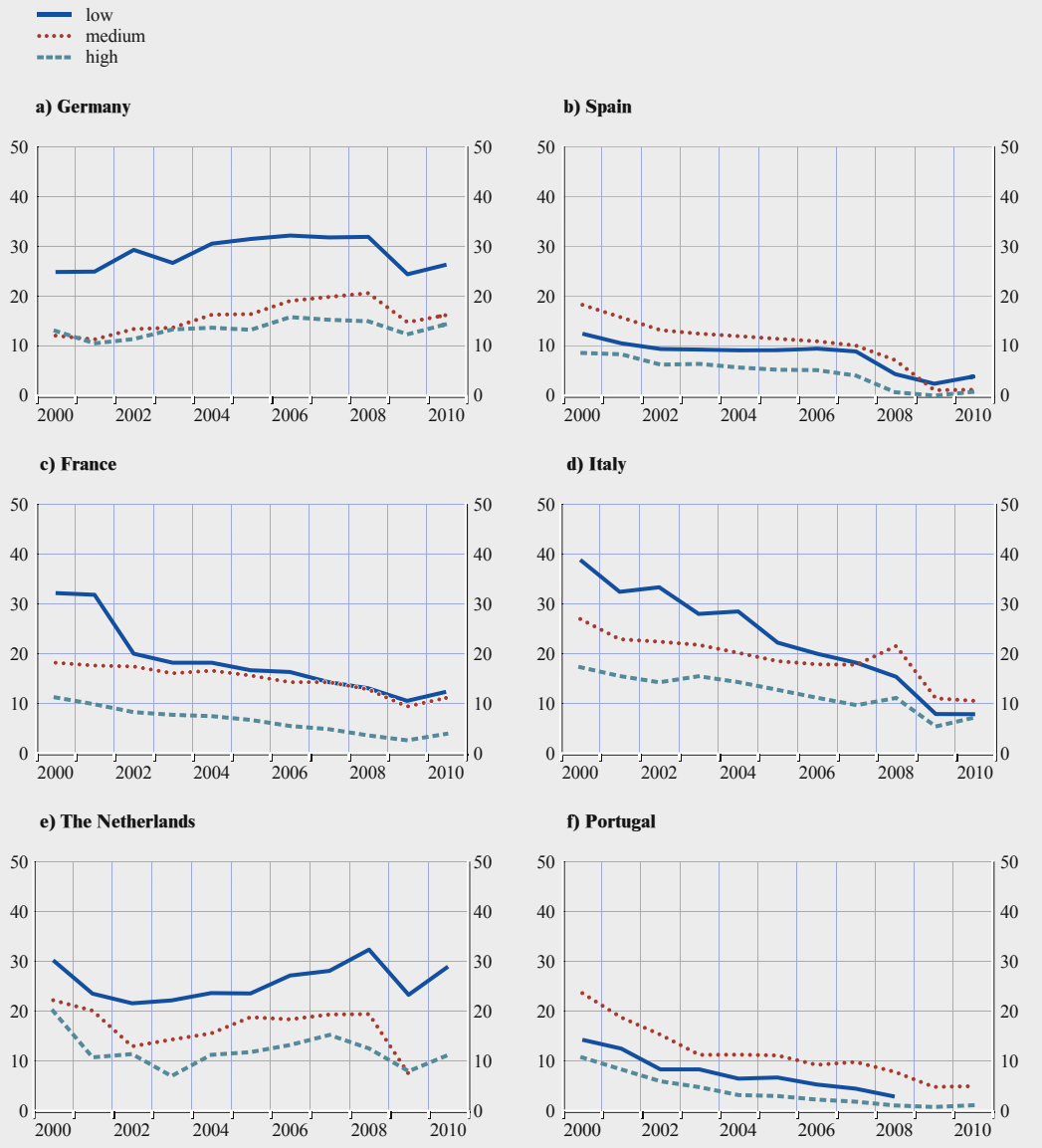
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms which have no financial debt, a low level of financial debt (below the 25th percentile of the distribution of leverage ratios across indebted companies) and a high level of financial debt (above the 75th percentile of the distribution of leverage ratios across indebted companies). The investment ratio is defined as the ratio of the change in tangible fixed assets plus depreciation to total assets, and leverage is calculated by dividing financial leverage by total assets.

Chart A17 Investment ratio and interest payment burden for the median firm

(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The different charts depict the median investment ratio for firms with high interest payment burden (above the 90th percentile), medium interest payment burden (between the 45th and 55 percentiles) and low interest payment burden (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and the interest payment burden is defined as the ratio of interest payments to earnings before interest, taxes, depreciation and amortisation, plus financial revenues, divided by total assets.

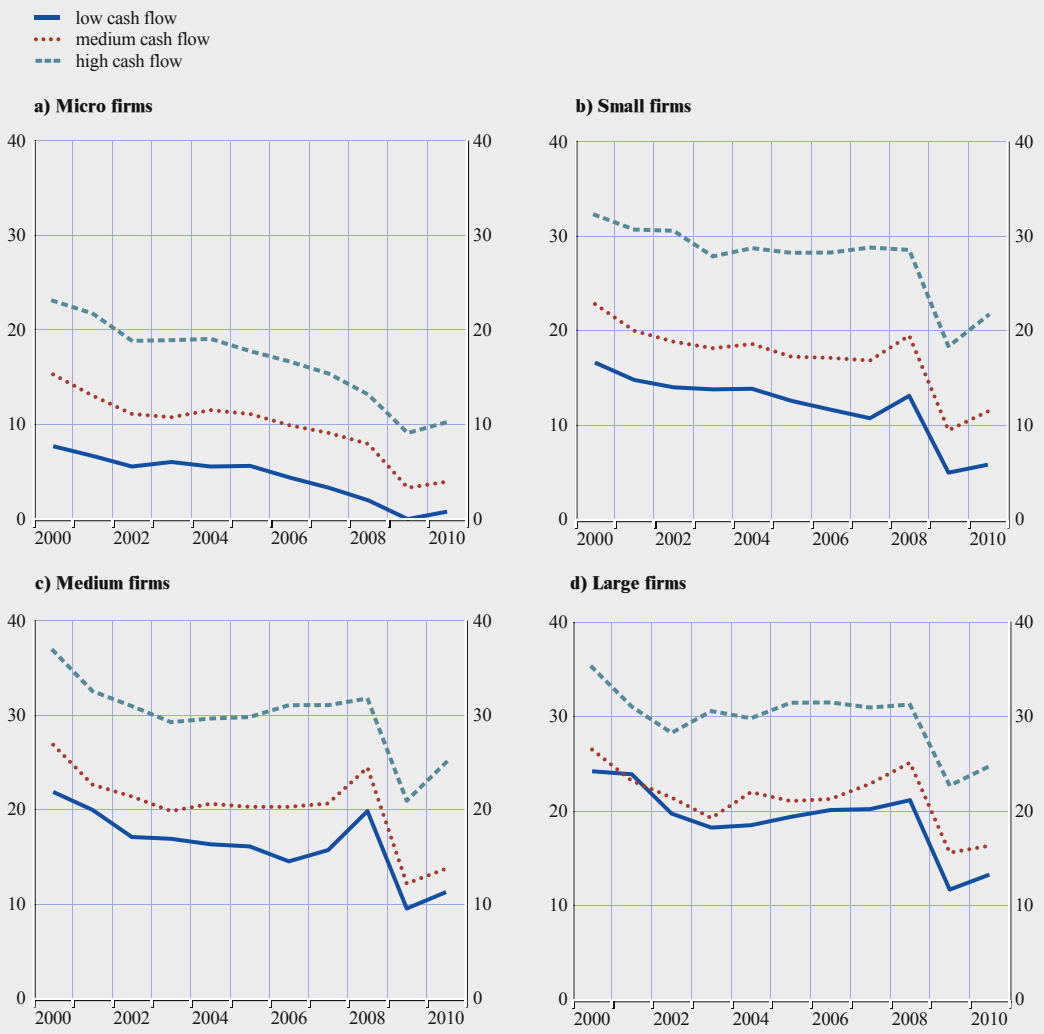
INVESTMENT RATIO AND THE FINANCIAL POSITION OF FIRMS, BROKEN DOWN BY SIZE

Firms are divided into four size classes: micro, small, medium and large. As shown in Charts A18-A21, firms under higher financial pressure invest less, regardless of the size of the company. Similarly, comparing the sub-charts in Chart A22, which indicate the differences in investment rates for firms facing very high or very low financial pressures, shows that profitability

and the interest payment burden significantly affect the investment decisions of firm of all sizes. The link between financial pressure and investment seems to be inversely related to the firm's size while, for the cash holding and indebtedness indicators, the differences in investment rates seem to be similar for all firm sizes.

Chart A18 Investment ratio and cash flow for the median firm, broken down by firm size

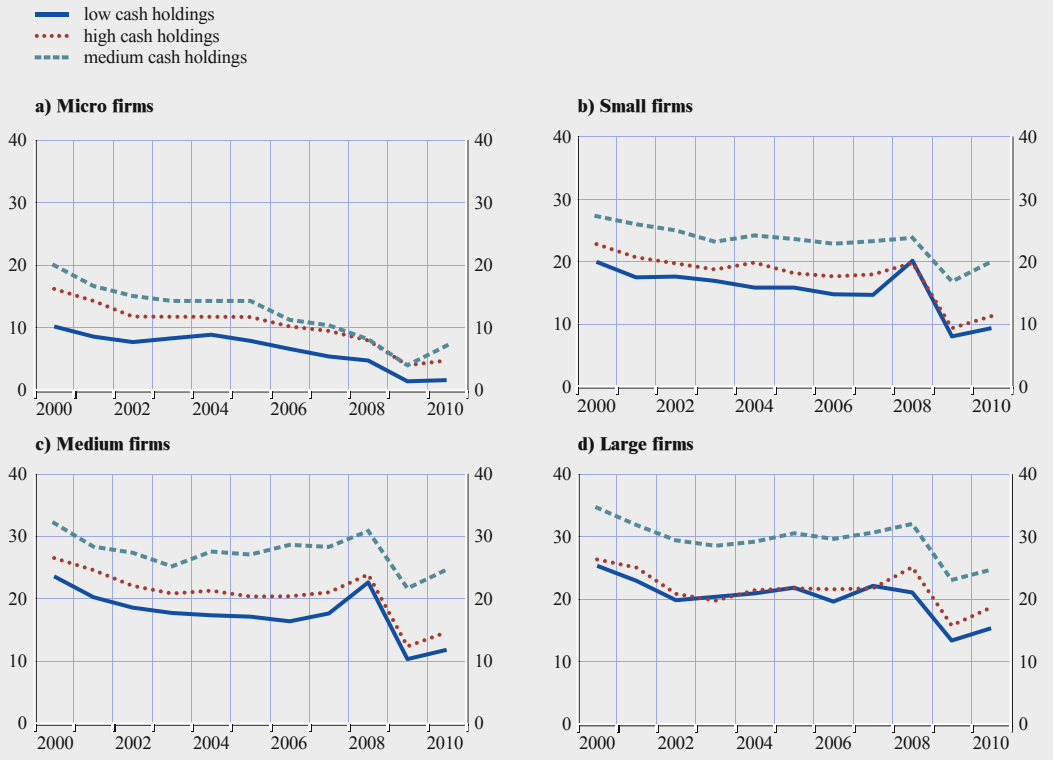
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with high cash flow (above the 90th percentile), medium cash flow (between the 45th and 55th percentiles) and low cash flow (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and cash flow is defined as the ratio of post-tax profits plus the depreciation of fixed assets divided by total assets.

Chart A19 Investment ratio and cash holdings for the median firm, broken down by firm size

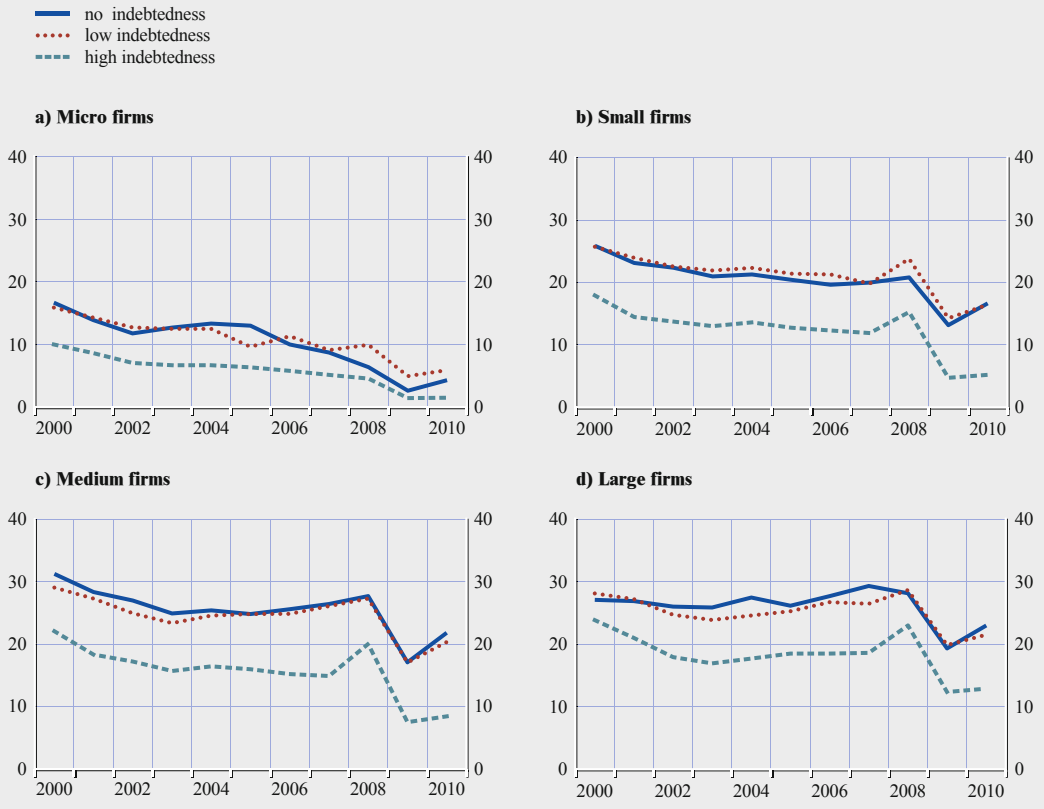
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with a high cash holding ratio (above the 90th percentile), a medium cash holding ratio (between the 45th and the 55th percentile) and a low cash holding ratio (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and the cash holding ratio is calculated by dividing cash and cash equivalents by total assets.

Chart A20 Investment ratio and indebtedness for the median firm, broken down by firm size

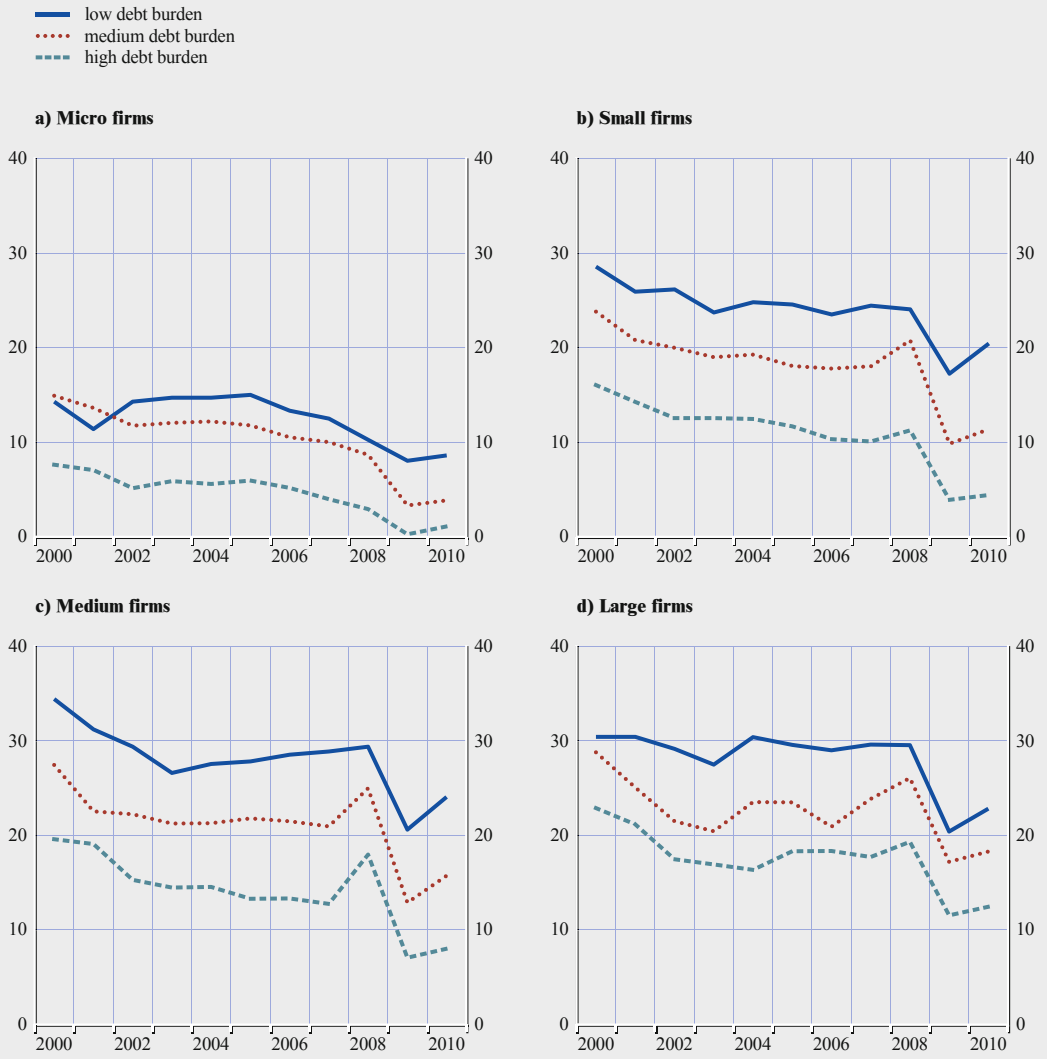
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The different charts depict the median investment ratio for firms with no financial debt, a low level of financial debt (below the 25th percentile of the distribution of leverage ratios across indebted companies) and a high level of debt (above the 75th percentile of the distribution of leverage ratios across indebted companies). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and "indebtedness is the ratio of short-term and long-term debt to total assets.

Chart A21 Investment ratio and interest payment burden for the median firm, broken down by firm size

(percentages)

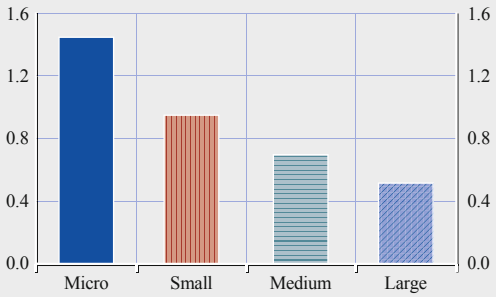


Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with a high interest payment burden (above the 90th percentile), a medium interest payment burden (between the 45th and 55th percentiles) and a low interest payment burden (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and the interest payment burden is defined as the ratio of interest payments to earnings before interest, taxes, depreciation and amortisation, plus financial revenues divided by total assets.

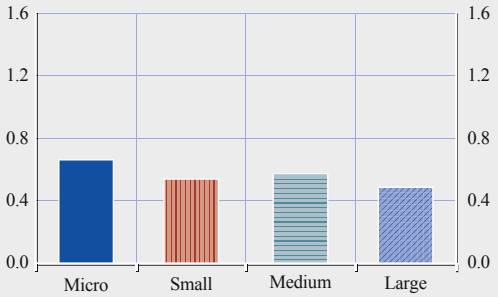
Chart A22

(percentages)

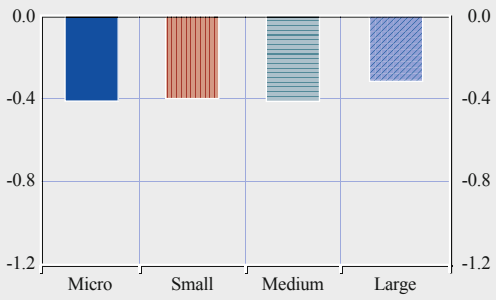
a) Firms with a high cash flow compared with firms with a low cash flow



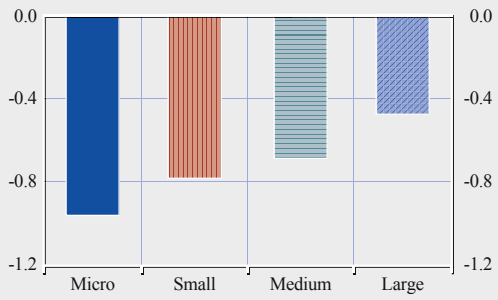
b) Firms with high cash holdings compared with firms with low cash holdings



c) Highly leveraged firms compared with firms with zero leverage



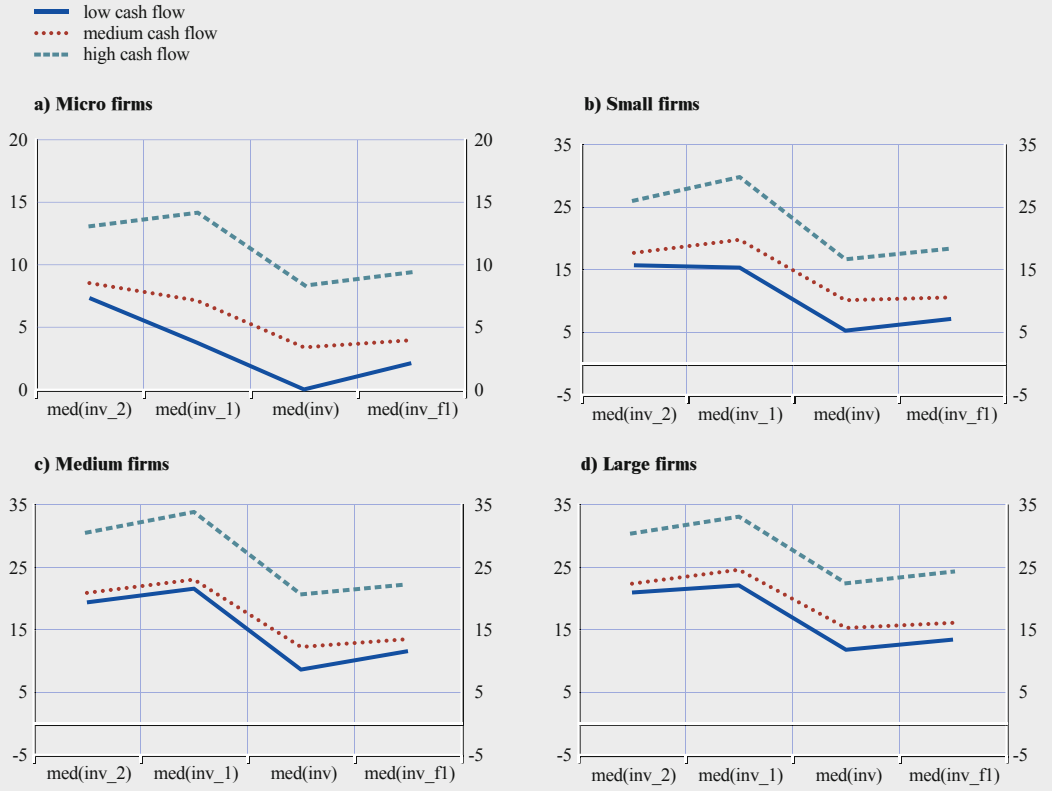
d) Firms with a high interest payment burden compared with firms with a low interest payment burden



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: For each of the financial indicators considered, the bar charts show the average difference, in the sample period, between the median investment rates for firms for which this indicator shows a high value (above the 90th percentile) and the median investment rate for firms for which this indicator shows a low value (below the 10th percentile), normalised by the median investment rate for firms for which this indicator stands at intermediate levels (between the 45th and the 55th percentiles).

Chart A23 Relationship between the investment ratio and cash flow during the crisis, broken down by firm size

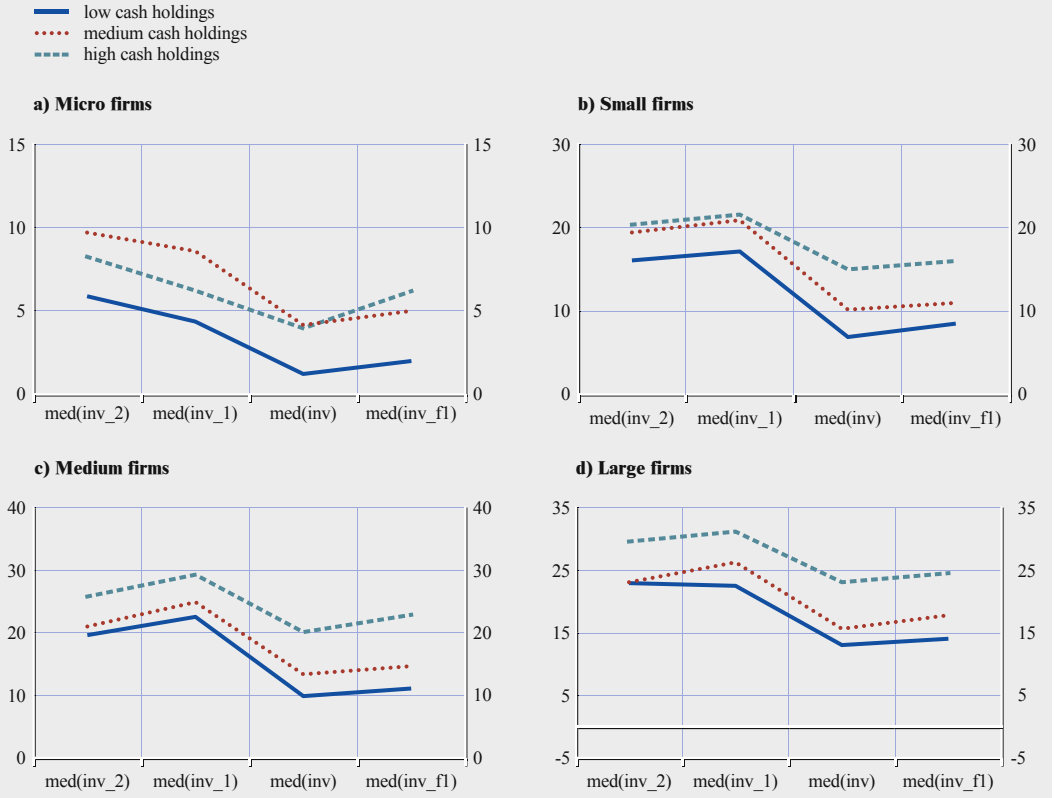
(percentages)



Sources: ECB.

Chart A 24 Relationship between the investment ratio and cash holdings during the crisis, broken down by firm size

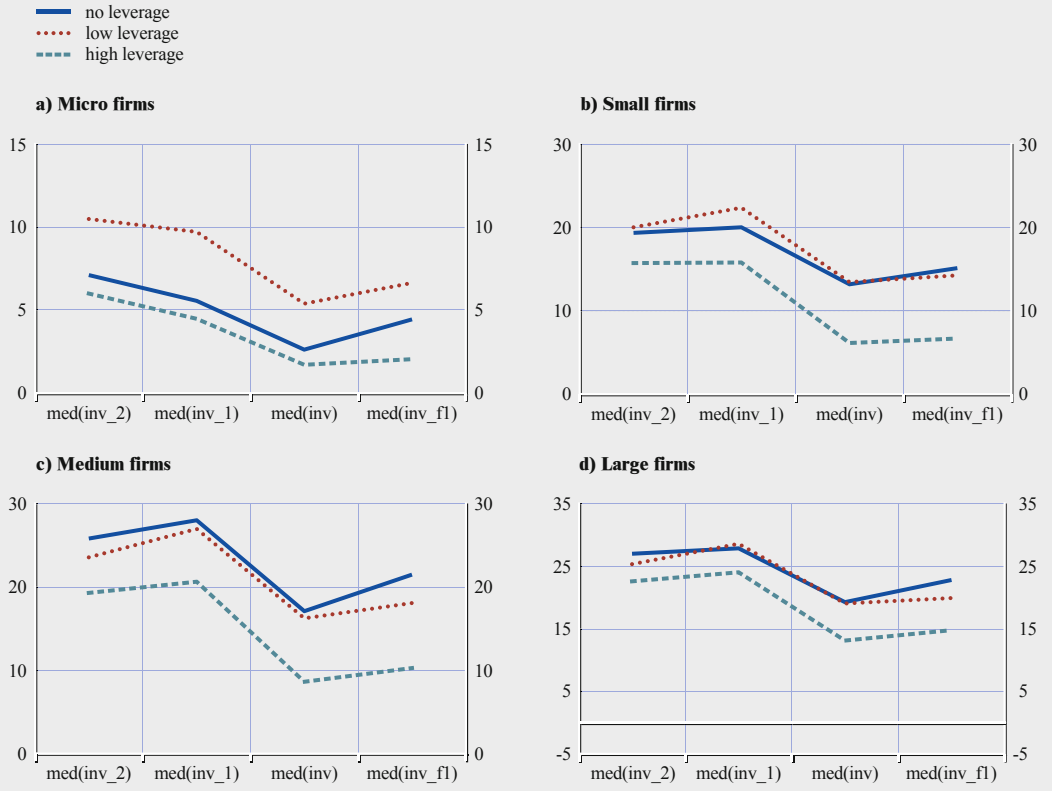
(percentages)



Source:

Chart A25 Relationship between the investment ratio and leverage during the crisis, broken down by firm size

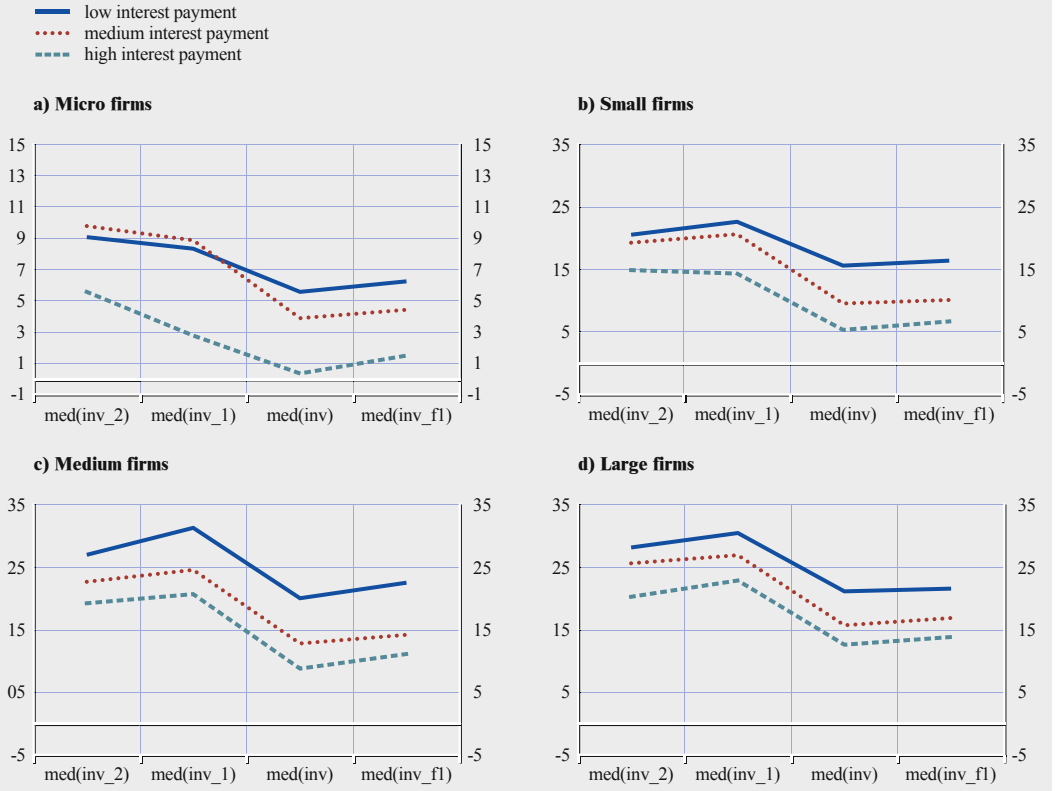
(percentages)



Source:

Chart A26 Relationship between the investment ratio and the interest payment burden during the crisis, broken down by firm size

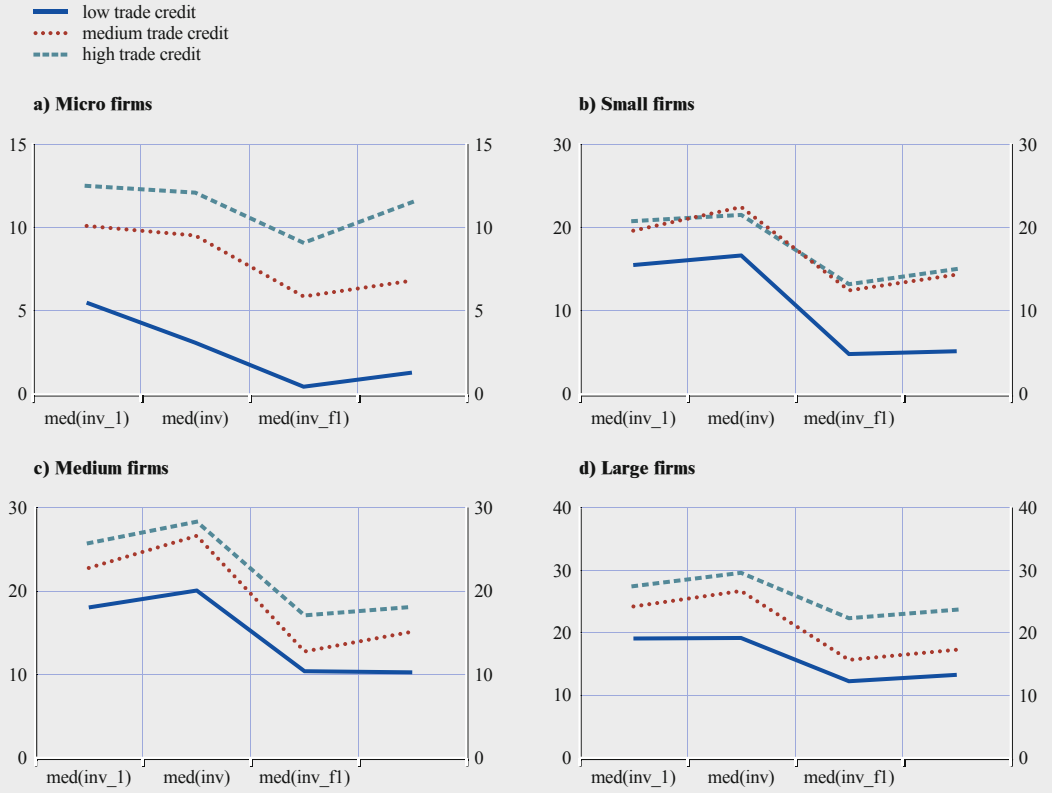
(percentages)



Source:

Chart A27 Relationship between the investment ratio and trade credit for the median firm, broken down by firm size

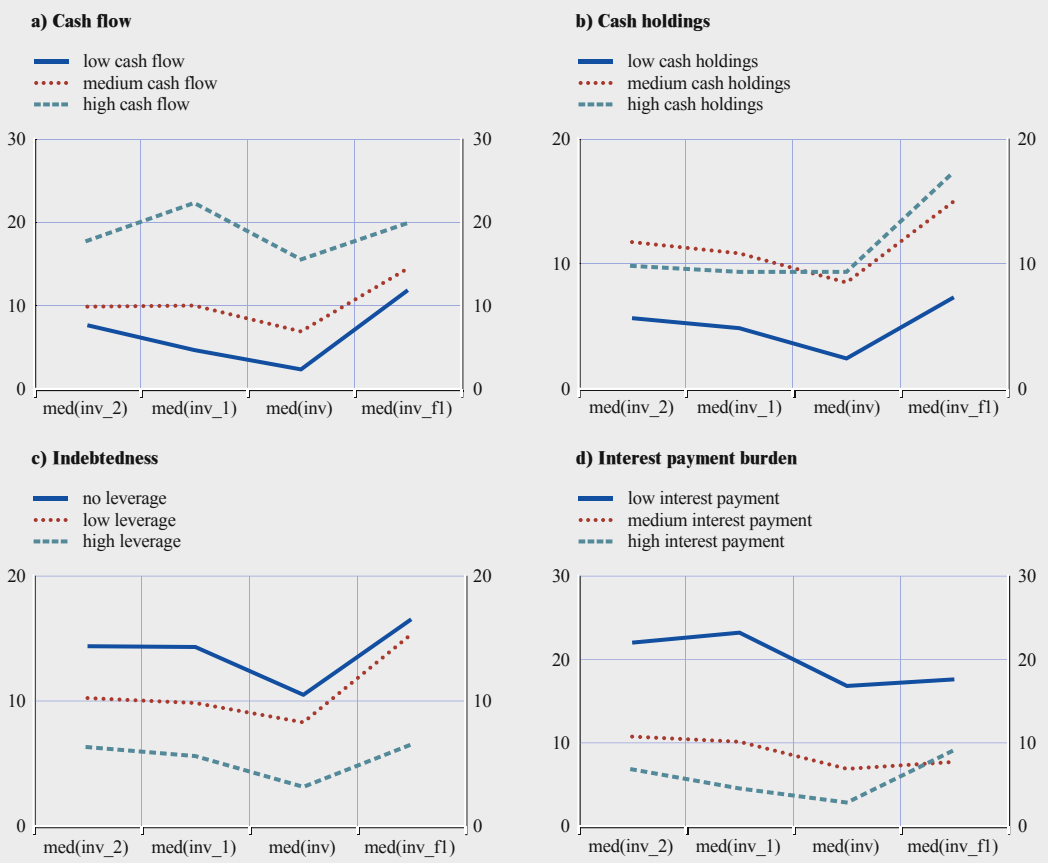
(percentages)



Sources: Bureau van Dijk Amadeus database and ECB calculations.
Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (Belgium)

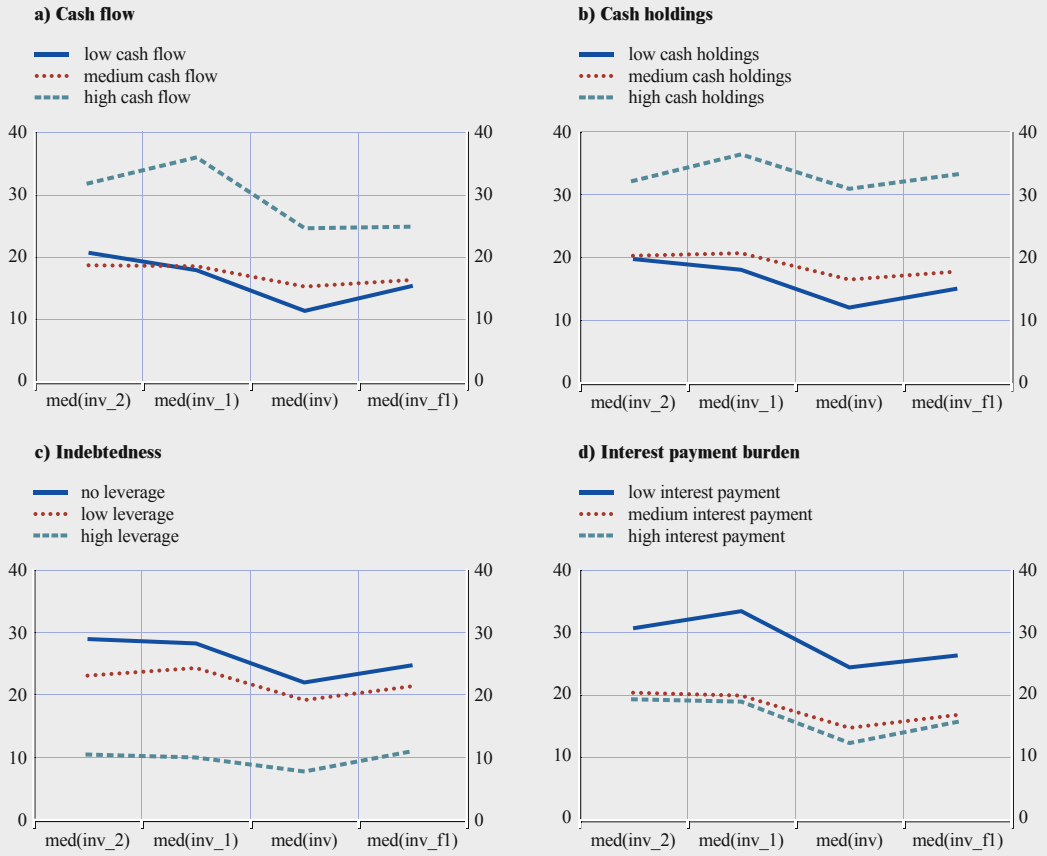
(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (Germany)

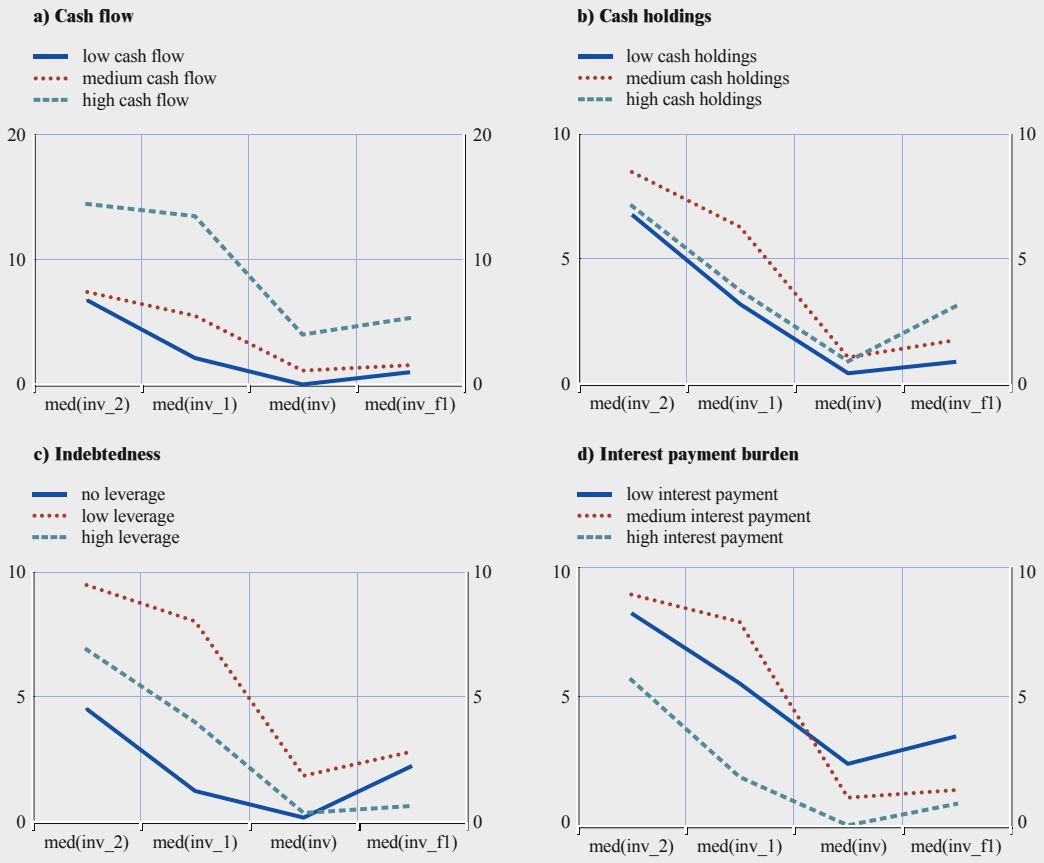
(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (Spain)

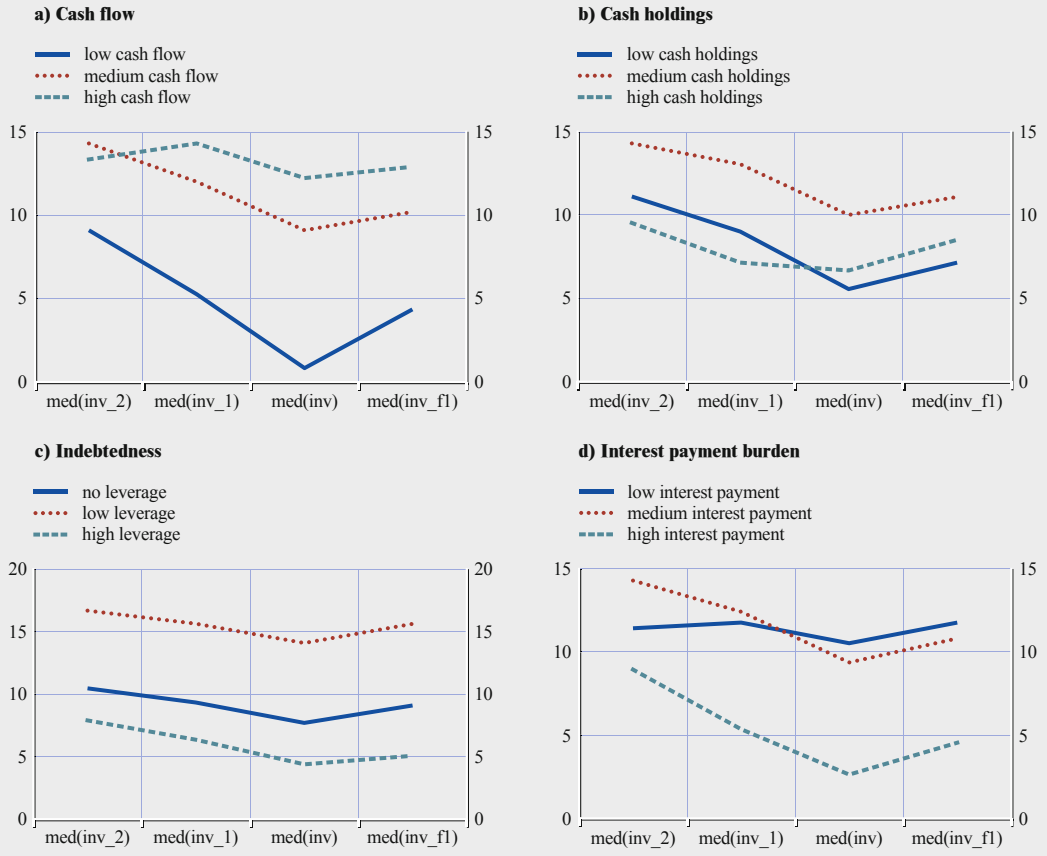
(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (France)

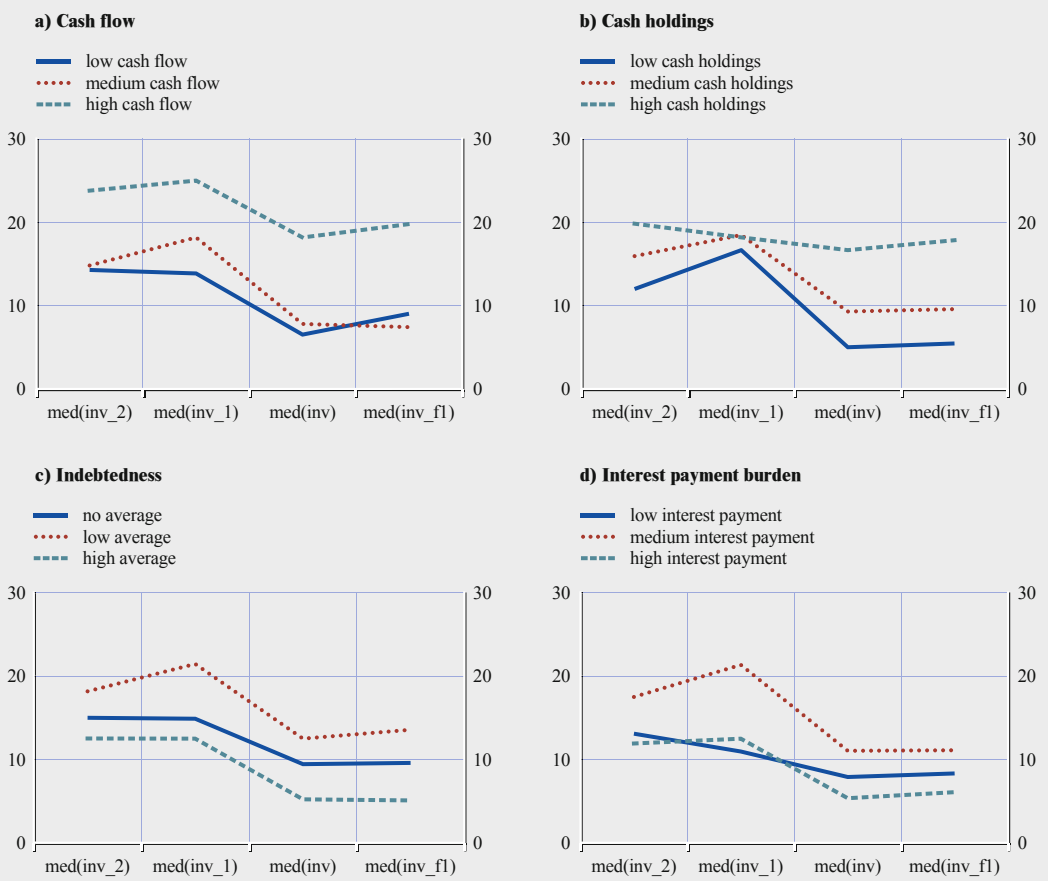
(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (Italy)

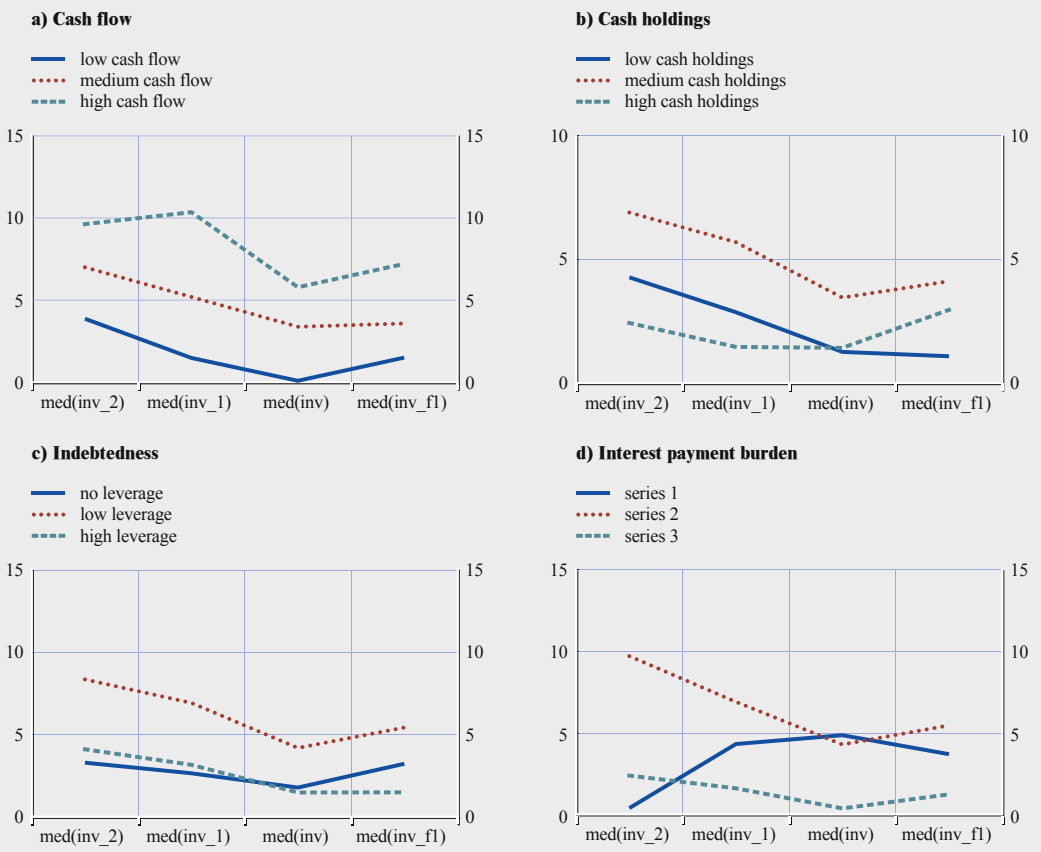
(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Chart A28 Impact of the crisis on the link between investment and a country's financial position (Portugal)

(percentages)



Notes: The charts depict the median investment ratio for firms with high levels of trade credit (above the 90th percentile), medium levels of trade credit (between the 45th and 55th percentiles) and low levels of trade credit (lower decile). The investment ratio is defined as the change in tangible fixed assets plus depreciation divided by total assets, and trade credit is calculated by dividing the accounts payable by total assets. Med(inv_1 (2)) indicates the median investment ratio one (two) year before the crisis (set at 2008); med(inv) is the median investment ratio in 2008 and med(inv_f1) is the median investment ratio one year after the crisis.

Table A18 Financial crises and turning points in economic activity in advanced economies since the 1960s

Country	Business cycle peaks					
Severe financial crises (the "BigFive")						
Spain	1978					
Norway	1987					
Finland	1991					
Sweden	1991					
Japan	1992					
Milder Financial crisis						
Australia	1989					
Canada	1981					
Germany	1980					
Denmark	1987					
France	1992					
United Kingdom	1973					
United Kingdom	1990					
Italy	1992					
United States	1984					
Other business cycle peaks						
Australia	1961	1973	1976	1981		
Canada	1989					
Switzerland	1974	1981	1990	1994	2001	
Germany	1966	1974	1992	2001		
Denmark	1973	1979	1992	2001		
Spain	1974	1992	1992			
France	1974					
United kingdom	1979					
Italy	1974	2002				
Japan	1973	1997	2001			
The Netherlands	1974	1980	2001			
Norway	1981					
Sweden	1976	1980				
United States	1969	1973	1979	1981	1990	2000

Sources: Jorda *et al*. (2012), Laeven and Valencia (2008), Reinhart and Rogoff (2009b) and Kamisky and Reinhart (1999).

Table A19 Probability of a crisis episode in euro area economies since the 1980s: the effect of debt accumulation

	Effect of debt accumulation on the probability of a financial crisis							
Regressions	1	2	3	4	5	6	7	8
Δ log (real loans)	72.83***	72.07***	68.50**	63.54**	81.56***	53.76*	62.87**	70.37**
	(25.66)	(26.71)	(29.63)	(28.67)	(24.35)	(29.67)	(29.46)	30.97)
Δ log (real stocks)		5.200	4.612	-0.816		12.10**		6.994*
		(3.459)	(3.566)	(7.277)		(5.509)		(3.955)
Δ log (real investment)			7.798	10.28		67.76*	24.55	10.91
			(17.85)	(19.84)		(34.88)	(16.21)	(17.23)
Δ log (real loans)* Δ log (real stocks)				224.9				
				(277.6)				
log (loans/GDP)					3.686*	8.129***		
					(1.991)	(3.114)		
Δ log (real loans)* Δ log (real investment)							-282.9	-531.3
							(312.5)	(346.1)
Δ log (real stocks)* Δ log (real investment)								-64.84
								(177.7)
Observations	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057
chicountry	6.952	7.018	6.725	6.373	9.590	16.66	7.022	7.421
pcountry	0.959	0.957	0.965	0.973	0.845	0.340	0.957	0.945
pseudo-r2	0.0819	0.0907	0.0912	0.0940	0.120	0.183	0.0889	0.101
pseudo-l	-87.39	-86.55	-86.51	-86.24	-83.76	-77.74	-86.73	-85.60
chi2	38.42	35.86	52.67	57.10	43.13	51.01	82.38	88.42
plogit	0.00132	0.00479	2.95e-05	1.10e-05	0.000460	9.28e-05	3.27e-10	1.40e-10
AUROC	0.751	0.752	0.753	0.756	0.782	0.846	0.767	0.777
seroc	0.0569	0.0567	0.0559	0.0586	0.0528	0.0427	0.0524	0.0524

Source: ECB calculations.
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1