

FINANCIAL STABILITY REPORT November 2012



FINANCIAL STABILITY Report

NOVEMBER 2012



Lisbon, 2012 www.bportugal.pt

eurosystem

BANCO DE PORTUGAL

Av. Almirante Reis, 71

1150-012 Lisboa

www.bportugal.pt

Edition

Economics and Research Department

Design, printing and distribution

Administrative Services Department Documentation, Editing and Museum Division Editing and Publishing Unit

Lisbon, 2012

Number of copies

130

ISSN 1646-2246 (print)

ISSN 2182-0392 (online)

Legal Deposit no. 313475/10

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OVERVIEW

The environment in which the Portuguese banking system has been operating remained highly unfavourable (Chart 1.1). The sovereign debt crisis in the euro area and the interaction between market players' perception of the risk attached to the Government debt and to the banks of the respective jurisdiction continue to be a major source of uncertainty and vulnerability for Portuguese banks. In addition, the uncertain recovery of global economic activity is a constraining factor on the future evolution of the Portuguese economy. The downside risks to the growth of the international economy are not only the result of the uncertainty surrounding the resolution of the sovereign debt crisis but also the need for the adjustment of the imbalances of the private sector in several advanced economies. In such a context, together with the demanding adjustment underpinning the economic and financial assistance programme, the Portuguese economy is going through a prolonged recessionary period, with a strong adverse impact on banks' operating conditions.

This recessionary background has been constraining significantly banks' activities as it implies a higher materialisation of credit risk, as well as downward pressures on net interest income associated to low interest rates, both with impact on profitability. Beyond these risks that are being materialising, there are other potential risks, broadly attached to market developments, which continue to overshadow banks' activity, even though to a lesser extent relative to more acute pressure some months ago. In particular, the eventual resurgence of tensions in the sovereign debt markets in the euro area constitutes an element of disturbance of banks' liquidity management and their capacity to return to the international debt markets. Further, turmoil in the international markets is also associated with negative value changes in securities portfolios.

All these factors are prone to impact on banks' profitability and, as a consequence, on their solvency. In addition, if pressures on profitability were perceived to be long-lasting, these would tend to reduce banks' capacity to raise capital in the market. In this context, it is particularly important that banks persist in managing carefully their balance sheets and the trade-off between profitability and risk of their operations, aiming at ensuring the maintenance of comfortable solvency levels. The economic and financial assistance programme embodies a facility for eventual capital needs, as a backstop measure to preserve financial stability.

Portuguese banks have been very successful in meeting these challenges, avoiding a deterioration of their financial situation and positioning themselves to meet the risks facing them from a position of greater strength. Solvency levels have been significantly strengthened together with a gradual convergence to a more balanced structural liquidity position. Moreover, banks made significant ende-avours to adapt the risk management to the new circumstances and reinforce available collateral in the context of the new eligibility rules for monetary policy operations.

These developments have benefited from the ECB's non-conventional monetary policy measures which have translated into a reduction of uncertainty in the banks' access to liquidity, namely long term refinancing operations (3 years) and changes to the eligibility criteria on collateral. The latter led to a significant widening of the pool of assets available as collateral which, as a whole, has become less sensitive to market fluctuations, such as those arising from sovereign debt ratings. More recently, the ECB's announcement that it would be initiating an Outright Monetary Transactions programme immediately eased conditions in the sovereign debt markets in the euro area, with a recovery in the value of the securities of the countries most affected by the sovereign debt crisis in the euro area and a change of sentiment in other financial market segments, namely in terms of prices and vola-tility in private debt and equity markets. In particular, international investors' perception regarding

solvency and systemic risk in the banking system improved considerably (see "Box 2.1 Identification and monitoring of systemic risk based on distance-to-default series", of this Report). Lastly, the fiscal consolidation process in Portugal is also contributing towards the progressive improvement of international investors' risk perception regarding the Portuguese state and the banks, evidenced by secondary market prices and improved conditions for a return to medium and long term debt issues in the primary market.

Long term refinancing operations with the ECB and changes to the collateral policy have allowed the stabilization of the banks' financing with the Eurosystem and, as a consequence, have facilitated banks' liquidity management. The liquidity position of the Portuguese banks, when measured by liquidity gaps of up to one year have improved substantially since the start of the year, reflecting the permanent nature of financing from the ECB over this timeframe. Portuguese banks' access to the international financial markets is still, however, limited, and it is therefore desirable for them to position themselves to take advantage of the windows of opportunity in which the market is more receptive to medium and long term debt issues. Notwithstanding this, two Portuguese banks recently issued debt in international financial markets which represents a favourable development in theis domain.

The initiatives implemented with the aim of ensuring the banks' greater resilience and accordingly improving investors' perception regarding their underlying risk, include the strengthening of own funds through equity market issues, capital subscribed by the state (or hybrid instruments eligible as core tier 1) or earnings retention, in addition to asset quality reviews, for instance the Special Inspections Programme performed in 2011 and the overall inspection to the construction and commercial real estate sectors, that have been taking place in the second half of 2012. Reference should also be made to the gradual reduction of the loans-to-deposits ratio implying the convergence towards a financial structure less vulnerable to liquidity shocks arising from changes in international investors' risk perceptions, as noted in the current financial crisis. The decline of the loans-to-deposits ratio occurred in a context in which household deposits have maintained positive growth rates.

The slowdown of household deposits in the resident banking system, in 2012, is in line with expectations, as the growth recorded in 2011 was, in part, due to portfolio shifts in this sector whose main counterpart comprised net redemptions in unit trust investment funds, in insurance products issued by entities belonging to the same financial group, as well as net redemptions of treasury saving certificates. In 2012, households also made significant investments in bonds issued by non-financial corporations and by the banks themselves, in both cases sold in their retail network. Such developments are illustrative of the public's confidence in the Portuguese banking system, in contrast to what has been observed in other countries which have also been more affected by the sovereign debt crisis in the euro area. Over the course of 2012, there was an increase in the financial savings of households, essentially based on net repayments of liabilities, particularly mortgage loans.

During the course of 2012, there was a reduction of bank credit to the private sector, although total credit to non-financial corporations virtually stabilised, having recently recorded a slight reduction. A more detailed analysis shows that the larger corporations have succeeded in sustaining relatively robust growth rates in terms of total credit from alternative sources to the resident banking system (*i.e.* bond sales to the public and in international markets and loans obtained from banks abroad). In turn, smaller companies, whose disclosure of financial situation usually is less widespread, are not present in debt securities markets nor do they find it easy to get credit from non-resident financial institutions, so that they have not been able to compensate the reduction in credit granted by resident financial institutions. In the recent period, this credit reduction was only very partially offset by shareholders' loans (non-financial corporations and households). As regards banking credit, it is also relevant to make reference to the duality between the behaviour of domestic and non-domestic resident banks in Portugal. In the period between the first half of 2010 and the first half of 2011, lending to corporations by non-domestic banks posted high growth rates, attenuating the slowdown

of credit to this sector. The situation was later reversed, with non-domestic banks evidencing a stronger reduction than the system as a whole. This evolution is part of a more general context of such institutions' balance sheet adjustments aimed at sustaining the financing of their activity in Portugal with locally obtained resources, *i.e.* without financing from parent companies. These developments occurred through a substantial increase of the recourse to Eurosystem financing by non-domestic resident banks, in parallel with a significant reduction in credit and an increase in customer deposits.

An analysis of factors underpinning the reduction of credit and its implications for the evolution of economic activity is relatively complex. On the one hand, the deleveraging of the private sector is not only inevitable but also desirable and implies the exit of economically non-viable companies from the market or an adjustment to the scale of their operations. On the other hand, to the extent the deleveraging of the corporate sector reflects non-selective restrictions on the credit supply side, the normal development of the activity of economically viable companies, including exporters, or the financing of projects having higher potential return may be restricted or even compromised. In such a context, economic policy measures to eliminate the obstacles to the financing of such companies must be adopted. Such policies should be drawn up in an integrated manner and take into account the fact that they are prone to introducing incentives leading to results which are contrary to those desired. National authorities, including Banco de Portugal, are adopting and identifying measures to facilitate the diversification of sources of financing for companies and to ensure that they are channelled into the most dynamic and competitive sectors of the economy. In particular, it is undesirable for the activity of economically non-viable companies to be sustained on the basis of the successive refinancing of banking credit, delaying banks' recognition of losses and having a crowding out effect on financing for others. The previously referred to asset quality review programs and recent regulations on the exhaustive identification of restructured credit, both promoted by Banco de Portugal, are examples of such measures. The measures to be adopted should also provide adequate incentives for the restructuring of defaults, when justified, or their respective resolution in a framework in which it is in the best interest of the banking system itself to find cooperative solutions in such domains. Reference should therefore, herein, be made to the fact that the recent change to the Insolvency Code and Recovery of Corporations aims to improve the flexibility of insolvency procedures and establishes negotiation mechanisms between viable companies, which find themselves in a difficult economic situation, and their respective creditors.

The deepening of the economic recession in Portugal, which is likely to continue through the next few quarters, is expected to factor into higher delinquency in banks' loan portfolios (Chart 1.2), particularly in the case of lending to corporations and to households for purposes other than the acquisition of houses. Default indicators in these two segments are at very high levels in comparison to the overall period following the inception of the euro area. As regards non-financial corporations, the higher default levels were particularly marked in the case of companies in the construction, real estate and trade sectors.

The high level of indebtedness and the low level of profitability of companies represent weaknesses which may fuel a strong increase in default levels, when subject to a demand shock of the magnitude underpinning the recession currently affecting the Portuguese economy. Accounting information for 2011 as a whole, suggests that the financial situation of corporations deteriorated, as evidenced by a reduction of their operating income and their decreased capacity to service debt out of operating income. This evolution was shared by most sectors of activity and size classes, but was particularly marked in the case of construction and micro-companies. Quarterly information for 2012 but only available for a sample of companies in which the major corporations are more represented, indicate a slight recovery of profitability. In this sample of corporations it is also possible to detect very differentiated situations: there has been a favourable evolution of the profitability of the sub-set of exporting companies which have evidenced robust growth in their turnover in external markets and

a continuous reduction, since mid 2011, in the profitability in the trade sector, which is particularly sensitive to developments related with domestic demand. In prospective terms, the analytical instruments available indicate the beginning of a gradual reduction of the situations of default in the case of non-financial corporations over the next few quarters, albeit towards a higher level than the one posted in 2011. This reflects the gradual recovery of economic activity underpinning the current projections, together with the lagged effects of the sharp reduction of short term interest rates in 2012. However, uncertainty over current projections, with a predominance of downside risks on economic activity, advises prudence regarding the assumption that there will be a reduction of the default levels of non-financial corporations in 2013.

In the case of households, the level of indebtedness is also very high both in historical terms and in comparison to other countries in the euro area. Notwithstanding, it is only in the credit for purposes other than the house purchase (consumption and other purposes) that the default level is much higher than in the previous recession. The default flow level of housing credit has remained near the average level observed since the inception of the euro area and the indicators of the stock of defaults, albeit with an upward trend, are at relatively contained levels. There are several structural reasons which may be underlying this evolution. Firstly, such credit is mostly collateralised by a borrower's primary residence, which typically carries lower probability of default. Secondly, the proportion of households in the lower income distribution strata with mortgage loans, which are those with a greater propensity to default, is relatively low. Thirdly, Portugal did not witness a house price bubble. As stated, currently available projections for economic activity and unemployment are subject to downside risks. In such a context and given that Euribor rates cannot increase significantly their mitigating role in terms of credit defaults on mortgage loans, as they are close to zero, the potential worsening of economic activity and higher unemployment vis-à-vis the levels which the most recent projections are based on represent a risk in terms of defaults by households, particularly in the case of loans for consumption and other purposes. In the case of mortgage loans, this aspect tends to be relevant in terms of potential losses for the banks in cases in which defaults culminate in payment in kind or mortgage foreclosure, when taking into account that the information available indicates that there has been a reduction of prices in the housing market in the most recent period.

The unfavourable developments in losses in the credit portfolio in the domestic activity, and the prospects that such trend will persist in the near future, exerts strong negative pressure on banks' profitability. Developments in net interest income are pressing banks' profitability as well. In contrast, the contribution of international activity continues to sustain banks' profitability, which has been benefiting from gains in the buy-back of debt securities at below-par levels. The combined effect of these factors implied only marginally positive profits in their consolidated activity in the first half of 2012.

In what concerns net interest income, reference should be made to the substantial decline in the spread between the average implicit rates on credit and the corresponding rates on customer deposits, in addition to a negative volume effect arising from the decline of credit together with a positive growth of deposits. In a context in which there has been a considerable reduction of interbank interest rates, the contribution of the margin associated with sight deposits, upon which practically no interest is paid, was smaller. These effects are likely to have dominated the effect of the substitution of market financing by ECB financing, the latter being relatively cheaper.

In contrast, international activity made a growing contribution to banks' earnings, which has more than offset losses on domestic activity. Such developments are positive, as they represent geographical diversification gains, in a context in which the performance of activities in Portugal is constrained by the recessionary conditions of the Portuguese economy. However, strategies to set up de novo operations in external markets or aggressive expansion plans in markets in which operations have still to achieve maturity, are usually associated with relevant medium term risks and should therefore be properly prepared and accompanied by particularly conservative assumptions when drawing up business plans. On the other hand, from a systemic viewpoint, the fact that the domestic banks have largely committed to the same external markets reduces the diversification gains accruing to the banking system as a whole.

In more general terms, the prospects for the banks' activity and profitability should be seen against the background of a paradigm shift in the banking systems of many economies, including the Portuguese economy, which translates into adjustment needs which are essentially structural in nature. The deleveraging of the Portuguese economy, including both private and public sectors, is associated with a reduction of the demand for financial intermediation services. In such a setting, it is fundamental that the restructuring of branch office networks, namely through the respective resizing and consequent functional reallocation of human resources, should continue in the near future, to enable the installed capacity of the banking system as a whole to adapt to the structural reduction of demand for banking services. These developments will occur alongside the entry into force of a new regulatory framework in the European Union largely reflecting Basel III recommendations, which gradually foresee more demanding liquidity and solvency requirements. The recent evolution of Portuguese banks' solvency and liquidity is consistent with the achieving of goals within the expected timeframe.

The autonomy of the banks' financing conditions vis-à-vis the financial situation of the respective states is not currently ensured. This fact lay at the base of the recent political thrust to deepen European integration, reforming the financial architecture in the euro area, including the centralisation of supervisory functions in the ECB, the centralisation of the banks' resolution function and an integrated deposit guarantee scheme, as well as the strengthening of European-wide mechanisms to provide direct assistance to individual banks. The main desideratum of the new institutional framework which is now being established is to disconnect the specific risk attached to each bank from the respective sovereign risk, contributing towards financial stability in the euro area.

Chart 1.1



GLOBAL EVOLUTION OF THE MACROEONOMIC AND FINANCIAL ENVIRONMENT OF THE PORTUGUESE

Sources: Barclays Capital, European Commission, Confidencial Imobiliário, Eurostat, IMF, iBoxx, Statistics Portugal, Thomson Reuters and Banco de Portugal.

Note: A value away from the center signifies higher risks or tighter monetary and financial conditions, having as reference the historical values for each series used in the different risk dimensions. For further details on the methodology see "Box 1.1 *Financial stability map*" in the Financial Stability Report of Banco de Portugal November 2011. Given the lack of availability of national accounts data for September 2012, it was assumed that values remained unchanged vis-à-vis June.

Chart 1.2



Source: Banco de Portugal.

Note: A value away from the center signifies higher risk, having as reference the historical values for each series used in the different risk dimensions. For further details on the methodology see "Box 1.1 Financial stability map" in the Financial Stability Report of Banco de Portugal November 2011.

2. MACROECONOMIC AND FINANCIAL RISKS

The macroeconomic and financial environment continues to pose a series of significant risks to financial stability in Portugal. Notwithstanding an across-the-board decline of the perception of risk in the international financial markets starting in the third quarter, Portuguese banks' access to market financing is still limited (Chart 2.1). Uncertainty continues to be a prevailing element in the decisions of economic agents, in a framework of deteriorating outlook for economic growth worldwide and, more markedly so, in domestic terms. Such uncertainty partly derives from the challenges associated with the implementation of the economic and financial adjustment programme, in addition to the risks related with adverse developments in the external environment and particularly the difficulty in resolving the sovereign debt crisis in the euro area.

Uncertain recovery of the world economy in 2013

According to the IMF, the world economy is likely to record a slowdown in 2012, transversal both to advanced and emerging market economies, followed by moderate recovery in the following year. These forecasts for 2013 are enshrouded in uncertainty and have been revised downwards owing to significant risks, the materialisation of which could disrupt the world economy's path to recovery (Chart 2.2). These risks are essentially associated with strategic US and European economic policy issues. There is major uncertainty in the United States over short term fiscal policy, notably as regards the specification of the increase in the fiscal burden and various expenditure cuts foreseen for the start of 2013. Although the implementation of these measures is likely to have recessionary effects on the economy, any failure to implement them may increase uncertainty over the medium and long term sustainability of the public finances in the US. In the case of the euro area, the commitments assumed over the last few months must be strengthened and implemented, to ensure greater financial, economic and fiscal integration, creating the necessary mechanisms to curb the effects of the interaction between sovereign risk and financial stability.

Notwithstanding the fact that IMF forecasts point towards a slight acceleration of economic activity in 2013, both in the case of advanced and emerging market economies, there continues to be major differentiation in growth rates. Growth of employment and private consumption in the emerging market economies is likely to continue to fuel domestic demand, in spite of the fact that growth rates appear unlikely to return to the levels preceding the global economic and financial crisis. In turn, economic

Chart 2.1



Chart 2.2



Source: IMF.

growth in the advanced economies is likely to remain relatively incipient. Economic activity in the United States may be conditioned by fragilities in the financial situation of households, by the persistence of a certain restrictiveness in financing conditions and by the need for fiscal consolidation over the medium term. Europe is likely to witness a slight acceleration of economic activity, reflecting a strengthening of external demand and a gradual diminishing of tensions in the euro area, as well as some moderation in the rate of fiscal consolidation in several countries. In the euro area there is major asymmetry between the growth prospects of the economies most affected by the sovereign debt crisis and others. Forecasts for the euro area are, however, enshrouded in uncertainty and subject to a series of significant risks such as the possibility of a re-intensification of the sovereign debt crisis, the implementation risks associated with the measures which have been defined on a national and European level, adjustment processes to the financial situation of the public and private sectors, the historically high level of unemployment and eventual negative pressures which may put the recovery of external demand at risk.

The forecasts for economic activity for 2013 have also been revised downwards in Portugal. The projections published in Banco de Portugal's Economic Bulletin for last Autumn point to a 1.6 per cent contraction of GDP, implying three consecutive years of negative economic growth. This recessionary scenario is occurring in the context of an adjustment process of the structural imbalances in the Portuguese economy, which has translated into a sharp contraction in public and private domestic demand. Although a marked growth of exports has enabled this effect to be mitigated, there is likely to be a certain deceleration of this component in 2013. Reference should be made to the fact that these projections are enshrouded in significant uncertainty, especially as regards the implementation of measures to resolve the sovereign debt crisis in the euro area and the impact of domestic economic policy measures, particularly the recently announced fiscal measures. There are also risks associated with the evolution of the international environment which could affect external demand for Portuguese exports, as well as the economy's financing conditions. In domestic terms, the high level of uncertainty, the increase in the number of agents subject to liquidity restrictions, the reduction of disposable income and the worsening of conditions in the labour market, which appear likely to be permanent, may translate into a sharper reduction of private consumption than considered in the central projection and into an increase in savings for precautionary motives.

The diminishing of tensions in the international financial markets in the most recent period may not be sustained

The sovereign debt crisis in the euro area has been characterised by a profound interaction between sovereign and banking system risk, particularly in those countries most affected by the sovereign debt crisis. Chart 2.3 illustrates the relationship between risk premia on sovereign and banking debt at the end of 2009 and mid 2012, in which a significant, simultaneous increase in such premia was only witnessed in this set of countries. The curbing of such interaction mechanisms is essential to ensure financial stability in the euro area and to guarantee the normalisation of economies' financing conditions. In the first months of 2012 several positive developments were noted in the international financial markets which appeared to signal an easing of tensions. The second quarter, however, witnessed a resurgence of volatility in these markets. These tensions were essentially associated with the increased number of countries under pressure in the context of the sovereign debt crisis, particularly Spain and Italy, as well as some uncertainty over the existence of mechanisms capable of ensuring the stability of the euro area as a whole.

In such a context, the measures taken by the European authorities during the summer were essential to curb the increase in tensions. Several measures designed to ensure financial stability in the euro area were adopted at the Euro Summit and European Council meeting of 28 and 29 June for the purpose of mitigating the interaction mechanisms between the banking system and sovereign risk. These measures provide for the strengthening of European integration, notably through the creation of a banking union



SOVEREIGN RISK AND THE BANKING SYSTEM



Sources: Thomson Reuters and Banco de Portugal calculations.

Notes: The countries currently under pressure (Ireland, Italy, Portugal and Spain) are identified in red. Greece is not included in the graph in order to preserve the readability of the scale. Countries with high ratings are identified in blue (Austria, Belgium, France, Germany and Netherlands). The series for banks in each country refer to unweighted averages of banks' credit default swaps in euros.

based on a single supervisory mechanism and greater integration regarding resolution systems and deposit guarantee funds (see "Box 1.1 *The Banking Union*", Banco de Portugal, *Economic Bulletin Autumn 2012*). The conditions governing the more flexible and efficient use of financial stability mechanisms have also been defined and in certain circumstances permit direct assistance to the banking system.

The ECB has also played a crucial role in this process, maintaining an accommodative monetary policy and, particularly, announcing new non-conventional measures (see "Box 1.2 *Non-standard monetary policy in major advanced economies*", Banco de Portugal, *Economic Bulletin Autumn 2012*). The declarations made by ECB president, Mario Draghi, at the end of July played an important role in stabilising the financial markets. On the said occasion, the ECB president stated that, pursuant to the scope of his mandate, the central bank was willing to do whatever it took to protect the uniqueness of monetary policy and preserve the euro. New non-conventional monetary policy measures were latterly announced (namely the Outright Monetary Transactions programme), with the aim of re-establishing the adequate functioning of the monetary policy transmission mechanism in the euro area. There has been a high level of fragmentation of financial markets in the euro area, disrupting the transmission of the single monetary policy (see "Policy Issue 1 *Monetary policy transmission in the euro area*", Banco de Portugal's *Economic Bulletin Autumn 2012*). Notwithstanding the global accommodative monetary policy, financing conditions in the countries most affected by the sovereign debt crisis remain highly restrictive, in contrast to search for yield phenomena in economies in which long term interest rates are at historical minimums (Chart 2.4).

As referred to, the adopted measures have helped to substantially mitigate tensions in the international financial markets (Chart 2.5). The announcement of these measures was followed by a decline in the probability of bank defaults, as discussed (in "Box 2.1 "*Identification and monitoring of systemic risk based on distance-to-default series*", of this Report). The evolution of systemic risk indicators in this box reflects an across-the-board decline in the volatility of the prices of bank shares, in addition to an increase in stock market capitalisation. The indicators for Europe and the euro area also suggest a certain divergence between systemic risk inside and outside the euro area, as sovereign risk and bank risk in the euro area continued to be closely interconnected.

The measures announced in the summer also helped to substantially mitigate tensions in Portuguese financial markets. This is likely to reflect the across-the-board decline in the global perception of risk, particularly as regards sovereign risk and especially following the measures taken by the ECB (Chart 2.6). This evolution may, at the same time, be associated with the correction an excessive deterioration in past periods, in a context of rising fears over the euro area's future. Reference should be made to the fact that the distance-to-default series estimated for Portuguese banks showed signs of significantly improving during the year, especially in the third quarter, and particularly reflecting the end of June increase in own funds.

Notwithstanding the globally positive evolution noted in the international financial markets over the last few months, there is some uncertainty over its sustainability, as there continue to be doubts over the effective implementation of the announced measures. Such measures are considered essential to curb the interaction mechanisms between the financial system and sovereign risk.

The implementation of the economic and financial adjustment programme is crucial for financial stability over the medium term, though involving short term risks

The economic and financial adjustment programme should lead to the correction of a series of structural imbalances and vulnerabilities. Over the medium term, this will help to improve the Portuguese economy's



Sources: Thomson Reuters and Banco de Portugal calculations. Note: Countries with high credit rating: Austria, Belgium, Finland, France, Germany and Netherlands. Countries under pressure: Greece, Ireland, Italy, Portugal and Spain. Source: Thomson Reuters.

Chart 2.6



Source: Thomson Reuters.

competitiveness and balance and accordingly, the stability of the financial system. The implementation of the programme is not, however, risk-free in terms of financial stability, particularly in a context of the significant deterioration of macroeconomic prospects in Portugal and in several of the main destination countries for Portuguese exports. These risks include, *inter alia*, difficulties in complying with fiscal consolidation objectives, some uncertainty over the impact of this consolidation process on economic activity and, consequently, on the financial situation of the banks.

The economic and financial adjustment programme has taken the form of unprecedented structural fiscal consolidation. Such notable endeavours must necessarily have pro-cyclical implications on economic activity and will imply significant short term costs in terms of economic growth and unemployment. In turn, the worsening of the macroeconomic situation poses additional challenges to the capacity to correct the imbalances in the public finances. In such a context, one important challenge consists of the need to identify strategic guidelines enabling such mutually reinforcing interaction mechanisms to be taken into consideration.

At the same time, the correction of several of the Portuguese economy's imbalances has been remarkable, particularly the rapid adjustment of the current and capital account. Together with the reduction of imports, the fact that export growth has outpaced external demand has translated into significant gains in market share.

The deleveraging of the banking system is unlikely to compromise potential economic growth

The adjustment of the Portuguese economy has also been mirrored in significant changes to the balance sheets of corporations and households, with an increase in savings rates and the gradual correction/ stabilization of previously high levels of indebtedness, as discussed in "Chapter 4. *Credit Risk*", of this Report. In a context of very limited access to financing in the international financial markets, Portuguese banks have played a critical role in this adjustment process, as a significant proportion of the economy's external indebtedness had been intermediated by the banking system.

The deleveraging process constitutes one of the essential points of the medium and long term adjustment of the Portuguese economy, owing to the fundamental need to ensure more sustainable levels of domestic and external indebtedness, compatible with disposable income and economic productivity. It is also, however, crucial to guarantee that this process will not compromise potential economic growth. The more productive and competitive sectors of the economy must continue to enjoy access to the financing necessary to ensure their activity, committing, over time, to productive investments with medium and long term returns. Reference should, therefore, be made herein to the fact that according to the evidence available, exporting companies have continued to enjoy greater access to bank financing, with positive growth rates. There is, however, a generally high level of asymmetry between large and small companies, with more significant difficulty being noted in access to financing by the latter, in particular those for which the domestic market is more important (see "Chapter 4 *Credit Risk*", of this Report). New companies have also had to contend with an increase in the restrictiveness of financing criteria and generally suffer from their lack of a credit history.

In the current stage of the cycle, lending to companies has essentially been directed to finance inventories, working capital and debt restructuring. Reference should be made to the fact that the banks may have to make difficult decisions in terms of lending and they must essentially differentiate between viable companies which are basically facing short term liquidity problems and those whose viability has been compromised. Banks are therefore supporting the necessary creative destruction process, helping the Portuguese economy to converge to a more sustainable equilibrium, backed by an increase in productivity and potential growth. Similarly, in the economic recovery stage, it will be fundamental for the banks to finance investment projects with higher potential returns.

The outlook for the Portuguese economy potentially implies several risks to financial stability which are mitigated by the existence of instruments to strengthen banks' liquidity and capital

The prolonged and significant deterioration of economic activity will necessarily have negative effects on the Portuguese financial system's profitability and solvency. In this context, the main impacts are associated with an expected additional deterioration of the quality of bank credit portfolios, as discussed in "Chapter 4 *Credit Risk*", of this Report. Given the moderate recovery prospects for economic activity in the euro area, the activity of Portuguese banks is also likely to continue to occur in a context of very low short term interest rates, which may have negative consequences on net interest income (see "Chapter 3 *Banking System: Activity, Profitability and Capital Adequacy*", of this Report). Portuguese banks' direct and indirect exposure to the property market is also a source of vulnerability. Banco de Portugal has therefore undertaken a new inspections programme to assess asset quality in the construction and property development sector. Portuguese banks' higher exposure levels to sovereign risk is also a vulnerability in the context of a possible resurgence of tensions in the sovereign debt markets. In contrast, the recent diminishing of the perception of risk in the international financial markets may contribute positively to enable the Portuguese banks to regain access to adequate financing conditions in the international wholesale debt markets.¹

Banco de Portugal has also continued to monitor the adjustment processes of Portuguese banks, *inter alia*, through its analysis of funding and capital plans and performance of stress test exercises. Reference should be made to the fact that there are still funds available for bank capitalisation purposes under the Economic and Financial Assistance Programme, notwithstanding the significant strengthening of the solvency ratios of the Portuguese banks.

In prospective terms, the Banking Union project should make it possible to enhance investor confidence in the euro area and mitigate the effects of the interaction between sovereign risk and the banking system, particularly if this project is accompanied by resolution mechanisms and common deposit guar-

¹ At the end of October, *Banco Espírito Santo* succeeded in placing a senior debt issue with a maturity of 3 years for the amount of EUR 750 million, mainly with non-residents. At the end of November, *Caixa Geral de Depósitos* was also responsible for a debt issue for the amount of EUR 500 million, which recorded a high level of demand.

antees. In turn, the balance sheet adjustments being made by Portuguese banks in the context of the Economic and Financial Assistance programme, translating into the strengthening of liquidity and capital, are consentaneous with the guideline principles governing the Basel III regulatory changes in enhancing their capacity to absorb negative shocks.

Box 2.1 | Detecting and monitoring systemic risk with DISTANCE-TO-DEFAULT SERIES

Since the outburst of the current financial crisis, economic research on macro-prudential indicators to monitor systemic risk in the financial system has intensified. Along these lines, this box presents a marketbased outlook of the financial system in Europe, in the euro area and in Portugal based on aggregated Distance-to-Default (DD) series¹, namely Portfolio Distance-to-Default (PDD), Average Distance-to-Default (ADD) and their difference.

DD series are market-based indicators based on Contingent Claims Analysis, *i.e.*, the Merton approach to credit risk. As a tool for systemic risk analysis, they are constructed using information of balance sheets from individual banks' and market based information from stock and option prices from individual banks and indices. DD indicates the number of standard deviations at which the market value of assets is away from the distress barrier, which is in turn determined by the liabilities structure.

At aggregated level, Portfolio Distance-to-Default (PDD), Average Distance-to-Default (ADD) and their difference are market based indicators that provide signals of systemic risk build-up and development, including the intensity of financial distress in the system, and the degree of risk dependence between the financial institutions. An increase in either DD indicator reflects improving capitalization in the sector, a drop in overall volatility and, from a longer term perspective, stronger fundamentals, including leverage.

Average Distance-to-Default series is computed by taking the simple average of individual bank's DD series. It is highly informative of the intensity of global distress in the set of banks that is being considered, as it assumes perfect correlation across the market value of banks' assets. In turn, risk interdependence across banks is embedded in Portfolio Distance-to-Default (PDD) series, thus this series tends to be a measure of the upper bound of distress in the system. In addition, it presents more fluctuations, as risk dependence varies in time.

When there is an increase of co-movement in banks' assets, which is informative of market distress and higher interdependences, the gap between these two series tends to narrow, which is a symptom of increased risk dependence. In these periods, both DD series tend to drop, as usually fundamentals deteriorate, market capitalization declines and market volatility becomes higher contemporaneously.

Systemic risk outlook in Europe and the euro area

The PDD and ADD series for Europe and euro area are based on the constituent banks of the STOXX Europe 600 Banks and EURO STOXX Banks indices, respectively. They are both displayed in Chart 1. The chart suggests that overall distress in the banking sector has eased further in the third quarter of 2012, as both PDD and ADD series have continued to increase steadily since the conduction of Long Term Refinancing Operations (3 year LTROs) by the ECB. The increase reflects an overall reduction in volatility across all the banks' stock prices combined with increasing market capitalization in the second half of the year.

The gap between PDD and ADD series in Europe (left-hand-side panel) and the euro area (right-handside panel) provides an additional feature of recent developments of systemic risk. The gap in Europe has been evidently larger than the one computed for the euro area banks. This difference reflects first the fact that risk interdependence in the monetary union remains very high –much higher than for Europe as a whole– and it shows also that the sovereign debt crisis is still exerting a great influence on the banks' risk profile in the region.

Indeed, market sentiment of future volatility across euro area banks, as measured by the individual implied

¹ The indicators presented in this box are based on the methodology described in Saldías (2012), "Systemic Risk Analysis Using Forward-Looking Distance-to-Default Series", Banco de Portugal Working Paper Series, 16/2012.



Sources: Bankscope, Thomson Reuters and Bloomberg.

Note: Monthly averages based on daily observations.

volatilities, has been on average 15 percentage points larger than in banks outside the monetary union that are included in the PDD-ADD series for Europe since the start of 2012. In addition, the implied volatility of the EURO STOXX Banks index has been 10 percentage points higher than the corresponding implied volatility of the STOXX Europe 600 Banks index over the same time span. This feature suggests a possible decoupling of the risk outlook in the banks outside the euro area from the news affecting the euro area.

Systemic risk outlook in Portugal

The PDD and ADD² series in Portugal are computed using the information of constituent banks from the PSI Financials index from March 2007 until September 2012. As there are no exchange traded options on the individual stocks or on the index in this case, the model used volatilities estimated from GARCH(1,1) models, which means that the indicator loses some of its forward-looking properties from option markets and the nowcasting informational properties dominate. These series are presented in Chart 2. As expected, these series show very similar developments of systemic risk to those shown in the previous section, with arguably less pronounced trends and naturally more impact from countryspecific information.

The start of the sample, which coincides with the start of the subprime crisis, shows a deteriorating risk profile among Portuguese banks, in line with developments in the rest of the region. It also shows an overall increase in risk dependence, as the PDD-ADD gap shrank. The indicators have no marked trend ever since until 2011, where strong and continuous downward trend started due to market perception of Portuguese sovereign risk. In 2011, the gap between PDD and ADD series became even negative, showing an excess volatility at aggregate level that does not correspond to the aggregation of information of individual banks.

As in the case of the wider European PDD-ADD series, in 2012 a remarkable improvement was observed,

² In particular, the ADD series takes the simple average of in individual DD series from the following banks: Banco Comercial Português (BCP), Banco Espírito Santo (BES), Banco Português de Investimento (BPI), Banco Internacional do Funchal (Banif) and Finibanco (until its delisting in December 2010). PDD series includes the market information from the PSI Financial index and balance sheet information from all banks, including Santander and Banco Popular Portugal.

as both indicators recover and start an upward trend, while risk co-movement has declined until very recently. This feature illustrates the decrease in market volatility, the effect of the capital issues in several of the banks in the sample and higher market capitalization overall in the system, the latter captured in the information at the level of the index. The larger gap between the PDD and ADD series illustrate the growing relevance of bank-specific information and a possible decline in the role of country-specific information.

CHART 2



Sources: Author calculations using data from Bloomberg and Bankscope. Note: Monthly averages based on daily observations.

3. BANKING SYSTEM: ACTIVITY, PROFITABILITY AND OWN FUNDS ADEQUACY 1

Portuguese banking system activity, in first half 2012, continued to develop in an adverse domestic and external environment, not only characterised by an intensification of the economic recession in Portugal and consequent increase in the materialisation of credit risk, but also the maintenance of limitations on access to financing in the international financial markets, in the context of the sovereign debt crisis. Notwithstanding, the ECB's non-conventional monetary policy measures, together with the recent capitalisation of the banks helped to make a substantial improvement to the Portuguese banking system's liquidity and capital situation. Portuguese banks have continued to gradually deleverage their balance sheets by reducing lending, accompanied by the resilience of household deposits. After a very sharp fall in the banking system's aggregate balance sheet during the course of 2011, several signs of stabilisation in comparison to the preceding year were noted. Banking system profitability also deteriorated in comparison to first half 2011, reflecting higher provisions and impairment associated with loans and advances to customers portfolios and the evolution of net interest income. This was accompanied by an improvement in earnings in comparison to the second half of the preceding year which had been heavily penalised by extraordinary events.

The Portuguese banking system's adjustment process will continue to develop in an adverse macroeconomic and financial framework. In particular, the deterioration of global and domestic growth prospects will continue to have a negative effect on the quality of bank lending, reflected in the need for provisions/ impairment and, consequently, the system's earnings. In a framework of the maintenance of a low level of interbank interest rates, net interest income is likely to remain compressed, with implications in terms of earnings. In such a context, the maintenance of adequate capitalisation levels will continue to be a crucial element for preserving the banking system's strength and resistance to adverse shocks. It is also fundamental that the branch office restructuring strategy and in more general terms the rationalisation of the banks' costs will continue into the near future to enable the banking system's installed capacity to adapt to the lower structural level of demand for banking services.

¹ In the analysis set out in "Section 3.1 Activity" and "Section 3.2 Profitability" the aggregate defined as being the Portuguese banking system refers to credit institutions and financial companies operating in Portugal under the supervision of Banco de Portugal, with the exception of institutions in the Madeira offshore zone. These include financial groups, on a consolidated basis, whose consolidation perimeter includes at least one credit institution or an investment company and credit institutions and investment companies, on an individual basis, which are not consolidated in Portugal (including the branches of credit institutions or investment companies). The analysis of this "universe" is important to the extent that it is this collection of institutions to which the new Capital Requirements Directive applies and is the reference "universe" in most European countries. It is not possible to provide data prior to 2007 for the aggregate under consideration as the adoption of the International Accounting Standards (IAS) was not transversal to all institutions with different accounting systems coexisting in 2005 and 2006. The data presented in this chapter are therefore based on different aggregates of institutions. In particular, up to 2004 the list of institutions refers to banks and savings banks, with the exception of banks headquartered or operating exclusively in the Madeira offshore zone and/or operating mainly with nonresidents. Branches of credit institutions headquartered in another European Union member state — excluding those not classified as monetary financial institutions (MFIs) — in addition to the branches of credit institutions headquartered in third countries were classified as banks. From December 2004 to 2009, two sets of institutions are considered. A first set for the period December 2004 to December 2007, made up of thirteen banking groups which adopted the Adjusted Accounting Standards in the preparation of their respective financial statements in 2005 (representing, in December 2004, around 87 per cent of the total assets of the set of institutions analysed up to the said date). The second set was for the period March 2007 to 2010. The period of superimposition of the different sets of institutions enables a consistent analysis of the changes to be achieved. To facilitate the reading of this document, whenever necessary, the charts and tables set out in this chapter have a straight line indicating breaks in the series.

3.1. Activity

The Portuguese banking system's balance sheet showed signs of stabilisation and recomposition in first half 2012, albeit contracting significantly over the same period 2011

In first half 2012, the Portuguese banking system's balance sheet on a consolidated basis remained practically unchanged from the end of the preceding year.² Positive contributions were made by the financial assets portfolio (see "Chapter 6 Market Risk", of this Report), claims on central banks³ and claims and investments in other credit institutions, in this latter case, largely deriving from the channelling of funds by a non-domestic institution to its respective registered office (Chart 3.1.1a). The financial assets portfolio, in turn, reflected the expansion of the available for sale assets portfolio, namely through the acquisition of Portuguese public debt instruments, particularly in the first quarter and the increase in the value of portfolio assets resulting from the improvement in international investors' perceptions of the risk attached to the Portuguese state. This was offset by a decline in the net loans and advances to customers portfolio (including securitised and non-derecognised assets).⁴ As opposed to first half 2011, credit disposal operations were responsible for no more than around 25 per cent of the decline in the loans and advances to customers portfolio noted in this period. These operations were down by approximately 75 per cent (to around EUR 1.3 billion). Activity in Portugal witnessed a gradual reduction in lending to the non-financial private sector in the first half, albeit differing between banks (see "Chapter 4 Credit Risk", of this Report). Particular reference should be made to the fact that loans made by non-domestic resident banks in Portugal contracted much more sharply in the case of non-financial corporations (around 10 per cent) than in comparison to domestic banks (around 3 per cent). This relative evolution is in contrast to second half 2010 and first half 2011,⁵ when non-domestic banks implemented a strategy of strengthening their market share, in a context already characterised by adjustments to the domestic banks' balance sheets.

In comparison to first half 2011, mention should be made of the banking system's maintenance of a gradual deleveraging process, translating into a decrease of 2.0 per cent (Chart 3.1.1b) in total system assets. In such a framework, reference should be made to the sharp net decline in loans and advances to customers portfolios (adjusted for securitisation operations), particularly explained by the decline in new loans which was only partially counterbalanced by the increase in claims and investments in central banks and other credit institutions. In turn, the contribution of the financial assets portfolio to the change in assets was virtually nil, insofar as it essentially comprised the recomposition thereof.

There continued to be a recomposition of the banks' financing structure, showing a different pattern to that of the preceding year

In comparison to the end of 2011, there was a strong increase in own funds, a stabilisation of household deposits and increase in financing obtained from the Eurosystem, in the framework of a continuous decline in market financing from non-residents.

² Reference should made to the fact that the slight 0.2 per cent reduction noted in the banking system's total assets is attributable to *BPN* Group operations prior to its respective privatisation, resulting in a reduction of EUR around 1.1 billion in assets. Excluding this effect, the half year rate of change in total assets, in June 2012, would have been 0.1 per cent.

³ The evolution noted reflects the temporary increase of deposits with Banco de Portugal, deriving from a capital increase by one of the main domestic banks.

⁴ It should be noted that the marked decline in securitised and non-derecognised assets is explained by the reversal of securitisation operations by several banking groups following the change in the eligibility criteria on financial instruments as collateral for Eurosystem monetary policy operations. For more detail, see "Chapter 5 Liquidity Risk", of this Report.

⁵ For more detail see "Box 4.1 The mitigating role of resident non-domestic financial institutions in the Portuguese economy's deleveraging process", Banco de Portugal, Financial Stability Report – May 2011.

Chart 3.1.1a



Notes: Securities, derivatives and investments include financial assets at fair value through profit or loss, available for sale financial assets, investments held to maturity, investments in subsidiaries and hedge derivatives. Net credit to customers — adjusted for securitisation operations excludes the other credit and amounts receivable (securitised) component, classified in the credit portfolio.

Chart 3.1.1b



Source: Banco de Portugal.

Note: The break in the series in 2007 comprises a widening of the group of institutions under analysis. Securities, derivatives and investments include financial assets at fair value through profit or loss, available for sale financial assets, investments held to maturity, investments in subsidiaries and hedge derivatives. Net credit to customers — adjusted for securitisation operations excludes the other credit and amounts receivable (securitised) component, classified in the credit portfolio.

Banking system financing in the first half of the year, was largely reliant on resources taken from central banks, notably the Eurosystem (see "Chapter 5 *Liquidity Risk*", of this Report), which grew by around 26 per cent over December 2011 (around 29 per cent over June 2011). This increase was much sharper in the first quarter and reflected the use of the ECB's 3 year maturity LTRO in February. The impact on the balance sheet structure deriving from the increase in resources taken from central banks was much more significant for non-domestic banks than for the domestic banks (with the respective proportion of the assets total having increased by around 5 and 2 percentage points, respectively). On the other hand, customer resources continued to be the banks' main source of financing, albeit with a much more moderate evolution than in 2011, having increased by around 1 per cent over December 2011 (around 3 per cent over June 2011). As regards other sources of financing, reference should be made to the continuation of a trend towards the decline of resources taken from other non-resident credit institutions and debt securities as a consequence of the fact that the domestic banks were unable to secure finance in the international wholesale debt markets and repurchasing operations on their own bonds, as noted in 2011. At the end of first half 2012, financing by central banks exceeded financing by securities. This is the first time this has happened since the inception of the euro area.

Particularly relevant in the framework of the economy's structural adjustment was the significant strengthening of the banking system's own funds in first half 2012. There was a substantial increase in subordinated liabilities (to around EUR 5 billion), as a result of the issue of hybrid instruments subscribed for by the Portuguese state, in the context of the operations for strengthening own funds by three of the main banking groups. There was also a considerable increase in banking system equity in this period, with growth of around 17 per cent over December 2011 (0.2 per cent in comparison to the same period

of the preceding year). This evolution is in sharp contrast to the preceding year (see "Section 3.3 *Own fnds adequacy*", of this Report).

Continued decline in the external assets of the domestic banking system

The context of a retraction in the international financial integration process has witnessed a global reduction of cross-border financial transactions which has also been noted in the case of Portugal. In first half 2012, the domestic banking system's external assets on a consolidated basis continued to decline (5 per cent year-on-year and 2 per cent over December 2011)⁶ to approximately 25 per cent of total domestic assets (Table 3.1.1). In terms of maturities and as in 2011, a recomposition of the portfolio to short term assets (up to 1 year), as opposed to assets for longer maturities, continued to be witnessed. As regards institutional counterparties, reference should be made to increased exposures to foreign banks, particularly in Angola and Mozambique and a reduction of the weight of the private non-banking sector in a reversal of the trend since the end of 2009.

3.2. Profitability

Deterioration of banking system profitability in comparison to first half 2011, albeit with signs of improvement in comparison to the second half of the preceding year

In an environment marked by a downturn in economic activity and low level of interest rates in the interbank market, banking system profitability was largely reliant on earnings from financial operations. In first half 2012, the Portuguese banking system's income before tax and non-controlling interests, on a consolidated basis, was down by around 45 per cent over the same period 2011. This evolution translated lower returns on assets and equity to 0.1 and 2.6 per cent, respectively, at the end of June (Chart 3.2.1). Essential contributory factors to the decline were the increase in provisions and impairment associated with loans and advances to customers portfolios (see "Chapter 4 *Credit Risk*", of this Report) and the evolution of net interest income as the main component of the profit and loss account, which was down by around 9 per cent year-on-year (Chart 3.2.2a). This was counterbalanced by a positive contribution made by earnings from financial operations as a reflection of banks' repurchasing operations on their own bonds at a discount over their secondary market value.

In comparison to second half 2011, reference should be made to the improvement of banking system ROA (return on assets) and particularly the positive contribution of earnings from financial operations as well as other provisions and impairment and operating costs components (Chart 3.2.2b). The improvement should, however, be suitably contextualised owing to the fact that second half 2011 profits were heavily penalised by several non-recurring events.⁷ In international terms and notwithstanding the fact that the deterioration in profitability noted in 2011 was a relatively across-the-board development in euro area countries, the Portuguese banking system's profitability slightly underperformed the euro area average (Chart 3.2.3).

⁶ International exposure is analysed in accordance with the methodological guidelines of the Bank for International Settlements for the reporting and publication of the "Consolidated banking statistics". In this analysis only the sub-collection of domestic institutions, on a consolidated basis is considered, as non-domestic institutions are part of the consolidation perimeter of the banking systems of the countries of their respective head offices.

⁷ Non-recurring events included the impact of the Special Inspections Programme (SIP), the partial transfer of banks' pension funds to the Portuguese Social Security System and recognition of impairment on Greek public debt. In the first case, the negative impact on earnings resulted from the need by the eight major banking groups to reinforce credit impairments. In turn, the transfer conditions of pension funds, defined in Decree Law n° 127/2011, generated valuation differences on the liabilities to be transferred, which resulted in a negative impact on net income. For more detail see the *Financial Stability Report – May 2012*.

Table 3.1.1

CONSOLIDATED FOREIGN CLAIMS OF THE DOMESTIC BANKING SYSTEM ON AN IMMEDIATE RISK BASIS — STRUCTURE PER CENT										
	Dec.2008	Jun.2009	Dec.2009	Jun.2010	Dec.2010	Jun.2011	Dec.2011	Jun.2012		
Total (10 ⁶ €)	108 913	113 005	117 727	120 299	114 903	103 497	100 732	98 393		
As a percentage of total assets	28.9	29.0	29.3	29.2	27.8	25.4	25.3	24.9		
International claims	71.7	72.1	71.2	70.7	69.2	67.5	67.7	65.0		
Maturity										
Up to 1 year	23.6	21.8	19.0	18.0	17.4	19.1	20.2	24.2		
From 1 up to 2 years	4.6	4.1	4.7	5.1	4.4	4.3	3.4	3.2		
More than 2 years	36.5	38.7	39.1	41.1	41.3	37.6	38.1	30.6		
Other	7.1	7.5	8.4	6.5	6.1	6.6	6.0	6.9		
Institutional Borrower										
Banks	21.8	20.1	18.3	15.3	14.3	12.4	12.4	13.5		
Public sector	2.2	2.8	4.5	5.3	4.9	4.4	4.3	4.4		
Non-banking private sector	47.0	48.9	48.1	49.7	49.7	50.4	50.8	46.8		
Other	0.7	0.3	0.2	0.5	0.2	0.2	0.2	0.3		
Geographical Borrower										
Developed countries	49.6	53.3	51.6	48.4	48.8	48.4	46.4	42.7		
Offshore centres	7.4	6.1	5.8	6.0	4.9	4.8	7.7	7.7		
Developing countries in Europe	6.2	5.3	5.2	5.5	5.6	5.9	6.0	6.1		
Other	8.5	7.4	8.5	10.8	9.8	8.4	7.6	8.5		
Local assets in local currency	28.3	27.9	28.8	29.3	30.8	32.5	32.3	35.0		
Geographical Borrower										
Developed countries	20.5	20.3	20.0	20.2	20.0	20.1	19.7	20.2		
Offshore centres	0.4	0.4	0.5	0.5	0.6	0.4	0.5	0.9		
Developing countries in Europe	4.7	4.3	5.1	4.8	5.1	5.9	5.3	6.5		
Other	2.8	2.9	3.1	3.8	5.2	6.1	6.7	7.4		
Memo:										
Local assets in local currency (10 ⁶ €)	30 834	31 546	33 899	35 204	35 440	33 608	32 519	34 479		
Local liabilities in local currency (10 ⁶ €)	21 472	23 007	24 819	22 237	25 291	22 802	25 389	26 419		

Source: Banco de Portugal.

Chart 3.2.1



RETURN ON ASSETS (ROA) AND RETURN ON EQUITY (ROE)

Source: Banco de Portugal.

Notes: The break in the series in 2004 corresponds to the implementation of the International Accounting Standards which also implied a redefinition of the group of banking institutions under analysis. The break in the series in 2007 comprises the widening of the group of institutions under analysis. The half-year data have been annualised.



Source: Banco de Portugal.

Note: Return on assets calculated on income before tax and minority interests.

In first half 2012, the empirical distribution curve for returns on assets suggests both a deterioration and a greater dispersion in comparison to the same period 2011. In turn, the curve moved to the right in comparison to the second half of the preceding year, translating the increase in the proportion of institutions with positive profitability levels (Chart 3.2.4).

There was a significant reduction of net interest income in the first half, in a context of the reduction of the loans-to-deposits ratio and intermediation margin with customers, notwithstanding the increase in investments in public debt securities and financing from the Eurosystem

As already referred to, the evolution of net interest income, as the main component part of Portuguese gross income, was negative both year-on-year and in comparison to the preceding half (down 9.6 per cent), particularly reflecting the decline in margin associated with operations with customers.

A breakdown of net interest income by type of operation shows a slight improvement in the margin associated with money market operations and the virtual stabilisation of the margin on operations with financial instruments. The evolution of the former particularly derives from the downwards movement in interbank interest rates in the first half and the highly significant increase in resources taken from central banks. As regards operations with financial instruments, reference should be made to the contribution made to the virtual stabilisation of the margin by two factors with opposite effects. A positive contribution was made by the decline in debt securities, as a continuation of developments since March 2010, in addition to the increase in financing to the public sector by the banking system. On the other hand, the reduction of the spread between interest on lending and borrowing (negative price effect) on this type of instrument had a negative effect on margin, consequently helping to cancel out of the first effect (Table 3.2.1).







RETURN ON ASSETS (PER CENT) | EMPIRICAL

Source: ECB.

Source: Banco de Portugal.

Chart 3.2.4

Note: Empirical distribution obtained by the use of a gaussian kernel in which institutions are weighted by assets; indicator calculated on income before taxes and minority interests.

Table 3.2.1

IMPLICIT AVERAGE INTEREST RATES	OF THE	MAIN	BALAN	NCE SH	EET ITE	MS ^(a) I	PER CENT			
	2007	2008	2009	2010	2011	2010		2011		2012
						H1	H2	H1	H2	H1
Interest-bearing assets	5.48	5.93	3.76	3.15	3.91	3.05	3.26	3.64	4.19	3.98
of which:										
Interbank assets ^(b)	4.16	4.31	1.74	1.47	2.13	1.30	1.66	2.00	2.25	1.82
Non-interbank assets										
Credit	5.87	6.33	4.16	3.43	4.35	3.33	3.56	4.03	4.68	4.52
Securities	5.60	6.32	4.80	4.14	4.77	4.19	4.12	4.48	5.14	5.07
Interest-bearing liabilities	3.49	3.92	2.25	1.77	2.47	1.71	1.84	2.25	2.70	2.65
of which:										
interbank liabilities ^(c)	4.39	4.64	2.00	1.25	2.01	1.25	1.28	1.80	2.24	1.82
non-interbank liabilities										
Deposits	2.46	3.04	2.00	1.49	2.37	1.38	1.60	2.06	2.67	2.76
Securities	4.38	4.79	2.74	2.72	3.36	2.52	2.96	3.19	3.55	3.84
Subordinated liabilities	5.30	5.55	3.99	3.25	3.63	3.34	3.15	3.41	3.91	3.84
Spreads (percentage points)										
Interest bearing assets - interest bearing										
liabilities	1.99	2.01	1.51	1.38	1.43	1.34	1.42	1.39	1.49	1.33
Credit - deposits	3.41	3.29	2.16	1.94	1.98	1.95	1.96	1.97	2.01	1.76

Source: Banco de Portugal.

Notes: (a) Implicit average interest rates are calculated as the ratio between interest flows in the period under consideration and the average stock of the corresponding balance sheet item. (b) Includes cash, deposits with central banks, claims and investments with credit institutions. (c) Includes resources from central banks and other credit institutions.

As stated, there was a decline of margin in operations with customers, in contrast to the relative stabilisation noted since second half 2009. This evolution reflected, on the one hand, the reduction of credit to the private non-financial sector and increase in deposit-taking (negative volume effect) and on the other, the compression of the spread between implicit interest rates on credit and deposits. The narrowing of

Chart 3.2.5 INTEREST RATE SPREADS IN OPERATIONS WITH CUSTOMERS



Source: Banco de Portugal.

Note: The spread on lending operations was calculated as the difference between the interest rates on outstanding amount of loans (supplied in the Monetary and Financial Statistics) and the 6-month moving average of 6-months Euribor, whereas the spread on borrowing operations is the difference between the 6-months moving average of 6-months Euribor, and interest rates on outstanding amounts of deposits. The total spread comprises the difference between the interest rate on loans and deposits. Last observation: September 2012.

the spread – noted in the case of domestic activity (Chart 3.2.5) – is partly explained by the rigidity⁸ which traditionally characterises the money market's interest rate transmission mechanism to interest rates on deposits. A scenario of persistent difficulties in access to financing in the wholesale debt market also witnessed an intensification of resource-taking from customers. Reference should, herein, be made to the prudential measure implemented by Banco de Portugal, starting November 2011, aimed at containing the progressive increase in interest rates on deposits.⁹ This measure had immediate effects on interest rates for new deposit operations (Charts 3.2.6a and 3.2.6b) and in conjunction with the ECB's nonconventional monetary policy measures enabled the upwards pressures on the cost of customer deposits to be reduced. Nevertheless, the first half year as a whole witnessed a slight increase in the average cost of customer deposits. Reference should also be made to the fact that, in a context of falling interest rates in the interbank market, the margin associated with sight deposits, on which virtually no interest is paid, was lower. This was offset with the objective of protecting net interest income and also as a reflection of the worsening outlook on credit risk in the resident private non-financial sector, by higher spreads charged by the banks on most new lending operations, particularly spreads on loans to nonfinancial corporations. This evolution reflects banks' added difficulties in managing the average spread on their mortgage loans portfolio. On the one hand, most of such loans, characterised by long maturities, are associated with low, fixed spreads, taking into account the banks' current marginal financing costs (which is proxied by the interest rate on deposits). On the other hand, flows of new operations have been falling, in a context of uncertainty and a deteriorating outlook on household income. Downwards pressure on net interest income associated with the above referred to factors comprise one of the main challenges for Portuguese banking sector profitability.

⁸ Several studies show that the impact of a unit change in the interbank interest rate is generally higher in the case of loans. For more detail see, *e.g.* Antão, Paula (2009), "The Interest Rate Pass-Through of the Portuguese Banking System: Characterization and Determinants", Banco de Portugal, *Working Papers 5*.

⁹ In April 2012, Banco de Portugal introduced a change to this measure, with the aim of increasing the penalty on short term deposits. For more detail see the consolidated version of Banco de Portugal "Instruction no. 28/2011" which includes the changes brought in by "Instruction no. 15/2012" at: http://www.bportugal.pt/ sibap/application/app1/instman.asp?PVer=P&PNum=28/2011.



Chart 3.2.6b



Source: Banco de Portugal.

Note: Last observation: August 2012.

Improvement in Portuguese banks' operating efficiency in the form of an increase in gross income and containment of operating costs

The significant reduction of operating costs, in comparison to second half 2011, was consistent with the branch office network's restructuring strategy and rationalisation of staff numbers implemented by the major banking groups. Particular reference should be made to the sharp decline in staff costs and general administrative expenditure (down 14.0 and 8.6 per cent, respectively). Reference should be made to the fact that, in first half 2012, the evolution of staff costs was influenced by a change in legislation related with the calculation formula for death grants. Considering only remuneration-related costs/ charges, the reduction was approximately, 5 per cent. On the other hand, notwithstanding the contraction of net interest income, gross income recorded favourable evolution owing to the highly substantial increase in earnings from financial operations, associated with own bonds repurchasing operations. The cost-to-income¹⁰ ratio was accordingly brought down to 53.0 per cent, which represents a drop of approximately 5 p.p. over the first half of the preceding year.¹¹ This improvement in operating efficiency, transversal to most Portuguese banks, can be seen in the movement of the empirical distribution curve to the left (Chart 3.2.7). The recent evolution of this indicator is in contrast to the deterioration noted in 2011 which, in turn, was common to various banking systems in the euro area (Chart 3.2.8). Reference should also be made to the fact that, last year, the Portuguese banking system's level of operating efficiency slightly underperformed the euro area average.

International activity made a positive, decisive contribution to Portuguese banks' earnings in first half 2012

In the context of a sharp reduction of economic activity in Portugal, Portuguese banks' earnings from their international activities, in first half 2012, enabled them to more than offset their negative earn-

¹⁰ The cost-to-income indicator is defined as the ratio between operating costs (comprising the sum of general administrative expenditure, staff costs and depreciation) and gross income.

¹¹ In comparison to second half 2011, the drop was approximately 12 p.p.. Reference should, however, be made to the fact that second half 2011 earnings were penalised by non-recurring events.

Table 3.2.2

GROUPS PER CENT														
	Relative weight of foreign subsidiaries						International activity y.o.y. rate of change				Domestic activity y.o.y. rate of change			
	2009	20	10	2011		2012	2010	2011		2012	2010	2011		2012
	Dec	Jun	Dec	Jun	Dec	Jun	Dec	Jun	Dec	Jun	Dec	Jun	Dec	Jun
Net interest income	21.9	26.4	28.7	28.7	28.9	28.8	28.6	16.1	3.8	-9.7	-10.3	3.4	2.8	-10.1
Commissions	18.6	19.8	20.3	21.2	20.7	26.5	20.5	8.0	0.6	27.1	8.2	-1.2	-2.2	-5.1
Gross income	22.4	22.4	24.2	25.6	28.9	25.4	9.9	11.5	10.3	6.6	-0.6	-6.4	-13.5	7.8
Administrative costs	21.4	22.6	23.3	24.7	24.7	27.1	12.4	10.2	6.7	7.8	0.7	-1.8	-1.2	-9.8
of which: staff costs	19.5	21.1	21.4	22.7	22.5	27.2	12.3	10.6	6.7	7.4	0.1	0.7	0.1	-15.5
Impairment	21.1	14.9	14.8	8.9	8.2	10.3	-26.1	-19.8	17.8	83.2	13.5	44.0	130.0	54.5
Income before tax and														
minority interests	25.0	28.7	34.8	77.0	-	243.1	36.8	32.7	13.8	-21.9	-14.6	-84.0	-	-
Net income	14.3	13.8	16.9	38.4	-	-	14.6	52.0	34.6	-23.9	-5.6	-61.1	-	-

Source: Banco de Portugal.



Chart 3.2.8

COST TO INCOME RATIO | INTERNATIONAL



Source: Banco de Portugal.

Note: Empirical distribution obtained by the use of a Gaussian kernel, in which institutions are weighted by total assets; indicator calculated as the ratio between operating costs (defined as the sum of staff costs, general administrative costs and depreciation and amortisations) and gross income.

Source: ECB.

ings from domestic activity (Table 3.2.2). Notwithstanding, earnings from international activities were down in this period, albeit with very different underlying evolutions in terms of jurisdiction/geography in which Portuguese banks operate. If, on the one hand, activity in Angola, Mozambique and Brazil is undergoing marked expansion and making a highly favourable contribution to consolidated earnings, there are, on the other, markets (such as Greece and Spain) in which banks have recorded significant losses, particularly in their credit portfolios. Over the medium term, in accordance with the Funding and Capital Plans of the main banking groups, activity in Angola, Brazil and Mozambique should continue to expand significantly, increasing their contribution to Portuguese banking system earnings.

3.3. Own founds adequacy¹²

At the end of June 2012, the Portuguese banking system's average Core Tier I¹³ ratio was up 1.7 percentage points over December 2011 to 11.3 per cent. This evolution translates the notable endeavours made by Portuguese banks to strengthen their solvency levels particularly aimed at meeting the capital adequacy requirements of the national and international plan, making it possible to accommodate the prudential impacts of the result of the Special Inspections Programme (SIP) and partial transfer of pension funds to the Portuguese Social Security System.¹⁴ At the end of first half 2012, a considerable number of institutions subject to Banco de Portugal's supervision had already achieved a Core Tier I ratio in excess of the 10 per cent objective defined in the Economic and Financial Assistance Programme, to be achieved by December of this year (Banco de Portugal, Official Notice no. 3/2011). The four major Portuguese banking groups¹⁵ also complied with the prudential recommendations defined by the European Banking Authority (EBA) for June 2012, all of which achieving a Core Tier I ratio of more than 9 per cent¹⁶. In a framework of the virtual stabilisation of own funds requirements, the improvement noted was the result of the highly significant increase of original own funds which, in turn, reflected the capitalisation operations of the main banking groups. Particular reference should be made to the importance of the issue of hybrid financial instruments, eligible as core own funds, subscribed for by the Portuguese state, by three of the major banking groups, for an amount of around EUR 5 billion.

Substantial increase of original own funds in the first half, accompanied by the virtual stabilisation of own funds requirements ...

Original own funds posted a highly significant increase in first half 2012 (Chart 3.3.1), reflecting the capitalisation endeavours made by Portuguese banking groups in order to strengthen their solvency levels. Positive contributions were made by increases in eligible capital, deriving from the issue of equity-like instruments, the capital increase made by one of the main banking institutions and increase in share issue premia associated with the capital increase made by another group. There was also a very sharp increase in reserves, particularly based on the incorporation of retained earnings.

- 12 The collection of institutions analysed in this section is not the same as in "Section 3.1. Activity" and "Section 3.2 Profitability" owing to the exclusion of the branches of financial groups headquartered in European Union member countries.
- **13** The Core Tier I ratio establishes a minimum level of capital that the institutions must assure based on own funds requirements deriving from the risks associated with their activity. The ratio, as such, is assessed on the quotient between "core" own funds and risk-weighted positions. "Core" own funds include an institution's highest quality capital, in terms of its stability and capacity to absorb losses, less any losses and certain elements with no autonomous realisation value, based on the principle of an institution as a "going concern". Risk-weighted positions represent a measure of the risks deriving from financial activity, namely credit, market (including minimum own funds requirements related to foreign exchange and trading portfolio) and operational risks. In Portugal, Core Tier I is based on the Basel III rules applicable in 2013 for the definition of Common Equity Tier I, *i.e.* prior to the application of the transitory regime for certain deductions. In particular, it does not include the deduction relative to investments in non-consolidated financial institutions, nor deferred tax assets deductions. The calculation of the Core Tier I ratio is defined in Banco de Portugal's Official Notice no. 1/2011.
- 14 In prudential terms, Banco de Portugal's Official Notice no.1/2011 provided for the possibility of the impacts deriving from the Special Inspections Programme (SIP) and the partial transfer of pension liabilities to the Portuguese Social Security System being deferred up to 30/06/2012, as agreed in the Economic and Financial Assistance Programme.
- 15 Those which, on account of their dimension, were part of EBA stress tests and which are therefore directly affected by its recommendations.
- 16 In such a context, the elimination of the prudential filter applicable to sovereign debt securities in available for sale portfolios and the valuation, at market prices of sovereign debt securities in held to maturity portfolios and loans to central government, with reference to the end of September 2011 is particularly relevant. It should also be added that the Core Tier I measure used by the EBA differs from the Portuguese measure on account of the fact that it includes, inter alia, deductions relating to investments in financial institutions which do not consolidated in the group and deductions relative to the difference between the expected loss and impairment for institutions using the internal ratings based approach (excluding share portfolios).

In turn, own funds requirements in comparison to the end of 2011 remained virtually unchanged, in line with the stabilisation of the banks' activity. Chart 3.3.2 indicates the stabilisation of the banking system's average assets weighting factor (measured by the risk-weighted assets to total assets ratio).

Chart 3.3.2





Note: For banks that make use of IRB methods in the computation of capital requirements, risk-weighted assets were adjusted to assure proper comparability with banks that rely on standard methods.

... translated into a significant increase in the Core Tier I ratio

As in the case of 2011, it was also possible, in first half 2012, to note the reorientation of bank funding and capital policies towards elements considered as being core, up by approximately 28 per cent. The whole of the increase in original own funds was due to the strengthening of better quality own funds, in terms of their stability and loss absorption capacity, as non-core elements remained stable.

The Portuguese banking system's Core Tier I ratio therefore posted a substantial first half increase to 11.3 per cent at the end of June, against an objective of 10 per cent by December 2012, as set out in the Economic and Financial Assistance Programme. The improvement of this indicator was transversal to most of the institutions analysed, albeit with greater heterogeneity between institutions (Chart 3.3.3). Greater heterogeneity, in turn, particularly reflected the evolution of the solvency ratios of two of the eight major banking groups, which distanced themselves (in opposite directions) from the banking system average in June 2012 (Chart 3.3.4). It should also be noted that the smaller institutions – most of which subsidiaries of major foreign banks – continue to enjoy higher solvency levels than the banking system average partly as a reflection of their lower average assets weighting factor.

As noted since the end of 2008, the fact that the complementary own funds profile continued to move downwards is partly explained by the decline in subordinated loans. Particular reference should be made to several own bonds repurchasing operations by the banks, helping to strengthen core elements in the form of higher earnings. The increase of original own funds was highly marked in this period and justified the similar evolution of the three own funds adequacy ratios analysed (Chart 3.3.5).

Substantial improvement in the equity to assets ratio

From a strictly accounting viewpoint, there was a significant increase in the shareholders' equity to total assets ratio, even with the exclusion of intangible components (Chart 3.3.6). Although the recent evolu-

Source: Banco de Portugal.

Source: Banco de Portugal.




Source: Banco de Portugal.

Note: Empirical distribution obtained by the use of a gaussian kernel in which institutions are weighted by assets. The series presented exclude *BPN*. It should be noted that *BPP* was liquidated in April 2010, after which it ceased to be included in the universe of banking instituitions.

Chart 3.3.5

OWN FUNDS ADEQUACY OF THE PORTUGUESE BANKING SYSTEM



Source: Banco de Portugal.

Note: The series presented exclude *BPN* and *BPP*. It should be noted that *BPP* was liquidated in April 2010, after which it ceased to be included in the universe of banking instituitions.

Chart 3.3.4

EVOLUTION OF THE PORTUGUESE BANKS' CORE TIER I RATIO | PER CENT



Source: Banco de Portugal.

Chart 3.3.6

8.0 -Capital/Assets -Tangible capital/Tangible assets 7.5 --- Adjusted Capital/Assets --- Adjusted Tangible capital/Tangible assets 70 6.5 6.0 get Per 5.5 5.0 4.5 40 Jun Dec Jun Dec Jun Dec Jun Dec Jun 2008 2008 2009 2009 2010 2010 2011 2011 2012

CAPITAL TO ASSETS RATIO | ADJUSTED FOR NON-

Note: It should be noted that *BPP* was liquidated in April 2010, after which it ceased to be included in the universe of banking instituitions. Non-recurrent events comprise the Special Inspections Programme (SIP), the partial transfer of banks' pension funds to the Portuguese Social Security System and impairment charges related to Greek public debt.

tion of this ratio was partly affected by non-recurring events having a negative effect on second half 2011 earnings, there are other factors which explain this improvement. Firstly, equity benefited from the improvement of international investors' perceptions of the risk attached to the Portuguese state, translating into a decline of the negative value of the reserves resulting from the fair value assessment

Source: Banco de Portugal.

of debt securities. Secondly, the capital increase made by one of the main banking institutions, in addition to higher issue premia on shares deriving from a capital increase made by another bank, made a positive contribution in terms of equity evolution. Lastly, it should be added that in the context of the recapitalisation operation of another banking group, share capital was reduced as a charge to reserves, resulting in the recomposition of this aggregate.

BOX3.1 | FINANCIAL SITUATION OF THE SIX BIGGEST GROUPS IN THE PORTUGUESE BANKING SYSTEM IN THIRD QUARTER 2012¹

According to the information available on the six biggest Portuguese banking groups, in third quarter 2012, there was a significant contraction of activity, measured by total assets on a consolidated basis (Table 1). Following the relative stabilisation noted in the first and second quarters, banks' balance sheets posted a sharp fall in the third quarter. This evolution particularly derives from two factors. Firstly there was a significant decline in the net loans and advances to customers portfolio (including securitised, non-derecognised assets) essentially on account of the decline in new lending. Secondly, there was a substantial drop in claims and investments in central banks which, in turn, had temporarily increased in the second quarter of the year owing to the capital increase made by one of the main domestic banks.

The third quarter witnessed a continuation of the trend towards the recomposition of bank financing structures in the form of an increase in the proportion of customer resources and decline in the proportion of market financing sources (debt securities and other credit institutions' resources). In turn, the proportion of central banks' resources diminished substantially in this period, in contrast to the evolution noted in the first two quarters, following the ECB's 3 year maturity LTRO in February. Reference should also be made to the increase in equity which not only benefited from the improvement in international investors' perceptions of the risk attached to the Portuguese state, translating into a decline in the negative value of the reserves resulting from the fair value assessment of debt securities but also the capital increase made by one of the banking groups.

In third quarter 2012, the profitability of the six biggest banking groups was slightly up in comparison to the second quarter, notwithstanding the fact that income before tax and non-controlling interests remained slightly negative (Chart 1). Firstly, reference should be made to the negative contribution made by net interest income and income from services and commissions, which components displayed a high level of resistance during the course of 2011, but which during the course of 2012 have, inter alia, evidenced the effects of the banks' balance sheet deleveraging process (Chart 2, Table 2). The evolution of net interest income is also associated with the decline in interest rates in the interbank market which, in turn, originated the compression of the spread between interest rates on credit and on deposits while, on the other hand, reducing the margin associated with sight deposits (on which practically no interest is paid). Recognition of impairment on the credit portfolio continued to have a negative effect on bank profitability levels in a context of the growing materialisation of credit risk, notwithstanding the decline recorded in comparison to the extraordinarily high amounts of the preceding quarter. There was also a reduction of earnings from financial operations and a slight increase in operating costs.

The Core Tier I ratio of the six main banking groups improved slightly to 11.5 per cent at the end of September 2012 (Table 3). This evolution particularly reflects the reduction of own funds requirements, in a context of the deleveraging of bank balance sheets. In turn, original own funds remained practically unchanged following their significant increase in the first half year, owing to the issue of hybrid instruments subscribed for by the Portuguese state and the capital increases made in that period, in the context of the increase in own funds by four of the main banking groups.

¹ The total assets of the six banking groups in this Box (*Caixa Geral de Depósitos, Espírito Santo Financial Group, Banco Comercial Português, Banco BPI, Santander Totta* and *Caixa Económica Montepio Geral*) represented around 77 per cent of the Portuguese banking system's assets in June 2012. To neutralise the impact of the integration of *Finibanco* in *Caixa Económica Montepio Geral*, data prior to 2011 were revised to include the said institution.

Table 1

BALANCE SHEET OF THE SIX MAJOR BANKING GROUPS | ON A CONSOLIDATED BAS

DALANCE SHEET OF THE SIX MAJOR DAINKING GROUPS ON A CONSULIATED BASIS														
	Struct	ure (as of total	a perce assets	entage)	Year-on-year rates of change				Qu	arterly rates of change (per cent)				
	2009	2010	2011	2012	20	11		2012		20	11		2012	
	Dec.	Dec.	Dec.	Sep.	Sep.	Dec.	Mar.	Jun.	Sep.	Sep.	Dec.	Mar.	Jun.	Sep.
Cash and claims on central banks	3.3	2.1	2.7	2.3	13.8	19.1	12.5	45.1	16.1	-2.3	37.6	-18.9	33.0	-21.8
Claims and investments in other credit institutions	5.6	3.2	4.2	3.4	-23.1	23.1	-7.0	-2.2	-5.3	2.1	19.3	-26.1	8.7	-1.2
Securities, derivatives and investments	15.8	19.7	18.0	19.1	-5.4	-12.9	3.7	0.9	-0.1	0.6	-3.2	8.1	-4.1	-0.4
Net credit to customers	63.5	60.0	58.1	62.2	-6.8	-7.6	-3.7	-0.2	-0.5	-0.5	-4.3	1.3	3.5	-0.8
Securitised non- derecognised assets	6.7	9.6	10.4	6.3	39.5	3.3	-10.1	-36.8	-42.3	-1.5	-2.0	-6.6	-29.9	-10.0
Tangible and intangible assets	1.0	1.0	1.0	1.0	0.9	-3.4	-6.6	-2.1	-0.3	1.1	-3.1	-1.9	1.7	3.1
Other assets	4.2	4.4	5.7	5.7	14.0	22.3	20.0	11.1	0.8	7.9	3.6	-2.9	2.3	-2.1
Total assets	100.0	100.0	100.0	100.0	-2.5	-4.7	-1.8	-2.5	-4.5	0.1	-1.8	-0.2	-0.5	-2.0
Resources from central banks	3.8	9.9	10.9	12.3	9.1	5.5	29.6	24.7	9.1	4.1	-0.1	12.6	6.5	-8.9
Resources from other credit institutions	7.3	7.3	5.6	4.3	-19.2	-26.2	-36.0	-25.3	-30.0	0.9	-5.8	-14.4	-8.1	-5.4
Resources from customers and other loans	45.2	46.4	52.4	54.3	8.1	7.6	10.3	3.1	1.4	1.9	0.6	2.4	-1.9	0.3
Liabilities represented by securities	27.1	20.1	17.2	13.8	-21.7	-18.6	-22.0	-22.8	-22.6	-6.2	-1.2	-11.6	-5.8	-6.0
Subordinated liabilities	2.5	2.1	1.3	2.7	-37.2	-39.9	-35.5	52.7	81.3	-15.9	-9.1	-2.2	104.2	-0.1
Other liabilities	7.1	7.5	7.5	6.1	7.0	-4.2	-4.3	-17.1	-24.3	5.1	-4.2	-5.7	-12.6	-4.0
Capital	6.9	6.8	5.1	6.5	-12.0	-29.1	-22.6	-8.9	1.9	-5.3	-18.5	7.7	9.6	6.0
Total liabilities and capital	100.0	100.0	100.0	100.0	-2.5	-4.7	-1.8	-2.5	-4.5	0.1	-1.8	-0.2	-0.5	-2.0
Memo:														
Credit to customers including non- derecognised securitisation operations	72.0	71.4	70.9	71.6	-1.6	-5.3	-3.1	-4.1	-5.2	-0.3	-3.5	0.6	-0.9	-1.5
Credit to customers including non- derecognised securitisation operations (adjusted for loan disposal operations)	-	71.6	72.8	74.0	0.6	-3.1	-1.8	-3.2	-4.4	-0.1	-3.2	0.9	-0.8	-1.3

Source: Banco de Portugal

Table 2

PROFIT AND LOSS ACCOUNT OF THE SIX MAJOR BANKING GROUPS | ON A CONSOLIDATED BASIS, AS A PERCENTAGE OF AVERAGE ASSETS

	Quarterly income (flow)					Cumulative income (year to date)					
	20	11		2012			2011		2012		
	Q3	Q4	Q1	Q2	Q3	Sep.	Dec.	Mar.	Jun.	Sep.	
Net interest income	1.44	1.47	1.33	1.27	1.10	1.42	1.43	1.33	1.30	1.23	
Income (net) from services and commissions	0.70	0.69	0.69	0.78	0.70	0.70	0.70	0.69	0.74	0.72	
Income from financial operations	0.13	0.04	0.47	0.54	0.35	0.15	0.12	0.47	0.50	0.45	
Other income	0.05	0.05	0.08	0.25	0.05	0.13	0.11	0.08	0.16	0.13	
Gross income	2.33	2.25	2.56	2.84	2.20	2.40	2.37	2.56	2.70	2.54	
Operating costs	1.40	1.57	1.35	1.34	1.42	1.39	1.44	1.35	1.35	1.37	
Provisions and impairment	0.94	2.95	0.94	1.79	1.25	0.88	1.39	0.94	1.36	1.33	
of which: associated with credit to costumers	0.57	1.36	0.77	1.51	1.04	0.66	0.83	0.77	1.14	1.11	
Consolidation differences and appropriation of net income	0.00	0.08	-0.05	-0.09	-0.32	-0.04	-0.01	-0.05	-0.07	-0.15	
Income before tax and minority interests	0.00	-2.36	0.32	-0.20	-0.15	0.18	-0.45	0.32	0.06	-0.01	
Income tax profit	0.01	-0.71	0.12	0.05	-0.09	-0.04	-0.20	0.12	0.08	0.03	
Income before minority interests	-0.01	-1.64	0.20	-0.25	-0.06	0.21	-0.25	0.20	-0.02	-0.04	
Minority interests	0.09	0.00	0.09	0.04	0.10	0.13	0.09	0.09	0.06	0.07	
Net income	-0.10	-1.64	0.11	-0.29	-0.16	0.09	-0.34	0.11	-0.09	-0.11	

Source: Banco de Portugal.

Note: Quarterly and cumulative income have been annualised for the calculation of the respective percentages over average assets.

Chart 1

RETURN ON ASSETS (ROA) AND RETURN ON EQUITY (ROE) OF THE SIX MAJOR BANKING GROUPS | Adjusted for Non-Recurrent events OBSERVED IN THE FOURTH QUARTER OF 2011



Chart 2

PROFIT AND LOSS ACCOUNT OF THE SIX MAJOR BANKING GROUPS | QUARTERLY FLOWS



Source: Banco de Portugal.

Note: Indicators calculated on net income. Quarterly data have been annualised. Non-recurrent events comprise the Special Inspections Programme (SIP), the partial transfer of banks' pension funds to the Portuguese Social Security System and impairment charges related to Greek public debt.

Source: Banco de Portugal.

Table 3										
OWN FUNDS ADEQUACY OF THE SIX MAJOR BANKING GROUPS ON A CONSOLIDATED BASIS										
		201	1	2012						
		Sep.	Dec.	Mar.	Jun.	Sep.				
1. Own funds										
Original own funds	(A)	24 815	24 448	24 913	29 944	29 777				
of which: non-core elements	(B)	2 941	1 227	1 218	1 179	1 173				
2. Capital requirements	(C)	21 336	20 082	20 165	20 100	19 835				
3. Core Tier - I ratio (per cent)	(A-B)/(C x 12.5)	8.2	9.3	9.4	11.4	11.5				

Source: Banco de Portugal.

4. CREDIT RISK

Risks to financial stability associated with the financial situation of households and especially non-financial corporations continued to be significant in 2012, in a context of high indebtedness. An adjustment to the balance sheets of households and corporations was, however, noted, during the course of the year. In first half 2012, the two sectors recorded a financing capacity situation for the first time since the start of euro area membership (Chart 4.1).

The reduction of income owing to higher unemployment, a decline in wages and increase in the fiscal burden have been reflected in the increased materialisation of household credit risk which was more marked in the credit for consumption and other purposes segment and relatively mitigated in the case of mortgage loans. The price reductions noted in the property market, deriving from the slowdown in demand, may imply a certain risk of losses for credit institutions in the event of mortgage foreclosures, notwithstanding the fact that market prices in the period preceding the crisis (Chart 4.2) had not been overvalued.

The sharp contraction in domestic demand had a major impact on the performance of non-financial corporations, limiting their self-financing capacity from internally generated resources. This situation was worsened by the significant increase in the restrictiveness of bank financing conditions, in a context of high levels of uncertainty and an increase in the banks' perception of risk. The difficulty in access to credit is greater for smaller companies, on whose less information regarding their activities and financial situation is available, in the case of the less profitable companies, which represent greater risk, and for those sectors of activity which are more reliant on the evolution of domestic demand. These are also the segments which have made the largest contribution to the materialisation of credit risk. The high, direct and indirect exposure of the banks to the "construction" and "real estate activities" sectors, together with the marked deterioration of the financial situation of companies in these sectors led Banco de Portugal to undertake a transversal inspection of such sectors' creditworthiness.

The current adjustment to the Portuguese economy will tend to persist in the future and will have direct implications on the prospects for the materialisation of credit risk. Defaults by households and mainly

Chart 4.1





Source: INE.

Notes: 12-H1* corresponds to the sum of the last four quarters ending in the second guarter of 2012.

Sources: Confidencial imobiliário and INE.

companies are therefore likely to continue to increase over the coming quarters (Chart 4.3).¹ In such an environment of greater materialisation of credit risk, the banks will increase their impairment provisions on credit portfolio losses. It is important to ensure that this process is consistent with the current restructuring of the Portuguese economy and will not put a brake on the medium term economic recovery dynamic. In such a context, the financial situation of the corporate and household sectors will continue to be monitored for the purpose of identifying possible measures to attenuate the effects of these sectors' high levels of indebtedness in terms of their financing capacity and level of default in the banking system. At the same time, national authorities, including Banco de Portugal, are identifying measures for the diversification of corporate financing sources and to support the economy's most dynamic and productive segments in financing their activities.

Households

In first half 2012, in a context of high levels of indebtedness, the financial situation of households was worsened by the downturn in economic activity, higher unemployment, wage cuts and increases in the fiscal burden. By contrast, households with mortgage loans benefited from the fall in interest rates in the money market, having a favourable effect on their disposable income. There is, however, evidence suggesting that the necessary correction process on the main imbalances in households' balance sheets continued to occur in first half 2012. There was an increase in households' financing capacity in comparison to the same period of the preceding year. This occurred, mainly on account of a rise in the savings rate, which is largely explained by the downwards revision of expectations regarding permanent income and greater uncertainty over the prospects for macroeconomic evolution in general and consequently, for the financial situation of households (Chart 4.4).



Chart 4.3

Source: Banco de Portugal.

Notes: See non-performing loans definition, note 1. Last observation: June 2012.

¹ Three credit risk indicators are preferentially used in this chapter. The default ratio is defined as total loans overdue for more than 30 days and other doubtful loans expressed as a percentage of the loans balance adjusted for securitisation. The annual flow of new overdue and other doubtful loans is expressed as a percentage of the loans, adjusted for securitisation, asset write-downs/write-offs, reclassifications and starting December 2005, credit disposals. The default ratio and the annual flow of new overdue and other doubtful loans are obtained based on Monetary Financial Statistics. Lastly, non-performing credit corresponds to a broader concept of credit risk made up of three elements, the amount owed on credit with instalments of capital or interest overdue for a period of 90 days or more, the overdue amount of restructured credit with certain characteristics not included in the preceding item and, lastly, the amount of credit with instalments of capital or interest overdue for a period of 90 days or more, but in relation to which there is evidence which justifies its classification as non-performing credit, namely a debtor's bankruptcy or liquidation.

Since 2011, the financial counterpart of higher household savings has largely comprised net debt repayments (Chart 4.5). There was virtually no change in households' investments in financial assets given the context of lower disposable income, unfavourable evolution of the capital markets, greater competition by the banks in taking in domestic savings and maintenance of households confidence in the banking system. This evolution underlies the recomposition of the sector's financial assets portfolio towards interest-earning instruments, particularly bank deposits and, more recently, bonds issued by non-financial corporations and banks (see "Chapter 5 Liquidity Risk", of this Report).

As stated, the fall in the interest rate in the money market in the last quarter of 2011 and during the course of 2012 (around 150 basis points in accumulated terms) mitigated the effects of the macroeconomic situation and contractionary fiscal policy on the financial situation of households. The transmission of money market interest rates to the interest rate on credit is usually rapid and total and essentially reflects the fact that most mortgage loans are indexed to Euribor rates and have, in general fixed spreads (Chart 4.6). The average monthly mortgage loan repayment displayed a downwards trend during the course of 2012 (Chart 4.7). Accordingly, the highly moderate increase in the amount of interest paid by households in first half 2012 will have been due to higher spreads on new loans. In turn, interest received benefited from the fact that interest rates in a context of portfolio recomposition to this type of instrument. Therefore, the difference between interest received and interest paid by households became positive in 2011. This had not been the case since the first years of euro area membership (Chart 4.8).

Sharp decline of lending to households in the context of high levels of uncertainty

The banking sector is highly exposed to household debt, accumulated over a long period in which expectations regarding the evolution of income exceeded the expected interest rate, implying the perception that the level of indebtedness would remain sustainable (Chart 4.9). With the worsening economic and financial crisis and given the need to promote a long-lasting consolidation of the public finances, there was a significant change in household expectations over the evolution of their income, pursuant

Chart 4.4





Source: INE.

Notes: 12-H1* corresponds to the sum of the last four quarters ending in the second quarter of 2012. (a) Disposable income adjusted for the change in net equity of households on pension funds. (b) Corresponds to the sum of GFCF, changes in inventories, acquisitions less disposals of valuables and acquisitions less disposals of non-produced non-financial assets. Sources: INE and Banco de Portugal

Notes: 12-H1* corresponds to the sum of the last four quarters ending in the second quarter of 2012. Consolidated figures. (a) Includes other technical insurance reserves and other receivables.

Chart 4.6



Notes: The interest rate spread on new loans to households for house numbers is calculated using 6 months Further. The

for house purchases is calculated using 6 months Euribor. The Interest rate spread on new loans to households for consumption is calculated using, respectively, 6-month Euribor, 1-year Euribor and the 5-year euro interest rate swap rate, in cases in which the initial rate fixation period is up to 1 year, between 1 and 5 years and more than 5 years. Last observation: September 2012.





Source: INE.

Note: Last observation: September 2012.



Chart 4.9



Sources: INE and Banco de Portugal

Sources: INE and Banco de Portugal.

Notes: 12-H1* corresponds to the sum of the last four quarters ending in the second quarter of 2012. (a) Difference between interest income received by households included in the income account and the respective financial intermediation services indirectly measured (FISIM). (b) Corresponds to the sum of interest payable by households included in the income account with the respective FISIM. to which the correction of this imbalance became inevitable. This correction process has already begun and will be gradual. The annual rate of change of total lending to households has been negative since the last quarter of 2010 and there has been a gradual reduction in the level of household indebtedness, measured as a percentage of disposable income, since 2010.

The decline in total lending to households reflected a gradual deceleration in the banks' mortgage lending and a marked reduction of loans for consumption and other purposes (Chart 4.10). The slower rate of deceleration of banks' mortgage loans is consistent with the usual lower volatility of credit in this segment, given its longer maturity. This evolution is also likely to be a reflection of the more favourable financing conditions provided by several banks regarding the acquisition of real estate assets that are either registered on their balance sheets or used as collateral for other loans.

According to the Bank Lending Survey, the decline in lending to households is mainly due to demand--side factors as, on the supply side, the respondent banks reported stabilisation, after a long period of progressively more stringent lending criteria. The reduction of demand reflects the decline in consumer confidence, unfavourable housing market prospects for this type of loan and lower levels of expenditure on durable consumer goods in the case of loans for consumption.

Gradual materialisation of credit risk on mortgage loans continues to contrast with the sharp increase in defaults on loans for consumption and other purposes

The deterioration of the financial situation of households has been reflected in an increase in the materialisation of credit risk. The default ratio on bank loans to households continued to increase in 2012, following the trend noted since 2008. This trend is visible both as regards mortgage loans and loans for consumption and other purposes, albeit at very different levels and rates (Chart 4.11 and 4.12 and Table 4.1). The default ratio on loans for consumption and other purposes has posted highly significant increases, reflecting a much higher accumulation of annual flows of new loans in default in comparison to their historical average. The default ratio on mortgage loans, though at a much lower level, has been gradually increasing. The latter translates, however, a prolonged accumulation of slightly higher than average default flows rather than a particularly severe default situation in the housing segment. This



Source: Banco de Portugal.

Notes: Contributions to the annual rate of change of total credit to households. Total credit to households includes all credit granted (loans, trade credit) independently of who conceives the credit. The annual rate of change of total credit is adjusted for securitasion operations, reclassifications, credit portfolio sales asset write-offs/downs and foreign exchange and price revaluations, as well as other operations of significant amount, but which have no impact in the effective financing of counterparties. Last observation: September 2012.

Chart 4.11



Source: Banco de Portugal.

Notes: See credit risk indicators definitions, note 1. See model in Alves and Ribeiro (2011) "Modelling the evolution of households' defaults" Banco de Portugal, *Financial Stability Report November*. Last observation: September 2012.

Chart 4.12



Source: Banco de Portugal.

Notes: See credit risk indicators definitions, note 1. See model in Alves and Ribeiro (2011) "Modelling the evolution of households' defaults" Banco de Portugal, *Financial Stability Report November*. The decline registered in December 2010 is justified by the sale of a large loan portfolio by BPN to Parvalorem, which is out of the Monetary and Financial Statistics. This sale had an impact of 0.59 per cent in the default ratio of households loans for consumption and other purposes. Last observation: September 2012.

Table 4.1

		Housing		Consumption						
	DEC-2010	DEC-2011	SEP-2012	DEC-2010	DEC-2011	SEP-2012				
Total exposure										
Number of debtors in default (%) $^{(b)}$	4.9	5.4	5.8	12.8	13.3	13.7				
Overdue credit and interest $(\%)^{(c)}$	1.8	2.0	2.2	8.5	9.4	9.6				
Exposures larger than the 90th percentile $^{(d)}$										
Proportion of the outstanding amounts $^{\left(e\right) }$	28.6	28.6	28.6	54.7	55.6	56.4				
Number of debtors in default ^(b)	5.9	7.1	8.2	13.9	15.5	16.1				
Overdue credit and interest ^(c)	1.8	2.1	2.6	7.1	8.3	8.9				

Source: Banco de Portugal.

Notes: (a) Indicators based on information supplied by the Central Credit Register (CRC). Includes loans made by banks, savings banks, mutual credit agricultural institutions, financial credit institutions, factoring companies, leasing companies, credit card issuing or management companies and other resident financial intermediaries. Also includes loans granted (or held) by entities outside the financial sector which report to the CRC *i.e.*, Parvalorem, Instituto de Turismo de Portugal and, since September 2011, some debt collection companies. Only exposures to a specific institution of more than EUR 50 were considered and unused lines of credit have been excluded. A debtor is considered to be in default if the amount of credit overdue is higher than 0.5 per cent of its total exposure in relation to all the entities reporting to CRC. The value of loans in CRC differs from the amount recorded in the Monetary and Financial Statistics essentially on account of the fact that institutions with the obligation to report directly for such purposes (banks, savings banks and mutual agricultural savings institutions) are a sub group of the entities participating in the CRC. (b) As a percentage of the number of debtors ranked by their total amount of exposure in the relevant segment. (e) Mortgage (or consumption) loans whose amounts are higher than the 90th percentile, as a percentage of total mortgage (or consumption) loans.

differentiation is also visible in the non-performing credit ratio which, notwithstanding having recorded a significant increase in both segments, increased much more considerably in the case of loans for consumption and other purposes. The differences noted in the evolution of defaults in the two segments partly derive from Euribor rates, which are used as indexers for the vast majority of mortgage loans and have fallen to historically low levels. However, these differences are also explained by more structural factors, namely on account of the fact that mortgage loans are mainly loans for the acquisition of a household's main residence, whose probability of default is usually lower. The results of the Households Finance and Consumption Survey, in 2010, have reinforced this idea as they show that mortgage loans are concentrated in households with a lower probability of default.² This is partly due to the fact that the participation of lower income households in this market is relatively low.³ Reference should, however, be made to the fact that the level and trend in terms of the annual flows of new loans in default noted, both in the case of mortgages and for consumption and other purposes, are in contrast to those estimated on the basis of a model which points towards a higher level and a trend towards a sharper increase.⁴ The larger deviation between the model and what has been noted in the recent period may be related with an increase in the number of restructured credit operations, a situation which is not captured by any of the model's variables.

In prospective terms, using the Portuguese economic projections as published in the Autumn *Economic Bulletin* as a reference, the referred model foresees a reduction on the flow of new defaults on mortgage loans in second half 2013, as the result of an improvement in the evolution of economic activity and expectations that key interest rates will remain at very low levels. By contrast, in the case of loans for consumption and other purposes, according to the estimated model, the default flow will continue to grow in the context of the continuation of very high levels of unemployment. In this credit segment, default projections are particularly sensitive to unemployment. These forecasts are, however enshrouded in a high level of uncertainty owing to the existing risks regarding the evolution of unemployment and economic activity. In the case of mortgage loans, the evolution of key interest rates has been the only factor contributing to maintain the default flow close to its historical average. Given that the said rates are already close to zero, new positive effects able of offsetting any worsening of economic activity and unemployment beyond those projected are not to be expected.

In order to attenuate the effect of the deterioration of the financial situation of households on the materialisation of credit risk, new legislation are being developed designed to help prevent default and extrajudicial settlements of default situations in credit agreements with consumers. A statute setting out the procedures for the regular supervision of the performance of loan agreements by credit institutions⁵ was approved in October 2012. In cases in which there are signs of default risk or in which a banking customer notifies the existence of risk, this statute forces credit institutions to take steps to avoid the materialisation of the default. The statute also establishes a standardised negotiation procedure on extrajudicial solutions for the settlement of default situations between credit institutions and bank customers. In this scope, consumers who are not able to meet their financial commitments owing to unemployment or an anomalous fall of income, may, when collaborating with credit institutions during the course of the negotiating process, benefit from several rights and guarantees designed to facilitate extrajudicial settlements for cases of default.

² See S. Costa (2012) "Households' default probability: an analysis based on the results of the HFCS", of this Report.

³ See S. Costa and L. Farinha (2012) "Household indebtedness: a microeconomic analysis based on the results of the Household Finance and Consumption Survey", Banco de Portugal, Financial Stability Report – May.

⁴ See N. Alves and N. Ribeiro (2011) "Modelling the evolution of households' defaults", Banco de Portugal, Financial Stability Report – November.

⁵ Decree Law no. 227/2012 scheduled to come into force on 1 January 2013.

Non-financial corporations

Non-financial corporations' excessive indebtedness aggravated by the weak performance of the segment in aggregate terms

The high levels of indebtedness of non-financial corporations continued to be one of the main sources of risk to financial stability in first half 2012 in the context of low levels of operating profitability and higher financing costs (Chart 4.13).

The proportion of loans, most of which made by the resident banking sector, in the financing structures of Portuguese companies is very high and higher than in most countries in the euro area. The significant increase in the indebtedness of Portuguese non-financial corporations which has been occurring over the course of more than a decade, was fuelled by highly favourable financing conditions – associated with European financial integration and the adoption of the euro – together with expectations of productivity growth. For various reasons, however, including the existence of distortions in the allocation of productive factors which had a negative effect on GDP growth, these expectations were not fulfilled, highlighting the unsustainability of the debt path and the inevitability of the adjustment process.

Major heterogeneity between the financial situation of companies with different characteristics

Accounting information available on the financial situation of private companies indicates the existence of substantial heterogeneity according to the characteristics of companies, notably their size. The debt--to-capital ratio is particularly high in the case of smaller and medium sized companies (Chart 4.14). The lower indebtedness ratios in the case of micro companies derive from the fact that around a half of such companies do not have any type of debt, with the percentage of indebted companies, the debt-to-capital ratio is higher in the case of micro, small and medium-sized than in the case of the larger companies.



Chart 4.13

Notes: Consolidated figures. (a) Total debt = Financial debt + trade credit and advances received from other sectors. (b) Financial debt = loans + debt securities issued.

Sources: INE and Banco de Portugal.







Source: Banco de Portugal (annual Central Balance Sheet).

Notes: Return on investment = (net income + interest paid) / total assets; Interest coverage ratio = EBITDA / interest paid; Cost of debt = Interest paid / Interest bearing debt. The cost of debt is only available after 2009 since interest bearing debt is only available in the date reported under international accounting standards (IAS). (a) Micro corporations is a very heterogenous group and thus its average cost of debt reflects a large number of situations.

Reduction of financing needs of companies is indicative of a certain adjustment

In sight of the current economic and financial crisis, Portuguese companies are facing added difficulties. On the one hand, the contraction of economic activity limits their self-financing capacity from internally generated resources. On the other, access to financing from market sources external to the company, either based on capital or debt (alternative to bank credit) is limited to a small collection of major companies (which, however, are also suffering albeit to a lesser extent from the impact of the increase in sovereign risk). In the case of smaller companies, which are heavily reliant on bank credit, partners' loans (corporations and households) are likely to be partly offsetting the difficulty in access to other financing sources. Credit Risk 64

In first half 2012, the financial situation of non-financial corporations indicated the existence of a certain adjustment which was evident in the 1.5 percentage points reduction of borrowing requirements as a percentage of GDP in comparison to the same period 2011 and in a slight increase in the savings rate (Chart 4.15). Companies' borrowing requirements have been significantly reduced in comparison to the abnormally high amounts registered in 2008 but are still higher than the level noted in the recession of 2003. Companies' gross savings are also well down over the levels noted since the start of euro area membership or the amounts noted in other countries (Chart 4.16). The recent evolution of the gross operating surplus benefited from the reduction of compensation of employees starting from first quarter 2011, which is largely associated with higher unemployment. Savings however, did not evolve at the same rate given the contrary effect of the growth of interest paid by companies as the average interest rate on loans maintained its upwards trend up until the end of 2011 (Charts 4.17 4.18). Starting from the beginning of 2012, the interest rate on loans to non-financial corporations started to come down, albeit less markedly than key interest rates as the spreads being charged are at very high levels and trending upwards. The increase in spread partly reflected the growing perception of risk by banks, which reacted to the cyclical deterioration of the economy anticipating a structural change and the consequent increase in uncertainty regarding the financial situation of companies. Reference should, however, be made to the fact that interest rates on loans to non-financial corporations, with a maturity of more than 5 years, which currently represent slightly more than 50 per cent of total bank loans to this sector, are around 1 percentage point lower than the average and are also closer to the levels noted in other euro area countries. This fact, allied with lower demand for credit for investment financing purposes, is likely to partly reflect loan restructuring operations, involving the establishing of new financing conditions by the banks, particularly lower interest rates and longer maturities.

Large companies data suggest that the observed deterioration of the financial situation of companies in 2011 is likely to have been attenuated in the first half 2012

Most accounting based indicators on the performance of non-financial corporations suggest a marked deterioration in profitability in 2011 across sector of activity and size⁶ (Chart 4.19). The reduction of opera-



Chart 4.15

Source: INE.

Notes: 12-H1* corresponds to the sum of the last four quarters ending in the second quarter of 2012. (a) Corresponds to the sum of GFCF, changes in inventories, acquisitions less disposals of valuables and acquisitions less disposals of non-produced non-financial assets.

6 The annual information from Banco de Portugal's Balance Sheet Database is collected from the Simplified Statistical Information (IES) which covers practically the universe of non-financial corporations.



Sources: Eurostat and INE.

Notes: Euro area figure corresponds to the average of 14 countries (excludes Luxembourg, Malta and Ireland). 12-H1* corresponds to the sum of the last four quarters ending in the second quarter of 2012.

ting income, measured by EBITDA⁷, translated into lower profitability ratios, notably ROI⁸ and the interest cover ratio. This evolution was recorded in most sectors of activity and size classes but was particularly marked in the case of construction and micro companies. The latter, as a whole, posted negative EBITDA.



Source: INE.





Source: Banco de Portugal.

Notes: Interest rates and spread refer to end of period outstanding amounts. Up to December 2002, the rates on the outstanding amounts are estimated. The spread is calculated as the difference between the rate on the outstanding amounts and the 6-month moving average of 6-month Euribor. Last observation: September 2012.

- 7 EBITDA "Earnings before interest, tax and depreciation", is a measure of operating profitability.
- 8 ROI "Return on investment" is a measure of the profitability of capital invested (equity and debt) and corresponds to the ratio between the sum of net income with interest paid and total assets.

Chart 4.19 (continue)



Source: Banco de Portugal (annual and quarterly Central Balance Sheet).

Notes: Return on investment = (net income + interest paid) / total assets; Interest coverage ratio = EBITDA / interest paid; Cost of debt = Interest paid / Interest bearing debt. The cost of debt is only available after 2009 since interest bearing debt is only available in the date reported under international accounting standards (IAS). Quarterly indicators are obtained using a constant sample of firms.



Chart 4.19 (continuation)

Source: Banco de Portugal (annual and quarterly Central Balance Sheet).

Notes: Return on investment = (net income + interest paid) / total assets; Interest coverage ratio = EBITDA / interest paid; Cost of debt = Interest paid / Interest bearing debt. The cost of debt is only available after 2009 since interest bearing debt is only available in the date reported under international accounting standards (IAS). Quarterly indicators are obtained using a constant sample of firms.

For 2012 only data on a sample of companies are available. The quarterly indicators show several positive signs regarding performance in the sectors on which information is available.⁹ There was a slight increase in ROI for companies as a whole. This increase was especially favourable in the case of private sector exporting companies. On the contrary, the profitability of the trade sector, which was badly affected by the evolution of domestic demand, has fallen sharply since third quarter 2011. The cost of debt, which registered an upwards trend during the course of 2011 and first quarter 2012, appear to have stabilised in the meantime, translating into a slight increase in the coverage ratio. Regarding the latter, a special reference should also herein be made to the more favourable evolution of indicators for exporting companies. Note however that the most recent indicators relating to the performance of companies refer to a sample in which large companies predominate. Such indicators are also based on information on companies which remain in the market and thus the positive signs observed are affected by this selection bias.

Non-residents contribute towards an almost stabilisation of total credit to non-financial corporations

For an assessment of non-financial corporations' financing conditions, all financing sources must be taken into consideration, including not only lending by resident banks, but also loans made by non-resident banks, debt issues (held by residents and non-residents), trade credit (from residents and non-residents) and Treasury loans, in the case of state-owned companies.

In the first three quarters of 2012, total credit to non-financial corporations, both private and public, remained relatively stable, with only a slight reduction in the third quarter. This aggregate behaviour, however, conceals very different evolutions in terms of the diverse financing sources (Chart 4.20). Whereas bank finance to non-financial corporations in the form of loans and debt securities held posted a sharp

⁹ The quarterly information from Banco de Portugal's Balance Sheet Database is compiled from the Quarterly Survey on Non-financial Corporations on a sample of around 3,000 companies covering a significant part of the added value of the non-financial corporations sector but which reflecting mainly the situation of the largest corporations.

CREDIT GRANTED TO NON-FINANCIAL CORPORATIONS | CONTRIBUTIONS TO THE ANNUAL RATE OF CHANGE



Source: Banco de Portugal.

Notes: Contributions to the annual rate of change of total credit to non-financial corporations. Total credit to nonfinancial corporations includes all credit granted (loans, debt, trade credit) independently of who conceives the credit. The annual rate of change of total credit is adjusted for securitasation operations, reclassifications, credit portfolio sales, asset write-offs/downs and foreign exchange and price revaluations, as well as other operations of significant amount, but which have no impact in the effective financing of counterparties. Last observation: September 2012.

decline with an annual rate of change, in September 2012, of minus 6.2 per cent, the strong growth of loans made by other sectors, notably non-residents, largely offset the former's decline. There also continued to be observed a significant differentiation between private and state-owned companies not included in the general government sector in terms of the evolution of bank credit (Chart 4.21).

Whereas the evolution of total credit by corporate dimension, excluding trade credit, showed positive changes in the case of credit to large companies, the change in total credit to small and particularly micro companies has moved increasingly into more negative territory (Chart 4.22). Medium sized companies enjoyed an intermediate situation, recording a much less marked fall in total credit. The decrease of total credit to smaller companies is particularly explained by a very sharp fall in bank credit, mitigated by the positive contribution made by other sectors, which is likely to be related with partners' loans.

By sector of activity, a high level of heterogeneity was noted in the evolution of total credit, with the "electricity, gas and water", "media" and "non-financial holdings" sectors recording positive rates of change, as opposed to the "education, health and other social care activities", "trade" and "construction" sectors with highly negative rates (Table 4.2). The fact that the first group largely comprises large companies which find it easier to access alternative financing sources, such as bond sales to non-residents and households, contributed to such differentiation. It should also be noted that in most sectors, the annual rate of change of bank credit, in September 2012, was always lower than that of total credit, reflecting the contribution of other financing sources. The fact that this was not the case in the "transport and storage" sector is likely to be related with the significant proportion of state-owned companies in this sector.

Non-financial corporations' financial situation, both current and expected, conditions the level of restrictiveness of credit supply and justifies the differentiation noted in the evolution of the amount of credit by corporate dimension. Besides there is a certain amount of evidence that banks have used the amount of credit as a factor of differentiation in their supply of credit to companies, a higher difference in



Chart 4.21

Source: Banco de Portugal.

Notes: Contributions to the annual rate of change of total credit to private and public (non-consolidating in general government) non-financial corporations. Total credit to private nonfinancial corporations includes all credit granted (loans, debt, trade credit) independently of who conceives the credit. The annual rate of change of total credit to private non-financial corporations is adjusted for reclassifications, asset write-offs/downs and foreign exchange and price revaluations, as well as other operations of significant amount, but which have no impact in the effective financing of counterparties. The annual rate of change of total credit to public non-financial corporations is based on the variation of outstanding amounts. Last observation: September 2012.

credit costs according to companies' characteristics, notably loan size, has not been witnessed up to the present time, unlike other countries (Chart 4.23). This is indicative of the fact that bank financing costs together with pressure on net interest income, deriving from the rigidity of several of their balance sheet components are the main factors underlying the evolution of interest rates on bank loans to companies.¹⁰ There has also been an increase in the restrictiveness of financing criteria for new companies which are also generally small and penalised by the fact that they do not have a credit history.

According to the Bank Lending Survey, credit standards are likely to have become more stringent, with the respondent banks having indicated higher spreads, shorter contractual maturities and more demanding requirements in terms of guarantees and non-pecuniary contractual conditions. However, during the course of 2012, the worsening level of restrictiveness on lending criteria to companies eased somewhat, benefiting from the improvement of aggregate liquidity and solvency levels in the banking system. In turn, investment surveys targeted at manufacturing, construction and services companies indicate that the percentage of companies considering that difficulties in obtaining bank credit are one of the main factors affecting their activity increased slightly in the case of services and manufacturing companies, albeit maintaining a clearly lower level than noted in the case of construction companies (Chart 4.24). In turn, the results of the September/October 2012 "Survey on the access to finance of small and medium-sized enterprises in the Euro Area" indicate that around 20 per cent of Portuguese

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¹⁰ See Antunes and Martinho (2012) "Access to credit by non-financial firms", Banco de Portugal, Financial Stability Report – May.

Chart 4.22









Source: Banco de Portugal.

Notes: Contributions to the annual rate of change of total credit to non-financial corporations. Total credit to nonfinancial corporations includes all credit granted (loans, debt, trade credit) independently of who conceives the credit. Total credit statistics were revised in order to make sure that all credit except trade credit is allocated by dimension. The annual rate of change of total credit is adjusted for securitasation operations, reclassifications, credit portfolio sales asset write-offs/downs and foreign exchange and price revaluations, as well as other operations of significant amount, but which have no impact in the effective financing of counterparties. Last observation: September 2012.

Table 4.2

CREDIT GRANTED TO NON-FINANCIAL CORPORATIONS BY BRANCH OF ACTIVITY CONTRIBUTIONS TO THE ANNUAL RATE OF CHANGE									
	Ba	ank credi	t	To	otal credi	t	Memo		
	2010 Dec.	2011 Dec.	2012 Sep.	2010 Dec.	2011 Dec.	2012 Sep.	Total credit sector (% total credit)	Bank credit sector (% total credit sector)	
							Sep. 2012	Sep. 2012	
Total	1.3	-2.4	-6.2	2.6	0.4	-0.7	100.0	51.4	
Sectors									
Manufacturing and mining	3.2	-3.0	-8.3	2.2	0.6	-0.6	11.4	64.3	
Elect. gas and water	11.3	5.3	-4.6	10.1	1.3	3.2	8.3	35.7	
Construction	-6.8	-3.1	-8.5	-5.8	-4.0	-5.0	13.9	72.1	
Trade	0.9	-6.0	-12.2	3.2	-4.0	-6.2	10.8	58.8	
Transport and storage	-1.8	5.4	0.9	0.8	6.7	-0.8	8.5	47.0	
Restaurants and hotels	8.6	9.4	-2.1	5.4	5.2	-1.1	3.6	72.5	
Media	26.9	-22.8	-4.6	59.9	-23.1	20.4	2.5	31.1	
Non-financial holdings	3.6	-6.3	-6.9	0.2	6.2	5.0	17.8	44.3	
Real estate activities	-1.3	-5.3	-3.7	2.0	-2.4	-3.5	11.3	58.6	
Consultancy	-5.3	4.5	-9.7	-0.2	6.1	-4.3	6.4	52.7	
Education, health and other social care act.	8.7	-4.3	-9.9	6.1	-5.6	-9.2	3.1	64.5	
Other	5.3	3.7	0.3	10.5	1.2	-1.6	2.5	39.7	
Memo									
Loans granted by resident financial institutions to private exporting firms	-0.4	1.1	2.1						

Source: Banco de Portugal.

Notes: Total credit to nonfinancial corporations includes all credit granted (loans, debt, trade credit) independently of who conceives the credit. There is no data on trade credit by branch of activity. Annual rates of change are adjusted for securitisation operations, reclassifications, credit portfolio sales, asset write-offs/downs and foreign exchange and price revaluations, as well as other operations of significant amount, but which have no impact in the effective financing of counterparties. Loans classification is done based on the Central Credit Register (CRC). Exporting firms are defined as all private firms that during three consecutive years export more than 50 per cent of their turnover or, alternatively, more than 10 per cent but summing up more than 150 thousand euros.

small and medium-sized enterprises (SMEs) identify access to financing as the main limitation on their activity. This proportion remained stable in comparison to the preceding half year survey but represents around double the percentage reported in 2010. It should also, however, be noted that the percentage of Portuguese SMEs in these conditions was lower than Greek, Spanish and Italian SMEs.

Significant materialisation of credit risk on loans to non-financial corporations, especially in the "construction", "real estate activities" and "trade" sectors

The marked deterioration of the financial situation of companies, recorded in 2011 and 2012, especially in a few sectors, helped to significantly increase the default levels of non-financial corporations. This evolution is visible in both the default and non-performing credit ratios which have been recording successive increases (Chart 4.25). This was accompanied by a strong, growing annual flow of new loans in default.

Large companies registered a much lower default level and a less pronounced trend as compared to smaller companies, in spite of the greater increase in the default ratio on major exposures than in the

Chart 4.23





Source: ECB.

Source: INE.

Notes: Small sized exposures correspond to loans of less than 1 million euros. Large sized operations correspond to loans of more than 1 million euros. The interest rate level is highly affected by several factors, with particular emphasis on the maturity of the loans. Note: (a) Percentage of companies indicating that difficulty in access to credit is one of the main constraints on their activity.

Chart 4.25

OVERDUE AND OTHER DOUBTFUL BANK LOANS TO NON-FINANCIAL CORPORATIONS



Source: Banco de Portugal.

Notes: See credit risk indicators definitions, note 1. The decline registered in December 2010 is justified by the sale of a large loan portfolio by BPN to Parvalorem, which is out of the Monetary and Financial Statistics. This sale had an impact of 0.6 per cent in the default ratio of non-financial corporations. Last observation: September 2012.

case of retail exposures, which do not necessarily correspond to exposures to large companies (Tables 4.3, 4.4 and Chart 4.26). In prospective terms, according to the estimated model, the average probability of default by non-financial corporations will peak in 2012. 2013, however, is likely to witness a gradual reduction, reflecting the outlook for the recovery of economic activity during the course of the year,¹¹ albeit higher than the level noted in 2011.¹² It should be noted that these projections are enshrouded in high levels of uncertainty, given the existing risks relative to the evolution of economic activity.

11 See "Outlook for the Portuguese economy: 2012-2013", Banco de Portugal, *Economic Bulletin – Autumn 2012*.
12 See A. Antunes (2012) "Modelling corporate default rates with micro data", mimeo.

By branch of activity and despite the widespread increase in defaults, a particularly high increase in the default ratio was witnessed during the course of 2012 in the "construction" and "real estate activities" sectors, from 10.2 and 7.0 per cent, in September 2011 to 18.1 and 12.6 per cent, respectively, in September 2012 (Chart 4.27). Notwithstanding the fact that these sectors jointly represent around 34 per cent of total loans to non-financial corporations, they accounted for a far higher proportion of non-financial corporations defaults (around 56 per cent). This evolution is consistent with the fact that these sectors, particularly "construction", had very high levels of indebtedness and much lower returns than the average (and moving downwards). The weak returns registered by these firms are mainly related with the current low level of public investments and the contraction of the mortgage lending market, which have conditioned the number of transactions of property developers. According to a corporate risk classification model developed by Banco de Portugal, these were also the sectors with the highest average probabilities of default.¹³ In such a context, the respective quality of credit to "construction" and "real estate activities" was subject to a specific inspection to assess the amount of impairment recognised in June 2012.

For the Portuguese economy's restructuring process to be successful it is crucial that non-viable companies exit the market, making room for the appearance of new dynamic companies with growth potential and that viable companies, facing short term liquidity problems, owing to the evolution of demand, should be able to remain in the market. Although this process is fundamental to ensure the improvement of the economy's long term growth prospects, it will lead to an increase in default levels. To mitigate this effect, reference should be made to the change in the Insolvency and Corporate Recovery Code in force since April 2012. This legislative change established a special process for the revitalisation of companies in a

	Dec-10	Dec-11	Sep-12							
Total exposure										
Number of debtors in default ^(b)	19.9	23.9	28.1							
Overdue credit and interest ^(c)	5.1	7.9	11.7							
Exposures for more than the 90th percentile ^(d)										
Number of debtors in default ^(e)	15.6	23.1	29.5							
Overdue credit and interest ^(f)	4.5	7.3	11.2							
of which: Exposures for more than the 99.9th percentile										
Number of debtors in default ^(e)	6.2	14.2	24.8							
Overdue credit and interest ^(f)	1.3	2.0	4.7							
Smaller exposures ^(g)										
Number of debtors in default ^(e)	20.3	24.0	27.9							
Overdue credit and interest ^(f)	9.2	12.4	15.9							

Table 4.3

Source: Banco de Portugal

Notes: Smaller exposures, exposures above the 90th percentile and exposures above the 99.9 percentile represent 11.2, 88.8 and 27.9 percent of total loans, respectively. (a) Indicators based on information from the Central Credit Register (CRC). Includes loans granted by banks, savings banks, mutual credit agricultural institutions, financial credit institutions, factoring companies, leasing companies, credit card issuing or management companies and other resident financial intermediaries. Also includes loans granted by entities outside the financial sector which report to the CCR *i.e.*, Parvalorem, Instituto de Turismo de Portugal and, since September 2011, some debt collection companies. Only exposures to a specific financial institution of more than EUR 50 were considered and unused lines of credit have been excluded. A non-financial corporation is considered to be in default if the amount of credit overdue is higher than 0.5 per cent of its total exposure in relation to all the entities reporting to CRC. (b) As a percentage of the number of non-financial corporations with debts to institutions participating in the CRC. (c) As a percentage of the number of companies institutions participating in the CRC. (d) As a percentage of the number of companies whose amounts are less than the lower limit of large exposures (comprise 90 per cent of the companies with debt to institutions participating in CRC).

13 See R. Martinho (2012) "A scoring model for Portuguese firms", of this Report.

Table 4.4

DEFAULT INDICATORS ON LOANS TO NON-FINANCIAL CORPORATIONS BY SIZE AND TYPE OF FINANCIAL INSTITUTION										
	Number of	debtors in c	lefault ^(a)	Overdue o	Memo					
	Dec-10	Dec-11	Sep-12	Dec-10	Dec-11	Sep-12	Weight (Sep-12)			
Loans granted by monetary financial institutions	18.4	22.9	26.9	4.3	6.6	10.1	100.0			
Micro corporations	19.3	23.8	27.6	7.3	10.6	15.2	33.4			
Small corporations	15.1	19.4	24.0	4.0	6.5	11.1	24.1			
Medium corporations	14.7	18.6	24.0	2.3	4.5	7.6	25.1			
Large corporation	7.9	12.8	16.5	1.1	1.6	2.1	17.4			
Loans granted by non-monetary financial institutions	21.8	28.5	35.6	10.4	16.5	22.6	100.0			
Micro corporations	23.6	30.8	38.0	15.7	23.3	28.2	32.3			
Small corporations	18.0	24.6	32.0	13.5	20.4	27.2	25.3			
Medium corporations	16.7	21.9	28.1	8.6	14.0	21.5	25.1			
Large corporation	9.1	11.2	15.0	0.9	2.3	7.3	17.3			

Source: Banco de Portugal.

Notes: Indicators based on information from the Central Credit Register (CRC). Includes loans granted by banks, savings banks, mutual credit agricultural institutions, financial credit institutions, factoring companies, leasing companies, credit card issuing or management companies and other resident financial intermediaries. Loans granted to non-financial holdings are excluded. (a) As a percentage of the number of non-financial corporations with debts to monetary financial institutions or non-monetary financial institutions participating in the CRC. (b) As a percentage of the total credit from monetary financial institutions or non-monetary financial institutions participating in the CRC to resident non-financial corporations.

Chart 4.26



Source: Banco de Portugal.

Notes: Observed and estimated evolution of the average probability of default of a sample of non-financial corporations. Values in natural units (quarterly). The model uses, among other regressors, the GDP growth rate (quarter on quarter) and the variation in the unemployment rate. Loans were classified based on each firm total exposure. Small exposures correspond to exposures of less than 1 million euros and large exposures correspond to total exposures of more than 1 million euros.

difficult economic situation or at imminent risk of insolvency. The special revitalisation process has been designed to permit debtors who are in a difficult economic situation or at imminent risk of insolvency, but still in a recoverable situation, to establish negotiations with their respective creditors in order to reach an agreement leading to their revitalisation.

The banks will continue to increase their impairments for credit portfolio losses

The Portuguese economy's adjustment process will continue to imply a short term downturn in economic activity and, consequently, an increase in unemployment and in the number of companies affected by bankruptcy or insolvency procedures which will, in turn, lead to new increases in default levels. Notwithstanding the banks' recognition of impairment for the said purpose, the non-performing loans coverage ratio has recorded a downwards trend, especially in the case of non-financial corporations (Chart 4.28). In such a context, it is to be expected that the banks will continue to increase their appropriations for impairment on their credit portfolios losses over the next few quarters.

Chart 4.27

OVERDUE AND OTHER DOUBTFUL BANK LOANS TO NON-FINANCIAL CORPORATIONS | BY BRANCH OF ACTIVITY



Source: Banco de Portugal.

Note: See credit risk indicators definitions, note 1.

Chart 4.28



Source: Banco de Portugal.

Note: The non-performing loans coverage ratio is calculated dividing accumulated provisions/impairments by non-performing loans (see definition, note 1).

5. LIQUIDITY RISK

There was an improvement in the liquidity position of the Portuguese banking system during the course of 2012, following the announcement by the ECB and the European Union of measures designed to mitigate tensions in financial markets deriving from the sovereign debt crisis in the euro area. These measures permitted a substantial decline in banks' short term financing requirements, translating into an improvement in liquidity gaps over all maturities and leading to an increase in the banking system's resilience to potential negative funding shocks. Nonetheless, notwithstanding the positive developments recently noted in international investors' assessments of the risks attached to the Portuguese banking system, the banks' access to the international financial markets remains heavily conditioned. There accordingly continues to be a need to strengthen the pool of assets available to use as collateral in ECB lending operations in a context of the continuation of risks regarding the sustainability of the decline of tensions in the international financial markets. On the other hand, the adoption of more demanding rules in line with the future Community regulation on liquidity requirements constitutes an additional challenge for the banks on an international level, including Portuguese banks (see "Box 2.1 The main Basel III proposals", Financial Stability Report - November 2010). In this context, the continuation of the gradual adjustment of the balance sheets of Portuguese banks, translating into an ongoing reduction of the loan-to-deposit ratio, is, over time, expected to lead to a convergence towards a more sustainable funding structure, less sensitive to changes in international investors' perceptions of risk. This adjustment of bank balance sheets is consentaneous with future European guidelines on liquidity regulation.

Notwithstanding some positive signs, the Portuguese banking system's access to funding in international financial markets remained heavily conditioned in 2012

There was a reversal of the upwards trajectory of the risk premia on Portuguese public debt in February. Contributory factors were the progress in the development of management mechanisms for the sovereign debt crisis in the euro area, with the objective of re-establishing investor confidence and severing the strong links between sovereign risk and the banking sector, as well as the progress achieved in the adjustment of the Portuguese economy. The situation in international financial markets particularly benefited from the ECB's adoption of new non-conventional monetary policy measures (see "Section 2.1 Monetary policy of the ECB" and "Box 1.2 Non-conventional monetary policy in the main advanced economies", Economic Bulletin - Autumn 2012).

The decline in international investors' perception of the risks attached to the Portuguese Republic was accompanied by a significant reduction in the rates of return noted in the secondary market on debt securities issued by resident banks which, in turn, translated into a decline in the respective spread *vis-à-vis* the IBoxx index¹ (Chart 5.1). This evolution partly reflects the correction of highly negative sentiment and high perceived risk felt in the international financial markets in second half 2011 and, to a lesser extent, second quarter 2012. This was accompanied by a significant decline in interest rates on term deposits starting November 2011, particularly in what concerns corporate deposits. Developments in interest rates on term deposits reflected the decline in money market interest rates, decline in pressure on bank liquidity deriving from the ECB's non-conventional monetary policy measures and Banco de Portugal's prudential measures designed to prevent imbalances deriving from excessive competition in deposit-taking from customers.

¹ This index is made up of securities guaranteed by investment grade mortgages issued in euros. The yields on the securities issued by the banks in the secondary market constitute an indicator of investors' risk perception and do not represent banks' effective funding costs in wholesale debt markets, to which their access remains limited.

During the course of 2012, Eurosystem lending and contingent capital instruments subscribed by the state took a major role in the funding of the Portuguese banking system

Following the ECB's second 3 year long term refinancing operation (LTRO) in February, Eurosystem lending operations once again played a leading role in financing the Portuguese banking system in first half 2012 (Chart 5.2). There was also a significant increase in subordinated liabilities, in the context of several banks' use of contingent capital instruments (CoCos) subscribed by the Portuguese state. Resource-taking from customers continued to make a positive contribution to the financing of the banking system, albeit to a lesser extent than what has been observed since the second half of 2010. On the other hand, there continued to be a significant decline in debt securities, reflecting banks' restricted access to wholesale debt markets, in addition to own bonds repurchase operations performed by the major banking groups. Net resources from other credit institutions, particularly non-residents, also continued to diminish, in a context of the fragmentation of financing markets in the euro area and maintenance of a particularly low level of activity in the international non-collateralised markets. Reference should also be made to a change in non-domestic banks' funding strategy, whereby they decreased their dependence on their respective parent companies, translating into a substantial increase in the use of Eurosystem liquidity operations and in a significant endeavour to adjust their balance sheets, both through increased deposit-taking and decreased lending.

Developments in customer deposits were different across sectors, with a continuation of the robustness of household deposits

Customer resources in the form of deposits continued to play a leading role in banks' funding structure, accounting for around 48 per cent of the balance sheet on a consolidated basis (51 per cent in the case of domestic institutions) in June 2012. These resources recorded a year-on-year rate of change of around 3 per cent in June 2012. Deposits in Portugal, however, remained relatively stable in the same period (Chart 5.3), whereas a positive contribution towards deposit-taking was recorded by the subsidiaries



Chart 5.2



Sources: Bloomberg, Thomson Reuters and Banco de Portugal. **Notes:** The yields on senior and covered bonds isued by portuguese banks were computed as the weighted average of yields observed in the secondary market for bonds issued by the banking groups BCP, BPI, BST, CGD, ESFG and MG with a residual maturity between 1 and 10 years. Last observation: October 2012. Source: Banco de Portugal.

Note: There is a series break in mid 2007 which corresponds to an enlargement in the number of institutions analysed.



Source: Banco de Portugal.

Notes: (a) Includes deposits by non-monetary financial institutions with a maturity below 2 years and deposits by insurance corporations, pension funds and the general government. (b) Excludes term deposits by non-monetary financial institutions with a maturity over 2 years, which are associated with the accounting recognition of securitisation operations. Last observation: September 2012.

and branch offices of Portuguese banks abroad.² In line with the trend in evidence since the middle of 2010, non-residents' deposits in Portugal continued to post negative year-on-year rates of change up to July 2012.

Deposits by the resident non-monetary sector continued to display high year-on-year growth in first quarter 2012, followed by deceleration in the more recent period. This evolution was influenced by the impact in general government deposits of the management of the disbursements associated with financial assistance to the Portuguese state. In the next few months, an additional slowdown is expected in this sector's deposits, associated with the partial transfer of the pension funds of thirteen banking groups to the state. In the current context of a contraction in economic activity, high levels of uncertainty and restrictive financing conditions, deposits by non-financial corporations have been recording negative year-on-year rates of change during the course of 2012.³ Deposits by non-monetary financial institutions (excluding deposits with an agreed maturity of more than 2 years), insurance companies and pension funds which, as in the case of general government deposits, tend to be more volatile, have also presented a negative contribution to the growth of deposits by the resident non-monetary sector.

The strong growth of household deposits observed in 2011 was associated with a recomposition of the sector's financial assets portfolio, in a context of the materialisation of market risk, increases in interest rates on deposits and maintenance of confidence in the banking system, translating into the substitution of investments in investment funds, life insurance, savings certificates and other public debt bonds by bank deposits. Accordingly, since portfolio adjustments are one of the main factors underlying the evolution

² Reference should be made to the fact that, in the analysis of deposits by residents sectors, the deposits of non-monetary financial institutions with a maturity of more than 2 years are excluded, as they largely correspond to the accounting recognition of securitisation operations. This adjustment is particularly relevant in first half 2012, as reversals of securitisation operations by several banking groups translated into a significant decline in the deposits of resident non-monetary financial institutions with a maturity of more than 2 years.

³ Although the rates of change on the deposits of non-financial corporations were already negative in 2011, this was conditioned by the abnormally high values recorded in 2010, which were associated with a foreign direct investment operation of a major company.

of household deposits, it was to be anticipated that there would be a slowdown in the growth of such deposits. In first half 2012, the net flow of household deposits was therefore practically nil (Chart 5.4). In contrast, there was a significant flow of investments in debt securities by households. This development reflects the fact that several major non-financial corporations issued a significant volume of bonds, which the banks have placed with their retail customers, at attractive maturities and interest rates, as well as the fact that several banks have resumed their issue of bonds directed at retail customers. These factors further contributed to the slowdown of household deposits recorded since the second quarter of the year. Notwithstanding, resident households' deposits continued to post positive year-on-year rates of change up to September 2012 (Chart 5.5). In terms of maturities, reference should be made to the highly significant growth of deposits with a maturity of more than 2 years, as opposed to deposits with shorter maturities and sight deposits, with a positive contribution towards banks' liquidity position.⁴

Continuation of the decline in the loan-to-deposit ratio, albeit with a greater contribution from the decrease of credit

In the first three quarters of 2012 as a whole, both the evolution of credit and deposits contributed towards the decline in the ratio between loans and customer resources in the form of deposits. This evolution was more significant for the banking system as a whole than for the collection of domestic banks which, notwithstanding, continued to post significantly lower ratios than non-domestic institutions (Charts 5.6 and 5.7). The deceleration of deposits noted since the end of the first quarter of the year translated into a smaller reduction of the loan-to-deposit ratio in the second quarter. In this context, an increase in the contribution made by the decline of credit to the evolution of this ratio was noted. Reference should also be made to the fact that, during the first semester, the decline of credit net of impairment was larger than that of gross credit, reflecting the increase in impairment owing to the deteriorating economic situation. The adjustment of the loan-to-deposit ratio in the Portuguese banking system lead to a convergence towards the average value noted in the euro area.



Chart 5.4

Source: Banco de Portugal.

Notes: Consolidated figures. (a) Corresponds to the sum of the last four quarters. (b) Includes other technical insurance reserves and other receivables.

4 This evolution arises in a context in which the deduction applied by Banco de Portugal on the own funds of the banks offering higher interest rates on deposits translates into a significantly higher penalty for the shorter periods. On the one hand, the spreads considered in the definition of key reference rates on the basis of which deductions to own funds are made are higher in the case of operations with longer maturities. On the other hand, the deduction to own funds applies for a period of one year notwithstanding the deposit's maturity period.

Chart 5.5





Source: Banco de Portugal.

Note: The annualised quarterly rate of change is calculated on seasonally adjusted data. Last observation: September 2012.

Source: Banco de Portugal

Notes: (a) Data on a consolidated basis. The concept of customer resources includes mostly deposits and does not account for debt securities issued by the banks and placed with their customer base. The break in the series in 2007 comprises an increase in the number of institutions under analysis. (b) Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, which considers only the set of institutions that collect customer deposits.

The framework of the Economic and Financial Assistance Programme included the objective of reducing the loan-to-deposit ratio of the major resident banking groups on a consolidated basis defining, as an indicative target, that this ratio should not exceed 120 per cent at the end of 2014. Against this background, the ratio has tended to diminish and, in June 2012, it stood at 127 per cent, around 30 percentage points below the maximum noted in June 2010 (Chart 5.8).



Source: Banco de Portugal.

Notes: (a) Data on a consolidated basis. The concept of customer resources includes mostly deposits and does not account for debt securities issued by the banks and placed with their customer base. The break in the series in 2007 comprises an increase in the number of institutions under analysis. (b) Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, which considers only the set of institutions that collect customer deposits.

The decline in the loan-to-deposit ratio in the first three quarters of 2012 was noted for most institutions, translating into a shift of the respective empirical distribution to the left (Chart 5.9). The bimodal character of the distribution indicates the presence of two groups of institutions with markedly different adjustment needs.

Portuguese banks' access to international debt markets remained highly restricted

During the first three quarters of 2012, Portuguese banks' issues of debt securities remained low, and essentially comprised covered bonds issued in order to expand the pool of assets eligible as collateral for monetary policy operations. Against this background, despite a certain recovery in debt issues placed with retail customers, a decline in the outstanding balance of bonds issued by Portuguese banks was witnessed. Notwithstanding, reference should be made to the issue of senior debt by *Banco Espírito Santo* at the end of October and, more recently by *Caixa Geral de Depósitos*. These bonds were substantially oversubscribed, illustrating international investors' increased confidence in the Portuguese banking system.

Increased use of Eurosystem financing, with a majority contribution by non-domestic banks

Against the background of the ECB's second 3 year LTRO and of the widening of the pool of assets eligible as collateral, there was an increase in Portuguese banking system financing from the Eurosystem during the course of 2012 (Chart 5.10). Participation in the 3 year LTRO was also significant at the level of the euro area as a whole, in which case reference should also be made to the use of the deposit facility (Chart 5.11). This development is in line with the low levels of activity observed in money markets, particularly in the case of non-collateralised operations, in a context of a cautious approach by the banks regarding the creditworthiness of counterparties and their own ability to obtain liquidity in the future. Segmentation in the wholesale debt markets continued to be reflected into a decline of the domestic banks' use of financing from other non-resident credit institutions. In turn, in the case of non-domestic institutions, the significant decline noted in the use of financing from other non-resident credit institu-









Source: Banco de Portugal.

Notes: Data on a consolidated basis. The concept of credit is net of impairment and includes securitised and non derecognised credits. The concept of customer resources includes mostly deposits, does not include debt securities issued by the banks and placed with their customer base and comprises stable funding lines obtained from the parent company, qualified shareholders or multilateral institutions.

Source: Banco de Portugal.

Notes: The concept of customer resources includes mostly deposits and does not account for debt securities issued by the banks and placed with their customer base. Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, on a consolidated basis. Empirical distribution obtained through recourse to non-parametric methods, namely to a Gaussian kernel that weights institutions by their assets.



Source: Banco de Portugal.

Notes: The figures correspond to the ammounts placed in the operations and do not reflect potential early redemptions. (a) Includes "Fine-tuning operations" and "Structural operations". (b) Includes "Fixed-term deposits" and "Reverse transactions". Last observation: October 2012.

tions in net terms was associated with a strategy of substitution of financing with parent companies for local financing by the branch offices and subsidiaries of foreign banks operating in Portugal. In such a context, the increase in the Portuguese banking system's use of Eurosystem financing during the course of 2012 was mostly due to non-domestic institutions located in Portugal, which also posted very high growth rates of customer deposits and increased their claims and investments in credit institutions abroad. The financing obtained by the Portuguese banking system accounted for around 5 per cent of the total use of Eurosystem monetary policy operations and around 12 per cent of the balance sheet of resident banks in Portugal in September 2012.

In light of the disturbances in the money market on a euro area level and to facilitate the distribution of liquidity obtained from the Eurosystem among Portuguese banks, as from 3 September Banco de Portugal provided resident institutions with a platform to register and process unsecured money market operations, enabling institutions to exchange funds, in euros, for maturities of up to one year. The expansion of this platform to collateralised operations is envisaged for a later stage. The aim of this initiative is to stimulate the efficient operation of the money market, contributing towards the effectiveness of the transmission of monetary policy to the real economy.

Strengthening of the pool of assets eligible as collateral for Eurosystem lending following ECB Council resolutions

The set of non-conventional monetary policy measures approved by the Governing Council of the ECB last December included some changes in the rules concerning collateral eligibility, such as a decrease in the minimum rating required for the eligibility of asset backed securities (ABS) and the possibility of allowing national central banks to temporarily accept as collateral bank loans fulfilling specific eligibility criteria (see "Section 4.3 *Liquidity risk*", *Financial Stability Report - May 2012*). In particular, this latter measure allowed, on the one hand, to significantly increase banks' ability to generate additional collateral

and, on the other hand, to diminish its sensitivity to international investors' perception of risk and to rating fluctuations, facilitating the banks' access to ECB lending operations.

Against this background, an increase in the Portuguese banking system's pool of assets eligible as collateral for monetary policy operations was observed over the course of the first three quarters of 2012. This increase was significantly higher than the respective use thereof, thus leading to a reduction in banks' refinancing risk (Chart 5.12). A contributory factor to such evolution was the incorporation of significant volumes of loans and advances to customers in the collateral pool. In addition, significant amounts of sovereign debt securities, debt securities issued by credit institutions and covered bonds were also included in the collateral pool. On the other hand, a decline in the value of asset backed securities (ABS) included the collateral pool was noted, reflecting a reversal of securitisation operations by several banking groups, following the changes in asset eligibility criteria for the use thereof as collateral in monetary policy operations. Among these changes, one should highlight the importance of the temporary widening of eligible assets so as to consider additional credit claims, whose use was considered more advantageous by the banks. Reference should also be made to the fact that banks dispose of a series of eligible assets which are not currently included in the pool, as well as significant additional collateral generating capacity in the form of loans and advances to customers.

Across-the-board improvement in liquidity gaps following the 3 yearLTROs⁵

Further to the evolution noted since the end of 2011, a significant improvement in the Portuguese banking system's liquidity gaps was witnessed in the first three quarters of 2012 (Chart 5.13). This was an across-the-board development both in terms of maturities and of the institutions under consideration, as illustrated by the shift to the right of the empirical distributions calculated for domestic institutions (Charts 5.14 and 5.15).



Source: Banco de Portugal.

Notes: (a) Outstanding amounts on main refi nancing operations, on longer-term r efinancingoperations and on occasional regularization operations. From 4 July 2011 it also includes intraday limit credit operations. From that date Banco de Portugal only has a single collateral pool for monetary policy and intraday credit operations.

Chart 5.13

LIQUIDITY GAPS IN CUMULATIVE MATURITY LADDERS



Source: Banco de Portugal.

Notes: The liquidity gap is defined as (Liquid Assets - Volatile Liabilities)/(Assets - Liquid Assets) x 100 for each cumulative ladder of residual maturity. Information obtained under the report set by Instruction no. 13/2009 of Banco de Portugal, on a consolidated basis. The dashed lines show domestic institutions

5 Liquidity gaps are defined according to the ratio (liquid assets – volatile liabilities)/(assets – liquid assets)*100, in each cumulative maturity scale.

Chart 5.12

EUROSYSTEM FINANCING AND COLLATERAL

The evolution of domestic banks' liquidity gaps largely reflected the increase in the maturity of financing obtained from the Eurosystem, translated into a decline of volatile liabilities (Chart 5.16). In the case of domestic banks, reference should also be made to the contribution made by the decline in debt securities with shorter residual maturity, in net resources from credit institutions and in commitments assumed towards third parties which, inter alia, include credit lines granted to customers. In the case of non--domestic banks, use of the LTROs only made an indirect contribution to the improvement of liquidity gaps, to the extent that it was associated with an increase in net claims and investments in credit institutions abroad for maturities of less than one year. Reference should also be made to the contribution of the above mentioned increase in unencumbered assets eligible as collateral for monetary policy operations observed since the second quarter of 2012 towards the increase in the banking system's liquidity gaps over the shorter residual maturities.



Source: Banco de Portugal.

Notes: Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, on a consolidated basis. Empirical distribution obtained through recourse to non-parametric methods, namely to a Gaussian kernel that weights institutions by their assets.

Source: Banco de Portugal.

-10

Notes: Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, on a consolidated basis. Empirical distribution obtained through recourse to non-parametric methods, namely to a Gaussian kernel that weights institutions by their assets.

0

10

20

30

40

-Dec-11

-Sep-12

Chart 5.16





Source: Banco de Portugal

Note: Information obtained under the report set by Banco de Portugal Instruction no. 13/2009, on a consolidated basis.
6. MARKET RISK

The main market risks to the Portuguese banking system derive from the interaction between weak economic growth prospects on a European level and tensions in the sovereign debt markets, in a context of banks' higher exposures to sovereign risk

The securities and financial investments portfolio exposes the banks to losses on the value of their securities. The eventual worsening of tensions in the international financial markets and particularly in the sovereign debt markets and their interaction with the real economy accordingly comprise the main sources of market risk to the Portuguese banking system. In particular, the losses associated with the depreciation of securities may translate into significant pressure on profitability and bank equity.

In a framework of the resurgence of tensions in the sovereign debt markets in the euro area in second quarter 2012, the connection between sovereign risk and the banks in the euro area was strengthened and led to the need to adopt additional measures to restore investor confidence. It is therefore crucial to implement the commitments assumed on a level of the euro area over the course of the last few months. Their respective implementation should ensure greater financial and fiscal integration, enabling the necessary mechanisms to curb the effects of interaction between sovereign risk and financial stability to be created.

The increase noted in the available for sale assets portfolio resulted from the acquisition of public debt securities and appreciation of the respective portfolio

There was an increase in the value of the Portuguese banking system's securities and financial investments portfolio, in first half 2012, especially in the first quarter of the year and particularly reflecting not only net acquisitions but also the increase in the portfolio's worth.¹ At the end of first half 2012, the Portuguese banking system's securities and financial investments portfolio had increased by around 7 per cent over the end of 2011. This increase, in contrast to the trend noted in 2011, was particularly significant in a context of the virtual stabilisation of total assets.

The increase in the portfolio essentially translated the evolution of available for sale financial assets, reflecting the acquisition of public debt securities and appreciation of the respective portfolio. This evolution benefited from the ECB's non-conventional monetary policy measures.² Reference should be made to the fact that pursuant to the scope of the capital requirements defined by the European Banking Authority (EBA) for June 2012, several of the major Portuguese banking groups invested a part of the first half increase in capital in public debt securities. This was offset by a reduction in the assets held to maturity portfolio, which translated a decline in Portuguese and Greek public debt securities and the redemption effect on the bonds of national private issuers relative to one of the biggest Portuguese banking groups (Chart 6.1).³ When analysed in terms of the source of risk, the portfolio's evolution translated into a slight increase in interest rate instruments, as the main component part of the securities and financial

¹ The securities and financial investments portfolio comprises financial assets at fair value through profit or loss, including trading derivatives (net of liabilities held for trading), available for sale financial assets, investments held to maturity, investments in subsidiaries and the net value of hedge derivatives registered in the Portuguese banking system's balance sheet, on a consolidated basis.

² For more detail see "Box 1.2 Non-standard monetary policy in major advanced economies" Banco de Portugal, Economic Bulletin - Autumn 2012.

³ Reference should be made to the agreement reached pursuant to the scope of the plan for the involvement of the private sector in financial support to Greece at the end of 2011. This initiative implied a haircut of 53.5 per cent of the value of securities, in addition to the conversion of 15 per cent into debt securities of the European Financial Stabilisation Fund and the remaining 31.5 per cent in new Greek sovereign securities with maturities of between 11 and 30 years.

investments portfolio, representing around 12.5 per cent of the banking system's total assets on a consolidated basis at the end of June 2012. In turn the equity securities portfolio which, at the same date, accounted for less than 1 per cent of assets, remained virtually stable.

Around 60 per cent of the debt securities portfolio comprised sovereign debt securities which, in turn, mainly include Portuguese public debt securities, particularly medium and long term debt securities, translating into one of the transmission channels between the banking system and sovereign risk (Chart 6.2). At the end of June 2012, the proportion of public debt securities registered in each of the different assets portfolios was 82 per cent of available for sale assets, 11 per cent of assets held to maturity and 7 per cent of assets at fair value. As already referred to, the increase in public debt securities was concentrated in the available for sale assets portfolio in which assets are assessed on a mark-to-market basis with fluctuations in their value being recognised in revaluation reserves.⁴

In comparison to other banks in the euro area, particularly in other countries subject to strong pressures in the sovereign debt markets, Portuguese banks continued to occupy an intermediate position in terms of their exposure to public debt securities over the course of first half 2012 (Chart 6.3).⁵





lidated basis.

Note: The securities and financial investments portfolio comprises financial assets at fair value through profit or loss, including trading derivatives (net of liabilities held for trading), available for sale assets, investments held to maturity, investments in subsidiaries and the net value of hedge derivatives registered in the Portuguese banking system's balance sheet on a conso-



Source: Banco de Portugal.

Note: Debt securities portfolio in the balance sheet of the banking system, on a consolidated basis.

- 4 In accounting terms, changes in the financial assets assessed at fair value portfolio through profit or loss are fully reflected in income accounts, whereas changes in other components of the securities and financial investments portfolio only affect income for the year when related with the sale of instruments or when they are underpinned by value changes which imply the recognition of impairment. Value changes which do not require such recognition are processed in the revaluations reserves component in shareholders' equity. In addition, value changes of available for sale financial assets, also valued at mark-to-market, have an impact in prudential terms, *i.e.* on institutions' regulatory capital, albeit differentiated in accordance with the type of instrument. In particular, whereas potential capital gains and losses on equity securities are considered for the own funds assessment, the effect of changes in the value of debt securities is neutral.
- 5 It should be remembered that the significant decline in public debt securities held by Greek banks in March 2012 was associated with the private sector's participation in the restructuring of Greek public debt.

First half 2012 witnessed an increase in earnings associated with financial operations, to which a major contribution was made by the repurchase of own bonds by the major resident banking groups

Earnings from financial operations, net of impairment, were up in first half 2012 in comparison to the second half of the preceding year, making a positive contribution to return on assets (Chart 6.4).⁶ This increase largely reflected the result of own bonds repurchase operations by the major Portuguese banking groups, also observed during the course of 2011, which benefited from the fact that they were undervalued in comparison to their nominal value. Reference should also be made to the contribution made by the reduction of yields on medium and long term debt securities issued by Portuguese entities – particularly Portuguese public debt securities – to the increase of the financial assets at fair value through profit or loss and available for sale financial assets portfolios.

Decline in the negative value of reserves positively reflected in terms of equity evolution

In this context, the appreciation of the financial assets portfolio made a positive contribution to the increase in institutions' equity, reflecting the decline in the negative value of reserves measured at the fair value of debt securities.

Chart 6.3

GOVERNMENT BONDS HELD BY MONETARY FINANCIAL INSTITUTIONS IN SELECTED EURO AREA COUNTRIES



Chart 6.4



Source: ECB.

Note: Last observation - August 2012.

Source: Banco de Portugal.

6 It should also be remembered that, in 2011, the value of the impairment associated with the securities and financial investments portfolio posted a highly significant increase in the context of the private sector's participation in the restructuring of Greek public debt.

ARTICLES

SYSTEMIC LIQUIDITY RISK

HOUSEHOLDS' DEFAULT PROBABILITY: AN ANALYSIS BASED ON THE RESULTS OF THE HFCS

A SCORING MODEL FOR PORTUGUESE NON-FINANCIAL ENTERPRISES



SYSTEMIC LIQUIDITY RISK*

Diana Bonfim** | Moshe Kim***

ABSTRACT

The new Basel III regulatory package offers the first global framework for the regulation of liquidity risk. This new regulation intends to address the externalities imposed upon the rest of the financial system (and, ultimately, on the real economy) generated by excessive maturity mismatches. Nevertheless, the new regulation focuses essentially on the externalities generated by each bank individually, thus being dominantly microprudential. We argue that there might also be a specific role for the macroprudential regulation of liquidity risk, most notably in what concerns systemic risk. Our argument is based on theoretical results by Farhi and Tirole (2012) and Ratnovski (2009), and on empirical evidence by Bonfim and Kim (2012). In this article we present some of those empirical results, which provide evidence supporting the existence of collective risk-taking strategies in liquidity risk management, most notably amongst the largest banks.

1. INTRODUCTION

The need to regulate liquidity risk was perhaps one of the most important lessons of the global financial crisis. The proposals included in the Basel III package represent an important step forward, by providing a harmonized set of rules for internationally active banks. This regulation will provide the necessary incentives for banks to reduce their maturity mismatches and to avoid an excessive reliance on short term funding. Furthermore, banks will have to hold a significant amount of high quality liquid assets, which will allow them to more easily react to unexpected liquidity shocks without having to resort to fire sales.

Despite this notable progress, something may be missing from this new framework: the regulation of the systemic component of liquidity risk. According to the IMF (2011), "systemic liquidity risk is the tendency of financial institutions to collectively underprice liquidity risk in good times when funding markets are functioning well because they are convinced that the central bank will almost certainly intervene in times of stress to maintain such markets, prevent the failure of financial institutions, and thus limit the impact of liquidity shortfalls on other financial institutions and the real economy."

In this article, we argue that further regulatory work should be envisaged in this area. The introduction of additional capital requirements for Systemically Important Financial Institutions (SIFIs) will not be sufficient to fully address this shortcoming in the regulatory framework, as this tool is designed to address a different market failure, more specifically, the too-big-to-fail problem. In what concerns systemic liquidity risk, the literature suggests that market failures are mainly associated with incentives for collective risk-taking, due to the explicit or implicit guarantees provided by the lender of last resort. Farhi and Tirole (2012) show

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^{*} We are thankful to Ana Cristina Leal and Nuno Ribeiro for insightful comments and suggestions. The opinions expressed are those of the author and not necessarily those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

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that banks have incentives to engage in collective risk-taking strategies when there is a strong belief that a (collective) bailout is possible. For instance, let us suppose that in a given country several banks engage in funding liquidity strategies that are deemed as globally risky (e.g., excessive reliance in short term debt to finance long-term assets, large funding gaps or persistent tapping of interbank markets). If several banks engage in these strategies simultaneously, there is naturally an increase in systemic risk. As discussed by Rochet and Tirole (1996) and Ratnovski (2009), a lender of last resort is not necessarily going to bail out one bank that gets into trouble because of its own idiosyncratic wrong choices (unless this bank is clearly too big or to systemic to fail). However, if several banks are at risk, the lender of last resort needs to take the necessary actions to contain systemic risk. In this case, the likelihood of a bailout should increase, as if one of these banks gets into trouble, very likely other banks will follow very soon. Hence, these risk-taking strategies may be mutually reinforcing in some circumstances. This collective behaviour transforms a traditionally microprudential dimension of banking risk into a macroprudential risk, which may ultimately generate much larger costs to the economy.

In this article we summarize some of the main results presented in Bonfim and Kim (2012), which provide empirical evidence supporting the hypothesis of collective risk-taking in liquidity risk management in banking. Using data for European and North-American banks in the run up to the global financial crisis of the last few years, we empirically assess whether there is evidence of collective herding behaviour of these banks in their liquidity risk management choices. Our results suggest that there was some herding in the pre-crisis period, most notably amongst the larger banks.

The remainder of the article is organized as follows. In section 2 we review the literature on liquidity risk management and regulation. In section 3 we present the data and some broad descriptive statistics, while in section 4 we discuss our main empirical results. In section 5 we summarize the current state-of-the-art in liquidity risk regulation and debate the policy implications of our results. Finally, in Section 6 we present some concluding remarks.

2. LITERATURE REVIEW

Over recent years, banks became increasingly complex institutions, being exposed to an intertwined set of risks. The 2008 financial crisis provided a painful illustration of how severe these risks can be and how they can seriously affect the real economy. However, regardless of how complex banks have become, there is an intrinsic risk that lies deep in their core function: banks are special due to their unique intermediation role. They grant loans to entrepreneurs and consumers, providing them with the necessary liquidity to finance their investment and consumption needs. However, banks use only a limited amount of their own resources to obtain this funding. Capital requirements on risky assets constitute a binding constraint for the minimum amount of own funds needed. Most of the funds used by banks are associated with liabilities to third parties. Traditionally, these liabilities would take the form of deposits. These liquid claims allow consumers to intertemporally optimize their consumption preferences, but leave banks exposed to the risk of bank runs, as shown by Diamond and Dybvig (1983). However, the risk of runs acts as a disciplining device on banks (Diamond and Rajan, 2001), given that depositors (Calomiris and Kahn, 1991), as well as borrowers (Kim *et al.*, 2005), have incentives to monitor the risks taken by banks.

Through time, banks gained access to a more diversified set of liabilities to fund their lending activities, thus being exposed not only to traditional runs from depositors, but also to the drying up of funds in wholesale markets, as discussed by Huang and Ratnovski (2011) or Borio (2010), amongst many others. The events that took place in 2007-2008 included at least one traditional bank run from depositors (on Northern Rock, in the UK), but also many other "runs" in markets that were important for banks'

funding¹. For a long period, interbank markets froze and most banks were not able to issue debt, even if guaranteed by high quality assets (as in the case of covered bonds)².

The increased reliance on wholesale funding makes the relationship between funding and market liquidity risk much stronger, as discussed by Brunnermeier and Pedersen (2009), Cai and Thakor (2009), Drehmann and Nikolau (2009), Freixas *et al.* (2011), Krishnamurthy (2010), Milne (2008), Strahan (2008), and Tirole (2011). Funding and market liquidity risk are two distinct concepts: whereas the former can be broadly defined as the risk of losing access to funding (through the form of runs or refinancing risk), the latter can be defined as the ability to sell assets without disrupting their markets prices and eventually incurring in large losses (see, for instance, Cai and Thakor, 2009, Milne, 2008, or Tirole, 2011). Brunnermeier and Pedersen (2009) and Brunnermeier (2009) show that under certain conditions market and funding liquidity risk may be mutually reinforcing, leading to liquidity spirals, most notably when there are systemic risk concerns. For example, if a bank is not able to rollover some of its debt, it may be forced to sell some of its assets to obtain liquidity. However, the fire sale of assets will depress asset prices and shrink banks' assets, given that they are marked-to-market, thus making access to funding even more constrained (Nikolau, 2009).

Given this, even though banks are the main providers of liquidity to the economy, they have to adequately manage the liquidity risk underlying their balance sheet structure, as their maturity transformation function makes them inherently illiquid. To alleviate the maturity gap between assets and liabilities, banks can hold a buffer of liquid assets (Acharya *et al.*, 2011, Allen and Gale, 2004a and 2004b, Farhi *et al.*, 2009, Gale and Yorulmazer, 2011, Rochet and Vives, 2004, Tirole, 2011, and Vives, 2011). However, holding liquid assets is costly, given that they provide lower returns than illiquid assets. Moreover, holding a liquidity buffer may also be inefficient, as it limits banks' ability to provide liquidity to entrepreneurs and consumers. Hence, even though banks have some incentives to hold a fraction of liquid assets (in the form of cash, short term assets or government bonds, for instance), these buffers will hardly ever be sufficient to fully insure against a bank run or a sudden dry up in wholesale markets.

Against this setting, regulation becomes necessary to mitigate some of these risks. One justification for the need to regulate liquidity risk is related to the fact that banks do not take into account the social optimum when they optimize the relationship between risk and return. However, a bank failure may constitute a huge externality on other banks and, ultimately, on the whole economy. This risk is exacerbated by the fact that liquidity shocks are events with very low probability (though with potentially very high impact), thus making it easy to overlook them during good periods. Allen and Gale (2004a, 2004b) show that liquidity risk regulation is necessary when financial markets are incomplete, though emphasizing that all interventions inevitably create distortions. Furthermore, Rochet (2004) argues that banks take excessive risk if they anticipate that there is a high likelihood of being bailed-out in case of distress. Ex-ante regulation of banks' liquidity may mitigate this behaviour. Many other authors share the view that liquidity risk regulation is necessary (Acharya et al., 2011, Brunnermeier et al., 2009, Cao and Illing, 2010, Gale and Yourlmazer, 2011, Holmstrom and Tirole, 1998, and Tirole, 2011, for example). Furthermore, there is mounting evidence on collective risk taking behaviours and systemic liquidity risk, as discussed by Acharya (2009), Acharya and Yorulmazer (2008), Boot (2011), Rajan (2006), and Tirole (2011). Against this background, there are increasing calls for a macroprudential approach to the regulation of liquidity risk (Farhi and Tirole, 2012, Boot, 2011, and Cao and Illing, 2010).

¹ In fact, Northern Rock was more affected by the "run" on wholesale funding than by the traditional depositor run.

² For further details and analysis of the freeze in interbank markets and constraints in debt issuance during the global financial crisis see Acharya and Merrouche (2012), Afonso *et al.* (2011), Allen and Carletti (2008), Angelini *et al.* (2011), Brunnermeier (2009), or Cornett *et al.* (2011).

3. DATA AND SUMMARY STATISTICS

3.1 Data

Given that one of our objectives is to assess the extent to which banks take each others' choices into account when managing liquidity risk, it is relevant to consider a sufficiently heterogeneous group of banks. With that in mind, we collect data from Bankscope for the period between 2002 and 2009, thus covering both crisis and pre-crisis years. We collect data on European and North-American banks, selecting only commercial banks and bank holding companies for which consolidated statements are available in universal format, so as to ensure the comparability of variables across countries. Savings banks were not included in the dataset, as they usually have different liquidity risk profiles and funding strategies. Using these filters, we collect data for the 500 largest banks (according to Bankscope's universal ranking) during 8 years, for 43 countries. Excluding banks without information on total assets, we obtain 2968 bank-year observations. Almost half of the observations refer to banks in Canada, France, Germany, Italy, Netherlands, Russian Federation, UK and US.

3.2 Liquidity risk measurement

As discussed by Tirole (2011), liquidity cannot be measured by relying on a single variable or ratio, given its complexity and the multitude of potential risk sources. As such, we consider three complementary liquidity indicators: i) loans to customer deposits; ii) the interbank ratio, defined as the ratio between interbank assets (loans to other banks) and interbank liabilities (loans from other banks, including central bank funding); and iii) the liquidity ratio, defined as liquid assets (deposits and loans to banks with less than 3 months residual maturity, quoted/listed government bonds realizable within 3 months, cash and equivalents) as a percentage of customer deposits and short-term funding.

The ratio between credit granted and deposits taken from customers provides a broad structural characterization of banks' main funding risks. Given that customers deposits are generally a stable funding source (in the absence of bank runs), those banks that finance most or all of their credit with deposits should, ceteris paribus, be less exposed to liquidity risk. In contrast, banks that show a large funding gap, *i.e.*, a very high loan-to-deposit ratio, will be more exposed to this risk, as they will need to rely on wholesale funding markets. Against this background, banks in which wholesale market funding as a percentage of assets is higher will be more sensitive to refinancing risk. This latter risk will be higher the shorter is the maturity of market funding. Hence, the analysis of the balance sheet structure based on the above mentioned liquidity indicators (loan-to-deposit ratio, funding gap or market funding as a percentage of assets) does not allow for a complete assessment of liquidity risk, as these indicators are unable to take into account the maturity mismatch between assets and liabilities. Furthermore, these are essentially structural indicators and thus strategic and cyclical changes may take some time to be reflected in the data. As such, the liquidity indicators mentioned above are insufficient to globally assess the liquidity position of credit institutions.

The interbank ratio allows assessing another dimension of bank's funding liquidity risk, evaluating whether banks are net borrowers or net lenders in interbank markets. Interbank markets allow markets to close, by allowing banks with short-term liquidity needs to obtain funds from other banks with temporary excess liquidity. However, after August 2007, unsecured money markets became severely impaired for a long period. Wagner (2007a) shows that interbank markets may be inefficient in providing liquidity when banks are hit by aggregate liquidity shocks. Against this background, the interbank ratio measured, for instance, as the ratio between interbank assets and interbank liabilities, may also be an important input to the assessment of liquidity risk. In fact, if banks structurally rely on funding from interbank markets, which is usually characterized by very short maturities, they may have severe difficulties in rolling over their debt in periods of distress.

Finally, another important dimension of liquidity risk is related to the buffer of liquid assets held by banks. Refinancing risk may be mitigated if banks hold a comfortable buffer of high quality very liquid assets that they can easily dispose of in case of unexpected funding constraints. In this respect, the ratio of liquid assets to short-term funding also provides important insights into banks' liquidity risk.

Taken together, these indicators allow us to capture different dimensions of liquidity risk, including structural balance sheet risks, exposures to short-term funding in interbank markets and the availability of a pool of highly liquid assets to face unexpected shocks. A more complete liquidity indicator would rely on the overall maturity mismatch between assets and liabilities. However, the data necessary for such an indicator are not available.

In Panel A of Table 1 we present summary statistics for these three indicators and in Panel B we depict their evolution during the sample period.

During the last decades, banks have moved from a traditional intermediation paradigm in which most loans were funded through deposits (thus implying loan to deposits ratios not far from 100%) to a new framework of bank funding. As access to wholesale markets became more generalized, banks were able to diversify their funding sources. This had implications on the maturity transformation role of banks. Looking at the pre-crisis period, we observe a consistent increase in this ratio, from 116.7 per cent in 2002 to 148.8 per cent in 2008.

The interbank ratio also recorded some deterioration during this period. Nevertheless, it is important to note that the financial market turmoil that began in August 2007 makes the intertemporal analysis of this ratio more challenging. During most of the global financial crisis, the lack of confidence led to severe disruptions in the functioning of interbank markets. Uncollateralized operations almost ceased to exist during significant periods and high haircuts were imposed on collateralized operations. Thus, there is a clear series break in this indicator from August 2007 onwards.

In contrast, there does not seem to exist evidence of any dilapidation of the buffer of liquid assets or of a relative increase in short-term funding of European and North-American banks in the run up to the crisis. However, in 2008 there was a marked deterioration in this liquidity ratio, mainly due to the strong growth in customer and short-term funding. Hence, even though most banks did not have to sell liquid assets to face short term funding needs, their maturity profile took a pronounced turn for the worse. During this period, many banks were not able to issue medium and long-term debt securities, thus shortening the average maturity of their liabilities.

LIQUIDITY INDICATORS - SUMM	IARY STAT	ISTICS							
Panel A - Global summary statistics									
	Ν	mean	min	p1	p25	p50	p75	p99	max
Loans to customer deposits	2744	133.9	0.3	5.3	76.5	106.1	151.2	738.1	961.3
Interbank ratio	2403	139.5	0.0	0.5	29.5	70.6	160.9	892.1	998.6
Liquidity ratio	2926	37.8	-6.6	1.1	15.5	28.8	46.6	172.8	842.3
Panel B - Liquidity indicators over time (mean)									

Table 1

	Panel B - Liquidity indicators over time (mean)								
	2002	2003	2004	2005	2006	2007	2008	2009	Total
Loans to customer deposits	116.7	105.2	116.4	131.0	134.9	137.5	148.8	139.7	133.9
Interbank ratio	212.3	182.3	156.4	148.0	147.1	136.6	106.8	116.2	139.5
Liquidity ratio	39.6	37.4	35.9	38.5	38.8	36.5	32.1	32.2	37.8

Sources: Bankscope and author's calculations.

Notes: The interbank ratio is defined as interbank assets as a percentage of interbank liabilities (loans to other banks as a percentage of loans from other banks). The liquidity ratio is defined as liquid assets (deposits and loans to banks with less than 3 months residual maturity, quoted/listed government bonds realizable within 3 months, cash and equivalent), as a percentage of customer deposits and short term funding.

4. EVIDENCE OF HERDING BEHAVIOUR IN LIQUIDITY RISK Management

It is possible to argue that banks do not optimize their liquidity choices strictly at the individual level. For instance, when other banks are taking more risk, any given bank may have the incentives to engage in similar strategies. These collective risk-taking strategies may be optimal from an individual perspective, as they should allow banks to increase profitability without increasing the likelihood of bankruptcy, due to the explicit or implicit commitment of the lender of last resort, as theoretically conjectured by Ratnovski (2009).

Using data for European and North-American banks in the run up to the global financial crisis of the last few years, in this section we empirically assess whether there is evidence of collective herding behaviour of these banks in their liquidity risk management choices. This analysis is very relevant from a policy perspective, as it may contribute to the discussion on how regulation can provide the correct incentives to minimize negative externalities. Indeed, evidence of collective risk-taking behaviours on liquidity risk may support the need to consider specific macroprudential tools to address systemic liquidity risks.

4.1 Statistical evidence of herding behaviour

4.1.1 Methodology

Our first step is to estimate measures of herding frequently used in financial markets (see, for example, Graham, 1999, Grinblatt *et al.*, 1995, Scharfstein and Stein, 1990, or Wermers, 1999). To do that, we adapt the often used herding measure proposed by Lakonishok *et al.* (1992) and applied to bank herding by Uchida and Nakagawa (2007) and, more recently, by Van den End and Tabbae (2012). This methodology allows testing the extent to which the liquidity choices of banks collectively deviate from what could be suggested by overall macroeconomic conditions. Implicitly, we are considering a concept of "rational herding", as defined by Devenow and Welch (1996). In other words, we do not consider that banks simply mimic each other's behaviours, but rather that they do so because there are important externalities that affect the optimal decision making process.

We compute:

$$H_i = \mid P_i - P_t \mid -E \mid P_i - P_t \mid$$

where P_i is the proportion of banks that show an increase in risk for a given liquidity indicator in each country and in each year, computed as $\frac{X_i}{N_i}$. X_i is the number of banks that recorded a deterioration of a liquidity indicator in a country in a given year, and N_i is the total number of banks operating in each country and in each year. For the loan-to-deposit ratio, X_i refers to the number of banks that showed an increase in this ratio, while for the other two liquidity indicators X_i refers to the number of banks that showed an increase in these indicators, *i.e.*, an increase in risk. P_t is the mean of P_i in each year. P_t can be interpreted as an indicator of banks' liquidity choices that reflect overall macroeconomic and financial conditions. The difference between P_i and P_t measures to what extent liquidity indicators in one country and in one year deviate from the overall liquidity indicators in that year, *i.e.* from common factors. According to the methodology proposed by Lakonishok *et al.* (1992), when banks independently increase or decrease liquidity indicators, P_i and P_t become closer and $|P_i - P_t| \rightarrow 0$. However, when several banks collectively deviate and increase or decrease their liquidity indicators, P_i departs from P_t . The second term in the equation is used to normalize the herding measure.

Computing this at the country level is crucial if we consider that the incentives for herding are much stronger amongst national peers. The common belief of bail out is more likely to be shared by banks in the same country. Indeed, the arguments to support that banks take riskier strategies because banks operating in other countries do so are much weaker than when considered at the national level. This will be particularly true if competition between banks exists within markets segmented by national borders.

4.1.2 Results

Table 2 shows our estimates for this herding measure for the three liquidity indicators. In some years we find significant evidence of herding behaviour, most notably in the years preceding the global financial crisis. For the loan-to-deposit ratio, there was statistically significant herding behaviour in 2003 and 2005. Collective risk-taking behaviour also seems to have been present in interbank markets between 2004 and 2006. The results are even stronger for the liquidity ratio, with significant results for the entire pre-crisis period (2003 to 2007). Finally, we also observe some herding during the crisis in the loan-to-deposit ratio. This may reflect a general decrease in this ratio due to a collective deleveraging process in some countries during this period.

All in all, these results support the hypothesis of collective risk taking before the crisis. Nevertheless, this traditional herding measure has several limitations and cannot be regarded as a full characterization of collective risk taking. This is essentially a static measure and, more importantly, it only considers whether or not there was an increase in risk, without considering its magnitude. Furthermore, this measure does not take into account all other possible determinants of liquidity choices. It is possible that common behaviours are observed because banks are affected by common shocks or because they share common characteristics, rather than by true herding behaviour. Hence, only in a multivariate setting, where bank specific characteristics and time effects are explicitly controlled for, it becomes possible to isolate the impact of other banks' choices on each individual bank. In the next subsection we deal with the identification challenges raised by this multivariate analysis.

MEASUREMENT OF HERD BEHAVIOR (MEAN)					
	Loans to customer deposits	Interbank ratio	Liquidity ratio		
2003	0.063***	-0.004	-0.019**		
2004	0.011	0.024***	0.039***		
2005	0.028***	-0.014**	-0.017***		
2006	-0.008	-0.017***	0.022***		
2007	-0.005	0.003	-0.032***		
2008	-0.011	0.001	0.004		
2009	-0.028***	0.010	0.005		

Table 2

Sources: Bankscope and author's calculations.

Notes: Herd behaviour measure based on Uchida and Nakagawa (2007) and Lakonishok et al (1992). The herding measure is computed as Hi = |Pi - Pt| - E|Pi - Pt|, where Pi is the proportion of banks that show an increase in risk for a given liquidity indicator in each country and in each year (i.e., increases in loan to deposit ratios or decreases in the interbank or liquidity ratio) and Pt is the mean of Pi in each year. Liquidity indicators as defined in previous tables.*** significant at 1%; ** significant at 5%; * significant at 10%.

4.2 Multivariate analysis

4.2.1 Identification methodology

In a multivariate setting, the impact of peers' liquidity indicators on a bank's liquidity decisions could be estimated through the following equation:

$$Liqx_{it} = \alpha_0 + \alpha_i + \beta_0 \sum_{j \neq i} \frac{Liqx_{jt}}{N_{it} - 1} + \beta_1 X_{it-1} + i_t + e_{it}$$
(1)

where $Liqx_{it}$ is one of the three liquidity indicators analyzed (loan-to-deposit ratio, interbank ratio and liquidity ratio, respectively), and $\sum_{j\neq i} \frac{Liqx_{jt}}{N_{it}-1}$ represents the average liquidity indicators of peers. In this setting, the coefficient β_{o} captures the extent to which banks' liquidity choices reflect those of the relevant peer group. α_{0} is a constant, α_{i} is the bank fixed effect, i_{t} is the year fixed effect and e_{it} is the estimation residual. X_{it-1} is a vector of control variables, which includes a set of core bank indicators on solvency, size, profitability, efficiency and specialization. More specifically, the variables included are: the Tier 1 capital ratio calculated according to the rules defined by the Basel Committee; bank size measured by the log of assets; two indicators on profitability (return on assets and net interest margin); the cost-to-income ratio, which is a proxy for cost-efficiency; and net loans as a percentage of total assets, to measure to what extent a bank is specialized in lending. In each estimation, we also control for the other two liquidity indicators. All variables are lagged by one period to mitigate concerns of simultaneity and reverse causality.

However, the estimation of equation 1 entails serious econometric problems: as we argue that peer choices may affect the decisions of a specific bank, we cannot rule out that the decisions of that bank will not, in turn, affect the choices made by peers. This reverse causality problem in peer effects is usually referred to as the reflection problem. This problem was initially described by Manski (1993), who distinguishes three different dimensions of peer effects: i) exogenous or contextual effects, related to the influence of exogenous peer characteristics; ii) endogenous effects, arising from the influence of peer outcomes (in our case, peers' liquidity choices); and iii) correlated effects, which affect simultaneously all elements of a peer group. Empirically, it is very challenging to disentangle these effects.

This discussion makes clear that the estimation of the equation above would not allow for the accurate estimation of peer effects. Our solution to this important identification problem relies on the use of an instrument to address this endogeneity problem. As discussed in Brown *et al.* (2008) and Leary and Roberts (2010), such an instrument must be orthogonal to systematic or herding effects. Given this, we use the predicted values of liquidity indicators of peer banks based on a regression of the determinants of liquidity indicators³. The predicted values depend on the characteristics of the banks in the peer group, excluding bank *i*. These predicted values depend only on observable bank characteristics and should thus be orthogonal to systematic or herding effects.

As in the previous subsection, we define the benchmark peer group as the banks operating in the same country and in the same year. These are the banks that are more likely to engage in collective risk-taking behaviours due to implicit or explicit bailout expectations.

³ For further details on this identification strategy, see Bonfim and Kim (2012).

4.2.2 Results

Table 3

In Table 3 we present the results of the instrumental variable approach in the estimation of peer effects in liquidity risk management. In the first three columns we present, for illustrative purposes, the results of the estimation of equation 1. Hence, in these columns the peer effects are included in the regressions without properly addressing the reflection problem discussed before. When running this simple, yet biased, estimation, we find strong evidence of positive peer or herding effects in individual banks' choices of loan to deposit ratios (column 1) and of the liquidity ratio (column 3). The higher the funding gap of other banks in a given country, the higher should be the loan to deposit ratio of a given bank in that country. At the same time, the lower the average liquidity ratio of peers is (either because they hold few liquid assets or because they rely excessively on short-term funding) the more vulnerable is a bank's liquidity position. In what concerns the interbank ratio, this specification does not yield any significant results regarding peer effects.

The second group of columns displays our main empirical results, when adequately dealing with the serious endogeneity problem created by considering peer effects. When we use the predicted values of peer's liquidity indicators as instruments, we conclude that the results presented in the first three columns

REGRESSIONS ON PEER EFFECTS IN LIQUIDITY STRATEGIES										
	Interaction with other banks - country year rivals (without instrumental variables)			Inter banks - Instr predic I	Interaction with other banks (country year rivals) - Instrumental variable = predicted values of rivals' liquidity ratios			First-step regressions		
	Loans to custome deposits	nterban r ratio	k Liquidity ratio	Loans to custome deposite	nterbank r ratio	Liquidity ratio	Loans to custome deposits	Interbani r ratio	Liquidity ratio	
	(1)	(2)	(3)	(+)	(3)	(0)	(7)	(0)	(9)	
Peers' loans to customer	∩ フフコ***	_	_	-0 118		_	0 /53***			
deposits	3.04	_	_	-0.76		-	3 58			
	5.04			-0.20			5.56			
Peers' interbank ratio	-	0.158	-	-	-0.785	-	-	-0.062		
	-	1.31	-	-	-0.20	-	-	-0.60		
Peers' liquidity ratio	-	-	0.248***	-	-	0.224	-	-	0.250***	
	-	-	2.82	-	-	0.38	-	-	3.65	
Bank-specific controls	S	S	S	S	S	S	S	S	S	
Fixed-effects	S	S	S	S	S	S	S	S	S	
Number of observations	1 2 1 1	1 241	1 210	1 180	1 222	1 178	1 180	1 222	1 178	
Number of banks	323	342	322	323	342	322	323	342	342	
R2 within	0.127	0.083	0.236	0.076		0.223	0.000	0.000	0.000	
R2 between	0.153	0.019	0.452	0.108	0.010	0.453	0.013	0.031	0.174	
R2 overall	0.176	0.019	0.429	0.114	0.007	0.434	0.039	0.002	0.214	

Sources: Bankscope and author's calculations.

Notes: All regressions include bank fixed-effects. *t*-statistics in italic. Peers are defined as the j≠i banks operating in the same country and in the same year as bank i. Columns 1, 2 and 3 show the results obtained when peer liquidity choices are considered directly in the regressions, i.e., not addressing the reflection problem. Columns 4 to 6 show the results of three instrumental variables regressions (one for each liquidity indicator), where the instruments are the predicted values of peers' liquidity ratios. Columns 7, 8 and 9 show the first stage estimation results for these three instrumental variables regressions. Both in the first and second step of the estimation several bank specific variables are included: the Tier 1 capital ratio calculated according to the rules defined by the Basel Committee; bank size measured by the log of assets; two indicators on profitability (return on assets and net interest margin); the cost-to-income ratio; and net loans as a percentage of total assets. In each estimation, we also control for the other two liquidity indicators. The interbank ratio is defined as interbank assets as a percentage of interbank liabilities (loans to other banks) as a percentage of loans from other banks). The liquidity ratio is defined as liquid assets (deposits and loans to banks with less than 3 months residual maturity, quoted/listed government bonds realizable within 3 months, cash and equivalent), as a percentage of customer deposits and short term funding. *** significant at 1%; ** significant at 5%; * significant at 10%.

do not hold: peer effects are not statistically significant in any of the three regressions, even though for the liquidity ratio the associated coefficient remains positive and large. Thus, there seems to be a strong indication that neglecting endogeneity in peer effects may originate biased and incorrect results.

This lack of significance cannot be attributed to the weakness of the instrument used. A good instrument should have an important contribution in explaining the potentially endogenous variable, *i.e.* the average peers' liquidity choices, but it should not directly affect the dependent variable. In the last group of columns of Table 3 we show that the chosen instrument is strongly statistically significant in the two regressions most affected by the endogeneity problem: the one on loan-to-deposit ratios and the other on the liquidity ratio.

However, given that our previous measures of herding behaviour suggested the existence of peer effects, we consider that it is important to run several robustness tests before rejecting the hypothesis of collective behaviour in a multivariate setting.

From all the robustness tests conducted, the only consistently significant results are presented in Table 4.⁴ These tests involved testing other possible definitions of the peer group. Indeed, the definition of the peer group is a critical issue in the analysis of peer effects (Manski, 2000) and deserves further analysis. Even though we believe that defining peers as other banks in the same country is the most reasonable assumption, due to the common lender of last resort, this definition may be challenged.

When we test different definitions of peer groups, we are able to obtain consistently significant results for a specific group of banks. More specifically, we are able to find consistent and significant evidence that peer effects are important determinants in the liquidity choices of the largest banks. There are several possible related reasons behind this result. First, larger banks are likely to compete mainly among themselves, replicating risk-taking strategies that allow for profit maximization. Second, larger banks have access to more diversified funding sources, usually with lower funding costs, thus allowing them to collectively engage in similar funding and liquidity strategies. Third, larger banks may have better liquidity risk management tools, reflected in similar liquidity choices. Finally, and perhaps more importantly, larger banks are more likely to be bailed out in case of systemic distress than smaller banks, thus facing more similar incentives.

We also find some evidence that small banks might be following the strategies of larger banks, but this result only holds for one specific definition of large banks (*i.e.*, those belonging to the Euribor panel).

In sum, when all banks are considered, evidence on peer effects is statistically weak, after dealing with the endogeneity problem. These results are consistent with the evidence obtained by Jain and Gupta (1987), who analyze herding effects between US commercial banks, finding only weak evidence of herd behaviour. However, we are able to find consistent evidence that there are significant peer effects amongst larger banks.

5. REGULATION AND POLICY IMPLICATIONS

The regulation of liquidity risk can be justified by the fact that banks do not take into account the social optimum when they optimize the relationship between risk and return. Ex-ante regulation of banks' liquidity may mitigate this behaviour, as discussed by Acharya *et al.* (2011), Allen and Gale (2004a, 2004b), Brunnermeier *et al.* (2009), Cao and Illing (2010), Gale and Yourlmazer (2011), Holmstrom and Tirole (1998), Rochet (2004), and Tirole (2011).

⁴ A detailed description of all the robustness tests conducted may be found in Bonfim and Kim (2012). These included, among others, the exclusion of the crisis period, the inclusion of a set of country-specific macroeconomic variables, estimation in first differences, lagged peer effects, and exclusion of banks with asset growth above 50% (as they might have been involved in mergers and acquisitions).

Table 4

REGRESSIONS ON PE	ER EFFEC	TS IN LIQ	UIDITY ST	RATEGIE	S - ROBU	STNESS O	N PEER G	GROUP DE	FINITION
	Interaction with other banks - country year rivals (without instrumental variables)			Interaction with other banks (country year rivals) - Instrumental variable = predicted values of rivals' liquidity ratios			First-step regressions		
	Loans to customer deposits	Interbank ratio	Liquidity ratio	Loans to customer deposits (4)	Interbank ratio	Liquidity ratio	Loans to customer deposits	Interbank ratio	د Liquidity ratio ⁽⁹⁾
Large banks (4th quartile in each country)									
Peer effects	0.003	0.193**	0.040	0.099	0.810**	0.135	1.157***	0.719***	1.022***
	0.05	2.35	0.63	0.52	2.28	0.82	6.31	4.01	6.06
Large banks (3rd and 4th quartiles)									
Peer effects	0.262***	0.221*	0.228***	-0.807*	0.586*	0.333	0.514***	1.167***	0.532***
	3.38	1.96	2.81	-1.72	1.83	1.00	3.59	4.60	4.81
Large banks (top 5 in eac country)	h								
Peer effects	0.047	0.383***	0.261**	0.418**	0.887	-0.030	0.632***	0.563**	0.801***
	1.44	3.61	2.33	1.99	1.51	-0.14	4.34	2.17	5.08
Large banks (banks classified as SIFIs)									
Peer effects	-0.491***	0.025	0.369**	-0.146	0.115*	-0.992	0.026	2.081***	0.105
	-2.36	0.46	2.24	-0.06	1.69	-0.31	0.44	4.98	0.48
Small banks following large banks (Euribor panel)									
Peer effects	0.260	-0.087***	0.120	0.582	0.231	0.660***	0.633***	1.107***	0.657***
	0.88	-3.22	1.50	1.35	0.84	2.73	9.01	24.34	8.85

Sources: Bankscope and author's calculations.

Notes: *t*-statistics in italic. Each line shows the coefficients for these peer effects for different robustness tests. Bank quartiles were defined based on banks' total assets. Top 5 referes to the banks classified as being in the top 5 by assets in each country in Banks-cope. The list of SIFIs (systemically important financial institutions) is the one disclosed by the Financial Stability Board in 2011. Columns 1, 2 and 3 show the results obtained when peer liquidity choices are considered directly in the regressions, i.e., not addressing the reflection problem. Columns 4 to 6 show the results of three instrumental variables regressions (one for each liquidity indicator), where the instruments are the predicted values of peers' liquidity ratios. Columns 7, 8 and 9 show the first stage estimation results for these three instrumental variables regressions. Both in the first and second step of the estimation several bank specific variables are included: the Tier 1 capital ratio calculated according to the rules defined by the Basel Committee; bank size measured by the log of assets; two indicators on profitability (return on assets and net interest margin); the cost-to-income ratio; and net loans as a percentage of total assets. In each estimation, we also control for the other two liquidity indicators. All regressions include bank fixed-effects. *** significant at 1%; ** significant at 5%; * significant at 5%;

However, a consensus is far from being reached on the optimal regulatory framework to mitigate liquidity risk, both academically and politically, though a remarkable progress has been achieved during the last few years. Traditionally, reserve requirements on bank deposits were the main tool for liquidity risk management, though they also play an important role in the implementation of monetary policy (Robitaille, 2011). More importantly, deposit insurance is by now broadly recognized as an important tool in preventing depositors' bank runs⁵. Explicit deposit insurance can sustain runs on bank deposits, as shown by Diamond and Dybvig (1983)⁶. However, deposit insurance can only be efficient in minimizing the likelihood of bank runs by depositors. For instance, Bruche and Suarez (2010) show that deposit insurance can cause a freeze in interbank markets when there are differences in counterparty risk. Indeed, deposit insurance is not sufficient to forestall all liquidity-related risks and may generate moral hazard (loannidou and Penas, 2010, Martin, 2006). Given the increased diversification of banks' funding sources (Strahan, 2008), other regulatory mechanisms must be envisaged to ensure the correct alignment of incentives. The dispersion of creditors and the diversification of risks and activities undertaken by banks make this issue even more complex.

Recent and ongoing discussions have suggested the possibility of further increasing capital requirements to also include liquidity risks⁷ (Brunnermeier *et al.*, 2009). However, there are several opponents to this view. As argued by Ratnovski (2007), funding liquidity risk is in part related to asymmetric information on banks' solvency. Increasing solvency without reducing the asymmetric information problem would not reduce refinancing risk. Perotti and Suarez (2011) have also put forth a proposal regarding a liquidity insurance mechanism to avoid systemic crises.

Many authors discuss the importance of holding a liquidity buffer. In a recent paper, Ratnovski (2009) discusses the trade-offs between imposing quantitative requirements on banks' liquidity holdings and improving the incentive scheme in lender of last resort policies. This author argues that quantitative requirements can achieve the optimal liquidity level, but not without imposing costs, whereas a lender of last resort policy that takes into account bank capital information may reduce distortionary rents, thus allowing for a more efficient solution. Nevertheless, transparency seems to be a critical issue in the latter case, as also discussed in Ratnovski (2007). There are many other contributions in the academic literature pointing to the possibility of imposing minimum holdings of liquid assets (Acharya et al., 2011, Allen and Gale, 2004a and 2004b, Farhi et al., 2009, Gale and Yorulmazer, 2011, Rochet and Vives, 2004, Tirole, 2011, and Vives, 2011). However, Wagner (2007b) shows that, paradoxically, holding more liquid assets may induce more risk-taking by banks. Freixas et al. (2011) show that central banks can manage interest rates to induce banks to hold liquid assets, i.e., monetary policy can help to promote financial stability. In turn, Bengui (2010) finds arguments to support a tax on short-term debt, whereas Cao and Illing (2011) show that imposing minimum liquidity standards for banks ex-ante is a crucial requirement for sensible lender of last resort policies. Finally, Diamond and Rajan (2005) and Wagner (2007a) focus on ex-post interventions.

Against this background, the new Basel III regulatory framework will be essentially based on the definition of minimum holdings of liquid assets and on restrictions to short-term funding. Globally, liquidity risk regulation was perhaps somewhat overlooked before the global financial crisis, with almost non-existent internationally harmonized rules (Rochet, 2008). However, the role played by funding liquidity during the global financial crisis made clear that a new international regulatory framework was necessary. In December 2010, the Basel Committee disclosed the final version of the international framework for liquidity risk regulation (Basel Committee, 2010), which is an important part of the new Basel III regulatory package. This new regulation provides the necessary incentives for banks to hold adequate liquidity buffers and to avoid over relying on short-term funding. Liquidity risk regulation will be based upon two key indicators: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The LCR

⁵ During the recent crisis, many governments in advanced economies decided to increase the coverage of their national deposit insurance schemes to avoid panic runs.

⁶ However, Demirgüç-Kunt and Detagriache (2002) find that explicit deposit insurance increases the likelihood of banking crises, using data for 61 countries. This empirical result is stronger when bank interest rates are deregulated, the institutional environment is weak and the scheme is run or funded by the government.

⁷ In Basel II, capital requirements were set to explicitly cover credit, market and operational risks, but not liquidity risk.

will require banks to hold sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario, being a ratio between the value of the stock of high quality liquid assets in stressed conditions and total net cash outflows, calculated according to scenario parameters defined in the regulation. High quality assets are considered to be those that have low credit and market risk, are easy to price, show a low correlation with risky assets and are listed on a developed and recognized exchange market. In turn, the NSFR is a longer-term structural ratio designed to address liquidity mismatches and to encourage an increased reliance on medium and long-term funding, thus increasing the average maturity of banks' liabilities. The NSFR is the ratio between the available and the required amount of stable funding, which should be at least 100%. According to the Basel Committee (2010), "this metric establishes a minimum acceptable amount of stable funding based on the liquidity characteristics of an institution's assets and activities over a one year horizon. This standard is designed to act as a minimum enforcement mechanism to complement the LCR and reinforce other supervisory efforts by promoting structural changes in the liquidity risk profiles of institutions away from short-term funding mismatches and toward more stable, longer-term funding of assets and business activities." The two indicators are complementary and ensure that banks hold an adequate pool of liquid assets, while simultaneously adopting a reasonable and prudent maturity mismatch.

This new regulation addresses the externalities generated by each bank individually, thus being dominantly microprudential. Still, the new regulation also entails some macroprudential concerns: on one hand, the LCR is calibrated to ensure that banks are able to withstand a 30-day period without access to market funding, under stress conditions; on the other hand, the NSFR limits the risk of collective excessive reliance on short-term funding. However, none of these ratios explicitly addresses systemic liquidity risk. There is increasing evidence that there is a systemic component in liquidity risk, thus asking for a specific macroprudential approach to this market failure. Indeed, our empirical results show that there are significant herding effects between banks, most notably amongst the largest banks. Moreover, these empirical results complement recent theoretical evidence showing that when most banks are overtaking risks, each bank manager has clear incentives to herd, instead of leaning against the wind. In this respect, Ratnovski (2009) argues that, in equilibrium, banks have incentives to herd in risk management, choosing suboptimal liquidity as long as other banks are expected to do the same. These collective risk-taking strategies may be optimal from an individual perspective, as they should allow banks to increase profitability without increasing the likelihood of bankruptcy, due to the explicit or implicit bail out commitment of the lender of last resort. These arguments are also discussed in detail by Farhi and Tirole (2012), who argue that when banks simultaneously increase their liquidity risk, through larger maturity mismatches, current and future social costs are being created. Given all these market failures, regulation is needed to ensure that these externalities are considered by banks in their liquidity risk management. Nevertheless, the costs and distortions generated by such regulation also need to be taken into account.

Acharya *et al.* (2011) consider the effect of the business cycle on banks' optimal liquidity choices and prove that during upturns banks' choice of liquid assets jointly decreases. In turn, Allen *et al.* (2012) show that when banks make similar portfolio decisions systemic risk increases, as defaults become more correlated. Jain and Gupta (1987) find (weak) evidence on bank herding during a crisis period. Collective risk taking incentives and behaviours are also discussed by Acharya (2009), Acharya and Yorulmazer (2008), Boot (2011), Rajan (2006), and Tirole (2011).

This emerging evidence on systemic liquidity risk calls for adequate macroprudential instruments that address the sources of such risks. Farhi and Tirole (2012) show that authorities' interventions during crises might sow the seeds for the next crisis, as they provide incentives for collective risk-taking. Their framework points to the advantages of a new macroprudential approach to the regulation of liquidity risk, in which regulators consider not only the risk taken individually by each institution, but also the overall maturity transformation of strategic institutions. In their model, the optimal regulation is associated with a liquidity requirement or, equivalently, a limit on short-term funding. These authors argue that breaking

down large banks in smaller units would not entirely mitigate systemic liquidity risk, as the problem is not only about being too-big-to-fail, but about being also too-many-to-fail (Acharya and Yorulmazer, 2007). Nevertheless, our empirical results show that herding behaviours are mainly concentrated amongst the largest banks, thus suggesting that the too-big-to-fail market failure might still be relevant. To some extent, Farhi and Tirole (2012) share this view, as they argue that if regulation is costly it may be optimal to impose a regulatory pecking order, imposing harsher regulatory constraints on institutions that are more likely to be bailed out.

Cao and Illing (2010) also contributed to this debate by developing a model of endogenous liquidity risk to analyse the regulation of systemic liquidity risk. They argue that the microprudential regulation of liquidity risk is insufficient to deal with the nature of externalities that create incentives for institutions to lean to excessive correlation in risk-taking, thus generating systemic risk. They contradict the consensus established since Holmstrom and Tirole (1998), who argued that the public provision of emergency liquidity is an efficient response to aggregate liquidity shocks. The model developed by Cao and Illing (2010) demonstrates that there are externalities that result in excessive maturity mismatches, creating systemic liquidity risk. This mechanism may be reinforced by central bank intervention, as it destroys the incentives for prudent financial intermediation. Within this framework, these authors show that regulations that impose "narrow banking" or capital requirements to deal with systemic liquidity risk are inferior to a mix between ex-ante liquidity regulation and ex-post lender of last resort policies.

Perotti and Suarez (2011) have also contributed to this debate, by proposing the implementation of a mandatory liquidity charge. This charge should work as a Pigouvian tax, discouraging banks' strategies that impose externalities on the rest of the financial system and, ultimately, on the whole economy. The liquidity charge proposed by Perotti and Suarez (2011) should be proportional to banks' maturity mismatches and applied to all institutions with access to safety net guarantees. These authors propose that this charge could be paid continuously to supervisors during normal times. In compensation, supervisors would provide emergency liquidity during systemic crisis. In turn, Boot (2011) argues that higher capital and liquidity requirements need to be complemented with more system-oriented measures, which focus on externalities and interconnectedness.

The new instruments proposed by the Basel Committee to regulate liquidity risk do not explicitly address systemic liquidity risk, focusing mainly on the externalities generated by each bank individually⁸. It is possible to argue that by making each institution individually less risky, systemic risk is being somewhat mitigated. In turn, the new regulation on Systemically Important Financial Institutions (SIFIs), which imposes capital add-ons on these institutions to correct externalities generated by the too-big-to-fail problem, will possibly help to mitigate systemic liquidity risk. SIFIs can generate systemic liquidity risk not only through their size, but also through their interconnectedness (IMF, 2011). These institutions can hold similar exposures of liquid assets or can have access to common funding sources. The empirical evidence presented in the previous section clearly shows that these very large institutions tend to engage in collective risk-taking strategies, through herding mechanisms. By requiring these institutions to hold more capital, their overall riskiness might be somewhat contained. However, these additional capital requirements do not address the specific sources of systemic liquidity risk.

Against this background, specific macroprudential tools should be designed to address systemic liquidity risk. This could entail imposing tighter limits for SIFIs on the new liquidity regulatory tools, for instance. Another possibility would be to fine tune the LCR and the NSFR to impose harsher penalties when macroprudential authorities identify excessive concentration in specific funding sources⁹. Nevertheless,

⁸ The LCR is calibrated to ensure that institutions are able to withstand shocks arising from an idiosyncratic or systemic shock, thus embodying some macroprudential concerns on systemic risk.

⁹ It should be noted that the new regulation already contributes to mitigate interconnectedness, through the runoff rates imposed on exposures to other financial institutions.

it is virtually impossible to fully prevent systemic liquidity crisis, as institutions will always present some correlation in their holdings of liquid assets and in their funding sources¹⁰. An alternative approach would be to develop a liquidity surcharge scheme based on the contribution of each institution to systemic liquidity risk (IMF, 2011), in the spirit of the proposals put forth by Perotti and Suarez (2011).

Another potential missing element in the new regulation might be related with the need to introduce countercyclical elements, in order to mitigate excessive risk taking during upturns. For instance, Acharya *et al.* (2011) show that during upturns banks' choice of liquid assets jointly decreases. In turn, Perotti (2011) argues that the new liquidity regulation is too rigid, as the limits to ratios cannot be calibrated through the cycle. Furthermore, this author argues that the new buffers are actually procyclical: as buffers discourage aggregate net liquidity risk only if they are costly, the low funding costs during upturns will probably imply non-binding restrictions during such periods.

In sum, two macroprudential concerns may be missing in the new regulation for liquidity risk: systemic risk and procyclicality.

6. CONCLUDING REMARKS

It is possible to argue that banks do not optimize their liquidity choices strictly at the individual level. When other banks are taking more risk, any given bank may have the incentives to engage in similar strategies. These collective risk-taking strategies may be optimal from an individual perspective, as they should allow banks to increase profitability without increasing the likelihood of bankruptcy, due to the explicit or implicit commitment of the lender of last resort.

Using data for European and North-American banks in the run up to the global financial crisis of the last few years, we empirically assess whether there is evidence of collective herding behaviour of these banks in their liquidity risk management choices.

This issue may have relevant policy implications, as banks may have incentives to engage in collective risktaking strategies when there is a strong belief that a (collective) bailout is possible (Farhi and Tirole, 2012). When other banks are taking more risk, a given bank may be encouraged to pursue similar strategies if its managers believe they are likely to be rescued in case of distress. Hence, these risk-taking strategies may be mutually reinforcing in some circumstances. This collective behaviour transforms a traditionally microprudential dimension of banking risk into a macroprudential risk, which may ultimately generate much larger costs to the economy. As liquidity risk is usually regulated from a microprudential perspective, a better knowledge of these interactions among banks may have very important consequences on the design of macroprudential policy.

By adapting the herding measure proposed by Lakonishok *et al.* (1992) to our setting, we find that there was some herding behaviour in the pre-crisis period, reflected in a broad deterioration of liquidity indicators. Given the limitations of this measure, we extend our analysis to a multivariate setting. However, the empirical estimation of these peer effects amongst banks in such a framework raises some econometric challenges, related with the reflection problem (Manski, 1993). When we deal with this identification problem through an instrumental variables approach, we can find evidence of robust and significant peer effects only for the largest banks. These banks are usually perceived as being more likely to be bailed out in case of distress, as they are usually too-big or too-interconnected-to-fail. This serious moral hazard problem in banking encourages excessive risk-taking, and has fuelled an encompassing debate on the need to regulate systemically important financial institutions (SIFIs).

Our results support the existence of collective risk-taking behaviours on liquidity risk. Given this, we argue that additional macroprudential policy tools may need to be considered, such as additional liqui-

10 In practice, the LCR may actually increase the correlation in the holdings of liquid assets.

dity buffers on parts of the banking system or during upturns, in order to mitigate systemic risks and procylicality. Furthermore, given that peer effects in liquidity risk management are significant mainly for the largest banks, it is possible to argue that the regulation on systemically important financial institutions may already play an important role in reducing incentives for collective risk-taking. Hence, even though the Basel III regulatory package does not explicitly deal with the systemic component of liquidity risk, it is possible that the more demanding regulatory requirements for systemically important financial institutions help to better align risk-taking incentives. Nevertheless, further work on the definition of macroprudential tools to address systemic liquidity risk is warranted.

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HOUSEHOLDS' DEFAULT PROBABILITY: AN ANALYSIS BASED ON THE RESULTS OF THE HFCS*

Sónia Costa**

ABSTRACT

In an environment where the Portuguese banking system has a high exposure to the household sector, identifying the households' characteristics associated with a higher probability of default on loans is of great importance to monitor the outlook for credit risk and its consequences for the stability of the financial system. This article estimates a probability of default for households which depends on their economic and socio-demographic characteristics and takes into account the existence of shocks that adversely affected their financial situation. The estimated probability is used to characterize the distribution of credit risk for some household's groups, which differ on their situation in the debt market, and for different types of loans. The analysis uses data from the Household Finance and Consumption Survey which took place during the second quarter of 2010.

1. INTRODUCTION

Households default ratios remain at relatively contained levels compared to non-financial corporations but have been increasing gradually in recent years. In an environment where the Portuguese banking system has a high exposure to the household sector, the identification of the households' characteristics associated with a higher probability of default is of great importance to monitor the outlook for credit risk and its consequences for the stability of the financial system.

In this paper it is estimated a probability of default on loans for households which depends of their economic and socio-demographic characteristics and takes into account the existence of shocks that adversely affected their financial situation. The estimated probability is used to characterize the distribution of credit risk for some household's groups, which differ on their situation in the debt market, and for different types of loans. The analysis uses data from the Household Finance and Consumption Survey (HFCS) which took place during the second quarter of 2010.¹ This database allows the identification of households that had late or missed payments on loans in the twelve months prior to the survey and to combine this information with detailed data on the socio-demographic characteristics of households, their financial situation and on the characteristics of the loans they hold.

The literature on the determinants of households' default emphasizes households'characteristics that affect the ability to fulfil credit responsibilities as well as macroeconomic factors that determine changes in their financial situation. Since the HFCS database refers to a single point in time, this paper will focus mainly on the first group of factors. The HFCS has some questions that allow identifying households

^{*} The author thanks Luísa Farinha and Nuno Ribeiro for their comments and suggestions. The opinions expressed are those of the author and not necessarily those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the author.

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¹ For a detailed presentation of the HFCS see Costa and Farinha (2012a).

who had adverse changes in their financial situation in the period preceding the survey, thus making it possible to evaluate the impact of these events on the probability of default. In the context of a proper risk assessment on the part of lenders and borrowers it is expected that the default events are largely determined by unanticipated negative shocks on the solvency of the debtors.

There are several articles in the literature using survey data to estimate default probabilities based on the characteristics of the households.² In Portugal, the estimation of default probabilities with microeconomic data has focused mainly in the sector of non-financial corporations (Antunes and Martinho (2012), Bonfim (2009) and Soares (2006)). In the case of households, Alves and Ribeiro (2011) study the relationship between risk measures of aggregate bank credit to the households sector in Portugal and macro-economic variables. They conclude that the annual flow of overdue credit and other doubtful loans, both for house purchase and for consumption and other purposes, increases with the level of interest rates and is broadly countercyclical. In turn, Farinha and Lacerda (2010) use micro data from the Central Credit Register managed by Banco de Portugal to examine the role of households' responsibilities vis-à-vis the banking system as determinants of entry into default. Duygan and Grant (2009) and Geargarakos et al. (2010) use the data from European Community Household Panel, a household survey conducted annually between 1994 and 2001 in several euro area countries (including Portugal), to analyze the determinants of default with a special focus on factors that explain cross-country differences. According to the findings of Duygan and Grant (2009) arrears are often precipitated by adverse shocks to household's income and health. The large differences found between countries in the households' reactions to these shocks are partially explained by the extent to which local financial and judicial institutions are effective in punishing default. In turn, Geargarakos et al. (2010) emphasize the role of social stigma in determining financial distress, concluding that this factor is more important in countries such as Portugal, where the proportion of households with mortgages is relatively low. As compared to the data used in the previous studies, the HFCS database have the advantage of including more comprehensive and updated information about the financial situation of households and in particular about their assets and liabilities.

This paper is organized as follows: section 2 includes a brief description of the methodology and data used; section 3 analyzes the incidence of default for different households types; section 4 presents the estimation results for the probability of default; section 5 analyzes the estimated probability according to the characteristics of households and of the loans they hold; and section 6 presents the main conclusions.

2. METHODOLOGY AND DATA DESCRIPTION

In the estimation of the probability of default on section 4 it is used a Logit model in which the dependent variable takes value 1 for households that had late or missed payments on loans in the twelve months prior to the survey and the value 0 for households that were indebted during this period but did not have any failures or delays in the payment on loans.³

The explanatory variables include the main economic and socio-demographic characteristics of the household, a dummy variable identifying whether there were adverse changes in the household financial situation in periods close to the interview and a variable that controls the type of loans that the household has.

The economic and socio-demographic characteristics considered were in line with those commonly used in the literature. Specifically, it consisted on the value of income, the value of regular expenditure, the

² See, for example, Alfaro and Gallardo (2012), Del Rio and Young (2005), Duygan and Grant (2009), Edelberg (2006), Geargarakos *et al.* (2010), Getter (2003), Magri and Pico (2011) and May and Tudela (2005).

³ Strictly speaking, the endogenous variable might reflect in some cases situations of delinquencies which will not be translated into default. However, since the two kinds of situations are strongly correlated, the estimated probability will be referred throughout the paper as a default probability, but should be interpreted as an upper limit to this probability.

value of assets, the value of debt, the type of household as well as variables at the individual level such as the age, education level and work status of the reference person.⁴

Household's income is given by the sum of regular income received individually by its members (employee income, income from self-employment, income from pensions and other social benefits) and household income (income from businesses and financial assets, rents on real estate and regular social and private transfers). The expenditure includes regular expenses with consumer goods and services, private transfers to other households, rents on the main residence, interest and repayments of loans and payments of leasing contracts. The value of assets is given by the sum of the value of real and financial assets, covering real estate, motor vehicles, businesses, other valuables goods, deposits, mutual funds, debt securities, shares, voluntary pension plans and other financial assets.⁵ The debt amount includes the outstanding balances on mortgages, on other loans, credit cards, credit lines and bank overdrafts. The household type distinguishes households with only one member and households with several members and controls for the presence of dependents (individuals younger than 25 years that do not to work and are not the household reference person or his spouse/partner, or his parent/grandparent). The income reference period is 2009, while for the remaining variables it is the time of the interview (2nd quarter of 2010).

Different classes of income, expenditure, assets and debt are identified by dummy variables that were defined according to various percentiles.⁶ Dummy variables were also created for the household type as well as for the age class, the work status and the education level of the reference person.⁷

The dummy variables for the adverse changes in the financial situation of the households were obtained with the information of some qualitative questions, which cover changes in the labor market situation, in the net worth, in income and in expenditure. The first variable identifies households in which any member has stated that, in the period of three years prior to the survey, lost his job, had to work shorter hours or had to accept other undesired changes on job. The second variable identifies households that in the three years prior to the interview had a substantial reduction in their net worth. The third variable identifies households who claimed that the income reported in the interview (which refers to 2009) was unusually low compared to the household income in a normal year. The fourth variable identifies households for whom regular expenses, during the twelve months preceding the interview, were higher than in a normal year. Finally, an aggregate variable, taking the value 1 for households which were affected by any of the previous negative shocks and value 0 for the remaining households, was constructed.

The use of this kind of variables to explain the probability of default is in line with the approaches followed in Duygan and Grant (2009) and Getter (2003). The purpose is to evaluate the effect on households' financial distress of unanticipated adverse events. The conclusion of Alves and Ribeiro (2011), that

⁴ The reference person corresponds to the person appointed by the household as such, if this person is male, or the partner/husband of this person, if this person is female and has a partner/husband in the household.

⁵ This definition of assets differs from the concept of the European System of National Accounts because it includes vehicles.

⁶ Six classes were defined both for income and expenditure corresponding to the households for whom these variables are below the 20th percentile, are between percentiles 20 and 40, 40 and 60, 60 and 80, 80 and 90 and for those that are above the 90th percentile. In the case of wealth and debt, the classes correspond to the households for whom this variables are below the 25th percentile, are between percentiles 25 and 50, 50 and 75, 75 and 90 and for those that are above the 90th percentile.

⁷ The dummies for the household type take the value 1, respectively, if the household comprises only one adult, if it comprises several members, all being adults, if it comprises only one adult and one or several dependents and if it comprises various adults and one or several dependents. For the sake of simplicity, in the remaining of the paper dependents are labelled as children. The age classes correspond, respectively, to the individuals with less than 35 years old, between 35 and 44, between 45 and 54, 55 and 64, 65 and 74 years and 75 years or more. The work status distinguishes employees with a permanent position, employees with temporary contracts, self-employed workers, unemployed, retirees and other situations of inactivity (such as the students and the persons dedicated to unpaid home tasks). The education levels considered are the first stage of the basic education, the second stage of the basic education, the secondary education and the tertiary education. These levels correspond to the levels effectively completed.

unemployment is an important determinant of the Portuguese households' default probability, seems to support the relevance of this kind of negative shocks. It is important to take into account that the variables constructed to measure the adverse changes in the financial situation of the households are only proxies for the unanticipated shocks. In fact, in some cases these variables might be capturing situations already taken into account in the loan decision. In any case, this is the only way to measure the effect of changes in time with the HFCS database.

Finally, the regressions for the probability of default include a variable that takes the value 1 for households that have mortgages and the value 0 for households that only have another type of loans. This variable allows evaluating if households with mortgages present a lower default probability, when their economic and socio-demographic characteristics are taken into account. In fact, the number of households in default on housing loans is generally smaller than the number of households in default on consumer credit. Additionally, according to the results of Farinha and Lacerda (2010) borrowers that have housing credit tend to have a lower probability of defaulting on other credit segments. These results do not control, however, for the socio-economic and demographic characteristics of debtors, since they are obtained with data from the Central Credit Register of Bank of Portugal, where these characteristics are not available.

In section 5 the estimated probability of default is used to characterize the distribution of credit risk for different household groups, which differ on their situation on the debt market, particularly by the existence of liquidity constraints and by the degree of indebtness. The combination of HFCS data for the households' debt with the estimated probability of default also enables to characterize the distribution of the credit risk for the outstanding amount of loans that existed on the second quarter of 2010. This analysis is made for all households' loans and by type of credit (mortgages and other loans). In the case of mortgages, the HFCS includes information about the year they were granted, which is not available for non-mortgage loans.⁸ The distribution of credit risk by the mortgage lending period will be analyzed using these data.

3. INCIDENCE OF DEFAULT ON THE HFCS DATA

Table 1 shows the percentage of households in default according to their socio-economic and demographic characteristics. Among the indebted households, about 12 percent had late or missed payments on loans in the twelve months prior to the survey (*i.e.* approximately between the second quarter of 2009 and the second quarter of 2010). The corresponding figure for households with mortgages is 9.7 percent, meaning that about 10 percent of these households had any failure or delay in payment of the mortgage loans or other loans. The percentage of households with some arrear is more than the double in the case of households with other loans.⁹ These data are consistent with the empirical evidence that households with mortgages have on average a lower credit risk than households with other types of loans.

The proportion of households in default shows a sharp downward trend with the wealth and income. By contrast, expenditure does not present a clear link with the incidence of default. This reflects the need to analyse this variable together with income. Indeed, the proportion of households in default increases, as expected, with the percentiles of the expenditure to income ratio. A similar situation occurs in the case of debt, whose results are easier to interpret when controlling for the other characteristics of households, as will be done in the next section. The lowest percentage of households in default occurs

⁸ The HFCS includes detailed information for each household about each of the three major mortgages on the main residence and each of the three major mortgages on other properties that the household might have.

⁹ As expected these values are significantly higher than numbers calculated with the data from the Central Credit Register (CRC) for the percentage of households in default on housing loans and on consumer credit (respectively, about 5 and 13 percent, in mid-2010). For this situation contributes the fact that in the indicators calculated with the CRC data, only are considered households with delinquencies in a specific type of credit, in a specific month and with arrears that lasted at least 30 days.

Table 1 (continue)

PERCENTAGE OF INDEBTED HOUSEHOLDS WITH LATE OR MISSED PAYMENTS ON LOANS	
Total	11.7
Have mortgages	
Yes	9.7
No	14.2
Have non-mortgage loans	
Yes	21.5
No	7.9
Wealth percentile	
Less than 25	25.7
Between 25 and 50	11.9
Between 50 and 75	9.6
Between 75 and 90	6.7
More than 90	4.0
Income percentile	
Less than 20	22.9
Between 20 and 40	19.0
Between 40 and 60	11.2
Between 60 and 80	9.8
Between 80 and 90	7.1
More than 90	5.9
Expenditure percentile	
Less than 20	14.8
Between 20 and 40	11.5
Between 40 and 60	12.3
Between 60 and 80	10.2
Between 80 and 90	11.4
More than 90	13.2
Expenditure/Income percentile	
Less than 20	7.0
Between 20 and 40	7.2
Between 40 and 60	8.1
Between 60 and 80	12.6
Between 80 and 90	17.7
More than 90	26.1
Debt percentile	
Less than 25	15.5
Between 25 and 50	11.4
Between 50 and 75	10.8
Between 75 and 90	14.5
More than 90	8.8
Debt/Income percentile	
Less than 25	14.6
Between 25 and 50	9.4
Between 50 and 75	7.2
Between 75 and 90	15.9
More than 90	21.9
Household type	
One adult	7.8
Several adults	6.7
One adult and children(s)	27.7
Several adults and children(s)	14.5

Table 1 (continuation)

PERCENTAGE OF INDEBTED HOUSEHOLDS WITH LATE OR MISSED I	PAYMENTS ON LOANS
Age	
Under 35	19.1
35-44	11.8
45-54	12.7
55-64	8.5
65-74	5.9
75 and over	7.4
Education	
First stage of basic	13.5
Second stage of basic	12.1
Secondary	9.3
Tertiary	6.7
Work status	
Employee	10.8
Permanent position	9.0
Temporary contract	24.7
Self-employed	11.8
Unemployed	28.8
Retired	7.5
Other not working	9.5
Undesired changes in job conditions	
Yes	18.8
No	7.9
Substancial decline in net worth	
Yes	21.1
No	7.5
Lower income than in a "normal" year	
Yes	19.1
No	8.9
Higher expenses than in a "normal" year	
Yes	15.4
No	9.9
Any adverse change in the financial situation	
Yes	15.6
No	3.3

Source: Household Finance and Consumption Survey.

for households with the highest debt levels. However, when the debt to income ratio is considered, the highest incidence of default is recorded in the highest percentile of the ratio.

By household type, the proportion of households in default is higher in households with children and in particular when there is only one adult. By age, the highest incidence of default occurs when the reference person is under 35 years and the lowest incidence in households whose reference person is in the oldest age classes. Regarding the work status, there is a significantly higher proportion of households in default when the reference person is unemployed or is an employee with a temporary contract than in remaining households. The percentage of households in default has a tendency to decrease with the level of education of the reference person.

Finally, households that suffered unfavorable changes in their financial situation in the years preceding the survey show significantly higher incidences of default than the remaining households. These results are common to any of the situations identified, *i.e.*, changes in the labor market situation, in net worth, in income or in expenditure. The incidence of default in households that have not undergone any of these unfavorable changes in their financial situation is rather low, which seems to support the relevance of these factors in determining the capacity of households to meet their credit responsibilities.

4. THE ESTIMATION OF THE PROBABILITY OF DEFAULT

Table 2 presents the estimation results of Logit regressions for the probability of default. The first column of the table includes the results when the dummy on the existence of adverse changes in the financial situation of households is not included in the regression, in the second column this variable is included and in the third column the sample is restricted to households where this variable takes value 1, *i.e.*, to those households who had adverse changes in their financial situation in the years preceding the interview.

Overall this multivariate analysis confirms the descriptive analysis performed in the previous section, pointing to a higher probability of default for households with the lowest wealth and income levels, for households with debt levels in the three highest classes, with a level of expenditure on highest percentile and for households with children.

Households where the reference person is unemployed have a higher probability of default than households where the reference person is an employee with a permanent position. Unlike the descriptive analysis seemed to suggest, there is no clear evidence that the probability of default for employees with a temporary contract is higher than for those with permanent contracts. With regard to education the fact that the reference person has completed the tertiary education seems to contribute to a decline in the default probability. This may reflect the greater ability of these households to take debt decisions appropriate to their financial situation. In the case of age, the results indicate that households with younger reference persons. For the remaining age classes the coefficients are not significant. This contrasts with the descriptive analysis, which pointed to lower incidences of default in the older age classes. One explanation for this divergence of results might be the fact that the lowest default incidences in the highest age classes are determined by other characteristics of these households, such as their higher levels of wealth and income and their lower debt levels.

The coefficient associated with the dummy for the existence of mortgages has a negative sign but it is not statistically significant. So when controlling the economic and socio-demographic characteristics, the fact that a household has a mortgage does not seem in itself to contribute to a lower probability of default.

Finally, the results confirm that adverse changes in the financial situation of households contribute to a significant increase in the probability of default. When this variable is included in the regression, the results for the other explanatory variables remain broadly unchanged suggesting that the existence of negative shocks on the financial situation of households is, however, not the only factor determining the probability of default. The same conclusion is obtained when estimating the regression only for households who had adverse changes in their financial situation. As mentioned in the previous section the incidence of default for households that did not have negative shocks is very low. This prevents the estimation of a regression including only those cases. Nevertheless, these data suggest that in this period the existence of unfavorable shocks were largely a necessary, though not sufficient, condition for the occurrence of default. This conclusion is consistent with what one would expect in a context where credit decisions have been rational and these shocks were largely unanticipated. The assumption that the shocks were unanticipated seems reasonable given that the years leading up to the HFCS coincided with the onset of the financial and economic crisis, and later with the onset of the sovereign debt crisis in the euro area.

Table 2 (continue)

REGRESSION RESULTS FOR THE PROBABILITY OF DEFAULT

	Indebted ho	ouseholds	Indebted households with unfavorable changes of their financial situation	
	(1)	(2)	(3)	
Wealth percentile				
Between 25 and 50	-1.185***	-1.123***	-1.511***	
	(-3.38)	(-3.25)	(-3.8)	
Between 50 and 75	-1.494***	-1.422***	-1.926***	
	(-3.69)	(-3.54)	(-4.17)	
Between 75 and 90	-1.901***	-1.785***	-2.264***	
	(-4.19)	(-4.04)	(-4.57)	
More than 90	-2.466***	-2.355***	-2.822***	
	(-3.96)	(-3.94)	(-4.14)	
Debt percentile				
Between 25 and 50	0.523	0.494	0.583	
	(1.59)	(1.53)	(1.63)	
Between 50 and 75	1.029**	0.962**	1.11**	
	(2.57)	(2.42)	(2.49)	
Between 75 and 90	1.516***	1.449***	1.563***	
	(3.28)	(3.12)	(3.11)	
More than 90	1.346***	1.287**	1.456***	
	(2.62)	(2.53)	(2,69)	
Income percentile		()		
Between 20 and 40	-0.575	-0.633	-0.877*	
	(-1.25)	(-1.38)	(-1.76)	
Between 40 and 60	-1.13**	-1.128**	-1.249**	
	(-2,4)	(-2,46)	(-2,53)	
Between 60 and 80	-1.154**	-1.083**	-1.206**	
	(-2,47)	(-2.38)	(-2,46)	
Between 80 and 90	-1.438**	-1.397**	-1.765***	
	(-2,44)	(-2.37)	(-2,64)	
More than 90	-1.119**	-1.076*	-1.126*	
	(-1.97)	(-1.95)	(-1.89)	
Expenditure percentile	((/	(
Between 20 and 40	-0.068	0.086	0.086	
	(-0.1)	(0.13)	(0.12)	
Between 40 and 60	0.632	0 754	0.838	
	(1.09)	(1.29)	(1 41)	
Between 60 and 80	0 399	0.489	0.566	
between oo and oo	(0.7)	(0.87)	(0.96)	
Between 80 and 90	0.888	0.943	1.088*	
between oo and yo	(1 51)	(1.61)	(1.76)	
More than 90	1 167**	1 211**	1 204**	
More than 50	(2)	(2.11)	(1.97)	
Household type	(2)	(2.11)	(1.57)	
Several adults	-0.186	-0 299	-0.258	
	(_0 /17)	-0.2 <i>53</i> (_0.75)	-0.238 (_0 52)	
One adult and children(s)	1 545***	1 386***	1 8***	
	(3.54)	(3.18)	(2 62)	
Several adults and children(s)	(J.J+) 0 788**	0.602	(5.00)	
	(2 05)	(1.6)	(2 1)	
	(2.03)	(1.0)	(2.1)	

Table 2 (continuation)

REGRESSION RESULTS FOR THE PROBABILITY OF DEFAULT							
	Indebted h	nouseholds	Indebted households with unfavorable changes of their financial situation				
	(1)	(2)	(3)				
Age							
35-44	-0.872**	-0.825**	-0.782**				
	(-2.51)	(-2.37)	(-2.04)				
45-54	-0.461	-0.406	-0.242				
	(-1.3)	(-1.15)	(-0.63)				
55-64	-0.65	-0.619	-0.405				
	(-1.57)	(-1.48)	(-0.87)				
65-74	-0.685	-0.738	-0.888				
	(-1.17)	(-1.25)	(-1.29)				
75 and over	-0.523	-0.466	-0.638				
	(-0.68)	(-0.57)	(-0.73)				
Education							
Second stage of basic	-0.244	-0.189	-0.145				
	(-0.93)	(-0.74)	(-0.53)				
Secondary	-0.38	-0.281	-0.287				
	(-1.09)	(-0.81)	(-0.75)				
Tertiary	-0.764*	-0.684*	-0.971**				
	(-1.92)	(-1.74)	(-2.12)				
Work status							
Employee with temporary contract	0.708*	0.558	0.585				
	(1.89)	(1.47)	(1.43)				
Self-employed	0.484	0.486	0.649*				
	(1.45)	(1.49)	(1.82)				
Unemployed	1.016***	0.797***	0.761**				
	(3.46)	(2.69)	(2.45)				
Retired	0.559	0.659	0.654				
	(1.39)	(1.64)	(1.37)				
Other not working	-0.276	-0.437	-0.739				
	(-0.41)	(-0.66)	(-0.94)				
Have mortgages	-0.499	-0.467	-0.197				
	(-1.52)	(-1.38)	(-0.5)				
Any adverse change in the financial situation		1 225***	-				
any access change in the interfactor structor	-	(4 41)	-				
		()					
Constant	-0.902	-1.931***	-0.856				
	(-1.37)	(-2.69)	(-1.2)				
Number of observations	1619	1619	1106				

Source: Household Finance and Consumption Survey.

Notes: The results must be interpreted against the omitted categories in the regression which correspond to households with wealth below the 25th percentile, with debt below the 25th percentile, with income below the 20th percentile, with expenses below the 20th percentile, with only one adult, whose reference person has less than 35 years, has an educational level corresponding to the first stage of basic education, is an employee with a permanent position, to households without mortgages and to households that did not have any adverse change in their financial situation. The coefficients presented correspond to the ergression coefficients whose magnitude cannot be interpreted as the marginal effect of explanatory variable on the variable to be explained. In the Logit models marginal effects have the same sign and significance of the estimated coefficients, but vary with the value of the regressors. The symbols *, ** and *** indicate that the coefficients are statistically significant at 10, 5 and 1 per cent confidence level, respectively.

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5. Analysis of the probability of default for different types of households and loans

The model estimated in the previous section was used to calculate the probability of default of each indebted household.¹⁰ This section analyzes the distribution of the probability of default for some household's groups, which differ on their situation in the debt market, and for different types of loans. These distributions were obtained taking into account the sample weights so as to be representative of the population.

The average default probability of the indebted households stands at about 13 percent, the median probability at about 9 percent and the 25 and 75 percentiles at about 5 and 16 percent, respectively. It is expected that households with higher indebtedness levels have greater difficulties in fulfilling the responsibilities associated with debt. Chart 1 shows the distribution of the probability of default for all indebted households, together with the distributions for households in which the debt to income ratio, the debt to wealth ratio and the ratio of debt service to income exceed certain threshold levels.¹¹ These distributions confirm that very high levels of indebtedness are usually associated with high default probabilities.

Chart 2 compares the distribution of the probability of default for households with and without liquidity constraints in the three years leading up to the HFCS.¹² Households with liquidity constraints correspond to households whose applications for loans were turned down or only partially satisfied or to households that did not apply for credit because they thought their application would be rejected. Households without liquidity constraints correspond to households who did not have loan applications rejected or only partially satisfied and that did not give up making loan requests due to perceived credit constraints. The average probability of default for liquidity constrained households is significantly higher than for unconstrained households (about 20 and 10 percent, respectively) and there are a substantial proportion of households with liquidity constraints with high levels of probability of default. This suggests that, in the three years leading up to HFCS, the credit risk was an important determinant of decisions of financial institutions to grant loans.

The estimated probability of default can be used to measure the credit risk of the outstanding household loans in the second quarter of 2010. In this period the concentration of household loans declines slightly in the highest levels of credit risk (Chart 3). Indeed, 53 percent of the household loans were granted to households with probability of default lower than the median value and 7 percent of the loans were granted to households in the highest decile of default probability. This distribution reflects the credit risk of mortgage loans, which have a dominant weight in the total loans granted to households. The data show that non-mortgage loans were more concentrated in households with higher probability of default than in households with low credit risk. In the second quarter of 2010 about 18 percent of the outstanding amounts of these loans correspond to households with probability of default in the highest decile of credit risk.

As expected, the proportion of high credit risk households is bigger in the case of non collaterised loans than in the case of mortgages (Chart 4). However, in the second quarter of 2010, the mean and median of the outstanding amounts of loans per household declines slightly for higher levels of credit risk, in

¹⁰ The results were obtained with the regression of the second column of Table 2.

¹¹ For a description and interpretation of these ratios and an analysis of the characteristics of the households with high levels of debt see Costa and Farinha (2012b).

¹² The households with liquidity constraints included in the chart do have some debt. This is due to the fact that the model used to estimate the probability of default includes the debt's percentiles as explanatory variables, which are not defined for households without debt. Nevertheless, the results obtained using a probability of default calculated for all households in the sample (based on a regression that does not consider the debt level) also points to a credit risk much higher for households with liquidity constraints than for the remaining households.




Source: Household Finance and Consumption Survey.

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the case of non collaterised loans, which is not observed in the case of mortgages (Charts 5 and 6). Thus, although there were a significant proportion of non-mortgage loans assigned to high credit risk households, the typical outstanding amount of these loans was relatively low compared with the levels of the non-mortgage loans for households with low credit risk.

For existing mortgages in the second quarter of 2010 it is possible to analyze the distribution of credit risk per year of lending (Chart 7). In general, the weight of loans tends to increase with the years of lending, reflecting the fact that older loans have a higher probability of having already reached the maturity. The loans granted in the years 2005-2007 stand out, however, by having a high weight in the total outstanding amounts in the second quarter of 2010. This reflects the strong credit growth

CHART 3



Source: Household Finance and Consumption Survey.

Source: Household Finance and Consumption Survey.

CHART 5





CHART 6



Source: Household Finance and Consumption Survey.



registered during this period. The largest share of loans granted in the period 2005-2007 is particularly marked when considering only loans with high credit risk. This is consistent with the data that point to a decline in the degree of tightening of the credit standards applied to the approval of loans by banks in this period and to its increase in the following years, in the context of economic and financial crisis and then of the euro area sovereign debt crisis.¹³

CHART 7





Source: Household Finance and Consumption Survey.

Note: (a) Three year centered mean of the percentages. The chart does not include values for 2010 because the HFCS database only includes loans taken until the second quarter of that year.

13 See, for example, the results of the Bank Lending Survey.

6. CONCLUSIONS

In this paper we use data from the HFCS 2010 to estimate a probability of default for Portuguese households according to their economic and socio-demographic characteristics. The results suggest that the probability of default is higher for households with lower levels of wealth and income, with high levels of expenditure and debt, for households with children, whose reference person is unemployed or for households whose reference person has a lower level of education than the tertiary. When controlling for these characteristics, the age of the reference person does not seem to have a significant effect on the probability of default. Additionally, no evidence was obtained for the fact that having a mortgage contributes to a lower probability of default. The results suggest that adverse changes in the financial situation of households contribute to a significant increase in the probability of default.

According to the HFCS data, a very high percentage of the households with late or missed payments on loans in the twelve months prior to the survey (second quarter 2010), claimed to have had an adverse change of their financial situation. Thus, the occurrence of these types of shocks seems to have been in this period a necessary, though not sufficient, condition for default events. This conclusion is consistent with what one would expect in a context where credit decisions have been taken in a rational way, and the shocks were largely unanticipated.

The estimated probability of default was used to perform a characterization of the distribution of credit risk for different household groups, which differ on their situation in the debt market, and for different types of loans. This analysis confirmed that the liquidity constrained households have an average level of credit risk higher than households who can get the credit they want. As expected, among indebted households, the average credit risk also appears to be greater when levels of indebtedness are very high. With respect to loans, the results indicate that in the second quarter of 2010 the concentration of mortgage loans was lower in the higher levels of credit risk than in the lower levels. By contrast, loans not collateralized by real estate were more concentrated in households with higher probability of default. In the case of mortgages, the existence of information about the year they were granted permits to conclude that a significant proportion of the mortgages with higher credit risk existing in the second quarter of 2010, had been granted in the years before the financial and economic crisis. This is consistent with the reduction in the tightening of the credit standards applied to the approval of loans by banks in this period in the context of the high liquidity that prevailed in international financial markets.

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A SCORING MODEL FOR PORTUGUESE NON-FINANCIAL Enterprises*

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ABSTRACT

This article presents an econometric model for identifying credit failure based on individual characteristics of Portuguese enterprises. The coefficients associated with the financial ratios proved to be significant and are consistent with economic intuition. The estimated model reveals a high level of sectoral heterogeneity with regard to firms' credit quality. From 2011 to 2012, there was, on average, an increase in the probability of default of firms with credit records, most notably in the cases of large enterprises and enterprises in the construction, real estate, restaurant & hotels and mining & quarrying sectors. As a result, in the recent period, there has been a general deterioration in the loan portfolio quality of the Portuguese banking system, which is heavily concentrated in higher risk firms.

1. INTRODUCTION

Two of the most important sources of information available for research and economic analysis are the Simplified Corporate Information (IES in Portuguese) and the Central Credit Register (CRC in Portuguese). The first is an annual mandatory and exhaustive repository of information on the balance sheet of companies legally registered in Portugal. The second is the Portuguese central credit register, a tool available for banks to assess the credit status of potential borrowers, on a monthly basis. The most interesting feature of these two sources of information is that they cover vast areas of interest: on the one hand, the firms' balance sheets; on the other hand, their access to credit. Through this feature, we can formulate models for identifying credit failure and thus monitor the credit status of firms, as well as assess the evolution of their credit quality and characterize the potential credit risk in the economy still not materialized in the prudential ratios of overdue credit.

This work benefited largely from previous studies. In fact, it was not intended to resume discussion on the determinants of credit risk and the discriminatory ability of financial ratios - on this issue already exists an extensive literature and conclusive¹ - but, rather, present a scoring model that is suitable for periodic update, as immune as possible to future changes in accounting standards or reporting models of IES, using major indicators of financial performance.

^{*} The opinions expressed are those of the authors and not necessarily those of Banco de Portugal or the Eurosystem. Any errors and omissions are the sole responsibility of the authors.

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¹ See the work of Bonfim, D. (2007) and Soares, M.C. (2007), based on the former Central de Balanços, Altman, E. e Narayan, P. (1997), for a survey of studies conducted in several countries, and, Bardos, M. (1998), for an example of the use of a scoring model by a Central Bank.

2. Data

In this study we used data from the IES and the CRC for the period 2009-2011. The limitation to this relatively recent period is related to the structural change of the IES's reporting model, following the introduction of the Accounting Normalization System (SNC in Portuguese) that replaced the Official Plan of Accounts (POC in Portuguese). The different valuation principles underlying the POC and the SNC would be, in principle, a factor distorting the analysis over a longer period. In fact, for some income statement and balance sheet variables used in the specification of the scoring model was not possible to obtain an univocal correspondence between the old and new IES,² which is why we only considered firms' financial information from 2009 onwards. Additionally, with regard to the CRC, in January 2009 a number of improvements were introduced, including a more detailed characterization of the credit liabilities reported to the Bank of Portugal and a greater efficiency in the identification of debtors. It was also in order to fully benefit from a more reliable CRC that the analysis was confined to the period 2009-2011.

3. DESCRIPTIVE ANALYSIS

In this section we present a characterization of the credit failure by branch of activity and firm size and a summary of some indicators of financial performance tested in the scoring model. The sectors of activity were defined by the highest aggregation level of Classificação das Atividades Económicas, revision 3.3 The firm size, grouped as Micro, Small, Medium and Large, was defined according to the Decree-Law n ° 372/2007.4 Within the set of firms that delivered the IES-2011, approximately 55 per cent had credit records in CRC. By branch of activity, the percentage of firms with bank financing access / borrowing needs varies from 40 per cent in case of non-financial holdings, and approximately 65 per cent in the case of mining & guarrying and manufacturing. The percentage of firms with some sort of credit failure differs between sectors, but it is particulary relevant in construction, mining & guarrying, real estate and restaurant & hotels (Table 1). With regard to size, the percentage of firms with bank financing access / borrowing needs is clearly lower in the case of micro enterprises (50 per cent), ranging from 88 per cent in the case of small firms and 94 per cent in the case of the large ones. The percentage of firms with credit failure is higher in micro and large categories. The evidence for micro firms differs from results obtained in earlier work, based on the former Central Balance-Sheet. This discrepancy may stem from the fact that, until 2005, this database integrates accounting information from a survey conducted by the Banco de Portugal to a sample of non-financial enterprises which tended to cover larger firms. Additionally, the survey could be answered voluntarily by enterprises not identified in the sample. As noted in Soares, M. C. (2007) this situation would generate a double bias in the data, first in favor of larger enterprises and, secondly, in favor of micro and small enterprises with good credit quality.

Table 2 synthetically presents the evolution of the distributions of several financial performance indicators for three mutually exclusive groups of enterprises: enterprises with no credit records (mostly micro firms), enterprises with credit records without default and enterprises with credit records with default. Note, however, that in this preliminary analysis was not imposed any filter on IES data. For this reason

² Note that in the reporting model of IES - 2010 companies reported data again for 2009, to ensure a year of comparable information.

³ This is the Portuguese Classification of Economic Activities, in many aspects similar to the NACE, the statistical classification of economic activities in the European Union. From the set of enterprises reporting the IES only financial holdings are disregarded.

⁴ The category of micro, small and medium enterprises (SMEs) is made up of enterprises that employ less than 250 persons and whose annual turnover does not exceed € 50 million or annual balance sheet total does not exceed EUR 43 million. A small enterprise is defined as an enterprise which employs less than 50 persons and whose annual turnover or annual balance sheet total does not exceed EUR 10 million. A micro enterprise is defined as an enterprise which employs less than 50 persons and whose an enterprise which employs less than 10 persons and whose annual turnover or annual balance sheet total does not exceed EUR 10 million. A micro enterprise is defined as an enterprise which employs less than 10 persons and whose annual turnover or annual balance sheet total does not exceed EUR 2 million.

CREDIT AND DEFAULT BY BRANCH	OF ACTIVITY A	ND FIRM SIZE			
	Percentage of enterprises in IES-2011	Percentage of enterprises in the subset of IES-2011 with credit register records as of Dec-2011	Weight in total credit to non-financial enterprises	Percentage of enterprises with some sort of credit failure in IES- 2011	Percentage of enterprises with some sort of credit failure in the subset of IES-2011 with credit register records as of Dec-2011
Branch of activity					
Agriculture, livestock and fishing	2.8	2.5	1.8	7.0	12.9
Mining and quarrying	0.2	0.3	0.4	14.4	20.3
Manufacturing	10.5	12.5	13.1	11.5	16.7
Electricity, gas and water	0.5	0.5	4.3	5.9	9.6
Construction	12.3	12.8	20.0	14.2	22.8
Trade	26.3	29.0	13.1	9.1	13.8
Transport	5.1	4.8	8.5	9.3	16.8
Restaurant and hotels	8.8	7.9	4.6	10.0	18.1
Media	2.3	2.1	1.2	6.8	11.9
Non-financial holdings	0.9	0.6	7.5	4.7	11.1
Real estate activities	6.7	5.3	13.5	9.1	19.2
Consultancy	12.7	11.6	7.5	6.5	11.5
Education, health and other social care activities	10.1	9.4	3.6	5.8	10.3
Other services	0.8	0.7	0.7	3.3	6.9
Size					
Micro	88.2	81.1	36.9	8.9	16.0
Small	10.0	15.8	23.9	11.2	12.5
Medium	1.5	2.6	23.4	12.1	12.8
Large	0.3	0.5	15.8	14.8	15.6

Sources: IES and CRC.

it was considered more useful the information regarding per centiles than the calculation of means and standard deviations, very sensitive to extreme values of the ratios.

Overall, firms' financial indicators deteriorated from 2009 to 2011, in the three groups analyzed. Enterprises with no credit records have wider ratios' distributions than enterprises with credit records (except for the financial debt ratio), which means that in this group there is a greater proportion of firms with lower credit quality, without access to bank financing, but also a higher proportion of firms with good credit quality, which are solely equity financed. Still, in the median, these firms have, generally, higher profitability levels and sales volumes than firms with default and lower than firms without default.

From the point of view of constructing the scoring model it is particularly interesting to compare the financial indicators of firms with credit records. Generally, the information of IES supports the economic intuition. Firms without default have typically lower debt levels (financial and non-financial), higher capital and liquidity ratios and greater ability to generate revenues and profits. These differences are observable either in the median or at the extremes of the distributions, suggesting that a well-specified model can be a valuable tool for analyzing firms' credit risk. As expected, the difference increases as we approach the tail of the distribution associated with a negative performance. It is however important to note that, given two firms, one without default and another with default, in many situations the latter may present financial ratios consistently better than the first. From this feature follows that, the probability that a

Table 1

DISTRIBUTION OF SOME OF THE MAIN FINANCIAL RATIOS

	IES-2011 enterprises with no credit register record			IES-2011 en register reco	register records, without default			register records, with default		
	2009	2010	2011	2009	2010	2011	2009	2010	2011	
ROA										
p10	-0.475	-0.559	-0.704	-0.189	-0.211	-0.284	-0.281	-0.326	-0.458	
p50	0.000	0.000	0.000	0.011	0.010	0.005	0.000	-0.001	-0.012	
p90	0.179	0.176	0.176	0.140	0.129	0.114	0.072	0.066	0.046	
TURNOVER										
p10	0.000	0.000	0.000	0.074	0.085	0.067	0.000	0.000	0.000	
p50	0.602	0.576	0.537	0.956	0.955	0.923	0.553	0.492	0.392	
p90	2.711	2.836	2.965	2.617	2.654	2.702	1.833	1.818	1.742	
DFIN										
p10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.009	
p50	0.000	0.000	0.000	0.112	0.236	0.232	0.213	0.358	0.366	
p90	0.609	0.673	0.656	0.642	0.730	0.772	0.786	0.958	1.091	
DNFIN										
p10	0.013	0.008	0.004	0.086	0.065	0.056	0.138	0.094	0.078	
p50	0.487	0.467	0.470	0.454	0.374	0.366	0.580	0.496	0.514	
p90	1.770	2.001	2.186	0.986	0.925	0.983	1.419	1.496	1.814	
CAP										
p10	-1.152	-1.535	-1.847	-0.172	-0.247	-0.401	-0.773	-1.185	-1.702	
p50	0.294	0.301	0.311	0.254	0.252	0.255	0.109	0.085	0.052	
p90	0.965	0.976	0.985	0.750	0.740	0.759	0.518	0.530	0.544	
LIQ										
p10	0.001	0.001	0.000	0.003	0.003	0.002	0.000	0.000	0.000	
p50	0.106	0.113	0.114	0.071	0.070	0.059	0.023	0.021	0.018	
p90	0.769	0.824	0.862	0.472	0.466	0.451	0.335	0.380	0.398	

Sources: IES and CRC.

Note: ROA= net income as a percentagem of total assets; TURNOVER= sales volume as a percentage of total assets; DFIN= financial debt as a percentage of total assets; CAP=shareholders' equity as a percentagem of total assets; LIQ=cash holdings and term deposits as a percentage of total assets.

scoring model under or overestimates the probability of default of a particular enterprise is relatively high. In fact, these models can be very useful in the analysis of diversified portfolios but the analysis of specific enterprises lacks other complementary pieces of information, not necessarily quantitative in nature.

4. METHODOLOGY

The existing literature tends to favor the use of discriminant functions given its greater robustness over time, lower sensitivity to changes in the composition of the sample and ease of coefficients' interpretation. In this work, we chose a discrete variable model based on a logistic function:

$$z_{\scriptscriptstyle t} = \Pr\left(y_{\scriptscriptstyle t} = 1 \mid x_{\scriptscriptstyle t-1}\right) = \frac{1}{1 + \exp\left(-\beta x_{\scriptscriptstyle t-1}\right)}$$

In this equation, y_t is equal to 1 if there is credit failure in t and to 0 otherwise. The z-score z_t is the probability of default during the period t, conditional on the variables that characterize firms in the previous period, summarized by x_t . In this formulation, it is possible to define a threshold score for firm classification

 α : if $\beta x_{t-1} \ge \alpha$, we classify the firm as defaulted, otherwise, we classify the firm as not-defaulted. This allows that, by varying α , the strictness of the criterion is changed: the higher the threshold, the fewer are the firms considered as defaulted. This notion allows us to compare the model predictions with the actual data in terms of default. We will come back to it later.

The logit-linear specification has as advantages the direct calculation of probabilities of default, without the need to define score intervals, and the lower sensitivity to extreme values of the financial ratios which, in the case of the discriminant function, can translate into probabilities of default that are excessively high or too low.⁵ The dependent variable is the dummy variable representing entry into default. The explanatory variables are some of the main ratios commonly used in firms' financial analysis, dummy variables for the deterioration / improvement of the ratios and grouping variables regarding firm size and branch of activity. Given the predictive nature that is intended for the model, the explanatory variables appear with a lag of one period (one year) *vis-à-vis* the dependent variable.

Definition of default

The results of a scoring model can differ considerably depending on whether the definition of default used is more or less demanding. In this work, it was determined that the firm presents credit failure in year *t* if it has at least a record of an overdue credit over one month in any of the financial products referred to in the CRC, either in case of an individual or a joint responsibility. Thus we only excluded records of overdue credits up to one month, in order to mitigate potential reporting errors by banks or extraordinary delays in the payment of installments, for example, due to operational issues.⁶ Additionally, since the dependent variable in the model is the entry into default, we disregarded written off or renegotiated loans, which are usually preceded by a situation of arrears.

Financial ratios

The choice of variables and the final specification of the model was performed in order to optimize quality of fit of the model, in the period under analysis, as measured by the $Pseudo-R^2$.

In the final specification we used the following ratios:

- ROA = net income as a percentage of total assets
- TURNOVER = sales volume as a percentage of total assets
- DFin = financial debt as a percentage of total assets
- DNFIN = non-financial debt as a percentage of total assets
- LIQ = cash holdings and term deposits as a percentage of total assets

The dummy variables that capture the dynamics of improvement / deterioration in financial performance, assumes the value 1 when the respective ratio increases and the value 0 when it remains constant or decreases. It also imposed a set of conditions to mitigate potential reporting errors in IES and to help redefining the universe of relevant enterprises to analyze, namely:

• Total Assets> 0

⁵ For further details see, for example, Bardos, M., "What is at stake in the construction and use of credit scores?", Computational Economics (2007) 29:159-172.

⁶ Note that debtors can enter in default with respect to interest and other expenses from the date on which installment should have been paid. With regard to principal, generally this only happens after 30 days from the expiration date of the installment. For further details see "Caderno n.º 5 do Banco de Portugal: Central de Responsabilidades de Crédito" at http://www.bportugal.pt/pt-PT/PublicacoeseIntervencoes/Banco/Cadernosdo-Banco/Paginas/CadernosdoBanco.aspx (only available in Portuguese).

- Sales volume> 0
- Financial debt> 0
- Exclusion of observations pertaining to the 1st and 99th percentile of each financial ratio.
- Exclusion of micro firms⁷

The z-score of a firm reflects the probability of defaulting on its credit liabilities in t, given the last known financial position (ratio levels) and its recent evolution (dummy variables) in *t-1*. Additionally, the inclusion of the categorical variables allows controlling for fixed-effects related to the activity sector and size, which might persist after controlling for the individual characteristics of the firms. More generally, the z-score is an indicator of a firm's credit quality, that can be calculated even for firms that are already in default situation or for firms that do not have credit records.

This type of model can be used to relate the failure of enterprises with the macroeconomic environment. In its simplest form, this can be done by adding one or more macroeconomic factors (such as the GDP growth rate or the change in the unemployment rate) with an across-the-board impact. However, since the model is estimated with data from 2009 and 2010, the estimation of a coefficient associated with a macroeconomic factor is not possible. Thus, the model results will not be sensitive to macro systemic variations not captured by the regressors used.

Table 3 presents the summary statistics of the sample. As in Table 2, which includes all available observations, in the sample also observe that firms that will entry into default in the next year present, in the current year, worse financial ratios than those that will not default. For example, while the return on assets of firms that enter into default is -6,0 per cent, this ratio is 0,7 per cent for those who do not enter into default. The standard deviation for this ratio, moreover, shows that there is a wide dispersion in their values. Also, the average financial debt of defaulting firms is equal to 41 per cent of assets, while for the non-defaulting is just 30 per cent. This behavior is also observed for the variation of these ratios.

As regards size, the table shows that most of the firms considered are small (85 per cent of total), and medium enterprises (13 per cent of total) are more numerous than large (two per cent of total). There appear to be no marked differences between these categories in what refers to default.

In terms of activity sectors, we observe that enterprises in the construction and real estate fall more than proportionately in default, while the opposite occurs for enterprises in manufacturing and trade.

5. RESULTS

The results for the preferred specifications are presented in Table 4. In the procedure for the selection of specifications of the regression model, we opted to present one case with the five financial ratios chosen, the respective indicators of variation plus the fixed-effects related to the activity sector and firm size and, another case, including the interactions between the financial variables and firm size.

As usual in binary models with micro data, the *pseudo*- R^2 of the two adjustments is low, close to 7 per cent. This means the variability in the observed default in the data will only be partially explained by variability in the financial ratios and other controls used. In turn, the model is able to classify firms in terms of default fairly efficiently. The ROC curve (Receiver Operating Characteristic) represents the sensitivity of the model as a function of the complement to 1 of the specificity of the model, for different values

⁷ In fact, smaller firms (micro enterprises) and with fewer resources available should be more prone to present reporting errors and anomalous figures in IES. For this reason, and after verifying that the discriminatory ability of financial ratios decreased significantly with the inclusion of micro firms, we decided to exclude the respective category from the model's final specification. Note that micro firms were excluded only for the estimation purpose, being subsequently treated as small enterprises (through the categorical variable) for the calculation of the z-score.

IN-SAMPLE MEAN AND	STANDARD DEV	IATION OF EXPLANAT	ORY VARIABLES	
		Entry into default=0	Entry into default=1	Total sample
ROA	Mean	0.007	-0.060	0.001
	Std. Dev.	0.151	0.250	0.163
TURNOVER	Mean	1.420	1.151	1.396
	Std. Dev.	1.080	0.939	1.071
DFIN	Mean	0.301	0.412	0.311
DUCU	Std. Dev.	0.246	0.265	0.250
DNFIN	Mean	0.412	0.479	0.418
	Sta. Dev.	0.347	0.434	0.357
LIQ	Std Dov	0.113	0.071	0.115
	Mean	0.747	0.725	0.745
DIGA	Std. Dev.	0.498	0.484	0.498
DTURNOVER	Mean	0.500	0.442	0.495
	Std. Dev.	0.500	0.497	0.500
DDFIN	Mean	0.600	0.666	0.606
	Std. Dev.	0.490	0.472	0.489
DDNFIN	Mean	0.410	0.440	0.413
	Std. Dev.	0.492	0.497	0.492
DLIQ	Mean	0.508	0.462	0.504
	Std. Dev.	0.500	0.499	0.500
Size				
Small	Mean	0.849	0.845	0.849
	Std. Dev.	0.358	0.362	0.358
Medium	Mean	0.129	0.134	0.130
largo	Std. Dev.	0.336	0.340	0.336
Large	Std Dev	0.021	0.021	0.021
Branch of activity	Sid. Dev.	0.144	0.145	0.144
Agriculture and related	Mean	0.022	0.015	0.021
, ignealtare and related	Std. Dev	0.146	0.122	0.144
Mining and guarrying	Mean	0.005	0.007	0.006
5 . 5 5	Std. Dev.	0.073	0.081	0.074
Manufacturing	Mean	0.272	0.257	0.271
	Std. Dev.	0.445	0.437	0.445
Electricity and gas	Mean	0.012	0.005	0.011
	Std. Dev.	0.107	0.070	0.105
Construction	Mean	0.143	0.251	0.152
	Std. Dev.	0.350	0.434	0.359
Trade	Mean	0.247	0.188	0.241
-	Std. Dev.	0.431	0.391	0.428
Iransport	Mean	0.041	0.041	0.041
Postaurant and botals	Std. Dev.	0.199	0.198	0.199
Residurant and noters	IVIEdI1	0.079	0.072	0.076
Media	Mean	0.209	0.238	0.208
Wedia	Std Dev	0.136	0.126	0.135
Non-financial holdings	Mean	0.002	0.002	0.002
	Std. Dev.	0.046	0.041	0.046
Real estate activities	Mean	0.012	0.021	0.013
	Std. Dev.	0.108	0.144	0.112
Consultancy	Mean	0.082	0.075	0.081
	Std. Dev.	0.274	0.263	0.273
Education and health	Mean	0.062	0.048	0.061
	Std. Dev.	0.242	0.213	0.239
Other services	Mean	0.003	0.003	0.003
	Std. Dev.	0.052	0.051	0.052
Number of observations		31200	3030	34230

Sources: IES, CRC and authors' calculations.

Note: The sample was defined according to the criteria described in section 4 (methodology).



of the latent variable, y_i default threshold (see equation (1)). The sensitivity is defined as the fraction of defaults observed correctly classified by the model, using a given threshold. The specificity is the fraction of observed defaults not correctly classified by the model, with the same threshold. The complement to 1 of the specificity is then the fraction of non-defaults incorrectly classified by the model. In other words, is type 2 error of the model, or the likelihood of a false positive. For various thresholds, the ROC curve gives us the sensitivity (true positive) versus type 2 error (false positives). A default threshold high enough will lead the model to classify all cases as non-defaults, which in Chart 1 correspond to the lower left corner of the ROC curve, a threshold sufficiently negative will classify all cases as defaults, corresponding to the upper right corner. A perfect model is such that, for some threshold, the type 2 error is 0 and the sensitivity is 1, which corresponds to the point (0;1) in the chart and to a ROC curve horizontally flat. A random model will have a ROC curve equal to the line segment between (0;0) and (1;1), also represented in the chart. The area under the ROC curve is a measure of the accuracy of the model. In the case of a perfect model, its value is 1, in the case of a random model, its value is 0,5. For the model on the right side of Table 4 the area is 0.7121, a reasonable value given the parsimony of the model and the fact that it applies to all sectors and all size categories. One would get better results by estimating this type of models sector by sector, or for the various size categories, but the robustness required in this type of application would be lost.

In the regression in the left side of Table 4, the coefficients associated with the levels of financial ratios proved to be significant and with the expected signal. The z-score of a firm increases both with its level of financial and non-financial debt. Conversely, the ROA, the turnover ratio and liquidity ratio contribute to decrease the probability of default, *i.e.*, give a downside contribution to the z-score. In the case of the dummies capturing the improvement / deterioration of financial ratios the results are alike.⁸ Firms recording an increase in sales and profits and are less likely to enter into default while the reverse applies for firms that increase their financial and non-financial debt.

When controlling for firms' specific attributes it does not appear to exist any fixed-effect / premium associated with firm size. In turn, the statistical significance of some of the coefficients associated with the sectoral dummies suggests the existence of differences between the z-scores of firms from different branches of activity.

In the right panel specification (Table 4) were also included interactions between the financial variables and firm size, which did not significantly improve the predictive ability of the model but has highlighted some differences between types of firm. It is interesting to note that, in general, small and medium enterprises have similar coefficients in size and magnitude, while the large ones presented marked differences. In particular, the coefficients associated with the return on assets and the variation of financial debt are significantly different. This result suggests the existence of a distinct behavior by banks when it comes to large enterprises. On the one hand, the return on assets has a much greater influence on the creditworthiness of large firms than for smaller ones. In the case of financial debt, the behavior of large firms is opposed to the others: if the debt increased, the probability of default decreased.⁹ This can be interpreted as an indicator of evergreening of loans, a situation in which the bank, in face of an imminent default by the enterprise chooses to renegotiate loan terms or approve new credit lines, thereby attempting to postpone default. However, given the short time span of the sample, a better assessment of this thesis requires an analysis in longer period of time.

Table 5 summarizes the estimated z-scores based on the last specification presented.¹⁰ From 2011 to 2012,

⁸ Except for the dummy associated with the liquidity ratio which did not prove statistically significant.

⁹ See Mata, Antunes e Portugal (2010) for a discussion of various mechanisms that justify that the probability of default depends on the level of debt.

¹⁰ Recall that 2011 z-scores, calculated on firms' financial information for 2009 and 2010 are in-sample estimates. 2012 z-scores, calculated on firms' financial information for 2010 and 2011 are out-of-sample estimates, since the 2012 credit records were not incorporated in the model estimation.

OUTCOMES OF THE T	INO MODE	LS ESTIMAT	ED				
Logit model without	the size cate	egory	Logit model with the size category interaction				
interac	tion			Ν	34230		
	N	34230		R ²	0.0703		
	R ²	0.0684	entryintodefault_f1	Coef.	P> z		
entryintodefault_f1	Coef.	P> z	ROA				
ROA	-0.521	0.000	Small	-0.508	0.000		
TURNOVER	-0.305	0.000	Medium	-0.501	0.208		
DFIN	1.286	0.000	Large	-5.447	0.004		
DNFIN	0.560	0.000	TURNOVER				
LIQ	-1.926	0.000	Small	-0.312	0.000		
DROA	-0.206	0.000	Medium	-0.254	0.000		
DTURNOVER	-0.167	0.000	Large	-0.484	0.013		
DDFIN	0.208	0.000	DFIN				
DDNFIN	0.105	0.023	Small	1.286	0.000		
DLIQ	-0.066	0.099	Medium	1.536	0.000		
Size			Large	0.352	0.402		
Small	-	-	DNFIN				
Medium	0.098	0.092	Small	0.549	0.000		
Large	0.097	0.479	Medium	0.614	0.000		
Branch of activity			Large	0.874	0.185		
Agriculture and related	-0.486	0.002	LIQ	4 775	0.000		
Mining and guarrying	0.092	0.706	Small	-1.//5	0.000		
Manufacturing	-	-	Medium	-3.416	0.000		
Electricity and gas	-1.083	0.000	DPOA	-1.//0	0.295		
Construction	0.632	0.000	Small	-0 207	0.000		
Trade	-0.096	0.103	Medium	-0.091	0.000		
Transport	0.069	0.509	Large	-0.839	0.006		
Restaurant and hotels	-0.079	0.347	DTURNOVER				
Media	-0.166	0.297	Small	-0.147	0.001		
Non-financial holdings	-0.399	0.396	Medium	-0.330	0.003		
Real estate activities	0.242	0.100	Large	-0.061	0.833		
Consultancy	-0.027	0.743	DDFIN				
Education and health	-0.380	0.000	Small	0.220	0.000		
Other services	0.126	0.739	Medium	0.263	0.038		
Constant	-2.529	0.000	Large	-0.642	0.043		
			DDNFIN				
			Small	0.082	0.104		
			Medium	0.355	0.004		
			Large	-0.631	0.045		
			DLIQ				

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0.120

0.583

0.999

0.552 0.004

0.003

0.691

0.000

0.000

0.115

0.422

0.306

0.320

0.412

0.091

0.783

0.000

0.697

0.000

-

-0.068

-0.061

0.000

-0.128

1.500

-0.485

0.097

0.632

-0.093

0.083

-0.086

-0.159

-0.386

0.248

-0.022

-0.379

0.148

-2.534

_ -1.069

-

Constant
constant

Small Medium

Large Size Small

Medium

Branch of activity Agriculture and related

Manufacturing

Electricity and gas Construction

Mining and quarrying

Restaurant and hotels

Non-financial holdings

Real estate activities

Consultancy Education and health

Other services

Large

Trade

Media

Transport



Source: Authors' calculations based on the outcome of the logit model with interactions between financial ratios (including dummies) and the size category.

there was a deterioration of firms' average z-score, from 0,126 to 0,136. This evolution has, however, implicit a dynamics of exit and entrance of firms in IES. Firms that disappear have a z-score significantly higher than the population, while the opposite is true, although to a lesser extent, in the case of new firms. Thus, when considering only firms that are common to both years, the deterioration is more pronounced, from 0,120 to 0,137. As regards the breakdown by activity sector and size the results are, to some extent, consistent with the evolution of prudential ratios of overdue credit. Enterprises in the construction and real estate sectors stand out clearly in the negative way, from micro to large enterprises. Additionally, it is worthwhile mentioning the worst credit quality of large firms in the transportation sector, micro firms in restaurant and hotels, as well as micro firms in mining and quarrying.

A useful way to classify firms by financial strength is to define intervals and distributing firms according to their z-score. The construction of 10 risk classes, based on the distribution of z-scores for 2011, shows that 31 per cent of firms move upwards in the risk class and 21 per cent move downwards, from 2011 to 2012. The mobility occurs mainly towards the deterioration of the risk profile. It is worth noting an increase of 25 per cent in the number of firms in the last risk class (associated with lowest credit quality), which is also the class where there was less mobility. Even with regard to the evolution from 2011 to 2012, it should be noted that about 58 per cent of firms have worsened or remained unchanged in terms of z-score, while 42 per cent improved.

Chart 2 shows the dynamics of rise / fall in risk class by activity sector between 2011 and 2012. In construction, real estate and non-financial holdings the evolution of z-scores was processed mainly towards increased risk. Instead, media and other services had a balance close to zero.

6. Z-SCORE AND THE CENTRAL CREDIT REGISTER (CRC)

An interesting exercise is to examine the relationship between the amounts of outstanding loans and firms' credit quality. In this case, we analyzed the transition between December 2011 and September 2012.

Starting with risk classes defined in the previous section, Chart 3 shows the amount of credit granted to firms in each risk class, as a per centage of total credit granted, as of December 2011 and September

CHART 1

Z-SCORES FOR 2011 AND 2012 BY BRANCH OF ACTIVITY AND FIRM SIZE															
z-score 2011	Agricul- ture and related	Mining and quar- rying	Manu- factur- ing	Elec- tricity and gas	Con- struc- tion	Trade	Trans- port	Restaur- ant and hotels	Media	Non- finan- cial hold- ings	Real estate activ- ities	Consul- tancy	Educa- tion and health	Other services	Total
Micro	0.09	0.16	0.13	0.06	0.19	0.12	0.08	0.15	0.12	0.12	0.17	0.12	0.11	0.09	0.13
Small	0.06	0.11	0.09	0.04	0.15	0.07	0.08	0.08	0.08	0.07	0.15	0.09	0.07	0.08	0.09
Medium	0.07	0.13	0.10	0.05	0.16	0.07	0.10	0.09	0.08	0.07	0.17	0.08	0.07	0.09	0.10
Large			0.09	0.04	0.18	0.06	0.14	0.14	0.08			0.08	0.10		0.09
Total	0.09	0.15	0.11	0.06	0.18	0.12	0.09	0.14	0.11	0.12	0.17	0.12	0.11	0.09	0.13
z-score 2012	Agricul- ture and related	Mining and quar- rying	Manu- factur- ing	Elec- tricity and gas	Con- struc- tion	Trade	Trans- port	Restaur- ant and hotels	Media	Non- finan- cial hold- ings	Real estate activ- ities	Consul- tancy	Educa- tion and health	Other services	Total
Micro	0.09	0.17	0.14	0.08	0.20	0.13	0.09	0.17	0.13	0.12	0.18	0.13	0.13	0.08	0.14
Small	0.06	0.11	0.09	0.04	0.15	0.07	0.08	0.09	0.09	0.07	0.15	0.09	0.07	0.09	0.09
Medium	0.06	0.12	0.10	0.05	0.16	0.08	0.10	0.10	0.08	0.08	0.18	0.09	0.07	0.10	0.10
Large			0.10	0.04	0.24	0.08	0.16	0.11	0.15			0.09	0.16		0.12
Total	0.09	0.15	0.12	0.07	0.19	0.13	0.09	0.16	0.12	0.12	0.18	0.13	0.12	0.08	0.14

Source: Authors' calculations based on the outcome of the logit model with interactions between financial ratios (including dummies) and the size category.

Note: Given the reduced number of large firms in agriculture and related, mining and quarrying, non-financial holdings, real estate activities and other services, it was decided to omit the average z-scores of these subsets.

2012.¹¹ A first observation is that the amount of credit granted to riskier firms is considerably high. Although this effect can be expected, as financial debt has a negative impact on the z-score, it is still worrying that the three deciles of highest risk accounted for about 60 per cent of the total portfolio in December 2011. When we look at the figures for September 2012, we observe that the total weight of these three deciles increases to 64 per cent at the expense of a reduction in lower deciles. Note, however, that this development mainly reflects the across-the-board deterioration in firms' credit quality (shift to the right of the z-scores distribution), though more pronounced in some activity sectors, rather than a significant increase in credit granted to riskier firms.

Table 6 shows the sectors in which the z-score increased the most, considering only the subset of enterprises in IES credit with records. The trend is similar to that shown in Table 5 (that refers to the universe of enterprises in IES). With regard to activity sector, firms in the construction, real estate, restaurant & hotels and mining & quarrying, experienced the largest increases in z-score in absolute terms. Regarding firm size, the z-score increase mainly in for enterprises. Note that the z-score increased slightly less in the subset of firms with credit records than in the universe of IES.

The risk structure of credit portfolio is quite heterogeneous by branch of activity. In September 2012, the largest sectors in terms of outstanding credit were construction, real estate, manufacturing and trade (Table 7). However, the risk profile varies dramatically across sectors. The three worst risk classes are dominated by construction, real estate and transportation that have a clearly disproportionate weight against the weight they have in total credit. On the other hand, in the top three risk classes, which account for only 5 per cent of total loans, trade and electricity & gas have more weight.

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¹¹ Risk classes (deciles) are computed from the 2011 z-score distribution, both for December 2011 and September 2012.

CHART 2





CHART 3



Source: Authors' calculations.

Note: Deciles are computed from the 2011 z-score distribution and are kept constant for 2012.

Sources: CRC and authors' calculations.

Note: The profile of the loan portfolio as of Dec-2011 is made according to the z-score of 2011. The profile of the loan portfolio as of Sep-2012 is made according to the z-score of 2012. Deciles are computed from the 2011 z-score distribution and are kept constant for 2012.

Table 6

AVERAGE Z-SCORE OF ENTERPRISES WITH CREDIT REGISTER RECORDS		
	Dec-11	Sep-12
Non-financial enterprises (total)	0.111	0.118
Branch of activity		
Agriculture, livestock and fishing	0.076	0.078
Mining and quarrying	0.124	0.134
Manufacturing	0.098	0.103
Electricity, gas and water	0.049	0.054
Construction	0.174	0.186
Trade	0.094	0.100
Transport	0.084	0.086
Restaurant and hotels	0.120	0.130
Media	0.096	0.104
Non-financial holdings	0.120	0.126
Real estate activities	0.175	0.185
Consultancy	0.106	0.111
Education, health and other social care activities	0.091	0.098
Other services	0.094	0.092
Size		
Micro	0.115	0.122
Small	0.096	0.101
Medium	0.102	0.105
Large	0.098	0.129

Sources: CRC and authors' calculations.

7. FINAL REMARKS

This article presents an approach that allows classifying Portuguese enterprises by level of credit risk. Using data from the Informação Empresarial Simplificada between 2009 and 2011 and data from the Central de Responsabilidades de Crédito (the Portuguese central credit register) for 2010 and 2011 is traced a risk profile by activity sector, size and a set of variables and financial indicators of the firm. The data confirm some of the known facts about the Portuguese business structure. Firstly, there is a strong predominance of micro and small enterprises. Secondly, there is a large concentration of credit registered in the CCR. The data also show that some financial indicators, such as the return on assets, sales volume or the financial debt, are significantly different between firms with and without credit default.

This finding was explored through a model that allows to discriminate between firms that will potentially default on their credit liabilities and the others. We used a logit specification for the probability of default of the company and estimated a model that included several financial indicators and fixed-effects for activity sector and size. The results confirm the intuition conveyed by the data. In particular, the higher the return on assets, the lower the probability of default (z-score) in the one-year horizon. The same applies for sales volume and the liquidity ratio. The financial debt and financial debt does not, however, contribute to increase the probability of default of the enterprise. The estimation also shows that the sensitivity of the probability of default to these financial ratios vary with firm size.

Applying the model to firms' financial data, we can classify them according to z-score. There is a strong sectoral heterogeneity in terms of z-score. The highest values refer to construction, real estate and mining & quarrying. The lowest values refer to electricity & gas, transportation and agriculture & related. In a dynamic perspective, the deterioration of z-scores was also more pronounced in construction and real estate activities.

CREDIT PORTFOLIO QUALITY AS OF SEPTEMBER-2012 BY BRANCH OF ACTIVITY AND RISK									
	Se	ctor weight in	Percentage of loans to the sector in the						
Branch of activity	3 best risk classes total	3 worst risk classes total	credit portfolio total	3 best risk classes	3 worst risk classes				
Agriculture, livestock and fishing	4%	1%	2%	9.3%	19%				
Mining and quarrying	0%	1%	0%	0.6%	74%				
Manufacturing	14%	10%	14%	5.2%	48%				
Electricity, gas and water	29%	0%	5%	30.3%	0%				
Construction	1%	28%	19%	0.3%	97%				
Trade	31%	5%	13%	12.4%	23%				
Transport	3%	14%	10%	1.6%	89%				
Restaurant and hotels	3%	5%	4%	3.7%	69%				
Media	1%	1%	1%	4.2%	49%				
Non-financial holdings	1%	6%	7%	0.7%	55%				
Real estate activities	0%	18%	12%	0.2%	96%				
Consultancy	5%	9%	8%	3.6%	74%				
Education, health and other social care activities	7%	2%	4%	10.1%	42%				
Other services	0%	1%	1%	1.7%	91%				
Weight of the 3 risk classes in the portfolio total	ght of the 3 risk classes in the folio total 5% 64% 100% 5% 6								

Table 7

Sources: CRC and authors' calculations.

Note: The profile of the loan portfolio as of Sep-2012 is made according to the z-score of 2012.

By matching the information about z-scores with CRC data, for December 2011 and September 2012, two relevant observations are brought to light. Firstly, credit outstanding amounts are concentrated in higher z-score deciles, with the enterprises in the three riskier holding about 60 per cent of total credit as of December 2011. Secondly, in recent years, this level of concentration increased. Given the weight that construction and real estate have in total credit, this effect was mainly due to the more pronounced risk deterioration in these sectors than in others.

The approach for calculating the z-score presented in this article can be improved at various levels. On the one hand, with the enlargement of the time span of the data will be possible to estimate coefficients for macroeconomic factors – this time, the results are invariant to the macroeconomic situation of the country, except for the component absorbed in financial ratios. Moreover, in specific applications there may be some advantage in estimating this type of models for smaller groups of firms. These two tasks, among others, will keep the interest in developing scoring models to deal with issues related to credit risk, financial stability and sectoral analysis of the Portuguese economy.

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