

Financial innovation, bank capital and the bank lending channel: A European empiricist's perspective¹

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Abstract

The period of credit crisis has reminded us of the crucial role performed by banks in supplying lending to the economy especially in situation of high financial distress. The recent literature has highlighted the role of financial innovation, banks' capital positions and impact of financial markets incentives as major determinants of the supply of bank loans and indicated new dimensions of the transmission of monetary policy to economic activity. This article starts by reviewing the “scant” presence on banking on macroeconomic models, it then proceeds by summarising the new empirical work on the bank lending channel from a European perspective with a particular emphasis on the role of financial innovation.

Introduction and the role of the banking sector in macroeconomic models

Until recently, macroeconomic literature tended to ignore or overlook the role of banks and financial frictions in the transmission mechanism of monetary policy.² The intuition for this was probably a combination of two main factors. First, the impact of financial intermediaries was not expected to have a large macroeconomically relevant impact under most economic conditions. This had partly to do with developments in economic modelling: In the years following the pioneering work of Modigliani

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² A good illustration of this is provided by Goodhart (2004) who pointed that in a major text of monetary economics (Woodford, 2003), banks make no appearance in the index.

and Miller (1958) – which assumed complete markets and did not include information asymmetries³ – there was largely a feeling in macroeconomic modelling that financial factors were mostly a “veil”. The scant attention to the modelling of financial institutions had also to do with developments in the banking sector. In particular we refer to the deep process of financial deregulation and globalisation of the banking industry occurred in the last three decades. Deregulation is likely to have increased competition and the overall supply of credit. At the same time, this increased competition could have lead to greater (and possibly excessive) risk-taking by banks. The standard or textbook reason for this is that increased competition reduces the market power of banks thereby decreasing their charter value. The decline in banks’ charter values - together with the existence of limited liability and the application of flat rate deposit insurance - could encourage banks to take on more - “probably excessive”- risk (Hellmann et al., 2000; Matutes and Vives, 2000; Salas and Saurina, 2003).⁴ Regulators have tried to counterbalance these possible incentives by giving capital adequacy a more prominent role in the banking regulatory process.⁵ The recent banking crisis illustrates how increase in bank risk-taking often coupled with excessive lending supply and a boom in housing prices, may have increased the risk of financial instability thereby augmenting the impact of banks’ behaviour and conditions on the macroeconomy.

The second reason for the scant role of banks on macroeconomic models is the technical difficulty to mimic easily their role in the monetary transmission mechanism. As a matter of fact, even the seminal model by Bernanke and Blinder (1988) – which triggered a substantial amount of econometric research – is still not micro-founded. The introduction of specific aspects of banks’ behaviour (such as decision of how much capital to have in excess of regulatory constraints) into already complex

³ Modigliani and Miller’s theorem (M&M, 1958), assumes that with full information and complete markets, the value of a firm is not influenced by its capital structure. When some imperfections are introduced into this frictionless world, additional dimensions will affect the relationship between capital and value of the firm: 1) taxes, 2) costs of financial distress, 3) information asymmetries, 4) transaction costs, and 5) imperfection in the products markets. Three additional factors are equally absent of the M&M paradigm but characteristic of the banking industry: 6) a highly regulated market (conduct and prudential rules), 7) the fact that most of its debt is held by small and unsophisticated investors and 8) access to the safety net. For a discussion see also Miller (1999).

⁴ This issue is not undisputed; Boyd and De Nicolo (2009) argue that the theoretical foundations linking more competition with increased incentives towards bank risk-taking are fragile. See Carletti and Hartmann (2002) for a useful survey of the literature linking competition and stability.

⁵ For instance Vives (2000, pg. 15) ‘the general trend is to introduce competition in banking and to check risk- taking with capital requirements and appropriate supervision’.

dynamic macro models is very challenging and is often left for further research.⁶ Only recently, initial steps in this direction have been taken by DSGE models that introduce financial imperfections into state-of-the-art macroeconomic models in order to provide a quantitative assessment of the macroeconomic impact on economic activity of financial intermediaries' behaviour.⁷

How do banks affect the monetary transmission mechanism? The main channels

In order to analyse the transmission mechanism of monetary policy most of the models have focused on asymmetries of information derived mainly from the relationship between borrowers and their banks, with a special attention to the role played by collateral values (see, Bernanke, Gertler and Gilchrist, 1999). Within this literature, the broad credit channel describes how the financial health of borrowers can affect the supply of bank finance and, ultimately, aggregate demand (Bernanke and Gertler, 1995). Monetary policy actions would move interest rates. Change in rates would in turn impact on borrowers' net worth via changes on cash flows and collateral values, which in turn affects banks' loan supply. This impact of changes in banks' loan supply on economic activity relies heavily on the assumption of imperfect substitutability between bonds and loans. Due to asymmetries of information lenders charge borrowers a premium to cover monitoring costs and it is the firm's financial position that partly determines their external finance premium and conditions of credit (Ashcraft and Campello, 2007). Angeloni et al. (2003) provide evidence for the existence of a broad credit channel in many of the largest euro area countries over the period 1993-1999.⁸ More recently

⁶ Most DSGE models assume market clearing and sticky "Calvo like" prices (see Tovar, 2008). A problem is that many features of financial intermediation - such as credit rationing - prevent market clearing. Other features derived from the financial structure such as financial vulnerabilities, illiquidity or the financial systems and pro-cyclicality are also hard to include. A striking shortcoming of these models from a financial economics perspective is that they usually only include one single measure of interest rate. Yet the perceived riskiness of borrowers (and banks) and other elements (such as uncertainty) clearly implies that the single interest rate assumption might be too restrictive (Arestis, 2009). For instance in the downswing of the cycle, official interest rates decline, but credit spreads normally increase.

⁷ For seminal models incorporating financial frictions, see Kiyotaki and Moore (1997) who assume that borrowing is limited to a given fraction of the value of collateral and use limited enforcement contracts; and Bernanke, Gertler and Gilchrist (1999) who focus on information asymmetries between financial intermediaries and firms. For more recent papers see, for instance, Iacoviello (2005) who focused on the household sector. Other recent interesting models focusing on the "wedge", or external finance premium derived from the situation of borrowers (and/or investment project) are Goodfriend and Callum (2007) and Christiano, Motto and Rostagno (2008). See also Sudo and Teranishi (2008) and Gerali et al. (2009).

⁸ A common characteristic of such studies is that they use micro data from individual banks. This is mainly because it is difficult to measure the effect of banks' conditions when using aggregate data, as it not easy to disentangle demand and supply factors. Other additional efforts to solve this identification problem include the use of generalised method of moments

other studies have found support for the existence of a broad credit channel in the euro area: Gambacorta (2008) – by using information for Italian bank prices rather than quantities – provides an alternative way of disentangling loan supply from loan demand shift; Jimenez et al. (2009) provide evidence from Spain using information from loan applications.

Analyses of the so-called “narrow credit channel” or “traditional bank lending channel” have focused on the financial frictions derived from the balance sheet situation of banks. According to these models, a monetary tightening has an effect on bank loans because the drop in reservable deposits cannot be completely offset by issuing other forms of funding (i.e. uninsured CDs or bonds; for an opposite view see Romer and Romer, 1990) or liquidating some assets.

It is questionable, however, whether this transmission channel – as set up in traditional models – would operate in euro area countries.⁹ In this respect, the operational framework in the euro area aims to steer short-term interest rates to be close to the policy rate by the ECB by providing necessary liquidity to the banking system (subject to the availability of collateral). Hence, the effect of deposit outflows (due to a rise in currency demand or purchases of treasury bills for example) on the banking system would be offset by liquidity provision from the ECB. In addition in the euro area, reserve requirements are very low (and remunerated) and it is highly unlikely that they could have an impact on the supply of bank loans.

Probably partly reflecting this, the seminal results from the Eurosystem Monetary Transmission Network (MTN) on the traditional bank lending channel for the euro area were mixed (see Angeloni et al., 2003).¹⁰ The results from the MTN suggested that only a small part of the reduction in loan growth in most euro area countries resulting from increases in interest rates was transmitted via supply effects. These supply effects were, however, weaker than those seen in the United States. In particular, the key factor in Europe seemed to be whether banks were holding high or low levels of liquid assets. The banks holding more liquid assets showed weaker loan adjustment in the wake of changes to the short

(GMM) estimation procedures or the use of sampling procedures to isolate certain shocks to the banking sector. Overall, identification issues and endogeneity problems remain one of the most challenging aspects to be tackled by this literature (see Peek and Rosengren, 2009).

term interest rates. But in contrast to the US, monetary policy does not have stronger effects on the lending of small banks. This finding was explained by some structural characteristics of European banking markets: the importance of banks' networks, state guarantees and public ownership (Ehrmann et al. 2003 and Ehrmann and Worms, 2004).

The question is whether the mixed results obtained for several euro area countries imply that financial intermediaries only have a negligible effect on the transmission mechanism of monetary policy. It could also be the case that banks do have an effect from a transmission mechanism standpoint but in a rather different form than the one usually depicted in the classical models.

In this regard, the current focus of the empirical literature is on how the various financial imperfections within the banking system (which are not included in models of the traditional bank lending channel) may affect the transmission mechanism of monetary policy (see Bernanke, 2008). Foremost among these imperfections are: the role of bank capital regulation, new forms of market funding and innovation in credit markets risk transfer.¹¹

It could be the case that recent developments in the euro area financial system, such as financial deregulation or financial innovation, could lead to different results when a more recent data window is studied than that of the MTN.

Bank capital and the effects of the crisis on credit supply

There is mounting evidence to suggest that bank capital is a potentially critical factor affecting banks' behaviour, particularly in times of financial stress. Van den Heuvel (2004, 2008) shows that bank capital affects lending even when regulatory constraints (e.g. those specified under the Basel framework and/or national capital requirements) are not binding, and that shocks to bank profits, such

⁹ A very useful description of the monetary policy implementation across countries is reported in Bindseil (2005). See also Disyatat (2008).

¹⁰ The MTN was an extensive three-year joint effort by the European Central Bank and the other Eurosystem central banks.

¹¹ In parallel some recent theoretical work incorporate aspects of banks' behaviour such as competitive conditions on banking systems (i.e. assuming monopolistic competition) and/or assuming that shortages in bank capital could reduce the economy's ability to withstand shocks (Meh and Moran, 2008; Gerali et al., 2009). See also Van den Heuvel (2002), Aikman and Paustian (2006) and Markovic (2006) whose framework features costly state verification.

as loan defaults, can have a persistent impact on lending.¹² He also suggests that monetary policy affects bank lending via the net worth position (or perceived solvency) of banks, indicating the existence of a bank capital channel which is different from the traditional textbook case. These results are in line with recent euro area evidence which suggests that bank capital can indeed have an impact on bank lending (Gambacorta and Mistrulli, 2004)¹³ and earlier but strong US evidence (see Kishan and Opiela, 2000). It is also highly probable that during the recent crisis, capital constraints on many banks might have limited supplied lending (Hempell and Kok-Sørensen, 2009). Along this line Beltratti et al. (2009) showed that stock market prices of banks with more Tier I capital have also done relatively better (in terms of supplied lending) during the crisis than low-capitalized banks.

Evidence from the syndicated loan market in the US during the crisis provides support for the existence of very significant supply constraints both in terms of quantities (Ivashina and Scharfstein, 2008) and price of credit (Santos, 2009). Using flows of funds data from the United States, Cohen-Cole et al. (2008) also argue in this direction. According to their results although the amount of outstanding lending has not decreased significantly during the first quarters of the crisis, this was not due to “new” lending but mainly due to the use of loan commitments, lines of credit and securitization activity returning to banks’ balance sheets.

From the perspective of both the narrow and the broad credit channel, a very interesting development, particularly in the euro area, has occurred during the recent credit crisis. In particular, non financial corporations were able to raise substantial amounts of funding via the corporate bond market even if at very high interest rates (see Figure 1). That is, many of the very large firms have been able to bypass supply constraints from the banking sector and this cast some doubt on the main hypothesis of the Bernanke and Blinder (1988) model. Namely, the imperfect substitutability between bank lending and bonds, at least for large borrowers. This was indeed a possibility that did barely exist prior to the introduction of the euro when a deep corporate bond market did simply not exist (De Bondt and Marques-Ibanez, 2005).

¹² See also Bolton and Freixas (2006).

¹³ See also Altunbas, De Bondt and Marqués (2004).

Overall, it is still early to draw firm conclusion on the quantitative effects of the financial crisis on credit supply. For a more complete assessment the collection of more complete information on borrowers, banks and loans characteristics at the individual level is warranted. Unfortunately most of these pieces of information are confidential and not standardised across countries.

Market funding, securitisation and the credit supply

Since the launch of the new currency, innovations in credit markets in the euro area had a significant impact on banks' ability and incentives to grant credit and, more specifically, on the effectiveness of the bank lending channel. Two major innovations in this respect have been the greater reliance on market sources of funding of banks, be it traditional (i.e. expansion of the covered bond market) or via developments in financial innovation (i.e. dramatic increase in securitisation activity). The significant recourse to specific funding instruments, such as covered bonds and securitisation, have made banks increasingly more dependant on capital markets. It has also made banks less dependent on deposits to expand their loan base (see Figure 2).

Financial innovation in the form of the increased use of market funding seems, to have buffered the effect of the bank lending channel prior to 2007, as under normal conditions, banks were able to easily switch from deposit to alternative forms of financing.¹⁴ Specifically, banks could use non-deposit sources of loan funding, for instance by issuing certificates of deposit or covered bonds or obtaining funds from affiliates. The presence of internal capital markets in bank holding companies may indeed isolate exogenous variation in the financial constraint faced by subsidiary banks. Ashcraft (2006) and Gambacorta (2005) show that affiliated bank loan growth rate is less sensitive to changes in monetary policy interest rate than that of unaffiliated banks. In other words, owing to the presence of internal capital markets, banks affiliated with multi-bank holding companies are much "larger" than their actual size indicates, at least in terms of their ability to smooth policy-induced changes in official rates. This depends

¹⁴ This argument is equivalent to the Romer and Romer (1990) critique to the existence of the bank lending channel and hinges on the demand from financial markets for certificates of deposit and other bank securities, which might not always exist, particularly during periods of banking problems.

upon the fact that a large holding company can raise external funds more cheaply and downstream funds to its subsidiaries. Similar results are obtained by Ehrmann and Worms (2004) and Altunbas, Marques-Ibanez and Zhussupova (2008). Overall this evidence suggests that the role of the bank lending channel may be reduced in the case of small banks affiliated to a larger entity.

At the same time, the recent crisis suggests that since banks are more dependent on market funding there is a closer connection between bank health conditions and the cost of fund raising. As a result, also banks' incentives and ability to lend are likely to be more sensitive to financial markets conditions than in the past when banks were overwhelmingly funded via bank deposits.¹⁵ From a monetary policy perspective, this would mean that the impact of a given level of interest rate on bank loan supply could change over time according to financial market conditions.

Another strand of the recent literature focuses on the role of securitisation (see Marques-Ibanez and Scheicher, 2009). The idea is that the spectacular growth in securitisation activity in recent years (see Figure 3) has modified the functioning of credit markets and can also have implications for the incentives of banks to grant credit and react to monetary policy changes.

First, there is significant evidence coming from the US that securitisation has led to laxer screening of borrowers (see Dell'Ariccia, Igan and Laeven, 2008; Keys et al., 2008). These papers assume that when securities are passed through from banks' balance sheets to the markets there could be fewer incentives for financial intermediaries to screen borrowers. In the short term, this change in incentives would contribute to looser credit standards, so some borrowers who in the past were denied credit would be able to obtain it. In the long term, this would lead to higher default rates on bank loans. The laxer screening of borrowers is typically linked to an expansion in the granting of credit. Indeed, Mian and Sufi (2008) – using comprehensive information broken down by US postal zip codes, to isolate demand factors – shows that securitisation played an important role in credit expansion.¹⁶

¹⁵ This is mainly because deposits tend to be a relatively “sticky” source of funding and by definition, less dependent on financial markets conditions than tradable instruments (see Berlin and Mester, 1999; Shleifer and Vishny, 2009).

¹⁶ More tentative evidence from the euro area is consistent with these findings and suggests that securitisation may be leading to more bank lending (see Altunbas, Gambacorta and Marques, 2008) and looser credit standards (see Maddaloni, Scovel and Peydró-Alcalde, 2008).

Second, there is evidence that securitisation has detached credit supply from monetary policy changes. Findings for the US jumbo mortgage market suggest that securitisation activity could make the bank lending channel less effective (see Loutskina and Strahan, 2006). In line with this hypothesis, Altunbas, Gambacorta and Marques-Ibanez (2009a) found that, prior to the current financial crisis, banks making more use of securitisation were more sheltered from the effects of monetary policy changes. However, their macro-relevance exercise highlights that the effects of securitisation are far from a complete insulation of loan supply from monetary policy changes and that the role of shock absorber of securitization on bank lending could even reverse in a situation of financial distress.

More significantly, Altunbas, Gambacorta and Marques-Ibanez (2009b) find that bank risk plays an important role in determining bank loan supply and in sheltering it from the effects of monetary policy and GDP shocks. Interestingly, the greater exposure of high-risk bank loan portfolios to monetary policy shock is attenuated in the expansionary phase, consistently with the hypothesis of a reduction in market perception of risk in good times. This is the topic which will be analyzed in the next section.

Bank risk-taking channel

While standard transmission mechanism models assume that the direction of causality goes from monetary policy impulses to the supply of credit, some recent work argues that monetary policy could also have an impact on banks' incentives to take on risk. The question is whether the stance of monetary policy could lead to an increase in the "risk tolerance" of banks which could possibly trigger a credit supply shock if the risk taking proves to be excessive. This mechanism could, at least in part, have contributed to the build of bank risk during the current credit crisis (see Figure 4).

Following Rajan (2005), the risk-taking channel may operate because low rates increase asset managers' incentives to take on more risks for contractual, behavioural or institutional reasons – the so-called "search for yield". This would induce a disproportionate increase in banks' demand for riskier assets with higher expected returns. The "search for yield" may also depend on the "sticky" rate of (nominal) return targets existing in certain contracts which are prevalent in banks, pension funds

and insurance companies. For fund managers, the importance of this mechanism seems to have increased in recent years, owing to the tendency towards more benchmarking and *short-termism* in compensation policies.

Another way for the risk-taking channel to be effective is through the impact of interest rates on valuations, incomes and cash flows, which amplifies the well-known “financial accelerator” (Bernanke et al., 1996). Low interest rates initially boost assets and collateral values, and this may reduce the risk perception and thereby increase the risk tolerance of borrowers and banks (Borio, Furfine and Lowe, 2001).

This is the broad philosophy regarding the risk-taking channel of monetary policy transmission (see Borio and Zhu, 2008), which argues that financial innovation is likely to have enhanced the importance of the perceptions, pricing and management of risk as factors influencing the behaviour of banks. This could have strengthened the link between the stance of monetary policy and banks’ incentives for risk taking. In turn, this would suggest the existence of an additional “behavioural” channel for the transmission of monetary policy. Building on this idea, Jiménez et al. (2009) and Ioannidou et al. (2009a) show evidence of this link. They use two comprehensive confidential databases obtained from credit register data for Spanish and Bolivian banks and find evidence that a “too accommodative” monetary policy may have lead to additional (and probably excessive) risk taking by banks prior to the crisis.

Altunbas, Gambacorta and Marqués (2009c) contribute to the debate by evaluating if a risk-taking channel of monetary policy was actually in place at a global level. Using a comprehensive database of listed banks operating in the European Union (EU15) and the United States during and prior to the period of the financial turmoil, they find evidence of a significant link between monetary policy looseness – calculated using both the Taylor rule and the natural rate – and bank risk-taking. The main policy implication of this result is that central banks actions have an impact on bank risk attitudes and that monetary policy is not fully neutral from a financial stability perspective.

Conclusions

Until very recently there has been only a scant attention to the banking sector in macroeconomic models due to a number of reasons. These would include technical difficulties in including the banking sector and financial imperfections in a general equilibrium setting. The current credit crisis, however, has reminded us of the crucial role performed by banks in supplying lending to the economy especially in situation of high financial distress. This role seems to be very different to that depicted in traditional models of the bank lending channel. Indeed, the most recent literature stresses that financial innovation in bank funding, securitisation markets and bank solvency ratio have a deep impact on how banks finance economic activity.

Recent results also underline an additional dimension of the transmission mechanism of monetary policy, the “risk-taking channel”. A too accommodative monetary policy may cause an increase in risk tolerance contributing to excessive lending supply and the build up of a crisis. This means that monetary policy might not be fully neutral from a financial stability perspective.

It is too early to draw firm conclusions on possible long-run changes in the monetary transmission mechanism due to financial innovation. As in previous episodes of banking crisis, the preliminary existing evidence for the current crisis vouches for the existence of significant loan supply constraints. It also suggests that the establishment of the corporate bond market has dampened such constraints at least for the very large borrowers. This role of the corporate bond market as “spare wheel” of bank lending has occurred even in a situation in which adverse selection problems are perceived as very high. A final consequence is that the current crisis has dramatically emphasised the need for more detailed and standardised data on borrowers and banks’ conditions for a more careful quantification of bank supply constraints during the current and, in perspective, the prevention of future banking crisis.

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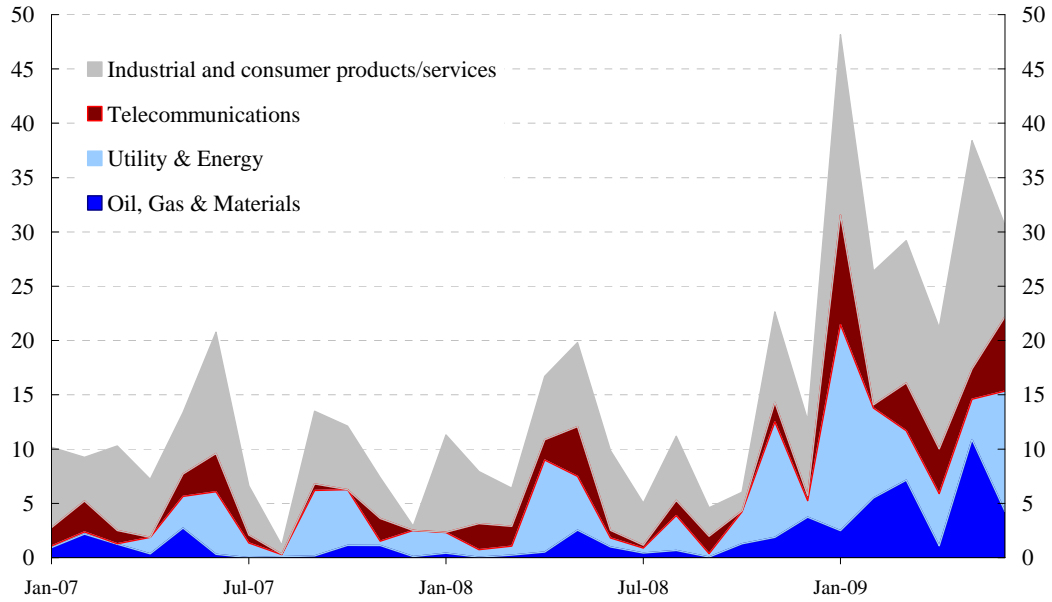
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Figure 1

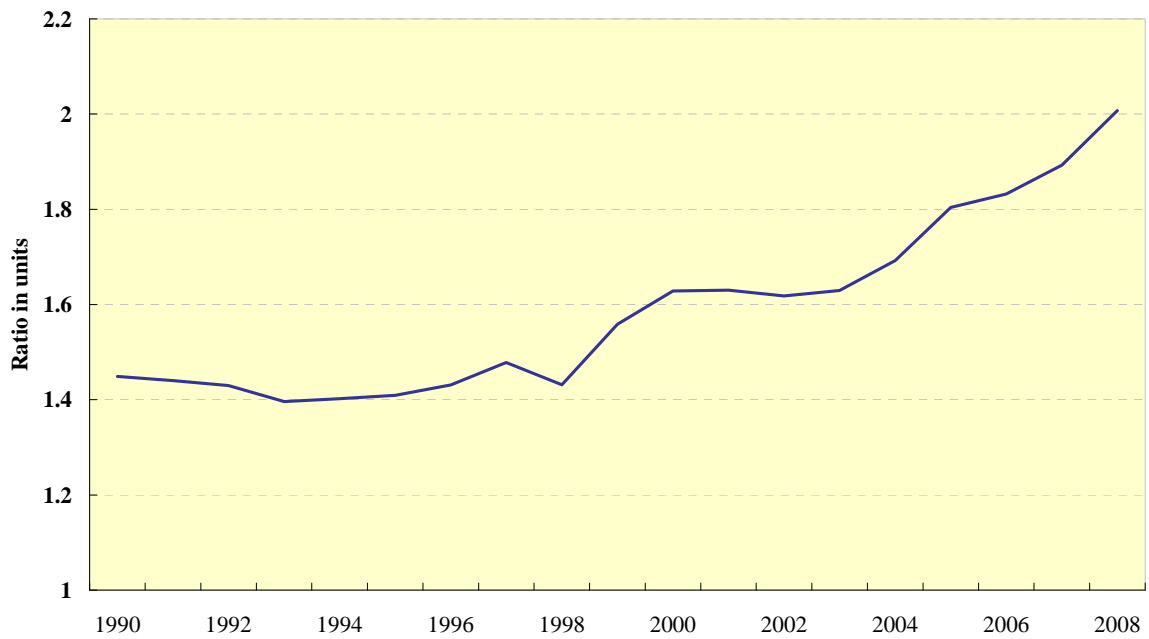
CORPORATE BOND ISSUANCE BY EURO AREA BORROWERS
(euro billions, only non-financial corporations are included)



Source: Dealogic.

Figure 2

TOTAL ASSETS TO TOTAL DEPOSITS OF THE LARGEST EURO AREA BANKS
(1)

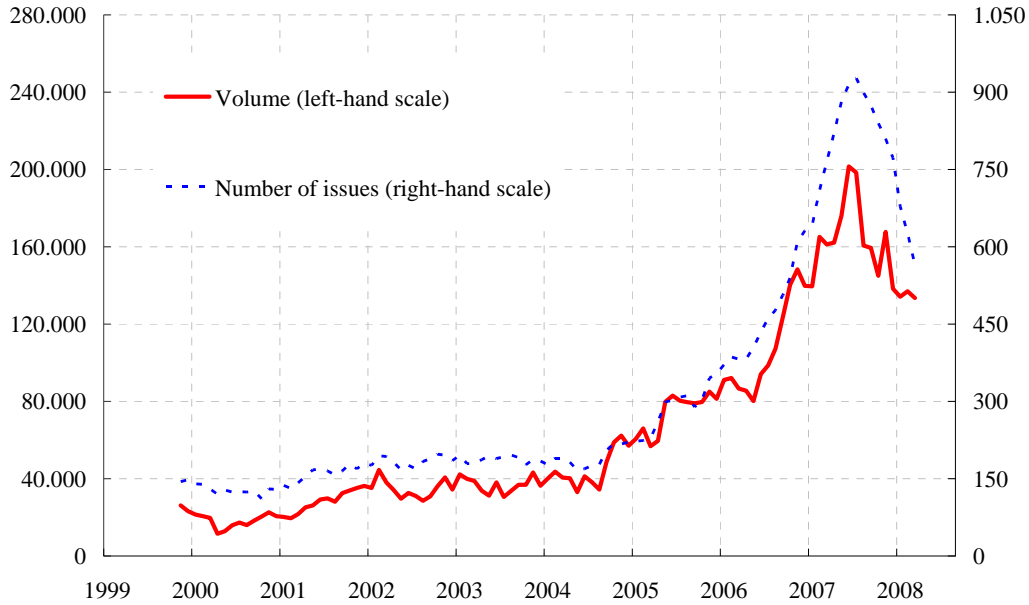


Source: Bankscope. (1) The sample includes Eonia banks.

Figure 3

SECURITISATION ISSUANCE IN EUROPE

(millions of euros, annual gross flows and numbers, 6 month moving averages of monthly data)



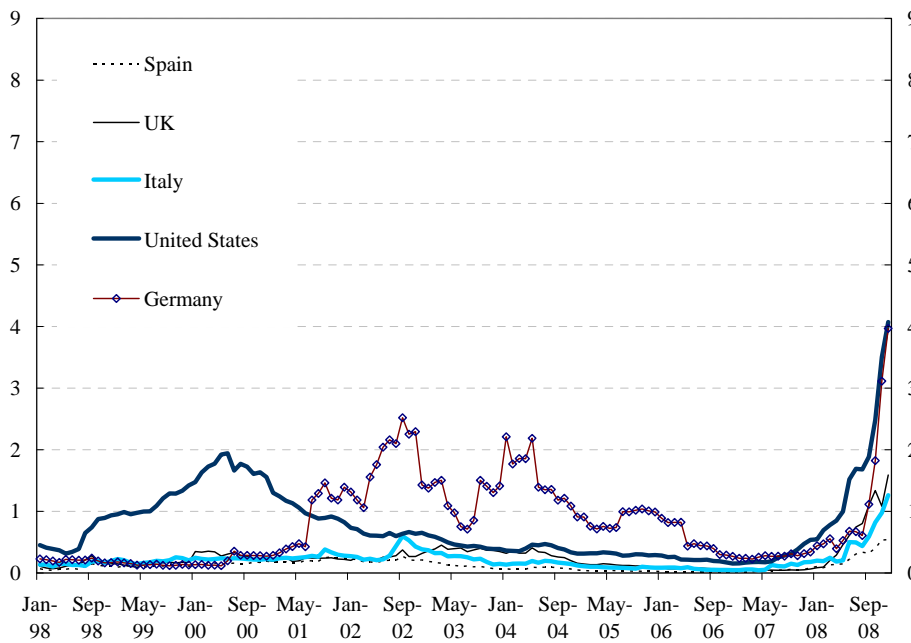
Source: European Commission.

Note: Total euro-denominated asset-backed securities issuance. Broad sample including all euro-denominated activity. It includes non-euro area European originators issuing in euro.

Figure 4

EXPECTED DEFAULT FREQUENCY

(one year-ahead, averages)



Source: Moody's KMV.