The effect of banks on the external finance behavior of firms

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Chapter 1

Introduction

1 Outline of the dissertation

Corporations face two crucial financial questions: What investments should the firm make? And how should it finance those investments? The first involves spending money, the second involves raising money. Therefore, raising capital is the lifeline of any corporation, and the efficiency of allocating various sources of external capital is an important determinant of the firm's cost of capital. The focus of this thesis is on the supply-side effects of corporate finance. When firms are able to obtain the needed capital more easily, this can stimulate investment and economic growth. It is well understood that a developed banking system improves economic growth (Levine and Servos (1998)).

Banks serve two main purposes: they act as delegated monitors and provide liquidity. The role of delegated monitor has been created to attenuate the problem of asymmetric information. This improves resource allocation and economic activity. Through this mechanism, efficient bank markets have a positive effect on economic growth. Modigliani and Miller (1958) show that in an Arrow-Debreu world without frictions such as taxes or asymmetric information, it doesn't matter how external capital is raised. In other words, the size of the pie is unaffected by the way it is sliced. This result started a whole literature which relaxes the stringent Arrow-Debreu assumptions. We contribute to this literature by investigating the impact of relaxing the following assumptions of perfect competition an symmetric information in financial markets. As European firms are still heavily dependent on bank loans for their external finance (ECB (2007)), the focus of this dissertation is on banks as providers of external finance. Alternative sources for external finance besides bank loans have also developed over the last decade. The introduction of the Euro has helped to create a truly European bond market. However, issuing bonds has long been the privilege of (very) large firms. The percentage of firms

issuing a bond is only 14.2%. The median firm that issue bonds has total assets of € 1,251.45 million whereas the median firm in the sample has total assets of € 136.58 million.

Following the second banking directive of 1989, the European banking markets have been exposed to a wave of mostly domestic mergers and acquisitions. As a result, half of the European countries have now a banking market which is characterized by 5 large banks taking at least 60% of the market share, a textbook case of an oligopoly. Moreover, the financial crisis changes the bank market structure as mergers and acquisitions are approved by regulators which would likely not pass the bar in normal times on grounds of anti-trust issues. An example is the takeover of Halifax Bank of Scotland by Lloyds TSB. This takeover will increase the concentration in the British banking market by 8.3%. An important aspect of an oligopoly is that companies can behave strategically. When there is perfect competition, everyone is a price taker as no company is large enough to set the price. However, when there are a small number of companies, they can start to (tacitly) cooperate to the detriment of their customers. The first two chapters investigate whether the bank market structure of the European banking markets leave the banks scope to set the prices and/or quantities of loans which are worse for costumers than in the case of perfect competition. In the first chapter, we examine the capital structure of non-financial listed companies. In the second chapter, we investigate the loan characteristics in the syndicated loan market.

Another implication of the Second Banking Directive of 1989 is that it contains provisions allowing all banks to pursue strategies leading to a German-style universal bank. Banks can hold equity stakes in non-financial firms, be they subject to certain regulatory limits. As banks can exploit both their information obtained from lending

to a firm as well as from being a shareholder it has a potential advantage over the average shareholder. Furthermore, institutional investors such as mutual funds and pension funds have become more important as owners of corporate equity. Institutional investments in world equity markets have grown substantially in recent decades to such a degree that financial institutions have emerged as the largest investor class in many countries (IMF 2005). Therefore, we examine in chapter 3 the impact of banks as shareholders of non-financial companies.

The final chapter investigates the impact of bank regulation and oversight on bank liquidity provision. We focus in particular on the requirements that the regulators set with regard to bank capital. The banking market is a heavily regulated industry due to state guarantees such as deposit insurance. Moreover, the financial crisis has made the importance of regulation very clear as it fuels a whole new wave of proposals such as the Larosière report and the "Volcker Rule". The difference between Europe and the U.S. appears to be an emphasis on macro-prudential regulation in the former while the stress is more on micro-tuning of the banking sector in the latter. The Basel Committee on Banking Supervision (BCBS) released, in 2004, the new Basel Capital Accord (Basel II). One of the central changes proposed by Basel II is that assets have be marked-to-market instead of marked-to-book. The banks have criticized the mark-to-market rule which lead to the following quote by Warren Buffet "In one way, I'm sympathetic to the institutional reluctance to face the music. I'd give a lot to mark my weight to 'model' rather than to 'market.'" (Fortune, 8/16/07). However, a consultation round for a new Basel Capital Accord was initiated by the BCBS in December 2009.

Since August 2007, we have witnessed the most severe financial crisis since the Great Depression of the 1930s. Due to large surpluses on the current accounts of China and

large deficits on the current accounts of the U.S., China invested in the U.S. in treasury bills from the U.S. This demand for treasury bills led to a very low interest rate on these bills. This very low yield caused the search of institutional investors for new products with higher yields but the same low risk as treasury bills. The names of these products are all too familiar: the most mentioned are Collateral Debt Obligations and Asset Backed Securities. The consensus on the start of the crisis is that banks who created these sophisticated products assessed the risk wrongly. The assumption that housing prices would decline was not stress tested and when this decline eventually occurred the losses were dramatic. The financial crisis has shown the importance of financial stability and the dangers of systemic risk. The problems of asymmetric information between the banks were so high that the inter-bank market all but dried up. Massive liquidity injections of the central banks were needed to keep the financial system afloat. Additionally, many governments had to step in and rescue several banks, creating huge financial burdens for their citizens. Moreover, banks play a critical role during periods of financial crisis because they are highly leveraged and regulated institutions. To maintain their capital ratios after experiencing a large negative capital shock, they must significantly shrink assets, which in turn tends to amplify the effects of economic shocks. Thus, the growing acceptance among investors that banks need to recapitalize led the crisis to deepen further and rendered it more difficult for policy makers to maintain macroeconomic stability.

2 Bank competition

In the second chapter, we investigate whether the market structures of European bank markets affect the access of non-financial firms to bank finance. More specifically, we

empirically examine the relationship between the degree of concentration of European bank markets and the capital structure of non-financial firms. To make it more tangible, imagine two identical firms in all but one thing, their location. One firm is situated in Belgium, a very concentrated banking market, and the other firm is located in Germany, a much less concentrated banking market. The standard view in industrial organization is that concentration can lead to market power. In our case, when there are few banks competing in an industry, it is easier for them to collaborate which can be detrimental to firms. Firms in the more concentrated banking market would be more restricted to obtain external finance which would be reflected in their capital structure. As a result, they would have less external capital and therefore less leverage. However, a large banking literature has shown that the reverse might hold true. A larger, more concentrated banking industry can produce relationship improvements between the banks and the borrowers. These banks have more information and can therefore better assess which firms should be given a loan. Overall, the results lend empirical support to the market power hypothesis which states that more concentrated bank markets lead to more market power for the banks and less bank financing. A negative and significant relationship between the degree of concentration of European bank markets and the market leverage of non-financial firms is found. Since the mean level of bank market concentration across the countries is 0.061 and the 75th percentile is 0.109, a change from the mean to the 75th percentile would mean a drop in firm leverage of 4.3%. When bank market concentration variables are substituted for indicators of bank competition based on the observed behavior of banks, the results remain unaltered. An increase from the mean to the 75th percentile of CR5, the Lerner Index or the Boone Indicator leads to a respective decrease in leverage of 8.0%, 7.1% and 3.5%. Since endogeneity of bank market structure, alternative sources of external finance

and the firm-specific factors driving the demand for leverage are controlled for, these findings reflect a supply-side effect. Thus, the ongoing consolidation of bank markets may impose an external debt finance constraint on non-financial firms. However, firms with effective access to the bond market are not constrained in their choice of leverage, stressing the importance of alternatives to bank financing. The results imply that the ongoing (domestic) consolidation of the banking industry in Europe can potentially hamper the access of firms to bank financing. This calls for renewed efforts to increase the contestability and integration of bank lending markets in Europe.

In chapter three, we focus on a specific market, namely the syndicated loan market where we use loans up to 29 January 2010. Syndicated loans are large loans that are provided by a group of (investment) banks - the syndicate - to a single borrower. Syndicated loans are a hybrid form of private and public debt. Like standard bank loans, they are much more flexible than public debt placements and are often tailored to the borrower's needs. Like bond issues, they can raise very substantial volumes of funds, and are placed among a potentially large number of institutions at harmonized conditions for all. In contrast to a traditional bank loan, which involves a relationship between a borrower and a single lender, a syndicated loan is originated by a "lead bank" which sells pieces of the loan to other (participant) banks. Before and after the syndication, the lead bank acts as an agent for the lending syndicate in collecting and processing information about the borrower. The lead arranger conducts due diligence on the borrower and signs a preliminary loan agreement ("mandate") with the borrowing firm that specifies covenants, fees and collateral. Once the preliminary loan agreement is signed, the lead arranger then turns to potential participant lenders to fund part of the loan. Each participant is responsible for a share of the loan and the terms of the loan are identical for all syndicate members. In addition to interest and commitment fee income, the lead

arranger receives a fee for arranging and managing the syndicated loan, which is paid by the borrowing firm. During the life of the loan, the lead arranger typically also acts as the 'agent' bank that monitors the firm, governs the terms of the loan, administers the drawdown of funds, calculates interest payments, and enforces financial covenants. A significant home bias has been documented in the syndicated loan market, indicating that large firms are dependent on their national banking market. Moreover, the overall European banking market is still far from integrated. The findings above suggest that bank market structure may explain some of the variation in bank loan characteristics of large listed firms. Results show that more concentrated banking markets decrease loan spreads, but have no effect on loan size or loan maturity. The price effect is both statistically and economically significant. The average loan spread will decrease by about 23 basis points if a borrower moves from a country in the sample with the lowest banking concentration to a country with the highest banking concentration, all else equal. When we use alternative measures of bank market structure such as CR5 and the Boone Indicator the loan spread decrease by 10.1 and 14.6 basis points respectively going from the minimum to the maximum. We also examine loans offered to firms during the financial crisis period. We find that banks respond by turning to large loans and increasing loan spreads. We find that the increase in loan spreads since the crisis is relatively higher for firms in countries with more concentrated banking markets. The results draw a more nuanced picture. The previous chapter finds a negative effect of more concentrated bank markets while this chapter finds that more concentrated bank markets lead to lower spreads and no effect on volume. Nevertheless, in the previous chapter the result is dependent on the size of the borrower. The companies in the largest quartile are found to be not affected by bank market structure in chapter 2. This chapter adds information for this subsample of companies showing the positive impact of bank

market structure for these large firms and shows that a more concentrated bank market worsens the lending conditions during a crisis. The policy implications therefore remain to increase the contestability and integration of bank lending markets in Europe.

3 Bank Ownership

In chapter four, we investigate whether or not banks play a positive role in the ownership structure of European listed firms. This is a topical issue since the financial crisis raises questions about the optimal scope of banking. Should the role of banks be restricted to financial intermediation or do banks also have a role to play as shareholders of non-financial corporations? We examine the relationship between bank ownership and the performance of the firms in which they act as shareholders. Research in the 1980s and 1990s concluded that German and Japanese firms benefited from the active involvement of their main bank in their corporate governance. This was part of the rationale for the deregulation of the banking systems in Europe. Therefore, we make a distinction between banks and other institutional investors as shareholders for a large sample of listed European firms. Banks, and the bank trusts they manage, are treated as a separate group next to institutional investors, such as mutual funds, pension funds trusts, private equity firms, financial companies and insurance companies. Banks can hold both debt and equity in corporations. This combination may give banks additional power in the disciplining of corporate management. Institutional investors can only use the powers attached to their equity stakes to exert influence. In the empirical set-up of the paper three relationships are explored simultaneously. The first is the link between the ownership structure of firms and their performance, measured as the Tobin's Q. The second is the relationship between ownership and the firm-specific or institutional

determinants. Since leverage may serve as a disciplining device, a third association is that between the observed leverage of a firm and its ownership structure, obviously with a special focus on banks, since they can hold both debt and equity. Hence, we tackle the following questions. What are the determinants of bank and institutional investor ownership in non-financial firms? What is the effect on the long-run corporate performance of bank versus institutional investor ownership? What are the interactions between ownership, leverage and performance. The main results can be summarized as follows. First, financial institutions, both bank and non-banks, typically hold equity stakes in large, cash rich and widely held firms which are moreover characterized by high dividend yield and a lower than average investment risk, measured as the volatility of the weekly stock market returns. The preference for dividends and low-risk stocks is most pronounced for institutional investors. We interpret these findings as evidence that financial institutions behave like typical investors, seeking return rather than influence. Second, after controlling for the capital structure decision of the firms and the ownership decision of financial institutions in a simultaneous equations model, we find that there is a negative relationship between financial institution ownership and the market value of firms, measured as the Tobin's Q. This negative value effect holds for banks as well as institutional investors. This is in sharp contradiction with the monitoring hypothesis. The findings reveal no evidence that banks, which can use both debt and equity as potential monitoring instruments, as well as institutional shareholders, are effective monitors of corporate management. This questions their role as shareholders. Third, although the presence of financial institutions in the ownership structure of firms is associated with higher levels of leverage, this feature does not function as an effective disciplining device for managers. Instead we find a negative association between leverage and the market value of firms. Over the sample period, banks have reduced their equity

holdings in non-financial firms. Given the results, this seems to be socially optimal. The financial crisis forces banks and regulators to review the scope of banking franchises. It might be advisable to restrict banks in their holdings of equity of non-financial firms. Banks should focus on intermediation and not combine lending and equity stakes, because this may create conflicts of interest. Institutional investors have become more important than shareholders. Yet the results indicate that their value added in terms of creating shareholder value is limited. This may have different reasons. One plausible explanation could be that most institutional investors, such as mutual funds and pension funds, have fiduciary duties to their own investors and typically track large stocks in widely used stock market indices. This would imply that they merely act as investors and do not seek to monitor or influence corporate managers. In order to provoke a more active stance as shareholder this class of owners should use their voting rights more actively.

4 Liquidity

In the final chapter, we examine the impact of bank regulation and supervision on bank liquidity provision. As one of the main reasons for the existence of banks besides delegated monitoring is the role they play as liquidity providers, it is important to understand how bank regulation and supervision affects the liquidity provision behavior of banks. The valuation under Basel II (mark-to-market) increases the sensitivity of a bank's capital requirement to the risk of its assets and may accentuate the procyclical tendencies of banking. During a recession, bank borrowers are downgraded by the credit risk models in use, minimum bank capital requirements will increase. To the extent that it is difficult or costly for banks to raise external capital in bad times, this

co-movement in bank capital requirements and the business cycle may induce banks to further reduce lending during recessions, thereby amplifying the initial downturn. We investigate the effect of bank regulation on a specific measure of bank liquidity exposure in the syndicated loan market. The new proposed regulations and regulatory bodies, due to the current financial crisis, stress the timeliness and importance of our research question. We use indicators for the oversight of bank capital, power of the regulators, restrictions on bank activities, the independence of the supervisory authority and diversification of bank activities. When we compare the banks in the top quartile of liquidity exposure to those in the bottom quartile, the former have weaker oversight of bank capital, more restrictions on their activities, a more powerful and more independent supervisory authority and less diversification of bank activities than the latter. The regressions show that stronger bank capital oversight is associated with lower liquidity provision. This effect is economically important as a bank from the bottom quartile of capital oversight gives 17.7% more liquidity than a bank from a country with capital restrictions from the top quartile, everything else equal. Moreover, we find that the share of retail deposits over total deposits has a significant positive impact on bank liquidity. Interestingly, the coefficient is higher for lead banks than for participant banks suggesting that the advantage of retail deposits is larger for lead banks. The current financial crisis raises the additional question of how bank liquidity creation responds during crises. While the crisis has a significant negative impact on bank liquidity, we find that stricter bank regulation mitigates this negative effect during crisis and more powerful banking supervisors aggravate the negative effect of the crisis. We find a different effect of bank regulation for large banks where stricter bank capital regulation improves liquidity provision. Finally, a concentrated ownership structure attenuates the negative role of capital regulation for participant banks.

5 Future research

Given the results from the first two chapters, one can broaden the scope of the sample and include large non-listed companies. Allowing non-listed firms in the sample will increase the variation in external finance alternatives and shed light on the effect of firms being listed. It has been shown that the determinants of standard corporate finance used to explain the capital structure also apply to banks. Since bank competition plays a role in the capital structure of firms, it might be interesting to assess whether this effect of bank competition can be traced to the characteristics of the banks.

Bank ownership is associated with a negative effect on firm value. As I went to great lengths to identify the type of shareholder, a next step would be to include the identity of the banks. Knowing the identity of the bank would allow insights in the reasons why banks become shareholders or why they choose to sell their shares. Moreover, using the characteristics of both banks and firms, I can investigate whether bank shareholdings of a certain type or size influence firm investments.

The impact of the financial crisis has been addressed in chapter 2 and 4. However, many interesting questions remain. One of them is to assess the different monetary policies of the lender parents and the pass through of these policies in economic lending. The syndicated loan market provides an ideal sample as it provides not only detailed loan data for a cross-section of European countries but it also contains detailed information on a large cross-section of banks from 46 countries. This variation allows assessing the impact of monetary policy on bank lending.

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Chapter 2

Bank market structure and firm capital structure in Europe

Bank Market Structure and Firm Capital Structure in Europe

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Abstract

We explore the impact of concentration in the banking markets on the capital structure of publicly quoted non-financial firms in the EU15 over the period 1997-2005, an era marked by intensive merger activity in the banking sector. Our main finding is a negative and significant relationship between the degree of concentration of European bank markets and the market leverage of firms, indicating the persistence of credit constraints. This finding is robust when we use behavioral measures of bank conduct. This support for the market power hypothesis indicates that further measures are needed to make bank lending more competitive.

Key words: bank concentration, capital structure

1 Introduction

The positive role of the banking sector in enhancing economic growth through a more efficient resource allocation has been widely documented (Levine and Zervos (1998)). Since banks are important suppliers of funds to firms, the structure of bank markets as well as the effects of market structure changes on the lending behavior of banks may have an impact on the access of firms to bank finance. It is, however, unclear how bank market structure changes affect the access of non-financial firms to bank lending (Black and Strahan (2002)). More concentrated banking markets have been found to lead to lower growth, except for industries depending heavily on external finance (Cetorelli and Gambera (2001)). In this paper we examine empirically whether the structure of European bank markets affect the use of non-financial firms to bank finance. More specifically, we investigate the relationship between the degree of concentration of European bank markets and the capital structure of non-financial firms.

Theory offers conflicting predictions concerning the relation between bank market structure and the access to and the cost of bank lending. When banks become bigger and increase their market power, they may ration credit to specific types of firms or make loans more expensive. This "market power" hypothesis predicts that increased concentration in bank markets may lead to lower observed corporate leverage. However, information asymmetries or agency costs may induce banks to invest more in relationship lending and increase the supply of loans. This "information-based" hypothesis implies that bank market concentration will not hurt access to bank finance by corporations and may lead to a higher reliance on bank debt.

We contribute to two strands of the literature as our measures of bank market structure are on the country level. First, we contribute to the evidence on how the supply of external finance affects the corporate behavior of companies. In this literature the effect of bank market structure has received little empirical focus (Lemmon and Roberts, 2007; Leary, 2009; Sufi, 2007). As our measures of bank market structure are on the country level, the area is wider than the metropolitan statistical area (MSA) in the U.S. Moreover, despite the continuing convergence in EU, national borders do seem to play a role in bank financing (Berger et al., 2003). Second, we contribute to the debate on

the role of bank market structure on the external finance of companies where we focus on listed non-financial companies instead of small and medium enterprises (Petersen and Rajan, 1995; Zarutskie, 2006). We argue that the available geographic market definition of the banking sector is best suited for listed firms. Moreover, during the period under consideration, the European banking sector has been characterized by a wave of mergers and acquisitions, predominantly in the form of domestic consolidation (ECB, 2006). The result has been a substantial increase in the level of bank market concentration in most countries. Similarly, European bond and stock markets have witnessed a pronounced development and integration since the introduction of the Euro (Rajan and Zingales, 2003) making these markets important alternatives for external finance next to bank loans. Both time and cross-section variation in our measures of bank market structure and increasing competition between banks and bond and stock markets make the sample particularly interesting to investigate the impact of the evolving market structure of financial intermediaries on external finance decisions by non-financial firms. Another contribution to this strand of literature is the use of both traditional concentration measures and behavioral measures of bank market structure. Our final contribution relates to instrumenting our measures of bank market structure. We use country indexes of competition policy from Carletti et al. (2008). As these competition policies are not industry specific we argue that they are exogenous to the market structure of the banking sector.

The sample period, 1997-2005, covers sub-periods characterized by different business cycle conditions, so that our results are not driven by specific macroeconomic conditions. Methodologically, as in Faulkender and Petersen (2006), we attempt to integrate demand and supply factors that may affect leverage decisions by non-financial corporations. Furthermore, the panel structure of the data, using a sample of individual firms across different years, allows us to control for unobserved time-invariant firm heterogeneity (Lemmon et al., 2008).

Our main finding is a negative and significant relationship between the degree of concentration in the European bank markets and the market leverage of firms, implying that increased concentration of bank markets imposes an external debt finance constraint on non-financial firms. This finding is also economic significant, an increase in the bank Hirschmann-Herfindahl Index from the mean (0.061) to the 75th percentile

(0.109) leads to a decrease in leverage of 4.3%.These findings are robust when we use behavioral measures of bank competition (Lerner index and Boone indicator), instead of the traditional market structure indicators (Hirschmann-Hirfindahl Index and CR5). Our findings strengthen the case for further regulatory action aimed at stimulating competition in European banking markets.

In the next section we develop the main hypotheses: the information-based hypothesis and the "market power" hypothesis. The empirical strategy which integrates the demand and supply factors for corporate leverage is outlined in section 3. We then present our data on listed non-financial firms, different bank market structure variables and measures of alternative external finance (section 4). In section 5 we examine the determinants of leverage and the impact of our measures of market structure. The bank market structure variables are instrumented and we check the robustness of the results. We conclude in section 6 and present broader implications of our findings.

2 Determinants of corporate leverage: supply and demand factors

This paper examines the effect of bank market concentration on the availability of bank loans to non-financial firms. The literature has identified two alternative hypotheses: the "information-based" hypothesis and the "market power" hypothesis. Banks have an informational advantage over public lenders. Higher bank market concentration may make banks more efficient and strengthen this information advantage, thereby inducing banks to invest more in relationships. This should mitigate the asymmetric information problem which is the main cause for credit rationing (Stiglitz and Weiss, 1981) and therefore lead to more lending and hence, to higher observed levels of corporate leverage. We call this the "information-based" hypothesis. The alternative hypothesis is the market power explanation. Several theories predict a negative effect of bank consolidation on the availability of loans. A non-financial company which is confronted with a concentrated banking market may face less attractive loan conditions when banks effectively use their market power. As a result firms will decrease their use of bank debt and exhibit lower leverage, assuming the absence of alternatives for external debt finance. We call this the "market power" hypothesis. Previous empirical studies have reported

mixed results. On the one hand Petersen and Rajan (1994) and Zarutskie (2006) find support for the "information-based" hypothesis. Petersen and Rajan (1994) find that a change in the bank market Hirschmann-Herfindahl Index (HHI) of 0.01 increases the ratio Total Debt/Assets of a typical firm by 0.36 %. Zarutskie's (2006) main finding is that the firm Outside Debt/ Assets increases by between 0.19% and 0.77 % following an increase in HHI of 0.01.

Most research on the effect of bank concentration on lending originates from the U.S. Moreover, research has concentrated on privately-held firms, more specifically SMEs, both for the U.S. and other countries. There are solid economic reasons to focus on SMEs: they are smaller, they are more opaque and hence characterized by larger informational asymmetry and they are more dependent on bank financing for their investments than large public firms, suggesting that the effects of bank competition should be more pronounced for SMEs (Berger et al., 2005). In this study we focus on listed European firms because the geographical market definition of the banking sector is on the country level. While studies for the U.S. are able to use more refined concentration measures, we have to rely on country-based measures of bank market structure. However, this geographic market definition should not introduce a bias, because for most firms of our sample the country level can be considered as the relevant market. Numerous studies have investigated the level of financial integration in Europe and although there is considerable progress in some segments, the banking markets are found to be not fully integrated (Baele et al., 2004; Berger et al., 2003). Furthermore, if the European bank market was completely integrated, this would work against finding an effect of country-specific bank concentration on the capital structure of non-financial firms. Another important aspect is that we use market leverage as the dependent variable, which requires data on the market value of the firms under investigation. We argue that this strategy can yield useful results because European firms, even the larger ones, are still heavily dependent on bank financing. If anything, should we find lending constraints due to the bank market structure for listed firms, this would only strengthen the similar case for SMEs. Not only the size of the firm is important, the size of banks has also been found to impact the lending behavior of banks. Berger et al. (2005) find that bigger banks tend more to lend to larger firms or to those having better accounting records.

Relationship lending is the main property of bank lending for the "information-based" hypothesis. This is seen as the 'raison d'être' of banks since relationships may mitigate informational asymmetries (James, 1987). Ongena and Smith (2000) document large cross-country variation in the average number of bank relationships in large firms across 20 European countries. Firms maintain more relationships in countries with unconcentrated but stable banking systems and active bond markets. However, there has been no consensus on the effect of bank concentration on relationship lending (Boot, 2000). Chan et al. (1986) argue that more competition in the banking market implies less relationship banking, since borrowers might be tempted to switch to other banks or to the bond or stock market. Banks then anticipate that relationships have a shorter lifespan and invest less in relationships. A complementary negative effect of competition on relationship lending may come from the impact of competition on the intertemporal pricing of loans. Increased credit market competition could impose constraints on the ability of borrowers and lenders to share surpluses intertemporally. Therefore, banks will not fund young corporations (Petersen and Rajan, 1995). This suggests that competition leads to less lending. An alternative view is that competition may elevate the importance of relationships as a distinct competitive edge. Boot and Thakor (2000) show that a relationship orientation can mitigate pressure on profit margins. As a relationship banking orientation can make a bank more unique relative to competitors, interbank competition may increase the value of relationship banking. Hence, theory does not provide a consensus on the interaction between relationship lending and bank concentration.

The "market power" and "information-based" hypotheses focus on the supply of bank loans. In our empirical setup, we control explicitly for the demand of external finance and we incorporate the firm characteristics which have been found in the corporate finance literature to explain capital structure behavior. The predictions of these characteristics are discussed in the next section. First we examine collateral and size. Collateral is closely related to relationship lending as bank loan contracts can easily accommodate collateral requirements. An extensive theoretical literature shows that collateral can mitigate moral hazard and adverse selection problems in loan contracting (Chan and Thakor, 1987; Stiglitz and Weiss, 1981). However, collateral is likely to be effective only if its value can be monitored (Rajan and Winton, 1995). Besanko

and Thakor (1987) show that competition lowers the rents of lenders and suggest that the use of collateral is more likely with competition than monopoly. Bank concentration does not seem to alter the lender's incentives to invest in information. Where the theoretical literature provides no consensus, empirical work by Jimenez et al. (2006) suggests that there is a negative relationship between collateral and bank concentration. Finally, while the relevant market definition for European firms is the country level, we expect that the largest firms in our sample will have a truly European scope and bank concentration on the country level will therefore not impact those firms. As a result, we conjecture that the interaction between bank concentration and size will have the opposite sign of the effect of bank concentration.

Other institutional aspects, such as the importance and development, of the banking markets have been investigated for their impact on the capital structure of companies. Demirgüç-Kunt and Maksimovic (1999) use the importance of banks to examine the impact of access to financial intermediaries and find that countries with larger banking systems have companies with lower ratios of corporate net fixed assets to total assets. They further argue that differences in the financial institutions between countries affect non-financial firms' leverage. Fan, Titman, and Twite (2006) use the supply of funds that are available to the banking sector, assuming that the amount of funds that flows to the banking sector can be viewed as exogenous. They find that the bank sector influences the capital structure choice of firms as banks prefer offering their borrowers debt with shorter maturity. Rajan and Zingales (1995) find that whether companies are from a bank-based or a market-based country does not affect the level of leverage, their results suggest that bank versus market orientation leads to differences in the relative amounts of private financing (bank loans) and arms-length financing through market securities. Finally, Giannetti (2003) examines both listed and unlisted companies from eight countries in the EU for the period 1993-1997. The measures of the development of the financial markets, which includes a measure for bank concentration, are argued to proxy not only for the availability of equity and market debt in a country, but also to be indirect measures of the importance of banks. She finds that bank concentration has a significant negative impact on firm debt, "perhaps in order to escape banks' market power" (p. 208).

3 Empirical strategy

Faulkender and Petersen (2006) argue that information asymmetry and agency problems are the market frictions that make capital structure choices relevant but also imply that firms are sometimes rationed by their lenders. Thus, when explaining a firm's leverage, it is important to include not only the determinants of its preferred leverage (the demand side) but also the variables that measure the constraints on a firm's ability to increase its leverage (the supply side). Therefore, we follow their empirical strategy, since we focus our analysis on one particular supply side factor, i.e. bank market structure. To examine the role of credit constraints and help explore the difference between bank markets (e.g., loans) and public debt markets (e.g., bonds and equity); we consider firm leverage to be a function of bank market concentration and the development of both the bond market and equity market. The observed debt level is a function of the supply and the firm's demand, both of which depend on the price of capital.

$$Q_{demand} = \alpha_0 Price + \alpha_1 X_{demand\,factors} + \varepsilon_{demand} \tag{1}$$

$$Q_{supply} = \beta_0 Price + \beta_1 X_{supply\,factors} + \varepsilon_{supply} \tag{2}$$

If there are no supply frictions, firms can borrow as much debt as they want (at the correct price), and the observed level of debt will equal the demanded level. This is the traditional assumption in the empirical capital structure literature. Only demand factors explain variation in the firms' debt levels, where demand factors are any firm characteristic that raises the net benefit of debt.

However, if firms without access to public debt markets are constrained in the amount of debt that they may issue (private lenders do not fully replace the lack of public debt), or when they face concentrated banking markets, they will have lower leverage ratios, even after controlling for the firm's demand for debt. Equating the demand and supply, we can express the above equations as two reduced form equations – one for quantity and the other for price – so that each is a function of the demand and supply factors.

$$Q_{observed} = \gamma_D X_{demand\,factors} + \gamma_S X_{supply\,factors} + \mu \tag{3}$$

We use a measure of bank market structure or bank conduct to capture the external financing constraints imposed by the access to bank loans. As stated before, theory provides mixed arguments leading to two opposing hypotheses. On the one hand, higher bank market concentration may lead to more bank financing under the "information-based" hypothesis. On the other hand, concentration may be associated with less bank financing when the "market power" hypothesis holds. We control for two alternatives, bond financing and equity issuing. We expect that bond financing will be positively linked with leverage since firms can turn to the financial markets if the bond market is well developed. With respect to equity issuing, firms will be able to issue equity more easily if the stock market is well developed. As a result they will have lower leverage.

The demand factors are captured by the firm characteristics. Rajan and Zingales (1995) examine large companies from the G-7 and find that the firm characteristics that explain capital structure in the U.S. also explain leverage in other countries. Several factors have been found to have a robust correlation with cross-sectional differences in leverage (Frank and Goyal, 2005). Leverage is positively related to tangibility, size and median industry leverage, whereas it is negatively related to growth opportunities and profitability. Tangibility captures the presence of fixed assets which are easier to collateralize. Therefore, firms remain more valuable when they go into distress, hence firms with a lot of collateralizable assets will find it easier to obtain bank loans. Furthermore, the agency costs for firms with high tangible asset ratios are lower, as collateral makes it more difficult for shareholders to substitute high-risk assets for low-risk ones. The next factor is size. Large firms will have more debt since larger firms are more diversified and have lower default risk. Larger firms are also typically more mature firms that have a reputation in debt markets and consequently face lower agency cost of debt. Finally, median industry leverage reflects a number of otherwise omitted common factors and in a trade-off setting, the industry median debt ratio is likely to be a proxy for the target capital structure. The growth opportunities of the firm are negatively correlated with leverage since growing firms are assumed to lose more of their value when they go into distress. Furthermore agency costs, which can arise due to underinvestment, asset substitution or free cash flow are mitigated to a large extent in growth firms. Finally, the

negative correlation found for firm profitability is usually ascribed to lower expected bankruptcy costs and more valuable interest tax shields. Firms that generate higher profits relative to investments also benefit from the discipline that debt provides in moderating the free cash flow problem (agency cost). In our empirical setup, we include all these 'stylized' demand factors (Rajan and Zingales, 1995; Fama and French, 2002; Flannery and Rangan, 2006) next to the supply effect of bank market concentration to explain the variation in corporate leverage.

4 Data

The sample of non-financial firms is constructed from Amadeus, a pan-European financial database that provides detailed balance sheet and income data of companies in Europe and standardized balance sheet information with the objective of achieving uniformity and enabling cross-border analysis. We select all consolidated listed firms of the EU15 for the period 1996-2005. This sample of firms is merged with market data from Datastream; we use the ISIN code of the firm as identifier. To reduce the impact of outliers we winsorize the sample at the 1st and 99th percentile. We delete all observations for which one of the variables is missing, this leads to the exclusion of firms from Denmark for which no loan data is available and firms from Luxembourg for which no data on private bond capitalization is available [1] . The final sample is an unbalanced sample of 3,364 firms and 19,735 firm-year observations. Table 1.A presents an overview of the firm-specific variables used in our empirical analysis to capture the demand side together with their sources. The construction of the variables is standard in the literature (Rajan and Zingales, 1995; Flannery and Rangan, 2006). The dependent variable used in the analysis is market leverage which is constructed as the ratio of debt, both short and long term, over the sum of debt and market value of the firm. We

[1] We use yearly updates from 1999 to 2006 of Amadeus to mitigate attrition problems. For Greece no consolidated data is available. We also run the regressions without Greece, the results remain the same. We exclude all financial firms with NACE Rev 1.1 code 65 'Financial intermediation, except insurance and pension funding', 66 'Insurance and pension funding, except compulsory social security', 67 'Activities auxiliary to financial intermediation' and regulated firms, NACE Rev 1.1 code 75 'Public administration and defense; compulsory social security'. When we include Denmark and Luxembourg in the base regressions, the results remain unaltered.

also use book leverage, defined as the ratio of debt over total assets, but this leads to similar qualitative results.

The supply side is measured using several indicators of bank concentration and conduct at the country level (Table 1.B), the size of the bond and equity market at the country level and a dummy indicating whether a firm issues a bond (Table 1.C). The ECB provides yearly concentration figures for the EU15 from 1997 onwards in their reports on EU banking structure (ECB, 2004, 2006, 2007). The first measure is the Hirschmann-Herfindahl Index (HHI), calculated as the sum of the squares of the credit institutions' market shares, according to total assets. Our second measure is the CR5, which is the share of the 5 largest credit institutions in total assets in each country. The HHI ranges from 0 to 1 where 0 indicates perfect competition and 1 would indicate a monopoly. The assumption is that less players in the market and therefore a more concentrated market leads to less competition as the remaining players can exercise market power.

Nevertheless, banks are special in nature and it has been suggested that the standard paradigm, that higher concentration leads to market power (Bain, 1956), may not be appropriate for the banking industry (see Degryse and Ongena, 2008). Due to asymmetric information inherent in bank lending, banking competition may have a 'special nature' (Carletti, 2005). Therefore, in addition to HHI and CR5, which are well known and widely used concentration measures, we use two alternative measures for the observable competitive behavior of banks, i.e. the Lerner index and the Boone indicator, as robustness checks. The Lerner index measures the degree of competition based on the observed pricing behavior of banks (the indicator is calculated as (price – marginal cost)/price). The index can take values between 0 and 1, where 0 stands for perfect competition and 1 for monopoly power. Therefore, a positive sign would lend support for the "information-based" hypothesis whereas a negative sign would provide support for the "market power" hypothesis. Using the Lerner index, Fernández de Guevera and Maudos (2007) find support for a negative relationship between concentration and competition. Fernández De Guevara and Maudos (2007) calculate this measure for all the countries in our sample, until 2000. The Boone indicator measures the effect of efficiency in terms of marginal cost on market shares. The rationale is that competition enhances the performance of efficient firms (lower marginal cost) which will lead to higher market shares.

Moreover, this effect is assumed to be positively correlated with competition, hence the stronger competition is, the more negative the Boone indicator will be. Therefore, the interpretation of the impact of the measure will be similar to that of the Lerner index where a positive (negative) impact lends support to the "information-based" hypothesis ("market power" hypothesis). Van Leuvensteijn, Bikker, van Rixtel and Kok-Sørensen (2007) apply the measure to commercial banks. The Boone indicator is available for France, Germany, Italy, Spain, Netherlands and UK for the period 1997 to 2004 [2].

Alternative sources to bank financing are included using three indicators of financial market development; two are obtained from the Financial Development and Structure database of the World Bank and one from Datastream. We use the ratio of private domestic debt securities to GDP, as a proxy for the development of the bond market, and the value of listed shares to GDP as a proxy for the development of stock markets. Our final measure of access to external finance is obtained checking which firms issue a bond using the bond module in Datastream. This provides us with a dummy which has value one starting from the year that the firm issues a bond. We include this dummy to explicitly account for one particular outside financing option using the fact that some firms effectively use bond financing, whereas others do not.

Finally, we include measures to control for robustness (Table 1.D) such as a contestability measure of national bank markets in order to capture the potential competition banks face in their home markets. Claessens and Laeven (2004) find no evidence that bank sector concentration has a negative effect on competition in a sample of 50 countries, but report that contestability determines effective competition. The measure of contestability is the share of total assets of foreign branches and subsidiaries relative to the total assets of the banking sector in a particular country (ECB, 2007). The relative size of foreign branches and subisidiaries measures the incidence of foreign banks entering the market, which should increase the pressure on the incumbent banks to behave more competitively. Hence, we expect a positive impact of contestability on the leverage of non-financial firms.

[2] An alternative measure of bank behavior would be the Panzar-Rosse measure. Bikker and Haaf (2002) calculate this H-statistic for 23 European and non-European countries and find support for the view that concentration impairs competition. However, we lack sufficient data for this measure to apply it in our panel data framework.

In Table 2, columns 1 and 2, we report the mean of the two concentration measures (HHI and CR5) for the period 1997-2005 and their percentage change between 1997 and 2005 in each country in the sample. There is considerable heterogeneity among the European countries. Moreover, the percentage change in the HHI between 1997 and 2005 is positive in almost all countries, reflecting a considerable amount of consolidation in the banking sector. Columns 3 and 4 show that there is again a considerable degree of heterogeneity across countries for private bond market capitalization. However, there is no clear relation between the relative size of the country and the importance of its bond market. The relative stock market capitalization also differs across countries, where the bigger countries tend to have the most developed equity markets. The percentage of firms issuing a bond across countries in column 5 indicate that there is a large dispersion in terms of effective bond market use by firms, but also that bond issuing is still only a possibility for a small number of firms. When we subdivide the firms in the sample in deciles according to market value, 66% of the firms having issued bonds are larger than the 70th percentile.

The summary statistics of the firm variables are presented in Table 3. We find substantial cross-sectional variation in both market and book leverage. The average leverage ratio is 26.6 % with a median of 21.1 %. There is variation across countries as well as across firms within each country. The summary statistics are comparable to the numbers reported in previous research, predominantly with U.S. data (Rajan and Zingales, 1995; Giannetti, 2003; Flannery and Rangan, 2006). The table also shows cross-sectional variation in the country-level variables. Our main variable of interest, HHI, has a mean of 0.061 but an equally large standard deviation. Over the considered period the HHI ranges from a minimum of 0.011 to a maximum of 0.273, indicating the co-existence of bank markets with a high and low degree of concentration. The alternative measure for bank market concentration: CR5, ranges from 0.170 to 0.880. The smallest countries typically have more concentrated banking markets. Moreover, the size of firms may have an impact on external financing behavior. If the distribution of the firms according to size would show that the small countries have typically more small firms than big firms relative to big countries, there could be a size bias. Table 4 shows the sample divided into size deciles where the size of the firm is measured by its market value. The first decile represents the smallest firms and the tenth decile

the largest firms. In most countries the firms are relatively uniformly spread over the deciles. This distribution of firms across the countries in the sample indicates that any firm size bias should be negligible.

In Table 5 the Pearson correlation matrix indicates that multicollinearity should not be a serious problem. The correlations between leverage and the firm characteristics have the expected sign and suggest that profitability and growth opportunities may be negatively correlated with leverage, while size, tangibility and the leverage industry median are positively correlated with leverage. Noteworthy for our analysis, the correlations suggest that the country-level variables may potentially influence the capital structure choice. The correlation of leverage with both concentration measures is negative whereas the measure of private bond market capitalization is positive. Stock market capitalization is negatively correlated with market leverage. These raw correlations do not, however, control for other characteristics.

5 Empirical results

Our base model is:

$$leverage_{i,j,t} = \alpha Z_{i,t-1} + \beta X_{j,t} + \eta_i + \delta_t + v_{i,j,t} \tag{4}$$

where the dependent variable is market leverage. $Z_{i,t-1}$ captures the demand side and contains all the firm characteristics that are standard in the empirical corporate finance literature (fixed assets, growth opportunities, size, profitability and industry median leverage). These variables are lagged to attenuate the endogeneity problem. $X_{j,t}$ captures the supply side and contains bank concentration or bank conduct (HHI/CR5/Lerner/Boone), private bond market capitalization over GDP (Private Bond), the stock market capitalization (Stock Market Cap) or a dummy variable taking the value one from the year onwards in which the firm starts issuing bonds (Dummy Bond). We use the subscript j to indicate that these variables, except for Dummy Bond, are at the country level. We use panel corrected standard errors allowing for heterogeneity

at the firm level (i.e. Rogers standard errors).[3] We argue that the fixed effects specification is the relevant one, both from a methodological and an economic point of view. First, including firm fixed effects alleviates the concern of omitted variable bias. Second, when one is interested in partial regression coefficients, holding other effects constant, what matters is whether the effects are independent of the observed regressors or not (Arellano, 2003). In addition, Lemmon, Roberts and Zender (2008) state that, given the importance of unobserved heterogeneity in leverage, parameter estimates that do not account for the firm-specific effect and serial correlation are suspect. Therefore, we use a within transformation by incorporating firm fixed effects and use panel corrected standard errors allowing for heterogeneity at the firm level (Rogers standard errors) together with year dummies (dummy for 2005 is excluded) to control for serial correlation. Finally, fixed effects at the firm level also control for industry and/or country effects. Therefore, the firm effects will encompass not only firm-specific characteristics but also those regulatory and macroeconomic conditions in the different countries that do not change over time.

5.1 The determinants of leverage

Table 6 presents the basic regressions. In the first column we explain the variation in the leverage ratio by only including firm characteristics in order to capture the demand side of corporate financing choices. In the second column we introduce the HHI as a measure of bank market concentration in order to take the supply side of bank loans into account. In the third column we also control for alternative sources of finance, i.e. the bond and the stock market. The last three columns show the results when, respectively, CR5, the Lerner index or the Boone indicator are used as alternative concentration or competition measures.

The first column shows that the coefficients of the firm characteristics have the expected sign and our results are broadly in line with previous findings in the literature

[3] We do not use the Fama-MacBeth estimation technique since Petersen (2007) documents that this estimation method is less suited for panels with a large cross-section and small time series.

(Rajan and Zingales, 1995; Giannetti, 2003; Fama and French, 2002). Firm profitability has a negative sign and is significant. The market-to-book ratio (proxy for growth opportunities) and depreciation have the expected sign but they are statistically insignificant. Size, tangibility and the industry median have positive and significant coefficients. These findings remain robust throughout the different specifications, indicating that the firm-specific variables capture the demand for external debt finance adequately. The question is whether loan supply conditions, captured by the degree of bank market concentration and its evolution over time, have a significant influence on the firms' choice of leverage.

The second column shows that bank market concentration, measured with the HHI, has a significantly negative effect on the observed levels of firm leverage when included separately. In the third column, we include the proxies for the alternatives to bank financing, the bond and stock market capitalization variables, but the HHI remains negative. This suggests that higher levels of bank market concentration cause a more difficult access of firms to bank loans or may even lead to some degree of credit rationing. This is consistent with the "market power" hypothesis. Since we account for the demand side of corporate leverage, our results imply that bank consolidation may cause financing constraints, even for the larger firms in the economy. Looking at the economic impact of higher bank market concentration on firm leverage, a change in HHI from the mean (0.061) to the 75th percentile (0.109) leads to a decrease in leverage of 4.3%. A change in HHI of 0.01 would lead to a decrease in leverage of 0.9 %, which is in line with the results found for SMEs (Petersen and Rajan, 1994; Zarutskie, 2006). The private bond market capitalization variable is insignificant in this specification. We have to interpret this finding with caution since, even though Table 2 indicates that only a small proportion of firms in Europe effectively have access to the bond markets, it is unlikely that more developed bond markets would have no effect on the capital structure choices of all firms. What's more, the corporate bond market exhibited substantial growth only after the introduction of the Euro in 1999 (we will test for this break later on). The stock market capitalization variable has the expected negative sign: the better developed the stock markets are, the less firms opt to hold debt.

The next three columns present the results with alternative measures of bank concentration. In column 4 we observe that the CR5 measure of bank market concentration

is negative and statistically significant. This corroborates the findings with the HHI, which is not unexpected given the high degree of correlation between both measures reported in Table 5. In the next two columns we include two behavioral measures for the degree of bank competition, as alternatives for the market concentration variables. The coefficients for both the Lerner index and the Boone indicator are negative and significant, corroborating the results for the HHI or CR5. The stock market variable remains unaltered, whereas the bond market variable now is significantly positive, as expected. Therefore, the alternative measures for bank market competition confirm the finding that a less competitive bank market structure has a negative effect on firm leverage, which is consistent with the "market power" hypothesis. The economic significance remains as an increase of one standard deviation in CR5, the Lerner Index and the Boone Indicator leads to a respective decrease in leverage of 8.0%, 7.1% and 3.5%.

5.2 Endogeneity

Using observed changes in bank market structure to explain differences in leverage across countries can create an endogeneity problem. The market structure of the banking sector can itself be influenced by firms' financing decisions. Moreover, the development of other institutions could drive both the bank market structure and firm leverage. While an individual firm takes the market structure of the banking sector as given, that market structure may be affected by the aggregate decision of all firms. One plausible explanation could be that companies with higher leverage have higher investment. Hence, these companies will need more external capital, which could trigger the entry of foreign banks in that country, thereby altering the market structure of the banking sector. To address the endogeneity issue we re-estimate the baseline regression using the instrumental variables approach. We follow Fan et al. (2006) and use the size of bank deposits in a country and the amount of non-life insurance premiums as instruments for bank market structure. Demirgüc-Kunt and Maksimovic (1999) propose the country's level of development and its legal system as instruments. However, since we focus on the EU15, our sample is very homogeneous in the level of development and is characterized by strong regulatory convergence. As an alternative, we use a dataset from Carletti et al. (2008) who constructed indices to capture the various dimensions of com-

petition policy and M&As (Table 1.E). Carletti et al. (2008) cover both the introduction of competition laws and competition authorities as well as changes in the relative responsibilities of competition and supervisory authorities in bank merger reviews. They also document the precise dating of the changes in competition law, allowing time variation in the measures. Carletti et al. (2008) argue that in all cases, the introduction of competition control constituted a significant change for the countries involved. The IV results are presented in Table 7. The first column shows results where bank deposits, non life insurance premium volume and the competition policy measures of Carletti et al. (2008) are used as instruments for HHI. The effect on corporate leverage remains negative, the coefficient is three times larger than in the OLS estimations. In the second column, we include the interaction between HHI and the instruments from column 1 in our instrument set; the results are very similar to our baseline regression. The next columns show that this result remains unaltered for our alternative measures of bank market structure (CR5, the Lerner index and the Boone indicator). All measures confirm the negative and significant effect of bank market structure on leverage. Overall, we can conclude that controlling for endogeneity does not alter the results.

5.3 Robustness

We apply a number of checks to assess the robustness of our findings. In the first three columns of Table 8 we examine the stability of the results across size classes. We split up our sample of firms in quartiles based on the market value of the firms. The results for the firms in the first quartile (relatively small firms) are in column 1, those for the firms in the second and third quartile in column 2 and the findings for the largest firms are presented in column 3. The coefficients indicate that the estimated effects are not robust to differences in size. Whereas the coefficients for the firms in the middle quartiles are similar to those in the full sample estimation, for the quartiles with the smallest and largest firms the bank concentration variable is insignificant. While this can be expected for the largest firms, since they should have easier access to bond financing, it is not clear why bank concentration would loose significance for the smallest firms. An explanation might be that for these smaller firms the country level is too wide as a geographic market definition of the banking market. However, when we substitute the

CR5, Lerner index or Boone indicator for HHI in the first size quartile estimation, the coefficient is significant negative, as in the full sample, supporting the "market power" hypothesis. These results indicate that analyzing bank/firm interactions for specific size segments have to be treated with caution. In column 4 we use only those firms that issue bonds and introduce a more refined measure to capture access of firms to the bond market. Dummy Bond is a dummy variable for those firms that have issued bonds, which takes value one starting from the year that the firm taps the bond market. The dummy variable exhibits the expected significant positive effect of bond financing on leverage and the coefficient on bank market concentration becomes insignificant. This confirms the conjecture that the degree of bank market concentration matters less for those firms with effective access to bond financing. This also implies that the further development and increased integration of bond markets in Europe may be an effective way of disciplining bank behavior. In column 5, a dummy variable taking the value one after 1999 is included. Our intention is to take the introduction of the euro in 1999 and the subsequent development and gradual integration of financial markets into account. This procedure addresses the concern that there might be a structural break in the sample. We also interact this dummy with the concentration measure. The 'Euro' dummy turns out to be positive and significant indicating that European firms increased their leverage after 1999. Whether or not this can be fully attributed to the Euro cannot be established from this simple exercise, since it is also possible that business cycle effects or changes in interest rate conditions may have contributed. The interaction term with HHI is insignificant, indicating that there is no additional effect on leverage that was not already captured by bank market structure itself. We find bank market concentration variable remaining negative and significant, as in the baseline regressions. In the final column of Table 8 we include the relative presence of foreign banks to account for the contestability of national bank markets. As we expect, this measure has a significant positive impact, suggesting that companies find it easier to get external finance in countries where there is more bank entry. Yet, the effect of contestability does not compensate the effect of bank concentration; on the contrary, the effect of bank market concentration becomes even more pronounced.

Table 9 contains a number of additional specifications to account for economic or methodological concerns. In the first column we include measures capturing the macro-

economic conditions (GDP growth and inflation) because they may influence the willingness of banks to lend. The coefficient for bank market concentration remains negative and significant. In the specification reported in the second column of Table 9, we run the baseline regression, but exclude those firms which have a zero debt ratio because this choice may be driven by totally different motivations. All results remain unaltered and the significance of the HHI becomes stronger. The next two columns contain two interaction effects. The interaction effect of bank concentration with collateral is insignificant. The interaction with size has a significant positive effect, but the negative effect of bank concentration becomes stronger, hence a larger firm size can only partially alleviate the financial constrainedness. In column 5 of Table 9, we lag the supply variables but the results from the base regression carry over. The final specification in Table 9 reports the results from a dynamic estimation as in Flannery and Rangan (2006). This accounts for the argument that firms may face adjustment costs when changing their level of leverage. The lagged leverage variable is instrumented with lagged book leverage and the firm characteristics. Although this procedure constitutes only a first step in applying dynamic estimation, the results for the bank market concentration measure remain qualitatively unaltered.

6 Conclusions

Credit constraints imposed by banks on firms may hamper economic growth. In this paper we examine whether or not changes in the market structure of European bank markets affect the access of non-financial firms to bank finance. More specifically, we investigate the relationship between the degree of concentration of European bank markets and the capital structure of non-financial firms. In our empirical investigation we confront the "information-based" and the market power theories, using panel data of 3364 listed firms from the EU15 over the period 1997-2005. During the last decade, the European banking sector has been characterized by a wave of mergers and acquisitions, predominantly in the form of domestic consolidation, leading to a marked increase in the measured level of market concentration in most European countries. Simultaneously, the European bond and stock markets have witnessed a rapid development and a gradually

increasing degree of integration since the introduction of the Euro. These developments in the bank and financial markets make the period under consideration, 1997-2005, and the geographical scope (EU15) particularly interesting to investigate the impact of the evolving market structure of financial intermediaries on external financing decisions by non-financial firms.

Overall, our results lend empirical support to the "market power" hypothesis. We find a negative and significant relationship between the degree of concentration of European bank markets and the market leverage of non-financial firms. As the mean over the countries is 0.061 and the 75th percentile is 0.109, a change from the mean to the 75th percentile would mean a drop in leverage of 4.3%. When we substitute the bank market concentration variables for indicators of bank competition based on the observed behavior of banks, the results remain unaltered. Since we control for endogeniety, alternative sources of external finance and for the firm-specific factors driving the demand for leverage, we are confident that these findings reflect a supply-side effect, implying that the ongoing consolidation of bank markets may impose an external debt finance constraint on non-financial firms. Our results are not consistent with the "information-based" hypothesis since we find no evidence that banks in more concentrated markets tend to engage in relationship lending, not even with the listed firms in our sample. One possibility for firms would be exploiting the competition between banks and financial markets to obtain more favorable financing conditions. Our finding that firms with effective access to the bond market are less constrained in their choice of leverage points in this direction. In any case our results imply that the ongoing (domestic) consolidation of the banking industry in Europe can potentially hamper the access of firms to bank financing. From a policy perspective, this calls for renewed efforts to increase the contestability and integration of bank lending markets in Europe.

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Table 1
Definitions of the variables

Variable	Definition	Source
A. Firm specific variables		
Market value of the firm / Size of the firm	Share price * Outstanding shares + Loans (Debt for less than one year) + Long term debt (Debt for more than one year)	Amadeus + Datastream
Market leverage	Loans + Long term debt / Market value of the firm	Amadeus + Datastream
Book leverage	Loans + Long term debt / Total assets	Amadeus
Profitability	EBIT / Total assets	Amadeus
Growth Opportunties	Market value of firm / Total assets	Amadeus + Datastream
Depreciation	Depreciation / Total assets	Amadeus
Tangibility	Fixed tangible assets / Total assets	Amadeus
Leverage Industry	The firm's industry median debt ratio (Using the Fama and French industry classification)	Amadeus
B. Measures of bank market structure		
HHI	The sum of the squares of the credit institutions' market shares, according to total assets. TThe index can take values between 0 and 1, where 0 stands for perfect competition and 1 for monopoly power.	ECB
CR5	The share of the 5 largest credit institutions in total assets in each country	ECB
Lerner	(Price – Marginal cost) / Price . The index can take values between 0 and 1, where 0 stands for perfect competition and 1 for monopoly power.	Fernández De Guevara and Maudos (2004)
Boone Indicator	Assumes that competition enhances the performance of efficient frims. The stronger competition is, the more negative the Boone indicator must be.	van Leuvensteijn, Bikker, van Rixtel and Kok-Sørensen (2007)
C. Alternative sources of external finance		
Private Bond	The ratio of private domestic debt securities issued by financial institutions and corporations as a share of GDP	World Bank
Dummy Bond	Dummy variable which has value of 1 starting from the year that the firm issues a bond	Datastream
Stock Market Cap	The value of listed shares to GDP	World Bank

Table 1 Continued
Definitions of the variables

Variable	Definition	Source
D. Robustness variables		
GDP Growth		IMF IFS
Inflation		IMF IFS
Contestability	The share of total assets of foreign branches and subsiduaries relative to the total assets of the whole banking sector in that particular country	ECB
E. Instrumenting variables		
Bank Deposits	Demand, time and saving deposits in deposit money banks as a share of GDP	World Bank
Non-life Insurance	Nonlife insurance premium volume as a share of GDP	World Bank
Competition policy - criteria	Index ranging from 0 to 1 using assessment criteria that are used in competition control	Carletti, Hartmann and Ongena (2008)
Competition policy - control	Index ranging from 0 to 1 using who is (are) the decision-making agency(ies) for competition control	Carletti, Hartmann and Ongena (2008)
Competition policy - third party	Index ranging from 0 to 1 using if a third agency can intervene in the process to replace/overturn the decision-making agency(ies)	Carletti, Hartmann and Ongena (2008)
Competition policy - notification	Index ranging from 0 to 1 using if merger notification is mandatory above (statutory) thresholds	Carletti, Hartmann and Ongena (2008)

Table 2
Summary stats external finance markets

For the two concentration measures (HHI and CR5), the first column states the mean, the second column the percentage change between 1997 and 2005. All means are calculated for the period for the period 1997-2005.

Country	HHI		CR5		Private Bond	Stock Market Cap	Dummy Bond
	mean	change	mean	change	mean	mean	mean
Austria	0.055	9	0.44	2	0.34	0.17	0.06
Belgium	0.162	202	0.76	57	0.45	0.76	0.11
Finland	0.228	27	0.83	-6	0.24	1.3	0.07
France	0.057	69	0.46	35	0.41	0.77	0.16
Germany	0.016	53	0.2	29	0.5	0.48	0.12
Greece	0.109	24	0.65	18	0.01	0.66	0.02
Ireland	0.057	20	0.45	12	0.23	0.58	0.06
Italy	0.024	14	0.27	8	0.38	0.46	0.15
Netherlands	0.174	9	0.83	8	0.47	1.21	0.19
Portugal	0.086	100	0.56	50	0.23	0.41	0.03
Spain	0.048	71	0.42	31	0.17	0.65	0.08
Sweden	0.080	2	0.56	-2	0.42	1.09	0.06
U.K.	0.030	92	0.3	50	0.17	1.46	0.18
Total	0.061	53	0.423	23	0.285	1.044	0.14

Table 3
Summary stats

This table reports mean, median, standard deviation, minimum, maximum, and number of observations (Obs) of variables. All variables are defined in Appendix A. The sample period is from 1997 to 2005.

Variable	Obs	Mean	Median	Std. Dev	Min.	Max.
HHI	117	0.061	0.040	0.053	0.011	0.273
CR5	117	0.423	0.360	0.189	0.170	0.880
Lerner	46	0.173	0.176	0.049	0.089	0.273
Boone	31	-2.529	-1.690	2.838	-9.360	0.630
Private Bond	117	0.285	0.228	0.160	0.002	0.684
Stock Market Capitalization	117	1.044	0.989	0.479	0.136	2.702
GDP Growth	117	2.576	2.700	1.274	-0.700	9.400
Inflation	117	1.832	1.763	0.887	0.141	5.435
Contestability	117	0.259	0.132	0.202	0.020	0.600
Dummy Bond	19735	0.137				
Market Leverage	19735	0.271	0.219	0.235	0.000	0.889
Book Leverage	19735	0.23	0.2	0.18	0	0.79
Profitability	19735	0.033	0.060	0.168	-0.978	0.335
Growth Opportunities	19735	1.274	0.887	1.318	0.179	10.327
Depreciation	19735	0.051	0.043	0.044	0.000	0.300
Size	19735	18.931	18.732	1.976	14.335	24.105
Tangibility	19735	0.293	0.241	0.232	0.001	0.95
Leverage Industry	19735	0.207	0.194	0.103	0.032	0.946

Table 4
Distribution of firm size

This table shows the sample divided into size deciles where the size of the firm is measured by its market value. The first decile represents the smallest firms and the tenth decile the largest firms. In most countries the firms are relatively uniformly spread over the deciles.

	Decile										
Country	1	2	3	4	5	6	7	8	9	10	# of firms
Austria	1.1	10.2	12.5	17.0	9.1	9.1	5.7	9.1	20.5	5.7	19
Belgium	6.3	5.3	11.3	15.3	14.4	10.6	11.8	7.9	9.5	7.6	78
Finland	9.4	8.8	13.5	11.7	9.4	8.5	9.0	12.4	11.5	5.5	104
France	13.9	12.6	10.5	9.0	8.9	9.7	8.6	8.3	9.5	8.9	564
Germany	8.5	10.8	11.1	11.4	11.4	11.0	8.9	9.3	7.3	10.3	483
Greece	7.7	10.5	14.6	14.2	14.5	12.6	10.8	7.4	5.4	2.3	271
Ireland	22.6	9.7	16.1	8.1	14.5	0.0	3.2	4.8	6.5	14.5	19
Italy	0.3	4.4	5.2	9.1	13.8	13.6	14.0	13.9	11.8	13.9	159
Netherlands	5.2	5.3	7.4	8.8	8.2	9.3	9.0	13.4	17.1	16.3	134
Portugal	15.6	10.1	8.6	5.8	10.4	13.1	8.6	8.3	7.0	12.5	50
Spain	0.7	1.5	4.4	4.7	8.6	11.5	11.8	15.0	18.4	23.3	99
Sweden	14.1	11.9	10.0	11.3	9.6	9.9	7.5	8.7	8.4	8.5	235
United Kingdom	11.0	10.3	9.1	9.0	8.7	8.8	11.0	10.6	10.7	10.7	1,149

Table 5
Pearson correlation matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Market Leverage	[1]	1										
Book Leverage	[2]	0.8357	1									
Size	[3]	0.2321	0.2082	1								
Profitability	[4]	-0.1952	-0.103	0.2198	1							
Growth Opportunities	[5]	-0.4797	-0.017	-0.1075	0.2284	1						
Depreciation	[6]	-0.0097	0.0077	-0.0778	-0.0967	0.0331	1					
Tangibility	[7]	0.3056	0.2918	0.2274	0.089	-0.1112	0.211	1				
Industry Median	[8]	0.334	0.2407	0.1835	0.0276	-0.2663	-0.1029	0.3268	1			
HHI	[9]	-0.0226	-0.0078	-0.0607	0.0224	0.0316	-0.0402	-0.0968	0.0548	1		
CR5	[10]	-0.0232	-0.0096	-0.0544	0.0218	0.0299	-0.0406	-0.0985	0.0569	0.9972	1	
Lerner	[11]	-0.0848	-0.0351	-0.0839	-0.0247	0.0952	-0.1303	0.0854	0.0361	-0.0452	-0.0523	1
Boone	[12]	-0.0794	-0.0854	-0.1539	0.0716	0.0086	-0.1001	-0.2086	0.0031	0.804	0.8208	-0.0587
Private Bond	[13]	0.0997	0.0117	0.0975	-0.02	-0.1682	0.2158	-0.0581	-0.0324	-0.0758	-0.065	-0.5639
Dummy Bond	[14]	0.1302	0.139	0.3614	0.0333	-0.0337	-0.0395	0.0847	0.0637	-0.059	-0.0582	-0.0017
Stock Market Cap	[15]	-0.1517	-0.0548	-0.0543	0.0699	0.2036	-0.0798	0.0661	-0.1413	-0.0286	-0.0354	0.6939
GDP Growth	[16]	-0.0968	-0.0038	-0.0396	0.106	0.1821	-0.1744	0.0678	-0.051	0.2615	0.2564	0.1065
Inflation	[17]	0.0286	0.0285	-0.0044	-0.0101	-0.0085	-0.0822	-0.0658	0.095	0.4058	0.4196	-0.0375
Contestability	[18]	-0.0759	-0.001	-0.0979	0.0443	0.1467	-0.1569	0.0734	-0.0654	-0.1456	-0.1667	0.5975

		[12]	[13]	[14]	[15]	[16]	[17]	[18]
Boone	[12]	1						
Private Bond	[13]	-0.2113	1					
Dummy Bond	[14]	0.0593	0.0065	1				
Stock Market Cap	[15]	0.6108	-0.3341	0.0718	1			
GDP Growth	[16]	0.1854	-0.4764	-0.0398	0.3431	1		
Inflation	[17]	0.3252	-0.1606	-0.062	-0.3193	-0.0632	1	
Contestability	[18]	0.7083	-0.6658	0.0627	0.6099	0.3266	-0.2261	1

Table 6
Baseline regression

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Market Leverage. External finance markets variables include the Hirshmann-Herfindahl Index of the bank sector (HHI) in column 1 and 2, the concentration ratio of the 5 largest banks (CR5) in column 3, the Lerner Index (Lerner) in column 4, the Boone Indicator (Boone) in column 5. All regressions include market capitalization of the private bond market to GDP (Private Bond), and market capitalization of the stock market to GDP (Stock Market Cap). Firm-level control variables are lagged one period and include profitability, growth opportunities, depreciation, firm size (Size), tangibility and European industry Market Leverage Industry according to the Fama/French classification (Leverage Industry). All regressions include year and firm fixed effects. Refer to Table 1 for variable definitions. The sample period is from 1997 to 2005. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
		HHI		CR5	Lerner	Boone
HHI		-0.843	-0.893			
		[5.23]**	[5.35]**			
CR5				-0.424		
				[6.33]**		
Lerner					-1.446	
					[9.06]**	
Boone						-0.012
						[7.17]**
Private Bond			-0.002	-0.005	0.44	0.159
			[0.06]	[0.14]	[6.35]**	[3.42]**
Stock Market Cap			-0.027	-0.022	-0.051	-0.331
			[2.67]**	[2.13]*	[3.43]**	[7.22]**
Profitability	-0.175	-0.173	-0.172	-0.173	-0.135	-0.257
	[10.55]**	[10.44]**	[10.36]**	[10.41]**	[4.74]**	[7.27]**
Growth Opportunities	-0.012	-0.012	-0.012	-0.012	-0.007	-0.013
	[9.42]**	[9.31]**	[9.22]**	[9.25]**	[3.05]**	[6.31]**
Depreciation	-0.0004	0.002	-0.001	-0.003	0.11	0.069
	[0.01]	[0.04]	[0.01]	[0.06]	[1.10]	[0.74]
Size	0.033	0.032	0.032	0.032	0.001	0.054
	[6.40]**	[6.32]**	[6.27]**	[6.37]**	[0.20]	[5.87]**
Tangibility	0.146	0.148	0.149	0.146	0.107	0.096
	[5.99]**	[6.05]**	[6.09]**	[5.99]**	[4.06]**	[2.33]*
Industry Median	0.224	0.227	0.23	0.226	0.131	0.117
	[5.51]**	[5.62]**	[5.70]**	[5.60]**	[2.43]*	[2.07]*
			[2.67]**	[2.13]*	[3.43]**	[7.22]**
Firm FE	3364	3364	3364	3364	2377	1305
Year FE	8	8	8	8	8	8
Observations	19735	19735	19735	19735	7002	6606
R-squared	0.14	0.14	0.14	0.15	0.14	0.22

Table 7
Endogeneity

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Market Leverage. External finance markets variables include the Hirshmann-Herfindahl Index of the bank sector (HHI) in column 1 and 2, the concentration ratio of the 5 largest banks (CR5) in column 3, the Lerner Index (Lerner) in column 4, the Boone Indicator (Boone) in column 5. These variables are instrumented using bank deposits to GDP, non life insurance premium volume to GDP and the competition policy measures of Carletti et al. (2008). Columns 2 to 5 include as additional instruments the interaction of the respective measure (HHI, CR5, Lerner and Boone) with the aforementioned instruments. All regressions include market capitalization of the private bond market to GDP (Private Bond), and market capitalization of the stock market to GDP (Stock Market Cap). Firm-level control variables are lagged one period and include profitability, growth opportunities, depreciation, firm size (Size), tangibility and European industry Market Leverage Industry according to the Fama/French classification (Leverage Industry). All regressions include year and firm fixed effects. Refer to Table 1 for variable definitions. The sample period is from 1997 to 2005. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5
	HHI		CR5	Lerner	Boone
HHI	-3.163	-1.204			
	(3.19)**	(7.33)**			
CR5			-0.592		
			(8.97)**		
Lerner				-1.558	
				(9.49)**	
Boone					-0.013
					(7.13)**
Private Bond	-0.025	-0.017	-0.032	0.474	0.165
	-0.72	-0.5	-0.9	(5.66)**	(3.35)**
Stock Market Cap	-0.049	-0.034	-0.029	-0.054	-0.315
	(3.81)**	(3.55)**	(3.01)**	(3.42)**	(6.65)**
Profitability	-0.163	-0.167	-0.169	-0.124	-0.26
	(10.68)**	(10.98)**	(11.06)**	(4.19)**	(6.64)**
Growth Opportunities	-0.011	-0.012	-0.012	-0.007	-0.013
	(9.21)**	(9.70)**	(9.73)**	(2.79)**	(5.79)**
Depreciation	0.00003	-0.004	-0.006	0.092	0.089
	(0.01)	(0.08)	(0.11)	(0.86)	(0.9)
Size	0.03	0.031	0.032	0.006	0.058
	(6.28)**	(6.52)**	(6.68)**	-0.72	(6.05)**
Tangibility	0.152	0.15	0.145	0.113	0.094
	(6.60)**	(6.58)**	(6.40)**	(4.08)**	(2.17)*
Industry Median	0.253	0.245	0.24	0.144	0.13
	(6.61)**	(6.44)**	(6.30)**	(2.38)*	(2.09)*
Firm FE	3356	3356	3356	1738	1282
Year FE	8	8	8	8	8
Observations	18700	18700	18700	5344	5843
R-squared	0.13	0.14	0.14	0.16	0.23

Table 8
Robustness

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Market Leverage. External finance markets include the Hirshmann-Herfindahl Index of the bank sector (HHI), market capitalization of the private bond market to GDP (Private Bond), and market capitalization of the stock market to GDP (Stock Market Cap). Firm-level control variables are lagged one period and include profitability, growth opportunities, depreciation, firm size (Size), tangibility and European industry Market Leverage Industry according to the Fama/French classification (Leverage Industry). Column 1 to 3 split the sample in quartiles according firm size. Column 1 uses quartile 1, column 2 quartile 2 and 3, column 3 uses quartile 4. Column 4 uses a dummy indicating whether a firm issued a bond (Dummy Bond). Column 5 includes a dummy for the introduction of the Euro (Euro Dummy) and the interaction with HHI. Column 6 includes contestability of the bank market (Contestability). All regressions include year and firm fixed effects. Refer to Table 1 for variable definitions. The sample period is from 1997 to 2005. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	Size Q1	Size Q2-3	Size Q4	Bond	Euro	Contest
HHI	-0.553	-0.835	0.113	-0.338	-0.903	-1.267
	[1.43]	[4.06]**	[0.40]	[0.93]	[4.81]**	[7.19]**
Private Bond	-0.141	0.059	0.108		-0.003	0.015
	[1.44]	[1.16]	[1.97]*		[0.09]	[0.48]
Stock Market Cap	0.003	-0.034	0.001	0.028	-0.028	-0.018
	[0.10]	[2.33]*	[0.03]	[0.89]	[2.68]**	[1.93]
Dummy Bond				0.038		
				[2.42]*		
HHI*Euro Dummy					0.001	
					[0.11]	
Euro Dummy					0.047	
					[5.01]**	
Contestability						0.220
						[7.27]**
Profitability	-0.105	-0.153	-0.162	-0.31	-0.172	-0.172
	[4.48]**	[6.79]**	[3.66]**	[5.84]**	[10.35]**	[11.38]**
Growth Opportunities	-0.005	-0.005	-0.003	-0.013	-0.012	-0.012
	[1.51]	[3.27]**	[1.77]	[3.33]**	[9.22]**	[10.01]**
Depreciation	0.07	-0.136	-0.114	0.118	-0.001	0.003
	[0.73]	[1.71]	[0.97]	[0.69]	[0.01]	[0.06]
Size	0.064	0.058	0.042	0.046	0.032	0.032
	[4.90]**	[7.59]**	[4.86]**	[3.78]**	[6.27]**	[6.83]**
Tangibility	0.139	0.131	0.102	0.054	0.149	0.148
	[3.22]**	[3.82]**	[2.55]*	[0.79]	[6.10]**	[6.70]**
Industry Median	0.017	0.287	0.105	0.198	0.23	0.218
	[0.17]	[5.46]**	[1.76]	[2.32]*	[5.69]**	[6.01]**
Firm FE	1499	2246	1131	479	3364	3364
Year FE	8	8	8	8	8	8
Observations	5229	9237	5269	3175	19735	19735
R-squared	0.09	0.17	0.19	0.23	0.14	0.15

Table 9
Robustness

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Market Leverage. External finance markets include the Hirshmann-Herfindahl Index of the bank sector (HHI), market capitalization of the private bond market to GDP (Private Bond), and market capitalization of the stock market to GDP (Stock Market Cap). Firm-level control variables are lagged one period and include profitability, growth opportunities, depreciation, firm size (Size), tangibility and European industry Market Leverage Industry according to the Fama/French classification (Leverage Industry). Column 1 includes GDP Growth and Inflation. Column 2 includes only firms with a positive amount of debt. Column 3 and 4 include an interaction term with HHI, respectively Tangibility and Size. Column 5 includes the lagged external finance market variables. Column 6 shows a dynamic specification where lagged market leverage is instrumented with lagged book leverage. All regressions include year and firm fixed effects. Refer to Table 1 for variable definitions. The sample period is from 1997 to 2005. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	Macro	Debt	Collateral	Size	Lag	Dynamic
HHI	-0.859	-0.963	-1.067	-4.656	-0.765	-0.508
	[5.16]**	[5.54]**	[5.28]**	[4.16]**	[3.97]**	[4.68]**
Private Bond	-0.003	-0.002	0.001	-0.009	0.076	0.065
	[0.08]	[0.07]	[0.04]	[0.27]	[1.74]	[3.06]**
Stock Market Cap	-0.037	-0.029	-0.026	-0.03	-0.023	-0.028
	[3.67]**	[2.72]**	[2.58]**	[2.95]**	[2.16]*	[3.97]**
GDP Growth	-0.004					
	[1.63]					
Inflation	0.012					
	[5.21]**					
HHI*Tangibility			0.547			
			[1.34]			
HHI*Size				0.196		
				[3.41]**		
Lagged Leverage						0.526
						[32.30]**
Profitability	-0.173	-0.193	-0.172	-0.17	-0.177	-0.101
	[10.41]**	[10.55]**	[10.37]**	[10.24]**	[9.46]**	[7.90]**
Growth Opportunities	-0.012	-0.014	-0.012	-0.012	-0.011	0
	[9.29]**	[9.33]**	[9.24]**	[9.27]**	[6.92]**	[0.30]
Depreciation	0.009	0.017	-0.001	0.007	-0.046	-0.029
	[0.15]	[0.27]	[0.02]	[0.12]	[0.70]	[0.64]
Size	0.034	0.03	0.032	0.021	0.031	0.008
	[6.58]**	[5.70]**	[6.29]**	[3.55]**	[4.94]**	[2.24]*
Tangibility	0.145	0.133	0.12	0.151	0.134	0.053
	[5.95]**	[5.30]**	[3.63]**	[6.16]**	[4.79]**	[3.30]**
Industry Median	0.237	0.226	0.231	0.224	0.235	0.009
	[5.87]**	[5.46]**	[5.70]**	[5.54]**	[5.11]**	[0.35]
Firm FE	3364	3301	3364	3364	3364	3364
Year FE	8	8	8	8	8	8
Observations	19735	18613	19735	19735	16181	19735
R-squared	0.15	0.16	0.14	0.15	0.14	

Chapter 3

Bank market structure and bank loans

Bank competition and bank loans

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Abstract

We explore whether bank competition affects the interest rate spread, size, and maturity on loans to borrowers. Results show that borrowers in more concentrated banking markets have loans with decreased loan spreads. This effect is both statistically and economically significant. While more concentrated banking markets reduce spreads, they do not seem to matter for loan size and maturity. However, during crisis periods the opposite holds as more concentrated banking markets increase spreads, again with no effect on loans size and maturity. Overall, we show that variation in bank market structure matters to how bank loans are priced.

Key words: Bank Market Structure, Bank Loans

1 Introduction

This paper examines the effect of bank market structure on bank loan contracts. It is well understood that bank financing enhances economic growth (Levine and Zervos (1998)). However, the impact of banking market structure on bank financing is more debated. The current financial crisis changes the banking market structure in important ways. Mergers and acquisitions have been approved that would unlikely pass the competition criteria before the crisis. For example the takeover of Britain's biggest mortgage lender Halifax Bank of Scotland by U.K..s third biggest mortgage lender Lloyds TSB. Although the Office of Fair Trading has raised concerns, the takeover was approved. As a result, the U.K. banking market has become considerably more concentrated. The Hirschmann-Herfindahl Index of the U.K. banking market increases with 8.3%. Therefore, understanding the effect of banking market structure on bank financing is crucial.

We use a sample of syndicated loans from EU15 corporate borrowers. Syndicated loans are large loans that are provided by a group of banks – the syndicate – to a single borrower. In contrast to a traditional bank loan, a syndicated loan is originated by a "lead bank" which sells pieces of the loan to other (participant) banks. Before and after the syndication, the lead bank acts as an agent for the lending syndicate in collecting and processing information about the borrower. The syndicated loan market represents for the period 2000-2009 almost half of all bank lending to non-financial companies. Sufi (2007) finds that large firms are prone to opaqueness in the ability to repay loans leading to ex-post moral hazard questioning the transparency argument. Carey and Nini (2007) document a significant home bias in the syndicated loan market, indicating that large firms are dependent on their national banking market questioning the "crossing national borders" argument. Moreover, Berger et al. (2003) also show that the overall European banking market is still far from integrated. These findings suggest that bank market structure may explain some of the variation in bank loan characteristics of large listed firms.

Theory offers conflicting predictions about the relation between bank market structure and the access to and cost of bank lending. When banks grow and increase their

market power, they may ration credit to specific types of firms or make loans more expensive. This "market power" hypothesis predicts that increased competition in bank markets may lead to lower loan size, shorter maturities and higher loan spreads. However, information asymmetries or agency costs may induce banks to invest more in relationship lending and increase the supply of loans. This "information-based" hypothesis implies that bank market concentration will not hurt access to bank finance by corporations and may lead to higher loan size, longer maturities and/or lower loan spreads.

This study is closely related to papers which examine the effect of bank market structure on external financing, investment, and firm growth rates (Petersen and Rajan (1994, 1995), Zarutskie (2006), Baert and Vander Vennet (2008), González and González (2008) and Ratti et al. (2008)). We contribute to this literature as our sample includes the pricing of the loans.

Results show that more concentrated banking markets decrease loan spreads, but has no effect on loan size or loan maturity. The price effect is both statistically and economically significant. The average loan spread will decrease by about 23 basis points if a borrower moves from a country in the sample with the lowest banking concentration to a country with the highest banking concentration, all else equal. We also examine loans offered to firms during the financial crisis period. Aggregate loan volumes have dropped substantially since the start of the financial crisis. We find that banks respond by turning to large loans and increasing loan spreads. We find that the increase in loan spreads since the crisis is relatively higher for firms in countries with more concentrated banking markets. These results suggest that the banking market structure affects borrowers' cost of loan finance. We control for other factors that are likely to affect loan contracting, including year and country effects.

In the next section we provide a discussion of the literature and the hypotheses. The loan, borrower and bank market structure data are presented in section 3. Section 4 shows the descriptive statistics on loan and borrower characteristics and bank market structure. The empirical results are presented in section 5 and section 6 discusses robustness issues. Section 7 examines the effect of the financial crisis on loan spreads. We conclude in section 8.

2 Literature

A growing body of papers studies various aspects of syndicated lending. Whether the corporate loan market is integrated is an important question for our research. If such is the case, then banks are not able to exercise any market power since companies can shop easily in other countries and/or new competitor banks can enter the market. Still, when the corporate loan market is fragmented, the possible impact of the banking market structure gains importance. Furthermore, banks from other countries cannot easily enter, nor can companies find a more attractive contract abroad giving domestic banks possible market power. Carey and Nini (2007) investigate whether the corporate loan market is globally integrated. They find that loan spreads are economically significantly lower in Europe than in the U.S. ant that borrowers stick to the home market if possible whereas lenders cross borders more frequently. However, the lenders still display significant home bias. Within Europe, Berger et al. (2003) provide evidence that the banking market is not well integrated. These results suggest that the banking market structure can play a significant role in the characteristics of bank loans.

A large literature has examined, both theoretically and empirically, the effects of bank market structure on bank lending. Petersen and Rajan (1995) theoretically show that if banks compete actively for loans, the rate they charge initially will reflect average credit quality, which in turn can so high that even good firms choose risky projects, which in turn may lead to credit rationing (Stiglitz and Weiss, 1981). By contrast, if banks have some market power, then they can choose a lower rate initially, knowing that they can make up any losses by earning monopoly rents on good firms in the future; this in turn may reduce initial risk-shifting incentives and thus initial credit rationing. This model relies on future rents or quasi-rents to maintain incentive compatibility. Therefore, if increased competition among banks decreases rents, such competition should also undermine relationships. Yet, this in turn suggests a possible drawback of relationships: since bank-borrower relationships implicitly rely on lack of competition, they create an environment where the borrower is exposed to exploitative behavior (hold-up problem), which in turn may distort borrower behavior. The "Winner's Curse" lets the inside bank earn rents on average; the greater the information advantage, the greater the rents and thus the bank's effective bargaining power. Dinc (2000) shows that a

bank's ability to sustain implicit relationship lending arrangements is very small if too few banks compete: informational monopoly lets the lender set its rate so high that any additional gains to maintaining a good reputation are too small to prevent reneging. On the other hand, if too many banks compete, the benefits from maintaining a good reputation are reduced, and once again banks renege. Hauswald and Marquez (2006) show that banks acquire proprietary information both to soften lending competition and to extend their market share. As competition increases, investments in information acquisition fall, leading to lower interest rates but also to less efficient lending decisions.

Petersen and Rajan (1995) find empirically, consistent with their theory, that in highly concentrated banking markets, young firms are more likely to receive bank finance, and the rate of interest that firms pay declines slower over time, allowing banks to earn rents on survivors. Elsas (2000) analyzes the impact of concentration on the incidence of relationship lending for German universal banks. The likelihood of observing a Hausbank relationship is non-monotonically related to bank concentration. For low and intermediate values of concentration, Hausbank relationships become more likely as competition increases. This contradicts the result of Petersen and Rajan (1995) that relation lending requires monopolistic market structures. Nevertheless, in highly concentrated markets, less competition fosters Hausbank relationships. Boot and Thakor (2000) investigate the impact of bank competition and capital market competition on relationship lending. They find that banks make more relationship loans as interbank competition increases, but each has lower added value for borrowers. They also investigate capital market competition which reduces relationship lending (and bank lending shrinks), but each relationship loan has greater added value for borrowers. Finally, Degryse and Ongena (2007) investigate the reaction of banks to increased competition. They empirically investigate the impact of interbank competition on bank branch orientation and find that bank branches facing stiff local competition engage considerably more in relationship-based lending. In sum, competition is not necessarily detrimental to relationship lending.

Baert and Vander Vennet (2008) examine the effect of bank market structure on the capital structure of listed companies and find that more concentrated banking markets are associated with lower leverage, suggesting that bank market concentration leads to bank market power. Another paper that analyzes the effect of bank market concentra-

tion and institutions on capital structure is González and González (2008). They find an opposite result, firm leverage increases with greater bank concentration and stronger protection of creditor rights, where greater bank concentration substitutes for creditor protection and asset tangibility to reduce the agency cost of debt between shareholders and debt holders. Finally, Ratti et al. (2008) show that greater bank concentration is associated with less tight financial constraint during both expansions and recessions. Their results are consistent with the "information-based" hypothesis.

Overall, theory and evidence both suggest pros and cons to concentrated bank market structure. Benefits include increased flexibility and access to funding; drawbacks include hold-up problems and negative spillovers from bank fragility. Which of these is dominant depends critically on both the nature of the borrowing firm and the nature of the banks that the firm has access to. Increased competition among banks tends to undermine relationships, but too much monopoly power may have the same effect.

3 Data

We combine several data sources to obtain our final dataset: the Dealogic's Loan analytics database and DCM database (previously known as Loanware and Bondware), the Bureau van Dijk's Amadeus database and Bankscope database, Thomson Reuters's Datastream database and various sources for country level data. We use the Dealogic's Loan analytics database to identify the firms that borrowed from banks and when they did so. We focus on borrowers parents from the EU15. This leaves us with a sample of 32,738 loans. When we restrict the sample to corporate borrowers, thereby excluding regulated and financial industries, we have a final set of 22,584 loans. These loans are taken out by 11,640 companies which belong to 8,483 company parents. Ninety six percent of the loans have one borrower parent. The majority of the loans (51.3%) in our sample consist of multiple tranches, or facilities, ranging from 2 to 13 tranches. According to Sufi (2007), these tranches should not be treated econometrically as individual observations as the characteristics of the tranches of the loan are negotiated at the same time. Therefore, we take one observation for each loan and weight variables on the tranche level by the share of value these tranches represent in the loan. Dealogic's

Loan Analytics starts at the beginning of the 1980s and the last loan in our sample is issued 29th of January 2010. However, since we are interested in the characteristics of the borrowers and the lenders, we start our sample from 1990 as the database on the borrowers only has data from that point onwards. Further information on each loan obtained from the Loan Analytics database are: the pricing of each loan, the maturity, it's purpose and type, the fee structure; the borrower, it's parent and their sector of activity. And finally, we obtain information on the syndicate of the loan including which bank participates, its role and for a sub-sample (28.37%) its participation in the syndicate.

We use several indicators of bank concentration and bank conduct at the country level.

1. Hirschmann-Herfindahl Index (HHI): the ECB provides yearly concentration figures for the EU15 from 1997 onwards in their reports on EU banking structure (ECB, 2004 to 2009). HHI is calculated as the sum of the squares of the credit institutions' market shares, according to total assets. The HHI ranges from 0 to 1 where 0 indicates perfect competition and 1 would indicate a monopoly.
2. Concentration Ratio of the 5 largest banks (CR5): this measure sums the share of the 5 largest credit institutions in total assets in each country.

The assumption underlying these two measures is that concentration leads to less competition as there are fewer players in the market and therefore, the remaining players can exercise market power. However, banks are special in nature and it has been suggested that the standard paradigm, that higher concentration leads to market power (Bain, 1956), may not be appropriate for the banking industry (see Degryse and Ongena, 2005). Therefore, in addition to HHI and CR5, which are well known and widely used concentration measures, we use two alternative measures of the observable competitive behavior of banks.

3. Boone indicator: this indicator measures the effect of efficiency in terms of marginal cost on market shares. The rationale is that competition enhances the performance of efficient firms (lower marginal cost) which will lead to higher market shares. This effect is assumed to be positively correlated with competition, hence the stronger competition is, the more negative the Boone indicator will be. Therefore, to inter-

pret the impact of the measure, a positive (negative) impact lends support to the "information-based" hypothesis ("market power" hypothesis). Van Leuven-steijn, Bikker, van Rixtel and Kok-Sørensen (2007) apply the measure to the banking market and single out the behavior of commercial banks, which are the most relevant banks when considering the financing of listed firms. The Boone indicator is available for France, Germany, Italy, Spain, the Netherlands and UK for the period 1997 to 2004. Therefore, all large countries in our sample are accounted for together with one of the countries that have the highest concentration in terms of HHI and CR5.

4. Contestability measure of national bank markets: this measure captures the potential competition banks face in their home markets. This approach is supported by Claessens and Laeven (2004) who find no evidence that bank sector concentration has a negative effect on competition in a sample of 50 countries, but report that contestability determines effective competition. The measure of contestability is the share of total assets of foreign branches and subsidiaries relative to the total assets of the banking sector in a particular country (ECB, 2007). The relative size of foreign branches and subsidiaries measures the incidence of foreign entry of banks, which should increase the pressure on the incumbent banks to behave more competitively.

We rely on Bureau van Dijk's Amadeus database, a pan-European financial database that provides detailed balance sheet and income data for 6 million companies in Europe and standardized balance sheet information with the objective of achieving uniformity and enabling cross-border analysis, to obtain information of firm's balance sheet. We complement the balance sheet data with market data for the public listed firms from the Datastream database such as the market value of the companies, the yearly return and their dividend yield. This sample of firms is merged with market data from Datastream; we use the ISIN code of the firm as identifier. We select all consolidated listed firms of the EU15 for the period 1996-2009. To reduce the impact of outliers we winsorize the sample at the 1st and 99th percentile. We delete all observations for which one of the variables is missing. The final sample is an unbalanced sample of 2,938 firms and 6,261 firm-year observations, reducing to 682 firms and 2,575 firm-year observations when we add the borrower characteristics. The variables include size, profitability, leverage, fixed

assets proportion, whether the borrower has a rating and the rating itself.

The construction of the borrower characteristic variables is standard in the literature (Rajan and Zingales (1995), Qian and Strahan (2007)). We measure access to external finance checking firm by firm whether they issue bonds using the bond module in Dealogic. This provides us with a dummy which has value one starting from the year that the firm issues a bond. We include this dummy to explicitly account for one particular outside financing option using the fact that some firms effectively use bond financing, whereas others do not. As country variables we include the liquid liabilities/GDP ratio which measures the financial depth of an economy. Stock market traded value/GDP measures the activity or liquidity of stock markets. The ratio of credit provided by financial intermediaries to the private sector to GDP measures the financial development of an economy and the importance of the banking sector. All of these macroeconomic variables with the exception of GDP growth volatility are annual values and are obtained from the World Development Indicators database. We use private bond market capitalization to GDP, calculated as the ratio of private domestic debt securities as a share of GDP, as a proxy for the development of the bond market, and a measure of stock market development, i.e. the value of listed shares to GDP as a proxy for the development of stock markets. Both are obtained from the Financial Development and Structure database of the World Bank. Creditor rights is provided by La Porta et al. (1998). See Appendix A for further details.

4 Summary statistics

Table 1 presents summary statistics of bank market structure, loan terms, syndicate structure, loan purpose, borrower characteristics, and country variables. There is considerable heterogeneity among the European countries. The percentage change in HHI between 1997 and 2008 is positive in almost all countries, reflecting a considerable amount of consolidation in the banking industry. The median spread is about 80.00 basis points. The mean is 118.29 and the standard deviation is 104.36, suggesting large variation in the median loan spread across countries. The median loan maturity is about 60 months with substantial cross-country variation. The median loan size is about 375

million euro.

An average of 6.7% of loans is secured. The median syndicate size is 10 lenders. Syndicate size varies substantially; the 10th percentile is 2 banks while the 90th percentile is 28 banks. In 41% of these syndicates, the leader of the syndicate has the same nationality as the borrower. About 31.4% of loans are for refinancing purposes. The second most frequent purpose is general corporate purposes (about 17.8%). About 11.7% of the loans are for acquisition purposes. There are fewer loans for capital expenditures, for financing assets, or for commercial paper backup. The borrowers in the collection of Amadeus matched Dealogic firms are large. The median asset value is about 4.8 billion euro. The median leverage ratio is 25.4. Borrowers are profitable (the median profitability is 6.6). The median tangibility ratio of tangible assets over total assets is 27.3%.

5 Results

The summary statistics presented in the previous section show significant differences in loan and borrower characteristics across countries. To show that bank market structure matters in lending contracts, it is important to control for borrower risk characteristics, loan purpose, industry effects, time-period effects, and firm effects. Table 2 presents the coefficient estimates from the random effects regression of loan size, loan maturity, and loan spreads. Columns 1 to 3 present results for the sample of all loans. Columns 4 to 6 examine loans to borrowers matched to firms in Amadeus. The dependent variables are the log of the loan tranche amount, the log of the loan maturity and the log of all-in interest spreads. The interest rate spreads are spreads over LIBOR, EURIBOR or a similar benchmark (including all possible fees). The key variable of interest on the right-hand side is the measure of bank market structure. All regressions include year dummies to control for changing market conditions, dummy variables for loan purpose, a dummy variable indicating whether the borrower has a rating and the rating of the borrower. The spread regressions additionally include the number of banks in the syndicate, the log of maturity, the log of loan size, and dummy variables for security and seniority. Columns 4 to 6 also include firm size, profitability, leverage, tangibility,

and industry dummies. The results show that spreads decline when the banking market is more concentrated when we control for borrower characteristics. However, neither the size of loan nor the maturity seems to be affected by the market structure of the banking market. The lower loan spreads in countries where banking markets are more concentrated suggest that lenders require less compensation which is in line with the information based hypothesis.

The borrower characteristic variables have the same signs as in the literature. Larger firms borrow larger amounts at lower spreads while highly levered firms will have to pay a larger spread. A company that can pledge more collateral or is profitable has loans with longer maturity. These results suggest that default risks are important. Loan maturity is positively related to loan spreads, consistent with longer maturity loans being riskier and higher spreads being charged on long-term loans. The coefficient on loan size is negative, consistent with larger loans being made to better borrowers. Secured loans and loans that have a covenant that mentions a senior tranche have higher spreads. The estimated coefficients from column 6 suggest that, with all other variables set at their mean values, the predicted spread decreases by 23 basis points from the minimum value of bank market concentration to the maximum value of bank market structure (Finland, the Netherlands in various years).

6 Robustness

6.1 Alternative measures of bank market structure

This section examines whether our results hold when alternative measures of bank market structure are examined. The alternatives CR5, the Boone indicator and contestability mentioned in the Section 3 are considered. Table 3 presents results that use these alternative proxies for bank market structure in place of HHI. We report results from regressions relating loan spreads to these alternative proxies for bank market structure. Results from the loan size and loan maturity regressions yield similar conclusions.

Column 1 of Table 3 reports results from including CR5 as a proxy for bank market structure. Consistent with earlier results, the coefficient on bank market structure is negative and statistically significant, implying that loan spreads are lower when a country has a more concentrated banking market. Column 2 employs the Boone indicator as a measure of bank market structure. Higher values of this measure reflect more market power in the banking market. Again, a banking market with more market power leads to lower spreads on loans. Column 3 employs a measure of contestability based on the total assets of the banks. The results show that this measure of contestability has positive and statistically significant coefficient estimates. This is in line with the information based hypothesis. The more contestable a banking market is the more competition, therefore a positive effect indicates that competition drives up loan spreads. The economic significance of the alternative measures is more subdued as the predicted spread decreases by respectively 10.1 and 14.6 basis points from the minimum to the maximum value of CR5 and the Boone Indicator and increases by 4.6 basis points for the measure of contestability.

6.2 Additional Control Variables

Recently, Qian and Strahan (2007) and Bae and Goyal (2009) show the importance of institutional factors in the structure of syndicated loans. Therefore, Table 4 includes additional institutional variables together with country specific variables in the baseline regressions presented in Table 2. All models include creditor rights and inflation. Column 2 includes measures of bankruptcy and reorganization laws. Columns 3 to 4 include a dummy with the value of one when the borrower is from the same country as the lead lender (Same Leader) and columns 5 to 6 a dummy indicating whether the borrower has the same nationality as all lenders from the syndicate(Same Syndicate). Columns 3 to 6 also include a dummy whether the company has access to the bond markets (Bond).

We only report results from loan spreads in the table. Interestingly, contrary to previous findings, creditor rights lead to higher spreads in our sample except when we additonally control for measures of bankruptcy and reorganization laws. When the lead borrower is from the same country as the borrower, the spread is significantly lower.

The same holds true if the whole syndicate has the same nationality as the borrower. However, when we also include the interaction between the bank market structure and the dummies, *Same Syndicate* becomes insignificant whereas *Same Leader* remains significant negative. Overall, including additional institutional variables in the loan size and loan maturity regressions does not affect our previous conclusions. Results show that a more concentrated banking market structure continues to have negative and statistically significant coefficients even in the presence of these additional control variables.

7 Crisis

Has the banking market structure affected the response of bank loan contracts to the current financial crisis? The crisis can be considered relatively exogenous (at least from the perspective of any single firm). While the crisis will have serious implications for the future banking market structure in many countries, the crisis did not materially change the bank market structure for any of the affected countries during our sample period. Moreover, the crisis significantly reduces expected rates of return on investments. We investigate whether the bank market structure has an additional impact over the crisis. Furthermore, we examine whether during periods of crisis, firms operating in countries with more concentrated banking markets face relatively lower increase in loan spreads. As starting point of the financial crisis we take 1 October 2007.

The empirical strategy is to include additional interaction terms between the crisis period and bank market structure measure to the baseline regressions reported in Table 2. If banks cut back on lending to firms, the interaction terms between the bank market structure measure and the crisis period should be negative in the loan size regressions (reported in Columns 1 and 3 of Table 5). We find a negative coefficient for the crisis. However, when we control for firm characteristics the coefficient for the crisis dummy changes sign and the interaction term of bank market structure and the crisis dummy becomes significant negative suggesting that the loan volume reduces more in more concentrated banking markets. Columns 2 and 4 present results from the random effects estimations of loan maturity. We find no effect of the crisis on loan maturities. When

we control for borrower characterisitics, the interaction term of bank market structure and the crisis dummy is significantly negative indicating that the maturity declined for borrowers in concentrated banking markets during the crisis period. Columns 3 and 6 present results from the loan spread regressions with the additional interaction terms. The coefficient on the interaction between bank market structure and the crisis period is positive and significant, suggesting that spreads are higher in countries with more concentrated banking markets compared to those that have less concentrated banking markets. In summary, these results indicate the response of loan contracts to variations in bank market structure is significantly higher during financial crises when monitoring and re-contracting costs are of particular importance to lenders.

8 Conclusions

Access of firms to bank finance enhances economic growth. In this paper we examine whether or not changes in the market structure of European bank markets affect the loan quantities, loan maturities, and the costs of loan financing. During the last decade, the European banking sector has been characterized by a wave of mergers and acquisitions, predominantly in the form of domestic consolidation. Moreover, the current financial crisis already has and is likely to have a large impact on the level of market concentration in most European countries.

We find a negative and significant relationship between the degree of concentration of European bank markets and the spread. The results suggest that, when a borrower moves from a country with the least concentrated banking market to a country with the maximum value of bank market structure (Finland, the Netherlands in various years), the predicted spread decreases by 23 basis points, with all other variables set at their mean values. When we substitute the bank market concentration variables for an indicator of bank competition based on the observed behavior of banks, the results remain unaltered. Overall, our results lend empirical support to the information based hypothesis. During crisis periods, the results show increasing loan spreads for more concentrated banking markets. This suggests that the "market power" hypothesis holds during crisis periods.

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Table 1
Summary stats

This table reports mean, standard deviation, minimum, maximum, and number of observations (Obs) of variables. All variables are defined in Appendix A. The sample period is from 1997 to 2009.

Variable	n	Mean	Mdn	S.D.	Min	0.25	0.75	Max
HHI	6261	0.058	0.045	0.049	0.011	0.025	0.062	0.316
CR5	6261	41.765	41	17.558	17	28	49.2	88
Boone indicator	2235	-2.679	-2.54	2.226	-9.36	-4.16	-0.91	0.63
Contestability	5568	0.227	0.115	0.199	0.04	0.103	0.488	0.952
Spread	6261	4.625	4.754	0.825	0	4.025	5.303	7.314
Loan Size	6261	5.374	5.343	1.562	0.039	4.341	6.399	10.521
Loan Mat	6261	4.011	4.094	0.77	0	3.584	4.431	6.075
Number Banks Syndicate	6261	11.056	8	9.898	1	4	15	89
Secured	6261	0.067		0.25				
Senior	6261	0.038		0.191				
Refinancing Purposes	6261	0.314		0.464				
Acquisition Purposes	6261	0.117		0.322				
General Corporate Purposes	6261	0.178		0.383				
Firm Size	2720	21.864	22.238	1.77	12.006	20.693	23.584	23.584
Profit	2694	0.068	0.066	0.086	-1.281	0.038	0.099	0.378
Leverage	2709	0.27	0.254	0.178	0	0.131	0.39	0.968
Fixed	2694	0.316	0.273	0.233	0	0.12	0.467	0.94
Rating Borrower	5816	0.578		1.455				
Rating missing	5816	0.852		0.355				
Bond	6261	0.366		0.482				
Same Lead Bank	6261	0.461		0.499				
Same Syndicate	6261	0.113		0.316				
Inflation	6261	0.020	0.019	0.011	-0.124	0.014	0.027	0.056
Creditor rights	6261	2.152	2	1.365	0	2	3	4

Table 2
Base regression

This table reports random effect estimates on the firm level of coefficients of the deal-level regression of the log of the size of the loan (Loan Size), the log of the maturity of the loan (Loan Mat) and the log of the spread of the loan (Spread). All regressions include the Hirschman-Herfindahl Index (HHI), a dummy for the purpose of the loan: Refinancing, Acquisition or General Corporate and year dummies. The spread regressions include the size and maturity of the loan, the number of banks in the syndicate (Number Banks Syndicate) and whether the loans is secured (Secure) and whether the covenant mentions a senior tranche (Senior). Columns 4 to 6 include industry dummies and additionally the size of the borrower (Firm Size), the profitability of the borrower (Profit), its leverage (Leverage) and fixed assets proportion (Fixed). Refer to Appendix A for variable definitions. The sample period is from 1998 to 2009. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	Loan Size	Loan Mat	Spread	Loan Size	Loan Mat	Spread
HHI	2.229	-0.593	-0.725	-0.998	-0.137	-1.017
	[0.91]	[1.35]	[1.14]	[1.02]	[0.50]	[2.81]**
Refinancing Purposes	0.531	-0.291	-0.271	0.565	-0.05	-0.317
	[4.65]**	[5.25]**	[4.44]**	[6.69]**	[0.87]	[7.43]**
Acquisition Purposes	1.153	-0.496	0.04	1.375	-0.299	0.107
	[15.80]**	[8.18]**	[0.89]	[12.25]**	[4.65]**	[2.47]*
General Corporate Purposes	-0.049	-0.371	-0.428	0.157	-0.152	-0.399
	[0.31]	[5.40]**	[9.12]**	[2.42]*	[4.53]**	[9.55]**
Loan Size			-0.106			-0.106
			[6.16]**			[6.31]**
Loan Mat			0.068			0.114
			[2.86]**			[3.23]**
Number Banks Syndicate			-0.005			-0.003
			[3.66]**			[5.54]**
Secure			0.118			0.166
			[3.14]**			[2.67]**
Senior			0.643			0.616
			[10.25]**			[8.06]**
Firm Size				0.279	-0.042	-0.039
				[7.18]**	[3.08]**	[3.60]**
Profit				0.187	0.519	0.142
				[1.03]	[3.79]**	[0.40]
Leverage				-0.133	-0.1	0.521
				[0.50]	[1.06]	[5.08]**
Fixed				-0.213	0.174	-0.148
				[1.30]	[3.62]**	[1.57]
Rating Borrower				-0.439	0.112	0.418
				[5.55]**	[2.23]*	[13.44]**
Rating missing				-2.38	0.582	1.833
				[7.07]**	[2.75]**	[14.50]**
Year FE	11	11	11	11	11	11
Industry FE	0	0	0	45	45	45
Constant	4.339	4.132	5.961	1.893	4.341	4.935
	[11.70]**	[30.81]**	[37.37]**	[2.16]*	[11.61]**	[21.71]**
Observations	6261	6261	6261	2575	2575	2575
Number of firms	2938	2938	2938	682	682	682

Table 3
Alternative measures of bank market structure

This table reports random effect estimates on the firm level of coefficients of the deal-level regression of the log of the spread of the loan (Spread). The regressions include alternative measures of bank market structure: CR5, Boone indicator and a measure of bank market contestability. All regressions inlcude a dummy for the purpose of the loan : Refinancing, Acquisition or General Corporate, the size (Loan Size) and maturity of the loan (Loan Mat), the number of banks in the syndicate (Number Banks Syndicate) and whether the loans is secured (Secure) and whether the covenant mentions a senior tranche (Senior), year dummies and industry dummies and additionally the size of the borrower (Firm Size), the profitability of the borrower (Profit), its leverage (Leverage) and fixed assets proportion (Fixed). Refer to Appendix A for variable definitions. The sample period is from 1998 to 2009. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3
	Spread	Spread	Spread
CR5	-0.003		
	[2.80]**		
Boone indicator		-0.019	
		[2.70]**	
Contestability			0.217
			[1.84]+
Refinancing Purposes	-0.316	-0.318	-0.3
	[7.47]**	[6.12]**	[6.25]**
Acquisition Purposes	0.107	0.191	0.122
	[2.46]*	[2.49]*	[2.64]**
General Corporate Purposes	-0.399	-0.387	-0.399
	[9.63]**	[12.71]**	[8.99]**
Loan Size	-0.107	-0.124	-0.103
	[6.27]**	[3.45]**	[6.22]**
Loan Mat	0.114	0.131	0.121
	[3.24]**	[4.25]**	[3.15]**
Number Banks Syndicate	-0.003	-0.002	-0.002
	[5.33]**	[0.66]	[5.17]**
Secure	0.166	0.444	0.189
	[2.70]**	[4.90]**	[2.92]**
Senior	0.617	0.688	0.618
	[7.96]**	[4.09]**	[8.17]**
Firm Size	-0.04	-0.042	-0.041
	[3.75]**	[4.72]**	[3.16]**
Profit	0.142	0.111	0.208
	[0.40]	[0.23]	[0.56]
Leverage	0.524	0.264	0.571
	[5.18]**	[0.92]	[5.63]**
Fixed	-0.15	-0.038	-0.199
	[1.58]	[0.31]	[1.84]+
Rating Borrower	0.418	0.37	0.418
	[13.40]**	[7.33]**	[12.24]**
Rating missing	1.83	1.666	1.81
	[14.48]**	[8.33]**	[13.70]**
Year FE	11	9	11
Industry FE	45	45	45
Constant	4.11	3.466	3.927
	[18.04]**	[12.79]**	[27.57]**
Observations	2575	1177	2314
Number of firms	682	239	625

Table 4
Robustness

This table reports random effect estimates on the firm level of coefficients of the log of the spread of the loan (Spread). All regressions include the Hirschman-Herfindahl Index (HHI), a dummy for the purpose of the loan: Refinancing, Acquisition or General Corporate), measure of creditor rights, inflation, the size (Loan Size) and maturity (Loan Mat) of the loan, the number of banks in the syndicate (Number Banks Syndicate) and whether the loans is secured (Secure) and whether the covenant mentions a senior tranche (Senior) and year dummies. Column 2 and 5 also include a dummy indicating whether the company is from the same country as the lead lender (Same) and whether the company has access to the bond market (Bond). Columns 3 and 6 include measures of bankruptcy and reorganization laws. Columns 4 to 6 include industry dummies and additionally the size of the borrower (Firm Size), the profitability of the borrower (Profit), its leverage (Leverage) and fixed assets proportion (Fixed). Refer to Appendix A for variable definitions. The sample period is from 1998 to 2009. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	Spread	Spread	Spread	Spread	Spread	Spread
HHI	-0.655	-0.702	-0.895	-1.105	-0.736	-0.676
	[1.67]+	[1.28]	[2.22]*	[2.44]*	[1.91]+	[1.64]
Creditor rights	0.035	-0.202	0.033	0.036	0.031	0.029
	[2.59]**	[4.74]**	[2.82]**	[3.56]**	[2.62]**	[2.41]*
Inflation	-0.001	0	-0.001	-0.001	-0.001	-0.001
	[2.52]*	[1.11]	[2.65]**	[2.86]**	[2.71]**	[2.71]**
Same Leader			-0.137	-0.19		
			[5.27]**	[4.71]**		
HHI*Same Leader				0.0001		
				[1.48]		
Same Syndicate					-0.234	-0.082
					[3.46]**	[0.65]
HHI*Same Syndicate						-2.939
						[1.22]
No automatic stay on assets		0.324				
		[2.92]**				
Secured creditors first paid		0.282				
		[2.50]*				
Restrictions for going into reorganisation		0.185				
		[1.84]+				
Management does not stay in reorganisation		0.18				
		[3.46]**				
Bond	0.018	0.022	0.006	0.006	0.013	0.014
	[0.55]	[0.67]	[0.18]	[0.19]	[0.40]	[0.42]
Refinancing Purposes	-0.315	-0.317	-0.296	-0.298	-0.318	-0.318
	[7.50]**	[7.30]**	[7.04]**	[7.23]**	[7.80]**	[7.74]**
Acquisition Purposes	0.103	0.099	0.122	0.121	0.108	0.108
	[2.36]*	[2.31]*	[2.80]**	[2.76]**	[2.45]*	[2.45]*
General Corporate Purposes	-0.399	-0.396	-0.383	-0.383	-0.399	-0.401
	[9.90]**	[9.71]**	[10.11]**	[10.08]**	[9.91]**	[9.98]**
Loan Size	-0.109	-0.105	-0.107	-0.105	-0.111	-0.111
	[6.21]**	[6.00]**	[6.02]**	[5.96]**	[6.67]**	[6.69]**

Table 4 Continued
Robustness

	-1	-2	-3	-4	-5	-6
Loan Mat	0.116	0.116	0.117	0.117	0.116	0.116
	[3.29]**	[3.32]**	[3.35]**	[3.33]**	[3.42]**	[3.40]**
Number Banks Syndicate	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	[5.82]**	[7.60]**	[5.91]**	[5.55]**	[7.40]**	[7.54]**
Secure	0.17	0.169	0.166	0.165	0.179	0.18
	[2.73]**	[2.74]**	[2.65]**	[2.60]**	[3.07]**	[3.13]**
Senior	0.616	0.62	0.597	0.598	0.614	0.612
	[7.88]**	[8.03]**	[7.86]**	[7.83]**	[8.31]**	[8.26]**
Firm Size	-0.044	-0.043	-0.049	-0.049	-0.046	-0.046
	[3.89]**	[3.75]**	[4.14]**	[4.15]**	[4.14]**	[4.22]**
Profit	0.17	0.167	0.231	0.244	0.17	0.17
	[0.47]	[0.46]	[0.63]	[0.66]	[0.48]	[0.47]
Leverage	0.493	0.474	0.505	0.506	0.508	0.506
	[4.64]**	[4.52]**	[4.82]**	[4.85]**	[4.71]**	[4.69]**
Fixed	-0.165	-0.182	-0.159	-0.158	-0.161	-0.152
	[1.51]	[1.65]+	[1.46]	[1.45]	[1.57]	[1.53]
Rating Borrower	0.414	0.417	0.405	0.405	0.411	0.41
	[13.18]**	[13.27]**	[13.50]**	[13.48]**	[13.77]**	[13.99]**
Rating missing	1.819	1.83	1.782	1.781	1.805	1.804
	[14.41]**	[14.59]**	[14.77]**	[14.78]**	[14.93]**	[15.10]**
Year FE	11	11	11	11	11	11
Industry FE	45	45	45	45	45	45
Constant	4.163	4.051	5.327	4.405	4.274	4.288
	[17.47]**	[18.13]**	[19.41]**	[18.48]**	[19.27]**	[19.73]**
Observations	2575	2575	2575	2575	2575	2575
Number of group	682	682	682	682	682	682

Table 5
Financial crisis

This table reports random effect estimates on the firm level of coefficients of the deal-level regression of the log of the size of the loan (Loan Size), the log of the maturity of the loan (Loan Mat) and the log of the spread of the loan (Spread). All regressions include the Hirschman-Herfindahl Index (HHI), a dummy for the purpose of the loan: Refinancing, Acquisition or General Corporate), a crisis dummy (Crisis) with value of 1 from 1 October 2007 onwards and the interaction between HHI and Crisis. The spread regression include the size and maturity of the loan, the number of banks in the syndicate (Number Banks Syndicate) and whether the loans is secured (Secure) and whether the covenant mentions a senior tranche (Senior). Columns 4 to 6 include industry dummies and additionally the size of the borrower (Firm Size), the profitability of the borrower (Profit), its leverage (Leverage) and fixed assets proportion (Fixed). Refer to Appendix A for variable definitions. The sample period is from 1998 to 2009. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	Loan Size	Loan Mat	Spread	Loan Size	Loan Mat	Spread
HHI	2.552	-0.454	-0.749	-0.221	0.27	-1.086
	[1.14]	[1.02]	[1.07]	[0.25]	[0.78]	[2.39]*
Crisis	-0.251	0.015	0.239	0.195	0.057	0.322
	[1.67]+	[0.19]	[2.67]**	[1.94]+	[0.99]	[2.63]**
HHI*Crisis	0.596	-0.304	1.785	-2.171	-1.324	2.256
	[0.45]	[0.49]	[2.02]*	[1.93]+	[2.07]*	[2.30]*
Refinancing Purposes	0.538	-0.287	-0.24	0.612	-0.021	-0.286
	[4.17]**	[5.02]**	[3.88]**	[6.43]**	[0.36]	[5.26]**
Acquisition Purposes	1.139	-0.511	-0.004	1.401	-0.271	0.049
	[13.84]**	[8.69]**	[0.09]	[11.92]**	[4.38]**	[0.89]
General Corporate Purposes	-0.053	-0.385	-0.422	0.183	-0.155	-0.365
	[0.33]	[5.40]**	[7.91]**	[2.70]**	[3.87]**	[5.61]**
Loan Size			-0.105			-0.108
			[6.20]**			[6.13]**
Loan Mat			0.038			0.035
			[1.49]			[0.86]
Number Banks Syndicate			-0.006			-0.003
			[2.99]**			[3.92]**
Secure			0.116			0.189
			[3.28]**			[3.80]**
Senior			0.686			0.649
			[11.36]**			[9.08]**
Firm Size				0.283	-0.041	-0.035
				[7.36]**	[2.73]**	[2.99]**
Profit				0.081	0.572	-0.005
				[0.57]	[2.93]**	[0.01]
Leverage				-0.044	-0.079	0.706
				[0.16]	[0.87]	[7.26]**
Fixed				-0.433	0.079	-0.208
				[2.69]**	[1.22]	[2.77]**
Rating Borrower				-0.454	0.099	0.437
				[5.71]**	[1.83]+	[12.76]**
Rating missing				-2.477	0.512	1.864
				[7.26]**	[2.21]*	[13.74]**
Industry FE	0	0	0	45	45	45
Constant	4.632	4.347	5.227	1.77	4.246	3.896
	[16.76]**	[70.31]**	[45.67]**	[2.12]*	[11.24]**	[14.88]**
Observations	6261	6261	6261	2575	2575	2575
Number of group	2938	2938	2938	682	682	682

Appendix A
Definitions of the variables

Variable	Definition	Source
A. Measures of bank market structure		
HHI	The sum of squares of the credit institutions' market shares, according to total assets	ECB
CR5	The share of the 5 largest credit institutions in total assets in each country	ECB
Boone indicator	Measures the effect of efficiency in terms of marginal cost on market shares. Competition enhances the performance of efficient firms which will lead to higher market shares	van Leuvensteijn, Bikker, van Rixtel and Kok-Sorensen (2007)
Contestability	The share of total assets of foreign branches and subsidiaries relative to the total assets of the whole banking sector in that particular country	ECB
B. Deal-specific variables		
Spread	The log of all fees (in basis points) over the deal reference margin which can be LIBOR or EURIBOR	Dealogic
Loan Size	The log of Deal value in Euro million	Dealogic
Loan Mat	The log of Deal maturity in months	Dealogic
Number Banks Syndicate	Indicates the number of lenders in the syndicate	Dealogic
Secured	Dummy variable which has value 1 when a deal is secured	Dealogic
Senior	Dummy variable which has value one when the covenant mentions a senior tranche	Dealogic
Deal purpose dummies	Dummy variables indicating whether deals for are for refinancing/ acquisition/ general corporate purposes	Dealogic
C. Firm-specific variables		
Firm Size	Size of the firm : log of the ratio of Total assets to CPI	Amadeus
Profit	EBIT / Total assets	Amadeus
Leverage	Loans + Long term debt / Total assets	Amadeus
Fixed	Cash and Cash equivalent / Total assets	Amadeus
Rating Borrower		Dealogic
Rating missing	Dummy which has the value one when the borrower has no rating	Dealogic
Bond	Dummy indicating when a company has access to bond financing	Dealogic
Same	Dummy indicating when the borrower and the lead lender have the same nationality	Amadeus + Dealogic

Appendix A Continued
Definitions of the variables

Variable	Definition	Source
D. Country-specific variables		
Inflation		IFS
Creditor rights	An index aggregating different creditor rights. The index is formed by adding one when: (1) The country imposes restrictions such as creditors' consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of the property pending the resolution of the reorganization. The index ranges from 0 to 4.	LLSV (1998)
Restrictions for going into reorganization	Dummy which has the value one if the reorganization procedure imposes restrictions such as creditors consent; equals 0 otherwise.	LLSV (1998)
Management does not stay	Dummy which has the value 1 when an official appointed by the court, or by the creditors, is responsible for the operation of the business during reorganization. Equivalently, this variable equals one if the debtor does not retain the administration of the property pending the resolution of the reorganization process. Equals 0 otherwise.	LLSV (1998)
No automatic stay on secured assets	Dummy which has the value 1 if the reorganization procedure does not impose an automatic stay on the assets of the firm on filing the reorganization petition. Automatic stay prevents secured creditors from gaining possession of their security. Equals 0 if such a restriction does exist in the law.	LLSV (1998)
Secured creditors first	Dummy which has the value 1 if secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm. Equals 0 if non-secured creditors, such as the government and workers, are given absolute priority.	LLSV (1998)

Chapter 4

Bank ownership, firm value and firm capital structure in Europe

Bank ownership, firm value and firm capital structure in Europe

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Abstract

We investigate the role of banks in the ownership structure of non-financial firms. Distinguishing between banks and other institutional investors as shareholders, we examine empirically the relationship between financial institution ownership and the performance of the firms in which they hold equity. We control explicitly for the capital structure decision of the firms and the ownership decision of financial institutions in a simultaneous equations model. Our main finding is that there is a negative relationship between bank ownership and the market value of firms, measured as the Tobin's Q. This is in contradiction with the monitoring hypothesis.

Key words: Financial institution ownership, Firm value
JEL classification: G32, G20

1 Introduction

We examine the relationship between bank versus institutional investors shareholdings on the performance of the firms in which they hold financial claims. The role of banks as shareholders of non-financial firms remains an unresolved issue in the corporate governance literature. Over the last decades, the issue has become even more relevant given the fact that institutional investors other than banks have gained a more prominent role as the major class of shareholders in, mainly listed, firms (IMF (2005)). Since these institutional investors only act as shareholders, we can compare the effectiveness of banks to institutional shareholders as corporate monitors. The results should also be informative for the debate about the optimal role of banks in the economy. Following the financial crisis of 2007-9, regulators have a tendency to force banks to (re)focus on their traditional role as financial intermediaries. The question is whether or not banks still add value by acting as shareholders of non-financial firms, next to their role as lenders.

Banks can hold both debt and equity in corporations. This combination may lead to an information advantage and give banks additional power in the disciplining of corporate management. This should support firm performance, both in the short and the long run. However, this dual role may also entail conflicts of interest as banks may also use their power as shareholders to protect their interests as lenders, thereby forcing corporate managers to pursue non-value-maximizing strategies. Therefore, we attempt to explore three relationships simultaneously in our empirical setup. The most important relationship is the link between the ownership structure of firms and their performance, which we measure as Tobin's Q. Since the ownership decision is potentially endogenous, the second relationship explores the link between bank or institutional investor ownership and firm-specific determinants. In their dual role of lender and owner, banks may have the power to influence the leverage decisions of firms. Since leverage may serve as a disciplining device, a third association is that between the observed leverage of a firm and its performance. In order to compare the value added of banks to institutional investors as equity holders, we run these estimations for both types of shareholders. Hence, we analyze the following questions: What are the determinants of bank and institutional investor ownership in non-financial firms? What is the effect on

the long-run corporate performance (measured as Tobin's Q) of bank versus institutional investor ownership? What are the interactions between ownership, leverage and firm value?

Research on banks as corporate shareholders in the 1980s and 1990s mainly focused on Germany and Japan, since these countries allowed close ties between companies and their so-called main banks. Most of this research concluded that German and Japanese firms benefited from the active involvement of their main bank in corporate governance (see, e.g., Cable (1985), Gorton and Schmid (2000) and Hoshi, Kashyap and Scharfstein (1990)). This was part of the rationale for the deregulation of the banking systems in Europe. However, recent evidence seems to indicate that banks no longer add value as corporate shareholders. Ferreira and Matos (2008) find that independent institutional investors add value whereas banks have no effect on firm value. They suggest that banks are poor monitors because they are too close to corporate management. Barucci and Mattesini (2008) find that Italian banks become shareholders to induce companies to undertake actions that would maximize the probability of debt repayment and not to optimize firm value. Finally, Dittmann, Maug and Schneider (2010) find little support that bankers on the board of German firms act as monitors of corporate management and find that they cause a decline in the valuation of non-financial firms as these bankers successfully promote their employer's business.

We contribute to this literature by focusing our empirical investigation on a cross-section of European countries instead of one country. Europe should be a fertile ground to investigate the value added for corporations of bank shareholdings as the Second Banking Directive of 1989 was implemented in all EU countries by 1994. The Second Banking Directive allows banks to act as active corporate shareholders. The directive contains provisions allowing commercial banks to pursue strategies similar to German-style universal banks. Banks can hold equity stakes in non-financial firms, be it subject to certain regulatory limits [1]. Moreover, by focusing on the core EU-15 group of countries, we ensure that relevant characteristics of the regulatory environment such as accounting or disclosure rules are more or less homogeneous. From a theoretical view-

[1] The Directive states that a bank cannot invest more than 60% of its capital in shares of non-financial firms and that any single investment cannot exceed the ceiling of 15% of the bank's capital.

point we do not only explore the direct link between bank shareholdings and firm value, but we also explicitly take the capital structure of firms into account when examining the effect of financial institution shareholdings. In this respect we differ from Ferreira and Matos (2008) by focusing on the dual role of banks as lenders and shareholders. Finally, we do not focus on the ownership decision only, but treat it as one of the three pillars of our empirical setup in which we link ownership, value creation and leverage.

We find that banks and institutional investors do not differ with respect to the ownership decision. They both typically hold equity stakes in large, cash rich and widely held firms which are moreover characterized by high dividend yield and a lower than average stock market return volatility. Our main finding is a negative and significant relationship between the importance of bank shareholdings in non-financial firms and the value of those firms, measured as Tobin's Q. Although the effect is most pronounced for banks, we also find that non-bank institutional investor equity stakes are not associated with higher firm valuations. An increase of bank ownership of 5.0%, leaving all other variables at their mean, will lead to a Tobin's Q reduction of 11.1%. When we control for the capital structure of the firm, the reduction becomes as much as 26.1%. The decrease in Tobin's Q is less severe for institutional investor ownership, where an increase of 5.0% ownership is associated with a Tobin's Q reduction that ranges between 5.8% and 6.5%. The conclusion is that the involvement of financial institutions in the ownership structure of firms fails to create shareholder value. This evidence is not compatible with the monitoring hypothesis and raises the question whether the current regulatory framework is optimal. Finally, although the presence of banks in the ownership structure of firms is associated with higher levels of leverage, this feature does not appear to function as an effective disciplining device for managers.

In the next section we briefly review parts of the relevant literature to motivate our choice of the empirical setup. In section 3, we present the data on listed non-financial firms, focusing on their ownership structure. In section 4 we empirically examine the determinants of bank ownership and the impact of bank versus institutional investor ownership on firm value and leverage. After conducting a range of robustness checks, we conclude in Section 5.

2 Literature and hypotheses

Why would banks and institutional investors acquire ownership stakes in non-financial corporations? What is the effect of their involvement in corporate governance on the performance of the firms? How does the capital structure of a firm influence the impact of shareholders on corporate performance? Regarding the first issue, some studies investigate the effect of the regulatory environment on bank shareholdings, since this may determine the effect that banks can have on corporate decisions. In this category of research, Li, Moshirian, Kien Pham and Zein (2006) show that differences in macro governance characteristics substantially explain cross-country variation in institutional ownership concentration. More specifically, large institutional shareholdings are more prevalent in countries with stronger shareholder and voting rights, more effective legal enforcement and extensive financial disclosure. Hence, they conclude that strong governance environments act to strengthen monitoring ability so that more financial institutions are encouraged to hold concentrated equity positions. Other studies focus on the firm-specific determinants of bank shareholdings. Barucci and Mattesini (2008) document for Italy that banks hold equity mainly in companies that are less profitable, less dynamic, hold less debt and are less tightly controlled.

The second issue is the effect of bank and institutional investor shareholdings on the value of the firm. Assuming that institutional investors have objectives similar to other shareholders, they have an incentive to maximize shareholder value. This effect is thought to have become stronger over time since institutional investors have collectively become the largest owners of equity. When institutional investors such as fund managers hold equity stakes in firms, they can monitor firm management through actions ranging from the sale of shares, the active use of voting rights or meetings with management. The more independent they are from the firms the stronger their influence can be. Empirically, there is evidence for a positive role of institutional shareholders. Woidtke (2002) shows that firm value is positively related only to ownership by private pension funds. Gillan and Starks (2003) state that the rise of professional money managers as a large shareholder group in companies can increase the potential for monitoring of firm management. Cornett, Marcus, Saunders and Tehranian (2004) show that better firm performance is associated with the presence of institutions without potential business

relationships with the firm.

More recently, a branch of the literature examines the monitoring activities of institutional investors for cross-country samples. Chen, Harford and Li (2007) find that banks and insurance companies are more supportive of management actions than other types of institutional investors in anti-takeover amendment proposals. Finally, Ferreira and Matos (2008) find that all institutional investors have a strong preference for the stock of large firms and firms with good governance. Firms with higher ownership by independent institutions, with potentially fewer business ties to firms, have higher firm valuations. They interpret this as evidence for the monitoring role of independent institutions.

For the case of bank ownership of corporations, it is important to realize that banks can play a dual role since they can both act as lenders and as shareholders. The general argument is that through equity investment of the bank, the opposing incentives of shareholders and debtholders (Jensen and Meckling (1976); Myers (1977)) can be mitigated. However, the theoretical arguments do not lead to clear predictions. Banks may hold equity to participate in the potential upside performance of the company, instead of just receiving the debt payoff. Moreover, as shareholders, banks may obtain valuable inside information that can be useful in the allocation of credit. Finally, banks may try to monitor the firm with the aim to reduce agency costs and protect their position as debtholders. For example, Mahrt-Smith (2006) finds that a small equity stake held by the bank can have a significant and positive impact on the lending relationship. Banks have an incentive to monitor corporations to which they lend, especially when there is a main bank/firm relationship (Boot (2000)). This way, banks may obtain valuable information from their involvement in lending to non-financial firms, information that they can use in their monitoring role as shareholder.

However, the combination of debt and equity may raise potential conflicts of interest which may weaken the effectiveness of banks as monitors. Debt holders are inherently risk averse because they face downside risk on their loans. Banks may be locked in a lending relationship which may weaken their ability to influence firm management. Therefore, banks may have a disadvantage in pressuring corporate managers for changes because it may harm their business relationships with the firm (Brickley, Lease and

Smith (1988); Almazan, Hartzell and Starks (1995)). Moreover, if a bank holding equity is primarily interested in ensuring the service of its outstanding debt, this could conflict with other shareholders' interests, because banks may induce the company to undertake more conservative policies directed towards debt repayment. In this case banks may even become forced to extend loans to underperforming firms or restructure existing debt at unfavorable conditions, leading to a soft budget constraint (Dewatripont and Tirole (1994)).

Empirically, a considerable part of the literature relates to German and Japanese banks. This is due to the institutional setting in these countries, characterized by strong bank-firm ties in the Japanese Keiretsu and the prevalence of the main bank system in Germany. German banks could even vote the stock they hold as custodians from their clients. Early studies, such as Cable (1985), Gorton and Schmid (2000), Edwards and Nibler (2000) reach benign conclusions regarding the role of banks in German corporate finance. This evidence highlighted the comparative advantages of the German bank-based system. Banks were credited with providing a long-term view on investment, providing expertise to companies as well as improved governance. Morck, Nakamura and Shivdasani (2000) report a nonlinear relationship between firm value and bank shareholding for Japanese firms. At low levels of ownership, firm performance falls as bank shareholding increases. At higher levels of bank ownership, this relationship is mitigated and sometimes reversed. They suggest that there are both costs and benefits to bank shareholding. More recently, however, Weinstein and Yafeh (1998) show that bank ownership and main bank relationships have had a negative effect on firm performance in Japan during the 1990s. Barucci and Mattesini (2008) investigate large Italian firms and find little support for the existence of a virtuous bank/firm shareholding relation associated with governance/monitoring arguments. Chirinko and Elston (2006) report that bank control in Germany affects company profitability negatively, although significance is rather weak. Dittmann, Maug and Schneider (2010) find that banks that are represented on German firm's boards promote their own business as lenders and as M&A advisors. They find little evidence that bankers on the board act as monitors of corporate management and even that bankers on the board cause a decline in the valuation of non-financial firms. These results suggest that German universal banks do not behave differently from Anglo-Saxon specialist banks in recent times. For the case

of emerging countries, Lin Zhang and Zhu (2009) provide evidence of a negative effect of bank ownership on firm performance in China. Our empirical investigation for the EU should be informative about these effects for a large sample of listed European firms.

The third effect we consider is the role of leverage. The link between bank shareholdings and the degree of firm leverage is largely undisputed. In Europe, e.g., Dittmann, Maug and Schneider (2010) report that bank lending is significantly positively related to the percentage of bankers on the board of German firms. Barucci and Mattesini (2008) show that bank shareholding is significantly correlated with the amount of debt granted to the firm by the bank in Italy. The next question is whether the degree of firm leverage is associated with better firm performance. This issue is part of a wider research agenda investigating the impact of the firm's capital structure on overall corporate performance. Jensen and Meckling (1976), Fama (1980), and Grossman and Hart (1982) argue that managers prefer lower financial leverage because it reduces the risk of bankruptcy and protects their undiversified human capital. Higher leverage may reduce the agency problems between managers and shareholders and thereby increase firm value by encouraging managers to act more in the interests of outside equity holders. This mechanism should alleviate the overinvestment problem, particularly in firms with excess free cash flow (Jensen (1986)).

Empirically, however, the evidence is mixed. McConnell and Servaes (1995) show that capital structure matters for firm value. Lin, Zhang and Zhu (2009) document a negative relationship between firm performance and leverage and attribute this relationship to the soft-budget constraint in the Chinese banking sector and weak corporate governance practices resulting from the increased borrowing. Bhagat and Bolton (2008) also find that higher leverage is associated with lower firm value.

Based on this literature survey, we examine the interaction between ownership, leverage and long-run firm performance for a large sample of listed European firms. We first conduct a separate analysis of the decision of banks and institutional investors to be involved in the ownership structure of non-financial firms. For the analysis of the relationship between bank ownership and firm value, we set up a system of equations that we estimate simultaneously. Since the extant empirical evidence is mixed for samples covering different countries and different sets of firms, our objective is to present a

careful analysis of the evidence for the EU-15. The first step is constructing a detailed database of ownership, to which we now turn.

3 Data

The ownership data is obtained from AMADEUS, a corporate database maintained by Bureau Van Dijk (BvD, Brussels), containing pan-European financial data with standardized balance sheet, income statement and ownership data for companies in Europe with the stated objective of achieving uniformity and enabling cross-border analysis. Several papers, such as Li, Moshirian, Kien Pham and Zein (2006), have used ownership data from BvD [2] . We select all consolidated listed firms of the EU-15 for the period 1997-2006. We retrieve shareholdings for listed non-financial firms in the EU-15 for which detailed ownership data are available and exclude financial firms from the sample. The final dataset contains 2,850 listed non-financial firms from EU-15 for the period 1997-2006, leading to 13,042 firm-year observations.

Ownership for different classes of shareholders is calculated as the sum of the percentage holdings in a firm's stock for each year. We set ownership variables to zero if a stock is not held by any of that particular shareholder type (Gompers and Metrick (2001)). We focus on banks as shareholders, measured by the percentage of shares held

[2] Amadeus subdivides the shareholders in different types: Bank, Employees/Managers, Financial company, Foundation/Research Institute, Individual(s) or family(ies), Industrial company, Insurance company, Mutual & Pension fund/Trust/Nominee, Other unnamed shareholders, Private Equity firms, Private individuals/private shareholder, Self-owned, State/Public authority, Unknown, Unnamed private shareholders. Since we focus on financial institutions and banks in particular, we control the accuracy of these entries. First, we control whether inconsistencies arise in shareholder type over the years. We use the most recent shareholder type since this proves to be the most accurate. Second, we control the names of the shareholders for keywords (in English or languages of the sample countries) that indicate whether a shareholder is a financial institution (e.g., "bank," "insurance company," etc.). Finally, we use a list of financial institutions provided by Li et al. (2006) to cross-check the financial institution shareholders in our sample. They use company information databases (Lexis/Nexis and Dun and Bradstreet), business news stories (through Factiva, Proquest, and the Google internet search engine), the shareholders' web sites and LionShares database constructed by FactSet Research Systems, Inc., which collects shareholdings of more than 4,000 large investment managers domiciled around the world.

by banks and investment vehicles under their direct control ($BANK$). We compare their influence with that of non-bank institutional investors ($INST\ INV$), measured by the percentage of shares held by financial companies, insurance companies, mutual and pension funds, trusts and private equity firms which are not part of a bank. The sum of $BANK$ and $INST\ INV$ is financial institution ownership ($FIN\ INST$). It is important to note that BvD uses the firm as starting point for which it collects balance sheet and ownership information, where ownership is calculated as the cash flow rights of respective shareholders. This approach differs from the one used in Ferreira and Matos (2008) who use the FactSet database to identify institutional investors shareholdings in individual firms. Moreover, contrary to FactSet, BvD provides ownership data of all shareholders, and has therefore information on ownership of, e.g., families or industrial firms. Table 1, shows the summary statistics of the ownership variables. Bank ownership is on average 5.4%, institional investors hold on average 23.4%, the sum amounts to total financial institution ownership of 28.8%. Family ownership is on average 11.6%, whereas ownership by other industrial companies is 18.2%. When we consider only observations with positive ownership, bank ownership increases to 12.4%, financial institution ownership to 35.6% and family ownership increases to 23.7%. The different data collection approach in this paper, i.e. bottom up from the firms through BvD, compared to the one used in Ferreira and Matos (2008), i.e. top down design from FactSet, results in different percentage ownership stakes for the various shareholder types. Shareholdings in our sample are significantly larger than the percentages quoted in their paper. Ferreira and Matos (2008) report financial institution ownership of only 7.4% of which 1.5% is held by bank trusts. The increased influence of financial institutions as shareholders (IMF (2005)) might be more pronounced for the developed countries but seems unlikely to completely explain the discrepancy between the two datasets. Table 2 shows the distribution of financial institution ownership and bank ownership over the countries. The table shows that there is considerable heterogeneity in ownership across the countries. As expected, due to its well developed financial markets, the UK has the highest share of financial institutions ownership, followed by the Scandinavian countries. The highest share of bank ownership is found in Spain, followed by Austria and Ireland. However, the highest relative share of bank ownership in total financial institution ownership is found in Greece and Austria with 55.7% and 51.7%, respectively. Germany has a relative share of 37.2% which is still twice the average of

19.2% but only the sixth highest in this ranking. A possible explanation is the change in German tax legislation in 2001 with respect to the treatment of capital gains generated by the sale of equity stakes by banks. This has caused a decline in German banks' shareholdings. The countries with the lowest relative share of bank ownership are the Scandinavian countries, Belgium, France and the U.K.

The summary statistics of the firm variables are presented in table 1, part B. The data are obtained from BvD, Datastream and Worldscope using the ISIN code of the firm as identifier. To reduce the impact of outliers we winsorize the sample at the 1st and 99th percentile. We delete all observations for which one of the variables is missing. The average Tobin's Q is 1.93 with a median of 1.59. The average company in our sample is large (€ 2.29 billion, $SIZE$) and has leverage of 20.6% (LEV). The companies hold 10.5% cash & cash equivalents ($CASH$), have a dividend yield of 2.8% (DY) and a turnover of 54.4% ($TURNOVER$). The firms in our sample have on average a positive return on assets, 4.0% (ROA) and are also profitable with respect to earnings before interest and taxes, 5.0% ($EBIT$). Moreover, the companies in our sample are somewhat less closely held than the firms in Ferreira and Matos (2008), the mean for our sample is 40.8% relative to 45.7% in theirs. The summary statistics are comparable to the numbers reported in previous research (Rajan and Zingales (1995)). Appendix A presents the construction of the firm-specific variables used in our empirical analysis.

In the regressions we include country-specific variables to account for any differences across countries. However, since we focus on the 15 countries of the 'old' European Union, we do not expect that country differences will explain a lot of the cross-sectional variation across firms. The EU has implemented a broad range of legal provisions aimed at harmonizing the institutional and business conditions across the EU. Table 1, part C, presents the summary statistics of the variables. The measure for the strength of auditing and reporting standards regarding company financial performance ($AUDIT$) is obtained from the Global competitiveness report. The variable $LEGAL$ results from anti-director rights multiplied by the rule of law index and is obtained from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The final two variables are obtained from the Financial Development and Structure database of the World Bank. We use private bond market capitalization to GDP as a proxy for the development of the bond market ($BOND$), and a measure of stock market development ($STOCK$).

4 Results

4.1 What determines financial institution ownership?

We start with the determinants of bank ownership in non-financial firms. All regression have panel corrected standard errors allowing for heterogeneity at the firm level (Rogers standard errors) together with year dummies and country dummies to control for residual correlation across years and residual correlation across firms and countries in a given year. Table 3 presents the estimates of the ownership panel regressions, the first column contains the results for banktrusts ($BANK$). We compare these results with non bank ownership ($INST\ INV$) and with financial institutions ownership ($FIN\ INST$). We estimate the model in the first three columns with OLS, the last three columns show the results for a Tobit specification. We use as explanatory variables firm size, market to book, turnover, dividend yield, return on equity, idiosyncratic stock market risk, leverage, cash holdings, closely held shares and measures for the importance of the bond and stock markets (Gompers and Metrick (2001); Ferreira and Matos (2008)) [3]. Firm size, dividend yield and stock return volatility are used as proxy for firm risk. Firm size, stock turnover and size of the stock market are related to liquidity and transactions costs. Market to book ratios and firm size have been shown to predict future returns (Fama and French (1992)). We find that, irrespective of the specification, the main common drivers of financial institution ownership are the size of the firm ($SIZE$) and whether the equity of the firm is closely held ($CLOSE$). The former has a positive effect on ownership while financial institutions prefer to hold equity stakes in widely held firms. The finding that financial institutions prefer equity holdings in large firms is consistent with similar findings, e.g., Gompers and Metrick (2001) for the U.S., Dahlquist and Robertsson (2001) for the Swedish market and Barucci and Mattesini (2008) for Italian firms. The rationale is that financial institutions have concerns about liquidity and transaction costs. Financial institutions avoid investing in closely held firms. When insiders hold dominant stakes in a firm, the outside investors can only exert negligible influence. However, the fact that the coefficient for $CLOSE$

[3] When we include $LEGAL$ and $AUDIT$ instead of country fixed effects, the results remain unaltered.

is smaller for banks may indicate that banks act more like relationship lenders than as monitors.

Firm ownership of all financial institutions is positively affected by the corporation's dividend yield (DY), indicating that they act as investors seeking cash returns. However, this effect is largely driven by the institutional investors since fund managers have a fiduciary obligation to their investors and hence prefer stocks paying regular dividends. Contrary to Ferreira and Matos (2008), we find that financial institutions avoid firms with relatively high levels of stock market volatility, measured as the standard deviation of stock returns (SD). This is in line with the predictions of the "prudent man" rules (Del Guercio (1996)). Banks however do not avoid idiosyncratic risk which suggests that they are able to alleviate idiosyncratic firm risk by monitoring the companies. Banks are the only shareholders who prefer stocks in firms with a relatively high level of leverage (LEV) which suggests complementarity between debt and equity in the case of banks (see Barucci and Mattesini, 2008). Finally, institutional investors turn to companies in countries with large bond and stock markets ($BOND$, $STOCK$) suggesting a preference for liquid markets. Combined, these findings suggest that institutional investors act as 'normal' stock market investors, seeking cash returns and avoiding risk, whereas the determinants for bank ownership appear to be in line with monitoring.

4.2 Effect of financial institution ownership on corporate performance

To investigate the relation between institutional ownership and firm value, we adopt Tobin's Q as a measure of firm value, calculated as the book value of total assets plus the market value of equity minus the book value of equity divided by total assets (Gompers, Ishii and Metrick (2003); Doidge, Karolyi and Stulz (2004)). Since Tobin's Q contains the stock market value of the firms' equity, it is a forward-looking measure of firm performance. It captures the long-term profit potential of each firm as assessed by the stock market. In this respect, it is a more complete indicator of company performance than accounting profits, such as ROA, which are inherently backward looking.

We first run regressions of a firm's Tobin's Q on variables associated with firm value such as size ($SIZE$), leverage (LEV), cash holdings ($CASH$), and median Tobin's Q

for the firm's activity where the industries are specified according to the Fama/French classification. As financial institution ownership variables we include the ownership of banktrusts, non-bank institutional investors and total financial institutions. Finally, we include the country-level variables $STOCK$ and $BOND$. The findings are reported in table 4. Irrespective of the type of financial institution or whether we use country fixed effects or firm fixed effects, we find that the coefficient of financial institutional ownership is negative. However, there is no significant relationship of financial institution ownership with firm value, except for bank ownership ($BANK$) which is significant in the firm fixed effects specification.

Large and cash-rich firms have higher valuations. The individual firm's Tobin's Q is positively affected by the median Q in its industry. And higher leverage (LEV) has a negative effect on Tobin's Q. Table 5, column 1, shows a non parametric quantile regression on Q. Furthermore, to alleviate measurement errors, in column 2 and 3, we use alternative transformations of Q such as log(Q) and -1/Q (Gompers, Ishii and Metrick (2009)). Finally, we replace Tobin's Q with return on assets (ROA), column 4, as an accounting measure of corporate profitability. Our results remain unaltered. Hence, after accounting for the effect of a set of standard control variables, we find that there is no effect from financial institution ownership both on the long-run performance potential and on a short-term profit measure of the European listed firms in our sample.

A potential explanation for these results is the possible endogeneity of financial institution shareholdings and the capital structure of firms. Financial institutions ownership may be driven by a specific set of determinants (see Table 3). Hence, we estimate a system of simultaneous equations which captures the drivers of firm value and the ownership decision and which employs these interactions to determine the ultimate effect on the long-term profit potential of listed firms. To identify financial institutional ownership we use dividend yield (DY), idiosyncratic risk (SD) and closely held shares ($CLOSE$). The results in table 3 show that these variables drive financial institutional ownership but are not related to firm value. A Durbin-Wu-Hausman test of endogeneity confirms that financial institution ownership is endogenous to firm value. For this test we instrument financial institutional ownership with the variables used in 3SLS to identify financial institutional ownership (DY, SD and $CLOSE$). Identification of the leverage equation is obtained using fixed assets of the company ($FIXED$), deprecia-

tion ($DEPR$), and the median industry capital structure ($LEV\ industry$)(Baert and Vander Vennet (2008)). Alternatively, we use the z-score of a company to intrument its leverage (Bhagat and Bolton (2008)) [4].

The results are presented in table 6. The effect of financial institution ownership on Tobin's Q is negative and significant and this holds for both banks and non-bank institutional investors. Apparently, neither of these shareholder types can exert sufficient influence to have an impact on firm performance. These findings do not support the monitoring hypothesis. The coefficients in the ownership equation indicate that the determinants of financial institution ownership remain unaltered when estimated in a system. When we consider the coefficients of the Tobin's Q equation, the results for the control variables are broadly similar to the ones in table 5. Median industry Q ($Q\ industry$), cash holdings ($CASH$) and the size of the firm ($SIZE$) display a positive association with its market value. The book leverage variable (LEV) has a negative impact on Q, as in Ferreira and Matos (2008). The finding that financial institutions add no (market) value as shareholders suggests a lack of monitoring influence on corporate management and is inconsistent with any form of the monitoring hypothesis. The results are also economic significant as a 5.0% increase of institutional investors ownership is associated with a 5.8% reduction of Tobin'Q, leaving all other variables at their mean value. The decrease of Tobin's Q associated with a 5.0% bank ownership increase is almost twice as large (11.1%).

The results remain qualitatively unaltered in Table 7 when we use $log(Q)$, (Part A). These results reinforce the interpretation that not only institutional investors but also banks lack the capacity to influence corporate management in terms of profit generation and stock market value creation. However, when we use ROA as dependent variable (Table 7, Part B), the negative contribution to firm performance of financial institutions as shareholders doesn't hold for a short-term profit measure. Since the coefficients of the control variables are very similar they are omitted from these tables.

[4] The results remain qualitatively the same and are not tabulated.

4.3 Controlling for capital structure

A two-equation system accounts for the potential endogeneity of the ownership decision. But we argue that a more complete setup should also include an explicit modeling of the capital structure decision. Banks can hold both debt and equity and can potentially use both financing means to influence corporate management. Institutional investors only hold equity and can only exert influence as shareholders. Consequently, in our final empirical setup we explore three relationships simultaneously while capital structure might well be endogenous in the case of bank ownership. The first is the link between the ownership structure of firms and their performance, measured as the Tobin's Q. $Q = f(bank\ ownership, LEV, X)$. The second is the relationship between bank ownership and firm specific determinants. $Bank\ ownership = f(LEV,\ Q,\ Y)$. The third association is that between the observed leverage of a firm and its ownership structure, with a special focus on banks, since they can hold both debt and equity, $LEV = f(bank\ ownership, Q, Z)$. X, Y and Z contain the respective control variables. In Table 8 we report the results of three-stage least squares (3SLS) regressions of a system of simultaneous equations for Tobin's Q, financial institution ownership and leverage.

After controlling for the firm's leverage decision, the ownership decision by financial institutions and commonly used firm- and country-specific determinants of Tobin's Q, we find that financial institution ownership is negatively associated with company value. This negative market value effect holds both for banks and institutional investors. The results for the three-equation system corroborate those of the two-equation setup. Apparently, financial institutions treat their shareholdings in non-financial firms as pure investments, rather than as an instrument to influence corporate management. Moreover, the economic significance increases as a 5% increase in ownership of banks and institutional investors is associated with a Tobin's Q reduction of respectively 26.1% and 6.5%.

Again, table 9 shows that the results are robust to alternative indicators of firm performance as the dependent variable, i.e. $log(Q)$ (Part A) and short-term profits, ROA, are positively influenced by financial institution ownership (Part B). We perform additional robustness checks to alleviate the potential endogeneity problem by including

the one-period lagged values of the explanatory variables. All results remain unaltered. In fact, the finding that financial institutions prefer shareholdings in large, cash-rich, high dividend yield and widely held firms is even strengthened.

Furthermore, we run several robustness checks (results not shown). We split the sample into quartiles according to the size of the firms since firm size plays an important role both as determinant of financial institution shareholding and as determinant of firm performance, the results remain the same for all size quartiles. Moreover, we restrict the sample to companies with positive profitability to control for the possibility that financial institutions and banks in particular focus on firms in distress, to take advantage of their monitoring ability. The results remain unaltered also in this specification. We also rerun the specifications for Germany and the U.K. separately as these countries represent the extremes in ownership culture in Europe. Both countries give similar results as the results of the baseline estimation. Finally, we take only firms with positive financial institution ownership, again the results remain unaltered.

5 Conclusions

We investigate the relationship between financial institution ownership, corporate leverage and the market value in a sample of listed non-financial firms from EU-15 for the period 1997-2006. More specifically, we focus on the value added of banks versus institutional investors in their role as shareholders on non-financial firms. The EU is especially well suited to examine this question since the Second Banking Directive of 1989 contains provisions allowing commercial banks to pursue strategies leading to a German-style universal bank, including shareholdings in corporations. Banks can hold equity stakes in non-financial firms, be it subject to certain regulatory limits. The early empirical evidence for Germany and Japan indicated that bank ownership was associated positively with firm performance. Simultaneously, institutional investments in world equity markets have grown substantially in recent decades to such a degree that financial institutions have emerged as the largest investor class in many countries. Therefore, we can usefully compare the influence of bank versus institutional investor shareholdings on the performance of the firms in which they hold equity stakes. In our

empirical setup we explore the relationships between ownership, corporate performance and corporate leverage simultaneously. Since leverage may serve as a disciplining device, we explicitly take the observed firm leverage into account. This is especially important for bank ownership, since they can hold both debt and equity.

Our main results can be summarized as follows. First, we report that financial institutions, both bank and non-banks, typically hold equity stakes in large, cash rich and widely held firms which are moreover characterized by high dividend yield and a lower than average stock market return volatility. The preference for dividends and low-risk stocks is most pronounced for institutional investors. We interpret these findings as evidence that financial institutions behave like typical equity investors, seeking return rather than influence. Second, after controlling for the capital structure decision of the firms and the ownership decision of financial institutions in a simultaneous equations model, we find that there is a negative relationship between financial institution ownership and the market value of firms, measured as the Tobin's Q. This negative value effect holds for banks as well as institutional investors. We find no evidence that banks, which can use both debt and equity as potential monitoring instruments, as well as institutional shareholders, are effective monitors of corporate management. Although the presence of financial institutions in the ownership structure of firms is associated with higher levels of leverage, this feature does not appear to function as an effective disciplining device for managers. Instead we find a negative association between leverage and the market value of firms. These results are in sharp contradiction with the monitoring hypothesis and question the role of banks as shareholders. The results also contrast with the positive effects reported in early studies on bank influence in firms, mainly in Germany and Japan. Since our finding of a negative association between bank shareholdings and company value for a large sample of European listed firms is compatible with similar findings in other geographical areas, this calls for a reassessment of the role of banks in corporate governance. The approach of international regulators to stimulate commercial banks to refocus on traditional intermediation, and hence on lending, seems warranted.

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Table 1
Summary stats

This table reports mean, median, standard deviation, minimum, maximum, and number of observations (Obs) of variables. All variables are defined in Appendix A. The sample period is from 1997 to 2006.

Variable		Obs	Mean	Median	Std. Dev.	Min	Max
Ownership variables							
FIN INST	Financial Institutions	13042	0.288	0.21	0.28	0	1
BANK	Bank	13042	0.054	0	0.1	0	1
INST INV	Institutional Investors	13042	0.234	0.16	0.25	0	1
FAM	Individuals and family	13042	0.116	0	0.21	0	1
FIRM	Industrial companies	13042	0.182	0.04	0.27	0	1
Firm variables							
CASH	Cash & Cash Equiv.	13042	0.105	0.06	0.13	0	0.82
CLOSE	Closely held shares	13042	0.408	0.4	0.26	0	0.98
DEPR	Depreciation	13042	0.047	0.04	0.04	0	0.28
DY	Dividend Yield	13042	0.028	0.02	0.03	0	0.15
EBIT	Profitability	13042	0.050	0.07	0.14	-0.95	0.34
FIXED	Fixed Assets	13042	0.302	0.25	0.25	0	1
LEV	Leverage	13042	0.206	0.18	0.17	0	0.8
LEV industry	Leverage industry med	13042	0.181	0.17	0.08	0.05	0.38
MB	Market to Book	13042	1.249	0.92	1.13	0.16	8.53
Q	Q	13042	1.932	1.59	1.17	0.37	9.64
Q industry	Q industry med	13042	1.647	1.57	0.3	1.22	2.86
ROA	Return on Assets	12992	0.040	0.05	0.12	-0.77	0.32
ROE	Return on Equity	13042	0.035	0.1	0.44	-3.23	0.86
SD	Stock Return Volatility	13042	0.063	0.05	0.03	0.01	0.22
SIZE	Size	13042	19.279	19.11	1.92	14.04	24.1
TURNOVER	Turnover	13042	0.544	0.36	0.59	0	3.54
Country variables							
BOND	Bond Market Development	13042	0.302	0.2	0.21	0	1.39
STOCK	Stock Market Development	13042	1.145	1.21	0.45	0.14	2.7
LEGAL	Legal Regime Quality Index	13042	31.220	20	13.22	0	42.58
AUDIT	Strength of Auditing	13042	5.890	6	0.38	4.4	6.2

Table 2
Summary stats ownership

This table reports ownership percentages of financial institutions (FIN INST), banks(BANK), institutional investors (INST INV), individuals and family(ies) (FAM) and industrial firms (FIRM) over the countries. The final column report the share of bank ownership in financial Institutional ownership.

Country	FIN INST	BANK	INST INV	FIRM	FAM	% Bank / FIN INST
Austria	15.1	7.8	7.3	1.9	31.1	51.7
Belgium	18.8	2.4	16.4	8.0	35.1	12.8
Denmark	24.9	3.4	21.5	7.2	16.1	13.7
Finland	21.3	2.6	18.8	12.2	18.8	12.2
France	19.1	3.2	16.1	19.9	30.7	16.8
Germany	11.3	4.2	7.1	14.5	34.8	37.2
Greece	7.0	3.9	3.1	28.9	23.4	55.7
Ireland	21.4	8.3	13.1	8.5	10.5	38.8
Italy	19.4	4.2	15.2	19.8	33.3	21.6
Netherlands	27.5	7.3	20.2	2.9	19.8	26.5
Portugal	14.7	8.0	6.7	1.7	42.9	54.4
Spain	29.8	14.9	15.0	5.9	40.2	50.0
Sweden	24.5	5.3	19.2	10.3	19.7	21.6
United Kingd	38.0	5.9	32.5	9.6	7.9	15.5
Total	28.7	5.5	23.5	11.6	18.2	19.2

Table 3
Determinants of financial institution ownership

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of ownership for banks (BANK), institutional investors (INST INV) and all financial institutions (FIN INST). The first three columns are OLS, the last three use a Tobit specification. All regressions inlcude the firm-level regressors firm size (SIZE), book-to-market (BM), turnover (TURNOVER), dividend yield (DY), return on equity (ROE), stock return volatility (SD), leverage (LEV), cash holdings (CASH) and closely held shares (CLOSE). All regressions include the country-level regressors market capitalization of the private bond market to GDP (BOND), market capitalization of the stock market to GDP (STOCK), year dummies and country dummies. Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. Coefficients significant at the 5% level are in boldface. * significant at 5%; ** significant at 1%

	OLS			TOBIT		
	-1	-2	-3	-4	-5	-6
	BANK	INST INV	FIN INST	BANK	INST INV	FIN INST
SIZE	**0.003**	**0.007**	**0.009**	**0.009**	**0.011**	**0.014**
	[2.86]**	**[2.88]****	**[3.59]****	**[7.73]****	**[6.86]****	**[8.04]****
MB	-0.002	0	-0.002	-0.002	0.001	-0.001
	[1.82]	[0.03]	[0.52]	[1.40]	[0.25]	[0.54]
TURNOVER	**0.006**	-0.009	-0.003	**0.011**	**-0.015**	-0.008
	[2.54]*	[1.74]	[0.48]	**[2.86]****	**[2.92]****	[1.35]
DY	0.107	**0.516**	**0.581**	**0.193**	**0.634**	**0.669**
	[1.92]	**[4.11]****	**[4.23]****	**[2.66]****	**[6.44]****	**[6.19]****
ROE	-0.004	**-0.018**	**-0.02**	**-0.01**	**-0.023**	**-0.027**
	[1.47]	**[3.03]****	**[3.18]****	**[2.27]***	**[3.80]****	**[4.05]****
SD	-0.02	**-0.335**	**-0.347**	-0.049	**-0.442**	**-0.445**
	[0.43]	**[3.58]****	**[3.27]****	[0.68]	**[4.53]****	**[4.18]****
LEV	**0.024**	0.008	0.029	**0.039**	0.008	0.03
	[2.50]*	[0.39]	[1.24]	**[3.36]****	[0.48]	[1.67]
CASH	-0.015	-0.035	-0.05	**-0.039**	-0.033	**-0.054**
	[1.63]	[1.24]	[1.66]	**[2.33]***	[1.50]	**[2.23]***
CLOSE	**-0.016**	**-0.049**	**-0.066**	**-0.079**	**-0.104**	**-0.12**
	[2.19]*	**[3.11]****	**[3.77]****	**[9.00]****	**[8.76]****	**[9.23]****
BOND	**0.045**	**0.179**	**0.224**	**0.078**	**0.147**	**0.2**
	[2.02]*	**[4.88]****	**[4.99]****	**[2.68]****	**[3.46]****	**[4.36]****
STOCK	**0.049**	**0.134**	**0.18**	**0.12**	**0.189**	**0.228**
	[5.61]**	**[8.09]****	**[9.14]****	**[8.63]****	**[9.95]****	**[11.03]****
year dummies	9	9	9	9	9	9
country dummies	13	13	13	13	13	13
Constant	-0.018	-0.185	-0.199	-0.244	-0.391	-0.381
	[0.49]	[3.29]**	[2.92]**	[6.38]**	[7.09]**	[6.42]**
Observations	13042	13042	13042	13042	13042	13042
R-squared	0.11	0.22	0.23			

Table 4
Institutional ownership and firm value

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Tobin's Q. Ownership include banktrusts (BANK), institutional investors (INST INV), both BANK and INST INV and all financial institutions (FIN INST). Firm-level control variables include firm size (SIZE), leverage (LEV), cash holdings (CASH) and European industry Tobin's Q median according to the Fama/French classification (Q industry). All regressions include the country-level regressors market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). The first four columns have year and country fixed effects, the last four columns have year and firm fixed effects. Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. Coefficients significant at the 5% level are in boldface. * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6	-7	-8
	Q	Q	Q	Q	Q	Q	Q	Q
BANK	-0.161		-0.152		**-0.195**		-0.189	
	[1.31]		[1.23]		**[1.98]***		[1.93]	
INST INV		-0.038	-0.029			-0.033	-0.02	
		[0.59]	[0.44]			[0.58]	[0.36]	
FIN INST				-0.047				-0.051
				[0.83]				[1.02]
SIZE	0.009	0.008	0.009	0.009	**-0.275**	**-0.275**	**-0.275**	**-0.274**
	[0.95]	[0.91]	[0.97]	[0.94]	**[5.46]****	**[5.45]****	**[5.45]****	**[5.45]****
LEV	**-1.108**	**-1.112**	**-1.109**	**-1.111**	**-1.002**	**-0.999**	**-1.001**	**-0.999**
	[12.97]**	**[13.01]****	**[12.98]****	**[12.99]****	**[7.89]****	**[7.87]****	**[7.88]****	**[7.87]****
CASH	**2.024**	**2.024**	**2.022**	**2.023**	**0.627**	**0.626**	**0.627**	**0.626**
	[10.35]**	**[10.35]****	**[10.35]****	**[10.35]****	**[2.90]****	**[2.89]****	**[2.90]****	**[2.89]****
Q industry	**1.087**	**1.088**	**1.086**	**1.087**	**1.148**	**1.148**	**1.147**	**1.147**
	[14.22]**	**[14.20]****	**[14.18]****	**[14.18]****	**[12.68]****	**[12.67]****	**[12.66]****	**[12.66]****
BOND	**0.549**	**0.549**	**0.554**	**0.553**	**0.537**	**0.531**	**0.54**	**0.537**
	[2.68]**	**[2.70]****	**[2.71]****	**[2.71]****	**[2.78]****	**[2.76]****	**[2.80]****	**[2.79]****
STOCK	**0.248**	**0.245**	**0.251**	**0.248**	**0.151**	**0.146**	**0.153**	**0.151**
	[3.13]**	**[3.07]****	**[3.14]****	**[3.11]****	**[2.04]***	**[1.98]***	**[2.06]***	**[2.03]***
year dummies	9	9	9	9	9	9	9	9
country dummies	13	13	13	13	0	0	0	0
firm dummies	0	0	0	0	2850	2850	2850	2850
Constant	-0.258	-0.265	-0.262	-0.266	5.112	5.103	5.112	5.106
	[1.04]	[1.06]	[1.05]	[1.06]	[5.45]**	[5.44]**	[5.45]**	[5.45]**
Observations	13042	13042	13042	13042	13042	13042	13042	13042
R-squared	0.23	0.23	0.23	0.23	0.2	0.2	0.2	0.2

Table 5
Institutional ownership and firm value
Robustness

This table reports estimates of coefficients of a median regression on Q and the annual time-series cross-sectional firm-level regression of log(Q), -1/Q and return on assets (ROA). Ownership is bank ownership (BANK). Firm-level control variables include firm size (SIZE), leverage (LEV), cash holdings (CASH) and European industry Tobin's Q / logQ/ -1/Q and ROA median according to Fama French classification (Q industry, logQ industry, -1/Q industry and ROA industry). All regressions include the country-level regressors market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). All regressions include year and country fixed effects. Column one is a quantile regression which includes additional industry fixed effects. The last three columns are OLS. Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. The robust t-statistics in parentheses are adjusted for clustering at the firm-level. Coefficients significant at the 5% level are in boldface. * significant at 5%; ** significant at 1%

	-3	-1	-2	-4
	Q	logQ	-1/Q	ROA
BANK	0.007	-0.071	-0.057	-0.022
	[0.14]	[1.35]	[1.74]	[1.91]
SIZE	**0.028**	**0.016**	**0.021**	**0.015**
	[10.05]**	**[3.97]****	**[7.86]****	**[14.36]****
LEV	**-0.742**	**-0.539**	**-0.326**	**-0.107**
	[23.58]**	**[15.05]****	**[15.23]****	**[10.35]****
CASH	**1.172**	**0.742**	**0.297**	**-0.036**
	[28.74]**	**[11.06]****	**[8.03]****	**[1.58]**
Q industry	**0.834**			
	[28.61]**			
logQ industry		**0.783**		
		[17.57]**		
-1/Q industry			**0.664**	
			[11.90]**	
ROA industry				**0.013**
				[13.26]**
BOND	**0.282**	**0.197**	**0.091**	-0.019
	[3.64]**	**[2.80]****	**[2.47]***	[1.17]
STOCK	0.024	**0.058**	0.015	**0.026**
	[0.66]	**[2.02]***	[0.93]	**[3.84]****
year dummies	9	9	9	9
country dummies	13	13	13	13
industry dummies	45	0	0	0
Constant	-0.324	-0.164	-0.657	-0.257
	[3.21]**	[1.59]	[8.43]**	[9.17]**
Observations	13031	13021	13042	12992
R-squared		0.26	0.2	0.12

Table 6
Institutional ownership and firm value
System of ownership and firm value (Q)

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Tobin's Q; and alternatively, banks (BANK) in system 1, institutional investors (INST INV) in system 2 and ownership for all financial institutions (FIN INST) in system 3. The system of equations is estimated using three-stage least squares. Firm-level control variables include firm size (SIZE), dividend yield (DY), stock return volatility (SD), leverage (LEV), cash holdings (CASH), closely held shares (CLOSE), and European industry Tobin's Q median (Q industry). All regressions include the country-level regressors strength of auditing and reporting (AUDIT), legal regime index (LEGAL), market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. t-statistics are in parentheses. Coefficients significant at the 5% level are in boldface.

	-1		-2		-3	
	Q	BANK	Q	INST INV	Q	FIN INST
BANK	**-4.876**					
	[2.03]*					
INST INV			**-3.084**			
			[5.19]**			
FIN INST					**-2.192**	
					[4.46]**	
Q		**-0.013**		**-0.015**		**-0.03**
		[3.98]**		**[2.04]***		**[3.63]****
SIZE	**0.032**	**0.005**	**0.033**	**0.007**	**0.037**	**0.012**
	[2.17]*	**[10.23]****	**[4.08]****	**[6.11]****	**[4.01]****	**[9.23]****
LEV	**-0.953**	**0.015**	**-1.123**	-0.016	**-1.057**	-0.005
	[10.08]**	**[2.11]***	**[15.82]****	[1.00]	**[15.70]****	[0.29]
CASH	**1.878**	0.016	**1.785**	-0.005	**1.804**	0.013
	[20.28]**	[1.50]	**[18.05]****	[0.20]	**[19.19]****	[0.52]
DY		**0.259**		**0.847**		**0.874**
		[6.87]**		**[10.01]****		**[9.19]****
SD		**0.095**		-0.01		-0.008
		[3.55]**		[0.17]		[0.12]
CLOSE		**-0.009**		**-0.023**		**-0.04**
		[2.19]*		**[3.02]****		**[4.47]****
Q industry	**1.008**		**0.999**		**0.991**	
	[17.97]**		**[22.53]****		**[22.29]****	
AUDIT	**-0.127**	**-0.018**	**-0.151**	**-0.037**	**-0.156**	**-0.053**
	[2.53]*	**[6.51]****	**[3.86]****	**[6.10]****	**[3.90]****	**[7.83]****
LEGAL	0.001	**0.001**	**0.011**	**0.004**	**0.008**	**0.004**
	[0.54]	**[4.71]****	**[3.68]****	**[14.42]****	**[3.01]****	**[14.28]****
BOND	0.055	**0.012**	**0.411**	**0.133**	**0.318**	**0.143**
	[0.81]	**[2.14]***	**[3.98]****	**[11.16]****	**[3.36]****	**[10.70]****
STOCK	**0.261**	0.006	**0.716**	**0.149**	**0.587**	**0.155**
	[5.35]**	[1.29]	**[6.78]****	**[16.06]****	**[6.36]****	**[14.74]****
year dumm	9	9	9	9	9	9
Constant	0.444	0.077	0.281	0.099	0.368	0.189
	[1.66]	[3.88]**	[1.24]	[2.30]*	[1.67]	[3.89]**
Observatior	13042	13042	13042	13042	13042	13042

Table 7
Institutional ownership and firm value
System of ownership and firm value (logQ/ROA)

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of log(Q) and ROA ; and alternatively, banks (BANK) in system 1, institutional investors (INST INV) in system 2 and ownership for all financial institutions (FIN INST) in system 3. The system of equations is estimated using three-stage least squares. Firm-level and country-level control variables are omitted for brevity. Firm-level control variables include firm size (SIZE), dividend yield (DY), stock return volatility (SD), leverage (LEV), cash holdings (CASH), closely held shares (CLOSE), and European industry Tobin's Q median (Q industry). All regressions include the country-level regressors strength of auditing and reporting (AUDIT), legal regime index (LEGAL), market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. t-statistics are in parentheses. Coefficients significant at the 5% level are in boldface.

Part A

	-1		-2		-3	
	logQ	BANK	logQ	INST INV	logQ	FIN INST
BANK	**-2.3**					
	[2.43]*					
INST INV			-0.352			
			[1.84]			
FIN INST					-0.231	
					[1.39]	
logQ		**-0.037**		**-0.048**		**-0.09**
		[4.66]**		**[2.74]****		**[4.54]****
Observatior	13021	13021	13021	13021	13021	13021

Part B

	-1		-2		-3	
	ROA	BANK	ROA	INST INV	ROA	FIN INST
BANK	0.055					
	[0.21]					
INST INV			**1.154**			
			[8.94]**			
FIN INST					**0.833**	
					[8.77]**	
ROA		-0.12		**-0.566**		**-0.784**
		[1.83]		**[3.99]****		**[4.92]****
Observatior	12992	12992	12992	12992	12992	12992

Table 8
Institutional ownership and firm value
System of ownership, firm value (Q) and leverage

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of Tobin's Q, leverage (LEV); and alternatively, banks (BANK) in system 1, institutional investors (INST INV) in system 2 and ownership for all financial institutions (FI) in system 3. The system of equations is estimated using three-stage least squares. Firm-level control variables include firm size (SIZE), dividend yield (DY), stock return volatility (SD), cash holdings (CASH), closely held shares (CLOSE), European industry log Tobin's Q median (logQ industry), fixed assets proportion (FIXED), depreciation (DEPR) and European leverage median (LEV industry). All regressions include the country-level regressors strength of auditing and reporting (AUDIT), legal regime index (LEGAL), market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. Absolute values of z-statistics are in brackets. Coefficients significant at the 5% level are in boldface. * significant at 5%; ** significant at 1%

	-1			-2			-3		
	Q	BANK	LEV	Q	INST INV	LEV	Q	FIN INST	LEV
BANK	**-14.138**		**2.809**						
	[7.34]**		**[14.56]****						
INST INV				**-3.628**		**0.197**			
				[7.20]**		**[3.61]****			
FIN INST							**-3.495**		**0.39**
							[8.03]**		**[8.82]****
Q		**-0.025**	**0.084**		**-0.021**	**0.025**		**-0.044**	**0.039**
		[9.17]**	**[12.25]****		**[2.86]****	**[5.60]****		**[5.70]****	**[7.99]****
LEV	**1.184**	**0.089**		-0.265	-0.007		0.069	0.059	
	[5.36]**	**[5.19]****		[1.30]	[0.17]		[0.35]	[1.27]	
SIZE	**0.045**	**0.004**		**0.045**	**0.011**		**0.056**	**0.019**	
	[3.85]**	**[8.45]****		**[5.47]****	**[8.33]****		**[6.04]****	**[13.22]****	
DY		0.033			**0.561**			**0.3**	
		[1.47]			**[6.29]****			**[3.32]****	
SD		**0.19**			0.082			**0.364**	
		[10.38]**			[1.25]			**[5.37]****	
CLOSE		0.003			**-0.027**			**-0.032**	
		[1.38]			**[3.38]****			**[3.76]****	
CASH	**2.567**	**0.072**	**-0.488**	**2.202**	0.02	**-0.421**	**2.262**	**0.08**	**-0.43**
	[19.69]**	**[6.18]****	**[19.35]****	**[17.61]****	[0.77]	**[26.92]****	**[18.52]****	**[2.73]****	**[24.82]****

Table 8 Continued
Institutional ownership and firm value
System of ownership, firm value (Q) and leverage

	-1			-2			-3		
	Q	BANK	LEV	Q	INST INV	LEV	Q	FIN INST	LEV
Q industry	**0.82**			**1.03**			**0.976**		
	[16.42]**			**[24.79]****			**[22.83]****		
FIXED			**0.09**			**0.12**			**0.114**
			[11.97]**			**[18.97]****			**[17.64]****
DEPR			-0.005			-0.019			-0.008
			[0.15]			[0.54]			[0.22]
LEV industry			**0.383**			**0.481**			**0.47**
			[15.32]**			**[23.29]****			**[21.93]****
AUDIT	**-0.339**	**-0.021**	**0.086**	**-0.196**	**-0.036**	**0.045**	**-0.257**	**-0.055**	**0.059**
	[7.00]**	**[7.55]****	**[11.00]****	**[5.72]****	**[5.91]****	**[9.64]****	**[7.01]****	**[8.06]****	**[11.18]****
LEGAL	**0.009**	**0.001**	**-0.003**	**0.014**	**0.004**	**-0.002**	**0.016**	**0.005**	**-0.003**
	[4.27]**	**[5.52]****	**[8.09]****	**[5.63]****	**[14.47]****	**[7.12]****	**[6.36]****	**[14.77]****	**[10.32]****
BOND	**0.29**	**0.019**	**-0.107**	**0.547**	**0.134**	**-0.106**	**0.587**	**0.153**	**-0.136**
	[3.89]**	**[3.50]****	**[7.54]****	**[6.24]****	**[11.08]****	**[9.47]****	**[6.90]****	**[11.25]****	**[12.01]****
STOCK	**0.313**	**0.012**	**-0.036**	**0.803**	**0.152**	**-0.038**	**0.8**	**0.165**	**-0.073**
	[5.80]**	**[2.92]****	**[3.26]****	**[8.85]****	**[16.41]****	**[3.47]****	**[9.60]****	**[15.83]****	**[7.05]****
year dumm	9	9	9	9	9	9	9	9	9
Constant	1.716	0.099	-0.601	-0.02	0.018	-0.106	0.332	0.046	-0.229
	[6.18]**	[5.57]**	[11.26]**	[0.10]	[0.42]	[3.83]**	[1.61]	[0.98]	[7.02]**
Observatio	13042	13042	13042	13042	13042	13042	13042	13042	13042

Table 9
Institutional ownership and firm value
System of ownership, firm value (logQ/ROA) and leverage

This table reports estimates of coefficients of the annual time-series cross-sectional firm-level regression of log Tobin's Q (log(Q)/return on assets (ROA), leverage (LEV); and alternatively, banks (BANK) in system 1, institutional investors (INST INV) in system 2 and ownership for all financial institutions (FI) in system 3. The system of equations is estimated using three-stage least squares. Firm-level and country-level control variables are omitted for brevity. Firm-level control variables include firm size (SIZE), dividend yield (DY), stock return volatility (SD), cash holdings (CASH), closely held shares (CLOSE), European industry log Tobin's Q median (logQ industry), fixed assets proportion (FIXED), depreciation (DEPR) and European leverage median (LEV industry). All regressions include the country-level regressors strength of auditing and reporting (AUDIT), legal regime index (LEGAL), market capitalization of the private bond market to GDP (BOND), and market capitalization of the stock market to GDP (STOCK). Refer to Appendix A for variable definitions. The sample period is from 1997 to 2006. Absolute values of z-statistics are in brackets. Coefficients significant at the 5% level are in boldface. * significant at 5%; ** significant at 1%

Part A

	-2			-3			-1		
	logQ	BANK	LEV	logQ	INST INV	LEV	logQ	FIN INST	LEV
BANK	**-5.94**		**2.301**						
	[7.74]**		**[13.35]****						
INST INV				-0.208		**0.122**			
				[1.12]		**[2.38]***			
FIN INST							-0.248		**0.295**
							[1.50]		**[7.30]****
logQ		**-0.052**	**0.157**		**-0.048**	**0.036**		**-0.089**	**0.048**
		[7.72]**	**[10.76]****		**[2.75]****	**[3.61]****		**[4.64]****	**[4.39]****
LEV	**0.207**	**0.069**		**-0.296**	**-0.021**		**-0.281**	**0.034**	
	[2.34]*	**[3.99]****		**[4.01]****	**[0.50]**		**[3.93]****	**[0.71]**	
Observatio	13021	13021	13021	13021	13021	13021	13021	13021	13021

Table 9 Continued
Institutional ownership and firm value
System of ownership, firm value (logQ/ROA) and leverage

Part B

	ROA	BANK	LEV	ROA	INST INV	LEV	ROA	FIN INST	LEV
BANK	**4.292**		**4.038**						
	[16.26]**		**[22.82]****						
INST INV				**1.326**		**1.237**			
				[19.20]**		**[15.84]****			
FIN INST							**1.164**		**1.183**
							[21.27]**		**[21.30]****
ROA		**0.321**	**-1.137**		**0.69**	**-1.065**		**0.826**	**-1.164**
		[19.76]**	**[30.86]****		**[12.32]****	**[27.17]****		**[13.82]****	**[31.94]****
LEV	**-0.56**	**0.145**		**-0.215**	**0.141**		**-0.296**	**0.231**	
	[12.75]**	**[8.39]****		**[6.85]****	**[3.66]****		**[9.61]****	**[5.36]****	
Observatio	12992	12992	12992	12992	12992	12992	12992	12992	12992

Appendix A
Definitions of the variables

System of ownership and firm value (logQ/ROA)

Variable	Definition	Source
A. Ownership variables		
FIN INST	Percentage of total shareholding where shareholders are financial institutions	Amadeus
BANK	Percentage of total shareholding where shareholders are banks or banktrusts	Amadeus
INST INV	Percentage of total shareholding where shareholders are institutional investors	Amadeus
FAM	Percentage of total shareholding where shareholders are individuals and family(ies)	Amadeus
FIRM	Percentage of total shareholding where shareholders are industrial companies	Amadeus
B. Firm-specific variables		
Q	(Total assets + Market value (Datastream item MV) - Book equity) / Total assets	Amadeus + Datastream
Q industry	The firm's industry median Q (using the Fama and French industry classification)	Amadeus + Datastream
SIZE	Size of the firm : Ln(Total assets/ CPI)	Amadeus + Datastream
LEV	(Current liability loans + Long term debt) / Total assets	Amadeus
LEV industry	The firm's industry median debt ratio (using the Fama and French industry classification)	Amadeus
DY	Dividend yield (Datastream item DY)	Datastream
ROE	Return on equity (Datastream item ROE)	Datastream
ROA	Return on assets (WorldScope item 08326)	Worldscope
TURNOVER	Annual share volume (Datastream item VO) divided by Adjusted shares outstanding (Datastream items NOSH/AF)	Worldscope
CLOSE	Number of shares held by insiders as a proportion of the number of shares outstanding (WorldScope item 08021)	Worldscope
SD	Standard deviation of one year of € weekly returns (Datastream items RI)	Datastream
CASH	Cash and Cash equivalent / Total assets	Amadeus
MB	(Current liability loans + long term debt + market value of firm) / Total assets	Amadeus + Datastream
DEPR	Depreciation / Total assets	Amadeus
FIXED	Fixed tangible assets / Total assets	Amadeus
C. Country-specific variables		
AUDIT	Strenght of auditing and reportings standards regarding company financial performance	Global competitiveness report
LEGAL	Anti-director rights multiplied by the rule of law index	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
BOND	Ratio of private domestic debt securities issued by financial institutions and corporations as a share of GDP	World Bank
STOCK	Value of listed shares to GDP	World Bank

Chapter 5

Bank regulation and bank liquidity provision

Bank regulation and bank liquidity provision

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Abstract

We examine the impact of bank regulation and supervision on bank liquidity provision. As liquidity provision is one of the pillars of banking and the banking sector is one of the most regulated industries in the world, understanding the impact of bank regulation on liquidity provision is very important. Our results show that stronger bank capital oversight is associated with lower liquidity provision. While the financial crisis has a significant negative impact on bank liquidity, we find that stricter bank regulation mitigates this negative effect during crisis but more powerful banking supervisors aggravate the negative effect of the crisis.

Key words: Bank liquidity, bank regulation

1 Introduction

We examine the impact of bank regulation and supervision on bank liquidity provision. It is understood that sound banking systems contribute to healthy economies. Banking is undoubtedly one of the most regulated industries in the world but the effect of these regulations on bank liquidity provision is less understood. As one of the main reasons for the existence of banks beside delegated monitoring is to provide liquidity, it is important to understand how bank regulation and supervision affects the liquidity provision behavior of banks. Therefore, we investigate the effect of bank regulation on a specific measure of bank liquidity provision in the syndicated loan market. The new proposed regulations [1] and regulatory bodies [2], due to the current financial crisis, stress the timeliness and importance of our research question.

This paper is related to the large literature on bank liquidity. Banks exist because they perform two central roles in the economy—they create liquidity and they are delegated monitors. While the first theories (Bryant (1980), Diamond and Dybvig (1983)), showing that liquidity is central to banking, focus on the liability side of banks, more recent theories (Homström and Tirole (1998); Kashyap, Rajan and Stein (2002)) stress the interaction between the asset and liability side of banks. Due to deposit insurance, banks even have a unique hedge when the market for liquidity becomes tight (Gatev an Strahan (2006)). The relation between bank capital and liquidity depends on the size of the bank. Bank capital has a positive effect on liquidity for large banks and a negative effect for small banks (Berger and Bouwman (2009)). Finally, banks have an advantage in lines of credit in the syndicated loan market. This liquidity provision is positively affected by more transaction deposits and less bank capital (Gatev and Strahan (2009)).

This research is most closely related to papers which examine the impact of bank regulation on various bank characteristics. Granting greater power to official supervisory and regulatory agencies to monitor and discipline banks directly doesn't improve banking performance (Barth, Caprio and Levine (2006)). Banks in countries with stricter

[1] 'Parting shot' The Economist Oct 8th 2009

[2] http://ec.europa.eu/internal_market/finances/docs/committees/supervision/20090923/com2009_501_en.pdf

capital requirement regulations and with more independent supervisors performed better (Beltratti and Stulz (2009)). The relation between bank risk and capital regulations, deposit insurance policies, and restrictions on bank activities depends critically on each bank's ownership structure (Laeven and Levine (2009)).

We use the database on bank regulation developed in Barth, Caprio, and Levine (2006) to examine the effect of regulation on bank liquidity provision. We define bank liquidity provision as the yearly total amount of new Lines of Credit to borrowers in the syndicated loan market. We use indicators for the oversight of bank capital, power of the regulators, restrictions on bank activities, the independence of the supervisory authority and diversification of bank activities. When we compare the banks in the top quartile of liquidity provision to those in the bottom quartile, the former have weaker oversight of bank capital, more restrictions on their activities, a more powerful and more independent supervisory authority and less diversification of bank activities than the latter. The regressions show that stronger bank capital oversight is associated with lower liquidity provision. This effect is economically important as a bank from the bottom quartile of capital oversight gives 17.7% more liquidity than a bank from a country with capital restrictions from the top quartile, everything else equal. Other bank regulation measures are insignificant. Concerning the bank characteristics, only the share of retail deposits over total deposits has a significant positive impact on bank liquidity. Interestingly, the coefficient is higher for lead banks than for participant bank. The current financial crisis raises the additional question of how bank liquidity creation responds during crises. While the crisis has a significant negative impact on bank liquidity, we find that stricter bank regulation mitigates this negative effect during the crisis. We find bank regulation to have a different impact depending on the bank size where stricter bank capital regulation improves liquidity provision for large banks. Finally, a concentrated ownership structure attenuates the negative role of capital regulation for participant banks.

We review the literature in the next section. The liquidity measure, bank regulation measures and bank characteristics are presented in section 3. Section 4 shows the descriptive statistics and the empirical results. Section 5 discusses the impact of the financial crisis and section 6 shows the robustness of the results. We conclude in section 7.

2 Literature

Banks exist because they perform two central roles in the economy—they create liquidity and they are delegated monitors. Bryant (1980) and Diamond and Dybvig (1983) analyze the idea that liquidity creation is central to banking. These theories argue that banks create liquidity on the balance sheet by financing relatively illiquid assets with relatively liquid liabilities. While these theories focus on the liability side of banks, more recent theories stress the interaction between the asset and liability side of banks. Holmström and Tirole (1998) and Kashyap, Rajan, and Stein (2002) suggest that banks also create liquidity off the balance sheet through loan commitments and similar claims to liquid funds. Kashyap, Rajan and Stein (2002) explain how banks can fulfill the liquidity demands of both depositors and borrowers simultaneously with less costly buffer stock of cash, as long as these demands are not too correlated. Gatev and Strahan (2006) show that when there is deposit insurance, banks obtain excess liquidity from inflows into government-protected deposits during episodes of reduced market liquidity. This excess liquidity is then channeled to the many large borrowers when they need cash because markets are tight. Thus, deposits afford banks a comparative advantage in offering liquidity insurance relative to other financial intermediaries. Gatev and Strahan (2009) find commercial banks to have an advantage in lines of credit in the syndicated loan market. Commercial banks are more likely to be a participant bank in the syndicate of a loan that provides liquidity. They show that liquidity provision of those banks is positively affected by more transaction deposits and less bank capital

Turning to the theories on the relationship between bank capital and liquidity creation, bank capital may impede liquidity creation by making bank's capital structure less fragile (e.g., Diamond and Rajan 2000, 2001). Capital may also reduce liquidity creation because it "crowds out" deposits (e.g., Gorton and Winton 2000). We call this hypothesis the "financial fragility-crowding out" hypothesis. An alternative view—related to banks' role as risk transformers—is that higher capital improves banks' ability to absorb risk and hence their ability to create liquidity. Liquidity creation exposes banks to risk—the greater the liquidity created, the greater is the likelihood and severity of losses associated with having to dispose of illiquid assets to meet customers' liquidity demands (Allen and Santomero 1998; Allen and Gale 2004). Capital absorbs

risk and expands banks' risk-bearing capacity (e.g., Bhattacharya and Thakor 1993; Repullo 2004; Von Thadden 2004; Coval and Thakor 2005), so higher capital ratios may allow banks to create more liquidity. This alternative hypothesis is called the "risk absorption" hypothesis.

Berger and Bouwman (2009) find that the relation between bank capital and liquidity depends on the size of the bank. They argue that the "financial fragility-crowding out" effect is likely to be relatively strong for small banks because small banks deal more with entrepreneurial-type small businesses, where close monitoring is important. A second reason is that small banks tend to raise funds locally, so that capital may "crowd out" deposits. This effect is relatively weak for large banks that can more easily access funding from capital markets. In contrast, the "risk absorption" effect is likely to be stronger for large banks because they are generally subject to greater regulatory scrutiny and market discipline than small banks, which may affect their capacity to absorb risk. A final and related reason why the crowding out effect may be stronger for small banks is that these banks fund themselves largely with deposits and capital. In contrast, large banks also use other liabilities that are less liquid than deposits (such as subordinated debt), suggesting that an increase in capital may lead to a drop in other liabilities rather than deposits. They show that bank capital has a positive effect on liquidity provision for large banks and a negative effect for small banks.

Barth, Caprio and Levine (2006) assemble, present and summarize new data on bank supervision and regulation across more than 150 countries. Their results question the efficacy of Basel II's first two pillars on capital regulations and official supervision. They find that strengthening capital standards and empowering direct official supervision of banks does not boost bank development, improve bank efficiency, or lower banking system fragility. Overall, the results cast doubt on the view that granting greater power to official supervisory and regulatory agencies to monitor and discipline banks directly will lead to improvements in banking performance and social welfare. Beltratti and Stulz (2009) investigate whether bank performance, measured as buy-and-hold dollar returns, is related to bank-level governance, country-level governance, country-level regulation, and bank balance sheet and profitability characteristics before the crisis. Banks in countries with stricter capital requirement regulations and with more independent supervisors performed better. Though banks in countries with more powerful supervisors

have worse stock returns, they provide some evidence that this may be because these supervisors required banks to raise more capital during the crisis and this was costly for shareholders. Finally, Laeven and Levine (2009) examine the interaction between bank risk taking, their ownership structures, and national bank regulations. They show that the relation between bank risk and capital regulations and restrictions on bank activities depends critically on each bank's ownership structure, such that the actual sign of the marginal effect of regulation on risk varies with ownership concentration. Stricter capital regulations and more stringent activity restrictions are associated with greater risk when the bank has a sufficiently powerful owner, but stricter capital regulations have the opposite effect in widely held banks.

3 Data

We combine several data sources to obtain our final dataset: the Dealogic's Loan analytics database, the Bureau van Dijk's Bankscope database, and Barth, Caprio and Levine (2006) database on banking regulation.

3.1 Liquidity provision

We use the Dealogic's Loan analytics database, using deals from borrower parents from the EU15, to identify the liquidity provision of the banks. This leaves us with a sample of 25,295 loans. The majority of the loans (56%) in our sample consist of multiple tranches, or facilities, ranging from 2 to 13 tranches. We construct data at the level of the bank-year, rather than at the loan level. Dealogic's Loan Analytics starts at the beginning of the 1980s and the last loan in our sample is issued 17 February 2009. However, since we are interested in the characteristics of the lenders, we start our sample from 1990 as the Bankscope database only has data from that point onwards. To measure the bank's exposure to liquidity provision (Gatev and Strahan (2009)), we first compute the total amount of new lending made by each bank lender by summing the amount committed by that lender during each year from 1994 to

2008. The new commitments are the weighted sum of all participations in the respective type of loan using the participation of the lender in the deal as weight, $New\ commitments_{b,y} = \sum_d commitment_{b,d,y} * participation_{b,d,y}$. Where b stands for the bank lender, d for each deal and y for each year. We have only for a sub-sample of the dataset (34.86%) the participation in the syndicate of the banks. We assume for the remaining part of the sample that each lender has an equal participation in the deal. We then split the commitments into amounts with liquidity risk (lines of credit) and amounts without liquidity risk (other loans). The final measure is a ratio with lines of credit in the nominator and both lines of credit and other loans in the denominator. Therefore, it measures the relative importance of new lending that exposes the bank to liquidity risk: $Incremental\ Liquidity\ Exposure_{b,y} = (New\ commitments\ on\ lines\ of\ credit_{b,y})/(New\ commitments\ on\ lines\ of\ credit_{b,y} + new\ commitments\ on\ term\ loans_{b,y})$.

Furthermore, we split the lenders according to their role in the syndicate: lead lender or participant lenders. This variable is constructed in a similar way to the measure of liquidity provision for the whole sample, where for each bank we sum its total lending in which it acts as the lead/participant lender, relative to its total new lending during the year. Ivashina (2009) states that each syndicate has at most one lead bank. The other 'lead' banks obtain this title for league purposes. Our sample contains 694 lenders of which 180 are at least once the lead bank. Some of our banks are almost always lead lenders while others are almost always participants. In general, participants provide funds but otherwise rely on the lead lenders for negotiation and pricing of loans and, to a certain degree, in cases of covenant violations or default. Lead lenders therefore must account not only for risk management concerns associated with loan funding, but also with their ability to understand the borrower and to monitor over the life of the loan. Therefore, risk-management considerations - such as the advantage of transaction deposits - may matter more for passive participants compared to lead arrangers. Alternatively, the lead bank may favor the advantage of transaction deposits even more for liquidity-risk management as this bank has to take into account the potential risks that the participants cannot fulfill their commitments regarding the credit line.

3.2 Regulation

To test the impact of bank regulation on bank liquidity, we use the indices of Barth, Caprio, and Levine (2006). These indices are as follows, where higher values represent 'more':

a. Capital, an index of regulatory oversight of bank capital, including indicators for whether the sources of funds that count as regulatory capital can include assets other than cash and government securities, and whether authorities verify the source of capital;

b. Official, an index of the power of the commercial bank supervisory agency, including elements like the rights of the supervisor to meet with and demand information from auditors, to force a bank to change the internal organizational structure, to supersede the rights of shareholders, and to intervene in a bank;

c. Restrict, an index of regulatory restrictions on the activities of banks, consisting, for example, of limitations in the ability of banks to engage in securities market activities, insurance activities, real estate activities, and to own non-financial firms;

d. Independence, an index of the independence of the supervisory authority, measuring the degree to which the supervisory authority is independent from the rest of the government and the degree to which the supervisory authority is shielded from lawsuits by banks and other parties.

e. Diversification, an index indicating whether there are explicit, verifiable, quantifiable guidelines for asset diversification, and banks are allowed to make loans abroad.

3.3 Bank characteristics

For control variables, we merge the bank-year aggregated Dealogic data to Bankscope from the end of the previous year. The banks come from 46 countries from all over the world. The bank characteristics include: $Retail\ Deposits_{b,y} = Customer\ deposits_{b,y}/Total\ deposits_{b,y}$; $Deposits_{b,y} = Total\ deposits_{b,y}/Total\ assets_{b,y}$; $Bank\ size_{b,y} = Log\ of\ (Total\ assets_{b,y}/CPI_{c,y})$; $Capital\ ratio_{b,y} = Book\ value\ of\ equity_{b,y}/Total\ assets_{b,y}$ and $Marketable\ Securities_{b,y} = (Due\ from\ other\ Banks_{b,y} + Treasury\ Bills_{b,y} +$

$CDs_{b,y} + Cash\ and\ due\ from\ Banks_{b,y} + Commercial\ Paper_{b,y})/Total\ assets_{b,y}$ where c stands for country. After combining the two datasets we are left with an unbalanced panel spanning 1994 to 2008, with bank-year as the unit of observation. The final sample includes about 100 banks per year or between 1500 bank-year observations when we use the known share of the bank and 2168 bank-year observations when we assume that all banks hold an equal share in the loan.

4 Results

In this section, we first show the summary statistics, we then compare regulation, supervision and characteristics of banks having the lowest liquidity provision (bottom quartile) to the banks that have the highest liquidity provision (top quartile). Finally, we regress these variables on liquidity provision to evaluate the relation between regulatory environment, bank characteristics and liquidity provision.

Table 1 reports summary statistics for the bank-year level data. We find that liquidity provision equals 41% for the average bank in a given year using the known participation of the banks. Table 1 also reports summary statistics for the lead share and participant for each bank-year. The measure equals 39.1% for lead banks and 42.0% for participant banks. When we use all observations and assume that banks have an equal share, the liquidity provision is 37.0%, and lead and participant provision is very similar with 36.8% for lead banks and 37.4% for participant banks. The bank regulation measures, from 46 countries, vary considerably over the sample. Of all lenders, 60% is from the EU15. Total deposits are 70.3% of total assets on average and of these total deposits 73.1% are retail deposits. The average bank is large (€ 856.78 billion) and has a capital ratio of 7.6%.

Table 2 divides the sample into the top and bottom quartiles of liquidity provision for the whole sample, for the lead banks and for the participant banks. The bottom-provision quartile has no liquidity provision; in contrast, the top-provision quartile has an average liquidity provision of 77% for the whole sample and the lead banks, while it is 78% for the participant banks. For the whole sample, all bank regulation measures are

significantly different except *Diversification*. Banks which have no liquidity provision come from countries with less restrictions on bank activities, less powerful supervisors and less independent supervisors, with stronger oversight of bank capital, and higher diversification. These results carry over for the participant banks where *Independence* and *Diversification* are not significantly different. Finally, the difference for the lead banks relative to the whole sample is the insignificance of *Capital* and *Independence* and lead banks with no liquidity provision have lower diversification regulation. Turning to bank characteristics we find that the banks with no liquidity provision are smaller banks. We see that the highest-exposed banks have significantly lower capital ratios and less marketable securities, but this difference is not significant. Interestingly, the highest-exposed banks have relatively less total deposits but a higher share of their deposits is retail deposits.

To link bank dominance in lending on lines of credit to their access to transaction deposits, we now test how bank portfolio allocation decisions vary with the structure of their liabilities. We are interested in whether bank regulation and in particular capital restrictions affect the comparative advantage of banks in bearing liquidity risk relative to credit risk. We allow for clustering at the country level. All regressions include unreported year dummies. Since the dependent variable is measured more accurately for banks making more loans in a given year, we weigh the observations by the number of new loans originated. In table 3, we estimate the relation between liquidity provision and measures of bank regulation. As the table shows, the effect of capital restrictions on the liquidity provision variable is stable when we add the additional bank regulation measures and bank characteristics. The coefficient on capital regulation equals -0.059 in the simplest model, column 1, which includes only annual time indicators. When we add other regulatory variables in column 2, the coefficient on capital regulation equals -0.057. Adding the bank characteristics in column 3 does not change the impact of capital restrictions. *Diversification* becomes significant. We find that there is a significant positive relation between liquidity provision and *Retail deposits*. The effect of capital regulation is economically large. An increase in capital regulation from the 25th percentile to the 75th percentile comes with an decrease in lending that exposes the bank to liquidity risk of about 17.7%.

We re-estimate our model of liquidity provision after splitting the sample based on

the lead-bank share. Table 3, columns 3 and 6 contain banks that act as lead banks, while columns 4 and 7 contain banks that act as participant arrangers. The effect of capital restrictions is significantly negative for both types of banks, where coefficient for participant banks is similar as for the whole sample and the coefficient for the lead banks is -0.081 which is significantly larger. Again, of the bank characteristics only *Retail deposits* has a positive significant coefficient. However, contrary to Gatev and Strahan (2009) we find that for the lead banks, the coefficient on transaction deposits equals about 0.393, about twice as large as the effect for banks participating in loan syndicates. This result questions their central argument that capital regulation is critical for systematic liquidity risk management, which in this case is the primary risk management objective of syndicate participant banks. This could be due to the different definition of lead banks, where we take a more stringent definition for the lead bank. However, when we divide the role as in Gatev and Strahan (2009), we obtain similar results as above (unreported) where lead banks have a higher coefficient on *Retail deposits* than participant banks.

5 Crisis

How did bank liquidity provision respond to the current financial crisis? The crisis can be considered relatively exogenous (at least from the perspective of any single bank). While the crisis did not change the measures of bank regulation for any of the affected countries during that short period, it did significantly reduce expected rates of return on investments. In table 4 we test whether bank regulation affects bank liquidity different during periods of crisis. We define the period from September 2007 until the end of our sample to be the crisis period.

The empirical strategy is to include additional interaction terms between the crisis period and bank regulation measures to the baseline regressions reported in table 4. The results in table 4 provide evidence that bank liquidity responds to variations in banking regulation during the crisis period. In all models we see the negative effect of the crisis on bank liquidity. This negative impact is more pronounced for lead banks than for participant banks. The interaction term between *Capital* and the crisis indicator variable

is positive and statistically significant at the 1% level. Moreover, the coefficient on the interaction is larger than the coefficient on $Capital$. This suggests that during crises the negative effect of strong capital oversight is completely attenuated. The impact of the crisis on the effect of bank regulation is largest for lead banks as the coefficient on the interaction between $Official$ and $Diversification$ and the crisis are both significantly negative suggesting that, during crisis periods, more powerful bank regulation and more diversification of bank activities are detrimental to the bank liquidity provision of lead banks. In summary, these results indicate the response of bank liquidity to variations in bank regulation is significantly higher during financial crises.

6 Robustness

We use several tests to check the robustness of our results. First, in table 5, column 1 to 3, instead of using our measure of bank capital ($Capital\ Ratio$) we use a different measure which is directly targeted by Basel II regulation, $Capital\ Ratio\ Tangible$, which is defined as (Equity - Intangible assets)/Total Liabilities. This measure of bank capital is significantly positive both for the whole sample and for participant banks. Moreover, the $Marketable\ Securities$ now also becomes significant positive. Our main result, the negative coefficient on $Capital$ remains. Second, column 4 to 6, we investigate whether bank ownership influences our results. Laeven and Levine (2009) show that the impact of bank regulation is different for banks with concentrated ownership vis-à-vis banks which are widely held, where their findings are overturned for widely held firms. To assess the impact of bank ownership we use the measure 'Independence indicators' of Bankscope. This measure goes from A to D where A stands for banks where none of the shareholders has more than 25%, i.e. the bank is widely held, and D means that there is one owner who directly owns more than 50% of the bank. We test the impact of bank ownership by introducing a dummy for widely held banks, $Widely$, which we interact with our measures of bank regulation. We corroborate the result of Laeven and Levine (2009) as we find that the negative effect of bank capital oversight is overturned for widely held firms. This result is driven by the participant banks as for lead banks the interaction is insignificant. Widely held banks also witness a negative impact of diversification of

activities. Again, this effect is driven by participant banks. Third, in columns 7 to 9 of table 5, we test whether large banks are differently affected. Berger and Bouwman (2009) find that bank capital has a positive impact on bank liquidity for large banks. To test whether large banks are different we include a dummy variable which equals 1 if banks belong to the top quartile in terms of size, $Large$. We interact this dummy with our regulation variables. The results show that for lead banks, the dummy is significant positive corroborating the results of Berger and Bouwman (2009). For participant banks $Large$ is not significant. However, the interaction of Large with Capital is significant positive for participant banks suggesting that bank capital regulation has a positive impact on bank liquidity provision for large participant banks.

Finally, in table 6, we test whether the results vary with the way we construct our measure of liquidity provision, the dependent variable. We check two proxies to construct new commitments for bank b in year y and d indexes new loans:

(1) $New\ commitments_{b,y} = \sum_d commitment_{b,d,y} * (1/N_{b,d,y})$
(2) $New\ commitments_{b,y} = \sum_d commitment_{b,d,y} * maturity_{i,j,t} * (1/N_{b,d,y})$

As noted, the numerator of our liquidity measure includes commitments on just lines of credit, whereas the denominator includes commitments for all types of new loans. Since each bank's actual share of funding at origination is missing for a large number of observations (more than 50%), we construct a parallel measure using all of the data in which each bank's share is assumed to equal 1/number of participants ($N_{b,d,y}$). The other measure weights the commitment amounts by the maturity of the loan. Banks with tighter bank capital regulations expose themselves to less liquidity risk in subsequent lending relative to other banks across the two measures irrespective of the bank role. Coefficient magnitudes are smaller when we use all loans to build the dependent variable. This difference makes sense because the specification implicitly gives more weight to participant banks relative to lead banks (lead-bank share averages around 35%, compared to about 8% for participants), and the relationships that we estimate are stronger for lead banks. Magnitudes are not affected by whether or not we weight commitments by maturity.

7 Conclusion

Some countries have stricter bank regulations than other countries. Besides delegated monitoring, the main role of the banking sector is liquidity provisioning to firms. We examine whether differences in bank regulation and supervision affect bank liquidity provision with a large sample of banks from 46 countries during the 1994 to 2008 period. When we compare the banks in the top quartile of liquidity provision to those in the bottom quartile, the banks with highest liquidity provision have weaker oversight of bank capital, more restrictions on their activities, a more powerful and more independent supervisory authority and less diversification of bank activities. The main result supports the view that stronger bank capital oversight is associated with lower liquidity provision. This effect is economically important as a bank from the bottom quartile of capital oversight gives 17.7% more liquidity than a bank from a country with capital restrictions from the top quartile, everything else equal. The current financial crisis raises the additional question of how bank liquidity creation responds during crises. While the crisis has a significant negative impact on bank liquidity, we find that stricter bank regulation mitigates this negative effect during crisis and more powerful banking supervisors intensify the negative effect of the crisis. We find a different effect of bank regulation for large banks where stricter bank capital regulation improves liquidity provision. Finally, we find that for widely held participant banks the negative role of capital regulation is attenuated.

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Table 1

Summary stats

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

Variable	n	Mean	Mdn	S.D.	Min	0.25	0.75	Max
Liq Exposure	1528	0.412	0.347	0.38	0	0	0.768	1
Liq Exposure (Lead)	356	0.391	0.290	0.384	0	0	0.772	1
Liq Exposure (Part)	1514	0.420	0.362	0.384	0	0	0.78	1
Liq Exposure (N)	2206	0.370	0.286	0.358	0	0	0.68	1
Liq Exposure (Lead) (N)	469	0.368	0.278	0.361	0	0	0.672	1
Liq Exposure (Part) (N)	2195	0.374	0.287	0.36	0	0	0.694	1
Capital	2206	6.655	6	1.957	3	5	8	10
Restrictions	2206	6.484	6	1.816	3	5	8	12
Official	2168	10.053	9	2.457	5	9	12	14
Independence	2206	1.338	1	0.836	0	1	2	3
Diversification	2206	1.545	2	0.499	0	1	2	2
Retail Deposits	2206	0.731	0.812	0.261	0	0.631	0.925	1
Bank Size	2206	4.832	4.903	2.084	-5.52	3.676	6.169	9.875
Total Deposits	2206	0.703	0.743	0.18	0.019	0.6	0.847	0.978
Capital Ratio	2206	7.61	6.451	5.633	0.064	4.62	8.984	90.588
Marketable Securities	2206	0.077	0.031	0.115	0	0.012	0.091	0.888

Table 2
Comparison

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	ALL			LEAD			PART		
	bottom	top	p-value	bottom	top	p-value	bottom	top	p-value
Restrictions	6.53	6.88	0.0032	6.02	6.51	0.0048	6.45	6.85	0.0016
Official	9.94	10.45	0.0019	9.52	10.11	0.0100	9.9	10.46	0.0005
Capital	7.21	6.13	0.0000	6.98	6.77	0.2671	7.18	6.16	0.0000
Independence	1.28	1.45	0.0026	1.34	1.37	0.7887	1.3	1.38	0.1005
Diversification	1.61	1.52	0.0076	**1.46**	**1.56**	0.0251	1.59	1.53	0.0945
Retail Deposits	0.74	0.77	0.0748	0.67	0.73	0.0127	0.716	0.766	0.0037
Bank Size	4.22	5.31	0.0000	**6.29**	**4.98**	0.0000	4.25	5.37	0.0000
Total Deposits	0.74	0.68	0.0000	**0.66**	**0.7**	0.0290	0.74	0.68	0.0000
Capital Ratio	7.87	7.07	0.0150	**0.061**	**0.073**	0.0152	0.077	0.07	0.0412
Marketable Securities	0.076	0.073	0.6420	0.073	0.071	0.8508	0.076	0.075	0.8826

Table 3
Baseline regression

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-5	-3	-4	-6	-7
		ALL		LEAD	PART	LEAD	PART
Capital	**-0.059**	**-0.057**	**-0.052**	**-0.081**	**-0.050**	**-0.081**	**-0.045**
	[4.21]**	**[5.98]****	**[5.48]****	**[10.70]****	**[5.63]****	**[7.58]****	**[4.90]****
Restrictions		0.001	-0.002	**-0.036**	-0.001	**-0.041**	-0.004
		[0.06]	[0.12]	**[2.40]***	[0.08]	**[2.78]***	[0.24]
Official		0.01	-0.002	0.025	0.008	0.003	-0.005
		[0.71]	[0.15]	[1.65]	[0.65]	[0.19]	[0.47]
Independence		0.019	0.033	**0.104**	0.013	**0.114**	0.031
		[0.40]	[0.78]	**[1.73]+**	[0.27]	**[1.92]+**	[0.73]
Diversification		-0.06	**-0.092**	-0.002	**-0.065**	-0.024	**-0.095**
		[1.65]	**[2.45]***	[0.04]	**[1.88]+**	[0.38]	**[2.55]***
Retail Deposits			**0.217**			**0.393**	**0.211**
			[3.75]**			**[3.64]****	**[3.62]****
Bank Size			0.014			0.009	0.018
			[1.53]			[1.03]	[1.61]
Total Deposits			-0.143			-0.12	-0.137
			[1.68]			[0.60]	[1.55]
Capital Ratio			0.005			-0.002	0.006
			[1.62]			[0.27]	[1.57]
Marketable Securities			0.194			0.014	0.216
			[1.08]			[0.07]	[1.20]
year dummies	15	15	15	15	15	15	15
Constant	1.063	0.645	0.553	0.782	1.031	0.81	0.956
	[14.30]**	[3.46]**	[3.48]**	[3.19]**	[5.94]**	[3.21]**	[5.38]**
Observations	1528	1500	1500	355	1487	355	1487
R-squared	0.3	0.32	0.36	0.28	0.27	0.31	0.32

Table 4
Financial crisis

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	ALL		LEAD		PART	
Capital	**-0.066**	**-0.064**	**-0.09**	**-0.094**	**-0.058**	**-0.056**
	[6.75]**	**[5.89]****	**[10.73]****	**[8.36]****	**[6.48]****	**[5.46]****
Restrictions	-0.0002	-0.002	**-0.036**	**-0.042**	-0.003	-0.004
	[0.01]	[0.14]	**[2.55]***	**[2.96]****	[0.15]	[0.25]
Official	0.015	0.005	**0.03**	0.01	0.012	0
	[1.02]	[0.36]	**[2.04]+**	[0.64]	[0.94]	[0.04]
Independence	0.022	0.03	0.099	0.096	0.017	0.029
	[0.43]	[0.62]	[1.62]	[1.49]	[0.35]	[0.62]
Diversification	-0.053	**-0.076**	0.007	0.002	**-0.061**	**-0.083**
	[1.39]	**[1.77]+**	[0.15]	[0.04]	**[1.68]+**	**[1.95]+**
Retail Deposits		**0.197**		**0.401**		**0.193**
		[3.28]**		**[3.62]****		**[3.17]****
Bank Size		0.011		0.003		0.015
		[1.21]		[0.30]		[1.40]
Total Deposits		-0.062		-0.047		-0.06
		[0.54]		[0.23]		[0.51]
Capital Ratio		0.091		-0.132		0.127
		[0.48]		[0.61]		[0.76]
Marketable Securities		0.003		-0.007		0.004
		[0.96]		[1.32]		[1.08]
Crisis	**-0.367**	**-0.385**	**-0.417**	**-0.559**	**-0.35**	**-0.373**
	[2.20]*	**[2.24]***	**[3.73]****	**[6.49]****	**[1.84]+**	**[1.85]+**
Capital*Crisis	**0.075**	**0.069**	**0.13**	**0.141**	**0.07**	**0.063**
	[6.69]**	**[4.95]****	**[12.23]****	**[8.00]****	**[5.64]****	**[4.13]****
Restrictions*Crisis	0.001	-0.007	0.032	**0.048**	0.003	-0.006
	[0.05]	[0.36]	[1.53]	**[1.96]+**	[0.16]	[0.24]
Official*Crisis	**-0.033**	-0.025	**-0.042**	**-0.024**	**-0.036**	-0.026
	[2.12]*	[1.27]	**[3.84]****	**[3.40]****	**[2.02]***	[1.18]
Independence*Crisis	-0.028	-0.024	-0.002	-0.026	-0.025	-0.025
	[0.74]	[0.63]	[0.03]	[0.36]	[0.65]	[0.61]
Diversification*Crisis	-0.011	-0.01	**-0.249**	**-0.342**	0.004	0.014
	[0.20]	[0.14]	**[5.56]****	**[5.07]****	[0.07]	[0.18]
Constant	0.927	0.855	0.77	0.814	0.954	0.854
	[5.85]**	[5.98]**	[4.45]**	[4.45]**	[6.20]**	[5.62]**
Observations	1500	1500	355	355	1487	1487
R-squared	0.28	0.3	0.24	0.27	0.23	0.26

Table 5
Robustness

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6	-7	-8	-9
	ALL	LEAD	PART	ALL	LEAD	PART	ALL	LEAD	PART
Capital	**-0.069**	**-0.09**	**-0.062**	**-0.056**	**-0.077**	**-0.048**	**-0.055**	**-0.071**	**-0.048**
	[7.17]**	**[6.25]****	**[6.38]****	**[5.97]****	**[9.76]****	**[5.22]****	**[7.03]****	**[8.45]****	**[6.28]****
Restrictions	-0.013	**-0.042**	-0.017	-0.004	**-0.049**	-0.006	-0.003	0.101	-0.005
	[0.75]	**[2.02]+**	[0.85]	[0.19]	**[2.62]***	[0.27]	[0.13]	[1.45]	[0.22]
Official	-0.001	-0.004	-0.004	-0.001	-0.001	-0.004	-0.014	-0.047	-0.02
	[0.06]	[0.16]	[0.33]	[0.06]	[0.04]	[0.33]	[0.98]	[1.59]	[1.37]
Independence	0.037	0.097	0.039	0.042	**0.153**	0.04	**0.08**	0.033	**0.084**
	[0.75]	[1.65]	[0.82]	[0.79]	**[1.95]+**	[0.73]	**[1.73]+**	[0.24]	**[1.85]+**
Diversification	-0.059	0.005	-0.064	**-0.085**	-0.015	**-0.088**	-0.042	0.066	-0.035
	[1.54]	[0.07]	[1.57]	**[2.15]***	[0.26]	**[2.20]***	[0.62]	[0.56]	[0.48]
Retail Deposits	**0.37**	**0.459**	**0.347**	**0.218**	**0.405**	**0.212**	**0.171**	**0.398**	**0.162**
	[3.63]**	**[2.22]***	**[3.50]****	**[3.91]****	**[3.47]****	**[3.72]****	**[3.16]****	**[2.59]***	**[3.03]****
Bank Size	**0.017**	0.019	**0.02**	0.014	0.015	0.018	0.006	0.002	0.009
	[2.20]*	[1.18]	**[2.12]***	[1.58]	[1.60]	[1.63]	[0.52]	[0.20]	[0.75]
Total Deposits	-0.023	0.221	-0.043	-0.125	-0.09	-0.121	-0.074	-0.188	-0.05
	[0.17]	[0.58]	[0.30]	[1.60]	[0.44]	[1.49]	[0.74]	[0.95]	[0.49]
Capital Ratio				0.005	-0.001	0.005	**0.007**	-0.001	**0.008**
				[1.51]	[0.15]	[1.50]	**[2.36]***	[0.09]	**[2.30]***
Capital Ratio Tangible	**0.092**	-0.053	**0.089**						
	[5.19]**	[0.09]	**[3.95]****						
Marketable Securities	**0.351**	0.103	**0.375**	0.153	-0.035	0.184	0.157	-0.133	0.181
	[2.24]*	[0.48]	**[2.45]***	[0.89]	[0.18]	[1.07]	[0.93]	[0.42]	[1.28]

Table 5 Continued
Robustness

	-1	-2	-3	-4	-5	-6	-7	-8	-9
	ALL	LEAD	PART	ALL	LEAD	PART	ALL	LEAD	PART
Widely				0.157	0.292	0.217			
				[0.99]	[0.36]	[1.25]			
Capital*Widely				**0.032**	0.023	**0.026**			
				[3.11]**	[0.59]	**[2.45]***			
Restrictions*Widely				-0.002	0.014	-0.005			
				[0.13]	[0.34]	[0.32]			
Official*Widely				-0.027	-0.034	-0.027			
				[1.64]	[0.52]	[1.57]			
Independence*Widely				0.018	-0.031	0.014			
				[0.37]	[0.27]	[0.28]			
Diversification*Widely				**-0.128**	-0.219	**-0.118**			
				[2.74]**	[1.22]	**[2.45]***			
Large							-0.105	**0.584**	-0.131
							[0.61]	**[2.14]***	[0.82]
Large*Capital Ratio							-0.005	0.015	-0.01
							[0.39]	[0.73]	[0.77]
Capital*Large							**0.02**	-0.022	**0.024**
							[1.70]+	[0.76]	**[2.43]***
Restrictions*Large							0.011	**-0.162**	0.014
							[0.56]	**[2.59]***	[0.74]
Official*Large							0.021	0.045	**0.025**
							[1.29]	[1.26]	**[1.71]+**
Independence*Large							**-0.071**	0.071	**-0.081**
							[2.28]*	[0.60]	**[2.62]***
Diversification*Large							-0.037	-0.042	-0.048
							[0.49]	[0.41]	[0.66]
Constant	0.87	0.802	0.804	0.547	0.543	0.946	0.524	0.448	0.905
	[4.09]**	[2.05]+	[3.36]**	[3.52]**	[2.25]*	[5.56]**	[2.55]*	[1.05]	[4.25]**
Observations	918	222	911	1500	355	1487	1500	355	1487
R-squared	0.46	0.4	0.41	0.38	0.33	0.33	0.39	0.34	0.36

Table 6
Robustness

This table reports estimates of coefficients of the bank-level regression. The dependent variable is bank liquidity exposure of the whole sample (ALL), the lead banks (LEAD) and the participant bank (PART). The regressors are oversight of bank capital (Capital), restrictions on bank activity (Restrictions), how powerful bank regulation is (Official), how independent bank regulation is (Independence) and how diversified bank activities can be (Diversification). The bank characteristics are the share of retail deposits of total deposits (Retail Deposits), the size of bank (Bank Size), the share of total deposits to total assets (Total Deposits), bank book equity over total assets (Capital Ratio) and the share of marketable securities over total assets (Marketable Securities). Each model includes year dummies. The sample period is from 1994 to 2008. The robust t-statistics in parentheses are adjusted for clustering at the country-level. + significant at 10%; * significant at 5%; ** significant at 1%

	-1	-2	-3	-4	-5	-6
	ALL	LEAD	PART	ALL	LEAD	PART
Capital	**-0.036**	**-0.063**	**-0.034**	**-0.037**	**-0.06**	**-0.034**
	[5.34]**	**[5.00]****	**[4.84]****	**[4.95]****	**[4.42]****	**[4.37]****
Restrictions	-0.002	**-0.032**	-0.003	0.007	-0.016	0.005
	[0.17]	**[1.77]+**	[0.19]	[0.54]	[0.93]	[0.34]
Official	0.002	0.005	0.001	0.002	-0.002	0.002
	[0.32]	[0.37]	[0.15]	[0.28]	[0.16]	[0.29]
Independence	0.004	0.048	-0.001	-0.001	0.053	-0.009
	[0.13]	[0.84]	[0.03]	[0.02]	[0.93]	[0.25]
Diversification	**-0.096**	**-0.136**	**-0.098**	**-0.093**	**-0.125**	**-0.099**
	[3.96]**	**[2.40]***	**[3.92]****	**[3.54]****	**[2.18]***	**[3.55]****
Retail Deposits	**0.204**	**0.308**	**0.223**	**0.205**	**0.224**	**0.238**
	[4.08]**	**[2.64]***	**[4.48]****	**[3.73]****	**[1.86]+**	**[4.34]****
Bank Size	**0.011**	0.009	**0.013**	0.008	0.011	**0.011**
	[1.75]+	[1.00]	**[1.81]+**	[1.64]	[1.22]	**[1.91]+**
Total Deposits	-0.039	-0.097	-0.04	-0.029	0.03	-0.038
	[0.48]	[0.48]	[0.51]	[0.36]	[0.17]	[0.46]
Capital Ratio	**0.466**	**0.998**	**0.485**	**0.418**	**1.038**	**0.445**
	[2.11]*	**[2.39]***	**[2.04]***	**[2.65]***	**[2.23]***	**[2.51]***
Marketable Securities	**0.212**	**0.381**	**0.221**	0.174	**0.29**	0.198
	[1.95]+	**[2.20]***	**[1.88]+**	[1.59]	**[1.86]+**	[1.64]
Constant	0.778	0.833	0.752	0.701	0.6	0.633
	[5.96]**	[3.35]**	[6.36]**	[5.21]**	[2.59]*	[5.38]**
Observations	2168	468	2158	2168	468	2158
R-squared	0.43	0.29	0.43	0.4	0.27	0.41