Commercial banks versus Stakeholder banks: Same business, same risks, same rules?

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ABSTRACT

This paper develops a contingency approach, to explain how bank ownership influences bank stability, as well as the effect of competition and regulation on bank stability. Using a country-level panel dataset for the period 1993-2007, we show that savings banks and cooperative banks (stakeholder banks) are more stable than commercial banks, while in systems with a high presence of cooperatives and savings banks, commercial banks are less stable than they otherwise would be. We also show that the effect of competition and bank regulation (in terms of capital regulations, deposit insurance, and activity restrictions) on bank stability is contingent upon the bank ownership type. These findings yield important policy implications. The same regulation and degree of competition has different effects on bank risk taking, depending on the bank's ownership structure.

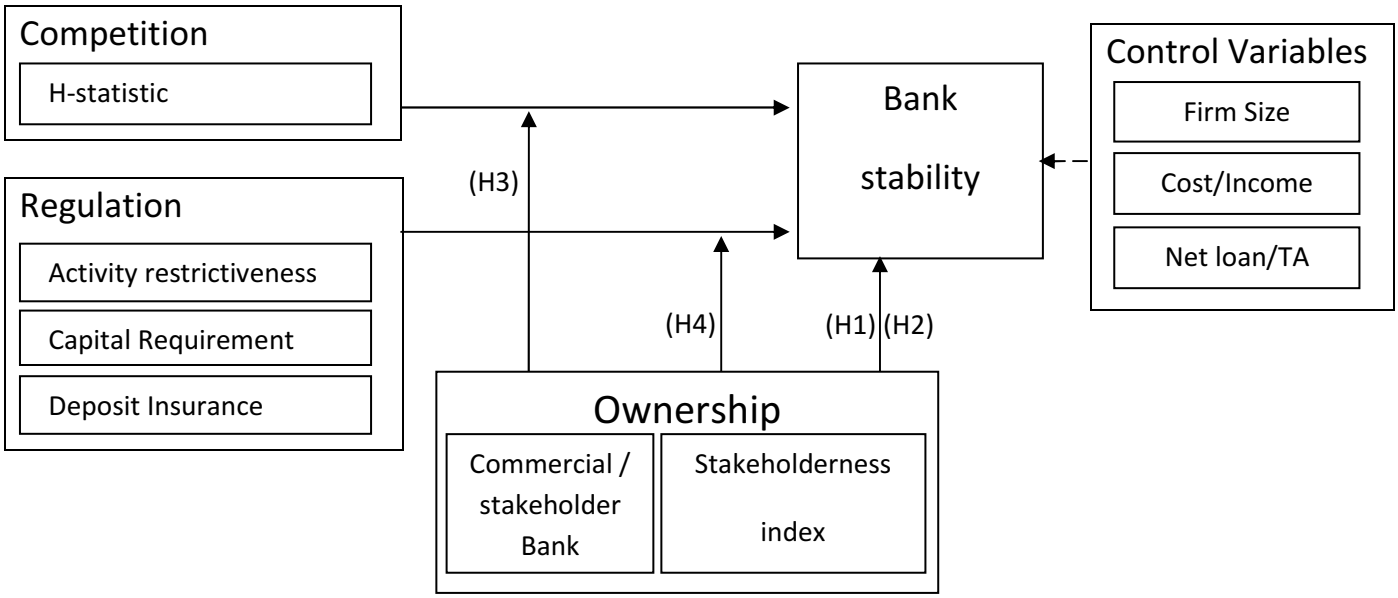
1. Introduction

The financial crisis that began in 2007 has hit financial systems around the world, and has focused attention on the inadequacies of the contemporary model of financial regulation, both at the national and at the global level (Avgouleas, 2008). Excessive risk- taking in the financial sector has been considered to be one of the primary causes of the crisis, but the deeper question is what causes such excessive risk-taking? The general argument is that flawed regulation, excessive competition, and perverse incentives have led to excessive risk taking in financial markets and are at the root of the most significant economic crisis since the Great Depression *(*Eichengreen, 2010). These arguments underscore the current effort to reform bank governance practices, competition, and regulation - in order to shape bank risk - in most countries around the world. However, there is no clear prediction of the effect of competition and bank regulation on financial stability, nor is there evidence that any universal set of best practices is appropriate for all banks, independent of their ownership structure; in other words, there is limited evidence on whether regulations and supervision that are successful for commercial banks, for example, will be equally effective for cooperatives or saving banks. This paper addresses these issues. First, the effect of bank ownership structure, competition and regulation on bank stability is explored. Second, we analyze whether the relationship between competition and bank stability on the one hand, and the relationship between regulation and bank stability, on the other hand, depends on the bank ownership structure. In particular, we differentiate between commercial and stakeholder banks. While Commercial banks are shareholder banks, aiming to maximize profits, savings and cooperative banks[1] are stakeholders banks aiming to maximize

[1] On the one hand, saving banks are a kind of stakeholder bank with no formal owners. Although many savings banks differ from country to country, and even within a single country, they have three main characteristics (Ayadi et al, 2009): 1)They are not only profit-oriented credit institutions in that they are committed to also pursue other objectives besides profit. 2) They have a social mission, a regional

profits as well as other social objectives. We argue that stakeholder banks, because of their features of origin, their mission, their activities, their organisational form and their legal status, are less risk-inclined than commercial banks, and that their presence affects the risk-taking incentives of their competitors. The proposed model is illustrated in Figure 1.

Figure 1: The Relationship between Competition, regulation, bankruptcy risk and ownership



The effect of competition and regulation on bank stability remains a widely debated and controversial issue, both among policymakers and academics worldwide.

Regarding competition, the two basic hypotheses in the literature on bank stability and competition have been the *franchise value paradigm* (competition-fragility view) and the *risk-shifting hypothesis* (competition-stability view). The competition-

commitment and a mandate to contribute to the 'general good'. 3) They can be decentralized elements of some larger system, network or nexus. Savings banks can be organized in different ways, depending on national legislations. In Europe there are savings banks that are joint stock companies or private entities (Ireland, United Kingdom, Italy, Sweden, Belgium, Finland, Holland and Denmark); public entities (Portugal, Switzerland, Austria, Germany, Greece and Luxemburg), and some are private foundations (Spain and Norway).On the other hand, mutual (or cooperative) banks are customer-owned entities that aim to provide the best possible products and services to its members.

fragility view contends that an increase in competition will hurt bank stability by eroding the franchise value (Keeley, 1990; Allen and Gale, 2000, 2004; Carletti, 2008). The competition-stability view holds that competition leads to less fragility, because the market power of banks results in higher interest rates for customers, making it more difficult for them to repay loans (Boyd and De Nicolo, 2005).

In terms of regulation, economic theory provides conflicting predictions about the effects of bank regulation and supervisory practices on bank stability. For instance, there is no academic consensus on the effect of capital regulation, activity restrictions and deposit insurance on bank stability. On the one hand, capital regulation and activity restrictions are seen as fostering stability by reducing bank incentives to engage in riskier activities (Boyd et al., 1998; Hellmann, Murdock and Stiglitz, 2000). On the other hand, they could lead to rent-seeking and could prevent banks from reaping necessary diversification and scale benefits (Claessens and Klingebiel, 2000). Finally, the role of deposit insurance schemes has been especially controversial. While they are intended to increase bank stability by protecting the payment and credit systems from contagious bank runs, they also encourage excessive risk-taking behavior (Merton 1977; Keeley, 1990), which some believe offsets any stabilization benefits (Barth et al., 2004; Demirgüç-Kunt and Detragiache, 2002).

None of the papers reviewed, however, considers possible differences in the relationship between competition, regulation and bank risk across commercial, savings and cooperative banks, as we do in this paper. This is somewhat surprising, since standard agency theories establish that the type of ownership of an organization is likely to affect its objectives, its strategy, its risk taking incentives, and its performance (Jensen and Meckling, 1976; John, Litov, and Yeung, 2008). We suggest that, rather than assuming that banks have the same risk preferences, and react in the same way to a

change in competition and regulation, it is critical to consider differences in their ownership structure when analyzing financial stability. Our analysis builds on Beck et al., (2010) and Laeven and Levine (2009). Beck et al. (2010) examine how regulation, supervision and other institutional factors influence the relationship between competition and bank risk-taking incentives. However, they do not include differences in ownership structure in their analysis. Closer to our analysis, Laeven and Levine (2009) empirically show that the relation between bank risk and bank regulation depends on the bank's ownership concentration. They focus on shareholder banks (profit-maximizing banks) and define different ownership structure by the fraction of ultimate cash flow rights held by the bank's largest owner. Rather, we differentiate between banks with different objective functions (commercial and stakeholders banks), and explore whether the relationship between risk and regulation depends on the ownership structure of the bank, and on the proportion of each type within the financial system in general.

To perform our analysis, we collect individual bank data from the BankScope database provided by Bureau van Dijk. We draw data from 1993 to 2007 and consider 17,114 banks from 72 countries of which 11,710 are commercial banks, 2,309 are savings banks and 3,095 are cooperative banks. We estimate the Panzar and Rosse (1987) H statistic as a measure of competition and, following the literature (Leaven and Levine, 2009, Beck et al., 2010, Boyd and Runkle, 1993, Maechler et al., 2005, Beck and Laeven, 2006, and Mercieca et al., 2007), we define bank stability as the inverse of the probability of insolvency, measured by the bank Z-score. Thus, the inverse of the bank Z-score measures bank risk. The Z-score (reflecting profitability, leverage and return volatility) is a widely-used measure of bank distance to default, and is monotonically associated with the bank's probability of failure; a higher Z-score

indicates that the bank is more stable (less risky). Finally, in order to analyze the extent to which the effect of bank regulation depends on bank ownership structures, we follow Laeven and Levine (2009) and select from the Barth et al (2006) database those regulatory variables that are stressed by the Basel Committee, and theory highlights affecting bank behavior. Thus, we examine deposit insurance, capital regulations, and regulatory restrictions on bank activities

Our findings are as follows. First, we show that stakeholder banks are less risk-inclined than commercial banks and that they make their rivals, especially competing commercial banks, less stable. This finding holds after controlling for competition, institutional characteristics and bank regulation. Second, our results show a negative direct effect of competition on bank stability, supporting the competition-fragility view. Moreover, we show that this negative effect is contingent on the bank's ownership structure. In particular, we find that the effect of competition on stability is significantly more negative for commercial banks compared to stakeholder banks, as well as for any bank operating in systems with a higher proportion of stakeholder banks. Finally, we find that capital requirements, activity restrictions and deposit insurance have a negative effect on bank stability, but that the impact of these regulatory measures on bank risk depends on the ownership structure of the bank. Specifically, we find that stringent capital regulatory measures decrease the stability of commercial banks, but this has no effect upon the stability of stakeholder banks. In addition, we show that capital requirements increase bank stability in economies with a high proportion of stakeholder banks. The effect of activity restrictions on bank stability is negative for stakeholder banks, but positive for commercial banks. Consequently, we also find that the negative effect of activity restrictions on bank stability increases with the proportion of

stakeholder banks in an economy. Finally we show that deposit insurance has a negative impact on bank stability, and that this effect is even stronger for commercial banks.

Overall, our findings suggest that it is important to consider the bank ownership structure when analyzing bank stability. This result may have important implications for academics and policy makers, as it indicates that ignoring bank ownership structure can lead to erroneous conclusions about the effects of competition and of banking regulations on bank stability.

The paper is organized as follows. In section 2, we first review the literature on the relationship between bank ownership structure and risk, stating our hypothesis on this relationship. We then review the literature on the relationship between competition, regulation and bank risk, formulating our hypothesis on the contingency effect of regulation, and of competition on bank stability. Section 3 summarizes the data. Section 4 presents the methodology and defines the key variables used in our analysis. Section 5 discusses the results and section 6 concludes.

2. Prior research and theoretical framework

2.1 Stakeholder banks and risk taking incentives.

The main difference between commercial and stakeholder banks lies in their objective function. While the former are shareholder banks aiming to maximize profit the latter are dual bottom-line institutions (Ayadi et al., 2009) in that they aim not only to maximize profits but also social objectives. It is well established in the literature (Holderness and Sheehan, 1988, Mehran, 1995, Aguilera and Jackson, 2003, La Porta et al., 1999, and Bebchuk and Hamdani, 2009) that firms with different types of owner pursue different strategic objectives and face different governance problems. It is thus possible to observe differences in firm behavior depending on their ownership structure.

Following this line of reasoning, we argue that stakeholder banks and commercial banks are likely to differ in their risk-taking incentives. The literature's verdict on the stability of stakeholder banks is less clear. On the one hand, several papers suggest that stakeholder banks are riskier than commercial banks. Fonteyne (2007) and Goddard et al. (2010) argue that stakeholder banks' inability to diversify and to raise capital at short notice make them less able to absorb demand- or supply-side shocks, and thus to adjust to adverse circumstances and changing risks.[2] In addition, Delgado et al. (2007) show that cooperative bank borrowers may have incentives to free-ride in taking risky loans, since the losses will be shared between all members of the bank. Rey and Tirole (2007) show that inter-generational conflicts between established and new members can make cooperatives less stable. Finally, Hower (2009) notes that firms that have a main banking relationship with a stakeholder bank are less likely to exit at the onset of financial distress than their counterparts whose main bank relationship is with a commercial bank.

On the other hand, there are arguments supporting the idea that stakeholder banks are more stable than commercial banks. First, they are less subject to the short-term pressures of the capital market (and hence to a myopic focus on the share price) as they are not owned by profit-oriented shareholders. Second, the absence of external shareholders in the stakeholder bank model can be deemed to be an inherent 'efficiency advantage' in the sense that, other things being equal, they should be able to operate with lower margins, and with either a preference for lower-risk - lower-return strategies or for generating buffers to be resorted to during bad times. Empirical papers on the subject note that stakeholder banks have lower reported returns, but no compelling

[2] For example, Brunner et al. (2004) note that the Swedish cooperative banking sector did not survive the crisis of the early 1990s in a cooperative form. Facing high marginal costs of capital, the need to restore capital was a major factor in the decision to de-mutualize.

evidence is found that this is due to less effective management compared to commercial banks (Brunner et al., 2004; Altunbas, Evans, and Molyneux, 2001). The findings that stakeholder banks have lower returns with a similar degree of efficiency, suggest that they may have preferences toward low-risk - low-return investments. In addition, stakeholder banks in many countries belong to regional associations and, directly or indirectly, to a national association (Ayadi et al., 2009). Thus, they are, in most cases, elements of decentralised networks with second- and third-tier organisations that support the decentralised or local units, which may help to increase the stability of stakeholder banks. Furthermore, the combination of traditional business models (particularly the dominance of retail funding) with a stable deposit base, and business strategies aimed at building up capital for future generations of members (Beck et al, 2009), makes the stakeholder banking model less prone to systemic instability problems. (Ayadi et al, 2009). Finally, adopting an agency perspective, some authors have suggested that stakeholder banks are less risk-inclined than commercial banks because managers in stakeholder banks may be more likely to pursue their own goals. This may be so because of the relatively lower oversight by stakeholder bank members compared to owners in a commercial bank. To the extent that bank managers have concentrated wealth, including their non-diversifiable human capital, they are expected to protect this internally by selecting 'excessively safe assets' or by diversification (Smith and Stulz 1985; May 1995). In contrast, shareholders (who are able to diversify their portfolio risk in the capital market and who are protected by limited liabilities) would like to undertake all positive net present value (NPV) projects, regardless of their risk, to maximize the value of the put option provided by the existence of deposit insurance (Guay 1999)[3]. Thus, this line of research suggests that shareholder-controlled

[3] As argued by Merton (1977), Marcus and Shaked (1984), and Ronn and Verma (1986), the system of levying fixed-price deposit insurance premia results in a put-option-like subsidy to bank stockholders, the

banks are riskier than stakeholder banks, where managers effectively control the organization.

The theoretical arguments supporting the idea that stakeholder banks are less risk-inclined than commercial banks have been empirically validated. For instance, the empirical work on the behavior of mutual banks suggests that mutual financial institutions tend to adopt less risky strategies than de-mutualized ones (O'Hara, 1981; Rasmusen, 1988; Saunders et al, 1990; Cordell et al., 1993; Gropper and Beard, 1995; Fraser and Zardkoohi, 1996; Knopf and Teall, 1996; Esty, 1997; Leonard and Biswas, 1998; Hansmann, 1996; Chaddad and Cook, 2004; Laeven and Levine, 2006; Iannotta et al., 2007; and Čihák and Hesse, 2007). Also, recent empirical studies show that, in the retail banking market of countries where stakeholder banks are more relevant, they are less risk-inclined than commercial banks (García-Marco and Robles-Fernández, 2008; Bøhren and Josefsen, 2007).

Gutiérrez and LópezPuertas-Lamy (2011) also show that stakeholder banks are less risk- inclined than commercial banks, and that any bank is less stable in the presence of stakeholder banks. This last result is consistent with the idea that the absence of external shareholders in stakeholder banks provides them with an 'efficiency competitive advantage' since they may be able to operate at lower margins and thus to "over-pay" for deposits or "under-charge" for assets. Consequently, a greater presence of non-profit-maximizing stakeholder banks could reduce the soundness of commercial banks. Moreover, stakeholder banks may use their lower average cost of capital to pursue aggressive expansion plans, leading to less space for commercial banks in the retail market and, in the end, to an increase of commercial banks' reliance on less stable

value of which increases with bank risk. Thus, bank shareholders have strong incentives for 'excessively' risky investments that potentially benefit themselves at the expense of the deposit insurance funds and the tax-payers who back it.

revenue sources (such as corporate banking or investment banking). These predictions are in line with empirical studies showing that, in those systems with a high presence of non-profit-maximizing banks, CBs are less stable than they would otherwise be (Čihák and Hesse, 2007; De Nicolò, 2000).

In light of the arguments presented, we believe that those supporting the idea that stakeholder banks are more stable than commercial banks outweigh those supporting the higher stability of commercial banks, which leads us to empirically test the theoretical prediction in Gutiérrez and LópezPuertas-Lamy (2011) with the following hypotheses:

H1: Stakeholder banks are less risk-inclined than Commercial banks

H2: The presence of stakeholder banks decreases bank stability, especially the stability of commercial banks

2.2 Is the effect of competition on stability contingent on the bank´s ownership structure?

In recent years, a theoretical and empirical literature has emerged which explores the links between competition and stability in the banking industry. The two basic perspectives in the literature have been the *franchise value paradigm* (competition reduces financial stability) and the *risk-shifting hypothesis* (competition increases financial stability). On the one hand, the competition-fragility view argues that less competitive banking systems are less fragile because the numerous lending opportunities, high profits, capital ratios and charter values of incumbent banks make them better placed to withstand demand- or supply-side shocks, and provide disincentives for excessive risk taking (Keeley, 1990; Allen and Gale, 2000, 2004; Carletti, 2008). On the other hand, the competition-stability view contends that

competition leads to less fragility, because the market power of banks results in higher interest rates for customers, making it more difficult for them to repay loans, increasing the possibility of loan default and increasing risk for bank portfolios, making the financial system less stable (Boyd and De Nicolo, 2005). Most recently, Martinez-Miera and Repullo (2010) suggest a non-linear relationship between bank competition and stability, arguing that heightened competition may reduce a borrower's probability of default (referred to as the risk-shifting effect), but it may also reduce interest payments from performing loans, which serve as a buffer to cover loan losses (referred to as the margin effect). The authors find evidence of a U-shaped relationship between competition (measured by the number of banks) and bank stability. In highly concentrated markets, the risk-shifting effect dominates and more competition reduces bank risk, while in very competitive markets the margin effect dominates, and increased competition erodes bank franchise value and hence increases risk.

Empirical evidence with respect to whether competition enhances or reduces bank stability is mixed. While Boyd et al. (2006) and DeNicolo and Loukoianova (2007) find that the risk of bank failure increases in less competitive markets, Jiménez et al. (2010) find that risk decreases with a rise in the market power of incumbent banks. Berger et al. (2009), using a variety of risk and competition measures from 23 countries, provide limited support to both the competition-fragility and competition-stability views. Specifically, they find that market power increases credit risk, but banks with more market power face less risk, overall. Beck et al. (2010) use a large cross-country dataset of banks to show that an increase in bank competition has a larger impact on risk-taking incentives in countries with strict activity restrictions and low levels of concentration.

However, none of these studies have considered the possibility that the relationship between competition and stability may vary across banks with different ownership structure. Such variations may arise from differences in bank origins, mission, activities, organisational form, legal status, access to external finance (stakeholder banks can only build up capital via retained earnings) and regulatory treatment. In this paper, we posit that commercial and stakeholder banks are likely to interact differently with their external environment and, as a result, they may react differently to a change in competition. In particular, we argue that the stability of stakeholder banks is less likely to be affected by a change in competition. On the one hand, in terms of the competition fragility view, managers in stakeholder banks may be less prone to pursue aggressive and risky strategies focused on avoiding declines in short-term profits, when facing an increase in competition. This may be so for at least two reasons. First, stakeholder banks have objectives other than profit, which may induce managers to prioritize the continuity of the bank's activities over the short-term pursuit of profit. Second, the pressure exerted by board members to avoid decreases in profit (through increased risk taking) is likely to be lower in a context of stakeholder banks compared to commercial bank, where managers are subject to the short-term pressures of the capital market. In this sense, Crespi et al. (2004) provide evidence that CEO replacement is more frequent in commercial banks than in savings banks. This finding is in line with the argument that CEOs in commercial banks may feel more pressure to focus on short-term profit-maximization.

On the other hand, in terms of the competition-stability view, we argue that, when the degree of competition changes, the loan interest rates charged by stakeholder banks are likely to fluctuate less than those charged by commercial banks; that is, when competition decreases, commercial banks may take advantage of their market power to

maximize profits by charging higher interest rates on their loans. Higher interest rates, in turn, make it harder for customers to repay their loans. This could increase moral hazard by inducing borrowers from commercial banks to shift their business activities into riskier projects. In contrast, the stakeholder bank's capacity to operate at lower margins, as the required return on investments is lower, may allow them to "under-charge" for assets in low competitive markets. As a result, under low levels of competition, customers of stakeholder banks may be less inclined to increase the risk of their business activities, since they may not find it harder to repay their loans. Thus, we hypothesize that:

H3: The effect of competition on bank stability is contingent on the bank´s ownership structure. The effect is stronger for commercial banks, i.e., more negative (following the competition-fragility view) or more positive (following the competition-stability view) compared to Stakeholder banks.

2.3 Is the effect of regulation on stability contingent on the bank´s ownership structure?

Economic theory provides conflicting predictions about the effects of bank regulation and supervisory practices on bank development, performance, and stability (Barth et al., 2002). Beyond yielding predictions about the relation between bank risk and ownership structure, some theories suggest that this relationship will vary with national regulations (Shleifer and Vishny, 1986; Buser, Chen, and Kane, 1981; John, Saunders, and Senbet, 2000; John, Litov, and Yeung, 2008). Boyd and Hakenes (2008) develop a theoretical model of bank risk taking and looting under different levels of ownership concentration. They stress that the risk effects of capital regulation can be quite different for banks with dispersed ownership relative to banks with a majority owner, suggesting that corporate governance is critical in determining good regulatory policy. More recently, Laeven and Levine (2009) empirically show that the influence of

capital regulation, deposit insurance policies and restrictions on bank activities on bank risk depend critically on the bank's ownership concentration, such that the actual sign of the marginal effect of regulation on risk varies with ownership concentration.

We frame our empirical analysis around this literature, arguing that the effect of regulation on bank stability is different for commercial banks than for stakeholder banks. As in Laeven and Levine (2009), we focus on those regulatory measures which have been stressed by the Basel Committee, and highlighted by theory, as affecting bank behavior. Specifically, we examine whether the effect of deposit insurance, capital regulation, and regulatory restrictions on bank activities is contingent upon the ownership structure of banks. For all three measures, we first explain the direct relationship between the regulatory measure and bank stability, and then establish why this relationship is likely to be different for commercial banks compared to stakeholder banks.

The effect of an imposition of capital requirements on bank stability is theoretically inconclusive. While traditional approaches to bank regulation emphasize the positive features of capital adequacy requirements (Dewatripont and Tirole, 1994), under the argument that capital serves as a buffer against losses, and hence failure, Koehn and Santomero (1980), Kim and Santomero (1988), Besanko and Kanatas (1996) and Blum (1999), among others, argue that capital requirements may also increase bank risk-taking behavior. This negative impact of capital requirements on bank stability may be due to a shift towards riskier investment portfolios to compensate owners for the loss of utility from more stringent capital requirements (Koehn and Santomero, 1980; Buser, Chen, and Kane, 1981). Also, it has been argued that, if raising equity capital is more expensive than attracting deposits, an increase in risk-based capital requirements tends to reduce the bank's willingness to screen and lend (Barth et al., 2004). In a general

equilibrium context, Gorton and Winton (2000) show that raising capital requirements forces banks to supply fewer deposits, which reduces the liquidity-provision role of banks.

Given these conflicting theoretical predictions, and the controversy over the attempt to set new risk-based capital requirements in the Basel III Capital Accord, it seems timely and important to examine the association between capital requirements and bank ownership structure. We posit that the arguments on the negative and positive effects of capital requirement on bank risk-taking behavior may not apply equally to stakeholder and commercial banks.

Stakeholder banks have quasi-prohibitive high costs of external finance[4] compared to commercial banks that can issue new shares on the capital markets. In addition, stakeholder banks cannot disclose or sell their reserves, and as a result, they tend to create reserves in good times and unlock them in bad times. This means that, independently of the capital regulatory regime, stakeholder banks will retain their profits as reserves creating a buffer against losses, and hence against failure. Furthermore, stakeholder banks do not have owners who may seek to compensate for the loss of utility from more stringent capital requirements by selecting riskier investment portfolios, as could be the case for commercial banks. Therefore, our hypothesis is that the existence of capital requirements may have a null or positive effect on the stability of stakeholder banks, but a negative effect on the stability of commercial banks.

[4] The responsible local authorities or foundation of savings banks cannot provide them with additional capital due to their high indebtedness, and the cooperative banks cannot force their members to pay in additional capital

H4a: The effect of capital requirements on bank stability is contingent on bank ownership structure, negative for commercial banks and null or positive for stakeholder banks

Regarding activity restrictions, countries attempt to reduce bank risk by restricting banks from engaging in non-lending activities, such as securities and insurance underwriting (Boyd et al., 1998). As stated in Barth et al., (2004) there are five main theoretical justifications for restricting bank activities. First, conflicts of interest may arise when banks engage in such diverse activities as securities underwriting, insurance underwriting, and real estate investment, since banks may attempt to "dump" securities on ill-informed investors to assist firms with outstanding loans (John et al., 1994, Saunders, 1985). Second, to the extent that moral hazard encourages riskier behavior, banks will have more opportunities to increase risk if allowed to engage in a broader range of activities (Boyd et al., 1998). Third, complex banks are more difficult to monitor. Fourth, banks may become politically and economically powerful to the extent that they become "too big to discipline". Finally, large financial conglomerates may reduce competition and efficiency. However, there are alternative theoretical reasons for allowing banks to engage in a broad range of activities. Fewer regulatory restrictions permit the exploitation of economies of scale and scope (Claessens and Klingebiel, 2000), fewer restrictions may increase the franchise value of banks and thereby augment incentives for more prudent behavior, and broader activities may enable banks to diversify income streams and thereby create more stable banks.

Our hypothesis is that the validity of each of the theoretical predictions regarding the effect of activity restrictions on bank stability is contingent on bank ownership structure. Managers at stakeholder banks will be less affected by the moral

hazard problem, since they are under less pressure to generate shareholder value and are more risk-averse than shareholders of commercial banks. Furthermore, stakeholder banks tend to be smaller than commercial banks, avoiding the moral hazard problems related to the "too big to discipline" problem. Thus, while stricter activity restrictions may favor the stability of commercial banks by reducing opportunities to increase risk by engaging in a broader range of activities (Boyd et al., 1998), they may hamper the stability of stakeholder banks who may not be inclined to engage in a broader range of activities to increase their risk, but to diversify income streams and thereby to increase their stability. Consequently, we hypothesize that the impact of restricting bank activities is likely to depend on bank ownership type:

H4b: The effect of activity restrictions on bank stability is contingent on the bank's ownership structure, positive for commercial banks and negative for stakeholder banks

Many countries adopt deposit insurance schemes to protect payment and credit systems from contagious bank runs. However, the introduction of deposit insurance schemes comes at a cost, since they may encourage excessive risk-taking (Merton 1977; Keeley, 1990), which some believe offsets any benefits of stabilization (Barth et al., 2004; Demirgüç-Kunt and Detragiache, 2002). We claim that the negative effect of deposit insurance on bank stability may vary depending on banks ownership structure. The moral hazard problem associated with deposit insurance may be more severe for commercial banks, focused on maximizing shareholder value, compared to stakeholder banks. This may be because stakeholder banks have both financial and social objectives, which reduce the moral hazard, problem, and loose assignment of property rights, which may lead risk-averse managers to impose their preferences for lower levels of risk. We combine the above arguments to make the following testable hypothesis:

H4c: The effect of deposit insurance schemes on bank stability is contingent on the bank's ownership structure. The effect is less negative for stakeholder banks, compared to commercial banks.

3 Sample description

To test our hypotheses we combine several data sources. We obtain information on bank balance sheet and income statement for all banks included in Bankscope, a database compiled by Fitch/Bureau Van Dijk that contains information on banks around the globe. The period of analysis is 1993-2007, and is therefore not contaminated by the exceptional event of the 2007-10 global financial crisis. When banks report information at the consolidated level, we have deleted the unconsolidated entries of the group from the sample to avoid double counting. We apply a number of selection criteria to arrive at our final sample. First, we exclude countries for which we have information on less than 10 observations. Second, we drop bank-year observations that do not have data available on our main variables (i.e., stakeholders and Z score). Finally, all variables are winsorized at the 1% tails to mitigate the impact of outliers and to enhance the robustness of the standard errors. After applying those criteria we end up with a sample of 17.114 banks from 72 countries, of which 11.710 are commercial banks, 2.309 savings banks and 3.095 are cooperatives banks. The regional distributions of banks as well as the mean values of our main variable of interests are reported in Table 1. While most of the bank-specific variables are ratios, variables in levels are expressed in millions of US dollars.

The bank-specific data are then linked to several macroeconomic, institutional and regulatory data sets. Specifically, we employ data from Demirgüç-Kunt and Detragiache (2005), Beck, Demirgüç-Kunt and Levine (2009), Barth, Caprio and Levine

(2006) and from the World Bank development indicators database. Matching our bank specific data with the country-level data yields a sample of 15.380 banks from 62 countries, of which 10.671 are commercial banks 2.024 savings banks and 2.685 cooperatives banks.

TABLE 1: Descriptive statistics (mean values of variables of interests)

	Stakeholderness %	**H- Statistic**	**Z-Score**	**# CB**	**#SB**
ARGENTINA	0.0431786	-	6.832402	13	6
AUSTRIA	0.4223885	0.97335	36.85898	13	32
BAHRAIN	0	-	28.37556	3	
BANGLADESH	0	-	10.55434	5	
BELGIUM	0.121347	0.6353	28.4632	7	7
BENIN	0	-	10.90722	2	
BERMUDA	0	-	16.10643	1	
BOLIVIA	0	-	8.618525	2	
BRAZIL	0.0021146	0.62585	13.05991	19	1
BURUNDI	0	-	11.16503	2	
CANADA	0.0174986	-	26.3467	10	1
CHILE	0.0033064	-	11.33062	6	1
COLOMBIA	0.0202597	0.590475	3.324368	5	2
COSTA RICA	0.0341354	-	11.20616	6	9
CYPRUS	0.0711161	-	10.78568	4	1
DENMARK	0.0186551	-	24.69202	7	7
DOMINICAN	0	-	6.407189	6	
ECUADOR	0	0.58	12.02007	4	
EGYPT	0	-	14.83937	2	
EL SALVADOR	0	-	23.01344	2	
FINLAND	0	-	18.02456	1	
FRANCE	0.3828031	0.43285	29.63398	30	18
GERMANY	0.3916387	0.3911	44.1609	24	179
GREECE	0.0168891	-	3.766222	4	1
GUATEMALA	0	-	22.04773	5	
HONDURAS	0	0.75	19.38824	4	
HONG KONG	0	0.3235	6.257819	7	
INDIA	0.0282262	-	4.466583	10	2
INDONESIA	0	0.713925	13.03179	20	
IRELAND	0.0041741	0.63405	29.52555	6	1
ISRAEL	0	-	21.03335	3	
ITALY	0.240835	0.55955	36.54996	21	66
JAMAICA	0	-	12.31179	1	
JAPAN	0.2053294	0.520275	30.3551	16	99

TABLE 1: Mean values of variables of interests-continued					
	Stakeholderness %	**H- Statistic**	**Z-Score**	**# CB**	**#SB**
JORDAN	0	-	22.24212	1	
KENYA	0.068511	0.520275	18.38354	6	1
KUWAIT	0	-	20.60843	1	
LATVIA	0	-	16.53751	2	
LEBANON	0	-	17.72016	3	
LUXEMBOURG	0	-	27.63731	4	
MALAYSIA	0.0135804	-	18.97466	6	1
MALTA	0	-	28.95786	1	
MEXICO	0.0000808	0.996875	13.56967	6	1
MOROCCO	0	-	21.10625	1	
NETHERLANDS	0.2036733	0.45	37.19487	7	1
NEW ZEALAND	0	-	43.52594	1	
NIGERIA	0.0004529	0.6061	13.47565	13	
NORWAY	0.2689337	0.41675	46.41094	3	29
PAKISTAN	0	-	16.12739	9	
PANAMA	0.0331688	0.584875	21.01557	12	1
PAPUA NEW GUINEA	0	-	10.91038	1	
PARAGUAY	0	0.651675	10.22906	4	
PERU	0.0000692	-	14.896	6	1
PHILIPPINES	0.0286357	0.6202	27.67904	6	4
POLAND	0.0242051	0.6202	15.28632	4	1
PORTUGAL	0.3170401	0.523525	26.79425	5	1
SAUDI ARABIA	0	-	15.86822	2	
SENEGAL	0	-	10.38725	3	
SLOVENIA	0	-	11.42091	2	
SOUTH AFRICA	0.0001851	0.624075	23.39418	5	1
SPAIN	0.3294606	0.45725	38.3142	12	34
SRI LANKA	0	-	9.65508	1	
SWEDEN	0.2649508	0.4139	36.86336	4	15
SWITZERLAND	0.0725724	0.58	60.92472	28	33
TAIWAN	0	-	20.39536	2	
THAILAND	0.0850202	0.4781	7.112318	3	1
TUNISIA	0	-	30.94682	3	
TURKEY	0.0074885	0.73465	7.157391	7	2
UNITED KINGDOM	0.0130323	0.533025	28.69776	21	2
URUGUAY	0	0.533025	5.939436	3	
USA	0.1382472	0.457625	45.27805	943	110
VENEZUELA	0.0405611	0.75	11.90018	10	2

4 Methodology and variables definitions

The primary estimation method used to test our hypothesis is Generalized Least Square (GLS) Random Effect (RE) technique following the Baltagi and Wu (1999) procedure. This technique is robust to first-order autoregressive (AR(1)) disturbances (if any) within unbalanced-panels and to cross-sectional correlation and/or heteroskedasticity across panels. In the presence of unobserved bank fixed-effect, panel 'Fixed-Effect' (FE) estimation is commonly suggested. However, such FE estimation is not suitable for this study for several reasons. First, time-invariant variable like the commercial bank dummy cannot be estimated with FE regression as it would be absorbed or wiped out in the 'within transformation' or 'time-demeaning' process of the variables in FE. Second, FE estimation requires significant within panel (bank) variation of the variable values to produce consistent and efficient estimates. When the important variables on the right-hand side do not vary much over time, like the degree of stakeholderness in this paper, the FE estimates are imprecise (Wooldridge 2002, p.286). Third, FE estimates may aggravate the problem of multicollinearity if solved with least squares dummy variables (Baltagi, 2005). Finally, for large 'N' and fixed small 'T', (which is the case with this study as we consider 15.380 banks over 15 years), FE estimation is inconsistent (Baltagi 2005, p.13). Thus, an alternative to FE, i.e., GLS RE, is proposed here. In particular the following regression models are used to estimate our hypothesis:

Regression model I (Direct effect, hypotheses 1 and 2):

*Bank Stability = f(ownership type, stakeholderness, ownership type*stakeholderness, Control Variables)*

Regression model II (contingencies related to competition and banks ownership structure, hypothesis 3):

Bank Stability = f (ownership type, stakeholderness, competition, competition ownership type, competition* stakeholderness, Control Variables)*

Regression model III (contingencies related to regulation and banks ownership structure, hypothesis 4a-c):

Bank Stability = f (ownership type, stakeholderness, regulation, regulation ownership type, regulation* stakeholderness, Control Variables)*

We start our analysis with running regression equation I for the entire sample, to test our hypotheses 1 and 2. First, to test hypothesis 1 (i.e., the relationship between bank ownership structure and bank risk taking incentives) we introduce into the base model the ownership variable *ownership type* (this variable takes the value of 1 when the bank is a commercial bank and zero otherwise). Then to test hypothesis 2 (i.e., the effect of the presence of stakeholder banks on banks risk taking incentives), we follow Cihak and Hesse (2007) and introduce into the base model the variable ownership type, the variable degree of stakeholderness (which is defined as the proportion of stakeholders bank in a country) and their interaction.

Next, we employ the regression model II and model III, which includes interaction terms between each measure of bank ownership and the competition and regulatory variables, to test our hypotheses 3 and 4. Each regulatory variable and each interaction term is introduced separately to avoid collinearity problems. The variables used in the regression models are defined as follows (see appendix 2.1 for a definition of variables and data sources):

Bank risk/ stability (dependent variable)

We measure bank stability using the z-score of each bank. The z-score is a widely used measure of bank´s distance to default (see Boyd and Runkle, 1993;

Maechler, Mitra, and Worrell, 2005; Beck and Laeven, 2006; Laeven and Levine, 2006; and Mercieca, Schaeck, and Wolfe, 2007) that is monotonically associated with the bank´s probability of failure (thus bank risk is defined as the inverse of the bank Z score). This variable is def ined as:

$$Z = \frac{ROA + E/A}{\sigma(ROA)},$$

where *ROA* stands from Return on Assets, E/A represents equity capital over total assets and $\sigma(ROA)$ is the standard deviation (volatility) of *ROA* calculating as a three-year rolling time window[5].

The Z-Score is defined as a state in which losses surmount equity ($E<-\pi$) (where E represents equity and π profits)[6] and measures the distance from insolvency (Roy, 1952). A higher *z*-score indicates that the bank is more stable. Because the *z*-score is highly skewed, we use the natural logarithm of the *z*-score, which is normally distributed. For brevity, we use the label "z-score" in referring to the natural logarithm of the *z*-score in the remainder of the paper.

Ownership structure

To test our hypothesis we use two measure of banks ownership structure. First, we differentiate between commercial and stakeholder banks (i.e., cooperatives and savings banks). To do so we define the variable *ownership type* as an indicator variable

[5] While in large parts of the literature the volatility of ROA is computed over the full sample period, we use a three-year rolling time window for the standard deviation of ROA to allow for time variation in the denominator of the Z-score. This approach avoids that the variation in Z-scores within banks over time is exclusively driven by variation in the levels of capital and profitability (Schaeck and Cihak (2010).

[6] Thus the probability of insolvency can be expressed as prob(-*ROA*<E/A), where *ROA* (=π/*A*) is the return on assets. If profits are normally distributed, then the inverse of the probability of insolvency equals (*ROA*+E/A)/σ(*ROA*), where σ(*ROA*) is the standard deviation of *ROA* (Laeven and Levine, 2009). Then the Z-score represents the number of standard deviations below the mean by which profits would have to fall so as to just deplete equity Even if profits are not normally distributed the Z score is the lower bound on the probability of default (by Tchebycheff inequality). A higher z-score therefore implies a lower probability of insolvency.

(CB) which takes the value 1 whenever the bank is a commercial bank and zero otherwise. Second we measure the proportion of stakeholder banks in an economy (*degree of stakeholderness*) by the proportion of total assets held by stakeholder banks[7]. We have treated ownership structure as an exogenous variable. The reason is that the proportion of stakeholder banks in a country presents almost no changes over time, because restructuring ownership is costly and difficult (partially due to legal restrictions).

Competition

We estimate the H-statistic as a direct measure of competitive conduct. The H-statistics is calculated from the reduced form bank revenue equations and measures the sum of the elasticities of the total revenue of the banks with respect to the bank's input prices. The H-statistic is interpreted as follows: $H<0$ indicates a monopoly; $H=1$ indicates perfect competition; and $0<H<1$ indicates monopolistic competition (Claessens and Laeven, 2004). This measure of competition has been used in the recent literature on bank competition (Molyneux, Lloyd-Williams and Thornton, 1994; Bikker and Haaf, 2002; Claessens and Laeven, 2004) since, unlike other measures of competition, it is derived from profit-maximizing conditions. Moreover, it is robust with respect to the market as it only requires bank-level data, so that no assumptions need to be made about the relevant market (Schaeck et al., 2009). We estimate the H-statistic following Claessens and Laeven (2004) and Schaeck et al. (2009). See appendix 2.2 for an exposition of the estimation methodology.

[7] For robustness, we have also measured the proportion of stakeholders' banks in the system by the proportion of liabilities, loans and deposits holds by stakeholder banks. Our main conclusion remains unchanged under these alternatives specifications.

Regulation

In selecting data on regulation from the Barth et al. (2006) database, we follow Leaven and Levine (2009) and use two criteria. First, we choose regulations stressed by the Basel Committee. Second, we analyze regulation measures that theory has highlighted to affect bank behavior. Therefore, we examine deposit insurance, capital regulations, and regulatory restrictions on bank activities.

Explicit Deposit Insurance: is a dummy variable that takes a value of one if the country has deposit insurance, and zero otherwise.

Capital Regulatory Index: capture the amount of capital and verifiable sources of capital that a bank is required to posses. This variable ranges from a low of 3 to a high of 10, with a higher value indicating greater stringency.

Activity restrictions: This index measures regulatory impediments to banks engaging in securities market activities (e.g., underwriting, brokering, dealing, and all aspects of the mutual fund industry), insurance activities (e.g., insurance underwriting and selling), real estate activities (e.g., real estate investment, development, and management), and the ownership of nonfinancial firms. This variable ranges from a low of 3 to a high of 10, with a higher value indicating higher restrictions.

Since our sample period expands from 1993 to 2007, and the data on regulatory measures correspond to the year 2006, we assume them to be constant over the sampling period since the regulatory and supervisory environment has not undergone major changes (Barth et al., 2001, 2006).

Control Variables

In addition to our variables of interest, we also include other variables to control for bank, industry and macroeconomic factors that are likely to affect the bank stability.

We follow Čihák and Hesse (2007) and we include the following control variables. At the bank level, we control for differences in bank size, asset composition, and cost efficiency by including banks' relative size (calculated as the ratio of the assets of bank *i* in country *j* at time *t* to total assets of country *j* at time *t*), net loans over assets, and the cost-income ratio. In addition, we calculate a measure of income diversity in line with Leaven and Levine (2007) to control for differences in structure of banks' income[8]. At the industry level, we include a measure of concentration[9] from the recent database of Beck, Demirgüç-Kunt and Levine (2009). Finally at the country level, we adjust for the impact of the following macroeconomic variables: GDP growth rate, inflation, the real interest rate and changes in the foreign exchange rate. While we introduce industry and bank control variables taking at time period t, we lag the macroeconomic variables by one period, (t-1), to capture that, in general, a macroeconomic boom gives way to recession a year or two before the crisis (Gavin and Haussmann, 1996)[10].

3. Results

We first provide descriptive statistics of our data, and then test our proposed hypotheses. Table 2 gives an overview of the descriptive statistics for the most relevant variables used in our study. The first column shows the mean values for the entire sample, while columns 2-4 show the standard deviation, the minimum and the

[8] Income diversity is a measure of diversification across different sources of income and is calculated as $1-\left|\frac{net\ \text{int}erest\ income - other\ operating\ income}{Total\ operating\ income}\right|$

Net interest income is interest income minus interest expense and other operating income includes net fee income, net commission income, and net trading income. Income diversity takes as a maximum the value of 1 and is increasing in the degree of diversification.

[9] Concentration is calculated as the market share of the three largest institutions in each country. The information is retrieved from Beck and Demigrüc-Kunt (2009) database on financial development and structure. For each country we have averaged the annual bank concentration ratio over our sampling period to smooth out any possible coverage problem.

[10] For robustness purpose, we repeat our analysis considering un-lagged macroeconomic variables. Our results remain unchanged under this alternative specification.

maximum values. Table 1 shows the regional distribution of banks as well as the mean values of our main variables of interest at the country level. Our final sample consists of 15.380 banks, of which about two-thirds are commercial banks. There is a wide cross-country variation in the sample, both regarding the average degree of stakeholderness and the bank Z-score (see Table 1). The average degree of stakeholderness ranges from 0 (e.g., Benin) to 39% percent (Austria), with a sample mean of 18%. The average bank z-score is 40.13. This is in line with previous literature (Čihák and Hesse, 2007; Uhde and Heimeshoff, 2009). The average country z-score in the sample is 20 with Switzerland showing the highest average z-score during the sample period (60.9) and Argentina the lowest (6.83).

The average size in terms of total assets is 4,823 millions of $. In addition, the average firm's cost-income ratio is 70 percent, net loans amount to 59 percent of the total assets, and bank concentration is 42 percent. Furthermore, the income diversity has a mean value of 0.68. In terms of competition, the average H-statistic is just low 50 percent. Finally, we present the mean values with respect to regulation. We would like to highlight the mean values of activity restrictiveness and capital requirements, which are 7.05 and 7.64 respectively. Furthermore about 3 percent of our sample constitutes banks with no deposit insurance. We test for possible multicollinearity problems considering the independent and control variables. The Variance Inflation Factor (VIF) gives a mean value of 1.60 and a maximum value of 3.33 for stakeholderness, indicating that there are no multicollinearity problems.

TABLE 2: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Ln bank Z score	3.30006	0.990364	-0.89854	5.391094
Total assets (lag)	4823.373	45620.62	0	2974163
Cost-income ratio	70.06867	38.07094	-0.1	994.89
Net loans/Total assets	59.19999	20.67138	-30.39	703.81
Income diversity	0.68451	0.267767	0	1
Real interest rate (lag)	5.3087	5.728615	-35	87
Inflation (lag)	2.777283	16.81535	-23	2252
GDP growth (lag)	2.602257	1.750472	-13	34
Real exchange rate (lag)	102.9156	7.707933	63	172
Bank concentration	0.418062	0.202599	0.195922	1
Commercial Bank (CB)	0.664916	0.472022	0	1
Stakeholderness	0.187394	0.123385	0	0.500475
H-statistic	0.476487	0.091397	0.3235	0.996875
Activity restrictiveness	7.059558	1.489448	3	11
Capital Requirement	6.050717	1.01489	3	10
Deposit Insurance	0.961242	.1930184	0	1

Before entering into the multivariate analysis, we compare the mean values of the z-score, as well as its individual components: the proportion of equity, ROA and the standard deviation of ROA between commercial banks and stakeholder banks (Table 3). The univariate analysis provides us with initial insight into the relationship between the type of bank and stability. The results seem to provide support to hypothesis 1 since the average Z-score is significantly higher for stakeholder banks compared to commercial banks suggesting that the former are more stable than the latter. Interestingly, the higher z-score is not driven by a higher degree of capitalization or profitability (since these are on average significantly lower for stakeholder banks) but stems from the returns volatility. On average, the standard deviation of returns is significantly lower for stakeholders' banks than for commercial banks. These findings are consistent with Čihák and Hesse (2007).

TABLE 3: Decomposition of Bank's Z-score for full sample 1993-2007

Type of Bank	Bank's z-score, mean	Equity/total asset, mean	ROA, mean	St. dev. of ROA, mean
Commercial banks	38.03413	12.71209	1.581762	1.209772
Stakeholder banks	44.27448	8.019317	0.5604935	0.4122675
Difference	-6.240355***	4.69277***	1.021269***	0.7975044***

Table 4 presents the results regarding the influence of ownership structure on bank's risk taking incentives (hypothesis 1) as well as the effect of the presence of stakeholder banks on the risk taking incentives of their competitors (hypothesis 2). Model 1 shows the base model together with the commercial bank variable. The coefficient of the commercial bank variable is negative and significant at the 1 percent level. This result provides support to hypothesis 1, establishing that stakeholder banks are less risk inclined than Commercial banks. The risk reduction effect associated with being a stakeholder bank is significant not only in a statistical sense but also in an economic sense. The coefficient estimate for the commercial bank variable in Table 4, model 2, suggests that stakeholder banks have a higher distance to default of about 0.14 standard deviation as compare to commercial banks (an increase of 4.2% versus the mean of the natural logarithms of the Z score of 3.30).

TABLE 4: The effect of bank ownership on bank stability

We estimate random effects models. The dependant variable is the bank Z-Score. Model (1) tests H1 by introducing into the base model the commercial bank dummy. Model (2) and (3) test for hypothesis 2 by including into the base model the variable degree of stakeholderness (model 2) and its interaction with the commercial bank dummy (model 3). Control variables are as described in section 2.4. Robust standard errors are within parentheses. *,**,*** indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	H	(1)	(2)	(3)
Size		-0.1231***	-0.1278***	-0.1315***
		(0.0017)	(0.0017)	(0.0017)
Cost-income ratio		0.0008***	0.0007***	0.0007***
		(0.0000)	(0.0000)	(0.0000)
Net loans/Total assets		-0.0008***	-0.0009***	-0.0009***
		(0.0001)	(0.0001)	(0.0001)
Income diversity		0.0293***	0.0300***	0.0291***
		(0.0041)	(0.0041)	(0.0041)
Real interest rate (lag)		-0.0087***	-0.0096***	-0.0106***
		(0.0003)	(0.0003)	(0.0003)
Inflation (lag)		-0.0051***	-0.0054***	-0.0063***
		(0.0003)	(0.0003)	(0.0003)
GDP growth (lag)		-0.0049***	-0.0053***	-0.0053***
		(0.0005)	(0.0005)	(0.0005)
Real exchange rate (lag)		0.0000	0.0000	-0.0000
		(0.0001)	(0.0001)	(0.0001)
Bank concentration		0.2954***	0.2986***	0.2704***
		(0.0108)	(0.0108)	(0.0110)
Commercial Bank (CB)	H1	-0.1453***	-0.2281***	-0.0400**
		(0.0160)	(0.0163)	(0.0195)
Stakeholderness	H2		-0.5565***	-0.1590***
			(0.0280)	(0.0361)
CB*Stakeholderness	H2			-1.0041***
				(0.0575)
constant		4.0246***	4.2242***	4.1644***
		(0.0237)	(0.0256)	(0.0258)
N		119293	119293	119293
r2_w		0.1001	0.1068	0.1100
r2_b		0.0000	0.0003	0.0001
r2_o		0.0025	0.0011	0.0014
N_g		14619.0	14619.0	14619.0

Model 2 adds the degree of stakeholderness to the regression. The results in this model ratify the validity of hypothesis one since the commercial bank variable remains negative and significant. Moreover the introduction of the stakeholderness variable

allows us to test hypothesis two. The degree of stakeholderness shows a negative and significant coefficient. This result suggests that the higher the proportion of stakeholder banks in a financial system, the lower the stability of banks becomes. For instance, the coefficient estimate for the degree of stakeholderness in model 2 suggest that an increase of one standard deviation in the proportion of stakeholder banks will, on average, decrease the stability of banks by 0.06 standards deviations (a decrease of 1.8% versus the mean of the natural logarithms of the Z score of 3.30).

This result provides support for the first part of hypothesis 2 (i.e., that he presence of stakeholder banks reduces the stability of their rivals). To test the second part of hypothesis 2 (i.e., that the presence of stakeholder banks decreases especially the stability of commercial banks), we introduce the interaction effect between the commercial bank variable and the degree of stakeholderness in model 3. The coefficient of the interaction term is negative and significant at the one percent level. This result provides support to the idea that the presence of stakeholder banks hurts especially the stability of commercial banks. Based on the estimate coefficient of the interaction term in table 4, model 3, the effect of a one standard deviation increase in the proportion of stakeholder banks is to decrease a) the stability of stakeholder banks by 0.019 standard deviations (a decrease of 0.5% versus the mean of the natural logarithms of the Z score of 3.30) b) the stability of commercial banks by 0.14 (a decrease of 4.2% versus the mean of the natural logarithms of the Z score of 3.30). Taking together, the results in Table 3 provide strong support to hypothesis 1 and 2.

Next, we analyse hypotheses 3 and 4, i.e., we examine whether the effect of competition and regulation on bank's stability depends on the bank's ownership structure. To test these hypotheses we run a series of regressions in which we examine the direct and interactive associations among ownership structure, competition,

regulations, and bank risk. Specifically, we include in equation (2) the interaction term between competition and each measure of bank ownership to test for hypothesis 3. Afterwards, we employ the interaction term between each regulatory measure (capital requirement, activity restrictions and deposit insurance) and each ownership variable to test the hypothesis 4a-c. We add each regulatory variable and each interaction term separately to our base model to avoid collinearity problems[11].

Table 5 (models 4-6) considers the effect of competition (H-statistic) on bank stability. The direct effect is presented in model 4, while models 5-6 provide insight into how the ownership type influences the effect of competition on bank stability. On the one hand, the regression results show a direct negative effect of competition on bank stability, providing support for the competition fragility view. On the other hand, this relationship is contingent on the type of banks ownership. The effect of competition on stability is significantly more negative for commercial banks as compared to stakeholder banks (the interaction term between the H statistic and the commercial bank dummy is negative significant at the 1% level) as well as for higher degrees of stakeholderness. For instance, the estimates suggest that bank stability will decrease by about 0.12 standard deviations for one standard deviation increase in competition for a stakeholder bank, but will decrease by 0.26 standard deviations if it concerns a commercial bank. These results provide support to hypothesis 3, stating that the negative effect of competition on bank stability is stronger for commercial banks compare to stakeholder banks. Furthermore, our results show the importance to consider the ownership structure of the financial sector when analyzing the relationship between

[11] The interaction terms between competition (regulation) and each measure of bank ownership are introduced separately for each ownership measure to avoid multicollinearity problems. Our two measures of ownership (the commercial bank dummy and the degree of stakeholderness) are negatively correlated at the 60% level. However, in unreported regressions, we have tested the robustness of our results when including both variables of ownership as well as their interaction terms with competition (and regulatory measures) simultaneously. All our results are robust for this alternative specification.

bank competition and financial stability. Finally, figure 2a-b illustrates the relationship between competition and bank stability under different ownership types. The slope of competition on bank stability (z-score) is steeper for commercial banks compared to stakeholder banks. Regarding the degree of stakeholderness, we focus on two specific values of stakeholderness (Q1 and Q3) to show how the relationship between competition and stability changes, rather than using a three-dimensional graph.

FIGURE 2a-b: the Competition – Z-score relationship

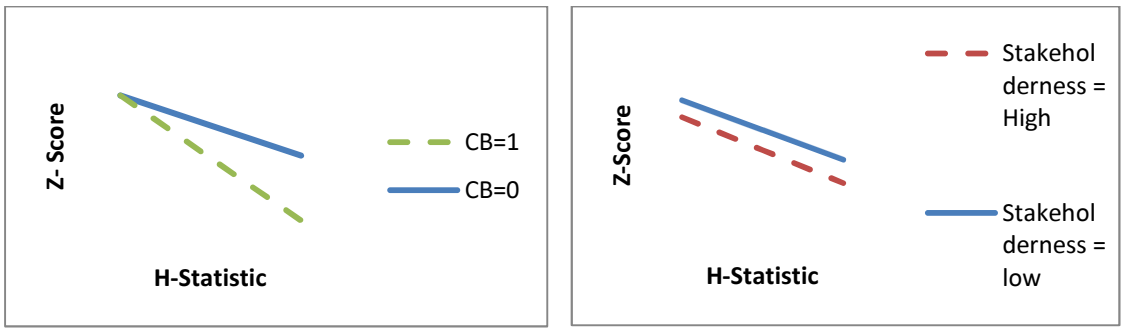


TABLE 5: The effect of competition and Capital requirements on bank stability, contingent on the bank ownership

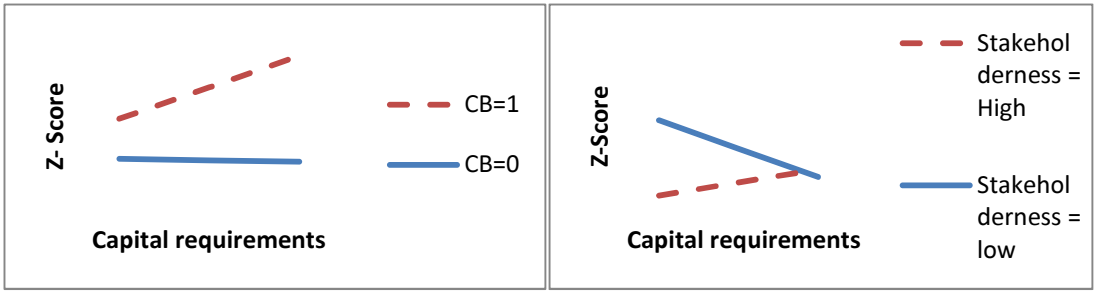
We estimate random effects models. The dependant variable is the bank Z-Score. Model (4) tests the direct effect of competition (H-statistic) on bank stability. Model (5) and (6) test H3 and include the interaction terms between each measure of bank ownership and the H statistic. Model (7) tests the direct effect of capital requirement on bank stability. Model (8) and (9) test H4 and include the interaction terms between each measure of bank ownership and capital requirements.

	H	(4)	(5)	(6)	(7)	(8)	(9)
Size		-0.1159***	-0.1153***	-0.1205***	-0.1233***	-0.1234***	-0.1270***
		(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Cost-income ratio		0.0008***	0.0008***	0.0008***	0.0008***	0.0008***	0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Net loans/Total assets		-0.0013***	-0.0014***	-0.0016***	-0.0008***	-0.0008***	-0.0010***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Income diversity		0.0256***	0.0257***	0.0276***	0.0306***	0.0306***	0.0326***
		(0.0042)	(0.0042)	(0.0042)	(0.0041)	(0.0042)	(0.0042)
Real interest rate (lag)		-0.0080***	-0.0078***	-0.0088***	-0.0087***	-0.0087***	-0.0089***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Inflation (lag)		-0.0038***	-0.0036***	-0.0040***	-0.0046***	-0.0046***	-0.0046***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
GDP growth (lag)		-0.0032***	-0.0031***	-0.0037***	-0.0049***	-0.0049***	-0.0058***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Real exchange rate (lag)		0.0005***	0.0005***	0.0005***	0.0001	0.0001	0.0001
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Bank concentration		0.3411***	0.3459***	0.3656***	0.2990***	0.2992***	0.3241***
		(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0109)
Commercial Bank (CB)		-0.1012***	0.5879***		-0.1243***	0.1088	
		(0.0157)	(0.0990)		(0.016)	(0.1098)	
Stakeholderness				-0.2577			-1.9885***
				(0.1624)			(0.1598)
H-Statistic		-1.8847***	-1.3594***	-1.9224***			
		(0.0998)	(0.1245)	(0.1398)			
H-Statistic *CB	H3		-1.4707***				
			(0.2086)				
H-Statistic * stakeholderness	H3			-0.7405**			
				(0.3451)			
Capital Requirement					-0.0288***	-0.0081	-0.0883***
					(0.0091)	(0.0132)	(0.0109)
Capital Requirement *CB	H4a					-0.0389**	
						(0.0181)	
Capital Requirement * Stakeholderness	H4a						0.2486***
							(0.0258)
Constant		4.8250***	4.5705***	4.9170***	4.1818***	4.0592***	4.5652***
		(0.0517)	(0.0631)	(0.0691)	(0.0588	(0.0820)	(0.0690)
N		115596	115596	115596	118262	118262	118262
r2_w		0.1023	0.1023	0.1101	0.1003	0.1003	0.1079
r2_b		0.0055	0.0074	0.0025	0.0000	0.0000	0.0014
r2_o		0.0105	0.0133	0.0081	0.0022	0.0022	0.0003
N_g		14453.0	14453.0	14453.0	14453.0	14453.0	14453.0

Next, we examine the relationship between bank's risk taking incentives, regulation and ownership structure. We present the results in Table 5-2.6, models 7-12. Model 7 to 9 in table 5 consider the effect of capital regulation on bank stability, which has been the focus of recent international and national regulatory approaches to promoting the safety and soundness of banking systems. In model 8, we test the direct effect of capital regulation on banks risk taking incentives. The coefficient of capital requirements shows a negative and significant sign at the 1% level. This result is in line with theory and empirical studies stressing the negative impact of capital requirement on banks risk taking incentives (Koehn and Santomero, 1980; Kim and Santomero, 1988; Besanko and Kanatas, 1996; Blum, 1999; Laeven and Levien, 2009; Barth et al., 2004, 2006). However, as shown in model 8, this negative relationship between capital requirement and banks risk taking incentives is contingent on bank's ownership structure. As predicted in hypothesis 4a the negative effect of capital requirement on bank stability hold only for commercial banks, i.e., the effect of capital requirements on bank stability is insignificant for stakeholder banks while it is negatively significant at the 1% level for stockholders banks. The risk taking incentives of stakeholder banks may not be affected by capital requirements because they are not strictly profit-oriented, and suffer from less pressure by shareholders to select a riskier investment portfolio, to compensate for the loss of utility from more stringent capital requirements. In addition, they tend to voluntarily create reserves in good times as a buffer for bad times. This means that independently of the capital regulatory regime, stakeholder banks are more likely retains their profits creating a buffer against losses and hence failure. Model 9 ratifies these results by showing that the effect of capital requirements on bank stability is less negative, and even becomes positive, as the level of stakeholderness increases. For instance, the estimates in Table 5, model 9 suggest that one standard deviation

increase on capital requirement will increase bank risk by 0.09 standard deviations in those economies where there are no stakeholder banks. However this negative effect of capital requirements on bank stability become less negative for higher proportion of stakeholder banks in an economy and even become positives when the proportion of stakeholder banks becomes 35 percent. For example, an increase of one standard deviation in capital requirement in the U.K. where the proportion of stakeholder bank is 1.3% will increase bank insolvency risk by 0.08 standard deviations while the same increase in capital requirement in Austria where the proportion of stakeholder banks is 0.42 will increase bank stability by 0.19 standard deviations. We graphically illustrate these relations in Figure 3a-b.

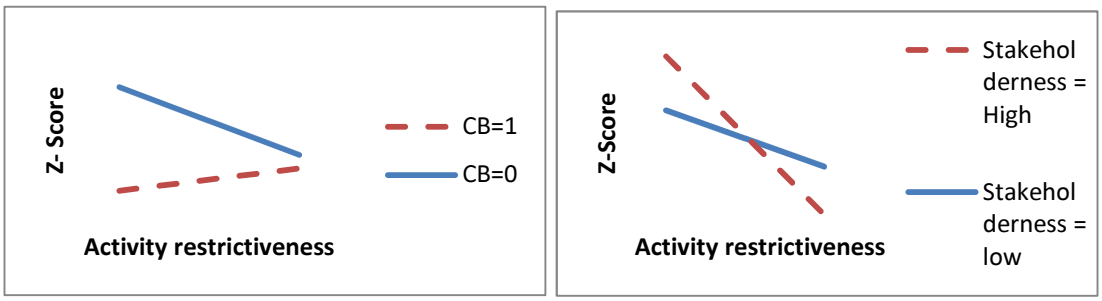
FIGURE 3a-b: the Capital Requirement– Z-score relationship



Models 10 to 12 in Table 5 analyses the effect of activity restrictiveness on bank stability and whether this relationship is contingent upon the bank ownership structure. Many countries attempt to reduce risk by restricting banks from engaging in non-lending activities. However, theory suggests that these regulations might have unintended effects (Leaven and Levine, 2009). Model 10 tests the direct effect of activity restrictiveness on banks risk taking incentives. The coefficient of activity restrictiveness shows a negative and significant sign at the 1% level. This result is in line with the literature stressing the negative impact of activity restrictions on banks'

stability. (John et al., 1994; Saunders, 1985; Boyd et al., 1998). However, as shown in model 11 this negative relationship is contingent on the bank's ownership structure. As predicted in hypothesis 4b, the negative effect of activity restrictiveness on bank stability depends on banks ownership structure. While the effect of activity restrictiveness on bank stability is negative and significant at the 1% level for stakeholder banks, it is positive and significant at the 1% level for commercial banks. According to the coefficients estimates in model 11, an increase of one standard deviation in activity restrictiveness increases the stability of commercial banks by 0.066 standard deviations, but it decreases the stability of stakeholder banks by 0.19 standard deviations. Model 12 ratifies this result by showing that the negative effect of activity restrictiveness on bank's stability increases with the proportion of stakeholder banks in an economy. One possible explanation for this finding is that stringent activity restrictions increase the stability of commercial banks by reducing their opportunities to increase risk taking by engaging in a broader range of activities (Boyd et al., 1998) but hurt the stability of stakeholder banks by limiting their abilities to diversify. These results suggest that regulators and policy makers should consider the ownership structure of the banking system when setting restriction on banks activities since the same regulation may have opposite effects depending on the bank ownership structure. Figure 4a-b graphically illustrates the contingent effect of activity restrictions on banks' stability.

FIGURE 4a-b: the Activity Restrictiveness– Z-score relationship



Finally, we consider the influence of deposit insurance on bank stability (Table 6, model 13-15). Model 13 tests the direct effect of deposit insurance on bank stability and shows a negative and significant relationship, at the 1% level. This is in line with the idea that the moral hazard problem generated by the existence of deposit insurance may offset its stabilization effects, i.e., the existence of explicit deposit insurance encourages banks to increase their risk taking behavior. However this negative effect of deposit insurance on bank stability varies with banks ownership structure, as shown in models 14-15. The negative impact of deposit insurance on bank stability is significantly stronger for commercial banks. For instance, while the presence of explicit deposit insurance decreases the stability of commercial banks by 1 standard deviation, the stability of stakeholder banks decreases by only 0.58 standard deviations. From this perspective, the introduction of explicit deposit insurance may need to be done with cautions since its negative effect on bank stability offset the positive effects, especially in those financial systems dominated by stockholders banks.

TABLE 6: The effect of activity restrictiveness and deposit Insurance on bank stability, contingent on the bank ownership

We estimate random effects models. The dependant variable is the bank Z-Score. Model (10) tests the direct effect of "activity restrictiveness" on bank stability. Model (11) and (12) test H4.b and include the interaction terms between each measure of bank ownership and "activity restrictiveness". Model (13) tests the direct effect of deposit insurance on bank stability. Model (14) and (15) test H4.c and include the interaction terms between each measure of bank ownership and deposit insurance.

	H	(10)	(11)	(12)	(13)	(14)	(15)
Size		-0.1253***	-0.1236***	-0.1401***	-0.1235***	-0.1234***	-0.1268***
		(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Cost-income ratio		0.0008***	0.0008***	0.0007***	0.0008***	0.0008***	0.0007***
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Net loans/Total Assets		-0.0008***	-0.0008***	-0.0011***	-0.0008***	-0.0008***	-0.0009***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Income diversity		0.0282***	0.0281***	0.0297***	0.0296***	0.0297***	0.0313***
		(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)
Real interest rate (lag)		-0.0088***	-0.0088***	-0.0107***	-0.0083***	-0.0083***	-0.0090***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Inflation (lag)		-0.0048***	-0.0049***	-0.0061***	-0.0043***	-0.0043***	-0.0044***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
GDP growth (lag)		-0.0045***	-0.0045***	-0.0044***	-0.0047***	-0.0047***	-0.0053***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Real exchange rate (lag)		0.0001	0.0000	-0.0001	0.0001	0.0001	0.0002
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Bank concentration		0.2902***	0.2882***	0.2926***	0.3113***	0.3113***	0.3303***
		(0.011)	(0.0110)	(0.0109)	(0.0109)	(0.0108)	(0.0108)
Commercial Bank (CB)		-0.0765***	-1.3610***		-0.1144***	-0.1093***	
		(0.0174)	(0.0900)		(0.0159)	(0.0160)	
Stakeholderness				2.3470***			-0.5339***
				(0.1230)			(0.0273)
Activity restrictiveness		-0.0525***	-0.1347***	-0.0074			
		(0.0063)	(0.0084)	(0.0071)			
Activity restrictiveness*CB	H4b		0.1791***				
			(0.0123)				
Activity Restrictiveness* Stakeholderness	H4b			-0.4614***			
				(0.0186)			
Deposit insurance					-0.9533***	-0.5833***	-1.0719***
					(0.0481)	(0.1360)	(0.0479)
Deposit insurance *CB	H4c					-0.4228***	
						(0.1454)	
Deposit insurance* Stakeholderness	H4c						-0.0266
							(0.2907))
Constant		4.3787***	4.9114***	4.2694***	4.0172***	4.0128***	4.0612***
		(0.0491)	(0.0610)	(0.0579)	(0.0237)	(0.0237)	(0.0215)
N		119048	119048	119048	119066	119066	119066
r2_w		0.1005	0.1005	0.1147	0.1007	0.1007	0.1073
r2_b		0.0004	0.0055	0.0000	0.0087	0.0091	0.0044
r2_o		0.003	0.0085	0.0011	0.015	0.0156	0.0110
N_g		14582.0	14582.0	14582.0	14585.0	14585.0	14585.0

The coefficients of the control variables in all models are consistent with previous literature. Firm size, net loans, real interest rates, inflation and GDP growth are negatively related to the Z-score, while, income diversity, real exchange rate and bank concentration are positively related. For instance size is significant and positive in all models regression indicating that Bank risk increases with size. This can be so because large banks may be more likely to engage in more risky transactions on the international financial market owing to the large fixed costs necessary to operate globally (Chen and Mazumdar, 1997). They may also incur in greater risks based on the expectation of a government bail-out (Boyd and Runkle, 1993). It is also interesting to notice that while competition is negatively relate to bank stability, the concentration ratio is positive and significant at the 1% level in all the specifications which suggests that bank's are more stable in concentrated banking systems. These findings seems to indicate that competition and concentration should be considered to measure different elements (see Berger et al., 2004; Beck et al., 2006; Schaeck et al., 2009; Jiménez et al., 2007). The fit of the model is in line with previous research on the topic.

Overall, the results obtained in these sections have important implications for policy makers since the same level of competition and regulation on capital requirements, activity restrictions and deposit insurance may be contingent upon the bank's ownership structure, and consequently, on the proportion of stakeholder banks in an economy. Therefore, ignoring ownership structure when analyzing the effect of competition and regulation on financial stability may leads to results that heavily depend on the specificity of the sample, reducing its external validity.

6 Sensitivity Analysis

To provide greater robustness for our results on the influence of ownership structure on the effect of competition and regulation on bank stability, we repeat our

analysis for several variables of bank regulations: “entry into banking requirements”, “independence of the supervisory activity”, “external governance” and “private monitoring” (see appendix 2.1 for a definition of these variables). First we provide support for our results regarding the relationship between competition and stability by using the competition regulatory measure “entry into banking requirements” as a proxy for the degree of market competition[12] As it is shown in Table 7-2.8, model 16, higher entry into banking requirements (i.e., less competition) have a negative direct effect on bank stability supporting the competition stability view. However, in line with our findings, this negative effect is contingent upon the banks ownership structure. As shown in model 17 higher entry into banking requirements reduces the stability of stakeholder’s banks but increases the stability of commercial banks. This finding suggests that the competition stability view hold for stakeholder’s banks but the competition fragility view is the one explaining the reaction of commercial banks to an increase in competition. One possible explanation for this finding is that an increase in competition increases the stability of stakeholder banks by exposing managers to market pressures. Higher market pressures may reduce the possibilities of managers ´opportunistic behaviors (i.e., the expense preference behavior of managers) and as a result inefficiencies that can lead to higher risk. However, an increase in competition reduces the stability of commercial banks since managers are subject to the short term pressure of the capital market. Therefore they may have to increase the risk taking behavior of the banks they manage to maintain the level of profits required by risk neutral shareholders. This result is ratify in model (18) where the interaction term between the variable entry into banking requirement and the degree of stakeholderness is introduced. The result of this model show that restricting competition by increasing

[12] Claessens and Levine (2004) show that contestability determines effective competition especially by allowing bank entry and reducing activity restrictions on banks.

the entry into banking requirements reduces the stability of banks only in those financial system where there are stakeholders banks. That is, the higher the degree of stakeholderness the more negative is the impact of imposing higher entry requirements in banking on banks' stability.

TABLE 7: Sensitivity Analysis considering independence of the authority

We estimate random effects models. The dependant variable is the bank Z-Score. Model (16) tests the direct effect of "entry into banking" on bank stability. Model (17) and (18) test the moderation effect of the bank ownership structure on the "entry into banking" - banks' stability relationship. Model (19) tests the direct effect of "independence of the authority bank" on bank stability. Model (20) and (21) test for the moderation effect of the bank ownership structure on "independence of the authority bank" - banks' stability relationship.

	(16)	(17)	(18)	(19)	(20)	(21)
Size	-0.1229***	-0.1229***	-0.1375***	-0.1231***	-0.1214***	-0.1258***
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Cost-income ratio	0.0008***	0.0008***	0.0007***	0.0008***	0.0008***	0.0008***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Net loans/Total Assets	-0.0008***	-0.0008***	-0.0010***	-0.0008***	-0.0009***	-0.0010***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Income diversity	0.0300***	0.0297***	0.0325***	0.0308***	0.0308***	0.0308***
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)
Real interest rate (lag)	-0.0085***	-0.0085***	-0.0106***	-0.0083***	-0.0081***	-0.0093***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Inflation (lag)	-0.0047***	-0.0046***	-0.0059***	-0.0044***	-0.0042***	-0.0046***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
GDP growth (lag)	-0.0048***	-0.0047***	-0.0048***	-0.0050***	-0.0049***	-0.0058***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Real exchange rate (lag)	0.0001	0.0001	-0.0000	0.0001	0.0001	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Bank concentration	0.3066***	0.3061***	0.3140***	0.3087***	0.3163***	0.3110***
	(0.0109)	(0.0109)	(0.0108)	(0.0109)	(0.0109)	(0.0110)
Commercial Bank (CB)	-0.1857***	-1.3354***		-0.1735***	-0.7131***	
	((0.0168)	(0.2143)		(0.0162)	(0.0425)	
Stakeholderness			9.5757***			-0.0913
			(0.3539)			(0.0555)
Entry into banking	-0.0525***	-0.1347***	-0.0074			
	(0.0063)	(0.0084)	(0.0071)			
Entry into banking *CB		0.1523***				
		(0.0283)				
Entry into Banking *			-1.3490***			
Ind. authority				0.3258***	0.0230	0.3669***
				(0.0231)	(0.0319)	(0.0257)
Ind. authority*CB					0.6314***	
					(0.0460)	
Ind.authority*						-0.4997***
constant	3.1860***	4.0290***	2.7604***	3.7616***	3.9807***	3.7342***
	(0.0975)	(0.1845)	(0.1032)	(0.0307)	(0.0346)	(0.0312)
N	119066	119066	119066	118825	118825	118825
r2_w	0.1006	0.1006	0.1141	0.1009	0.1009	0.1071
r2_b	0.0014	0.0019	0.0000	0.0032	0.0101	0.0003
r2_o	0.0061	0.0068	0.0022	0.0093	0.0187	0.0049
N_g	14585.0	14585.0	14585.0	14559.0	14559.0	14559.0

Table 8: Sensitivity Analysis considering the governance index and private monitoring

We estimate random effects models. The dependant variable is the bank Z-Score. Model (22) tests the direct effect of the "governance index" on bank's stability. Model (23) and (24) test the moderation effect of the bank ownership structure on the governance index-banks' stability relationship. Model (25) tests the direct effect of "private monitoring" on bank stability. Model (26) and (27) test the moderation effect of the bank ownership structure on the "private monitoring" -banks' stability relationship.

	(22)	(23)	(24)	(25)	(26)	(27)
	Regulation#			Regulation#		
	governance index			private monitoring		
Size	-0.1064***	-0.1052***	-0.1295***	-0.1052***	-0.1036***	-0.1304***
	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0020)
Cost-Income Ratio	0.0009***	0.0009***	0.0008***	0.0009***	0.0009***	0.0008***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Net loans/Total Assets	-0.0012***	-0.0012***	-0.0014***	-0.0012***	-0.0012***	-0.0015***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Income Diversity	0.0448***	0.0444***	0.0382***	0.0460***	0.0456***	0.0415***
	(0.0049)	(0.0049)	(0.0049)	(0.0049)	(0.0049)	(0.0049)
Real interest rate (lag)	-0.0081***	-0.0080***	-0.0133***	-0.0079***	-0.0078***	-0.0132***
	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0004)
Inflation (lag)	-0.0031***	-0.0029***	-0.0062***	-0.0029***	-0.0027***	-0.0058***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
GDP growth (lag)	-0.0041***	-0.0040***	-0.0041***	-0.0039***	-0.0038***	-0.0037***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Real exchange rate	0.0004***	0.0004***	-0.0000	0.0005***	0.0005***	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Bank Concentration	0.2574***	0.2575***	0.1445***	0.2754***	0.2735***	0.1843***
	(0.0128)	(0.0128)	(0.0140)	(0.0129)	(0.0129)	(0.0133)
Commercial Bank	-0.0217	-2.6807***		-0.0661***	-2.0641***	
	(0.0223)	(0.2868)		(0.0217)	(0.1913)	
Stakeholderness			7.8076***			
			(0.4947)			(0.3158)
Regulation#	0.1022***	0.0091	0.2530***	0.1727***	0.0464***	0.2500***
	(0.0101)	(0.0142)	(0.0105)	(0.0103)	(0.0158)	(0.0110)
Regulation# *CB		0.1857***			0.2155***	
		(0.0200)			(0.0205)	
Regulation# * stakeholderness			-0.6554***			-0.8222***
			(0.0355)			(0.0352)
constant	2.3096***	3.5828***	2.1085***	2.1581***	3.2718***	1.8785***
	(0.1431)	(0.1978)	(0.1547)	(0.0976)	(0.1438)	(0.1086)
N	96670	96670	96670	96670	96670	96670
r2_w	0.0998	0.0998	0.1189	0.0999	0.0998	0.1199
r2_b	0.0004	0.0028	0.0001	0.0052	0.0111	0.0043
r2_o	0.0044	0.0087	0.0030	0.0126	0.0197	0.0106
N_g	11721.0	11721.0	11721.0	11721.0	11721.0	11721.0

Second, we check for the robustness of our results on the relationship between regulation and stability by considering alternatives measures of regulation. Specifically, we consider the following regulatory measures: "Independence of the supervisory activity" (Table 7, models 19-21), "external governance" (Table 8, models 22-24) and "private monitoring" (Table 8, models 25-27). The results of these analyses are in line with our main results and provide additional support for idea that the effect of regulation on bank stability needs to be understood taking into account the ownership type of banks.

7 Conclusions and limitations

Excessive risk taking has been considered one of the main causes of the financial crisis, underscoring current efforts to reform bank regulation and supervision to shape bank risk. Yet, there is no evidence that any universal set of best practices is appropriate for all banks. In this paper, we analyze the implications of bank ownership structure on bank stability and on the relationship between competition and regulation on bank stability. We differentiate between commercial and stakeholder banks (cooperatives and savings banks), and we show that stakeholder banks are less risk-inclined compared to commercial banks and make their rival banks less stable, especially when commercial banks are involved. Moreover, we show that there is a direct negative effect of competition on bank stability supporting the competition-fragility view (Matutes and Vives, 1996, 2000; Hellmann et al., 2000; Repullo, 2004). In terms of the effect of regulation on bank stability, we show that capital requirements, activity restrictions and deposit insurance have a direct negative effect on bank stability. However, our findings reveal that these effects are contingent on the bank ownership type. In particular, we find that the negative effect of competition on stability is significantly more negative for commercial banks than for stakeholder banks, as well as for any bank operating in

systems with a higher proportion of stakeholder banks. In terms of regulation we show that stringent capital regulatory measures decrease the stability of commercial banks, but have no effect on the stability of stakeholder banks. Consequently, the higher the proportion of stakeholder banks in an economy, the less negative is the impact of capital requirements on bank stability. The effect of activity restrictions on bank stability is negative for stakeholder banks, but positive for commercial banks. As a result, the negative effect of activity restrictions on bank stability increases with the proportion of stakeholder banks in an economy. Finally we show that deposit insurance has a negative impact on bank stability, and that this effect is stronger for commercial banks.

Overall, our findings suggest that it is important to consider bank ownership structure when analyzing bank stability. This result may have important implications for academics and policy makers alike, since it indicates that ignoring bank ownership structure can lead to erroneous conclusions about the risk-taking effects of competition and of banking regulations on bank stability.

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APPENDIX 2.1 Variable Definitions

Variable name	Description	Data Source
Bank z-score	Is a measure of banks' distance to default is estimated as (ROA + equity / assets) / sd(ROA), where sd(ROA) is calculating as a three year moving average.	Bankscope. Author's calculation
Stakeholderness index	The stakeholderness index measure the proportion of assets held by Stakeholder´s banks. Is calculated as the ratio of savings' banks assets plus cooperatives' banks assets over total assets.	Bankscope. Author's calulation
Commercial bank	Commercial bank dummy taking the value 1 if the bank is a commercial one and zero otherwise.	Bankscope. Author´s calulation
Size	Log of a bank total asset.	Bankscope
Net Loans/ Total asset	Ratio of net loans to total assets.	Bankscope.Author´s calulation
Cost income ratio	Ratio of cost to income.	Bankscope. Author´s calulation
Income diversity	$1-\left\lvert\frac{net\ \text{int}erest\ income-other\ operating\ income}{Total\ operating\ income}\right\rvert$	Bankscope. Author´s calulation
H-statistic	The H-statistic (Panzar and Rosse,1987) is an indicator of competition that measure the ability of a bank to pass on increases in factor input prices to customers. It is calculated by estimating the sum of the elasticities of reduced form revenue equations with respect to factor input prices.	Bankscope. Author´s calulation
Concentration	Concentration is calculated as the market share of the three largest institutions in each country averaged over the sample period.	Beck and Demigrüc-Kunt (2009)
GDP growth (lagged by one period)	It is the rate of real growth of the gross domestic product.	World Bank Development Indicators
Depreciation	Measure the change of the exchange rate.	World bank Development Indicators
Inflation	It is the rate of change of the GDP deflator	World bank Development indicator
Real interest rate (lagged by one period)	It is the change in nominal interest rate minus the rate of in inflation.	World Bank Development Indicators
Overall activities restrictiveness	Activity restrictions index for securities, insurance, real estate, and ownership of non financial firms that take on values between 3 and 11, whereby greater values indicate more restrictions.	Barth, Caprio and Levine (2004)
Capital regulatory index	Summary index for overall capital stringency calculated as the sum of initial capital stringency and overall capital stringency	Barth, Caprio and Levine (2004)
Explicit deposit insurance scheme	Is a dummy variable that takes on the value one if the country has a deposit insurance, and zero otherwise	Barth, Caprio and Levine (2003)

Variable name	Description	Data Source
External governance index	Summary index of the degree of stringent corporate governance measures	Barth, Caprio and Levine (2004)
Diversification index	Summary index indicating whether there are explicit, verifiable, quantifiable guidelines for asset diversification and banks are allowed to make loans abroad. Its range from 0 to 2, with a higher value indicating	Barth, Caprio and Levine (2004)
Prívate monitoring index	Variable indicating whether a)there are certitified audit required ,b)the percentage of ten biggest banks rated by international credit rating agencies equals100%, (c) Percentage of ten biggest banks rated by domestic credit rating agencies equals100%, d) there are no explicit deposit insurance scheme, (e) bank accounting, subordinated debt is allowableas a part of regulatory capital, subordinated debt is requiredas a part of regulatory capital,off-balance sheet items are disclosed to supervisors,off-balance sheet items are disclosed to the public,and banks must disclose risk management procedures to the public	Barth, Caprio and Levine (2004)
Independence of Supervisory Authority– Banks	Dummy variable indicating the degree to which the supervisoryauthority is protected by the legalsystem from the banking industry yes=0; no=1	Barth, Caprio and Levine (2004)
Entry into banking requirements	Variable indicating whether various types of legal submissions are required to obtain a banking license	Barth, Caprio and Levine (2004)

APPENDIX 2.2: ESTIMATION OF THE H-STATISTIC

To empirically estimate the H-statistic we follow Claessens and Laeven (2004) and Klaus et al (2009) and we estimate the following reduced form revenue equations for each country:

$$\ln(P_{it}) = \alpha + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) + \\ + \gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \\ + \delta D + \varepsilon_{it} \qquad (22)$$

Where P_{it} is the ratio of gross interest revenue to total assets (proxy for output price of loans), $W_{1,it}$ is the ratio of interest expenses to total deposits and money market funding (proxy for input price of deposits), $W_{2,it}$ is the ratio of personnel expense to total assets (proxy for input price of labor), $W_{3,it}$ is the ratio of other operating and administrative expense to total assets (proxy for input price of equipment/fixed capital). The subscript *i* denotes bank *i*, and the subscript *t* denotes year *t*.

As in Claessens an Laeven we include the following control variables at the individual bank level: $Y_{1,it}$ is the ratio of equity to total assets, $Y_{2,it}$ is the ratio of net loans to total assets, and $Y_{3,it}$ is the logarithm of total assets (to control for potential size effects). D is a vector of year dummies for the years 1993 through 2007 (we drop the year dummy for the year 1993). We take natural logarithms of all variables.

To follow the same approach as in Claessens and Levine and as in Klaus (2009), we estimate model (1) both using OLS with time dummies and GLS with fixed bank-specific effects. The *H*-statistic equals $\beta_1 + \beta_2 + \beta_3$. The previous authors to have a more comprehensive measure of the degree of competition reruns equation (22) (using OLS with time dummies and GLS with fixed effects and time dummies) with the ratio of total revenue to total assets since this alternative dependent variable extends to nontraditional sources of bank revenues like fee income-generating activities. Then, we also do so and our final H statistic is the average of the estimates of the H-statistics obtained from the four regression setups.

Since the H is statistic only a valid indicator of competition if the market is in equilibrium, we also estimate the following equation for each country to test for the equilibrium condition:

$$\ln(ROA_{it}) = \alpha + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) + \\ + \gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \\ + \delta D + \varepsilon_{it} \tag{23}$$

Where ROA is the pre-tax return on assets (pre-tax profits to total assets. We define the equilibrium *E*-statistic as $\beta_1 + \beta_2 + \beta_3$ Using a F test we test whether the equilibrium *E*-statistic (defined as $\beta_1 + \beta_2 + \beta_3$) equal zero. The idea behind this test is that, in equilibrium, returns on bank assets should not be related to input prices since the first-order condition for profit maximization requires risk-adjusted rates of return to be equal across banks (see, for example, Shaffer 1982 and Molyneux et al. 1996).