Bank Competition and Financial Stability:

Friends or Foes?

Thorsten Beck

Abstract

Theory makes ambiguous predictions about the relationship between market structure and competitiveness of the banking system and banking sector stability. Empirical studies focusing on individual countries provide similarly ambiguous results, while cross-country studies point mostly to a positive relationship between competition and stability in the banking system. Where liberalization and unfettered competition have resulted in fragility, this has been mostly the consequence of regulatory and supervisory failures. The advantages of competition for an efficient and inclusive financial system are strong, and regulatory and supervisory policies should focus on an incentive-compatible environment for banking rather than try to fine-tune market structure or the degree of competition.

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1.   Introduction

Stability concerns are often at the center of banking sector policy debates. After a relatively stable period between World War II and the 1970s, developed and developing countries alike have been hit by banking crises in the three decades since then. While the early years of the 21st century have seen a period of relative banking system stability around the world, recent turbulences linked to the U.S. subprime crisis have again caused concerns for policy makers, even in emerging economies that are not at the center of the storm.

Competition in the banking market has been at the center of the policy debate on financial stability. As in other, non-financial, markets competition is often seen as pre-requisite for an effective banking system. Several theoretical and empirical studies, however, have shed doubts on this proposition, claiming that monopoly rents gives banks higher incentives to invest in relationships with smaller and more opaque borrowers.[1] Similarly, theoretical and empirical studies have not come to a conclusive finding on the relationship between banking market competition and stability. There is a notion that excessive competition can lead to fragility and restraints on competition are necessary to preserve the stability of the banking system. Activity and branching restrictions put in place after the financial crises of the 1930s in many industrialized countries had the explicit goal of restricting competition. Financial liberalization in the 1970s and 1980s resulting in unchecked competition, on the other hand, has often been blamed for subsequent banking fragility in many developed and developing countries. Unfettered competition in the U.S. financial system has been partly blamed for the recent boom and subsequent bust in the subprime mortgage market.

The past decades have also seen a rapid consolidation of banks around the world, which is intensifying concerns among policymakers about bank concentration, as reflected in major reports by the Bank for International Settlements (2001), International

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[1] While theory and some empirical work suggest that market power might entice banks to invest in long-term relationships with small and opaque enterprises as they know that they can regain the initial investment in the relationship at a later stage (Petersen and Rajan, 1995; Bonaccorsi di Patti and Dell'Ariccia, 2004), other empirical papers point to the healthy effect of competition on availability of lending to SMEs (Cetorelli and Strahan, 2004; Beck, Demirgüç-Kunt and Maksimovic, 2004). See Berger et al. (2004) for an overview.

Monetary Fund (2001), and the Group of Ten (2001). This consolidation has happened not only within countries, but also across countries. The past decades have seen a wave of foreign bank entry in many developing countries, and, more recently, there have also been cross-border mergers in many developed financial systems, most notably within Europe. Consolidation has happened both within business lines but also across business lines, resulting in financial conglomerates that offer commercial and investment banking, insurance and pension fund services. While consolidation has often been justified by efficiency and scale economy arguments, the process of consolidation and the resulting financial conglomerates have given rise to stability concerns. Specifically, the size and complexity of these institutions might undermine proper regulation and supervision by both markets and authorities; their size and critical role across different segments of financial systems might make it difficult for authorities to intervene and potentially close such as institutions, a phenomenon known as "too-big" or "too-important-to-fail."

What are the effects of bank competition and the consolidation process on the stability of banking systems around the world? While seemingly opposing trends, consolidation does not necessarily imply less competition, as such consolidation can take place across different business lines or markets or create fewer, but more competitive players. Both competition and consolidation, however, have raised stability concerns among policy makers. This paper summarizes the existing literature and tries to derive policy conclusions. This is an important topic for policy makers for several reasons. First, given different policy goals such as deepening, broadening and stability of financial systems, it is important to understand whether there are trade-offs across these different policy goals with respect to competition. Second, given the array of regulatory policies at the disposal of policy makers, it is important to understand how they affect competition and stability as well as how they vary across different competitive environments in their effect on stability.

The discussion on the relationship between bank competition and stability has been made difficult by measuring both stability and competition appropriately, as we will discuss in section 2. While we will not review exhaustively the literature on banking distress or on measuring bank competition, understanding both concepts is important for the remainder of the discussion. Section 3 turns to the theoretical literature, which has

derived different predictions concerning the effect of competition on bank stability. Albeit sometimes arbitrary, for presentational purposes, we organize the literature into two opposing views, the competition-stability and competition-fragility hypotheses. Section 4 presents the results of empirical studies. We distinguish between bank-level studies focused on one country, on the one hand, and more recent cross-country studies, on the other hand. While the bank-level studies do not provide unambiguous findings on the relationship between competition and stability, cross-country studies point mostly to a positive relationship. In addition, the review of the theoretical and empirical literature allows two conclusions: first, it is important to consider the interaction of regulatory policies and market structure and, second, bank concentration is not an appropriate measure of bank competition and any effect of bank concentration on stability works through channels other than bank competition. Section 5 uses the theoretical and empirical findings to define the policy space for policy makers, also taking into consideration the related literature on bank regulation and banking system stability. Section 6 concludes and points to future research directions.

It is important to define what this paper does not cover. First, the paper is focused on domestic bank competition; the increased financial integration in the EU – while of increasing importance for policy makers and regulators – will not be specifically touched upon in this paper. Second, an important dimension of competition, as pointed out by Claessens and Laeven (2004), is foreign bank entry. While we do not cover this literature in this paper, our policy discussion will make reference to the findings of this literature. It remains to be stressed that this paper reflects the current state of knowledge. As discussed in the Conclusions, more research is needed, especially in light of new markets and products.

2.   Measuring Stability and Competition

In order to test the relationship between stability and competition, we need appropriate measures of both. Bank stability is mostly measured in a negative way, i.e. by considering individual or systemic bank distress. Systemic banking distress can be broadly defined as periods where the banking system is not capable of fulfilling its intermediation function (deposit taking, lending, payment services) for the economy

effectively anymore. In this paper, we follow the definition by Demirguc-Kunt and Detragiache (1998, 2002) who define banking distress as systemic if (i) non-performing assets reached at least 10 percent of total assets at the peak of the crisis, (ii) the fiscal cost of the rescue operations was at least 2 percent of GDP, (iii) emergency measures, such as bank holidays, deposit freezes, blanket guarantees to depositors or other bank creditors, were taken to assist the banking system, or (iv) if large-scale bank nationalizations took place.[2] More difficult than defining a crisis is the exact timing, i.e. the start and the end year, and most cross-country papers therefore subject their analysis to alternative definitions of the exact crisis periods.

Using this definition of systemic banking crises, Honohan and Laeven (2005) find 116 systemic banking crises in 113 countries over the period 1974 to 2002, which illustrates how widespread financial crises have become across the globe (Figure 1). Both developed and developing countries have been hit by systemic crises, with fiscal costs of up to 55% of GDP in Argentina in the early 1980s. The 1980s and 1990s have been characterized by a relatively large number of banking crises. During this period, at least 20 countries were in a systemic banking crisis at the same time; ranging from such diverse countries as Japan and U.S. to Argentina and West Africa. In addition to systemic crises, there were numerous nonsystemic banking crises, which disturbed the normal functioning of banking business.

While systemic banking crises top the list of bank supervisors' and policy makers' concerns, individual bank fragility can also be worrying, as it puts countries' financial safety net under pressure (Beck, 2004). Several systemic banking crises have started as crises in individual banks. Furthermore, the failure of large international banks present in several countries can have important repercussions for cross-border financial activities, as the example of Herstatt in 1974 has shown. Today's important cross-border financial sector dependencies have become clear in the recent crisis when first signs of distress in the U.S. subprime market showed up in several German banks.

Individual bank distress can be measured in terms of proximity to bankruptcy or entry into bankruptcy. Specifically, researchers often use the z-score, which is the sum of capital-asset ratio and return on assets, weighted by the standard deviation of return on

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[2] See also Caprio and Klingebiel (1999).

assets (Boyd, de Nicoló and Jalal, 2006). The resulting ratio indicates the number of standard deviations in return on assets that a bank is away from insolvency and thus the likelihood of failure. Alternatively, researchers have used the non-performing loan ratio as fragility indicator. Unlike the z-score, this measure focuses on credit risk and cannot be related directly to the likelihood of failure. Neither of the two measures considers actual failure of banks.

Even more difficult than measuring bank stability is measuring bank competition. Here, the literature has used a variety of measures, which can be broadly classified into three groups. First, there are market structure measures such a concentration ratios, number of banks or Herfindahl indices. These indicators measure the actual market shares without allowing inferences on the competitive behavior of banks. They are rather crude measures that do not take into account that banks with different ownership behave differently and that banks might not compete directly with each other in the same line of business. Most importantly, the literature has not come to a conclusion on whether market structure determines bank behavior (structure-conduct-performance hypothesis) or market structure is the result of performance (efficient structure hypothesis).[3]

Second, competition measures, such as the H-Statistics, which measures the reaction of output to input prices, gauge the competitive behavior of banks, but impose certain restrictive assumptions on banks' cost function. Specifically, under perfect competition, increases in input prices cause total revenue and marginal cost to move together, while in imperfect competition they do not. However, the inference from this measure derived from the profit-maximizing condition is only valid if the market in question is in equilibrium. Estimates of the H-Statistics vary widely, as the studies by Claessens and Laeven (2004) and Bikker and Spierdijk (2007) show. Similarly, the Lerner index indicates a bank's market power by considering the ratio between marginal cost and price, which should be equal in perfect competition, but will diverge in less competitive environments. Specifically, the ratio of price to marginal cost decreases in

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[3] See Berger et al. (2004) for a discussion of this literature.

the degree of competitiveness. Importantly, the price has to be properly adjusted for lending risk.[4]

Third, indicators of the regulatory framework can provide indications of the contestability of the banking system. Such measures include entry requirements, formal and informal barriers to entry for domestic and foreign banks, activity restrictions and other regulatory requirements, which might prevent new entrants from challenging incumbents. However, one can include even the wider institutional framework among these indicators, such as the contractual and informational framework, a topic to which we will return to in section 5.

An additional challenge in measuring competition is to properly define the relevant market. Cross-country studies typically define an economy as the relevant market, not necessarily a correct assumption. Studies for the U.S. have typically focused on the Metropolitan Statistical Areas (MSAs) as the relevant market. Further, market structure and competition indicators are typically measured on the institutional level, rather than the product level; i.e. competition is assumed to be the same across different product lines, such as deposit, lending and payment services.

3.   Bank Competition and Stability: What Does Theory Predict?

Theoretical models have made contrasting predictions on the relationship between bank concentration, competition and stability.[5] These predictions might differ in static and dynamic models and have important interactions with elements of the regulatory framework, such as deposit insurance. Most theoretical models do not make a distinction between market structure, such as concentration, and competition, but rather assume a one-to-one mapping from market structure to competitive behavior of banks. In the following, we will summarize the theoretical literature under two headings, depending whether the model predicts a positive or negative relationship between competition and stability.

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[4] Other performance measures such as interest rate spreads and margins are not necessarily good indicators of the competitiveness of a banking system as they are driven by other bank- and country-specific factors, such as bank size and business, contractual framework, taxation and macro performance. See Beck (2007) for a discussion.

[5] See Carletti and Hartmann (2003) for an in-depth literature survey and Allen and Gale (2004) for an excellent exposition on the different theoretical mechanisms that can lead to contrasting relationships between competition and stability.

3.1. Competition-fragility hypotheses

Some models predict that more concentrated and less competitive banking systems are more stable, as profits provide a buffer against fragility and provide incentives against excessive risk taking. This "charter value" view of banking, as theoretically modeled by Marcus (1984), Chan, Greenbaum and Thakor (1986), and Keeley (1990), sees banks as choosing the risk of their asset portfolio. Bank owners, however, have incentives to shift risks to depositors, as in a world of limited liability they only participate in the up-side part of this risk taking. In more competitive environment with more pressures on profits, banks have higher incentives to take more excessive risks, resulting in higher fragility. In systems with restricted entry and therefore limited competition, on the other hand, banks have better profit opportunities, capital cushions and therefore fewer incentives to take aggressive risks, with positive repercussions for financial stability. In addition, in more competitive environment, banks earn fewer informational rents from their relationship with borrowers, reducing their incentives to properly screen borrowers, again increasing the risk of fragility (Boot and Greenbaum, 1993; Allen and Gale, (2000, 2004). These models thus predict that deregulation resulting in more entry and competition, such as in the U.S. in the 1970s and 1980s and in many emerging markets, would lead to more fragility.

More concentration and less competition can also have positive repercussions for liability risk. Smith (1984) shows that less competition in banking leads to more stability if information about the probability distribution of depositors' liquidity needs is private and lower competition allows banking relationships to endure for longer periods. Matutes and Vives (1996), however, argue that concentration is not a consistent signal of competition, so that bank illiquidity can arise in any market structure. Specifically, a bank's distress probability is determined endogenously by depositor' expectations resulting in the possibility of multiple equilibriums.

Another channel through which competition can impact stability is the interbank market and payment system. As shown by Allen and Gale (2000), perfect competition can prevent banks to provide liquidity to a peer that is hit by a temporary liquidity shortage. If all banks are price takers, no bank has incentive to provide liquidity to the

troubled bank, with the result that this bank will eventually fail with negative repercussions for the whole sector. Saez and Shi (2004), on the other hand, show that a limited number of banks can cooperate, act strategically and help a bank with temporary liquidity shortages.

What regulatory policies can enhance banks' charter value and thus prudent risk taking? Deposit insurance can reduce fragility by preventing bank runs (Diamond and Dybvig, 1983), but also introduces moral hazard and risk shifting into the banking system by providing increased incentives to banks to take excessive risk and reduced incentives for market participants to monitor. A reduction in charter value and more generous deposit insurance can thus act in a multiplicative way to undermine bank stability. Matutes and Vives (1996) show that deposit insurance schemes can prevent a systemic confidence crisis and overcome the coordination failure problem in their model of multiple equilibriums. At the same time, however, deposit insurance schemes can increase unhealthy competition between banks, reduce diversification benefits and ultimately increase failure probability. Cordella and Yeyati (2002) show that with fixed-rate deposit insurance schemes, higher competition increases deposit interest rates and risk, while lowering profits. With risk-adjusted deposit insurance premiums, on the other hand, banks can credibly commit to lower asset risk, thus lowering cost of funding even in competitive environments. Perrotti and Suarez (2003) show that bank failure policies that aim for mergers of failing banks with healthy banks increase the incentives of banks to take prudent risk, as the "last bank standing" increases its charter value. At the same time, an active entry policy can reduce negative effects of increasing concentration in the banking market. The model by Perotti and Suarez also underlines the importance of taking into account dynamic incentive effects for banks.

Another popular regulatory measure is a minimum capital requirement for banks, to thus boost the charter value and reduce incentives for excessive risk taking. Hellmann, Murdock, and Stiglitz (2000), however, show that even with capital requirements, deposit interest rate ceilings are still necessary to prevent banks from excessive risk-taking in competitive markets.

A somewhat different argument of proponents of the competition-fragility hypothesis is that more concentrated banking systems have larger banks, which in turn

allows them to better diversify their portfolios. Models by Diamond (1984), Ramakrishnan and Thakor (1984), Boyd and Prescott (1986), Williamson (1986), Allen (1990), and others predict economies of scale in intermediation. While the "large-bank" argument does not rely directly on competition in the market place, it is an important side effect of market structure.

A final argument refers to the number of banks to be supervised by the authorities. If a more concentrated banking system implies a smaller number of banks, this might reduce the supervisory burden and thus enhance overall banking system stability. According to Allen and Gale (2000), the U.S., with its large number of banks, supports this "competition-fragility" view since it has had a history of much greater financial instability than the U.K or Canada, where the banking sector is dominated by fewer larger banks. As in the case of bank size, this argument is about the market structure in banking, not the competition that this implies.

3.2. Competition-stability hypotheses

While the charter-value hypothesis predicts that more concentrated and less competitive banking systems are more stable, an opposing view is that a more concentrated banking structure results in more bank fragility. First, Boyd and De Nicoló (2005) argue that the standard argument that market power in banking boosts profits and hence bank stability ignores the potential impact of banks' market power on firm behavior. Rather than banks choosing the riskiness of their assets, it is the borrowers who choose the riskiness of their investment undertaken with bank loans. They confirm that concentrated banking systems enhance market power, which allows banks to boost the interest rate they charge to firms. Boyd and De Nicoló's (2005) theoretical model, however, shows that these higher interest rates may induce firms to assume greater risk, which results in a higher probability that loans turn non-performing. Thus, in many parameterizations of the model, Boyd, and De Nicoló (2005) find a positive relationship between concentration and bank fragility and thus the probability of systemic distress.[6] Similarly, Caminal and

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[6] Martinez-Miera (2008), however, shows that higher interest rates also imply higher interest revenues for banks, which might result in a U-shaped relationship between competition and bank fragility.

Matutes (2002) show that less competition can lead to less credit rationing, larger loans and higher probability of failure if loans are subject to multiplicative uncertainty.

Second, advocates of the "competition-stability" view argue that (i) relative to diffuse banking systems, concentrated banking systems generally have fewer banks and (ii) policymakers are more concerned about bank failures when there are only a few banks. Based on these assumptions, banks in concentrated systems will tend to receive larger subsidies through implicit "too-big" or "too important to fail" policies that intensify risk-taking incentives and hence increase banking system fragility (e.g., Mishkin, 1999). Further, having larger banks in a concentrated banking system could also increase the contagion risk, resulting in a positive link between concentration and systemic fragility.

Proponents of the competition-stability view would also disagree with the proposition that a concentrated banking system characterized by a few banks is easier to monitor than a less concentrated banking system with many banks. The countervailing argument is that bank size is positively correlated with complexity so that large banks are harder to monitor than small banks. Holding all other features of the economy constant, concentrated banking systems tend to have larger banks. Further, the recent consolidation trend has also led to financial conglomerates offering a whole array of financial services, previously offered by specialized institutions, another complicating factor for bank supervisors. Thus, this argument predicts a positive relationship between concentration and fragility.

4.   Bank Competition and Stability: What Do the Data Tell Us?

We can distinguish between several strands of empirical literature, which allow us to infer on the relationship between market structure, competition and stability. Up until recently, the literature either focused on one country or on the comparison of two countries. Only recently, the availability of large cross-country, time-series data sets has enabled cross-country studies to assess the relationship between competition and stability.

4.1.   Bank-level evidence

In a seminal paper, Keeley (1990) provides evidence that increased competition following the relaxation of state branching restrictions in the 1980s reduced banks' capital cushions and increased risk premiums reflected in higher interest rates on certificates of deposit. Overall, this suggests that higher competition in the U.S. eroded charter values and resulted in higher bank fragility in the 1980s. This is consistent with Dick (2006) who finds evidence of increased charge-off losses and loan loss provisions following deregulation in the 1990s, but contradicts findings by Jayaratne and Strahan (1998) who find that branch deregulation resulted in a sharp decrease in loan losses. Jiménez, Lopez, and Saurina (2007) find for a sample of Spanish banks for the period 1988 to 2003 that banks with higher market power, as measured by the Lerner index, have lower non-performing loans, thus providing evidence for the charter value hypothesis. Notably, they do not find any significant relationship between market structure, as measured by concentration ratios, and non-performing loan ratios.

As discussed by Calomiris (2000) and Calomiris and Mason (2000), an extensive literature finds an inverse relationship between bank scale and bank failure in the United States. Boyd and Runkle (1993), examining 122 U.S. bank holding companies, find that there is an inverse relationship between size and the volatility of asset returns, but no evidence that large banks are less likely to fail. Boyd and Graham (1991, 1996) find that large banks were more likely to fail in the U.S. during the period 1971 to 1986, but less likely in the period 1987 to 1994. De Nicoló (2000), on the other hand, finds a positive and significant relationship between bank size and the probability of failure for banks in the U.S., Japan and several European countries.

An extensive strand of literature infers the effect of market structure and competition on bank fragility by assessing the effect of mergers creating larger banks and increasing market concentration. Paroush (1995) points to higher bank stability caused by increases in market power stemming from diversification gains after mergers. Benston, Hunter and Wall (1995) and Craig and Santos (1997) also point to positive diversification and thus stability gains from bank mergers in the U.S. However, empirical work by Chong (1991) and Hughes and Mester (1998) indicates that bank consolidation tends to increase the riskiness of bank portfolios.

De Nicoló and Kwast (2001) assess the direct and indirect interdependencies of large and complex U.S. banking organizations (LCBO) arising from inter-bank on- and off-balance sheet exposures, including linkages through the payment and settlement systems) by considering the correlation of their stock returns. They find that these correlations increased between 1988 and 1999, as did the market share for these LCBOs, interpreting this as evidence for an increase in systemic risk in the U.S. banking system, partly as consequence of consolidation.

A few descriptive studies have compared banking market structures and stability across pairs of countries. Bordo, Redish and Rockoff (1996) observe a greater stability of Canadian banks than of U.S. banks and relate this to the oligopolistic market structure in Canadian banking, compared to the higher degree of competition in U.S. banking. On the other hand, in spite of higher profitability, there are no indications of less competition in the Canadian market. Comparing the UK and German banking systems, Hoggarth, Milne and Wood (1998) find more competition and less stability in the UK; Staikouras and Wood (2000) find more competition and more stability in the Spanish than in the Greek banking system.

Summarizing, there is no clear conclusion from these different empirical studies on the validity of either the competition-stability or the competition-fragility hypotheses. Two conclusions, however, can be drawn. First, a higher degree of market concentration does not necessarily imply less competition. Specifically, testing for the relationship between market structure and stability and for the relationship between competitiveness and stability does not necessarily yield the same results. Second, as predicted by several theoretical studies, there is an important interaction effect between the regulatory and supervisory framework, on the one hand, and market structure and competitiveness, on the other hand, in their effect on banking system stability.

4.2   Cross-country studies

The recent availability of large cross-country time-series datasets has initiated a new wave of literature assessing the validity of the different theoretical models. Beck, Demirguc-Kunt and Levine (2006 a,b) build on the crisis prediction work by Demirguc-Kunt and Detragiache (1998, 2002) to assess the competition-stability and competition-

fragility hypotheses. Specifically, using standard panel logit models, they assess whether the probability that a country suffers a systemic banking crisis in a specific year depends on the concentration of the banking system, controlling for other banking system, macroeconomic and institutional factors that the literature has shown to be associated with the probability of a banking crisis They find that more concentrated banking systems are less likely to suffer systemic banking crises, a finding that is robust to a number of different specifications and controlling for an array of other factors potentially associated with crises. Table 1 presents these results for a sample of 69 countries and 47 crisis episodes over the period 1980 to 1997. These findings hold when they control for general measures of bank competition. When analyzing the channels through which concentration might be positively associated with banking system stability, they find tentative evidence that more concentrated banking systems allow better possibilities for banks to diversify risk. On the other hand, they do not find any evidence, that it is easier for bank supervisors to monitor more concentrated banking systems or that the higher stability results from the market power and consequent franchise value of banks in more concentrated banking systems. Bank concentration is thus not an indicator of the lack of competition. Rather, more competitive banking systems are also less likely to suffer systemic banking distress.

Boyd, de Nicoló and Jalal (2006) arrive at a different conclusion using bank-individual fragility data. Rather than focusing on systemic bank distress, they use the z-score, a bank-level measure of distance from insolvency as fragility indicator. Unlike Beck et al. (2006a,b), they find banks are closer to insolvency, i.e. more likely to fail, in countries with more concentrated banking systems. Cross-country results on the effect of concentration thus vary depending on whether one considers individual bank fragility or systemic banking distress. It is important to note, however, the different concepts these studies consider – actual systemic banking distress vs. the probability of individual bank fragility; the latter might not necessarily result in the former.

Schaeck, Cihak and Wolfe (2006) find a negative relationship between bank competition and systemic bank fragility using a more refined measure of competition in the banking market – the H-Statistics. Specifically, using a sample of 38 countries over the period 1980 to 2003, they show that more competitive banking systems are less prone

to systemic distress and that time to crisis is longer in more competitive banking systems (Table 2).[7]   Unlike Beck, Demirguc-Kunt and Levine, however, they do not find an independent link between bank concentration and systemic banking fragility. The differences in this finding, however, could be due to the smaller sample utilized by Schaeck, Cihak and Wolfe. Schaeck and Cihak (2007) identify bank capitalization as one of the channels through which competition fosters stability. Utilizing data for more than 2,600 European banks, they show that banks have higher capital ratios in more competitive environments.

Finally, there is cross-country evidence that regulatory policies that restrict entry and banks' activities are negatively associated with bank stability. Specifically, Barth, Caprio and Levine (2004) and Beck et al. (2006 a,b) find that banking systems with more restrictions on banks' activities and barriers to bank entry are more likely to suffer systemic banking distress, while capital regulations are not significantly associated with the likelihood of suffering a crisis. Limiting contestability of the banking sector thus seems to undermine rather than to strengthen bank stability, a result contradicting the charter value hypothesis.

Overall, the cross-country evidence points mostly to a positive relationship between bank competition and stability, but yields mixed results on the relationship between concentration and stability. This also underlines that market structure measures, such as concentration ratios are inadequate measures of bank competition. Higher concentration might result in more stability through channels other than lack of competitiveness, such as improved risk diversification. The rather clear picture arising from the cross-country studies is somewhat in contrast to the ambiguous findings emerging from country-specific bank-level studies, which can be explained by the fact that the latter do not control for the regulatory framework.

5.   Bank Competition and Stability: Policy Implications

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[7] Levy Yeyati and Micco (2007) find different results for a smaller sample of eight Latin American countries in the 1990s. Specifically, they find that banks in more competitive banking systems are more fragile, as measured by the z-score and the non-performing loan ratio. This contrasting result might be explained by the contemporaneous increase in foreign bank penetration in these countries, which resulted in lower competition.

The empirical cross-county results point to overall positive effects of competition on stability, while they yield contradictory results on the relationship between bank concentration and stability. They also underline that crude market structure measures, such as concentration ratios, are not good measures of competition. Overall, maintaining a competitive and contestable banking system seems to have positive repercussions for stability. At the same time, allowing growth of banks even if it implies more concentrated banking systems might have benefits in terms of risk diversification.

While the empirical findings reported so far have important policy implications, it is difficult, for several reasons, to translate them directly into a policy agenda. First, market structure, such as the number of bank or market share of the largest banks, is not directly subject to policy actions in market-based financial systems. Second, many regulatory measures that are associated with banks' competitive behavior have other, more direct, effects on bank stability than through their effects on competition. We will discuss these different regulatory policies in turn.

A large literature has pointed to the risks of financial liberalization in a weak institutional environment (Demirguc-Kunt and Detragiache, 1999). This literature points to the dark side of competition in terms of its relationship with individual and systemic bank fragility. Most importantly, theory and international experience with liberalization episodes over the past thirty years show that liberalization in an environment where banks can shift risk to the taxpayer leads to excessive and imprudent risk taking, often resulting in systemic banking distress. Most recently, the sub-prime crisis in the U.S. has shown how an increase in the number of competing lenders can result in declining lending standards at times of loose monetary policy and financial innovation such as securitization that allowed easier risk shifting (Dell'Ariccia, Igan, and Laeven, 2008). While proper regulatory safeguards (entry requirements, capital regulations, liquidity requirements etc.) and effective bank supervision are important, an incentive compatible financial safety net that forces banks to assume the consequences of their risk decisions seems especially important.

It is in this context, that restrictions on banks' activities have often been imposed to prevent financial conglomerates from emerging. Similarly, deposit interest rate ceilings and other restrictions have been proposed to prevent unhealthy competition and

excessive risk taking leading to fragility (Hellmann, Murdock, and Sitglitz, 2000). While theoretically attractive, they are difficult to implement, monitor and enforce in reality, especially in the weak institutional environment they are designed for and might prevent banks from reaping necessary diversification and scale benefits. Critically, they can easily serve as cover for rent-seeking activities, allowing incumbent banks to protect their rent, and can result in political regulatory capture. Not surprisingly, Kroszner and Strahan (1999) find that the strength of lobby groups related to small banks and insurance companies – segments of the financial sector standing to lose from branch deregulation in the U.S. – determined the speed with which states abandoned branching restrictions in the 1970s and 1980s. Mexico offers a well-studied example, where regulatory capture led to a suboptimal privatization process and subsequent bank distress in the 1980s and 1990s (Haber, 2005).[8]

The role of deposit insurance schemes has been especially controversial. While often introduced to protect small depositors' lifetime savings and to prevent bank runs, they also provide perverse incentives to banks to take aggressive and excessive risks. These perverse incentives are held less in check in weak supervisory frameworks (Demirguc-Kunt and Detragiache, 2002). While several of the theoretical studies discussed above point to risk-based premiums as solution, other elements such as management of the scheme, compulsory membership and link with the remainder of the financial safety net are important characteristics as well (Demirguc-Kunt and Kane, 2002; Beck and Laeven, 2008).

Another important area that interacts with competition is bank failure resolution, as shown by Perrotti and Suarez (2003). A combination of an active merger and acquisition policy for banks and a liberal entry policy can give banks incentives to take prudent risks, wile at the same time maintaining contestability of the banking system. An important issue in the context of increasing consolidation has been the issue of "too-big" or "too-important-to-fail" banks. A clear policy of governments is necessary on how to address large failing banks that are systemically important. While intervention and government support for such institutions might be unavoidable in times of distress, a

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[8] See Haber and Perotti (2008) for a recent survey on the relationship between politics and finance.

clear and transparent framework on who takes the decision and assumes the cost is necessary.

The institutional structure of financial sector supervision can be an important factor as well. The recent trend towards consolidated supervision has been justified with the trend towards financial conglomeration across different segments of the financial system and the need to create an even regulatory playing field. Theory suggests that the separation of responsibility for monetary and financial stability and thus also for lender-of-last resort facilities and bank failure resolution might create stability-enhancing incentives (Kahn and Santos, 2005). Empirical analysis of these questions is still outstanding and previous conclusions on the ideal institutional structure might have been put in doubt by the different reactions to the recent crisis.

The contractual and informational framework can also plays an important role in interacting with the market structure and competition. Take the example of credit information sharing, which numerous studies have shown to be associated with better access to credit (Love and Mylenko, 2003 and Brown, Jappelli and Pagano, 2007), but also with better credit decisions by banks. For instance, Powell et al. (2004) use the actual data in the public Argentine credit registry to show that availability of system-wide registry information can substantially improve the precision of credit decisions even for a large bank. This has important positive repercussions for bank stability. Effective systems of credit information sharing have thus positive ramification for competition, lowering barriers to entry, and stability.

Another important issue for policy makers, though not covered in the previous sections, is foreign bank entry.[9] Claessens and Laeven (2004) show that foreign bank participation is an important dimension of competition in the banking system. Numerous studies have shown that foreign bank participation has contributed to rather than weakened financial sector stability, as often feared by policy makers in developing countries (see Cull and Martinez Peria, 2007, for a literature overview). Specifically, Cull and Martinez Peria (2007) show, using data on the share of banking sector assets held by foreign banks in over 100 developing countries during 1995-2002, that countries that experienced a banking crisis tended to have higher levels of foreign bank

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[9] Claessens (2006) reviews the effect of cross-border banking on bank competition.

participation than those that did not. Importantly, however, foreign participation increased as a result of crises rather than prior to them.

While foreign bank entry is mostly positively related to banking system stability, government ownership has mostly a negative impact on both competitiveness of the banking system and its stability (Barth, Caprio, and Levine, 2004; Caprio and Martinez Peria, 2002).

A final consideration is competition from the non-bank financial sector and capital markets. As both the East Asian crisis and the recent sub-prime crisis in the U.S. have shown, fragility can start from non- or underregulated non-bank segments of the financial system. This does not imply limiting interlinkages between different segments of the financial system, but rather calls for a regulatory and supervisory framework that is focused on financial products rather than institutions and avoids possibilities of regulatory arbitrage resulting in risk shifting to less-regulated segments.

6. Conclusions

Theory makes ambiguous predictions about the effect of competition on banking stability. Empirical research has been made difficult by finding proper measures of bank competition. Cross-country research has found that more concentrated banking systems are less likely to suffer from systemic banking distress. On the other hand, more competitive banking systems are also less likely to suffer from systemic banking distress. Bank-level analyses give less clear indications, however, and are often confounded with regulatory changes in the country being analyzed.

The tentative conclusion of this paper is that competition per se is not detrimental for banking system stability in a market-based financial system with the necessary supporting institutional frameworks. Policies associated with more competitive financial systems – fewer activity restrictions, lower entry barriers, openness to foreign bank entry – have also been found to be associated with higher stability. However, it is important to note the necessary institutional frameworks for countries to reap maximum benefits from competition. While unchecked competition can lead to fragility in weak institutional environment, it is important to focus in improving these frameworks, rather than limiting competition, at least in the long term. Restrictions put in place at times of financial

liberalization to allow upgrading of regulatory and supervisory frameworks and capacities should be temporary and have clear sunset clauses.

Stability is one important concern of policy makers in the financial sector, but should not be the only one. Deep and efficient financial systems are important for economic growth and poverty alleviation (Beck, Levine, and Loayza, 2000; Beck, Demirguc-Kunt and Levine, 2007). Even if there were a trade-off between competition and stability, it is ex-ante not clear whether stability should have a higher priority than efficiency, which has clearly been shown to be linked to higher degrees of competition. It is more, there is evidence that countries with deeper but more volatile financial systems have grown faster over the period 1960 to 2000 than countries with low but stable levels of financial deepening (Ranciere, Tornell and Westermann, 2006, 2008). The positive growth effect of financial liberalization thus outweighs the negative crisis effect. This is also confirmed by theoretical work that shows that Schumpeterian competition, i.e. competition through innovation, in the financial system can lead to individual bank failures, but also to higher innovation and thus efficiency in the financial system (Allen and Gale, 2004). Designing institutions, including regulatory policies, to create efficient financial markets that allocate society's savings to their best use and support real markets, should therefore be the primary concern of policy makers. Given the increasing evidence that competition per se does not cause financial fragility, it seems important to focus on a regulatory framework and a financial safety net to support competitive and efficient financial markets, rather than restraining competition.

The literature surveyed in this paper and the conclusions point to further much needed research. Better measuring competition (on the product rather than institutional level and taking into account input markets and access to network services, such as the payment system) and banking distress beyond credit risk will be an important challenge. As countries' financial markets become more integrated, as for example in Europe, it is important to design regulatory frameworks and financial safety nets that allow reaping the maximum benefit of this increased competition, while aligning incentives of the different stakeholders to reduce the risk of bank fragility. The recent crisis has reminded us that regulatory and supervisory frameworks need constant updating as new products, markets and interlinkages emerge.

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Table 1. Bank Concentration, Regulation and Systemic Stability

The logit probability model estimated is Banking Crisis $_{[Country=j, Time=t]}= \alpha + \beta_1$ Real GDP growth$_{j,t}+ \beta_2$ Terms of trade change$_{j,t} + \beta_3$ Real interest rate$_{j,t} + \beta_4$ Inflation $_{j,t} + \beta_5$M2/reserves$_{j,t} + \beta_6$Depreciation$_{j,t} + \beta_7$ Credit growth$_{j,t-2} + \beta_8$ Concentration$_{j,t}+ \beta_9$ Regulatory measure$_{j,t} + \varepsilon_{j,t}$. The dependent variable is a crisis dummy that takes on the value of one if there is a systemic and the value of zero otherwise. Growth is the growth rate of real GDP. Real interest rate is the nominal interest rate minus the inflation rate. Inflation is the rate of change of the GDP deflator. M2/reserves is the ratio of M2 to international reserves. Credit growth is the real growth of domestic credit, lagged two periods. Depreciation is the rate of change of the exchange rate. Concentration equals the fraction of assets held by the three largest banks in each country, averaged over the sample period. Moral Hazard is an aggregate index of moral hazard associated with variations in deposit insurance design features. Fraction of entry denied measures the number of entry applications denied as a fraction of the total received. Activity restrictions captures bank's ability to engage in business of securities underwriting, insurance underwriting and selling, and in real estate investment, management, and development. Required reserves is the percentage of reserves regulators require to hold. Capital regulatory index is a summary measure of capital stringency. Official Supervisory Power is an index of the power of supervisory agency to enforce prudential regulations on banks. State ownership is the percentage of banking system's assets in banks that are 50% or more government owned. Foreign ownership is the percentage of banking system's assets in banks that are 50% or more foreign owned. Banking freedom is an indicator of relative openness of banking and financial system, while economic freedom is a composite of 10 institutional factors determining economic freedom. KKZ_composite is an aggregate measure of six governance indicators. White's heteroskedasticity consistent standard errors are given in parentheses. Detailed variable definitions and sources are given in the data appendix. The sample period is 1980-1997. Source: Beck, Demirguc-Kunt and Levine (2006b)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Concentration	-1.467**	-2.556*	-2.285***	-2.472***	-2.847***	-2.533**	-2.796***	-2.524***	-1.953***	-1.930***	-1.881***
	(0.565)	(1.552)	(0.939)	(1.060)	(1.142)	(1.096)	(1.091)	(1.083)	(0.806)	(0.809)	(0.769)
Moral Hazard	0.037										
	(0.075)										
Fraction of Entry Denied		1.885***									
		(0.737)									
Activity Restrictions			0.166**								
			(0.072)								
Official Supervisory Power				-0.021							
				(0.166)							
Required Reserves					0.016						
					(0.016)						
Capital Regulatory Index						-0.079					
						(0.129)					
State ownership							0.015*				
							(0.008)				
Foreign ownership								-0.005			
								(0.008)			
Banking freedom									-0.506***		
									(0.165)		
Economic freedom										-0.513***	
										(0.225)	
KKZ_composite											-0.439**
											(0.201)
No. of Crises	47	21	34	34	27	33	32	31	47	47	47
No. of Observations	989	583	767	767	572	755	686	609	955	955	989
% crises correct	66	62	68	62	63	61	66	68	68	66	68
% correct	71	81	79	78	77	79	74	73	70	70	72
Model χ^2	37.93***	29.34***	38.21***	38***	30.46***	37.62***	30.97***	34.15***	52.41***	47.58***	49.59***

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Table 2: Bank Competition and Systemic Stability

Source: Schaeck, Cihak and Wolfe (2006)

	Duration Models				Logit Models			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	4.6274	0.8507	0.0802	6.5739	-5.4307	-1.1953	-0.6020	-2.8211
	(0.6236)***	(1.5846)	(1.9978)	(5.2874)	(0.7062)***	(1.4726)	(1.8109)	(4.3279)
GDP growth (real)	-0.0691	-0.0214	-0.0184	-0.0141	0.1315	0.0787	0.0719	0.0709
	(0.0803)	(0.0904)	(0.0909)	(0.0880)	(0.0817)	(0.0922)	(0.0935)	(0.0920)
Real interest rate	-0.0084	-0.0103	-0.0085	-0.0067	0.0219	0.0253	0.0235	0.0231
	(0.0118)	(0.0139)	(0.0126)	(0.0131)	(0.0100)**	(0.0130)*	(0.0130)*	(0.0130)*
Inflation	-0.0021	-0.0018	-0.0010	0.0002	0.0053	0.0043	0.0036	0.0033
	(0.0018)	(0.0017)	(0.0018)	(0.0022)	(0.0031)*	(0.0037)	(0.0039)	(0.0038)
Terms of trade change	-0.0024	-0.0029	-0.0026	-0.0025	0.0002	0.0001	-0.0000	-0.0001
	(0.0017)	(0.0017)*	(0.0017)	(0.0018)	(0.0027)	(0.0035)	(0.0032)	(0.0033)
Depreciation	-0.0039	-0.0025	-0.0027	-0.0030	0.0002	-0.0010	-0.0008	-0.0007
	(0.0015)***	(0.0017)	(0.0015)*	(0.0014)**	(0.0023)	(0.0020)	(0.0019)	(0.0018)
M2/international reserves	0.0138	0.0187	0.0293	0.0266	0.0057	-0.0020	-0.0110	-0.0080
	(0.0296)	(0.0305)	(0.0324)	(0.0319)	(0.0239)	(0.0262)	(0.0326)	(0.0320)
Credit growth (real)	-0.0014	-0.0019	-0.0020	-0.0022	0.0010	0.0016	0.0017	0.0018
	(0.0004)***	(0.0005)***	(0.0005)***	(0.0006)***	(0.0008)	(0.0008)**	(0.0008)**	(0.0008)**
Moral hazard index	-0.0372	0.2685	0.2602	0.0527	0.3375	0.0299	0.0601	0.1363
	(0.2190)	(0.2772)	(0.2933)	(0.3306)	(0.3417)	(0.3690)	(0.3683)	(0.3984)
British legal origin	-0.5227	-0.3812	-0.1951	-0.6531	1.1127	1.1103	1.0450	1.2049
	(0.6629)	(0.7934)	(0.8777)	(0.9105)	(0.8397)	(0.9437)	(0.9338)	(0.9193)
French legal origin	-1.1209	-1.5525	-1.3319	-1.2832	1.6562	2.2597	2.1015	2.1036
	(0.6180)*	(0.5790)***	(0.5518)**	(0.6086)**	(0.6230)***	(0.6465)***	(0.5998)***	(0.6185)***
Scandinavian legal origin	-1.1441	-1.0797	-1.5069	-1.2270	1.2795	1.2279	1.5485	1.4447
	(0.5604)**	(0.5249)**	(0.7134)**	(0.7192)*	(1.1575)	(1.1414)	(1.2624)	(1.2846)
H-Statistic		5.0854	4.2562	-6.3020		-5.8513	-5.2130	-1.7627
		(1.7922)***	(1.9919)**	(8.2633)		(1.7523)***	(1.8819)***	(6.2430)
Concentration			2.3486	-11.8460			-1.8366	2.9196
			(2.4725)	(11.2600)			(2.4980)	(8.6863)
H-Statistic * Concentration				23.9997				-7.8430
				(18.7818)				(13.1666)
Observations	619	619	619	619	567	567	567	567
Number of crises	22	22	22	22	28	28	28	28
Type I Error (%)	n/a	n/a	n/a	n/a	25.00	28.57	25.00	25.00
Type II Error (%)	n/a	n/a	n/a	n/a	41.37	33.95	33.58	33.21
Akaike Info. Criterion	0.1610	0.1555	0.1571	0.1578	0.400	0.387	0.390	0.393
Pseudo R^2	n/a	n/a	n/a	n/a	0.091	0.132	0.135	0.136

We estimate exponential duration models with time varying covariates for the period 1980–2003 in column (1) - (4) and logit models in column (5) - (8). The dependent variable is the log of time to crisis in the exponential duration models. The observations are right hand censored if no crisis surfaced during the observation period. The number of observations in the duration models is greater than in the logit models since the data set has to be set up differently for analysing duration data with multiple crises. If a crisis runs over multiple years, the years following the onset of a crisis are deleted from the data set. If a country experienced multiple crises, subsequent systemic episodes are included in the sample. The number of crises in the duration model setup is smaller since duration analysis focuses on time spans for each country and exploits information in the data at the end of each span. Therefore, values of the first observation for each country recorded in the initial data set are discarded in this analysis. The dependent variable in the logit models is a dummy variable that equals one if a crisis is observed or zero otherwise. All explanatory variables are lagged in the models by one period to avoid simultaneity problems. If a crisis runs over multiple years, the years following the onset of a crisis are deleted from the data set. If a country experienced multiple crises, subsequent systemic episodes are included in the sample. The Appendix provides detailed information on the explanatory variables. Specifications (1) and (5) are our baseline models that include covariates used in previous studies, whereby we update the Moral Hazard Index by Demirgüç-Kunt and Detragiache (2002). We also incorporate three dummies for origin of the legal system, whereby we capture German legal origin in the intercept. Specifications (2) and (6) include the *H-Statistic* as measure for the competitiveness of the industry and Specification (3) and (7) incorporate the level of concentration as measured by the three bank concentration ratio, averaged over the sampling period. To control for nonlinear relationships between the degree of competitiveness and the level of concentration, we include an interaction term of these two variables in Specification (4) and (8). White's heteroskedasticity consistent standard errors are given in parentheses. Type I and Type II Error are calculated as the total number of crisis observations (28) divided by the number of observations in the sample (567); this yields a cut-off point of 0.0494. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *.

Figure 1: Crisis frequency

This graph shows the number of countries that were in a systemic or non-systemic crisis at a given year. Source: Honohan and Laeven (2005)