How Do Bank Competition, Regulation, and Institutions Shape the Real Effect of Banking Crises? International Evidence

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Abstract

This paper studies the influence of bank competition on the real effect of 36 systemic banking crises in 30 countries over the 1980-2000 period and how this influence varies across countries depending on bank regulation and institutions. We find that bank market power is not on average useful for mitigating the negative real effect of a systemic banking crisis. Market power promotes higher growth during normal times in industries that are more dependent on external finance but induces a bigger reduction in growth during systemic banking crises. We also find a country-specific effect depending on bank regulation and institutions. Stringent capital requirements and poor protection of creditor rights increase the benefits of bank market power for mitigating the negative real effect of a systemic banking crisis because bank market power has a positive effect on economic growth during both crisis and non-crisis periods in these environments.

Keywords: Banking crises; bank competition; economic growth; institutions; regulation.

JEL Codes: E44, G21, K20

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1. Introduction

The current global financial crisis highlights the relevance of reducing the negative real effect of a systemic banking crisis. The empirical evidence on the variables that explain the real effect of banking crises is scarce and limited to studies of the role of industries' external dependence, countries' financial development, and the size of the banking crisis. Dell'Ariccia et al. (2008) find that the industrial sectors that are highly dependent on external finance tend to experience a substantially greater contraction of value added during a banking crisis. Krozsner et al. (2007) go further and show that the negative effect on the growth of highly financially dependent industries is much greater in countries with deeper financial systems. Serwa (2010) suggests that is the size of the crisis that matters for economic growth.

There is, however, no empirical evidence on how bank competition shapes the real effect of banking crises and how its influence depends on bank regulation and institutions in the country. Our paper attempts to fill this gap by linking the literature on the impact of bank competition on economic growth with the Law and Finance literature and the literature that analyzes the real effects of banking crises.

Cetorelli and Gambera (2001) find a general depressing effect on growth associated with a concentrated banking industry. However, this general effect varies across sectors because bank concentration promotes economic growth in the industrial sectors that are most in need of external finance by facilitating credit access to younger firms. They argue that in such industries bank market concentration facilitates the formation of close lending relationships between banks and firms, which, in turn, have an enhancing effect on firms' growth. Claessens and Laeven (2004) find similar results using direct measures of bank competition.

There are also a number of recent cross-country studies highlighting the importance of bank regulation and supervision for the functioning and development of banking systems. Barth et al. (2004) analyze the relationship between specific regulatory and supervisory practices and banking-sector development. They show the more beneficial effects of policies that force accurate information disclosure and foster incentives for private agents to exert corporate control in promoting bank development. They also show that policies that rely excessively on official supervision and restrictions on bank activities are worse for financial development and stability. Beck et al. (2006) find that bank concentration increases financial stability after controlling for countries' regulation and institutions.

Our paper extends the above literature by analyzing the influence of bank market competition on the real effect of systemic banking crises. We analyze 36 systemic banking crises in 30 developed and developing countries over the 1980-2000 period. We use data for 28 industries in each country and a direct measure of bank competition (Lerner index). We use cross-country differences in bank regulation and institutions to assess the robustness of the influence of bank market competition and whether the regulatory and institutional environment shapes this influence. Thus, our research differentiates between the direct effect of regulatory and institutional variables on economic growth and the indirect effect that these variables may have by influencing the role of bank competition during banking crises.

We control for potential endogeneity of bank competition, regulation, and institutions using instrumental variables. The Law and Finance literature suggests that legal origins and cultural variables are the ultimate determinants of regulation and institutions across countries (La Porta et al., 2008) Moreover, regulation on, for instance, bank entry or antitrust legislation may affect bank market competition (Barth et al., 2004). So bank competition, regulation, and institutions may share ultimate determinants and be affected by endogeneity problems leading to correlations among them that would bias the results. To separate specific effects, we consider the three sets of variables and focus on the exogenous component of each one using instruments. This procedure allows us to interact and simultaneously analyze bank competition with, respectively, bank regulation and institutions.

The results suggest that bank market power is not on average useful for mitigating the negative real effect of a systemic banking crisis. External financially dependent sectors where market power promotes higher (lower) growth during normal periods also suffer on average a higher (lower) reduction in growth during a systemic banking crisis. This finding is consistent with market power enhancing lending relationship in normal times and the existence of switching costs for firms in changing lenders during a systemic banking crisis. We also find a country-specific effect for bank market power depending on bank regulation and institutions. Bank market power has a positive effect on economic growth during both crisis and non-crisis periods in countries with stringent capital requirements and poor protection of creditor rights. The positive effect of bank market power during non-crisis periods does not remain during a systemic banking crisis for other characteristics of bank regulation and institutions such as the lack of explicit deposit insurance, stringent restrictions on bank activities and ownership of non-financial firms, or poor protection of property rights.

Moreover, the results indicate a direct effect for regulation and institutions after controlling for bank market power. We find that the exogenous component of stricter regulation, the lack of an explicit deposit insurance, and better protection of property and creditor rights favor economic growth during normal times. Our results are robust to alternative proxies for bank competition, different instruments, and definitions of the crisis windows. All the robustness checks are available in the online appendix.

The rest of the paper is organized as follows. Section 2 provides a brief review of the related literature and discusses the hypotheses. Section 3 describes the methodology. Section 4 discusses the data and the proxies used for industrial growth, bank competition, regulation, and institutions. Section 5 presents the empirical results and robustness checks and, finally, Section 6 concludes.

2. Theoretical Background and Hypotheses

The Law and Finance literature provides substantial and recent empirical evidence indicating that financial development helps firms to grow faster by supplying more external funds, and that a country's financial development is related to its legal and institutional framework (La Porta et al. 1997, 1998; Levine 2005; Rajan and Zingales, 1998). The natural extension of this evidence to banking crisis periods suggests that there will be a more contractionary impact on sectors in which growth is dependent on funds provided by banks when a sudden negative shock obliges them to reduce their credit supply.

Empirical evidence confirms the above hypothesis. Bordo et al. (2001), Boyd et al. (2005), and Hutchison and Noy (2005) show that the magnitude of output losses associated with banking crises varies substantially across crisis episodes. Hoggarth et al. (2002) find that output losses incurred during crises in developed countries are higher on average than those in emerging economies. Serwa (2010) suggests that the output loss depends on the size of the crisis. Dell'Ariccia et al. (2008) and Krozsner et al. (2007) confirm that the negative real effect remains after carefully controlling for reverse causality between economic downturns and banking crises. They find that more financially dependent industries perform significantly worse during banking crises than industries that are not so dependent on external funds. This indicates causality running from banking crises to recessions, stemming at least in part from a reduction in the credit supply, and not simply from recessions to banking crises.

Krozsner et al. (2007), moreover, show that the negative effect of banking crises on growth is greater in countries with more developed financial systems. Their finding is the natural extension for banking crisis periods of the evidence provided by Rajan and Zingales (1998) for non-crisis periods. The interpretation is that operating in an environment where financial markets are well developed is an advantage for more financially dependent industries in good times, but a disadvantage in times of banking crises. They also find a differential impact of banking crises on growth for industries dominated by young firms and for industries with high levels of intangible assets.[1]

The role of bank competition during banking crises is less clear. Previous research suggests two opposite relationships between bank competition and economic growth during normal times. In markets without information asymmetries, less competition involves higher levels of bank market power and implies higher interest rates and lower availability of funds for investment. Less competition in banking might thus reduce economic growth. In markets with asymmetric information, however, less competition may increase banks' incentives to invest in the acquisition of soft information by establishing close relationships with borrowers over time, facilitating the availability of credit and thereby reducing firms' financial constraints (Petersen and Rajan, 1994, 1995; Boot, 2000; Dell'Ariccia and Marquez, 2004). Less competition in banking might thus foster economic growth.

Empirical evidence on the relation between bank competition and economic growth is also limited to normal times. Cetorelli and Gambera (2001), using bank concentration as a proxy for bank competition, find that the effect of bank concentration on economic growth varies across sectors. While bank concentration has a general negative effect on growth, it also promotes growth of industrial sectors that are more in need of external finance by facilitating credit access for younger firms. These findings support models predicting that bank concentration facilitates the creation of lending relationships in sectors that most need them (more financially dependent sectors), leading to an enhancing effect in firms' growth. Moreover, Claessens and Laeven (2004) find that the effect of bank competition on economic growth depends on financial development. They find that, in countries with less developed financial systems, financially dependent industries grow faster when the banking market is less competitive, while in more developed financial systems, more competition is associated with higher growth. Fernández de Guevara and Maudos (2009) find similar results using

[1] Demirgüç-Kunt et al. (2006) adopt a different perspective and use data for 36 banking crises to study what happens to the banking system following a banking crisis.

provinces as the benchmark market for banks in Spain. They find that less competition has an inverted-U effect on firms' growth, suggesting that market power has its highest effect at intermediate values.

There is, however, no empirical evidence on the effects of bank competition on economic growth during banking crisis periods. Nor is there a clear theoretical forecast. On the one hand, a less competitive banking market that favors lending relationships might reduce the negative effect of a systemic banking crisis on the credit channel. The better the information banks have about the quality of firms' investment opportunities, the more credit supply might be turned to more profitable investments during the crisis (Wurgler, 2000; Almeida and Wolfenzon, 2005). In such cases, less competition might reduce the negative real effect of banking crises. On the other hand, close lending relationships between banks and firms create switching costs for borrowers when changing lenders. If the relationship bank goes bankrupt, some of its borrowers might be obliged to borrow from non-relationship banks. These borrowers would face an adverse selection problem as non-informed banks will prefer to allocate their funds to the better known, but less profitable, projects of relationship firms (Detragiache et al. 2000). The consequence is that the projects financed are not the best in the economy. In such cases, less competitive banking markets might increase the negative real effect of a banking crisis. As the theory predicts both effects, we do not make an a priori forecast as to how the degree of competition in banking influences the real effect of banking crises, and treat it rather as an empirical issue.

In the analysis we control for differences in bank regulation and institutions across countries. A major stumbling block when empirical analysis includes regulation and institutions is separating out the effects and the correlated outcomes because all these variables can ultimate be jointly driven by legal traditions or cultural and religious variables (La Porta et al., 2008). Such interrelations and the potential endogeneity of country-level variables make it difficult to tease out the specific effect of each variable and to know which of them plays the major role in economic growth. For that reason, we focus on the exogenous component of each variable using instrumental variables estimations. The inclusion of the exogenous component allows us to simultaneously include in the regressions the proxy for bank market competition with proxies for bank regulation and institutions. This analysis has two main purposes. First, by controlling for differences in regulatory practices and institutional environment across countries, we check the robustness of the results for the influence of bank market power on

industrial growth across crisis and non-crisis periods. For instance, if bank market power is proxying for regulations that impede competition, then controlling for the legal and institutional environment will drive out the significance of bank market power and explain the reasons for potential significant coefficients of bank competition. Moreover, this analysis allows us to check if regulations and institutions have an independent influence on economic growth around systemic banking crises. Second, after controlling for the direct influence of bank regulation and the quality of institutions, we also analyze how bank regulation and institutions interact with bank market power to shape the influence on industrial growth across crisis and non-crisis periods.

As regulatory variables we specifically consider the influence of restrictions on non-traditional bank activities, restrictions on bank ownership and control of non-financial firms, overall capital stringency, and the presence of explicit deposit insurance. Restrictions on non-traditional bank activities and bank ownership and control of non-financial firms may interact with bank competition to shape the real effect of a systemic banking crisis. The need to focus on deposits and loans favors specialization of bank activities and may make the formation of lending relationships with firms more helpful for banks. In this case, a less competitive market may play a crucial role in promoting lending relationships and may thus have a more positive (less negative) effect on economic growth during non-crisis periods (Petersen and Rajan, 1994; Cetorelli and Gambera, 2001). Whether this expected positive interaction between bank market power and legal restrictions on bank activities changes during crisis periods is again an empirical question. On the one hand, if the benefits of lending relationships survive during a systemic banking crisis, the interaction will remain positive. On the other hand, if a systemic banking crisis destroys lending relationships and gives rise to switching costs for borrowers when changing lenders, we can expect a negative interaction as the very countries where bank market power and legal restrictions promote more growth in normal periods will also be the ones that experience a greater reduction in growth in crisis periods.

Capital regulation is the most traditional pillar for regulators and supervisors to foster financial stability (Dewatripont and Tirole, 1994). As more stringent capital requirements reduce the funds available to banks to grant loans, we would expect a negative influence on economic growth of overall capital stringency during normal periods. The influence may change during banking crisis periods. Empirical evidence shows that worse-capitalized banks

reduce the credit supply more during economic downturns (Jiménez et al., 2012) or charge higher loan rates during credit slowdowns (Lown and Peristani, 1996). This evidence suggests that more stringent capital requirements might contribute to reducing the negative real effect of a systemic banking crisis. How overall capital stringency and bank competition interact to shape the real effect of a banking crisis is, however, less clear-cut, because there are no studies analyzing it.

The empirical literature on the effects of deposit insurance coverage during banking crises is also inconclusive. Claessens et al. (2003) find that generous support for banking systems does not reduce the output cost of banking crises. Angkinand (2009) finds the opposite result. Neither of the two papers controls for reverse causality problems between economic downturn and the real effect of banking crises. Dell'Ariccia et al. (2008) address the reverse causality problems and do not find a statistically significant relation between blanket depositor protection and the real cost of crises. None of the above papers analyze how deposit insurance interacts with bank competition to influence the real effect of a systemic banking crisis.

Finally, we analyze the influence of a country's institutions on the real effect of banking crises. As the Law and Finance literature has proved that financial development is positively related to institutional quality, the role of institutions on the real effect of banking crises was partially captured by Kroszner et al. (2007) when they found a greater reduction of economic growth in countries with deeper financial systems. A different influence to the negative one associated with financial development might, however, stem through interactions with bank competition. Fernández et al. (2010) find that bank concentration is more beneficial for solving adverse selection and moral hazard problems between firms and banks in less developed markets that have poor institutional infrastructure. The difficulty of developing markets in such environments may make long-term relationships between banks and debtors helpful in solving the problem (La Porta et al., 1997, 1998). The lower level of competition in such markets may favor these relationships and thereby have a greater positive effect on economic growth during normal times. There is, however, no empirical evidence on whether a high-quality institutional environment complements or substitutes bank competition to promote long-term relationships with borrowers during banking crises. We treat this again as an empirical question.

3. Methodology

We first analyze the impact of financial development and bank competition on economic growth in countries with systemic banking crises and for three separate sub-periods, namely, before, during, and after the banking crisis. We follow Krozsner et al. (2007) and Dell' Ariccia et al. (2008) for classifying the sub-periods around banking crises. We use [t, $t+2$] as the crisis period, where t is the first year of the crisis period as reported by Caprio and Klingebiel (2003). We separate the pre-crisis period from the crisis period by three years, that is, we define the pre-crisis period as [t_1, t-3], where t_1 is the first year of the sample period (1980 or first year available). Similarly, we define the post-crisis period as [t+3, T], where t is the crisis inception year and T is the end of the sample period (generally, 2000).

We extend the method in Kroszner et al. (2007) to control for the influence of a country's financial development. Our basic model is:

$$\begin{aligned} GROWTH_{ij} = {} & \beta_0 + \beta_1 \, \mathrm{SHARE}_{ij} \\ & + \beta_2 \, FD_i * ED_j \\ & + \beta_3 \, LERNER_i \\ & + \beta_4 \, LERNER_i * ED_j \\ & + \beta_5 \, Industry\ Dummies_j \\ & + \beta_6 \, Country\ Dummies_i \\ & + Error_{i,j} \end{aligned} \qquad [1]$$

GROWTH_{ij} is the real growth in value added of sector j in country i.[2] SHARE_{ij} is the share of sector j in the total value added of country i. It controls for the potential convergence effects among industries, i.e., the tendency of larger industries to experience slower growth.

FD_i is the development of the financial system of country i. ED_j is the external dependence ratio of sector j. The interaction FD_i*ED_j controls for the potential reverse causality between economic growth and financial development by focusing on industries that are more dependent on external finance. The premise of this approach is that, if industries that depend more on external finance are hurt more severely after a banking crisis, then a banking crisis is

[2] Like Dell'Ariccia et al. (2008), we check that basic results do not change when we use gross capital formation, employment, and number of establishments as the dependent variable instead of value added.

likely to have an independent negative effect on real economic activity.[3] Following Kroszner et al. (2007), we expect β_2 to be positive in non-crisis periods and negative in the crisis period.

We include two additional terms to analyze the influence of bank competition: a proxy for bank market power ($LERNER_i$), inversely related to bank market competition; and the interaction of bank market power with the external dependence ratio of each sector ($LERNER_i$*ED_j). This interaction allows us to control for reverse causality problems and to isolate the supply effects associated with bank competition from "demand effects" associated with economic growth. If bank market power influences credit supply during a banking crisis, we would expect to find a stronger effect on growth in more financially dependent sectors. According to Cetorelli and Gambera (2001), we expect a negative sign for β_3 and a positive one for β_4 in non-crisis periods. As we explained in Section 2, we do not make a forecast for their signs in the crisis period and treat it as an empirical question.

We use industry and country dummies to control for all unobservable sources of value added growth specific to each industry and each country. Inclusion of these fixed effects avoids the need for financial development, bank competition, and regulatory and institutional variables to enter the regression on their own. It allows us to focus only on the terms of their interaction. For this reason, we check that the results do not vary when we drop LERNER from the regressions and do not include it in the following models.

In a second model specification, we check if basic results for bank market power remain unchanged after including the exogenous component of bank regulation and institutions, and how the latter variables interact with bank market power to influence economic growth before, during, and after a systemic banking crisis. The second model we use for each sub-period is:

$$
\begin{aligned}
GROWTH_{ij} = {} & \beta_0 + \beta_1 \, \mathrm{SHARE}_{ij} \\
& + \beta_2 \, FD_i * ED_j \\
& + \beta_3 \, LERNER_i * ED_j \\
& + \beta_4 \, REGINST_i * ED_j
\end{aligned}
$$

[3] This approach was initially applied by Rajan and Zingales (1998) and subsequently used by Cetorelli and Gambera (2001), Claessens and Laeven (2003), Fisman and Love (2003), and Braun and Larrain (2005) to investigate the effects of bank concentration, trade credit usage, property rights, and recessions, respectively, on sectoral growth. Kroszner et al. (2007) and Dell'Ariccia et al. (2008) have also applied this approach to specifically study the real effect of banking crises.

$$+ \beta_5 LERNER_i * REGINST_i * ED_j$$
$$+ \beta_6 Industry\ Dummies_j$$
$$+ \beta_7 Country\ Dummies_i$$
$$+ Error_{i,j}$$

[2]

In this extension of model [1], we add an interaction term between a set of regulatory and institutional variables and the index of external financial dependence for each sector ($REGINST_i$*ED_j). This term captures the direct effect of the particular regulatory and supervisory variable. Moreover, we sequentially incorporate interaction terms between bank market power, a proxy for country's regulation and institutions, and for the sector's external dependence ($LERNER_i$*$REGINST_i$*ED_j). This interaction captures the indirect effect of the particular regulatory and institutional variable through bank market power, i.e., how regulations and institutions in a country shape the impact of bank competition on economic growth during crisis and non-crisis periods.[4]

We define additional specifications in which we use the difference in the real growth rate of value added between crisis and non-crisis periods as dependent variables, i. e., $\Delta GROWTH_{ijCRISIS\text{-}NONCRISIS}$ is defined as $GROWTH_{ijCRISIS}$-$GROWTH_{ijNON\text{-}CRISIS}$, where $GROWTH_{ijCRISIS}$ is the real growth in value added of sector j in country i during the crisis period and $GROWTH_{ijNON\text{-}CRISIS}$ is the real growth in value added of sector j in country i during the non-crisis period.[5] The explanatory variables in these specifications are those in models [1] and [2].

The regressions are estimated using ordinary least squares (OLS) or instrumental variables (IV). The IV methodology allows us to focus on the influence of the exogenous component of bank competition, regulation, and institutions. We use the predicted values of an OLS estimation instead of the observed values of bank market power, regulatory, and institutional variables. As explanatory variables in the OLS estimations we apply the instruments proposed by Barth et al. (2004) for bank regulation and supervision in a country: legal origin dummy variables (English, French, German and Scandinavian), latitudinal distance from the equator, and religious composition dummy variables. Religious composition is measured as

[4] Barth et al. (2004) use a similar sequential procedure to analyze the influence of regulatory and supervisory practices on bank development. The interaction with the external dependence of the sector controls again for potential reverse causality problems with economic growth.
[5] The results do not change when we drop countries with multiple crises.

the percentage of population in each country that is Roman Catholic, Protestant, Muslim, or "other". Civil law countries will tend to support stronger governments relative to private property to a greater degree than common law countries (La Porta et al., 1998). According to this argument, stringent regulations and less developed institutions are expected to be found in civil law countries. As countries in tropical climates tend to produce exploitative political regimes that gear governmental institutions toward protecting a small elite (Beck et al., 2003), higher restrictions on banks' activities and a poorer institutional environment are also expected, the shorter the distance from the equator. Finally, according to Stulz and Williamson (2003), the Catholic and Muslim religions tend to generate a hierarchical bond of authority that shapes the structure of government institutions and regulations. For this reason, measures of religious composition are included as instrumental variables. The model is:

$$\begin{aligned} LERNER/REGULATION/INSTITUTIONS_i = {} & \alpha_0 + \alpha_1 \sum Legal\ origin_i \\ & + \alpha_2 \sum Religious\ composition_i \\ & + \alpha_3 Latitudinal\ distance_i \\ & + Error_i \end{aligned} \qquad [3]$$

To test the suitability of using an Instrumental Variables (IV) estimator, we perform the Durbin-Wu-Hausman test which verifies the null hypothesis that the introduction of IVs has no effect on estimates of the regression's coefficients. We report IV estimations when the test is rejected at the 10 percent level or less. Otherwise, we report OLS estimates using the observed values of bank market power, regulation, and institutions. The results of the first stage regressions for model [3] are available in the online appendix and the F-test confirms that instruments are jointly highly significant in all the first stage regressions.

4. Data and Variables

We use industry-specific and country-specific data from a variety of sources. We take the information on banking crises from Caprio and Klingebiel (2003). This database contains information on 113 systemic banking crises in 93 countries since the 1970s. We calculate the industrial real growth in value added and the industry's share in total value added in the country using the UNIDO Industrial Statistic Database (2006). This database contains information on 28 industrial sectors at 3-digit ISIC disaggregation level. To deflate the

industrial value added, we use the Consumer Price Index (CPI) from International Financial Statistics (IFS).

We initially collect information on industrial growth for 76 countries experiencing at least one banking crisis over the 1980-2000 period. We drop 37 countries for which we do not have information for industrial value added for both crisis and pre-crisis periods.[6] Following Krozsner et al. (2007) we also exclude countries for which we do not have sectoral value added for at least five sectors during any of the sub-periods (6 countries). Finally, missing data on financial development reduce our final sample to 30 countries and 36 systemic banking crises over the 1980-2000 period. The basic estimations use a sample of 527 country-industry observations for the pre-crisis and crisis period, and 651 country-industry observations for the post-crisis period. Table 1 reports the banking crises included in our analysis and the average growth rate of real value added for each country during the pre-crisis, crisis, and post-crisis periods.

We follow Rajan and Zingales (1998), Beck et al. (2000), or Krozsner et al. (2007), among others, and measure financial development (FD) as the ratio of private credit of deposit money banks to GDP taken from the IFS. The industry's share in total value added and financial development are calculated for the first year in our sample, 1980, or first year available, to control for the potential endogeneity of these variables.

We use the index calculated by Rajan and Zingales (1998) as the measure of external dependence for each sector (ED). This index is defined as the fraction of capital expenditures not financed with cash-flow from operations constructed at industry-level for a sample of US firms.[7] As in Cetorelli and Gambera (2001), we focus on the external financial needs of younger firms (those less than 10 years old).

[6] We report results using banking crises for which information is available both in the pre-crisis and crisis periods. We test that the results do not change when we do not restrict the sample to the availability of information during both the pre-crisis (582 country-industry observations) and crisis period (531 country-industry observations).

[7] Rajan and Zingales (1998) argue that the financial structure of US industries is an appropriate benchmark because the relatively open, sophisticated, and developed US financial markets should allow US firms to face fewer obstacles in achieving their desired financial structure than firms in other countries. This approach offers a valid and exogenous way of identifying the extent of an industry's external dependence anywhere in the world. An important assumption underlying it is that external dependence reflects technological characteristics of the industry that are relatively stable across space and time.

Following previous literature, we use the Lerner index (LERNER) as a proxy for bank market power.[8] The Lerner index defines the difference between price and marginal cost expressed as a percentage of price, taking into account that divergence between product price and marginal cost of production is the essence of monopoly power. The Lerner index takes the value of 0 in the case of perfect competition, 1 under perfect monopoly, and negative values when the price is lesser than marginal cost as a result of non-optimizing behavior by banks. We estimate a simple indicator of the Lerner index at bank-level using the same procedure as Maudos and Fernández de Guevara (2004). Algebraically the Lerner index for each bank n is calculated as follows:

$$LERNER_n = \frac{p_n - MC_n}{p_n} \qquad [4]$$

where the product price p_n is the total financial and operating income (interest income + commission income + fee income + trading income + total operating income) divided by total assets of bank n. MC_n is the marginal cost of bank n of producing an additional unit of output. The marginal cost is estimated on the basis of the following translogarithmic cost function:

$$\ln C_n = \alpha_0 + \ln TA_n + \frac{1}{2}\alpha_k (\ln TA_n)^2 + \sum_{z=1}^{3} \beta_z \ln w_{zn} + \frac{1}{2}\sum_{z=1}^{3}\sum_{k=1}^{3} \beta_{zk} \ln w_{zn} \ln w_{kn}$$
$$+ \frac{1}{2}\sum_{z=1}^{3} \gamma_z \ln TA_n \ln w_{zn} + \mu_1 Trend + \mu_2 \frac{1}{2} Trend^2 + \mu_3 Trend \ln TA_n$$
$$+ \sum_{z=1}^{3} \lambda_z Trend \ln w_{zn} + \ln u_n \qquad [5]$$

where C_n are the bank´s total financial and operating costs (interest expense + commission expense + fee expense + trading expense + total operating expense), TA_n total assets and w_z the price of the different factors of production (z):

w_1 = price of labor: personnel expense / total assets.

w_2 = price of physical capital: (total operating expense - personnel expense) / fixed assets

[8] See Prescott and McCall (1975) for US banks, Shaffer (1993) for Canadian banks, Angelini and Cetorelli (2003) for Italian banks, and Maudos and Fernández de Guevara (2004) for banks in five European countries.

w_3 = price of deposits: interest expense / deposits & short term funding

We estimate the costs function (and hence the marginal costs) separately for each bank in each country. We allow the parameters of the cost function to vary from one country to another to reflect different technologies. We also introduce fixed effects to capture the influence of specific variables to each bank). We capture the influence of technical change in the cost function over time by including Trend. To capture the influence of variables specific to each bank, we estimate the function introducing fixed individual effects.

The Lerner index at country level is obtained as the weighted average of the value of the Lerner indices of the banks in the sample, using as weighting factor the total assets of each bank, using BankScope data. We use the average value of LERNER over the sample period for each country using BankScope data and check that the results do not change when we estimate an indicator of the Lerner index for each sub-period around the crisis date, that is, a Lerner index for the pre-crisis, crisis, and post-crisis periods. A time-varying indicator allows us to control for potential alterations in competitive conditions in the banking industry during periods of banking crises but incorporates a potential reverse causality bias if the economic downturn explains, at least in part, some of the banking crises and, therefore, an increase of bank concentration and market power during crisis times. An average value for Lerner is potentially less affected by this potential reverse causality problem.[9] Table 1 shows that there is a wide variation of bank market power across countries. The Lerner index ranges from a minimum value of 0.07 for Algeria to a maximum value of 0.69 for Korea.

We include four regulatory variables widely used in previous papers (Barth et al., 2004; Beck et al., 2006). The first is whether banks are allowed to take part in activities that generate non-interest income (RESTRICT). This variable indicates whether bank activities in the securities, insurance, and real estate markets are: (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited. RESTRICT can range from 1 to 12, where higher values indicate more restrictions on bank activities and non-financial ownership and control. In our sample, this variable takes a maximum value of 11 (Costa Rica) and a minimum value of 4 (Kuwait and Sri Lanka). The second regulatory variable indicates whether bank ownership and control of non-financial firms (RESTOWN) are: (1) unrestricted, (2) permitted, (3) restricted, or (4)

[9] Moreover, the lack of data to estimate the Lerner index in the pre-crisis sub-period reduces the number of observations from 527 to 119 in that sub-period. Anyway, the results do not change to those reported using the average value and are available in the online appendix.

prohibited. This variable specifically analyzes the influence of mixing banking and commerce and ranges from 1 (India, Kenya, and South Africa) to 4 (Bolivia, Costa Rica, and Indonesia).

The third regulatory variable is the overall capital stringency (CAPREQ) that indicates whether there are explicit regulatory requirements regarding the amount of capital that a bank must have relative to various guidelines. This variable can range, in theory, from a minimum value of 0 to a maximum of 9, with a higher value indicating greater stringency. In our sample Hungary and Norway present the highest value of capital requirements (9) and Venezuela has the lowest (1). Information on the above three regulatory variables comes from the World Bank's Bank Regulation and Supervision database.

Finally, the fourth regulatory variable is the presence of explicit deposit insurance in a country. We use a dummy variable (INS) that takes a value of 1 if there is explicit deposit insurance and 0 otherwise. Deposit insurance data come from Demirgüç-Kunt and Sobaci (2001).

We use three alternative variables to proxy for a country's institutional quality. First, we use the index of protection of property rights (RIGHTS). This variable presents the rating of protection of property rights constructed by the Heritage Foundation. It ranges from 1 to 5, with higher values indicating greater protection of property rights. In our sample, the highest protection of property rights is found in Finland, Japan, Korea, Kuwait, and Norway. The lowest value of this index is found in Bangladesh, Cameroon, Côte d'Ivoire, Jamaica, and Zimbabwe.

The second proxy for institutional quality is the Index of Economic Freedom calculated by the Heritage Foundation (FREEDOM). This index ranges from 0 to 100 with higher values indicating greater economic freedom. Demirgüc-Kunt et al. (2004) and Beck et al. (2006) use this index for purposes similar to ours. In our sample, Japan has the highest value (71.7311) and Zimbabwe the lowest (47.2675).

Finally, we include the protection of creditor rights in each country (CREDITORS). We use the index developed in La Porta et al. (1998) which is equal to the sum of the scores (0 to 1) for five categories: no automatic stay on assets, payment of secured creditors first, restrictions on reorganization, restrictions on management during reorganization, and legal reserves required as a percentage of capital. This index theoretically ranges from 0 to 5, with higher values indicating stronger creditor rights or stronger protection against borrower

expropriation. In our sample, it ranges from a minimum value of 1 in Finland to a maximum of 4 in Egypt, India, Indonesia, Malaysia, and Zimbabwe. Data availability for CREDITORS reduces our sample to 11 countries and 13 systemic banking crises when we include this variable in the regressions.

INSERT TABLE 1 ABOUT HERE

Table 2 reports the correlation matrix. A country's financial development is positively correlated with the real growth rate in value added during non-crisis periods (both pre-crisis and post-crisis). The Lerner index is negatively correlated with the growth in value added during normal periods and positively during periods of banking crises. Correlations between regulatory and institutional variables with the real growth in value added are not significant in the crisis period and we only find significant correlations in non-crisis periods. RESTRICT, CAPREQ, and CREDITORS are positively correlated with the real industrial growth in the post-crisis period. INS and RIGHTS are positively correlated with the real industrial growth both in the pre-crisis and post-crisis period. FREEDOM is positively correlated with the real industrial growth in the pre-crisis period. Only RESTOWN is not significantly correlated with the real growth in any of the three sub-periods. Correlations between regulatory and institutional variables are mostly significant although not strongly (less than 0.5). Only RIGHTS and FREEDOM have a correlation higher than 0.5 which is no surprise as both variables are alternative proxies for a country's institutional quality. The only non-significant correlations between regulatory and institutional variables are between RESTOWN and CAPREQ, and between RESTRICT and FREEDOM.

INSERT TABLE 2 ABOUT HERE

5. Empirical Results

5.1. Bank Competition and Banking Crises

We now empirically analyze the effect of bank market power on economic growth during crisis and non-crisis periods. Table 3 reports the results of model [1].

The results for the interaction FD*ED are, after controlling for bank market power, consistent with the findings of Kroszner et al. (2007). The positive and significant coefficient of FD*ED in column (1) indicates that industries with higher levels of financial dependence tend to grow faster in countries with more developed financial systems during non-crisis periods. Although we do not obtain negative significant coefficients for crisis or post-crisis periods in columns (2) and (3), the significant negative coefficient of FD*ED in column (4) indicates that the reduction in the growth rate from the pre-crisis to the crisis period is greater for financially dependent sectors in well-developed financial systems. Although negative, the coefficient of FD*ED is not statistically significant in column (5) where the dependent variable is the difference in growth between crisis and non-crisis periods.

The significant negative coefficient of LERNER in the pre-crisis period indicates that bank market power has a negative effect on growth that, on average, affects all sectors. This result supports the idea that lower levels of competition in the banking system impose a deadweight loss in the credit market that affects the whole economy. However, the positive coefficient of LERNER*ED indicates that there is also a positive industry-specific effect in more financially dependent sectors. This positive effect is consistent with bank market power facilitating the formation of lending relationships in the sectors that most need them (Petersen and Rajan, 1994, 1995; Boot, 2000; Dell'Ariccia and Marquez, 2004). These results confirm the findings of Cetorelli and Gambera (2001) for bank concentration during normal periods but use a more complete proxy for bank competition.

The results in column (2) show an opposite pattern for bank market power during a systemic banking crisis. We find a significant positive coefficient for LERNER and a significant negative coefficient for the interaction LERNER*ED. These effects persist during the years after the crisis in column (3). The different influence across crisis and non-crisis periods is statistically significant. LERNER and LERNER*ED hold their respective positive and negative significant coefficients in columns (4) and (5) when we use the difference in growth across crisis and pre-crisis and across crisis and non-crisis periods, respectively, as dependent variables. These results suggest that lending relationships, favored by bank market power, do not appear to be useful for mitigating the negative real effect of a banking crisis because the sectors where market power promotes higher (lower) growth during normal periods also suffer a higher (lower) reduction in growth during a systemic banking crisis. Our findings are consistent with the existence of switching costs for firms when changing lenders during

banking crises. If the relationship bank goes bankrupt during the banking crisis, the firm might be obliged to borrow from non-relationship banks. These borrowers would face an adverse selection problem as non-informed banks will prefer to allocate their funds to better known, but less profitable, projects of relationship firms. Therefore, less competition in banking increases the negative effects of banking crises on economic growth.

The effect is economically significant. Using, for instance, the estimation in column (2), on average, in a country experiencing a banking crisis, a sector at the 75th percentile of external dependence and located in a country at the 75th percentile of bank market power experiences a 14.18 times greater contraction in real annual growth in value added between the crisis and pre-crisis periods than a sector in the 25th percentile of external dependence and located in a country at the 25th percentile of bank market power.

Finally, we focus the analysis on the differential effect of bank market power across industries depending on their external dependence. In columns (6) to (10), we drop the level of bank market power and keep only the interaction term. The coefficient of the interaction LERNER*ED remains positive in the pre-crisis period. Although it does not turn negative, its positive effect is reduced in the crisis period. Its significant negative coefficients in columns (9) and (10) confirm that the reduction of the positive effect of bank market power during a banking crisis is statistically significant. These results confirm the robustness of those obtained in columns (1)-(5) when both LERNER and the interaction LERNER*ED are included in the regressions.

INSERT TABLE 3 ABOUT HERE

5.2. Bank Competition, Regulation, Institutions, and Banking Crises

In this section we control for the influence of bank regulation and institutions in a country. Table 4 and 5 report the results of model [2] for, respectively, bank regulation and institutions. [10]

The results indicate that the influence of bank market power on economic growth varies across countries depending on bank regulation and institutions. The positive and significant coefficients of the triple interaction terms in columns (1), (4), and (7) in Table 4 indicate,

[10] Given that we find the most significant results for the pre-crisis and crisis periods, we focus the analysis on these sub-periods.

respectively, that more stringent regulation on bank activities, bank ownership and control of nonfinancial firms, and bank capital increases the positive effect of bank market power on growth in sectors that are more dependent on external finance during normal times. The negative and significant coefficient of LERNER*INS*ED and the positive coefficient of LERNER*ED in column (8) indicate that the presence of an explicit deposit insurance reduces the positive effect of market power on growth during normal times.

These results suggest that the need to focus on deposits and loans favors specialization of bank activities and may make the formation of lending relationships with firms more helpful for banks. In this case, bank market power may provide a higher marginal benefit to promote lending relationships during normal times (Petersen and Rajan, 1994: Cetorelli and Gambera, 2001). Stricter restrictions on the mixing of banking and commerce may also increase the marginal benefit of less competitive banking markets for promoting lending relationships as a substitute of bank equity stakes for solving the conflicts of interest and information asymmetries between banks and debtors. More stringent capital regulation reduces the amount of credit available and may increase the incentives for banks to provide funds to firms with which they maintain lending relationships. Finally, the negative interaction between market power and the presence of explicit deposit insurance suggests that increased bank incentives to take risks because of deposit insurance during normal periods reduce the benefits of market power for establishing lending relationships.[11]

During the crisis period, however, regulatory restrictions on non-traditional banking activities and on bank ownership and control of non-financial firms, and the presence of an explicit deposit insurance interact differently with bank market power whereas only capital stringency keeps the positive interaction of normal times. The results in columns (2)-(3), (5)-(6), and (11)-(12) show that the signs of the significant coefficients of the triple interaction terms are opposite to those in columns (1), (4), and (10), respectively. That is, we find that bank regulation favoring a greater positive impact of market power on economic growth during normal times also promotes a more negative real effect for market power during crisis times. The only exception is capital regulation. The positive and significant coefficient of the triple interaction LERNER*CAPREQ*ED in columns (7) and (8) suggests that bank market power interacts positively with stringent capital requirements to reduce the negative real effect of banking crises not only in normal periods but also in crisis periods. Results in column (9)

[11] See Demirgüç-Kunt and Detriagache (2002), among others, for empirical evidence on the negative relation between deposit insurance and financial stability in a sample of 61countries.

confirm that there is not a significant difference in the interaction of bank market power with capital stringency between the crisis and pre-crisis period. This positive interaction is consistent with capital requirements during a systemic banking crisis helping to keep the lending relationships promoted by bank market power in normal times.

We also find significant direct effects for the exogenous component of bank regulation on economic growth. The coefficients of RESTRICT*ED, CAPREQ*ED, and INS*ED in columns (2), (8), and (11) indicate, respectively, that the reduction in economic growth during a systemic banking crisis is lower when non-traditional bank activities are unrestricted, capital requirements are higher, and there is an explicit deposit insurance in the country.

INSERT TABLE 4 ABOUT HERE

Table 5 reports the results of model [2] using alternative proxies for institutional quality. We focus on the exogenous component of the index of protection of property rights (RIGHTS), the index of Economic Freedom (FREEDOM), and the index of protection of creditor rights (CREDITORS) after controlling for country's financial development.

The negative coefficients of LERNER*RIGHTS*ED and LENER*FREEDOM*ED in columns (1) and (4) indicate that, during normal times, bank market power promotes economic growth of the industrial sectors that are most in need of external funds in countries with lower levels of protection of property rights. This result is consistent with well-functioning markets requiring law enforcement and good-quality institutions. Bank market power may thus, in poor institutional environments, substitute markets and be more beneficial in solving adverse selection and moral hazard problems between banks and firms through the formation of lending relationships. The significant positive coefficient of LERNER*CREDITORS*ED in column (7) indicates that bank market power and the protection of creditor rights interact positively to increase economic growth during normal periods. This result is consistent with stronger protection of creditor rights favoring the formation of lending relationships between banks and firms in less competitive banking markets to promote industrial growth.

The results for the crisis period and for the difference in growth between crisis and pre-crisis periods, however, show opposite effects. The coefficients of LERNER*RIGHTS*ED and LERNER*FREEDOM*ED are positive in columns (2) and (5) whereas the coefficient of LERNER*CREDITORS*ED is negative in column (8). They suggest that bank market power has a stronger contractionary impact during a banking crisis in countries whose institutions promote more growth before the crisis. Unlike the results for a country's institutions in columns (2) and (5), the significant positive coefficient of LERNER*ED in column (8) indicates that bank market power has a positive effect during a banking crisis in countries with poor protection of creditor rights. Thus, we find a positive effect for bank market power in such countries both in crisis and non-crisis periods. This result suggests that bank market power does not require good protection of creditor rights to favor the formation of lending relationships and may substitute legal protection to promote bank relationships both in normal and crisis periods.

Finally, we also find a significant direct effect for the exogenous component of institutions after controlling for financial development and market power. The positive and significant coefficients of FREDOM*ED and CREDITORS*ED in columns (4) and (7) confirm that a better institutional environment and better protection of creditor rights favor economic growth during normal times. The negative coefficients of these variables during crisis periods indicate that more financially dependent sectors also experience a higher reduction in growth in these environments when a systemic crisis occurs.

INSERT TABLE 5 ABOUT HERE

5.4. Robustness Checks

In a further analysis, we make additional checks for the robustness of the results. All these results are available in the online appendix. First, we check that results do not vary when we use alternative definitions of the crisis period, such as (t-3, t+3) and (t-5, t+5). Second, we check that the results hold when we use alternative proxies for bank competition, such us: 1) bank concentration, defined as the ratio of assets of the three largest banks to total assets of the banking industry; the rank of bank concentration; and the Herfindahl index of market concentration (Cetorelli and Gambera, 2001; Beck et al., 2006); 2) the legal requirements for entry into the banking industry provided by the World Bank's Bank Regulation and

Supervision Database. Finally, the results are robust to alternative definitions of the set of instruments for regulatory and institutional variables. For instance, we check that results do not vary when we use as instruments only the country's legal origin as in La Porta et al. (1998), Beck et al. (2000), and Levine et al. (2000), or when we use the legal origin, the rule of law, the total GDP, and the country's population as in Cetorelli and Gambera (2001).

6. Conclusions

It is widely accepted that banking crises constrain economic growth. While crises tend to occur when there are economic downturns, problems in the banking sector also have independent negative effects on the real economy. Dell'Ariccia et al. (2008) confirm that more financially dependent industries perform significantly worse during banking crises than industries that are not so dependent on external funds. Krozsner et al. (2007), moreover, show that banking crises have a more strongly negative effect on growth in countries with more developed financial systems, and Serwa (2010) finds that the negative real effect is positively related to the size of the crisis.

This paper extends the above evidence on the real effect of a systemic banking crisis by analyzing the role of bank competition and how this role varies across countries depending on bank regulation and institutions. We compare the growth of financially dependent sectors across crisis and non-crisis periods for a sample of 36 systemic banking crises in 30 developed and developing countries over the 1980-2000 period.

The influence of bank market power on growth during normal times has been analyzed by Cetorelli and Gambera (2001). They provide evidence consistent with bank market power promoting economic growth of those industries that most need external financing. This paper shows that external financially dependent sectors where market power promotes higher (lower) growth during normal periods also suffer on average a higher (lower) reduction in growth during a systemic banking crisis. This finding is consistent with bank market power enhancing lending relationship in normal times and the existence of switching costs for firms when changing lenders during a systemic banking crisis.

Moreover, we find a country-specific effect for bank market power depending on bank regulation and institutions. Bank market power has a positive effect on economic growth

during both crisis and non-crisis periods in countries with stringent capital requirements and poor protection of creditor rights. In these environments, bank market power favors the formation of lending relationships that stimulate growth in normal periods and mitigate the reduction of credit supply in crisis periods.

The positive effect of bank market power during non-crisis periods does not remain during a systemic banking crisis for other characteristics of bank regulation and institutions. Bank market power has a more positive effect on growth of external dependent sectors during normal periods when the restrictions on bank activities and bank ownership and control of non-financial firms are more stringent, in countries without explicit deposit insurance, and with poor protection of property rights. However, bank market power is also associated in these countries with a higher reduction in growth of more financially dependent sectors during a systemic banking crisis.

Bank regulation and institutions also have a direct effect on economic growth after controlling for bank market power. More stringent restrictions on non-traditional banking activities and on bank ownership of non-financial firms, the lack of explicit deposit insurance, less stringent capital restrictions, and better protection of property and creditor rights favor the growth of external dependent sectors during normal times. However, these characteristics lead to a greater reduction in growth during a systemic banking crisis. Our results are robust to alternative proxies for bank competition, different instruments, and definitions of the crisis windows.

Our analysis has two basic policy implications. First, as the effect of bank competition depends on the individual country's regulation and quality of institutions, antitrust enforcement is not equally beneficial in every country. Antitrust enforcement should consider the benefits that less competitive banking markets may provide during banking crises depending on the country's regulatory and institutional framework. In particular, more stringent bank capital requirements and poor protection of creditor rights increase the benefits of bank market power for lending relationships and for promoting growth both in crisis and non-crisis periods. Antitrust enforcement may actually damage economic growth in these environments. Second, regulation and institutions are relevant for mitigating the real effect of a systemic banking crisis, and optimal regulations for stability periods may become inefficient for crisis periods. For instance, the negative consequences on economic growth of

relaxing restrictions on bank activities and on mixing banking and commerce during normal periods become positive during periods of banking crises.

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Table 1: Descriptive Statistics [(a)]

		REAL GROWTH IN VALUE ADDED (RGVA)											
Country	**Banking crisis date**	**Pre-Crisis**	**Crisis**	**Post-Crisis**	**FD**	**LERNER**	**RESTRICT**	**RESTOWN**	**CAPREQ**	**INS**	**RIGHTS**	**FREEDOM**	**CREDITORS**
Algeria	1990	0.0949	-0.0548	-0.1869	0.3990	0.0702	5	3	7	0	3	55.8384	-
Bangladesh	1987	0.0029	-0.0136	0.0091	0.1512	0.2535	9	3	5	0	2	48.4427	-
Bolivia	1986, 1994	-0.0654	0.0166	-0.0210	0.1440	-	9	4	2	0	3	64.4188	-
Cameroon	1987, 1995	-0.0481	-0.0090	-0.0582	0.2850	0.4277	8	2	2	0	2	48.3088	-
Central African Rep.	1988	-0.0603	0.0334	-0.0099	0.1130	-	6	2	2	0	-	-	-
Costa Rica	1994	-0.1335	-0.0201	-0.0277	0.2640	0.3252	11	4	4	0	3	66.9105	-
Côte d'Ivoire	1988	-0.0279	0.0778	-0.1090	0.4020	0.4265	7	3	6	0	2	51.1518	-
Egypt	1991	0.0441	-0.0324	0.0094	0.1780	-	10	3	3	0	3	52.9808	4
Finland	1991	-0.0076	-0.0212	0.0064	0.4300	0.3332	5	2	6	1	5	64.1425	1
Hungary	1991	-0.0520	-0.0313	-0.0353	0.2607	0.1487	8	3	9	0	-	58.0390	-
India	1993	-0.0078	0.0079	-0.0011	0.2330	0.2982	9	1	5	1	3	48.2495	4
Indonesia	1992, 1997	0.0272	-0.0123	0.0017	0.0780	0.4332	10	4	7	0	3	59.6740	4
Jamaica	1994, 1996	-0.1216	-0.0170	-	0.1809	0.3171	9	3	8	0	2	66.0187	-
Japan	1992	0.0357	0.0075	-0.0044	1.1730	0.3197	10	3	4	1	5	71.7311	2
Jordan	1989	0.0153	-0.0080	0.0386	0.4750	0.3165	8	3	7	0	4	64.7780	-
Kenya	1985, 1993	-0.0183	0.0087	0.0326	0.3170	0.4348	9	1	7	0	3	57.8736	-
Korea, Rep. of	1997	0.0699	-0.0190	0.0054	0.4830	0.6955	6	3	3	0	5	67.6792	3
Kuwait	1986	-0.0142	0.0307	-0.0281	0.3370	0.1925	4	3	8	0	5	67.2737	-
Malaysia	1985, 1997	-0.0046	-0.0124	0.0216	0.4350	0.1817	7	3	6	0	4	68.6097	4
Nigeria	1991	-0.0565	-0.0910	-0.0270	0.1090	0.3926	6	3	6	0	3	51.4148	-
Norway	1990	-0.0306	-0.0078	-0.005	0.7500	0.3902	5	2	9	1	5	56.1867	2
Panama	1988	0.0034	0.0167	-0.0521	0.4790	0.2687	6	2	4	0	3	72.0927	-
Poland	1992	-0.0149	-0.0055	-0.0394	0.1067	0.4472	5	2	4	0	4	57.3449	-
Senegal	1988	-0.0362	0.9993	-0.0361	0.4050	0.5194	7	3	6	0	4	59.0858	-
South Africa	1989	-0.0589	-0.0038	-0.0531	0.3820	0.4232	7	1	8	0	3	62.9641	3
Sri Lanka	1989	-0.0235	0.0054	0.0063	0.1830	0.2994	4	3	3	0	3	63.3965	-
Sweden	1991	-0.0190	-0.0222	-0.0060	0.8340	0.2476	6	3	4	0	4	63.3104	2
Tunisia	1991	-0.0136	0.0460	-0.0194	0.4870	0.3224	8	3	-	0	3	62.9197	-
Venezuela	1994	-0.1281	-0.0509	0.1146	0.5030	0.3010	7	3	1	0	3	55.7823	-
Zimbabwe	1995	-0.1005	0.0035	-	0.2860	-	7	3	7	0	2	47.2675	4
Mean		-0.0300	-0.0088	-0.0110	0.3717	0.3383	7.3507	2.6753	5.1629	0.1594	3.4250	60.1743	2.9900
Median		-0.0228	-0.0090	-0.0064	0.3170	0.3191	7	3	5	0	3	62.9197	3
Standard Deviation		0.0711	0.0584	0.0799	0.2489	0.1172	1.9287	0.8270	2.2257	0.3663	0.9711	7.2861	1.0471
Maximum		0.5040	0.4360	0.5076	1.1730	0.6955	11	4	9	1	5	72.0927	4
Minimum		-0.2735	-0.3635	-0.4983	0.0780	0.0702	4	1	1	0	2	47.2675	1

[(a)] This table shows country averages of the industry-level real growth in value added for the pre-crisis, crisis and post-crisis periods. The final sample consists of 30 countries experiencing a total of 36 episodes of systemic banking crises. Data are for the period 1980-2000. Following Krozsner et al. (2007), the pre-crisis period is [t_1, t-3], where t_1 is the first year of the sample period (1980 or earliest available) and t is the crisis year. The crisis period is defined as [t, t+2], where t is the first year of the crisis period reported on Caprio and Klingebiel (2003). The post-crisis period is [t+3, T], where t is the crisis inception date and T is the end of the sample period (generally, 2000). We also report the mean value for the variable FD, defined as the ratio of private credit to GDP in 1980 (or the first year available), and the average for the variable LERNER, that refers to the Lerner Index. RESTRICT is a measure of the legal restrictions on non-traditional bank activities on insurance, real estate, and securities. RESTOWN measures the legal restrictions on the bank ownership and control of non-financial firms. CAPREQ is a variable measuring the overall capital stringency. INS is a dummy variable indicating if the country has or not explicit deposit insurance system. RIGHTS is a measure of the protection of property rights. FREEDOM is the index of Economic Freedom from the Heritage Foundation. CREDITORS is a variable indicating the protection of creditor rights.

Table 2: Correlations [(b)]

Country	PRE-CRISIS	CRISIS	POST-CRISIS	FD	LERNER	RESTRICT	RESTOWN	CAPREQ	INS	RIGHTS	FREEDOM	CREDITORS
PRE-CRISIS	1.0000											
CRISIS	0.0199	1.0000										
POST-CRISIS	0.0615	-0.1072***	1.0000									
FD	0.2355***	0.0310	0.1589***	1.0000								
LERNER	-0.0842**	0.0677*	-0.0640**	-0.1857***	1.0000							
RESTRICT	0.0395	-0.0102	0.1532***	-0.1488***	0.0566**	1.0000						
RESTOWN	0.0036	-0.0359	0.0144	0.0315	0.1415***	0.3123***	1.0000					
CAPREQ	0.0632	0.0300	0.1089***	0.1601***	-0.0247	-0.1366***	-0.0370	1.0000				
INS	0.1716***	0.0056	0.1146***	0.3905***	-0.1460***	-0.1228***	-0.2696***	0.1944***	1.0000			
RIGHTS	0.2676***	0.0154	0.1213***	0.4860***	-0.0421	-0.3430***	0.0910***	0.1732***	0.4100***	1.0000		
FREEDOM	0.1538***	0.0565	-0.0213	0.3241***	-0.2635***	0.0067	0.2793***	-0.0645**	0.0561**	0.5687***	1.0000	
CREDITORS	-0.0177	0.0470	0.4616***	-0.0262	0.0062	0.2892***	0.1704***	0.3250***	-0.2502***	-0.2207***	-0.2443***	1.0000

[(b)] This table shows partial correlation between the main variables. The final sample consists of 30 countries experiencing a total of 36 episodes of systemic banking crises. Data are for the period 1980-2000. Following Krozsner et al., (2007), the pre-crisis period is [t_1, t-3], where t_1 is the first year of the sample period (1980 or earliest available) and t is the crisis year. The crisis period is defined as [t, t+2], where t is the first year of the crisis period reported on Caprio and Klingebiel (2003). The post-crisis period is [t+3, T], where t is the crisis inception date and T is the end of the sample period (generally, 2000). We also report the mean value for the variable FD, defined as the ratio of private credit to GDP in 1980 (or the first year available), and the average for the variable LERNER, that refers to the Lerner Index. RESTRICT is a measure of the legal restrictions on non-traditional bank activities on insurance, real estate, and securities. RESTOWN measures the legal restrictions on the bank ownership and control of non-financial firms. CAPREQ is a variable measuring the overall capital stringency. INS is a dummy variable indicating if the country has or not explicit deposit insurance system. RIGHTS is a measure of the protection of property rights. FREEDOM is the index of Economic Freedom from the Heritage Foundation. CREDITORS is a variable indicating the protection of creditor rights.

Table 3: Bank Competition and Banking Crises [(c)]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Explanatory Variables	**Pre-crisis**	**Crisis**	**Post-Crisis**	**Crisis vs. Pre-crisis**	**Crisis vs. Non-Crisis**	**Pre-crisis**	**Crisis**	**Post-Crisis**	**Crisis vs. Pre-crisis**	**Crisis vs. Non-Crisis**
SHARE	-0.0965***	0.0437	0.0484	0.1403	0.1012	-0.0965***	0.0437	0.0484	0.1403	0.1012
	(-3.13)	(0.55)	(1.01)	(1.62)	(0.93)	(-3.13)	(0.55)	(1.01)	(1.62)	(0.93)
*FD * ED*	0.0589***	-0.0119	-0.0041	-0.0708***	-0.0508	0.0589***	-0.0119*	-0.0041	-0.0708***	-0.0508
	(2.75)	(-0.82)	(-0.17)	(-2.61)	(-1.24)	(2.75)	(-1.82)	(-0.17)	(-2.61)	(-1.24)
LERNER	-0.0439***	0.0273***	0.0429***	0.0682***	0.0400***					
	(-5.46)	(2.91)	(3.03)	(8.15)	(3.69)					
*LERNER * ED*	0.0417***	-0.2881**	-0.0077	-0.0401***	-0.0753***	0.0363***	0.0221***	-0.0686***	-0.0141**	-0.0332***
	(5.58)	(-1.98)	(-1.51)	(-3.88)	(-5.88)	(9.00)	(4.76)	(-7.28)	(-2.49)	(-3.34)
Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.7049	0.5642	0.5423	0.5907	0.5331	0.7049	0.5650	0.5423	0.5907	0.5331
F-Test	101.35***	76.27***	37.42***	76.85***	60.95***	101.35***	76.15***	37.42***	76.85***	126.98***
# Observations	527	527	651	527	490	527	527	651	527	490
Durbin-Wu-Hausman Test	25.74***	0.50	9.20***	16.85***	6.33**	59.96***	3.70*	27.41***	52.45***	43.79***

[(c)] This table shows the results of regressions analyzing the influence of bank competition on the real effect of banking crises. Regressions are estimated using OLS or instrumental variables for cross-country data at industry-level. The dependent variable is the growth rate of real value added during different sub-periods (pre-crisis, crisis, or post-crisis) or the difference in growth of value added across different sub-periods (crisis vs. pre-crisis and crisis vs. non-crisis). SHARE is the industrial share of value added for each industry in 1980. FD measures the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). LERNER is the proxy for bank market power calculated as the Lerner index. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for bank competition does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. Instruments for bank competition are those used in Barth et al. (2004): legal origin, the percentage of religious population and the latitudinal distance from the equator. Country and industry dummy variables are included but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

Table 4: Bank competition, Regulation, and Banking Crises [(d)]

	RESTRICT			RESTOWN			CAPREQ			INS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory Variables	**Pre-crisis**	**Crisis**	**Crisis vs. Pre-Crisis**	**Pre-Crisis**	**Crisis**	**Crisis vs. Pre-Crisis**	**Pre-Crisis**	**Crisis**	**Crisis vs. Pre-Crisis**	**Pre-Crisis**	**Crisis**	**Crisis vs. Pre-Crisis**
SHARE	-0.0967***	0.0437	0.1342	-0.0998***	0.0436	0.3892*	-0.0965***	0.0657	0.1635**	-0.1041***	0.2992	0.1403
	(-3.13)	(0.55)	(1.65)	(-3.22)	(0.55)	(1.83)	(-3.09)	(0.86)	(1.97)	(-3.34)	(1.37)	(1.62)
*FD * ED*	0.0582***	-0.0119	-0.0769***	0.0584***	-0.0118	-0.0828***	0.0605***	-0.0087	-0.0827***	0.0759***	-0.0842*	-0.0708***
	(2.83)	(-0.82)	(-4.26)	(2.78)	(-0.83)	(-3.58)	(2.82)	(-0.64)	(-3.06)	(3.44)	(-1.86)	(-2.61)
*LERNER * ED*	-0.5821***	0.0244**	0.0211**	-0.0556***	0.1416**	0.2461**	-0.1786***	-0.0105	-0.0115	0.1500***	-0.0372	-0.4099***
	(-13.63)	(2.40)	(2.08)	(-4.16)	(2.44)	(2.44)	(-4.05)	(-1.08)	(-0.63)	(11.48)	(-0.65)	(-15.88)
*RESTRICT * ED*	-0.0026	-0.0587*	-0.0324***									
	(-0.85)	(-1.90)	(-2.74)									
*LERNER * RESTRICT * ED*	0.1814***	-0.0762**	-0.0584***									
	(13.23)	(-2.10)	(-5.49)									
*RESTOWN * ED*				-0.0725***	0.0004	0.0963***						
				(-7.25)	(0.13)	(3.79)						
*LERNER * RESTOWN * ED*				0.0547***	-0.0793**	-0.0634*						
				(8.20)	(-2.00)	(-1.74)						
*CAPREQ * ED*							-0.0250***	0.0024*	0.0061***			
							(-5.66)	(1.82)	(2.90)			
*LERNER * CAPREQ * ED*							0.0539***	0.0093**	-0.0023			
							(3.56)	(1.97)	(-0.26)			
*INS * ED*										-6.5970***	0.2045**	5.3627***
										(-8.13)	(2.00)	(13.36)
*LERNER * INS * ED*										-4.4699***	0.1529*	2.8520***
										(-8.33)	(1.89)	(18.41)
Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.7054	0.5650	0.5693	0.6908	0.5650	0.3823	0.7065	0.7012	0.6732	0.6853	0.1689	0.5907
F-Test	97.09***	76.15***	81.22***	78.70***	74.58***	13.46***	104.19***	823.67***	457.51***	85.11***	3.86***	76.85***
# Observations	527	527	527	527	527	527	509	509	509	527	527	527
Durbin-Wu-Hausman Test	151.11***	4.35**	6.68***	96.25***	13.38***	17.71***	2.89**	0.74	1.54	59.93***	3.67*	52.44***

[(d)] This table shows the results of regressions analyzing how bank regulation shape the influence of bank market power on the real effect of banking crises. Regressions are estimated using OLS or instrumental variables for cross-country data at industry-level. The dependent variable is the growth rate of real value added during different sub-periods (pre-crisis and crisis) or the difference in growth of value added between crisis and. pre-crisis periods. SHARE is the industrial share of value added for each industry in 1980. FD measures the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). LERNER is the proxy for bank market power calculated as the Lerner index. RESTRICT is a measure of the legal restrictions on non-traditional banking activities (on insurance, real estate, and securities). RESTOWN is an index that measures the legal restrictions on bank ownership and control of non-financial firms. CAPREQ measures the overall capital stringency. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for bank competition and regulatory variables does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. Instruments for bank competition and regulatory variables are those used in Barth et al. (2004): legal origin, the percentage of religious population and the latitudinal distance from the equator. Country and industry dummy variables are included but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

Table 5: Bank Competition, Institutions, and Banking Crises [(e)]

	RIGHTS			FREEDOM			CREDITORS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Explanatory Variables	**Pre-crisis**	**Crisis**	**Crisis vs. Pre-Crisis**	**Pre-crisis**	**Crisis**	**Crisis vs. Pre-Crisis**	**Pre-crisis**	**Crisis**	**Crisis vs. Pre-Crisis**
SHARE	-0.1000***	0.0471	0.1466*	-0.0965***	0.0437	0.1369	-0.0923*	0.0551	0.1515**
	(-3.17)	(0.57)	(1.66)	(-3.13)	(0.55)	(1.56)	(-1.76)	(1.38)	(2.53)
*FD * ED*	0.0414**	-0.0266	-0.0856**	0.0589***	-0.0119	-0.0586**	0.0531***	0.0032	-0.0545***
	(2.33)	(-1.16)	(-2.57)	(2.75)	(-0.82)	(-2.07)	(3.88)	(0.38)	(-3.46)
*LERNER * ED*	0.4547***	-0.2327**	-0.2448**	12.8371***	-2.0269**	-0.0526***	0.0851***	0.0238***	0.0105
	(20.16)	(-1.98)	(-1.97)	(3.45)	(-2.46)	(-3.93)	(10.52)	(4.41)	(1.53)
*RIGHTS * ED*	0.0097	-0.0442**	-0.0458						
	(1.00)	(-2.15)	(-0.51)						
*LERNER * RIGHTS * ED*	-0.1142***	0.0390**	0.0297*						
	(-20.73)	(2.42)	(1.73)						
*FREEDOM * ED*				0.1497***	-0.0315***	-0.0017			
				(3.27)	(-3.56)	(-0.90)			
*LERNER * FREEDOM * ED*				-0.2594***	0.0336*	-0.0001			
				(-3.53)	(1.82)	(-0.80)			
*CREDITORS * ED*							0.0899***	-0.0060	-0.0539***
							(11.18)	(-1.45)	(-6.13)
*LERNER * CREDITORS * ED*							0.0032*	-0.0085**	-0.0477***
							(1.76)	(-2.00)	(-5.84)
Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Country Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R-Squared	0.7027	0.5603	0.5899	0.7049	0.5650	0.5920	0.7522	0.4330	0.7556
F-Test	95.04	70.31***	74.06***	105.14***	76.15***	75.50***	21.57***	5.72***	16.43***
# Observations	506	506	506	527	527	527	204	204	204
Durbin-Wu-Hausman Test	152.28***	2.20	1.83	133.39***	3.24**	5.57***	10.77***	3.71**	9.54***

[(e)] This table shows the results of regressions analyzing the influence of bank market power and institution on the real effect of banking crises. Regressions are estimated using OLS or instrumental variables for cross-country data at industry-level. The dependent variable is the growth rate of real value added during different sub-periods (pre-crisis and crisis) or the difference in growth of value added across between crisis and pre-crisis periods. SHARE is the industrial share of value added for each industry in 1980. FD measures the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. ED is the measure of external financial dependence calculated in Rajan and Zingales (1998). LERNER is the proxy for bank market power calculated as the Lerner index. RIGHTS measures the protection of property rights in each country. FREEDOM is the index of Economic Freedom from the Heritage Foundation. CREDITORS is a measure of the protection of creditor rights in each countries. The Durbin-Wu-Hausman statistic tests the null hypothesis that the use of instruments for bank competition and institutional quality does not change the estimation outcome. We report IV estimates when the test is rejected at the one percent level. Instruments for bank competition and institutional variables are those used in Barth et al. (2004): legal origin, the percentage of religious population and the latitudinal distance from the equator. Country and industry dummy variables are included but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.