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# How institutions and regulation shape the influence of bank concentration on economic growth. International evidence

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## Abstract

This paper analyzes how the influence of bank concentration on economic growth varies across countries depending on bank regulation, supervision, and institutions. Results for 87 countries over 1980-2004 indicate that bank concentration has a general negative effect on economic growth that disappears in countries with a poor-quality institutional environment. This result is consistent with a higher contribution of bank concentration to build lending relationships with borrowers in countries where the poor quality of institutions impedes the market development. Tighter restrictions on bank activities also reduce the negative influence of bank concentration on economic growth. More market monitoring, however, is associated to a more negative influence of bank concentration on economic growth.

**Keywords:** Bank concentration, institutions, bank regulation, economic growth.

**JEL Codes:** G10, G20, E44, O43.

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## 1. Introduction

This paper analyzes empirically how the quality of the institutional environment and bank regulation and supervision across countries modify the influence of bank concentration on economic growth. The paper extends the evidence provided by Cetorelli and Gambera (2001) for the influence of bank concentration on economic growth. They have documented that banking concentration exerts a depressing effect on overall economic growth even as it promotes the growth of industries that depend heavily on external finance. Our results show that the effect of bank concentration on economic growth is also conditioned by the features of institutions, bank regulation, and supervision in the country.

A large number of papers have recently established that banking and stock market development are positively associated with higher real per capita growth.[1] Following this finding, literature has been interested in knowing the country characteristics that favor both the development of stock markets as the banking sector. On the one hand, the law and finance literature has found that financial markets are better developed in countries with strong legal frameworks and institutions (La Porta *et al*., 1998; Beck and Levine, 2002; Demirgüc-Kunt and Maksimovic, 2002; Tadesse, 2002; Barth *et al*., 2004; Beck *et al*. 2003a; Ergungor, 2004).

On the other hand, a number of recent cross-country studies have highlighted the importance of bank regulation and supervision on the functioning and development of the banking system. Barth *et al*. (2004) analyze the relationship between specific regulatory and supervisory practices and banking-sector development in 107 countries. Their findings suggest that policies that rely on guidelines that force accurate information disclosure and foster incentives for private agents to exert corporate control work best to promote bank development than policies that rely excessively on direct government supervision and regulation of bank activities.

There have also been a number of recent cross-country studies on the effects of the structure of banking system on financial sector stability, access to financing, and growth (see Berger *et al*. (2004) for a review). For example, Demirgüc-Kunt *et al*. (2004) investigate the

[1] Evidence demonstrating that well-functioning banks promote growth is provided using country level data by King and Levine (1993a, 1993b), and Levine and Zervos (1998); using industry level data by Rajan and Zingales (1998), Beck and Levine, (2002), Carlin and Mayer (2003), and Claessens and Laeven (2003). Demigüc-Kunt and Maksimovic (1998, 1999, 2002), and Levine *et al.* (2000) also provide evidence at the firm level data that firms in countries with a large banking sector grow faster than predicted by individual firm characteristics.

effects of regulations, market structure, and institutions on the cost of financial intermediation. Beck *et al*. (2003b) shows in a sample of 79 countries that crises are less likely in more concentrated banking systems. Cetorelli and Gambera (2001) analyze the relevance of bank market concentration on economic growth. While bank concentration has a general negative effect on growth, it also promotes growth of industrial sectors that are more in need of external financing by facilitating credit access for younger firms.

In this paper we integrate part of the previous literature by relating literature focused on influence of bank market structure on economic growth with the literature focused on the role of the institutions, bank regulation and supervision. In particular, we study how the influence of bank concentration on economic growth may vary across countries depending on the legal, supervisory, and institutional environment. We modify the standard cross-country growth regression model to include an interaction term between banking concentration and legal, supervisory, and institutional variables

Our findings indicate that the interaction between bank concentration and the legal and institutional environment matters for growth. We use a sample of 87 countries over the 1980-2004 period to provide evidence about the less negative impact of the bank concentration to promote growth in presence of less developed institutions, lower market discipline and tighter restrictions on bank activities.

This study is useful to provide some empirical evidence about the best regulatory and supervisory features on banking industry that could promote economic growth when the banking sector is highly concentrated.

The rest of the paper is organized as follows. Section 2 contains a brief review of the related literature and discusses the hypothesis tested in the paper. Section 3 describes the characteristics of the database and the methodology, while Section 4 discusses the empirical results. Section 5 checks the robustness of our basic results. Finally, Section 6 concludes the paper.

## 2. Theoretical background and hypothesis

The banking literature suggests two possible opposing effects of bank concentration on economic growth through its effect on the access of firms to external financing. In a market without information asymmetries, where agents have perfect information on the quality of goods being exchanged, market power results in a higher price for credit and less credit availability. Following this argument, a negative relation would be expected between bank

concentration and firm external financing, and therefore, between bank concentration and economic growth.

In markets with asymmetric information, however, higher bank market concentration may increase banks' incentives to invest in the acquisition of soft information by establishing close relationships with borrowers over time (*relationship banking*), facilitating the availability of credit, thereby reducing firms' financial constraints (Petersen and Rajan, 1994, 1995; Boot, 2000; Dell' Ariccia and Marquez, 2004). Following this argument, a positive relationship would be expected between bank market concentration and economic growth. However, this positive effect may vary with the intensity of the hold-up problems (Rajan, 1992). Hold-up problems may lead borrowers to be less willing to enter such relationships, thereby lowering the benefits of concentration to encourage growth.

Empirical evidence on the influence of bank concentration on debt availability is mixed. Petersen and Rajan (1994, 1995), and Berlin and Mester (1999) show in the US market that firms in less concentrated credit markets are subject to greater financial constraints. However, D'Auria *et al.* (1999) for Italian firms and Degryse and Ongena (2005) for Belgian firms find that an increase in bank market concentration increases the cost of financing provided by banks. Cetorelli and Gambera (2001) directly analyze the effect of bank concentration on economic growth. They found that the general effect of bank concentration on growth is negative whereas it promotes growth of those industrial sectors that are more in need of external finance by facilitating credit access to younger firms.

The existence of opposing arguments and mixed empirical evidence means that the influence of bank market concentration on growth is basically an empirical question. We now discuss whether differences across countries in the influence of bank concentration on economic growth may be explained by differences in the quality of institutions or in bank regulation and supervision.

### *2.1. Institutions*

For a market to function well, firms must be able to rely on contracts and their legal enforceability. Weak legal systems and poor institutional infrastructure impede market development (La Porta *et al*., 1997, 1998; Demirgüc-Kunt and Maksimovic, 2002). Rajan and Zingales (1998) argue that bank-based architecture survives and is more effective in the latter scenario because banks can use their power to protect their interests in the absence of effective legal provision.

Our hypothesis is that in environments with weak legal systems and poor institutional infrastructure, bank concentration may be more beneficial to solve adverse selection and moral hazard problems between firms and banks. The difficulty for development of markets in such environments may increase the benefits of long-term relationships between banks and debtors to solve these problems (La Porta *et al.,* 1997, 1998). Bank concentration in these markets may favor these relationships and have therefore a positive effect on economic growth. Bank concentration in underdeveloped markets may therefore substitute good legal protection of creditors and property and operate in the absence of strong institutions to reduce information asymmetries and agency costs between banks and firm owners.

In developed markets, however, private contracting conflicts and information asymmetries may be solved by smooth functioning institutions, and concentration is no longer useful for promoting the long-term relationships that then become less beneficial. As information asymmetries are lower, bank concentration may have in these environments the typical negative effect associated to market power in well-functioning markets.

From this view, we forecast a negative sign for the interaction of bank concentration with the quality of the institutional environment. Then, our first hypothesis is:

*H.1. Bank concentration has a more positive (less negative) effect on economic growth in countries with less developed institutions.*

*2.2. Bank regulation*

Empirical studies demonstrate that restrictions on non-traditional bank activities, such us in securities, insurance, real estate, and control of non-financial firms have a negative influence on bank performance and stability (Barth *et al*. 2001, 2004; Beck *et al*. 2006b). Claessens and Laeven (2004) have shown that more strictly regulated bank markets are less competitive. However, to our knowledge there are no studies analyzing how the obligation for banks of focusing in the traditional activities of loans and deposits affects the influence of bank concentration on economic growth.

On the one hand, the obligation of focusing in deposits and loans favors the specialization of bank activities and may increase for banks the benefits of establish lending relationships with firms. In this case, bank concentration may play a crucial role for promoting lending relationships by facilitating the exploitation of economies of scale and scope in lending relationships, and then may have a more positive (less negative) influence on economic growth.

On the other hand, Boot and Thakor (2000) have suggested that hold-up problems occurs more often in less competitive financial systems and, for that reason, firms may be less willing to enter close relationships with a bank under more stringent restrictions on nontraditional bank activities if they, as suggest Claessens and Laeven (2004), reduce competition.

As both effects can be theoretically expected, we make no *a priori* forecast of the effect of restriction on non-traditional bank activities on the influence of bank concentration on economic growth, treating it as an empirical issue.

We analyze separately the influence of the restrictiveness between the mixing of banking and commerce. These rules explicitly define the relationships between financial intermediaries and the productive sector and try to deal with the potential conflict of interest, risk sharing, franchise value, diversified incomes, and competitive issues that banks may face when they are part of financial conglomerates.[2]

Restrictions on the bank ownership of non-financial firms may have a more clear effect on the contribution of bank concentration on economic growth. Lower restrictions in non-traditional bank activities may increase the marginal benefit of bank concentration as a substitute to solve, through the promotion of long-term relationships, the conflicts of interest and information asymmetries between banks and debtors. Moreover, lower restrictions in the mixing of banking and commerce may increase the hold-up problems because a bank being a shareholder and a lender of the firm will have more power that a bank being only a lender. Then, the ability of bank concentration to promote long-term relationships between banks and their debtors increases with the restrictiveness in these non-traditional bank activities.

Our second hypothesis is:

> *H.2. Bank concentration has a more positive (less negative) effect on economic growth in countries with less coercive restrictions on non-traditional bank activities.*

### *2.3. Bank supervision*

We explicitly incorporate the influence of bank supervision into the analysis by using the same variables as Barth *et al*. (2004) to gauge both the intensity of official supervision (OFFICIAL) and private monitoring (MONITOR) of banks. The new Basel Accord assumes

[2] See Saunders (1994) for a more detailed review of the benefits and costs traditionally associated to the affiliation between banking and commerce.

both types of supervision improve the stability of banks. Official supervision is promoted in Basel's Pillar 2 and private monitoring in Pillar 3, although empirical evidence points to a need for caution with regard to the question of reinforcing official bank supervision. The Barth *et al*. (2004) analysis of country-level data concludes that policies that promote private monitoring are better for bank development and stability than policies that rely on direct government supervision. Using bank-level data, Caprio *et al*. (2007) find official supervision has no significant effect on bank valuation. As far as we know, there are no studies analyzing the influence of private and official supervision on the influence of bank concentration on economic growth.

Policies that rely on guidelines that force accurate information disclosure empower private-sector corporate control of banks, and foster incentives for private agents to exert corporate control favor the development of financial markets and may reduce the benefits of bank concentration to solve through close lending relationships the agency and adverse selection problems between banks and firms. By contrary, greater powers of supervisors may be defined as an alternative to the empower private-sector corporate control of banks and, in this case, increase the benefits of bank concentration to solve, through close lending relationships, the agency costs and adverse selection problems.

Therefore, we establish the following hypothesis:

*H.3. Bank concentration has a more positive (less negative) effect on economic growth in countries with more powerful official supervision.*

*H.4. Bank concentration has a less positive (more negative) effect on economic growth in countries with more private monitoring.*

## 3. Data and Methodology

Our empirical analysis relies on data of 87 developed and developing countries, over 1980-2004. Because we cover a wide sample of countries, we have a wide range of legal and institutional environments, so the use of country-specific information on legal and institutional issues yields a deeper exploration and analysis of the role of banking concentration on economic growth.

Other studies of the related literature use a smaller number of countries on their empirical analysis. For example, the recent work on the relationship between market power of banks

and economic growth by Cetorelli and Gambera (2001) uses data of 41 countries. On the other hand, Beck et al. (2006a), analyzes the impact of bank concentration, regulations and institutions on the likelihood of suffering a systemic banking crisis, using data of 69 countries over the period 1980-1997.

Following most of the previous studies, we measure economic growth (GROWTH) by the annual growth rate of real per capita GDP (King and Levine, 1993; Jayaratne and Strahan, 1996; Beck, *et al*., 1999; Levine *et al.*, 2000; Romero-Ávila, 2007). Data comes from the *World Economic Outlook* database, edited by the International Monetary Fund (IMF).

The model is:

$$GROWTH_{i,t} = \theta_0 + \alpha_1 GDP_{pc1980_i} + \theta_2 BANK_{i,t} + \theta_3 MARKET_{i,t} + \\ + \theta_4 CONC_{i,t} + \theta_5 REGINST_{i,t} + \theta_6 CONC_{i,t} * REGINST_{i,t} + \theta_7 \sum_{t=1980}^{2004} T_t + \omega_{i,t} \quad [1]$$

Where *i* refers to countries and *t* refers to temporal periods. Due to the potential nonlinear relationship between economic growth and the assortment of explanatory variables, we use natural logarithms of the regressors. Appendix A describes in detail all variables included in the analysis and their sources.

The $GDP_{pc1980}$ variable is the natural logarithm of the real per capita GDP in the initial period, 1980. This variable allows us to control for the economic development level in 1980, and captures the convergence effect of the economy as a whole to its long-run steady state. A negative sign is expected for the coefficient of this variable.

BANK is the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. MARKET is the stock market capitalization divided by GDP. These variables control for the financial development in the country and come from Beck *et al*. (2000). We expect positive sign for the coefficients of these two variables.

Following Demirgüc-Kunt *et al*. (2004), we measure bank market concentration through the fraction of bank assets held by the three largest commercial banks in the country (CONC). Figures are obtained from the World Bank Database, whose base source is the Fitch IBCA's Bankscope Database. We do not have a clear forecast for the sign of the coefficient of CONC.

REGINST is the set of proxy variables of the institutions and bank regulation and supervision in the country. These variables are FREEDOM, RESTRICT, RESTOWN, OFFICIAL, MONITOR, ACCOUNT, and INS.

Our indicator of the quality of a country's legal environment is the Index of Economic Freedom published by the Heritage Foundation (FREEDOM). Economic Freedom is defined

as the absence of government coercion or constraint on the production, distribution, or consumption of goods and services beyond the extent necessary for citizens to protect and maintain liberty itself. The index includes variables fall into ten categories of economic freedom: trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation and informal market activity. This variable has also been used for similar purposes to our by Demirgüc-Kunt *et al.* (2004), Beck *et al.* (2006a).

The proxies for the regulatory and supervisory variables come from the World Bank's *Bank Regulation and Supervision Database* initially developed by Barth *et al.* (2001). The measure of restrictions on bank activities (RESTRICT) indicate whether bank activities in the securities, insurance and real estate markets and bank ownership and control of non-financial firms are: (1) unrestricted, (2) permitted, (3) restricted or (4) prohibited. This indicator varies between a minimum value of 4 for New Zealand and Zambia, and a maximum value of 16 for Papua New Guinea.

As indicator of the restrictiveness between the mixing of banking and commerce we split the latter variable and only consider whether bank ownership and control of non-financial firms is: (1) unrestricted, (2) permitted, (3) restricted or (4) prohibited. This indicator varies between a minimum value of 1 and a maximum value of 4 (RESTOWN).

A country's official supervisory power (OFFICIAL) is measured by adding a value of 1 for each affirmative answer to 14 questions intended to gauge the power of supervisors to undertake prompt corrective action, to restructure and reorganize troubled banks and to declare a deeply troubled bank insolvent. This variable can in theory range from 0 to 14, where a higher value indicates more official supervisory power. In our sample it varies between a minimum value of 4 for Burundi and Guatemala, and a maximum value of 14 for Paraguay.

We use three indicators of private supervision. First, we measure private supervision using the private monitoring index of Barth *et al*. (2004) (MONITOR).This variable can range from 0 to 10, where a higher value indicates more private oversight. Second, we also use the accounting and information disclosure requirements in the country (ACCOUNT). This variable ranges from 0 to 6, with higher values indicating more information disclosure requirements.

The third alternative measure of private monitoring is the presence of explicit deposit insurance in a country. It has long been suggested that more generous deposit insurance weakens the market discipline enforced by depositors, and encourages banks to take greater

risk (Merton 1977). Recent empirical evidence confirms this effect, showing that deposit insurance increases the likelihood of banking crises (Demirgüc-Kunt and Detragiache, 2002). To capture whether there is deposit insurance in the banking system, we use a dummy variable (INS) that takes a value of 1 if there is explicit deposit insurance and 0 otherwise.

To analyze how bank concentration affects economic growth in different legal and institutional environments we sequentially incorporate an interaction term between bank concentration and each variable proxying the legal and institutional environment ($CONC_{i,t} * REGINST_{i,t}$). The paucity of instruments, the extensive number of country variables, and the need to use interaction terms with the concentration variable supports incorporation of the coefficients separately rather than at the same time.[3]

Methodologically, this paper uses two econometric procedures to asses the effect of regulation, supervision and institutions on the influence of bank concentration for economic growth. First, we employ a pure cross-sectional estimator, where data are averaged over the period 1980-2004. Second, we follow Beck et al. (2000), Levine *et al*. (2000) or Beck and Levine (2002) and construct a panel dataset with data averaged over each of the five 5-year periods between 1980 and 2004 (1980-1984; 1985-1989; 1990-1994; 1995-1999; 2000-2004). We then use the random-effects estimator to control for unobserved country-specific effects not explicitly included in the regressions. In this type of estimation, we also include a set of dummy time variables for each five-year period over 1980-2004 ($\sum_{t=1980}^{2004} T_t$ ).These dummies capture any unobserved country-invariant time effects not included in the regression, but their coefficients are not reported for reasons of space.

In both types of estimations, we control for the potential endogeneity of bank and market development, bank concentration, and the legal and institutional variables. A major stumbling block when analysis includes institutional, regulatory, and supervisory variables is separating out the effects and the correlated outcomes. Such interrelations and the potential endogeneity of country 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.

Our empirical analysis uses a number of instruments for the observed values of each country variable (BANK, MARKET, CONC, and REGINST) to identify the exogenous component of the variable and control for potential simultaneity bias. The instruments are defined following Barth *et al*. (2004): five binary variables indicating the origin of the

[3] Barth *et al*. (2004) use a similar sequential procedure to analyze the influence of regulatory and supervisory practices on bank development.

national legal code (English common law, French civil law, German civil law, the Scandinavian civil law, and Socialist/Communist code), the latitudinal distance from the equator and the religious composition of the population in each country (Catholic, Protestant, Muslim, other religions).This methodology lets us to focus on the influence of the exogenous component of each country variable. Thus correlations between the observed values for the country variables need not remain when we analyze only their exogenous components.

Table 1 reports descriptive statistics by country, averaged over the 1980-2004 period and Table 2 reports the correlations. The real GDP per capita growth is positively correlated with the bank and market development and with the quality of the institutional development in the country. Market supervision of banks and the presence of deposit insurance in the country are also positively related to economic growth whereas restrictions on bank activities and official supervision are negatively related with economic growth.

(INSERT TABLE 1 AND 2 ABOUT HERE)

## 4. Results

In this section we analyze the hypothesis that the effect of bank market concentration on economic growth varies across countries depending on institutions and the characteristics of bank regulation and supervision.

### *4.1. Institutions, bank concentration, and growth*

Table 3 reports the results of regressions analyzing the influence of institutions on the role of bank concentration for economic growth. Panel A reports results using cross-country data averaged over the whole period and Panel B reports results using the random effects estimator in the panel dataset with data averaged over each of the five 5-year periods between 1980 and 2004.

Results of the two first columns of each Panel are consistent with previous literature. We obtain a positive influence of bank financial development on economic growth. The positive coefficients of BANK are statistically significant at the 0.01 per cent level in the random effects estimations although they are not statistically significant in the cross-country estimations. The market development has not statistically significant coefficients.

Consistent with Cetorelli and Gambera (2001), the negative and statistically significant coefficients of CONC in the cross-country estimations (columns 1 and 3) suggest an average

depressive effect of bank concentration on economic growth. Although negative, the coefficients of CONC in the cross-section estimations are not statistically significant.

The positive coefficients of FREEDOM in columns (2) and (4) confirm the importance of a well-developed institutional environment for economic growth, traditionally suggested by the literature (La Porta *et al*., 1998; Demirgüc-Kunt and Maksimovic, 1998, 1999, 2002; Beck *et al*., 2002; Claessens and Laeven, 2003). Given the positive correlation between the quality of institutions and the market development, we do not introduce simultaneously both variables in the estimations. [4]

(INSERT TABLE 3 ABOUT HERE)

The first novel result of this paper is shown in columns (3) and (6) by incorporating interaction of bank concentration and the development of the institutional environment in the country. We obtain in both types of estimations a positive coefficient for CONC and a negative one for the interaction term CONC x FREEDOM. These results confirm our H.1., suggesting that the negative influence of bank concentration on economic growth increases with the quality of the institutions in the country. In fact, the positive coefficient of CONC in these estimations indicates that a higher bank market concentration can foster economic growth in countries with the poorest-quality of institutions.

This result is consistent with the higher value of close relationships between banks and firms in countries where the poor-quality of the institutional environment does not favor the development of markets. Bank concentration may have a positive role for the development of close relationships in these environments and, thus, a more positive influence on economic growth. However, in countries with good-quality of the institutional environment, where markets are more developed and close relationships between firms and banks less frequent and beneficial, diminishes the ability of bank concentration to favor growth through the promotion of close relationships, whereas dominates the negative effects associated to market power in well-functioning markets.

The influence of institutions on the effect of bank concentration on economic growth is also economically significant. For instance, using the coefficients of column (6), a one standard deviation increase in the quality of institutions (0.658) would reduce the positive

[4] Claessens and Laeven (2003) analyze the relationship between financial development, property rights and economic growth. They find that in countries with better institutional quality and more secure property rights, which protect returns of assets against competitors'actions, firms can allocate resources better, leading to higher economic growth.

influence of bank concentration on economic growth 21.38 times the standard deviation of economic growth.

(INSERT TABLE 4 ABOUT HERE)

In Table 4 we test a possible non-lineal influence of bank concentration on economic growth. The observed negative influence of bank concentration might be originated by the increasing hold-up problems associated to a higher concentration. In this case, we could expect that the negative influence of bank concentration would only be observed for high levels of bank concentration but not for low levels. Results in Table 4 reject this possible non-linear effect because the square of bank concentration does not have significant coefficients in any of the estimations of Table 4.

*4.2. Bank regulation, concentration, and growth*

We now examine if regulatory restrictions on non-traditional bank activities modify the impact of bank market concentration on economic growth.

Results in Table 5 show positive and statistically significant coefficients for the interaction terms of CONC x RESTRICT and CONC x RESTOWN. This result indicates that both tighter restrictions to banks on activities in the securities, insurance and real estate markets, as on the bank ownership and control of non-financial firms reduce the negative influence of bank concentration on economic growth. The effect of restrictions on non-traditional activities is also economically significant. For instance, using the coefficients of column (3), a one standard deviation increase in the restrictions on non-traditional activities (2.558) would reduce the negative influence of bank concentration on economic growth 31.66 times the standard deviation of economic growth.

Different causes may explain this result. Tighter restrictions to engage in these activities oblige banks to be more focused in the traditional activities of lending and borrowing, and therefore, increase their incentives to establish close lending relationships with firms. Limiting bank ownership and control of non-financial firms may also reduce the market power of banks associated to a given bank concentration, and thus reduces the hold-up problem in the lending relationship. Higher restrictions on bank ownership of non-financial firms may also increase the marginal benefit of bank concentration to solve the conflicts of interests that can not be reduced when banks are not allowed to take equity of their debtors.

(INSERT TABLE 5 ABOUT HERE)

*4.3. Bank supervision, concentration, and growth*

In this section we analyze if the effect of banking market concentration on economic growth varies depending on the official supervision actions as soon as the private monitoring.

The results are reported in Table 6. We do not observe a significant effect for official supervision because neither OFFICIAL nor the interaction term CONC x OFFICIAL have statistically significant coefficients. However, consistent with our H.4 a higher market discipline promotes a negative influence of bank concentration on economic growth in cross-country estimations. The negative coefficients of CONC x MONITOR and CONC x ACCOUNT in the OLS estimations are consistent with a reduction of the benefits of market concentration to promote a close relationships between banks and firms where the existence of private supervision and financial information disclosure make possible well functioning of financial markets. Thus, in more developed markets, the negative effect of a higher market power associated to a higher bank concentration dominates over the positive effect on the establishment of lending relationships that are less frequent.

This negative influence of bank market concentration is also observed in countries with a explicit deposit insurance as the interaction term CONC x INS has a negative coefficient. Although negative, the coefficients of the interactions terms of CONC with MONITOR, ACCOUNT and INS are not statistically significant in the random-effects estimations.

(INSERT TABLE 6 ABOUT HERE)

**5. Robustness Checks**

In further analysis we check the robustness of the results. First, we consider three alternatives to the Economic Freedom Index as measures of the quality of the legal and institutional environment: 1) the KKZ index. This is calculated by Kaufman *et al*. (2001) as the average of six indicators: voice and accountability in the political system; political stability; government effectiveness; regulatory quality; rule of law and control of corruption; 2) the law and order index of the International Country Risk Guide, and 3) the property rights index from the Economic Freedom index. Results are not significantly different to those reported using the Economic Freedom index.

Second, as robustness check we use alternative measures of bank market concentration: 1) the fraction of deposits held by the five largest commercial banks in total banking system deposits, from the World Bank's *Bank Regulation Supervision Database* developed by Barth

*et al*. (2001), and 2) the Herfindahl index averaged over the 1980-1997 period, from Beck *et al.* (2006a). Results are similar to those reported.

## 6. Conclusions

This paper analyzes how the influence of bank concentration on economic growth varies across countries depending on bank regulation, supervision, and institutions. Results for 87 countries over 1980-2004 indicate that bank concentration has a general negative effect on economic growth that disappears in countries with a poor-quality institutional environment. This result is consistent with a higher contribution of bank concentration to build lending relationships with borrowers in countries where the poor quality of institutions impedes the market development. Stricter restrictions on non-traditional bank activities and on bank ownership of non-financial firms also reduce the negative influence of bank concentration on economic growth. More market monitoring is associated, however, to a more negative influence of bank concentration on economic growth.

These results have important policy implications. First, they suggest that antitrust enforcement may actually damage economic growth in countries with a poor-quality institutional environment, stricter restrictions on nontraditional bank activities or weaker market discipline. Second, optimal antitrust legislation or policies will therefore vary across environments, depending on the combination of legal, supervisory and institutional forces acting upon a country's banking system.

## Appendix A
## Variables and sources

| Variable | Definition | Source |
|---|---|---|
| GROWTH | The growth rate of the real GDP per capita of each country. On panel data estimations we calculate the average growth rate of the real GDP per capita of each five 5-year periods between 1980 and 2004. In cross-country estimations we use the average growth rate of the real GDP per capita of the global period 1980-2004. | International Monetary Fund, World Economic Outlook Database. |
| $GDP_{pc1980}$ | It is defined as one plus the natural logarithm of the real GDP per capita on the initial year (1980). | International Monetary Fund, World Economic Outlook Database. |
| BANK | Defined as one plus the natural logarithm of the ratio private credit by deposit money banks and other financial institutions to GDP. | Beck, *et al*. (2000) |
| MARKET | Defined as one plus the natural logarithm of the ratio stock market capitalization to GDP (value of listed shares to GDP) | Beck, *et al*. (2000) |
| CONC | Defined as one plus the natural logarithm of the assets of three largest banks as a share of assets of all commercial banks. | Beck, *et al*. (2000) |
| RESTRICT | This variable indicates whether bank activities in the securities, insurance and real estate markets, and bank ownership and control of nonfinancial firms are (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited. This indicator can theoretically range from 4 to 16, with higher values indicating more restrictions on banks to engage in such activities. | Barth, *et al*. (2000, 2003, 2007) |
| RESTOWN | The extent to which banks may own and control nonfinancial firms. Higher values correspond to higher restrictions to own and control industrial firms. | Barth, *et al*. (2000, 2003, 2007) |

| | | |
|---|---|---|
| OFFICIAL | Index of official supervisory power. Adds one for an affirmative response to each for the following 14 questions: 1) Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? 2) Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in elicit activities, fraud or insider abuse? 3) Can supervisors take legal actions against external auditors for negligence 4) Can the supervisory authority force a bank to change its internal organizational structure? 5) Are off-balance sheet items disclosed to supervisors? 6) Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7) Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8) Can the supervisory agency legally declare-such that this declaration supersedes the rights of bank of bank shareholders-that a bank is insolvent? 9) Does the Banking Law give authority to the supervisory agency to intervene that is, suspend some or all ownership rights-a problem bank? 10) Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: a) Supersede shareholder rights? b) Remove and replace management? c) Remove and replace directors? | Barth, *et al*. (2000, 2003, 2007) |
| MONITOR | This variable increases by a value of one for each of the following characteristics for a country: 1) if income statement contains accrued but unpaid interest/principal while loan is performing; 2) if income statement contains accrued but unpaid interest/principal while loan is non-performing; 3) the number of days in arrears after which interest income cease to accrue; 4) if consolidated accounts covering bank and any non-bank financial subsidiaries are required; 5) if off-balance sheets items are disclosed to supervisors; 6) if off-balance sheet items are disclosed to public; 7) if banks must disclose risk management procedures to public; 8) if directors are legally liable for erroneous/misleading information; 9) if there have been penalties enforced and 10) if regulations require credit ratings for commercial banks. This variable therefore ranges from 0 to 10, with higher values indicating greater private oversight. | Barth, *et al*. (2000, 2003, 2007) |
| ACCOUNT | Accounting and information disclosure requirements, which scores one for an affirmative response to each for the following 6 questions: 1) Are financial institutions required to produce consolidated accounts covering all bank and any non-bank financial subsidiaries? 2) Are off-balance sheet items disclosed to supervisors? 3) Are off-balance sheet items disclosed to the public? 4) Must banks disclose their risk management procedures to the public? 5) Are bank directors legally liable if information disclosed is erroneous or misleading? and 6) Do regulations require credit ratings for commercial banks? This variable therefore ranges from 0 to 6, with higher values indicating greater accounting requirements. | Barth, *et al*. (2000, 2003, 2007) |
| INS | Dummy variable that takes value 1 whether there is an explicit deposit insurance scheme and, if not, whether depositors were fully compensated the last time a bank failed, and 0 otherwise. | Barth, *et al*. (2000, 2003, 2007) |

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## Table 1
## Summary statistics by country

GROWTH is the growth rate of real per capita GDP in each country. BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. RESTOWN is an indicator of the extent to which banks may own and control nonfinancial firms. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise. Values are averaged over the 1980-2004 period.

| COUNTRY | GROWTH | BANK | MARKET | CONC | FREEDOM | RESTRICT | RESTOWN | OFFICIAL | MONITOR | ACCOUNT | INS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | -0.0430 | 0.4735 | 0.6795 | 0.6700 | 1.585 | 8 | 2 | 10 | 8 | 5 | 0 |
| Austria | 0.1848 | 0.8672 | 0.1359 | 0.7151 | 1.506 | 5 | 1 | 12 | 6 | 3 | 1 |
| Bahrain | 0.0709 | 0.4817 | 0.9704 | 0.8689 | 0.1383 | 9 | 1 | 13 | 7 | 5 | 0 |
| Bangladesh | -0.1371 | 0.2090 | 0.0260 | 0.5985 | -0.43 | 12 | 3 | 11 | 5 | 2 | 0 |
| Belgium | 0.7160 | 0.5195 | 0.5364 | 0.8851 | 1.108 | 9 | 2 | 10 | 8 | 4 | 1 |
| Belize | 0.1751 | 0.4096 | | | 0.135 | 12 | 2 | 12 | 4 | 2 | 0 |
| Benin | -0.1055 | 0.0994 | | 0.9331 | -0.1633 | 10 | 3 | 8 | 6 | 4 | 0 |
| Botswana | -0.1198 | 0.1213 | 0.1407 | 1.016 | 0.6583 | 10 | 2 | 13 | 8 | 3 | 0 |
| Burkina Faso | -0.0794 | 0.1325 | | 0.8859 | -0.3366 | 10 | 3 | 8 | 6 | 4 | 0 |
| Burundi | -0.5060 | 0.1470 | | 1.004 | -1.336 | 12 | 2 | 4 | 4 | 3 | 0 |
| Cameroon | -0.2391 | 0.1738 | | 0.9068 | -0.8116 | 10 | 2 | 13 | 5 | 3 | 0 |
| Canada | 0.0251 | 0.8775 | 0.7025 | 0.6413 | 1.605 | 7 | 3 | 9 | 9 | 5 | 1 |
| Chile | -0.2774 | 0.5525 | 0.0530 | 0.5771 | 0.9466 | 11 | 3 | 10 | 7 | 5 | 0 |
| Colombia | -0.5630 | 0.2611 | 0.0951 | 0.4431 | -0.4833 | 13 | 3 | 12 | 7 | 5 | 0 |
| Congo, Rep. | -0.0632 | 0.0839 | | 1.032 | -1.235 | 8 | 2 | 13 | 5 | 3 | 0 |
| Côte d'Ivoire | -0.2622 | 0.2769 | 0.0776 | 0.9287 | -0.3316 | 10 | 3 | 8 | 6 | 4 | 0 |
| Cyprus | 0.1700 | 0.9823 | 0.3481 | 0.9290 | 0.9666 | 8 | 3 | 7 | 8 | 5 | 0 |
| Czech Republic | -0.1624 | 0.5643 | 0.2114 | 0.7794 | 0.69 | 12 | 3 | 7 | 8 | 5 | 0 |
| Denmark | 0.1189 | 0.5389 | 0.4114 | 0.7441 | 1.741 | 8 | 3 | 8 | 7 | 4 | 0 |
| Dominican Republic | -0.3827 | 0.2433 | | 0.7253 | -0.2566 | | | 12 | 5 | 4 | 1 |
| Ecuador | -0.7876 | 0.2302 | 0.0725 | 0.4850 | -0.435 | 14 | 4 | 13 | 7 | 5 | 0 |
| Egypt, Arab. Rep. | -0.2797 | 0.3650 | 0.1613 | 0.6042 | -0.235 | 13 | 3 | 13 | 7 | 6 | 0 |
| El Salvador | -0.1834 | 0.3202 | 0.1101 | 0.8777 | 0.1233 | 13 | 4 | 9 | 7 | 4 | 0 |
| Finland | 0.0744 | 0.3208 | 0.7180 | 0.9878 | 1.775 | 7 | 2 | 5 | 9 | 6 | 1 |
| France | 0.0771 | 0.8130 | 0.4882 | 0.5513 | 1.206 | 6 | 2 | 7 | 9 | 4 | 1 |
| Gabon | -0.1714 | 0.1367 | | 1 | -0.4983 | 8 | 2 | 13 | 5 | 3 | 0 |
| Gambia | -0.4335 | 0.1405 | | 1.2 | -0.3966 | 14 | 4 | 10 | 5 | 3 | 0 |
| Germany | 0.2029 | 1.051 | 0.3288 | 0.6868 | 1.545 | 14 | 2 | 8 | 9 | 3 | 1 |
| Ghana | -0.7877 | 0.0542 | 0.1388 | 0.8378 | -0.2166 | 12 | 2 | 11 | 7 | 4 | 0 |
| Greece | -0.2432 | 0.4049 | 0.2897 | 0.8699 | 0.6616 | 9 | 2 | 11 | 8 | 4 | 0 |
| Guatemala | -0.3639 | 0.1640 | 0.0115 | 0.4373 | -0.3833 | 13 | 3 | 4 | 8 | 4 | 0 |
| Guinea | -0.2043 | | | | -0.6883 | 6 | 3 | 13 | 8 | 5 | 0 |
| Guyana | -0.4419 | 0.4734 | 0.1657 | 1.1 | 0.0816 | 9 | 2 | 9 | 5 | 3 | 0 |
| Honduras | -0.3743 | 0.3121 | 0.0770 | 0.5462 | -0.2366 | 9 | 3 | 8 | 6 | 3 | 0 |

**Table 1 (cont.)**
**Summary statistics by country**

| COUNTRY | GROWTH | BANK | MARKET | CONC | FREEDOM | RESTRICT | RESTOWN | OFFICIAL | MONITOR | ACCOUNT | INS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hungary | -0.3154 | 0.2845 | 0.1457 | 0.7203 | 0.8816 | 11 | 3 | 13 | 8 | 4 | 0 |
| Iceland | -0.2612 | 0.5381 | 0.4833 | 1.066 | 1.531 | 9 | 3 | 5 | 7 | 4 | 0 |
| India | -0.2155 | 0.5451 | 00.1972 | 0.3852 | -0.1633 | 10 | 1 | 8 | 7 | 3 | 1 |
| Indonesia | -0.3147 | 0.2780 | 0.1218 | 0.6483 | -0.94 | 14 | 4 | 13 | 9 | 4 | 0 |
| Ireland | 0.2745 | 0.7359 | 0.6069 | 0.7452 | 1.578 | 8 | 2 | 11 | 8 | 4 | 0 |
| Israel | -0.4136 | 0.5941 | 0.4117 | 0.7834 | 0.6666 | 13 | 3 | 7 | 7 | 5 | 0 |
| Italy | 0.0219 | 0.5785 | 0.2822 | 0.4748 | 0.94 | 10 | 3 | 4 | 7 | 5 | 0 |
| Jamaica | -0.5037 | 0.2470 | 0.3933 | 0.8547 | -0.0283 | 12 | 3 | 11 | 9 | 5 | 0 |
| Japan | 0.3376 | 1.558 | 0.8996 | 0.4671 | 1.038 | 13 | 3 | 10 | 10 | 5 | 1 |
| Jordan | -0.1589 | 0.6555 | 0.6175 | 0.8861 | 0.1883 | 11 | 3 | 13 | 7 | 4 | 0 |
| Kenya | -0.4730 | 0.2913 | 0.1174 | 0.6498 | -0.8533 | 10 | 1 | 13 | 9 | 5 | 0 |
| Korea, Rep. | 0.2593 | 0.9638 | 0.2974 | 0.5409 | 0.3333 | 9 | 3 | 11 | 10 | 6 | 0 |
| Lesotho | -0.3542 | 0.1415 |  | 1.1 | -0.0866 | 12 | 2 | 9 | 3 | 0 | 0 |
| Luxembourg | 0.2471 | 1.0389 | 1.871 | 0.2704 | 1.636 | 6 | 2 | 13 | 9 | 5 | 0 |
| Malawi | -0.6398 | 0.1072 | 0.0928 | 1.047 | -0.3383 | 13 | 2 | 10 | 5 | 2 | 0 |
| Malaysia | 0.0556 | 0.9866 | 1.250 | 0.4788 | 0.4033 | 10 | 3 | 10 | 8 | 5 | 0 |
| Mali | -0.0210 | 0.1345 |  | 0.9784 | -0.1666 | 10 | 3 | 8 | 6 | 4 | 0 |
| Mauritania | -0.2854 | 0.2860 |  | 1.166 | -0.3883 |  |  |  |  |  | 0 |
| Mauritius | -0.0375 | 0.3705 | 0.2955 | 0.9269 | 0.6433 | 13 | 2 | 9 | 6 | 4 | 0 |
| Mexico | -0.6040 | 0.1749 | 0.1785 | 0.7643 | -0.16 | 12 | 2 | 8 | 8 | 5 | 0 |
| Nepal | -0.2319 | 0.1618 | 0.0735 | 0.7778 | -0.5516 | 8 | 1 | 8 | 4 | 2 | 0 |
| Netherlands | 0.1676 | 1.457 | 0.8629 | 0.8027 | 1.843 | 6 | 2 | 4 | 8 | 4 | 1 |
| New Zealand | -0.0264 | 0.7513 | 0.3918 | 0.8518 | 1.751 | 4 | 1 | 7 | 8 | 6 | 0 |
| Niger | -0.2198 | 0.1084 |  | 1.009 | -0.7533 | 10 | 3 | 8 | 6 | 4 | 0 |
| Nigeria | -0.6548 | 0.1360 | 0.0798 | 0.5994 | -1.191 | 9 | 3 | 12 | 7 | 4 | 0 |
| Norway | 0.0736 | 0.8926 | 0.2872 | 0.9182 | 1.718 | 7 | 2 | 8 | 10 | 4 | 1 |
| Pakistan | -0.2219 | 0.2293 | 0.1042 | 0.6640 | -0.74 | 12 | 3 | 13 | 6 | 5 | 0 |
| Panama | 0.1096 | 0.5903 | 0.1663 | 0.4652 | 0.2 | 8 | 2 | 10 | 6 | 4 | 0 |
| Papua New Guinea | -0.3270 | 0.1903 | 0.5783 | 1.047 | -0.4583 | 16 | 4 | 13 | 7 | 5 | 0 |
| Paraguay | -0.5643 | 0.1862 | 0.0228 | 0.5887 | -0.6833 | 12 | 2 | 14 | 5 | 4 | 0 |
| Philippines | -0.2989 | 0.3427 | 0.3030 | 0.7247 | 0.0983 | 7 | 2 | 10 | 9 | 5 | 1 |
| Poland | -0.6497 | 0.1621 | 0.0864 | 0.6556 | 0.6866 | 7 | 2 | 7 | 7 | 4 | 0 |
| Portugal | -0.0265 | 0.8236 | 0.2001 | 0.9782 | 1.31 | 9 | 3 | 13 | 8 | 4 | 0 |
| Senegal | -0.1423 | 0.2380 |  | 0.8328 | -0.4966 | 10 | 3 | 8 | 6 | 4 | 0 |
| Seychelles | 0.2442 | 0.1579 |  | 1.2 | -0.496 | 8 | 2 | 5 | 5 | 3 | 0 |
| Sierra Leone | -0.7854 | 0.0340 |  | 0.9746 | -1.265 |  |  |  |  |  | 0 |
| Singapore | 0.3287 | 1.058 | 1.331 | 0.9388 | 1.573 | 8 | 2 | 8 | 6 | 4 | 0 |
| South Africa | -0.3614 | 0.8987 | 1.362 | 0.9280 | 0.1683 | 8 | 1 | 6 | 7 | 5 | 0 |
| Spain | 0.0579 | 0.7886 | 0.4292 | 0.9048 | 1.253 | 6 | 1 | 9 | 9 | 4 | 1 |
| Sri Lanka | -0.1965 | 0.2030 | 0.1202 | 0.7454 | -0.3866 | 7 | 3 | 6 | 8 | 5 | 0 |

**Table 1 (cont.)**
**Summary statistics by country**

| COUNTRY | GROWTH | BANK | MARKET | CONC | FREEDOM | RESTRICT | RESTOWN | OFFICIAL | MONITOR | ACCOUNT | INS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Swaziland | -0.2959 | 0.1805 | 0.1353 | 1.026 | -0.3866 | 14 | 4 | 8 | 6 | 4 | 0 |
| Sweden | -0.0105 | 0.9969 | 0.7617 | 0.9865 | 1.67 | 9 | 3 | 7 | 7 | 4 | 0 |
| Switzerland | 0.1360 | 1.472 | 1.499 | 0.5842 | 1.88 | 5 | 2 | 13 | 9 | 5 | 0 |
| Tanzania | -0.5823 | 0.0682 | 0.0360 | 0.7497 | -0.3633 | 9 | 2 | 13 | 9 | 4 | 0 |
| Thailand | 0.1038 | 0.8799 | 0.3289 | 0.5610 | 0.07 | 9 | 3 | 8 | 8 | 3 | 0 |
| Togo | -0.1635 | 0.2057 | | 1.058 | -0.82 | 10 | 3 | 8 | 6 | 4 | 0 |
| Tunisia | -0.1021 | 0.5899 | 0.0997 | 0.5091 | 0.1683 | 11 | 3 | 12 | 6 | 3 | 0 |
| Turkey | -0.8748 | 0.1126 | 0.1409 | 0.7229 | -0.3116 | 12 | 3 | 13 | 9 | 5 | 0 |
| United Kingdom | 0.1289 | 0.9391 | 1.212 | 0.5603 | 1.676 | 5 | 1 | 10 | 10 | 5 | 0 |
| United States | 0.0784 | 1.386 | 0.9535 | 0.3836 | 1.478 | 12 | 3 | 12 | 8 | 4 | 1 |
| Uruguay | -0.7764 | 0.3439 | 0.0132 | 0.8037 | 0.5916 | 4 | 10 | 11 | 7 | 5 | 0 |
| Venezuela | -0.7524 | 0.2860 | 0.0711 | 0.6009 | -0.185 | 10 | 3 | 10 | 7 | 4 | 0 |
| Zambia | -0.8562 | 0.0598 | | 0.7790 | -0.3616 | 4 | 13 | | | | 0 |
| Mean | -0.1895 | 0.4909 | 0.4319 | 0.7571 | 3.031 | 9.857 | 2.523 | 9.690 | 7.059 | 4.095 | 0.1609 |
| Std. Desv. | 0.3556 | 0.4289 | 0.4833 | 0.2249 | 0.6580 | 2.558 | 0.8100 | 2.680 | 1.571 | 1.020 | 0.3669 |
| Min. | -0.9900 | 0.0245 | 0.0034 | 0.2597 | 1.54 | 4 | 1 | 4 | 3 | 0 | 0 |
| Max. | 2.389 | 2.648 | 3.229 | 1.430 | 4.336 | 16 | 4 | 14 | 10 | 6 | 1 |

## Table 2:
## Correlations

GROWTH is the growth rate of real per capita GDP in each country. BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. RESTOWN is an indicator of the extent to which banks may own and control nonfinancial firms. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise. Values are averaged over the 1980-2004 period.

| VARIABLES | GROWTH | BANK | MARKET | CONC | FREEDOM | RESTRICT | RESTOWN | OFFICIAL | MONITOR | ACCOUNT | INS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GROWTH | 1.000 | | | | | | | | | | |
| BANK | 0.5066*** | 1.000 | | | | | | | | | |
| MARKET | 0.3691*** | 0.6495*** | 1.000 | | | | | | | | |
| CONC | -0.1412** | -0.2792*** | -0.0813 | 1.000 | | | | | | | |
| FREEDOM | 0.4970*** | 0.7070*** | 0.5359*** | -0.2558*** | 1.000 | | | | | | |
| RESTRICT | -0.3559*** | -0.3845*** | -0.3577*** | 0.0332 | -0.3840*** | 1.000 | | | | | |
| RESTOWN | -0.2261*** | -0.1561*** | -0.2379*** | -0.0139 | -0.1477*** | 0.5605*** | 1.000 | | | | |
| OFFICIAL | -0.1358** | -0.0970* | -0.0840 | -0.1491** | -0.1004** | 0.1711*** | 0.0573 | 1.000 | | | |
| MONITOR | 0.1726*** | 0.4828*** | 0.2890*** | -0.3468*** | 0.5634*** | -0.2597*** | 0.0044 | 0.0186 | 1.000 | | |
| ACCOUNT | 0.0174 | 0.2643*** | 0.2268*** | -0.2224*** | 0.4088*** | -0.1456*** | 0.1615*** | 0.0239 | 0.6741*** | 1.000 | |
| INS | 0.3048*** | 0.3869*** | 0.1168* | -0.1591** | 0.3331*** | -0.2466*** | -0.2771*** | -0.1392*** | 0.3496*** | 0.0209 | 1.000 |

## Table 3
## Institutions, bank concentration and growth

In this table we present the results of regressions analyzing the influence of institutions on the role of bank concentration for economic growth. In Panel A, regressions are estimated using OLS estimators for cross-country data. We use the mean value for each variable in each country, over the 1980-2004 period. In Panel B we present the results of regressions estimated using random effects estimators. In this case, data averaged over each of the five 5-year periods between 1980 and 2004. In all regressions the dependent variable is the growth rate of real per capita GDP in each country (GROWTH). $GDP_{80}$ is the real per capita GDP in the initial period (1980). BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. MARKET measures the market financial development as the stock market capitalization divided by GDP. FREEDOM is an indicator of the quality of the institutional environment. Year dummy variables are included on estimations of Panel B, but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| | **Panel A: Cross-country data** | | | **Panel B: Panel data** | | |
|---|---|---|---|---|---|---|
| **Explanatory Variables** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| $GDP_{80}$ | -0.2460***<br>(-3.58) | -0.3081***<br>(-5.65) | -0.2939***<br>(-5.56) | -0.1950***<br>(-9.29) | -0.2127***<br>(-13.28) | -0.2027***<br>(-12.55) |
| BANK | 0.8276<br>(1.38) | 0.1240<br>(0.34) | -0.0129<br>(-0.04) | 0.7984***<br>(5.08) | 0.3863***<br>(4.57) | 0.3599***<br>(4.33) |
| CONC | -4.916**<br>(-2.09) | -3.941**<br>(-2.34) | 31.68**<br>(2.33) | -0.6288<br>(-0.53) | -0.5033<br>(-0.68) | 16.82**<br>(2.27) |
| MARKET | 0.3322<br>(1.23) | | | -0.0399<br>(-0.31) | | |
| FREEDOM | | 7.049***<br>(6.94) | 4.119***<br>(2.78) | | 2.217***<br>(7.51) | 8.926***<br>(3.11) |
| CONC X FREEDOM | | | -55.42**<br>(-2.64) | | | -27.05**<br>(-2.35) |
| Time Dummies | - | - | - | YES | YES | YES |
| Adjusted $R^2$ | 0.3995 | 0.6349 | 0.6605 | 0.4537 | 0.5592 | 0.5677 |
| Wald Test | 15.30 | 37.08 | 33.29 | 164.90 | 349.74 | 371.46 |
| Observations | 87 | 84 | 84 | 348 | 336 | 336 |

## Table 4
## Institutions, bank concentration and growth

In this table we present the results of regressions analyzing the influence of institutions on the role of bank concentration for economic growth. In Panel A, regressions are estimated using OLS estimators for cross-country data. We use the mean value for each variable in each country, over the 1980-2004 period. In Panel B we present the results of regressions estimated using random effects estimators. In this case, data averaged over each of the five 5-year periods between 1980 and 2004. In all regressions the dependent variable is the growth rate of real per capita GDP in each country (GROWTH). $GDP_{80}$ is the real per capita GDP in the initial period (1980). BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. CONCSQUARE is the square of bank concentration MARKET measures the market financial development as the stock market capitalization divided by GDP. FREEDOM is an indicator of the quality of the institutional environment. Year dummy variables are included on estimations of Panel B, but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| | **Panel A: Cross-country data** | | | **Panel B: Panel data** | | |
|---|---|---|---|---|---|---|
| **Explanatory Variables** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| $GDP_{pc1980}$ | -0.2314*** | -0.2314*** | -0.2759*** | -0.1950*** | -0.2125*** | -0.2019*** |
| | (-3.36) | (-5.29) | (-5.29) | (-9.23) | (-13.21) | (-12.56) |
| BANK | 1.543* | 0.6905 | 0.4870 | 0.8047*** | 0.3700*** | 0.3335*** |
| | (1.99) | (1.66) | (1.18) | (4.24) | (4.10) | (3.78) |
| CONC | -85.10 | -106.18** | -10.03 | 0.1744 | -3.884 | 12.21 |
| | (-1.45) | (-2.55) | (-0.17) | (0.02) | (-0.60) | (1.38) |
| CONCSQUARE | 6.643 | 8.616** | 7.161* | -0.0725 | 0.3163 | 0.5112 |
| | (1.24) | (2.31) | (1.95) | (-0.08) | (0.53) | (0.87) |
| MARKET | 0.1739 | | | -0.0443 | | |
| | (0.60) | | | (-0.32) | | |
| FREEDOM | | 7.033*** | 41.48*** | | 2.220*** | 9.294*** |
| | | (7.16) | (2.84) | | (7.48) | (3.38) |
| CONC X FREEDOM | | | -124.08** | | | -28.44** |
| | | | (-2.36) | | | (-2.59) |
| Time Dummies | - | - | - | YES | YES | YES |
| Adjusted $R^2$ | 0.4074 | 0.6587 | 0.6776 | 0.4538 | 0.5597 | 0.5699 |
| F-Test | 12.83 | 33.04 | 30.07 | 163.07 | 343.94 | 375.06 |
| Observations | 87 | 84 | 84 | 348 | 336 | 336 |

## Table 5
## Bank regulation, concentration and growth

In this table we present the results of regressions analyzing the influence of institutions on the role of bank concentration for economic growth. In Panel A, regressions are estimated using OLS estimators for cross-country data. We use the mean value for each variable in each country, over the 1980-2004 period. In Panel B we present the results of regressions estimated using random effects estimators. In this case, data averaged over each of the five 5-year periods between 1980 and 2004. In all regressions the dependent variable is the growth rate of real per capita GDP in each country (GROWTH). $GDP_{80}$ is the real per capita GDP in the initial period (1980). BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. RESTRICT is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. RESTOWN is an indicator of the extent to which banks may own and control nonfinancial firms. Year dummy variables are included on estimations of Panel B, but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| | **Panel A: Cross-country data** | | **Panel B: Panel data** | |
|---|---|---|---|---|
| **Explanatory Variables** | **(1)** | **(2)** | **(3)** | **(4)** |
| $GDP_{80}$ | -0.2905*** | -0.2854*** | -0.2140*** | -0.2025*** |
| | (-5.33) | (-5.26) | (-13.22) | (-12.65) |
| BANK | 0.6178 | -0.0226 | 0.1854 | 0.3366*** |
| | (1.03) | (-0.06) | (1.29) | (3.43) |
| CONC | -28.71** | -32.10*** | -13.44** | -16.06** |
| | (-2.06) | (-2.76) | (-2.04) | (-2.46) |
| FREEDOM | 7.091*** | 7.064*** | 2.213*** | 2.338*** |
| | (7.11) | (7.02) | (7.60) | (7.98) |
| RESTRICT | 0.3074** | | -0.4048** | |
| | (2.09) | | (-2.16) | |
| RESTOWN | | 0.6787* | | -1.496** |
| | | (1.69) | | (-2.19) |
| CONC X RESTRICT | 2.655* | | 1.395** | |
| | (1.84) | | (1.96) | |
| CONC X RESTOWN | | 12.05** | | 6.348** |
| | | (2.45) | | (2.35) |
| Time Dummies | - | - | YES | YES |
| Adjusted $R^2$ | 0.6488 | 0.6531 | 0.5677 | 0.5700 |
| F-Snedecor | 26.56 | 27.04 | 366.85 | 375.44 |
| Observations | 84 | 84 | 336 | 336 |

## Table 6
## Bank supervision, concentration and growth

In this table we present the results of regressions analyzing the influence of institutions on the role of bank concentration for economic growth. In Panel A, regressions are estimated using OLS estimators for cross-country data. We use the mean value for each variable in each country, over the 1980-2004 period. In Panel B we present the results of regressions estimated using random effects estimators. In this case, data averaged over each of the five 5-year periods between 1980 and 2004. In all regressions the dependent variable is the growth rate of real per capita GDP in each country (GROWTH). $GDP_{80}$ is the real per capita GDP in the initial period (1980). BANK measures the bank financial development as the value of private credits by deposit money banks and other financial institutions to the private sector divided by GDP. CONC is the bank market concentration. FREEDOM is an indicator of the quality of the institutional environment. OFFICIAL measures official supervisory power. MONITOR measures market monitoring. INS is a dummy variable that takes a value of 1 if the country has an explicit deposit insurance scheme and 0 otherwise. Year dummy variables are included on estimations of Panel B, but are not reported. T-statistics are between parentheses. ***, **, and * indicate significance levels of 1%, 5% and 10%, respectively.

| | **Panel A: Cross-country data** | | | | **Panel B: Panel data** | | | |
|---|---|---|---|---|---|---|---|---|
| **Explanatory Variables** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| $GDP_{80}$ | -0.3116*** | -0.2834*** | -0.2904*** | -0.3090*** | -0.2166*** | -0.2103*** | -0.2099*** | -0.2128*** |
| | (-5.64) | (-5.44) | (-5.40) | (-5.81) | (-13.36) | (-12.59) | (-12.47) | (-13.41) |
| BANK | 0.0634 | 0.7867 | 0.7895 | 0.1762 | 0.3466** | 0.3390 | 0.4239** | 0.2355* |
| | (0.14) | (0.79) | (1.39) | (0.37) | (3.59) | (1.52) | (2.57) | (1.94) |
| CONC | -12.37 | 35.72*** | -0.8872 | 41.80** | -3.743 | 5.375 | 0.1453 | 11.660 |
| | (-1.15) | (2.84) | (-0.36) | (2.07) | (-0.80) | (0.63) | (0.10) | (0.96) |
| FREEDOM | 7.125*** | 7.144*** | 7.021*** | 7.007*** | 2.210*** | 2.252*** | 2.235*** | 2.315*** |
| | (6.93) | (7.35) | (7.07) | (6.93) | (7.48) | (7.50) | (7.45) | (7.78) |
| OFFICIAL | 0.0390 | | | | -0.0926 | | | |
| | (0.39) | | | | (-0.75) | | | |
| MONITOR | | -0.5513 | | | | 0.2008 | | |
| | | (-1.66) | | | | (0.87) | | |
| INS | | | -1.744** | | | | 0.4054 | |
| | | | (-2.18) | | | | (0.47) | |
| ACCOUNT | | | | -0.8159** | | | | 0.8807 |
| | | | | (-2.20) | | | | (1.22) |
| CONC X OFFICIAL | 0.8019 | | | | 0.2869 | | | |
| | (0.75) | | | | (0.58) | | | |
| CONC X MONITOR | | -4.968*** | | | | -0.7813 | | |
| | | (-3.26) | | | | (-0.77) | | |
| CONC X INS | | | -10.14* | | | | -1.938 | |
| | | | (-1.96) | | | | (-0.54) | |
| CONC X ACCOUNT | | | | -10.87** | | | | -2.981 |
| | | | | (-2.25) | | | | (-1.03) |
| Time Dummies | - | - | - | - | YES | YES | YES | YES |
| Adjusted $R^2$ | 0.6292 | 0.6730 | 0.6512 | 0.6529 | 0.5632 | 0.5606 | 0.5598 | 0.5648 |
| F-Snedecor | 24.47 | 29.47 | 26.83 | 27.03 | 351.15 | 342.51 | 340.04 | 356.85 |
| Observations | 84 | 84 | 84 | 84 | 336 | 336 | 336 | 336 |