BANKS' OWNERSHIP STRUCTURE, RISK AND PERFORMANCE †

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Abstract

This paper studies empirically the effect of ownership concentration on the risk and performance of commercial banks, controlling for shareholders protection laws, bank regulations, and other country and bank specific traits. The sample used comprises 818 banks around 40 countries, for the period from 2000 to 2005. Our analyses show that ownership concentration is more important to explain performance than risk taking. Our main finding is the first empirical evidence of a cubic relationship between ownership concentration and bank performance. Such evidence is supportive of theoretical hypotheses of effective monitoring at low levels of ownership concentration, expropriation or loss of managerial discretion at moderate ownership concentration, and high costs of expropriation at high levels of ownership concentration. Finally, we also find a cubic relationship between ownership concentration and bank risk.

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1. Introduction

The study of risk and performance of banks is of great relevance, since banks' investment decisions are argued to influence economic growth and stability (Allen and Gale, 2000; Levine, 2006). Too little bank risk taking may hinder economic growth, whereas too much bank risk threatens economic stability. Hence, it makes sense for governments and institutions to regulate banks with the aim of shaping and influencing bank risk taking and performance with the purpose to attain economic growth and stability.

Remarkably, the existence of these regulations constraining the action of banks may make the governance of these institutions different to non-financial firms. However, the debate whether banks are different from non-financial firms is far from conclusive and goes back to Fama (1985) famous question whether *"are banks different?"*. On the one hand, some authors (Macey and O'Hara, 2003; John and Qian, 2003; Levine, 2003) argue that banks are different as they are heavily regulated, highly levered and more opaque than non-financial firms. On the other hand, authors like Caprio *et al* (2007) find that "*the same core corporate control mechanisms that influence the governance of non-financial firms also influence bank operations.*".

This paper tries to shed new light to this debate by analyzing the connection between banks' ownership structure and risk as well as performance using an international database of 818 banks from 40 different countries for the period from 2000 to 2005. This panel allows the use of GMM techniques to control for endogeneity problems that emerge naturally in the ownership-performance analysis (Coles *et al.* 2006, 2007). Specifically, we try to answer two questions. First, whether the effect of ownership structure is more important on risk than on performance. Second, we investigate the existence of non-linear effects in the previous connections. We measure ownership concentration through the main shareholder's equity holdings and we integrate in the analysis shareholders protection laws and banking regulations.

Concerning to the first question, we find weak evidence of a relationship between ownership concentration and bank risk only for large banks, but not for other banks. Such result extends the evidence of Laeven and Levine (2006), given that these authors only focus on large banks. However, once we incorporate small banks in the sample, the result does not hold. A deeper investigation of the issue shows the existence of a non-linear relationship between ownership concentration and risk. Also, once we compare the effect of ownership concentration on risk with that on performance, our results indicate that it is more important

in the latter case rather than in the former. To do so, we examined how the Z-Score[1], a measure of bank stability, varies with ownership concentration. We found a negative relationship which is explained by a decrease in the numerator (performance) rather than an increase in the denominator (risk). This is evidence of the existence of expropriation as ownership concentration increases.

Answering the second question, we found a first ever evidence in the literature of a cubic relationship between ownership concentration and bank performance. . Such evidence is supportive of theoretical hypotheses of monitoring effect at moderate ownership concentration, expropriation or loss of managerial discretion effects at medium to high ownership concentration, and high costs (and absence) of expropriation at very high concentrated ownership. A similar cubic relationship between performance and insider ownership was found by Morck *et al.* (1988) for non-financial firms.

The rest of the article is structured as follows. Section 2 summarizes the most relevant literature akin to the objectives of this work. Section 3 is methodological and describes the sample, variables and empirical models to be tested. The empirical results obtained are presented in Section 4. In the final section of the article, we lay out the main conclusions of this research and discuss the significance of our results.

2. Theoretical context

To examine banks' risk taking behaviour, we first rely on the traditional risk shifting theoretical hypothesis, by which shareholders in a limited liability firm have incentives to increase risk (Galai and Masulis, 1976; Esty, 1998), as they can experience unlimited gains, but no losses. Therefore, if managers act in the interests of shareholders, in principle managers should seek to maximize shareholders' wealth, by taking more risky projects. Of course, such risk shifting behaviour is detrimental to creditors' interests, unless these are able to effectively monitor managers. In the case of banks, the study of risk shifting is of special relevance, as banks are in general highly levered respect to non financial firms, which means they experience stronger incentives to risk shifting practices. According to agency theory, risk taking behaviour is influenced by conflicts between managers and shareholders (Jensen and Meckling, 1976). Instead of maximizing shareholders' wealth, managers can pursue their own interests, by enjoying private benefits of control or preserving specific acquired human capital (Demsetz and Lehn, 1985; Kane, 1985). In addition, managers bear the specific risk of the

[1] Z-Score is a ratio where the numerator is the sum of return over average assets and the capital to asset ratio, while the denominator is the standard deviation of return over average assets (Boyd et al., 1993).

firms they manage, and for such they are expected to be more risk averse than shareholders with a diversified investment portfolio. Thus, if no mechanisms to align the interests of managers to the ones of shareholders are present, such as executive compensation contracts or effectively monitoring of managerial actions, managers would have incentives to take less risk. Therefore, a firm controlled or actively monitored by shareholders is expected to take more risk than a firm where personal managers' interests prevail. By these same arguments, a shareholder that participates in the management of the firm would experience opposite risk incentives, suggesting that such shareholder would have an attitude to take less risk than a shareholder not involved in management. Another mechanism to solve the conflict of interests between shareholders and managers is the equity ownership by managers (Jensen and Meckling, 1976; Fama and Jensen, 1983). By such mechanism, interests of shareholders and managers converge as managers' shareholdings increases, resulting in more risk taking. However, increasing levels of managers' equity ownership may provide them with voting power sufficient to pursue personal objectives, resulting in less risk taking, expropriation of shareholders, and entrenchment.

Incentives to risk taking are also influenced by ownership structure, investor protection laws and banking regulations. Conflicts of interests between managers and shareholders are argued to be more important in firms with dispersed ownership structures, as coordination problem hinders effectively monitoring of managerial actions by small shareholders, who have to rely on external monitoring through the market for corporate control (Fama and Jensen, 1983; Jensen, 1988). By contrast, conflicts between managers and shareholders are expected to be less important in firms with concentrated ownership structure, as controlling shareholders have strong incentives to monitor managers, and even replace them in the case of poor performance (Franks *et al*, 2001). Because shareholders' interests are likely to prevail in firms with concentrated ownership, we expect these firms take more risk than ones with a dispersed ownership structure. The considerations made by Burkart *et al*. (1997), however, point that as the monitoring effort exerted by a large shareholder increases, managerial initiative to pursue new investment opportunities decreases. This can be translated in terms of less risk taking by managers if concentration of ownership is high. In addition, investor protection laws and banking regulations can also play a role in the risk taking attitude of banks. Some studies point that a legal system that protect small shareholders can substitute for the existence of a large shareholder that monitors management (Shleifer and Wolfenzon, 2002; John *et al.*, 2000; Caprio *et al.*, 2007). Therefore, the role of a large shareholder in increasing risk taking by managers is expected to be more important in countries without

effective legal protection of shareholders. Finally, banking regulations aimed to avoid financial instability can affect banks' risk taking behaviour. Despite the considerable empirical research on how ownership structure and other corporate governance factors affect financial institutions' risk taking behaviour[2], only the study of Laeven and Levine (2006) analyzes the relationship between bank risk taking and ownership structure, legal protection of investors and banking regulations across a large set of countries.

However, looking only at risk taking behaviour does not convey a clear picture in terms of bank efficiency. Therefore, it is also of interest to understand how banks' performance is related with ownership structure, legal investor protection and bank regulations. Such issue, although linked to the previous risk taking discussion, deserves a separate investigation, as it may provide conclusions regarding bank corporate finance efficiency. There is little empirical evidence on the issue, contrasting with the extensive research available on the relationship between corporate performance and ownership structure of non financial firms (for a review, see Miguel *et al.,* 2004). As previously argued, monitoring of managerial actions is difficult in a firm with dispersed ownership structure. On the contrary, a concentrated ownership structure providing effective monitoring in principle is expected to enhance firm performance. However, another potential conflict of interests arises in firms with concentrated ownership, as the controlling shareholders may engage in activities that expropriate minority shareholders (Shleifer and Vishny, 1986; Faccio and Stolin, 2006). Therefore, concentration of ownership may also have a negative impact on corporate performance, due to expropriation of minority shareholders by controlling shareholders. Thus, these theoretical hypotheses of monitoring and expropriation have opposite predictions regarding the relationship between ownership concentration and performance. In their model for the role of large shareholders, Burkart *et al*. (1997) challenge the view that monitoring is purely beneficial, by describing a trade-off between the benefits of monitoring and the ones of managerial discretion. In other words, too much monitoring reduces managers' initiative to seek firm-specific investments, which is detrimental to firm value. They propose the ownership structure as a commitment device to delegate a certain degree of control to management. The mentioned theories suggest that a non linear relationship between ownership concentration and firm performance is possible. In fact, Miguel *et al* (2004) predict and find empirical evidence of a quadratic relationship, in which performance (firm value) increases at low levels of ownership concentration (due to the

[2] Saunders *et al.* (1990); Anderson and Fraser (2000), Brewer and Saidenberg (1996), Chen *et al*. (1998), Demsetz *et al*. (1996) Demsetz and Strahan, 1997; Knopf and Teall, 1996; Cebenoyan *et al*. (1999), Gorton and Rosen (1995), Sullivan and Spong (1998, 2007).

monitoring effect), and decreases at high levels (as a result of the expropriation effect). However, relying also on the theoretical argument that expropriation in general is costly (Burkart *et al*., 1998), we should expect less severe expropriation in a high concentrated ownership structure. This makes it possible a cubic relationship between ownership concentration and performance, up to now unsupported by any empirical evidence, according to Miguel *et al*. (2004). Performance or firm value is also argued to increase in the presence of strong shareholder protection laws aimed to avoid expropriation by controlling owners (Claessens *et al.,* 2000; La Porta *et al.,* 2002). Therefore, the effectiveness of shareholder protection laws affects the relationship between ownership structure and performance. The unique characteristics of banks, however, may interfere in such relationship, as argued by Caprio *et al.* (2007). First, due to the higher opacity and complexity of banks (Morgan, 2002), investor protection laws alone may not provide effective protection to small shareholders. Second, heavy regulations imposed on banks may substitute for, or interfere with investor protection laws, or make these latter superfluous. As a consequence, it is not clear that we should expect a positive impact of investor protection laws on banks' performance and valuation, as it is the case for non financial firms. Third, the emergence of bank regulations aimed to reduce expropriation by insiders (Caprio and Levine, 2002) should enhance bank performance and valuations. Fourth, the presence of deposit insurance aimed to protect depositors through the reduction of excessive risk taking by banks may cause inefficiencies in terms of performance and valuation.

With the purpose of providing a broader picture of how risk taking and expropriation incentives are shaping banks' performance, this paper analyses how both risk and performance are affected by ownership concentration, investor protection laws and banking regulations. It has similarities with the studies of Laeven and Levine (2006) and Caprio et al. (2007), both in purposes and in the cross country coverage of the databases used. However, it differs from those in three aspects. First, our database includes a larger set of observations, as it comprises not only large and often publicly listed banks, but also medium, small and not listed commercial banks around 40 countries out of the 49 for which La Porta *et al*. (1998) report data on legal protection of shareholders. As noticed by La Porta *et al.* (2002) and recognized by Caprio *et al.* (2007), focusing on largest firms makes it harder to find a relationship between investor protection and firm value, because large corporations have alternative governance mechanisms for limiting expropriation of minority shareholders, such as public scrutiny, reputation-building, foreign shareholdings, and listing on international exchanges. Thus, the decision to include a large set of banks is motivated by the fact that

small and not publicly listed banks are the ones which most need investor protection laws and regulations. Second, our risk analysis relies on the volatility of earnings as the relevant measure of risk, instead of Z-Score as in Laeven and Levine (2006). Our belief is that Z-Score is rather a measure of stability, which may not convey a correct picture of bank risk taking behaviour. Third, the methodology used for both risk taking and performance analyses is based on panel data. More specifically, we perform dynamic panel data estimations through the Generalized Method of Moments. We believe that panel data analysis is able to control for omitted variables and endogeneity, an important issue when jointly analyzing ownership structure and performance (Coles *et al*., 2007).

3. Data description

A sample of banks around the world is drawn from the *Bankscope* database. The countries selected to conduct the cross country panel data studies are the ones for which La Porta *et al*. (1998) report data on legal protection of shareholders (except New Zealand, as most banks there are owned by Australian banks). Such selection of countries also allows comparability with the studies of Laeven and Levine (2006) and Caprio *et al.* (2007). Departing from an initial database of all commercial banks from the selected 48 countries, we collected available annual data on largest owner's shareholdings and on accounting and financial numbers for the period from 1997 to 2005. To avoid duplicity of data, while keeping as many observations as possible, only unconsolidated statements were considered when collecting accounting and financial data. To avoid redundant data, banks in which the largest owner is another bank with at least 10% of shareholdings were excluded from the sample. Risk and performance variables were generated using standard deviations over a moving window of four years, which reduced the time dimension of the panel to the period from 2000 to 2005. Then, after generating other bank specific variables, and deleting multivariate outliers using the Hadi and Simonoff (1993) method, a base panel of 818 banks with 1,830 bank-year observations around 40 countries[3] is obtained for use in the performance regressions. Panels used in risk (Earnings Volatility and Z-Score) regressions differ slightly in the observations used, as multivariate outliers are computed separately for each regression.

[3] There are no observations for Colombia, Ecuador, Hong Kong, Indonesia, Norway, Pakistan, Uruguay and Zimbabwe.

3.1 Dependent variables

3.1.1. Risk

Earnings Volatility: it is the risk measure from which the main results concerning bank risk taking are derived and it consists of the standard deviation of the ratio of total earnings before taxes and loan loss provisions to average total assets, computed over a moving window of 4 years. Using data from 1997 to 2005 resulted in earnings volatility computed for a 6-year period from 2000 to 2005. Source: calculations on data from *Bankscope*.

Z-Score: it is a ratio where the numerator is the sum of return over average assets before taxes and the capital to asset ratio, while the denominator is the standard deviation of return over average assets computed over a 4 moving window of 4 year (see definition of Z-Score in section 4.1.4). It is often referred as a measure of firm stability (or distance to default). Source: calculations on data from *Bankscope*.

3.1.2. Performance

Risk-Adjusted ROA: the bank's ratio of return on average assets before taxes to the standard deviation of this same return. The standard deviation is computed over a moving window of 4 years. Source: calculations on data from *Bankscope*.

3.2. Independent variables

3.2.1. Bank specific

Ownership Concentration: the equity percentage participation of the largest shareholder of the bank. More specifically, it is the total participation of the largest shareholder taken from the *Bankscope* database, i.e., the sum of direct and indirect fractions of the bank's voting rights held by the largest shareholder, whenever this information is available. Often, only the direct participation is available, and this value is used instead. Quadratic and cubic variables for ownership concentration are also generated for examination of a cubic relationship between performance and ownership. Source: *Bankscope*.

Revenue Growth: bank's average growth in total revenues respect to the previous year. Source: calculations on data from *Bankscope*.

Size: log of bank's annual total assets in thousands of US dollars. Source: *Bankscope*.

Leverage: a bank's ratio of total debt to total assets. Source: *Bankscope*.

State Owned: a dummy indicating if the largest shareholder of the bank is the government of a country or State. It is included to control for government ownership, which is argued to affect principal-agent relationships (Levine, 2003). Source. *Bankscope*.

3.2.2. Country specific

Shareholders Rights: it is the measure of shareholders' legal protection of the country, represented by the anti-director rights index of Djankov *et al*. (2005), which is a revised version of the same index of La Porta *et al.* (1998) It is assumed constant all over the period from 1997 to 2005.

Capital: a measure of a country's regulatory restrictions on bank capital, represented by the index created by Barth *et al*. (2006). Higher values indicate greater stringency. Using data collected by those authors for years 1998 and 2003, the index is constructed for two periods: the first from 1997 to 2000 and the second from 2001 to 2005.

Official: the index of official supervisory power, created by Barth *et al*. (2006). This index is also constructed for the periods 1997-2000 and 2001-2005, using data collected by those authors.

Independence: the degree to which the country's supervisory authority is independent from the government and legally protected from the banking system. Source: Barth *et al*. (2006).

Deposit Insurance: a dummy variable indicating if the country has explicit deposit insurance or not (yes = 1, no = 0). Source: Demirguç-Kunt *et al*. (2005).

Restrict: index of a country's regulatory restrictions on banks ability to engage in securities market activities, the insurance business, conduct real estate activities, or own non-financial firms. Source: Barth *et al*. (2004)

Diversification: dummy for diversification guidelines imposed on banks. It takes a value of one if there are explicit, verifiable, quantifiable guidelines regarding asset diversification for banks, and zero otherwise. Source: Barth *et al*. (2004).

GDP: measure of a country's economic development, represented by the log of annual gross domestic product per capita (in terms of US dollars). Source: IMF.

GDP Growth: measure of a country's overall level of economic activity, expressed by the annual percentage growth in the gross domestic product. Source: IMF.

Country-Average ROA: return on assets averaged across all banks in the country. Source: calculations on data from *Bankscope*.

Table 1 reports the descriptive statistics of the variables in the selected panel (1830 observations, 818 banks). Table 2 shows mean values of some key bank-level variables by country. Table 3 shows the matrix of correlations between all variables, except Deposit Insurance.

Insert Tables 1 , 2 and 3 about here

3.3 Methodology

The methodology chosen to derive the results in this paper is based on panel data analysis. More specifically, we perform dynamic panel estimations using the so-called system Generalized Method of Moments (GMM), a combination of the estimation techniques proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

Our choice is first justified by the characteristic of the database available, which consists of observations of bank accounting and ownership variables distributed along a period of 9 years (from 1997 to 2005). As described in the previous section, an unbalanced panel composed of 1,830 bank-year observations, comprising 818 banks, along 6 years (from 200 to 2005) was obtained after generating variables for bank risk and performance, and eliminating multivariate outliers.

A key variable on the analyses performed is the Ownership Concentration, defined as the sum of the direct and indirect fractions of bank's voting rights held by its largest shareholder. A concern would arise in using panel data techniques, if this variable were stable over time. However, for the panel used, there is variability in the Ownership Concentration variable for almost 80% of the banks.

The main justification for the use of panel data analyses in this study is that, by introducing the time dimension, panel data techniques are able to mitigate the influence of spurious characteristics in the relation between managers and shareholders. Similarly to Coles *et al.* (2006, 2007), we assume that risk, performance and ownership structure are jointly determined. It means that applying OLS techniques to our data would produce biased coefficients, provided that regressors are endogenous to the dependent variables. Following Roodman (2006), additional features of our data have driven our choice to system GMM, instead of traditional Random of Fixed effects static panel data estimation. First, our dependent variables (risk and performance) are dynamic, in the sense that they depend on past realizations. This is intuitively true, as risk and performance are likely to experience time clustering. Also, our risk and performance measures depend on their past value by

construction, as they consist or include a standard deviation calculated in a moving window of four periods. Second, other bank specific variables are suspected to be endogenous or not strictly exogenous, such as leverage and size. Third, the panel used has few time periods and a large number of observations. Fourth, our specification is overidentified, in the sense that we have more instruments (strictly exogenous independent variables) than parameters (predetermined, endogenous and not strictly exogenous variables). Finally, heteroskedasticity and autocorrelation within banks, but not across them, are assumed.

All panel regressions performed in this study use system GMM, which means that a system of two equations is used for each model – the original equation and a transformed one. Pre-determined and not strictly exogenous transformed variables of the transformed equation are instrumented with their available lags in levels, whereas the variables in levels of the original equation are instrumented with suitable lags of their own first differences. The use of system GMM is argued to dramatically improve efficiency, respect to the so-called difference GMM, which consists only of the transformed equation. In this study, the transformation used in the second equation is the forward orthogonal deviations, which preserves the sample size of our unbalanced panel. We adopt the two-step estimation procedure with the finite-sample correction of standard errors proposed by Windmeijer (2005), which produce coefficients less biased and lower standard errors.

For all regressions, two lags of the dependent variable were included as regressors (pre-determined variables). The choice of the two different sets of instruments respective to their equations, adopted the following procedure. Lags of pre-determined variables and Ownership Concentration were always considered as instruments (namely, the GMM instruments set) to the transformed equation. Eventually, Revenue Growth, Leverage and Size (bank specific variables), which are suspected to be not strictly exogenous, are also included as GMM instruments. The lags of the first differences of all remaining variables not included in the GMM instruments set compose the so-called IV-styled instruments set.

The regressions were run using the “xtabond2” program implemented by Roodman (2006). All regressions specifications are overidentified according to the Hansen test of overidentification restrictions (Hansen, 1982). Also, all the GMM and IV-styled instruments sets chosen are valid, as confirmed by the “difference in Hansen” test performed for each set of each regression (Hansen, 1982). Finally, the Arellano-Bond test for autocorrelation in the idiosyncratic disturbance term (aside from the fixed effect) is reported for each regression.

4. Results

4.1. Bank risk taking

4.1.1. Overall picture

According to the risk shifting hypothesis, a bank controlled or effectively monitored by shareholders is expected to take more risk than a bank without these characteristics. Therefore, we expect risk increases with the level of shareholdings of the ultimate owner. Also, shareholders protection laws and banking regulations are expected to substitute for the existence of a large shareholder to monitor managers. To test for the risk shifting hypothesis and the role of shareholders protection laws and banking regulations on bank risk taking, GMM panel regressions of Earnings Volatility on Ownership Concentration and on legal and banking regulations variables, controlled for other bank and country specific variables are run. Results are in Table 4. Regression results in column *R1* including only some bank and country specific independent variables do not provide evidence of the risk shifting hypothesis, as the coefficient of Ownership Concentration is not significant. As shown in column *R2,* the inclusion of Leverage and State Owned variables does not change this result. Finally, the regression in column R3, which includes also bank regulations and shareholders rights variables, does not report a role for Ownership Concentration. Similarly, shareholders legal protection is not important to explain bank risk taking. Turning to bank regulations, there is evidence that bank risk increases with the level of Capital requirements stringency, the Independence of supervisory authority, and the adoption of Deposit Insurance. The evidence found on the Capital variable contrasts with the absence of such relationship in Laeven and Levine (2006). Together with the evidence of a positive relationship between Z-Score and Capital in Table 6, column *R1*, our results tell that both bank risk taking and stability increase when Capital requirements increase. Such evidence support Basel II's policy recommendation on the stringency of capital requirements. Conclusions regarding the Independence variable are not straightforward. In principle it should not be expected, as an independent authority should be more effective in reducing excessive bank risk exposures. Nonetheless, if an independent supervisor is able to induce a more efficient risk management by banks, this would not result necessarily in less bank risk taking, which in turn does not invalidate our evidence. However, caution is recommended when using the independence index, as pointed by Barth et al. (2006), who suggest using it simultaneously with information on national political institutions. Some country and bank specific controls are significant to explain

Earnings Volatility. As expected, higher levels of GDP per capita reduce bank risk taking. Country-Average ROA also reduces risk, which in principle is not expected, as return and risk should be positively related. However, from the viewpoint of risk management efficiency, such result may make sense. In fact, the performance analysis at the end of this section shows that Country-Average ROA, a measure of a country's bank industry profitability, is positively associated with bank performance (Table 7, column *R3*). An alternative explanation is that banks might be reluctant to take excessive risk in a very profitable environment, as argued by Laeven and Levine (2006). Next, a negative relationship between Leverage and risk is reported, which in principle sounds unexpected. However, the explanation may be the existence of endogeneity between Size, Leverage and Earnings Volatility. Looking at Table 2, we see a high negative correlation between Size and Earnings Volatility, which makes sense intuitively. Therefore, through the high positive correlation between Size and Leverage, the negative relationship between Leverage and risk reported in the regression also makes sense. In other words, if a bank is high levered, it is likely the case that it is also a large bank, which in turn is likely to experience less risk taking due to greater stability and diversification of portfolios and activities, respect to small banks. Finally, the State Owned variable is not significant, which means that a bank managed by the government does not differ from other banks with respect to their risk taking behaviour.

4.1.2. Controlling for legal system protection of shareholders

To check if ownership concentration differently affects bank risk taking across country legal protection of shareholders, regressions on two sub samples are run. Columns *R1* and *R2* of Table 5 present the results of regressions considering respectively banks in countries with high shareholders rights (anti-director rights index from 4 to 5), and low shareholders rights (index from 0 to 2). In both cases, no evidence is found on the importance of ownership concentration to explain bank risk taking. In the case of countries with high shareholders protection, such evidence supports the theoretical argument that effective legal protection of shareholders serve as a substitute for the existence of a large shareholder that monitors management, increasing bank risk taking. However, in the case of countries with poor shareholders legal protection, such evidence contradicts the theoretical prediction that ownership concentration provides risk taking incentives to management. Concerning the role of banking regulations, the independence of the supervisory authority is still important. However, while supervisor's independence increases bank risk in countries with strong shareholders protection, such relationship is negative in countries with weak protection. A

possible explanation is that in countries where legal system fails to protect investors and align managers' and shareholders' interests, an independent supervisor is effective in reducing bank risk taking, whereas in countries with strong shareholders protection, an independent supervisor induces more efficient risk management by banks, which results in more risk taking.

4.1.3. Other controls

The next four regressions assess the importance of ownership concentration and bank regulations to bank risk taking when considering subsets of large/small banks and listed/non-listed banks. This is to recognize that the importance of a large owner that monitors managers and encourage bank risk taking depends on the presence of additional governance mechanisms to which often only large and publicly listed firms are subject. Also, as small and not public listed banks are argued to be the ones who most need regulations, such analyses allow an investigation of the relative importance of bank regulations to these subsets of banks. Columns *R3* and *R4* of Table 5 contain the results of regressions on large and small banks subsets, respectively. Large banks included in the sample are the 20 largest banks in each country. Evidence for this subset is that ownership concentration does not help to explain bank risk, which is an expected result, considering that probably other governance mechanisms work to shape risk taking behaviour of large banks. The sample of small banks is composed by banks which size is equal or lower than the 25-percentile of the distribution of the variable Size. Frustrating our expectations, we did not find a relationship between ownership concentration and risk also for small banks. Shareholders rights are found to be negative related to bank risk for large banks, but no relationship is found for small banks. Therefore, the higher the efficiency of the legal system that protects shareholders, the lower the risk taken by large banks. Risk taking in small banks, on the contrary, are not affected by the level of protection of shareholders, probably because these banks are not even subject to this governance mechanism. Concerning bank regulations, the Capital and Independence variables are no more important to explain bank risk taking in these subsets.. For large banks, another regulatory variable becomes important to explain risk: the higher the Official supervisory power, the lower the bank risk taking. None of the bank regulations variables is important to explain risk in the small banks subset, which is somewhat surprising, as in the absence of legal and market governance sophisticated mechanisms, bank regulations might shape small banks risk taking.

Turning to the publicly listed/non-listed banks, the evidence points that ownership concentration is important only for non-listed banks, for which a positive relationship between it and risk is verified, whereas no relationship is found for listed banks. As commented before, this is an expected result, as risk taking at listed banks is influenced by alternative governance mechanisms, rather than relying on a concentrated ownership structure.

A common evidence for both small and non-listed banks is a negative relationship between risk and the Country-Average ROA variable. We interpret that risk taking in these banks are explained more by the business cycle, measured by the level of profitability in the industry, than by their ownership structure, or country specific legal system and regulations.

Insert Tables 4 and 5 about here

4.1.4. Z-Score analysis

Regressions are also run on Z-Score as a dependent variable. For the complete sample, column *R1* of Table 6 shows no evidence that ownership concentration influence Z-Score. Including Leverage as a regressor does not change this result, as shown in column *R2*. Restricting the sample to the 20 largest banks in each country, however, we do find a negative relationship between ownership concentration and Z-Score, which should mean that risk increases with ownership concentration (column *R3* in Table 6). Assuming that our ownership concentration variable is highly positively correlated with cash flow rights, such result agrees with the finding of Laeven and Levine (2006). However, by construction, Z-Score itself is correlated with leverage. Therefore, if leverage is included as an independent variable in the regression, the negative relationship between Z-Score and ownership concentration disappears, as can be seen in Table 6, column *R4*. This latter evidence coincides with the result obtained in the previous subsection 4.1.3, which is the absence of relationship between ownership concentration and risk measured by earnings volatility (Table 5, column *R3*). Looking closer at the definition of Z-Score (for instance, see Boyd et al., 1993), it can be decomposed in three parts: the first is the risk-adjusted ROA, the second is the inverse of the standard deviation of ROA and the third is the negative of the ratio between leverage and the standard deviation of ROA:

$$Z-Score=\frac{ROA+CAR}{\sigma(ROA)}=\frac{ROA}{\sigma(ROA)}+\frac{E/V}{\sigma(ROA)}=\frac{ROA}{\sigma(ROA)}+\frac{1-D/V}{\sigma(ROA)}$$

$$\Rightarrow Z-Score=\frac{ROA}{\sigma(ROA)}+\frac{1}{\sigma(ROA)}-\frac{Leverage}{\sigma(ROA)}=RiskAdjustedROA+Risk^{-1}-\frac{Leverage}{\sigma(ROA)}$$

, where ROA is return over total assets, CAR is capital-asset ratio, and $\sigma(ROA)$ is the standard deviation of ROA.

In other words, Z-Score is a measure of performance (Risk-Adjusted ROA), plus an inverse measure of risk, minus a measure of financial leverage. It is often referred as a measure of stability, as it represents the inverse of the probability of insolvency of a firm. One can see a variation in Z-Score as the result of variations in its components. A decrease in performance, an increase in risk, or an increase in leverage, causes a decrease in Z-Score. Therefore, a change in Z-Score can be misinterpreted as change in risk. For instance, in a situation where expropriation causes poor performance, a decrease in Z-Score can be wrongly interpreted as an increase in risk. For such, caution is required when relying on Z-Score as a measure of risk.

In the next section, an analysis of how bank performance is related to ownership structure, investor protection laws, bank regulations and other bank and country specific factors, will shed a light also on the relationship between bank risk taking and these factors.

Insert Table 6 about here

4.2. Performance

Regarding performance, the cubic hypothesis for the relationship between bank performance and ownership concentration is assessed, taking into account country specific legal protection of shareholders, bank regulations, and other bank and country specific traits. Results in Table 7 show the evidence of a cubic relationship between ownership concentration and bank performance, with significance at the 5% level of the linear, quadratic and cubic coefficients. The correspondent roots of the equation relating bank performance to ownership

concentration confirm the positive effect of monitoring on performance, when the largest shareholder's stake increases until 34.25% (e. g., Burkart *et al.,* 1997). For values of concentration of ownership from 34.25% to 82.10%, bank performance decreases, supporting the hypothesis of expropriation of minority shareholders by the main shareholder (Shleifer and Vishny, 1986; Faccio and Stolin, 2004), or alternatively, the increasing costs of managerial loss of discretion (Burkart *et al.,* 1997). From values of ownership concentration from 82.10% to 100%, bank performance increases, giving support to the hypothesis that expropriation is reduced as a consequence of its increasing costs imposed to the main shareholder (Burkart *et al*., 1998).

Evidence does not confirm a positive effect of shareholders protection laws on bank performance. However, many bank regulations variables are significant when explaining bank performance. Coefficients with high significance are obtained for the variables Capital (index of restrictions on bank capital), Independence (of the supervisory authority), and Deposit Insurance. In the case of Capital, the positive coefficient found means that more stringent regulations on capital contribute to increase bank performance. Again, such evidence is in favour of Basel II's policy recommendation on the stringency of capital requirements, and reassures the evidence found for the increase in bank risk and stability as Capital variable increases (see section 4.1.1). The Deposit Insurance coefficient is also positive, meaning that the adoption of explicit deposit insurance enhances bank performance. In addition, the greater the Independence of the supervisor the greater is bank performance. There is also a weak evidence of a decrease in bank performance as the Official supervisory power increases. The message left for policy makers is that more independent and less powerful bank supervisors enhance bank performance. Finally, a weak evidence that regulatory restrictions on bank activities increase performance is also found, which supports such kind of regulation. It might be that restrictions are doing their job in reducing risk taking, with an impact of increasing performance. However, one might expect that restrictions avoid diversification, which in turn increase risk and decrease performance.

We also find strong evidence that State Owned banks performs worse than the rest of banks. Moreover, bank specific variables of Size and Revenue Growth, as well as the Country-Average ROA, also have a very significant positive impact on performance.

Insert Table 7 about here

Summarizing, we can draw the following figure for the relationship between ownership concentration and performance:

Insert Figure 1 about here

4.3. Bank risk revisited

The inconclusive results concerning how bank risk varies with ownership concentration lead us to investigate a possible non linear relationship between these variables. Theory tells that the monitoring effort exerted by the large shareholder increases as his shareholdings increases. However, at the same time, managerial incentives to exert effort decreases as monitoring increases, because managers have less discretion to act (Burkart *et al*, 1997). Therefore, a firm controlled or effectively monitored by shareholders should take more risk than a firm where private interests of managers prevail. Nevertheless, too monitoring may lead to less discretion of managers, and as consequence, to less risk taking. Also, if shareholder participates in the management, his appetite for risk taking is likely to decrease, as managers' interests prevail over shareholders' ones. We do not have information if the largest shareholder also is actively involved in management, but it is reasonable to expect that the degree of involvement increases with the level of shareholdings. Also, it is an important question if the expropriation of minority shareholders by the main owner in a concentrated ownership structure is going to reduce also risk taking, in addition to deteriorate corporate performance. The answer to this question is not trivial, as illustrated by Table 3, which reports a negative correlation of 0.2106 between risk (Earnings Volatility) and performance (Risk-adjusted ROA). Finally, another question is whether for high ownership concentration, disincentives to expropriate, due to high costs, also increase risk taking, in addition to an expected increase in performance. To assess such considerations, a hypothesis of a cubic relationship between bank risk and ownership concentration is proposed, where:

Bank risk increases with ownership concentration at low levels of concentration, due to effective monitoring by shareholders, decreases at intermediate levels of concentration, due to expropriation of minority shareholders or less managerial discretion, and increases at high levels of concentration, due to the high costs to expropriate.

Table 8 presents the results of a dynamic panel GMM regression that confirm the hypothesis of a cubic relationship between bank risk and ownership concentration, considering the same sample used in the regressions for Performance (Section 4.2). However, evidence found is not so strong, as significance for the linear and quadratic coefficients is at the 10% level.

Insert Table 8 about here

The roots of the cubic equation on ownership concentration are 24.56% and 77.67%. Figure 2 exhibits the cubic relationship of the portion of Earnings Volatility explained by Ownership Concentration.

Insert Figure 2 about here
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5. Conclusions

This paper departs from an analysis of the connection between banks' ownership structure and their risk policies to conclude that ownership concentration has a non-linear relationship with risk. This has lead us to investigate whether this connection is translated in a non-linear relationship between ownership concentration and performance. Borrowing from the literature on non-financial firms (Morck *et al.* 1988) we have proposed a cubic relationship between both variables.

We explain this S-shape relationship relying on the two main agency problems that appear within an organization, independently whether it is financial or non-financial. The problem between managers and shareholders that appears in the absence of appropriate incentives or sufficient monitoring to align manager's interest with that of shareholders (we can define it as agency problem one, APO). The second agency problem appears between controlling shareholders and minority ones. This generates expropriation of controlling shareholders at the expense of minority shareholders (we can define it as agency problem two, APT). The role of corporate governance mechanisms, like ownership structure, is to mitigate both agency costs (Sheiffer and Vishny, 1997). In particular, when ownership concentration is low, the APO is particularly harmful. In this situation, an increase in ownership concentration reduces the free-riding in monitoring that appears in dispersed ownership structures. As consequence, APO is alleviated, and performance should improve. This logic applies until the point where the ownership concentration is high enough such that shareholders with a significant stake (blockholders) emerge. These blockholders have power high enough to force the firm to follow practices that only favor blockholders' interests (APT). In this situation, the APT is more important than the APO and becomes particularly important as the ownership concentration increases. The result is a decrease in performance. Finally, when ownership concentration is quite large, blockholders have a stake high enough to internalize a very significant proportion of the expropriating costs. In that case, the incentives to expropriate decrease. This should lead to an improvement in performance. An alternative explanation for a decrease in performance for moderate levels of ownership concentration is the trade-off between the benefits of monitoring and those of managerial discretion, proposed by Burkart et al. (1997). In other words, as monitoring by shareholders increases, managers have less discretion and initiative to seek new investment opportunities, which reflects in decreasing performance.

This theoretical contention is analyzed using an international database extracted from *Bankscope* database, that covers commercial banks from 40 different countries for the period from 2000 to 2005. The results confirm our arguments and show that the expropriation region is between 34% and 82%. This is remarkable given that a significant proportion of banks have (around 30%) a stake of the three largest blockholders in that region, which gives us a warning signal of the seriousness of the problem in financial institutions, particularly in countries with a weak corporate governance system. This kind of situation introduces inefficiencies in the functioning of banks that may well have perverse effect on the overall financial system. To investigate these issues in a deeper level should be the subject of some future research.

A final comment is that our results help to shed a light on the issue of whether banks are different from non-financial firms. We obtained non-linear (cubic) relationships between ownership structure and bank risk and performance that do not importantly diverge from the empirical evidence available for firms in general (see a survey by Miguel *et al.* 2004). Therefore, even presenting unique characteristics that make them differ from non-financial firms (e. g., higher leverage, greater opacity and heavy regulations), our evidence show that banks behave in the same way as firms in general, in response to the same agency problems and similar corporate governance mechanisms they are subject, when compared with non-financial firms. Specifically, our evidence support traditional theoretical hypotheses of effective monitoring by shareholders, expropriation of minority shareholders by controlling shareholders, loss of managerial discretion and internalization of expropriation costs.

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TABLES AND FIGURES

Table 1 – Descriptive Statistics
(Panel with 1830 observations of 818 banks around 40 countries, for the 2000-2005 period)

Variable	*Median*	*Mean*	*Std. Deviation*	*Minimum*	*Maximum*
Earnings Volatility	0.0043861	0.0088625	0.0193904	0.0000616	0.3468873
Z-Score	22.27226	39.03593	141.9235	-2.25241	5383.002
Risk-Adjusted ROA	2.540981	3.231148	3.615277	-4.01723	23.78284
Own. Concentration	59.55	57.34242	39.61993	0.01	100
Revenue Growth	0.1246522	0.1461647	0.3148627	-1.275445	1.925778
Size	14.41282	14.50952	2.080025	9.106977	20.86743
Leverage	0.9215213	0.890151	0.0897964	0.4044261	1.092401
State Owned	0	0.1377049	0.3446842	0	1
Capital	5	4.913115	1.569806	1	9
Official	11	10.56311	2.616813	6	15.5
Independence	1	1.469399	0.9109582	0	3
Deposit Insurance	1	0.9142077	0.2801337	0	1
Restrict	8	8.281831	2.806495	5	13
Diversification	0	0.4551913	0.4981242	0	1
Shareholders Rights	3	3.370219	0.9546659	0	5
Log (GDP per capita)	10.28002	9.47719	1.459891	5.831856	10.82749
GDP growth	2.1	2.625137	2.766594	-10.9	18.3
Country-Average ROA	0.9523081	1.098256	1.45519	-11.7282	8.158765

Table 2 – Country Descriptive Statistics (Mean values of key bank-specific variables by country)

	Country	*Observations*	*Banks*	*Earnings Volatility (10^{-2})*	*Risk-Adjusted ROA*	*Z-Score*	*Own. Conc. (%)*	*Size*	*Leverage*
1	ARGENTINA	45	24	6.401	0.2145	6.61	71.64	12.625	0.818
2	AUSTRALIA	27	13	0.325	4.6343	27.52	36.67	16.543	0.939
3	AUSTRIA	53	20	0.736	3.2219	35.39	69.57	13.210	0.876
4	BELGIUM	26	11	0.384	4.2763	31.54	76.52	14.101	0.917
5	BRAZIL	72	36	2.398	2.7402	18.29	73.53	14.193	0.843
6	CANADA	9	4	0.691	1.5510	21.35	78.63	12.161	0.857
7	CHILE	24	9	0.260	7.2999	48.75	70.49	14.905	0.907
8	DENMARK	71	28	0.554	4.2763	32.17	28.12	14.131	0.891
9	EGYPT	44	14	0.626	1.7438	27.97	54.28	14.322	0.910
10	FINLAND	4	2	0.193	4.8919	33.74	33.23	15.240	0.949
11	FRANCE	167	67	0.544	3.8784	41.55	72.81	14.832	0.908
12	GERMANY	228	90	0.644	2.3133	79.36	75.20	13.845	0.905
13	GREECE	14	7	1.629	2.6036	21.13	42.59	16.159	0.920
14	INDIA	105	38	0.733	3.4325	16.60	70.60	15.110	0.943
15	IRELAND	20	7	0.139	4.6030	55.74	73.62	14.822	0.949
16	ISRAEL	24	8	0.295	1.4506	17.50	57.67	16.197	0.935
17	ITALY	71	30	0.349	3.6684	36.31	39.59	15.278	0.912
18	JAPAN	146	81	0.279	1.8309	30.17	9.66	17.123	0.949
19	JORDAN	7	3	0.494	6.0038	38.71	17.77	14.033	0.893
20	KENYA	26	14	0.976	4.3131	44.78	36.65	10.829	0.818
21	KOREA REP. OF	26	10	0.418	2.1697	14.17	46.49	17.455	0.948
22	MALAYSIA	33	16	0.575	3.5604	27.54	52.62	15.742	0.910
23	MEXICO	7	3	4.130	0.9713	14.05	35.24	12.502	0.785
24	NETHERLANDS	15	7	0.331	2.2149	25.48	53.15	14.286	0.930
25	NIGERIA	41	20	1.250	4.6313	21.12	57.39	12.993	0.859
26	PERU	14	7	1.226	3.0737	34.42	70.74	12.808	0.885
27	PHILIPPINES	26	13	0.682	3.6396	42.83	38.42	13.734	0.845
28	PORTUGAL	21	9	0.701	2.7873	30.69	68.18	15.226	0.889
29	SINGAPORE	10	4	0.217	3.6197	59.55	82.75	15.501	0.866
30	SOUTH AFRICA	9	4	1.952	1.2661	8.08	100.00	12.424	0.844
31	SPAIN	44	22	0.331	6.5050	77.27	65.65	14.480	0.877
32	SRI LANKA	16	7	0.655	3.2776	21.93	26.43	13.200	0.937
33	SWEDEN	8	4	0.565	2.4364	28.58	59.08	17.213	0.888
34	SWITZERLAND	180	76	1.184	4.0130	51.11	69.11	12.910	0.791
35	TAIWAN	43	22	0.313	0.9802	20.78	24.69	15.924	0.936
36	THAILAND	18	7	0.583	1.6104	10.85	47.97	16.510	0.930
37	TURKEY	26	13	2.330	1.8807	9.16	63.90	15.574	0.839
38	UNITED KINGDOM	47	20	0.536	2.4018	41.58	81.45	13.278	0.844
39	USA	54	41	0.385	6.3017	41.43	37.54	15.125	0.908
40	VENEZUELA	9	7	2.051	3.0934	12.88	23.30	13.673	0.866
	Whole Sample	1830	818	0.886	3.2311	39.04	57.34	14.510	0.890

Table 3 – Correlation Matrix
(Panel with 1830 observations of 818 banks around 40 countries, for the 2000-2005 period)

	Earnings Volat.	Z-Score	Risk-Ad ROA	Own. Conc.	Revenue Growth	Size	Lever.	Shar. Rights	Capital	Official	Indep..	Restrict	Diversif	GDP per capita	GDP Growth
Earnings Volatility	1														
Z-Score	-0.0679*	1													
Risk-Adjusted ROA	-0.2106*	0.1757*	1												
Own. Concentration	0.0835*	-0.0383	-0.0448	1											
Revenue Growth	-0.0401	-0.0186	0.0942*	0.0585*	1										
Size	-0.2569*	-0.0148	0.0334	-0.2075*	-0.0186	1									
Leverage	-0.2971*	-0.0162	0.0392	-0.1294*	0.0138	0.5513*	1								
Shareholder Rights	0.0246	-0.0624*	0.0623*	-0.0733*	-0.023	0.1844*	0.0983*	1							
Capital	0.0307	0.0184	0.0887*	0.0184	0.0863*	-0.2720*	-0.1772*	-0.0384	1						
Official	0.0233	-0.0343	0.0241	-0.1070*	-0.045	-0.0376	-0.2047*	0.1615*	0.2051*	1					
Independence	0.0118	-0.005	0.0751*	0.1202*	-0.0470*	-0.1984*	-0.1855*	0.0929*	0.0740*	0.5778*	1				
Restrict	-0.0059	-0.0938*	-0.0613*	-0.3561*	-0.0824*	0.4006*	0.2334*	0.4110*	-0.2008*	0.2933*	-0.1253*	1			
Diversification	0.0552*	-0.0056	0.0028	-0.0133	-0.0930*	-0.0345	-0.1306*	0.0624*	-0.2983*	0.1778*	0.3096*	-0.0825*	1		
GDP per capita	-0.1497*	0.0763*	0.0283	-0.0387	-0.0369	0.0954*	-0.0134	-0.3075*	-0.0384	-0.1465*	-0.1564*	-0.3573*	0.2094*	1	
GDP Growth	0.1255*	-0.0596*	0.0202	-0.0639*	0.0562*	0.1080*	0.0781*	0.3957*	-0.0381	0.2106*	0.1212*	0.3420*	-0.1327*	-0.5391*	1
Country-Av. ROA	-0.0343	-0.008	0.1431*	-0.0252	0.1031*	-0.0493*	-0.0828*	-0.037	0.2166*	0.2848*	0.1908*	0.0299	-0.1364*	-0.1061*	0.3533*

* Significant at the 5% level.

Table 4 – Relationship between Bank Risk Taking, Ownership Structure, Laws, and Banking Regulations.

Dependent variable: Earnings Volatility. GMM dynamic panel-data regressions[+] over the period 2000-2005. (Two-step system GMM, orthogonal deviations transform, Windmeijer's std errors correction).

	Independent variables	*(R1)*	*(R2)*	*(R3)*
	Bank Specific			
1	Earnings Volatility (t-1)	0.8137201 *** (0.1120584)	0.8226958 *** (0.107989)	0.9193723 *** (0.0679096)
2	Earnings Volatility (t-2)	-0.1251172 *** (0.020056)	-0.1281152 *** (0.0193367)	-0.1202688 *** (0.0374239)
3	Ownership Concentration	0.00000108 (0.00000925)	0.000000723 (0.00000886)	0.000000375 (0.000008)
4	Revenue Growth	-0.0002762 (0.0003969)	-0.0002186 (0.0003916)	-0.0002581 (0.0003211)
5	Size	-0.0001904 (0.0001291)	-0.0000522 (0.0000908)	0.0000626 (0.0000615)
6	Leverage		-0.0070133 ** (0.0034825)	-0.0054288 * (0.0029408)
7	State Owned		0.0002908 (0.0002887)	0.0003562 (0.000245)
	Country Bank Regulations			
8	Capital			0.0001974 ** (0.0000811)
9	Official			-0.0000396 (0.00006)
10	Independence			0.000286 * (0.0001621)
11	Deposit Insurance			0.0007175 *** (0.0002552)
12	Restrict			0.00000292 (0.000062)
13	Diversification			0.0002746 (0.0002282)
	Other Country Specific			
14	Shareholders Rights			-0.0001308 (0.0001716)
15	Log (GDP per capita)	-0.0003877 *** (0.0000957)	-0.0003935 *** (0.0000981)	-0.0004005 *** (0.0001093)
16	GDP growth	-0.000101 (0.0000783)	-0.0001017 (0.0000774)	-0.0000666 (0.0000735)
17	Country-Average ROA	0.0000897 (0.0000697)	0.0000721 (0.0000693)	-0.0003323 *** (0.0001242)
	Other			
18	Year 2002	0.0000163 (0.0002907)	0.0000319 (0.0002869)	-0.0000562 (0.0002822)
19	Year 2003	0.0001985 (0.0003062)	0.0001837 (0.000303)	0.0002393(0.00 02827)
20	Year 2004	-0.0001195 (0.0003209)	-0.0001564 (0.0003091)	-0.0001315 (0.0002895)
21	(constant)	0.0083129 *** (0.0026978)	0.012608 *** (0.0044622)	0.0080259 * (0.004102)
Number of observations		1,834	1,834	1,688
Number of groups (banks)		833	833	767
Number of instruments		44	46	53
GMM-style instruments		1, 2, L2(3)	1, 2, L2(3)	1, 2, L2(3)
IV-style instruments		4, 5, 15-20	4-7, 15-20	4-20
F (variables; groups - 1)		69.21 ***	58.53 ***	62.58 ***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)		0.31 0.756	0.23 0.818	0.19 0.845

[+] Std errors in parentheses; Significance levels: *** 1%, ** 5%; * 10%.

Table 5 – Relationship between Bank Risk, Own. Structure, Laws, and Bank Regulations.

Dependent variable: Earnings Volatility. GMM dynamic panel-data regressions[+] over the period 2000-2005. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction): (*R1*): High Shareholders Rights; (*R2*): Low Shareholders Rights; (*R3*): Large Banks; (*R4*) Small Banks; (*R5*): Listed Banks; (*R6*) Non-Listed Banks.

	Independent variables	*(R1)*	*(R2)*	*(R3)*	*(R4)*	*(R5)*	*(R6)*
	Bank Specific						
1	Earnings Volatility (t-1)	0.71171 *** (0.1282023)	0.61594 *** (0.0910844)	0.59208 *** (0.1619378)	0.87492 *** (0.0804695)	0.376834 ** (0.1646544)	0.84916 *** (0.066545)
2	Earnings Volatility (t-2)	-0.1096757 (0.0719642)	-0.0696991 (0.0438615)	-0.0676326 (0.0658009)	-0.0732853 (0.0699612)	-0.0625499 (0.0580798)	-0.118103 ** (0.05674)
3	Ownership Concentration	-0.00000205 (0.0000090)	-0.000015 (0.0000178)	0.00000417 (0.0000082)	-0.00000155 (0.0000216)	0.000002 (0.0000255)	0.0000182 * (0.0000106)
4	Revenue Growth	-0.0007115 (0.0004693)	-0.0002147 (0.0004053)	-0.0001128 (0.0004147)	-0.000062 (0.0002994)	0.0005368 (0.0005549)	-0.0003997 (0.0008371)
5	Size	-0.0000662 (0.0000933)	0.0000195 (0.0000972)	0.00000241 (0.0001049)	0.0004597 (0.000418)	-0.000131 (0.0001242)	-0.000887 * (0.0005115)
6	Leverage	-0.0008689 (0.0055767)	-0.00929 *** (0.003223)	-0.014651 ** (0.0067732)	-0.0075525 (0.004724)	-0.02150 ** (0.0085142)	0.0002031 (0.0057783)
7	State Owned	0.0001269 (0.0003413)	-0.0006501 (0.0004768)	0.000684 (0.0004845)	0.001780 ** (0.0007382)	0.000242 (0.0006552)	0.0005945 * (0.0003114)
	Country Bank Regulations						
8	Capital	0.000065 (0.0001028)	-0.001288 ** (0.000592)	0.0000771 (0.0001241)	0.0000412 (0.0002838)	-0.0000991 (0.0001968)	-0.00000266 (0.0002013)
9	Official	-0.0000756 (0.0001107)	0.000752 ** (0.0003107)	-0.000210 ** (0.0001038)	0.0000117 (0.000183)	0.00000984 (0.0001481)	0.0000573 (0.0000971)
10	Independence	0.0003812 * (0.0002014)	-0.001968 ** (0.0008889)	0.0002051 (0.0002227)	0.0007255 (0.0006305)	0.0000721 (0.000349)	0.0001822 (0.0002455)
11	Deposit Insurance	0.0006232 (0.0006445)	-0.0006242 (0.0020914)	0.0005765 (0.0005454)	0.0011135 (0.0012513)	0.0007919 (0.000743)	0.00153 *** (0.0003886)
12	Restrict	0.0000189 (0.0001203)	-0.00078 *** (0.0002285)	0.0000645 (0.00012)	-0.00000651 (0.0001675)	0.0001043 (0.0001225)	0.000229 ** (0.0001056)
13	Diversification	-0.0002665 (0.0005251)	0.0012772 (0.0010071)	0.0001385 (0.0005367)	0.0002035 (0.0007318)	-0.0006551 (0.0006517)	0.0002695 (0.0003056)
	Other Country Specific						
14	Shareholders Rights	0.0004594 (0.0003916)	-0.0014016 (0.0010631)	-0.000488 ** (0.0002385)	-0.0003189 (0.0003682)	-0.0006111 (0.0004032)	-0.0000706 (0.000204)
15	Log (GDP per capita)	-0.00048 ** (0.0002176)	-0.0002674 (0.0007492)	-0.000413 ** (0.0001693)	-0.0003852 (0.0002608)	-0.000637 ** (0.0003228)	-0.0000385 (0.000212)
16	GDP growth	-0.00016 ** (0.0000726)	-0.0000222 (0.0000726)	-0.0000487 (0.0000723)	-0.000069 (0.0001628)	0.0001464 (0.000106)	0.0000407 (0.0001108)
17	Country-Average ROA	0.0000771 (0.0002325)	-0.0000259 (0.0003219)	0.0002191 (0.0001698)	-0.0006 *** (0.0001855)	0.0003033 (0.0001895)	-0.00056 *** (0.0001572)
	Other						
18	Year 2002	-0.000578 * (0.0003429)	0.0012637 (0.0008242)	0.0000665 (0.0003349)	0.0000887 (0.0011002)	0.0001277 (0.0006937)	-0.0009929 (0.0006255)
19	Year 2003	0.0002374 (0.000283)	0.0007665 (0.0007632)	0.0002642 (0.0003091)	0.0002968 (0.0011006)	0.0005933 (0.0006599)	-0.0006053 (0.0005962)
20	Year 2004	0.0003121 (0.0002386)	0.00062 (0.0007995)	0.0000314 (0.0003021)	-0.0009973 (0.0011292)	0.0002819 (0.0006409)	-0.0010341 (0.0006899)
21	(constant)	0.0060299 (0.0072942)	0.024125 ** (0.0098518)	0.020974 ** (0.0083556)	0.0050227 (0.006782)	0.03095 *** (0.0097794)	0.0103212 (0.0067783)
Number of obs.		764	447	476	422	498	1,190
Number of groups (banks)		344	199	204	211	217	550
Number of instruments		53	53	53	53	53	113
GMM-style instruments		1, 2, L2(3)	1, 2, L2(3)	1, 2, L2(3)	1, 2, L2(3)	1, 2, L2(3)	1, 2, L.(3-6)
IV-style instruments		4-20	4-20	4-20	4-20	4-20	7-20
F (variables; groups - 1)		36.11 ***	21.97 ***	14.18 ***	21.81 ***	27.65 ***	27.36 ***
Arell.-Bond test for AR(2) in 1st differences (z; Pr > z)		0.32 0.751	-0.64 0.523	-0.11 0.913	-0.31 0.758	-0.95 0.343	0.82 0.413

[+] Std errors in parentheses; Significance levels: *** 1%, ** 5%; * 10%.

Table 6 – Relationship between Z-Score, Own. Concentration, Laws, and Regulations.

Dependent variable: Z-Score. GMM dynamic panel-data regressions[+] over the period 2000-2005. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction): (R1): All the sample; (R1): All the sample, including Leverage; (R3): Large Banks; (R4) Large Banks, including Leverage.

	Independent variables	*(R1)*	*(R2)*	*(R3)*	*(R4)*
	Bank Specific				
1	Z-Score (t-1)	0.4074911 *** (0.091585)	0.4134569 *** (0.0844543)	0.2508189 *** (0.0841386)	0.2660833 *** (0.0887235)
2	Z-Score (t-2)	0.0238202 (0.0345676)	0.024566 (0.0339327)	-0.0000925 (0.0316836)	-0.0025106 (0.032468)
3	Ownership Concentration	0.034511 (0.0280195)	0.0230267 (0.0251215)	-0.0468506 * (0.02594)	-0.0198725 (0.0286782)
4	Revenue Growth	-2.058028 (2.579452)	-0.250403 (1.936868)	2.498433 (2.101881)	1.803481 (2.972943)
5	Size	4.047902 *** (1.559725)	3.40605 ** (1.552391)	-1.161199 (1.886067)	-0.231018 (1.076999)
6	Leverage		-9.657394 (20.84345)		-11.84505 (28.80207)
7	State Owned	-4.20808 ** (2.129313)	-4.236015 ** (2.057134)		
	Country Bank Regulations				
8	Capital	1.67032 ** (0.8341561)	1.115318 (0.7711368)	0.9874503 (0.8882415)	1.239085 (0.7749202)
9	Official	0.2704866 (0.4064985)	0.1107241 (0.4406152)	1.174411 (0.7817472)	0.837839 (0.7146281)
10	Independence	1.144934 (1.234431)	1.061179 (1.279962)	0.0240324 (2.10167)	0.3689739 (1.775799)
11	Deposit Insurance	3.240053 (3.105595)	2.513199 (3.17955)	2.347501 (5.332855)	0.8601564 (4.480027)
12	Restrict	-1.276941 ** (0.6280101)	-1.031624 * (0.5706437)	-0.7079018 (0.957231)	-0.821758 (0.8837416)
13	Diversification	0.5012515 (2.036165)	0.405321 (2.021935)	6.214028 ** (2.807617)	6.610519 ** (2.780769)
	Other Country Specific				
14	Shareholders Rights	-1.013 (1.064674)	-0.6945993 (1.140614)	3.036735 ** (1.371979)	2.669377 * (1.483035)
15	Log (GDP per capita)	-0.1505813 (0.9913229)	-0.0031543 (0.9788056)		
16	GDP growth	-0.3066726 (0.2155635)	-0.2779663 (0.2284919)	2.780562 ** (1.410445)	2.652293 *** (1.024569)
17	Country-Average ROA	0.4134105 (0.3963945)	0.3194017 (0.3808033)	-0.3707713 (0.7025179)	-0.2320965 (0.6730926)
	Other				
18	Year 2002	-1.528224 (1.888197)	-1.700848 (1.802141)	-1.384514 (1.684318)	-0.9486223 (1.960856)
19	Year 2003	-1.440172 (1.638711)	-1.70041 (1.596604)	-0.9317551 (2.234916)	-0.9131559 (1.928788)
20	Year 2004	0.9071106 (1.665088)	0.848129 (1.5933)	0.7348201 (1.068402)	0.5366399 (1.08651)
21	(constant)	-44.13897 ** (18.5686)	-25.28855 (18.60763)	-10.23793 (29.36912)	-10.1017 (27.09628)
Number of obs.		1,800	1,800	488	488
Number of groups (banks)		811	811	206	206
Number of instruments		91	113	89	90
GMM-style instruments		1, L.(3-5)	1, L.(3-6)	1, L.(3-5)	1, L.(3, 4, 6)
IV-style instruments		7-20	7-20	8-14, 16-20	5, 8-14, 16-20
F (variables; groups - 1)		7.52 ***	7.59 ***	4.81 ***	5.35 ***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)		-0.71 0.478	-0.65 0.515	0.28 0.783	0.26 0.793

[+] Std errors in parentheses; Significance levels: *** 1%, ** 5%; * 10%.

Table 7 – Cubic Relationship between Bank Performance and Ownership Concentration, controlled for Laws, Banking Regulations, and Bank specific factors

Dependent variable: Risk-Adjusted ROA (Return over Average Assets). GMM dynamic panel-data regressions[+] over the period 2000-2005. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction). All the sample, except banks controlled by banks.

	Independent variables	*(R1)*	*(R2)*	*(R3)*
	Bank Specific			
1	Risk-Adjusted ROA (t-1)	0.355446 *** (0.0687988)	0.3522632 *** (0.0829431)	0.3510173 *** (0.0818977)
2	Risk-Adjusted ROA (t-2)	-0.0123739 (0.0267088)	-0.0085002 (0.0290217)	-0.0099154 (0.0291825)
3	Own. Concentration	0.0940367 (0.0775023)	0.1731634 ** (0.0817024)	0.1801871 ** (0.073161)
4	Own. Concentration ^2	-0.0021738 (0.001785)	-0.0036364 * (0.0018672)	-0.0037621 ** (0.0016994)
5	Own. Concentration ^3	0.0000136 (0.0000109)	0.000021 * (0.0000114)	0.0000217 ** (0.0000105)
6	Revenue Growth	0.0161285 (0.01533)	0.5745189 *** (0.1499128)	0.5203786 *** (0.1460803)
7	Size	-0.0250446 (0.0872153)	0.1707006 *** (0.0488295)	0.1437111 *** (0.0474006)
8	Leverage	4.290553 (3.159466)	0.348038 (0.8802588)	0.558006 (0.9075811)
9	State Owned	-0.572847 *** (0.2212573)	-0.7274347 *** (0.2520025)	-0.6637895 *** (0.2300508)
	Country Bank Regulations			
10	Capital		0.2726926 *** (0.0801823)	0.224988 *** (0.0858657)
11	Official		-0.0657309 (0.0440292)	-0.0867557 * (0.0466646)
12	Independence		0.437997 *** (0.1521648)	0.4628378 *** (0.1624099)
13	Deposit Insurance		1.235888 *** (0.3313933)	1.15606 *** (0.3406606)
14	Restrict		0.0855526 * (0.0475836)	0.118663 * (0.0605887)
15	Diversification		0.0224942 (0.1959196)	0.0562499 (0.1936475)
	Other Country Specific			
16	Shareholders Rights			0.1076432 (0.0997247)
17	Log (GDP per capita)			0.1297545 (0.0901526)
18	GDP growth			-0.0218878 (0.032099)
19	Country-Average ROA			0.1716877 *** (0.0482796)
	Other			
20	Year 2002	-0.9544215 *** (0.3154356)	-1.362697 *** (0.3333891)	-1.195126 *** (0.2990632)
21	Year 2003	-0.7092336 ** (0.3198641)	-1.178878 *** (0.3417776)	-1.112988 *** (0.3175533)
22	Year 2004	-0.5468053 * (0.3030975)	-1.044217 *** (0.3387154)	-0.9731253 *** (0.3138809)
23	(constant)	-1.701618 (1.840733)	-4.635281 *** (1.602246)	-6.11413 *** (2.100452)

[+] Std errors in parentheses; Significance levels: *** 1%, ** 5%; * 10%.

Table 7 - (continued)

	(R1)	*(R2)*	*(R3)*
Number of obs.	1,983	1,830	1,830
Number of groups (banks)	886	818	818
Number of instruments	99	84	87
GMM-style instruments	1, L2(3, 4, 5), L.8	1, L2(3, 4, 5)	1, L2(3, 4, 5)
IV-style instruments	6, 7, 9-22	6-22	6-22
F (variables; groups - 1)	7.99 ***	12.24 ***	13.13 ***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)	-0.05 0.958	0.00 0.996	0.00 0.997

Table 8 – Cubic Relationship between Bank Risk and Ownership Concentration, controlled for Laws, Banking Regulations, and Bank specific factors

Dependent variable: Earnings Volatility. GMM dynamic panel-data regressions[+] over the period 2000-2005. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction). All the sample, except banks controlled by banks.

	Independent variables	*Coefficient*	*Standard Error*
	Bank Specific		
1	Earnings Volatility (t-1)	0.9850757 **	0.0334561
2	Earnings Volatility (t-2)	-0.074704 **	0.0368616
3	Own. Concentration	0.0002403 *	0.0001383
4	Own. Concentration ^2	-0.00000644 *	0.00000337
5	Own. Concentration ^3	0.000000042 **	0.0000000212
6	Revenue Growth	-0.0001337	0.0004387
7	Size	-0.0003818	0.0006194
8	Leverage	-0.0117932	0.0093917
9	State Owned	0.0006075	0.0003896
	Country Bank Regulations		
10	Capital	0.0001574	0.000184
11	Official	-0.0001505	0.0001017
12	Independence	0.0003246	0.0002413
13	Deposit Insurance	0.0012675 ***	0.0004639
14	Restrict	0.0003066 **	0.0001515
15	Diversification	-0.0000612	0.0003161
	Other Country Specific		
16	Shareholders Rights	0.0000435	0.0003037
17	Log (GDP per capita)	-0.0000395	0.0002908
18	GDP growth	-0.0001073	0.0000873
19	Country-Average ROA	-0.0005772 ***	0.0001806
	Other		
20	Year 2002	-0.0005658	0.0004986
21	Year 2003	-0.0001206	0.0004434
22	Year 2004	-0.000387	0.0004874
23	(constant)	0.0135478 *	0.0073131
	Number of obs.	1,707	
	Number of groups (banks)	780	
	Number of instruments	139	
	GMM-style instruments	1, 2, L.(3, 4, 7, 8), L2(5)	
	IV-style instruments	6, 9-22	
	Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)	0.76 0.448	

[+] Significance levels: *** 1%, ** 5%; * 10%.

Figure 1 – Cubic Relationship between Bank Performance and Ownership Concentration

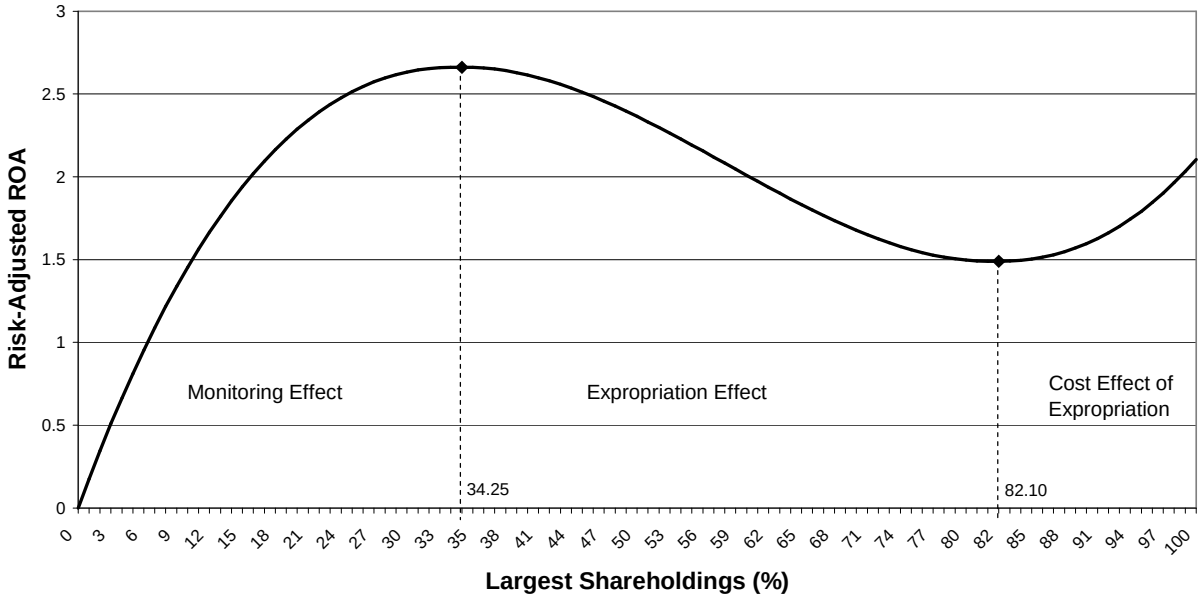
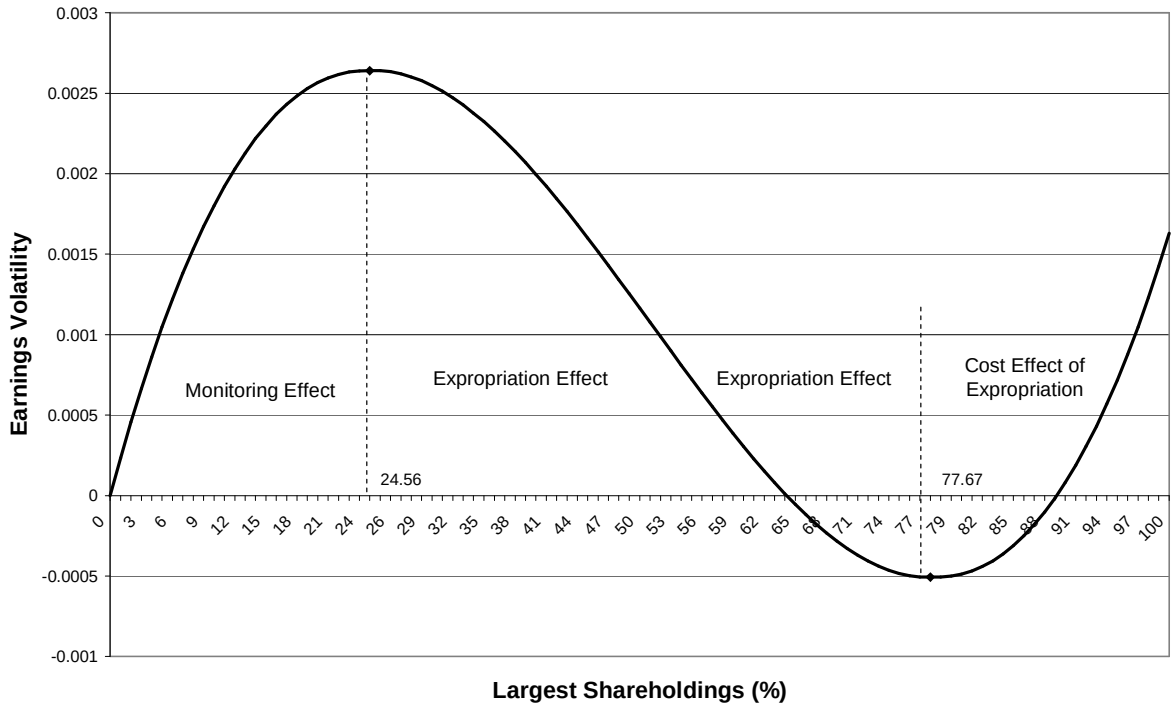
Figure 2 – Cubic Relationship between Bank Risk and Ownership Concentration