RISK-TAKING BEHAVIOUR AND OWNERSHIP IN THE BANKING INDUSTRY: THE SPANISH EVIDENCE[+]

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Abstract:

This paper analyses the determinants of risk-taking in the Spanish financial intermediaries with special emphasis on the ownership structure and size of the different entities. On the one hand, the specific legal configuration of Spanish Savings banks may lead them to differ from Commercial banks in their risk behaviour. In particular, they may make riskier investments. Nevertheless, other theories indicate that greater stockholder control in Commercial banks may induce them towards greater risk-taking in certain situations. In this paper we test these hypotheses with a dynamic panel data model (1993-2000) for Spanish Commercial banks and Savings banks. We analyse whether differences in risk behaviour are related to different ownership structures or to other factors such as the size of the entity.

Key Words: Commercial banks, Savings banks, corporate control, ownership structure, bank risk-taking

JEL Classification: C33, G21, G32

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1. Introduction

A review of the financial literature reveals numerous attempts to quantify and explain risk-taking behaviour of financial intermediaries. This topic is central in economics and finance since controlling the risk-taking in banking relates directly to the protection both of depositors and the financial system as a whole. Moreover, there is a clear conflict inside banks between the interests of shareholders and the interests of depositors. The former are willing to take higher levels of risk that increases the share value at the expense of the value of deposits.

Although mechanisms such as flat rate deposit insurance are an effective device to avert bank runs, some authors, such as Merton (1977), claim that deposit insurance can generate problems of moral hazard in the behaviour of banks, raising the shareholders incentives to take risk above the optimal level. Kane (1988) and Barth (1991), among others, use this argument to explain the 1980's crisis in American thrift institutions, characterised by excessive risk-taking and high rate of failure. As well, banking risk-taking has been analysed in the US financial market from different viewpoints. Saunders *et al.* (1990), Chen *et al.* (1998), Gorton and Rosen (1995) or Anderson and Fraser (2000) analyse the link between managerial ownership and risk-taking. Demsetz and Strahan (1997) analyse the link between size and bank risk.

Risk taking in the Spanish banking sector has been scarcely analysed, although the Spanish case is especially interesting. In the Spanish financial market there are two different forms of bank ownership and legal form competing for loans and deposits in the same market. In one hand, the Spanish Commercial banks (SCB) are privately owned banks being shareholder-oriented corporations. In the other hand, Spanish Savings banks (SSB) are commercial non-profit organizations where control is shared among multiple interest groups: local and regional governments, employees, depositors and their founding entities. In this

sense, their ownership structure comes close to the shared ownership model (García-Cestona and Surroca, 2002)

The SSB control about half of the Spanish banking market. They display several important features. First, the SSB earnings must be retained or must be invested in social and cultural activities (around 25% of net yearly profits). Second, they have no formal owners. Third, decision-making in SSB involves depositors, public authorities and employees, among others. For this reason, the range of objectives serves a variety of sometimes conflicting interests among stakeholders. Lastly, SSB are immune to market corporate control with the exception of friendly takeovers or mergers by other Saving banks.

The disperse ownership structure of SSB would appear to give managers freedom of action, which induces Savings banks to undertake more risk. Furthermore, the presence of public authorities on their governing bodies will affect decision-making. For example, Spanish regional governments may have incentives to control the Savings banks in their regions to enhance the sustainability of certain adjustment policies. The influence of these regional governments may weigh too heavily in certain commercial decisions taken by Savings banks, and may lead to excessive risk-taking.

Our paper analyses how these differences between Spanish Savings and Commercial banks translate into risk-taking behaviour. In this sense, this paper adds new evidence to the debate on patterns of risk behaviour among companies with different form of ownership and legal structure. We use the accounting model of bank risk proposed by Hannan and Hanweck (1988) and Boyd *et al.* (1993), that enables us to obtain an approximate measure of insolvency risk for each institution.

This paper also analyses how risk-taking behaviour is affected by internal control mechanisms in the governance of financial institutions. Crespí *et al*. (2004) point out that internal control mechanisms works properly if the probability of a significant board turnover,

including the replacement of the chairman or the general manager of the bank, increases with poor economic performance. Also, we expect that bank risk-taking can be reduced by the implementation of this type of corporate control. However, differences between Savings banks and Commercial banks mentioned before could lead a different impact of control mechanisms over risk patterns. Therefore, it is examined how risk-taking is affected by significant board turnover or the replacement of the general manager in the case of Commercial banks, and by the replacement only of the general manager in Savings banks.

In addition, the paper focuses on the different size of the entities as a new source of different patterns in bank risk-taking. In particular, it is analysed whether differences in risk behaviour between Commercial banks and Savings banks are due more to size differences than to differences in their organizational form.

The remainder of the paper is organized as follows. Section 2 explains the theoretical framework. Section 3 describes the risk-taking model. Section 4 presents the data sample together with a preliminary descriptive analysis. Section 5 reports the results of the estimation and the tests of the hypotheses. Section 6 contains the main conclusions.

2. Theoretical Background and Hypotheses

2.1. The moral hazard problem and owner-manager agency conflict

Risk-taking behaviour in financial institutions has been examined from different perspectives. The agency problem in financial institutions has been repeatedly addressed in the literature. A large part of this literature focuses on managerial behaviour in banking institutions (Saunders *et al.*, 1990; Allen and Cebenoyan, 1991; Gorton and Rosen, 1995). Other studies examine different corporate control mechanisms (Prowse, 1995; Houston and James, 1995; Crawford *et al.,* 1995; Crespí *et al.,*2004). However, the majority of these

authors assume the moral hazard problem to affect financial institutions in the same way as any other kind of firm.

According to Ciancanelli and Reyes-Gonzalez (2000), the agency problem that arises in banks is more complex in nature. Regulation in this sector has far reaching effects because of the interdependence of monetary flows. Excessive risk-taking in an institution may result in bankruptcy, causing repercussions that are soon felt in the rest of the banking sector and, before long, in the economy as a whole. One of the commonest forms of intervention is deposit insurance. Caprio and Levine (2002) explain how deposit insurance reduces controlling incentives among depositors and debt-holders, who see that part of their capital is protected. This limited responsibility allows shareholders to retain as much profit as possible, while recouping part of their losses from the deposit insurance fund. This has a twofold effect. First, financial institutions are induced to take on more risk, thus increasing their amount of debt[1]. The second effect reported by Caprio and Levine (2002) is that banks may become interested in finding a large number of small scale depositors, in order to spread debt rather than sharing it among just a few. In this way, while accepting some loss of efficiency, they escape the stricter control under which large scale depositors might place them.

This moral hazard problem has been thoroughly examined in US financial institutions, especially in an attempt to find an explanation for the 1980s Savings and Loan crisis in the U.S. (Gorton and Rosen ,1995; Kane, 1988; Barth, 1991 among others[2]). The moral hazard can be mitigated in banks with high prospects of future gains. At high franchise value, bank owner interests and manager interests are most likely aligned, since both perceive high costs associated with financial distress because the franchise value is not fully marketable. This phenomenon is common in all kinds of firms, but it is particularly serious in financial institutions, where loans are based on asymmetric information not easily transferable to third

parties making the bankruptcy particularly costly (Marcus, 1984; Keeley, 1990; Demsetz *et al.,* 1997; Galloway *et al.*, 1997).

Banking sector is also affected by the well known owner-manager agency conflict (Fama and Jensen, 1983). Cebenoyan *et al.* (1999) suggest that studies of this problem may result in different findings according to the approach used in each case. Thus, from the *corporate control* perspective, when control mechanisms are inadequate and information is asymmetric, managers will tend to take riskier decisions. Many authors agree, however, that owner-manager agency conflict may counteract the increase in risk-taking arising from the moral hazard problem. Managers can be reluctant to risk their wealth, their specific human capital or the associated advantages with controlling the firm. This risk aversion may lead them to choose safer investment projects or to operate with higher capital than owners would consider optimal.

In other hand, the importance of the agency problem depends on the capability of the bank owners for monitoring management performance. If there is a sufficient concentration of outside ownership, the agency problem may be attenuated and the degree risk aversion in managers controlled. If capital is widely dispersed over a large number of shareholders, their individual incentive to control managers is reduced (the *free rider* problem). In this sense, ownership dispersion can increase the likelihood of opportunist managers behaviour.

In short, shareholder control over directors has a two-way effect on risk. On the one hand, when such control exists, the owner-manager agency conflict disappears, while the moral hazard problem persists. In such cases, we might therefore expect to find higher levels of risk in financial institutions. With a low or non existent owners control degree moral hazard and agency conflicts co-exist. In such a case, the effect on risk-taking is less clear. First, the agency problem may increase risk, if, faced with the prospect of poor results, managers decide to risk over and above the optimal level and beyond shareholders' wishes.

This would lead to greater risk than that resulting from the moral hazard problem alone. Lastly, if managers are more intent on retaining their own invested human capital and wealth, the moral hazard problem will reduce and there will be less risk taken than in the previous case.

Some authors have pointed out the importance of governance mechanisms in banking sector and its different effect with respect to companies in other economic sectors (Prowse, 1997; Adams and Mehran, 2003). Prowse (1997) examines relationship between the economic performance of US Bank Holdings Companies and the probability that a control mechanisms was activated. He analyses management turnover, hostile takeovers, friendly mergers and regulatory interventions. Prowse finds that these governance mechanisms are activates less frequently in the banking sector. Crespí, *et al.* (2004) examine the effectiveness of control mechanism in Spanish banking sector. They find that Spanish Saving banks shows weaker internal control mechanisms than Comercial banks.

2.2. Spanish Commercial Banks versus Savings Banks

In the Spanish banking sector there are several types of financial firms with different organizational forms and different ownership structures competing in the same market. Commercial banks are shareholder-oriented corporations while Spanish Savings banks are a mix between mutual companies and public institutions[3]. That is, they have no capital and therefore no owners. Regulations, accounting practices, external reporting, etc. are practically the same for both types of banks.

Savings banks have the ownership form of a private foundation, with a board of trustees with representatives from regional authorities, city halls, employees, depositors and the founding entity. In particular, according to García-Cestona and Surroca (2002) between the 15 and 45% of the members come from the Public Administration, between 20 and 45% from depositors, between o and 35% from the founding body and between the 5 and 15%

from the workforce. This diversity of bodies intervening in the governance of SSB suggests that their managers have a broad freedom of action. In the case of Commercial banks, there is a higher likelihood that their managers are under shareholders control. From the property rights approach we can expect that SSB perform worse than SCB, but the empirical evidence shows that Spanish Savings and Commercial banks have similar levels of productive efficiency (Grifell-Tatjé and Lovell, 1997; Lozano, 1998).

In respect to banking risk-taking, various empirical studies find that the organizational form of the financial institutions is directly related with their risk behaviour. (Verbrugge and Goldstein, 1981; Cordell *et al.*, 1993; Lamm-Tennant and Starks, 1993; Esty, 1997). García-Marco and Robles (2003) find significant differences in risk-taking behaviour related with ownership structure and size in a sample of Spanish financial entities.

Under the moral-hazard point of view, as institutions with shareholders, Commercial banks might be expected to take greater risks than Savings banks, where there is no capital. However, in the case of SCB with a low degree of shareholder control, the outcome is less clear. In this case, the owner-manager agency conflict is likely to arise.

Spanish large Commercial banks are listed in the stock market and their shares, although concentrated, are more dispersed among small shareholders than other financial firms. Some medium-sized banks are listed while others are not. We assume, therefore, that in a Commercial banks, where there is a moral hazard problem affecting the bank risk-taking, greater shareholder concentration will mean greater risk-taking.

Besides, the diversity of interests in Savings banks' governance structure may cause a dissimilar pattern of risk-taking. In particular, if any interest group within the board of SSB gains control over the institution, it will be able to tailor policy to suit its own interests, causing different patterns of risk behaviour among Savings banks. In this way, managers of SSB controlled by regional governments will encourage competition and contribute to

regional development[4]. However, the effect over risk of politicización of the decision making is not clearly defined (La Porta *et al.*, 2002). In one hand, the interest of politicians in conserving the use of the savings banks like an instrument to reach political objectives can limit the risk-taking to guaranteeing the continuity of the organization. In the other hand, regional goverments can look for the accomplishment of politically desirable but nonprofitable projects and increase therefore the risk of the Savings bank.

3·. A risk-taking model

In order to identify the factors that lead to a financial institution being unable to pay its debts, we propose the following model:

$$P(\pi < -E) = f(\textit{Ownership Structure, Corporate Control}, \textit{Size}, \textit{Profitability, Type of Business}) \quad (1)$$

where π are the total bank profits, $P(.)$ indicates probability, and E is the equity capital. According to model (1) the likelihood of insolvency is a function of factors such as firm ownership structure, corporate control mechanisms, size of the corporation, profitability and the type of business.

To assess the level of exposure to insolvency risk in financial institutions, we use the "Z-score", proposed by Hannan and Hanweck (1988) or Boyd *et al.* (1993) and used by Nash and Sinkey (1997) and García-Marco and Robles (2003), among others.[5] This indicator considers risk of failure to depend fundamentally on the interaction of the income generating capacity, the potential magnitude of return shocks, and the level of capital reserves available to absorb sudden shocks. Mathematically, the *Z-score* is defined as:

$$Z_{it} = \left[\frac{\sigma_i(ROA_{it})}{E_i(ROA_{it}) + CAP_{it}} \right]^2 \quad (2)$$

where ROA_{it} is the return on assets of bank i in period t, $E_i(.)$ indicates expected value, $\sigma_i(.)$ indicates standard deviation and CAP_{it} is the averaged ratio of equity capital to total assets for the entity i in period t.

This indicator reveals the degree of exposure to operating losses, which reduce capital reserves that could be used to offset adverse shocks. Entities with low capital and a weak financial margin relative to the volatility of their returns will score high on this indicator. Since this indicator assigns great importance to the solvency and profitability record of financial institutions, it is a measure of their weakness or strength.

Ownership structure is measured by means of three variables: *Ownership, Concentration* and *Public Control.* The first of them is a dummy variable that takes a value of 1 for Commercial banks and zero for Savings banks. For Commercial banks, we also consider an indicator of shareholder concentration. We assume that Commercial banks with a high concentration, will be shareholder controlled, while in those where shareholders are more disperse, managers will be free to operate according to their own interests. If concentration has a positive effect on the likelihood of insolvency, there must be a moral hazard problem, because owners behave in a riskier fashion. In these circumstances, we might also expect Commercial banks to assume greater risks than Savings banks.

To measure the degree of ownership concentration, we caluculate Herfindahl's index for shareholder distribution defined as $C_i = \sum_{j=1}^{3} w_{ij}^2$ where wji is the proportion of stocks owned by shareholders in the j cathegory. We consider three cathegories: shareholders with less than 100 shares, with less than 500 but more than 100 and shareholders with more than 500 shares (see Appendix 1 for calculation details).

In the case of Savings banks, we are interested in analyse differences in risk patterns related with the control in the board of the regional governments. In order to analyse this , we construct a dummy variable, *Public Control*, that takes a value of 1 if the Savings bank is

controlled by Regional Government and zero otherwise. We consider public control to be when the Regional Government together with the public founding bodies makes up more than 50% of the General Assembly.

As corporate control mechanism, we consider turnover in the governance structure. We use a dummy variable that takes a value of 1 if there is a change of Chairman and/or in the 50% or more of board members in Commercial banks. In the case of SSB, this variable is equal to 1 if there is a change of the General Manager of the Assembly. It is expectable that the turnover effects to be felt in the following period, rather than having a contemporaneous impact on risk-taking. If this mechanism is used to control the risk level of the bank, the effect of the turnover must be negative, but If it were due to poor profit, changing governing body may lead to higher risk-taking.

Profitability is measured by *ROE*, defined as return on equity. We expect a positive relationship between risk and profitability, such that profit-maximising policies will be accompanied by higher levels of risk. For *type of business* we use the ratio *Total Net Lending to Assets* (TLA). We consider this kind of operation generally to involve a higher level of risk than other alternative forms of investment.

Finally, in expression (1), we consider size of entity to be another determinant of the likelihood of insolvency. Large banks are likely to be more expertiser in risk management than small institutions. Also, they have better diversification oportunities. However, as Demsetz and Strahan (1997) stress, certain activities and characteristic usually linked with large banking institutions may be inherenty risky. To measure size of entity we take the log of *Total Assets* and perform a cluster analysis to obtain the right number of different sizes. The procedure is described in the following section.

4. Data and preliminary analysis

The analysis is performed on data from a sample of financial institutions from 1993 to 2000. 127 institutions make up the sample for 1993 and 129 for the remaining years of the study period, making a total of 1030 observations. Of the total number of firms, 50 are Savings banks and the rest are Commercial banks. We collect the data from Annual Balance Sheets and Profits and Losses Accounts. Data on Savings banks was taken from the Annual Statistics published by the Spanish Savings Banks Confederation. Data on Commercial banks was taken from the Spanish Securities and Exchange Commission (SEC), and the Bulletin of Statistics published by the Spanish Private Banking Association.

The final years of the sample period were characterised by an intense period of mergers among Savings banks and mergers among Commercial banks. Since merged institutions can not be considered to have disappeared, we decide to retain them within the sample as individual entities[6].

In order to characterise the financial institutions by size we now use Ward's method to perform a cluster analysis on the natural logarithm of *Total Assets* for each year of the sample period. Results are reported in Table 1. In each case three clusters emerge, thus classifying the institutions into three groups: Small, Medium and Large.

[Insert Table 1 around here]

The most numerous group overall is formed by medium sized institutions, followed by the small and then the large ones. The whole period is characterised by a process of growth leading to a marked increase in the number of medium sized institutions in 1997 and 1998. The last two years are characterised by a decline in the number of small sized institutions and a sharp rise in the number of large ones which then become the most numerous group.

[Insert Figure 1 around here]

In Figure 1, size is related to ownership structure. Most of the Commercial banks are in the small size category, while most of the Savings banks class as medium size. There is an overall decline in the number of small institutions throughout the period. A striking feature of the SSB is the process of growth that take them from the medium to the large size category along the sample period. Indeed, in 1999 and 2000 most of the Savings banks classed as large. This would suggest that the policies adopted by Savings banks were clearly aimed at achieving growth. Though an increase in the number of large SCB is also apparent in the last two years of the sample period, it is not as significant as in the case of the SSB.

The total number of observations is 630 for Commercial banks and 400 for Savings banks. While there were 14 large Commercial banks in 1993, by 2000 the number had more than doubled to 28. The SSB growth rate, which was stronger, took the number of large Savings banks from 10 in 1993 to 32 in 2000.

[Insert table 2 around here]

Table 2 contains descriptive statistics for the non-qualitative variables in model (1). It reveals much greater dispersion in Commercial banks on all the three variables. Variation Coefficient (Standard deviation/mean) for the *Z-score* in Commercial banks, for example, is seven times higher than in Savings banks (5.49 vs. 0.76), regardless of size. Indeed, it barely alters at all across different sizes of Savings bank. The maximum and minimum values of the three variables correspond to Commercial banks. There is also a greater asymmetry among SCB than among SSB. At first sight, there appear to be differences in the distribution of variables linked to their different ownership structure.When *Z-score, ROE* and *TLA* are examined in relation to size and ownership structure some differences again emerge. Though there is no clear pattern, the medium size group appears more disperse.

[Insert table 3 around here]

In order to analyze statistical differences in *Z-score* distribution among entities, two non-parametric tests are performed: the Kruskall Wallis test for equality of medians and the Siegel Tukey test for equality of variances. As Table 3 shows, the results point to distinct differences in the insolvency risk indicator, associated not only with legal form but also with size. Equality of medians and variances is clearly rejected when comparisons are made between Savings banks and Commercial banks of any size category. Analysis reveals more diversity on the *Z-score* between different sized SCB than there is between different sized SSB, where equality of medians is rejected only between large and medium sized Savings banks and equality of variances only between medium sized and small Savings banks.

5. Empirical findings

Before reporting the results of the estimation of model (1), the specification of the empirical model is given as follows:

$$\begin{aligned} Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \beta_2 ROE_{it} + \beta_3 TLA_{it} + \beta_4 CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \eta_i + \varepsilon_{it} \end{aligned} \tag{3}$$

where Z is the *Z-score* defined in expression (2); *ROE* is the return on equity, *TLA* is the *Total Net Lending/Assets* ratio; *CG* is the dummy variable for changes in bodies of governance; *Ow* represents *Ownership*, a dummy variable that takes a value of 1 for Commercial banks and 0 for Savings banks; *Lg* is a dummy variable that takes a value of 1 for members of the cluster of large institutions and zero otherwise; and *Me* takes a value of 1 for members of the cluster of medium sized institutions and zero otherwise. We also use as control variables are time dummies and *Merger, M,* which is a dummy variable that takes a value of 1 for observations on merged institutions and 0 otherwise.

Experssion (4) is a dynamic panel data model which is estimated in first differences in order to eliminate individual random effects, η_i. We use the Generalized Method of Moments

(GMM) proposed by Arellano and Bond (1991, 1998). The instruments used are lagged values of the endogenous variable, *Z-score*, from *t-3* to *t-6*, lagged values of the predetermined variable *TLA* from *t-2* to *t-6*, the constant and time dummies. The results of the estimation are reported in Table 4 (Model A).

The Sargan test statistic of overidentifying restrictions does not reject the validity of the instruments used. Self correlation tests reveal no first order or second order serial correlation. Results reveal high persistence on risk. Higher levels of *ROE* are accompanied by greater risk. Also, the greater the weight of *Total Net Lending /Assets*, the higher the level of risk taking.

[Insert Table 4]

Internal control mechanisms appear to work properly. Thus, turnover in governing bodies in Savings banks and Commercial banks is followed by a reduction in risk in the following period. Results appear to show SCB to be more risk-inclined than SSB. Large institutions also appear to assume greater risk, while no significant differences emerge between medium and small entities.

In order to check for significant differences on the effect of explanatory variables related with ownership structure, we estimate a second model (Model B in Table 4) in which interactions between *Ownership* and the remaining explanatory variables are included. In this case, we also use as instruments the lagged values of the cross products of *Z-score* and *TLA* with *Ownership*. As can be seen in Table 4, first and second order self correlation tests and the Sargan test show the model to be valid.

While results reveal significantly positive persistence in Commercial bank risk, the same effect is not significant in Savings banks. Major differences are also revealed in the impact of the remaining variables. Thus, increases in *ROE* have a significantly greater effect

on the level of risk-taking behaviour in Commercial banks than in Savings banks. Indeed, the effect on Commercial banks is positive, whereas on Savings banks it is negative.

The kind of business measured with *TLA* also seen to produce opposite effects. In Commercial banks, increases in this type of credit lead to increased risk, while in Savings banks their effect is negative. This result may be related to differences in the nature of business in each type of institution. In Savings banks, which are generally oriented towards small investors, an increase in this ratio is indicative of an increase in business volume, whereas in Commercial banks it may reflect a more aggressive strategy in the credit market.

Further significant differences emerge in relation to institutional size. The level of risk is found to be lower in both large Savings banks and large Commercial banks, which suggest that they are better able to diversify than their smaller counterparts. Large Commercial banks are less risk-taking than large Savings banks. There are no appreciable size-related differences, however, between small and medium sized Savings banks or between small SCB and small SSB. It is worth noting that the level of risk in medium size Commercial banks is significantly higher than other institutions of any type or size.

There are significant differences between Savings banks and Commercial banks in the effect of turnover among members of their governing bodies. In the case of Savings banks, turnover are followed by an increase in risk, while in Commercial banks, the opposite occurs. This may mean that turnover on the board works as a kind of corporate control mechanism in Commercial banks, while in Savings banks changes may be made to serve some other purpose.

Following the same treatment as applied to *ownership*, we now propose to analyse the interactions between the various explanatory variables and institutional size (Model C in Table 4). In this case, we use the same intruments that in Model A ant lagged values of the cross products of *Z-score* size variables.[7]. The results, show some degree of serial correlation

of the first order but not of the second. Sargan test indicates the validity of the used instruments.

Findings indicate a high persistence in insolvency risk for the larger institutions (large and medium sized), while this effect is non-significant in small ones. Although *Return on Equity* has a positive effect on risk in all types of institution, its impact is significantly greater in large ones. *TLA* is non-significant for small institutions and its effect is clearly negative for large and medium size ones. This suggest that increases in the proportion of credits granted by the largest institutions reduce their risk levels. Also, turnover of members of governing bodies has a negative effect on risk-taking in large and medium size institutions and ~~a~~ it is non-significant in small ones. This result indicates that internal control mechanisms work most effectively in large institutions.

Summarizing, our findings point out clear evidence of major differences linked to legal form and size. However, it is important to determine whether control mechanisms specific to each type of ownership structure are effectively working to control the level of risk.

5.1. The Commercial Banks Model

In this seccion we analyze only the Comercial banks sample. Starting with equation (3), we include the explanatory variable *Concentration* measured by the Herfindahl Index desrived above. This new model is estimated with and without interactions with the size dummies.[8]

Instruments used for the estimation of the model (Table 5) are the same as in Model A (Table 4). In both cases, the Sargan test yields a very high p-value, and there is neither first order nor second order serial correlation.

[Insert Table 5]

The significant coefficients differ very little from those obtained in Model A. Focusing our attention on the variable *Concentration,* this have no significant effect on risk, which suggest that the degree of shareholder dispersion has no impact on the level of risk-taking.

We also report in Table 5 the results of the multiplicative model. In this case, shareholder concentration is significant and it is possible to observe differences linked to Commercial banks size. *Concentration* has a negative effect in large and medium sized SCB, and a positive effect in small ones. The negative effect suggests that greater shareholder concentration in Commercial banks reduces risk-taking behaviour, and serves as a mechanism by which shareholders are able to control managers. Shareholders are apparently reluctant to take on excessive risk even when protected by deposit insurance, which was one of the hypotheses we aimed to test. The moral hazard problem is seen to exist only in smaller Commercial banks, where greater concentration is coupled with greater risk. However, our data indicates there is practically only one shareholder involved in the ownership structure in this case, which is the only one in which the moral hazard hypothesis holds.

Another factor with a negative effect on risk-taking is change in governing bodies, which has a negative effect, regardless of size. This internal control mechanism appears to work, especially in the largest Commercial banks. Its influence is weakest in medium-size ones.

5.2. The Savings Banks Model

In this case, we analyze only the Saving banks sample. Now, we extend equation (3) to include the variable *Public Control,* as defined in section 3.[9]

Following the same procedure as with Commercial banks, we estimate the model with and without interactions between the explanatory variables and size. The results are reported

in Table 6. Again, the Sargan test shows the instruments used in both models to be valid. Though there is some degree of first order serial correlation, this disappears in the model including interactions. There is no sign of second order serial correlation.

[Insert Table 6]

It is remarkable the sharp contrast between Savings banks and Commercial banks. This time, turnover among Savings banks board members appears to have no effect on risk-taking. This shows that there are reasons other than risk control behind decisions to change Savings banks managers.

Discrepancy in the sign of the effect of *ROE* and *TLA* is confirmed, since these two factors have a negative impact on risk-taking. The dummy size variables are non significant, indicating that there are no size-related differences in risk-taking in Savings sanks. Examination of the interactions reveals no differences in the determinants of risk-taking in different sizes of SSB except when it comes to the inertial effect of risk. This effect appears to be exclusive to medium-size Savings banks.

Turning our attention to the variable *Public Control*, we find that it is not significant in either model (with or without interactions). Local and regional government control in Savings banks does not appear to affect their level of risk-taking, whatever their size.

6. Conclusions

This paper examines risk behaviour in Spanish Commercial banks and Spanish Savings banks, two different types of financial institutions, each with its own legal configuration and ownership structure, but competing in the same market. Our results reveal major differences in the patterns and determinants of risk-taking behaviour, linked with both legal configuration and size. The major size-related differences that emerge among

Commercial banks are not apparent among Savings banks, where risk behaviour appears to be more homogeneous.

The moral hazard and agency problems in financial institutions have been thoroughly examined in the literature. Our findings show that Commercial banks, which are shareholder-oriented corporations and therefore with clearly defined owners, exhibit a stronger tendency towards risk-taking than Savings banks, with their more diffuse ownership structure.

This supports the moral hazard hypothesis described in the literature, in the sense that, when able to rely on deposit insurance, the owners' incentive to take risk increases. Higher shareholder concentration is implicitly linked to stricter shareholder control over managers. In this paper, however, it is found to be only in small Commercial banks that high ownership concentration leads to a greater increase in risk-taking, which appears to be clear evidence of the moral hazard problem in this kind of institution. In medium-size and large Commercial banks, however, the degree of concentration has the opposite effect; the greater the dispersion, the higher the level of risk-taking. This shows that Commercial bank managers in these size categories are more likely to increase risk when they are subject to less strict control, which may be an indication of possible owner-manager agency conflicts.

The agency problem, which implies that less control will result in greater risk-taking, is also reflected in the result obtained from the analysis of the impact of turnover in governing bodies on risk-taking in the following period. In Commercial banks, turnover leads to a reduction in risk, which could mean that it works as a control mechanism. In Savings banks, however, the opposite effect is observed. This appears to suggest that in Savings banks such changes are made with a different purpose in mind. No evidence is found to suggest that local and regional government control over Savings banks has any effect on their degree of risk-taking.

Finally, when institutional size is taken into consideration, turnover in governing bodies is seen to have a negative effect only in large and medium-sized Commercial banks, with no appreciable effect being found in small Commercial banks. This is probably an indication that the agency problem alluded to earlier tends to occur in the largest institutions, where corporate control mechanisms are most effective.

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Table 1. Size distribution over total sample: Cluster Analysis

	1993	1994	1995	1996	1997	1998	1999	2000	Total
Large	24	26	28	27	26	29	64	58	282
	(18.9%)	*(20.2%)*	*(21.7%)*	*(20.9%)*	*(20.2%)*	*(22.5%)*	*(49.6%)*	*(45.0%)*	
	{2.3%}	*{2.5%}*	*{2.7%}*	*{2.6%}*	*{2.5%}*	*{2.8%}*	*{6.2%}*	*{5.6%}*	
Medium	69	49	50	50	75	68	34	46	441
	(54.3%)	*(38.0%)*	*(38.8%)*	*(38.8%)*	*(58.1%)*	*(52.7%)*	*(26.4%)*	*(35.7%)*	
	{6.7%}	*{4.8%}*	*{4.9%}*	*{4.9%}*	*{7.3%}*	*{6.6%}*	*{3.3%}*	*{4.5%}*	
Small	34	54	51	52	28	32	31	25	307
	(26.8%)	*(41.9%)*	*(39.5%)*	*(40.3%)*	*(21.7%)*	*(24.8%)*	*(24.0%)*	*(19.4%)*	
	{3.3%}	*{5.2%}*	*{5.0%}*	*{5.0%}*	*{2.7%}*	*{3.1%}*	*{3.0%}*	*{2.4%}*	
Total	127	129	129	129	129	129	129	129	1030
	Centroids								
Large	14.524	14.506	14.536	14.639	14.738	14.805	13.983	14.271	
Medium	12.456	12.792	12.825	12.929	12.625	12.738	12.217	12.415	
Small	9.762	10.514	10.526	10.658	9.923	10.173	10.235	10.018	

( ) = percentage of total for the year, { } = percentage of whole sample.
Centroids are calculated from the natural logarithm of total assets.

Figure 1
Size Distribution by Ownership Structure

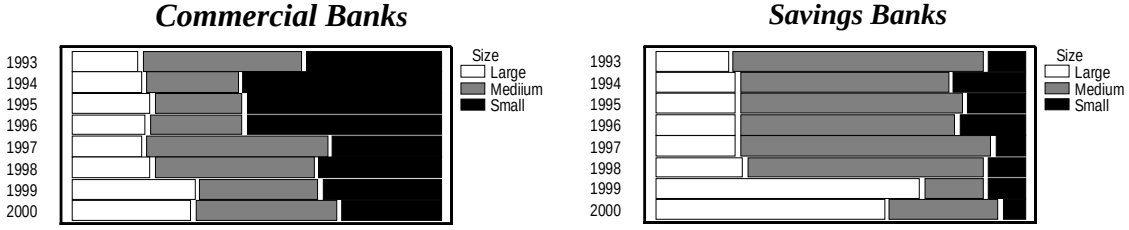

Table 2. Descriptive statistics by size and ownership structure

	Mean	Median	Std. Error	Asymm.	Kurtosis	J-B
Large Institutions						
Z-score	0.037	0.007	0.064	3.896	24.639	6215.2*
Commercial Banks	0.028	0.001	0.083	3.812	19.057	1935.2*
Savings Banks	0.048	0.045	0.032	0.469	3.137	5.063*
ROE	0.142	0.133	0.161	13.166	204.0	482655*
CommercialBanks	0.130	0.117	0.221	9.884	112.7	76126.8*
Savings Banks	0.147	0.150	0.039	-0.947	5.305	50.035*
Total Net Lending / Assets	0.521	0.509	0.150	-0.109	3.969	11.591*
CommercialBanks	0.475	0.440	0.195	0.022	3.359	0.801
Savings Banks	0.557	0.548	0.100	0.205	2.339	3.399
Medium size Institutions						
Z-score	0.037	0.005	0.154	13.624	215.6	844298*
Commercial Banks	0.037	0.001	0.214	10.001	114.1	119480*
Savings Banks	0.036	0.036	0.030	0.431	2.492	9.004*
ROE	0.121	0.129	0.095	-0.002	9.716	828.9*
Commercial Banks	0.079	0.085	0.094	-1.135	9.702	469.4*
Savings Banks	0.164	0.154	0.065	1.759	10.030	556.1*
Total Net Lending / Assets	0.512	0.535	0.187	-0.500	3.604	25.057*
Commercial Banks	0.487	0.513	0.232	-0.224	2.490	4.321
Savings Banks	0.537	0.543	0.104	-0.032	2.607	1.428
Small Institutions						
Z-score	0.018	0.002	0.051	7.189	72.590	64591.5*
Commercial Banks	0.014	0.001	0.052	7.896	78.090	63294.3*
Savings Banks	0.042	0.047	0.031	-0.255	1.581	4.644
ROE	0.050	0.071	0.447	-15.901	269.4	920672*
Commercial Banks	0.037	0.054	0.488	-14.505	225.0	536664*
Savings Banks	0.142	0.149	0.047	-1.564	6.308	42.321*
Total Net Lending / Assets	0.391	0.409	0.275	0.171	2.031	13.508*
Commercial Banks	0.357	0.330	0.279	0.462	2.259	15.023*
Savings Banks	0.618	0.622	0.105	0.385	2.554	1.617
Total Sample						
Z-score	0.031	0.002	0.110	16.517	358.831	5480750*
Commercial Banks	0.025	0.001	0.138	13.762	238.394	1474404*
Savings Banks	0.041	0.041	0.031	0.377	2.687	11.096*
ROE	0.106	0.122	0.268	-21.633	645.821	17814281*
Commercial Banks	0.074	0.085	0.336	-17.694	421.152	4622715*
Savings Banks	0.156	0.151	0.056	1.476	11.864	1454.974*
Total Net Lending / Assets	0.478	0.505	0.217	-0.416	2.970	29.706*
Commercial Banks	0.431	0.438	0.252	0.024	2.310	12.551*
Savings Banks	0.554	0.555	0.106	0.109	2.720	2.103

Sample includes 1030 observations: 282 corresponding to large institutions (147 Commercial banks and 135 Savings banks), 441 to medium sized inst. (225 Commercial banks and 216 Savings banks) and 307 to small inst. (258 Commercial banks and 49 Savings banks). Number of institutions in sample: 79 Commercial banks (77 in 1993) and 50 Savings banks each year. J-B is the Jarque-Bera Normality Test. * indicates rejection of the null hypothesis of normality at the 1% significance level.

Table 3. Z-score: tests of equality of medians and variances

		Large vs Medium	Medium vs Small	Large vs Small
Total sample				
Equality of medians		5.079**	3.659*	11.913***
		(0.024)	(0.056)	(0.001)
Equality of variances		0.534	6.920***	5.452***
		(0.593)	(0.000)	(0.000)
Commercial Banks				
Equality of medians		0.028	3.084*	5.264**
		(0.867)	(0.079)	(0.022)
Equality of variances		2.723***	5.482***	1.998**
		(0.007)	(0.000)	(0.046)
Savings Banks				
Equality of medians		10.382***	2.197	0.278
		(0.001)	(0.138)	(0.598)
Equality of variances		0.667	1.913*	1.509
		(0.505)	(0.056)	(0.131)
Commercial Banks vs Savings Bank	**Total**	**Large**	**Medium**	**Small**
Equality of medians	176.597***	73.536***	66.389***	21.349***
	(0.000)	(0.000)	(0.000)	(0.000)
Equality of variances	10.370***	0.598	5.177***	7.137***
	(0.000)	(0.550)	(0.000)	(0.000)

The null hypothesis of equality of medians is tested with the Kruskal-Wallis test and the equality of variances with the Siegel-Tukey test. Between parentheses the p-value. *, ** and *** indicate rejection of the null hypothesis at the 1, 5 and 10% significance levels respectively.

Table 4. Determinants of insolvency risk

	Model A		Model B		Model C	
	Coeff.	**P-value**	**Coeffi.**	**P-value**	**Coeff.**	**P-value**
Constant	-0.018	(0.148)	0.030*	(0.001)	-0.016*	(0.000)
Z-score(t-1)	1.030*	(0.000)	0.082	(0.403)	-0.013	(0.228)
x *Ownership*			1.065*	(0.000)		
x *Large size*					1.081*	(0.000)
x *Medium size*					1.399*	(0.000)
ROE	0.417*	(0.000)	-0.043*	(0.004)	0.170*	(0.000)
x *Ownership*			0.432*	(0.000)		
x *Large size*					0.152*	(0.000)
x *Medium size*					0.102*	(0.000)
Total Net Lending / Assets	0.012	(0.841)	-0.353*	(0.000)	0.003	(0.782)
x *Ownership*			0.456*	(0.000)		
x *Large size*					-0.031*	(0.000)
x *Medium size*					-0.033*	(0.000)
Turnover Governing bodies (t-1)	-0.095*	(0.000)	0.009*	(0.000)	0.002	(0.497)
x *Ownership*			-0.079*	(0.000)		
x *Large size*					-0.060*	(0.000)
x *Medium size*					-0.031*	(0.000)
Merger	-0.185*	(0.000)	0.003	(0.787)	-0.021*	(0.001)
Ownership	0.044*	(0.000)	0.011	(0.383)	0.021*	(0.000)
Large size	0.060*	(0.000)	-0.025**	(0.032)	0.027*	(0.000)
x *Ownership*			-0.029**	(0.043)		
Medium size	0.006	(0.598)	0.011	(0.282)	0.033*	(0.000)
x *Ownership*			0.034**	(0.012)		
Time Dummies	Yes		Yes		Yes	
First-order serial correlation	-0.604	(0.546)	-1.238	(0.216)	-1.776	(0.076)
Second-order serial correlation	1.230	(0.219)	0.318	(0.751)	0.136	(0.892)
Wald joint significance (df=8,14,16)	3581.27	(0.000)	83512.61	(0.000)	16340333	(0.000)
Wald time dummies (df=6)	31.088	(0.000)	328.995	(0.000)	1727.178	(0.000)
Sargan Test (df=28, 58, 50)	21.463	(0.806)	55.937	(0.552)	56.473	(0.246)

The dependent variable is the *Z-score*. The models were estimated by GMM, in first differences, with the Arellano and Bond (1998) New DPD package, using the *Two Step Estimator* that is robust to heteroskedasticity. Shown in parentheses the p-valor. ***, ** and * indicate parameter significance at the 1%, 5% and 10% significance levels respectively. The time dummies included are significant in all cases. We test joint significance of the explanatory variables (Wald joint significance) and joint significance of the time dummies (Wald time dummies), df indicates degrees of freedom in test. The estimated models are:

Model A:

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \beta_2 ROE_{it} + \beta_3 TLA_{it} + \beta_4 CG_{it-1} + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \eta_i + \varepsilon_{it}$$

Model B:

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \delta_1 Ow_{it} Z_{it-1} + \beta_2 ROE_{it} + \delta_2 Ow_{it} ROE_{it} + \beta_3 TLA_{it} + \delta_3 Ow_{it} TLA_{it} + \beta_4 CG_{it-1} + \delta_4 Ow_{it} CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \delta_6 Ow_{it} Lg_{it} + \beta_7 Me_{it} + \delta_7 Ow_{it} Me_{it} + \beta_8 M_{it} + \eta_i + \varepsilon_{it}$$

Model C:

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \delta_1 Lg_{it} Z_{it-1} + \gamma_1 Me_{it} Z_{it-1} + \beta_2 ROE_{it} + \delta_2 Lg_{it} ROE_{it} + \gamma_2 Me_{it} ROE_{it} + \beta_3 TLA_{it} + \delta_3 Lg_{it} TLA_{it} + \\ + \gamma_3 Me_{it} TLA_{it} + \beta_4 CG_{it-1} + \delta_4 Lg_{it} CG_{it-1} + \gamma_4 Me_{it} CG_{it-1} + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \eta_i + \varepsilon_{it}$$

Table 5. Determinants of insolvency risk: Commercial Banks

	Without interactions			With interactions		
	Coeff.	**T-ratio**	**P-Value**	**Coeff.**	**T-ratio**	**P-Value**
Constant	0.027*	2.876	(0.004)	-0.075*	-7.091	(0.000)
Z-score(t-1)	1.085*	33.293	(0.000)	-0.068*	-13.818	(0.000)
x *Large size*				0.785*	463.254	(0.000)
x *Medium size*				1.454*	436.747	(0.000)
ROE	0.219*	3.140	(0.002)	0.234*	87.176	(0.000)
x *Large size*				-0.188*	-29.104	(0.000)
x.*Medium size*				-0.042*	-13.948	(0.000)
Total Net Lending / Assets	0.087**	2.424	(0.015)	0.062*	12.848	(0.000)
x *Large size*				0.054*	15.189	(0.000)
x *Medium size*				-0.007**	-2.464	(0.014)
Turnover in Governing bodies (t-1)	-0.077*	-10.698	(0.000)	-0.026*	-12.641	(0.000)
x *Large size*				-0.030*	-12.197	(0.000)
x *Medium size*				0.007*	2.907	(0.004)
Concentration	0.081	1.173	(0.241)	0.080*	7.121	(0.000)
x *Large size*				-0.184*	-13.451	(0.000)
x *Medium size*				-0.393*	-25.225	(0.000)
Merger	-0.093**	-2.163	(0.031)	-0.023*	-11.151	(0.000)
Large size	-0.039*	-3.272	(0.001)	0.177*	13.885	(0.000)
Medium size	0.064*	5.089	(0.000)	0.402*	26.208	(0.000)
Time dummies		Yes			Yes	
First-order serial correlation		-0.452	(0.651)		-0.782	(0.435)
Second-order serial correlation		0.912	(0.362)		0.208	(0.835)
Wald joint significance (df=8)		12085.7	(0.000)	(df=18)	226373416.3	(0.000)
Wald time dummies (df=6)		102.078	(0.000)	(df=6)	10937.914	(0.000)
Sargan Test (df=28)		21.549	(0.802)	(df=48)	53.701	(0.265)

See the end note of table 4. The estimated models are:

1. Without interactions

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \beta_2 ROE_{it} + \beta_3 TLA_{it} + \beta_4 CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \eta_i + \beta_9 C_{it} + \varepsilon_{it}$$

2. With interactions

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \delta_1 Lg_{it} Z_{it-1} + \gamma_1 Me_{it} Z_{it-1} + \beta_2 ROE_{it} + \delta_2 Lg_{it} ROE_{it} + \gamma_2 Me_{it} ROE_{it} + \\ + \beta_3 TLA_{it} + \delta_3 Lg_{it} TLA_{it} + \gamma_3 Me_{it} TLA_{it} + \beta_4 CG_{it-1} + \delta_4 Lg_{it} CG_{it-1} + \gamma_4 Me_{it} CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \beta_9 C_{it} + \delta_4 Lg_{it} C_{it} + \gamma_4 Me_{it} C_{it} + \eta_i + \varepsilon_{it}$$

Table 6. Determinants of insolvency risk: Savings Banks

	Without interactions			With interactions		
	Coeff.	**T-ratio**	**P-Value**	**Coeff.**	**T-ratio**	**P-Value**
Constant	0.041*	17.463	(0.000)	0.060*	5.051	(0.000)
Z-score(t-1)	0.554*	17.078	(0.000)	0.177	0.812	(0.417)
x *Large size*				0.338	1.432	(0.152)
x *Medium size*				0.518**	2.266	(0.023)
ROE	-0.107*	-20.842	(0.000)	-0.007	-0.045	(0.964)
x *Large size*				-0.018	-0.105	(0.916)
x *Medium size*				-0.168	-0.984	(0.325)
Total Net Lending /Assets	-0.067*	-3.538	(0.000)	-0.176**	-2.444	(0.015)
x *Large size*				-0.052	-1.287	(0.198)
x *Medium size*				0.012	0.325	(0.745)
Turnover on Governing Bodies (t-1)	-0.002	-0.888	(0.374)	0.076	0.991	(0.322)
x *Large size*				-0.082	-1.050	(0.294)
x *Medium size*				-0.093	-1.190	(0.234)
Public Control	0.001	0.799	(0.424)	-0.035	-1.430	(0.153)
x *Large size*				0.038	1.467	(0.142)
x *Medium size*				0.032	1.473	(0.141)
Merger	0.015*	2.565	(0.010)	0.029**	2.224	(0.026)
Large size	-0.004	-1.393	(0.164)	-0.024	-1.628	(0.104)
Medium size	-0.001	-0.227	(0.821)	-0.016	-1.143	(0.253)
Time Dummies		Yes			Yes	
First-order serial correlation		-1.707	(0.088)		-0.175	(0.861)
Second-order serial correlation		-0.700	(0.484)		0.678	(0.498)
Wald joint significance (df=8)		4306.27	(0.000)	(df=18)	640.92	(0.000)
Wald time dummies (df=6)		1140.07	(0.000)	(df=6)	330.49	(0.000)
Sargan Test (df=28)		34.330	(0.190)	(df=18)	18.155	(0.446)

See the end note of table 5. The estimated models are:

1. Without interactions

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \beta_2 ROE_{it} + \beta_3 TLA_{it} + \beta_4 CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \eta_i + \beta_9 P_{it} + \varepsilon_{it}$$

2. With interactions

$$Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \delta_1 Lg_{it} Z_{it-1} + \gamma_1 Me_{it} Z_{it-1} + \beta_2 ROE_{it} + \delta_2 Lg_{it} ROE_{it} + \gamma_2 Me_{it} ROE_{it} + \\ + \beta_3 TLA_{it} + \delta_3 Lg_{it} TLA_{it} + \gamma_3 Me_{it} TLA_{it} + \beta_4 CG_{it-1} + \delta_4 Lg_{it} CG_{it-1} + \gamma_4 Me_{it} CG_{it-1} + \\ + \beta_5 Ow_{it} + \beta_6 Lg_{it} + \beta_7 Me_{it} + \beta_8 M_{it} + \beta_9 P_{it} + \delta_4 Lg_{it} P_{it} + \gamma_4 Me_{it} P_{it} + \eta_i + \varepsilon_{it}$$

Apendix 1

To measure the degree of ownership concentration in the case of SCB, we caluculate Herfindahl's index for their shareholder distribution. We have data for the total numbers of shares and shareholders for each Commercial bank. Specifically, we have the number of shareholders in the following categories:

T1. Those with 100 shares and less

T2. Those with 100 to 500 shares

T3. Those with 500 shares and over

If we use s_{1it} and s_{2it} to denote the numbers of shareholders in Commercial bank *i,* in categories T1 and T2 during period *t*, and N_{it} to denote the total number of shares, the index is given by:

$$C_{it} = \left(\frac{s_{1it}}{N_{it}} x50 \right)^2 + \left(\frac{s_{2it}}{N_{it}} x300 \right)^2 + \left(1 - \frac{s_{1it}}{N_{it}} x50 - \frac{s_{2it}}{N_{it}} x300 \right)^2$$

where we have assumed the average number of shares owned by shareholders in categories T1 and T2 to be 50 and 300 respectively.

Footnotes

[1] This risk-seeking behaviour on the part of owners is a symptom of the moral hazard problem identified by Merton (1977).

[2] See also Akerlof and Romer (1993) who analyse the behaviour of American Savings Banks during the eighties. According to these authors, inadequate accountancy rules and lax regulation encouraged insider stockholders to "loot" deposit insurance funds.

[3] There is a third type of bank: Credit cooperatives but they only control less than the 5% of the loan and deposit markets.

[4] There are many examples, such as the entry of Castilla León Savings bank to Spain's largest sugar company, by Regional Government order; or the purchase by some Andalusian Savings banks of a portfolio of shares in the Seville Electricity Company, without this giving them any right of control in the company.

[5] It would be useful to examine other measures of bank risk-taking, such as market risk or systematic risk but only large Commercial banks in our sample are listed in the Spanish Stock Market.

[6] Given that the variables for the model are ratios, merged institutions are assigned the same ratio value from the date of the merger.

[7] We do not include the instruments of the predetermined variable multiplied by the size dummies because computational considerations prevent invert the instrument matrix.

[8] Around 90% of small Commercial banks score above 0.9 on the Concentration Index. In the medium size category, shareholder concentration increased gradually throughout the sample period. Most of the institutions with the highest dispersion are large Commercial banks.

[9] The total number of publicly controlled Savings banks was 20 in 1993. The last two years

show a sharp rise in the public control of Savings banks in our sample but until 1997 the majority of large Savings banks were not publicly controlled.