CIRPÉE
Centre interuniversitaire sur le risque, les politiques économiques et l'emploi

Cahier de recherche/Working Paper **02-01**

Corporate Governance and Depository Institutions Failure : the Case of an Emerging Market Economy

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Juillet/July 2002

Résumé : Cet article étudie la relation qui existe entre la structure de propriété et de gouvernance des institutions de dépôt (ID) d'un côté, et la cause dominante de faillite de l'autre. Une abondante littérature démontre que les ID détenues par actions, au sein desquelles les dirigeants sont bien supervisés (soit par le marché ou le Conseil d'Administration) ou ont des intérêts alignés à ceux des actionnaires, font faillite en raison du risque moral entre actionnaires et détenteurs de la dette, manifesté dans les états financiers ou hors bilan. Par ailleurs, au sein de ID dont le contrôle est diffus, caractérisées par un faible contrôle des dirigeants ou des intérêts divergents des actionnaires et de la direction, la cause principale de faillite réside plutôt dans la manifestation de coûts d'agence ou préférence pour la dépense qui conduit à la faillite. Nous exploitons l'opportunité qu'offre la crise Colombienne du secteur bancaire et des coopératives financières (CF) et la qualité relative de l'information disponible de ce pays pour réaliser l'étude. Notre objectif est d'établir empiriquement l'importance relative de ces deux conflits comme déterminants de faillite de l'ID. Les résultats suggèrent que, dans le cas de la Colombie, le risque moral est un facteur clé dans la faillite des banques alors que les coûts d'agence expliquent la faillite des CF. La faillite des banques étatiques s'explique de manière significative et simultanée par le risque moral et les coûts d'agence.

Abstract : In this paper we study the relationship that exists between ownership and governance structure of depository institutions (DI) on one side, and the dominant *cause* of failure on the other. Extant theory implies that while in stock owned DI where management is either well controled (through markets or board control) or interests are aligned with those of shareholders, the dominant cause of failure will be moral hazard between shareholders and debtholders, manifested in balance sheet or off-balance sheet risk taking. On the other hand, in DI of diffuse ownership with poor management control or where management's interests are not alligned with those of owners, the dominant cause of failure will be agency costs, manifested in expense preference behavior that leads of failure. We exploit the opportunity that offers the Colombian crisis of banks and financial cooperatives (FC) and the relatively good quality of data available for this country to perform the study. Our objective is to establish empirically the relative importance of these two conflicts as determinants of insolvency in DI. Results suggest that, in the case of Colombia, moral hazard is a key factor in explaining bank failure while agency costs explain insolvencies among FC. In state-owned banks both moral hazard and agency costs are significant in explaining failure. We also control whether the absence « quality of management » provides a better explanation of failure than agency costs, but reject this hypothesis.

Corporate governance and depository institutions failure: the case of an emerging market economy

And when I mind with how much greediness
We seek the present gain in everything
Not caring (so our lust we may possess)
What damage to posteriority we bring
"**A Collection of Emblems".** *George Wither*

1 Introduction

In this paper we test the hypothesis that corporate governance determines the extent to which agency costs and moral hazard play a role in failure of depository institutions (DI).[1] More specifically, we test whether DI whose governance is weak due to diffuse ownership, such as mutual intermediaries, are more likely to fail due to severe agency costs, while institutions with strong governance due to concentrated ownership, such as stock banks, are more exposed to moral hazard resulting from conflicts of interest between shareholders and debtholders. [2] Although this hypothesis has not to our knowledge been tested directly, it is implicit in the extant theory of financial intermediation. This theory suggests that, *ceteris paribus,* in DI with concentrated ownership and strong governance, moral hazard will be the conflict that dominates as cause of failure when it occurs, while agency costs will dominate as a cause of failure in DI with diffuse ownership and weaker governance. However, other mechanisms to control these conflicts such as markets and hierarchies will also influence the outcome. To test this hypothesis, we evaluate the relative importance of both conflicts in explaining failure of DI with different ownership and governance structures in an emerging market: Colombia. In doing this, we contribute to the litterature that seeks to explain financial institutions failure and a regulatory and supervisory framework that may create more stable conditions in the financial sector.

Our tests support the hypothesis that in DI with diffuse ownership, such as financial cooperaives and cooperaive banks, agency costs dominate as cause of failure. Moral hazard dominates in commercial banks of concentrated ownership. In state owned banks, both factors appear to play a nearly equal role as determinant of failure.

The link between moral hazard and stock bank insolvency has been substantiated both at the theoretical and empirical level for industrialized and developing countries. But, is this also the main reason why DI with different corporate governance or ownership such as financial cooperatives (FC) and state-owned banks fail? To respond to this question we confront in a direct way

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[1] For the purpose of this paper we will use the expressions "agency costs" and "moral hazard" in a somewhat loose fashion to refer to the two conflicts of interest that exist between owners of the firm vs. managers, and depositors vs. shareholders respectively. These two different labels are consistent with the use given to these two terms in the literature and allow us to distinguish the two conflicts throughout the text. Strictly speaking, both conflicts can be described by asymmetric information models labeled as *moral hazard with hidden information* (Rasmusen, [85]). The difference between the two resides only in the parties that act as principals and agents.

[2] La Porta et al [60] differentiate six ownership categories: widely held (with no significant shareholder) family or individually owned, state owned, institutionally owned, corporate owned or cooperatively owned. We focus here on DI falling under the second (family or individually owned), third (state owned) and last (cooperatively owned) categories.

those factors that play a dominant role in insolvencies for stock banks in hands of private individuals, state owned banks and cooperative DI (FC and cooperative banks). Theory suggests that, depending on ownership diffusion and corporate governance, either moral hazard or agency costs can lead to sub-optimal decision-making in the DI. However, banking failure literature has focused almost exclusively on moral hazard issues as determinant of insolvency, because shareholders attempt to expropriate either liability holders or the deposit insurance fund. While in the public banking corporation agency conflicts are an issue, they are rarely seen as a determinant of failure and largely ignored by supervisors. In fact, the contrary is considered to be true: administrators are seen as conservative decision makers that seek to preserve their employment through low risk investment decisions *resulting in lower insolvency risk*. However, a substantial body of literature based on expense preference behavior (EPB) theory applied to financial intermediaries, suggests that ownership diffusion and EPB are positively correlated. Can this EPB be so extreme as to affect the very solvency of the financial intermediary?

The Colombian case, with relatively good quality of the data, a diversity in ownership and corporate governance, and a relatively large sample size in terms of the number of failed DI, provide an opportunity to study the fundamentals of this phenomenon in an emerging market. The Colombian data available for both the banking (public and state owned) and FC systems offer the possibility of contrasting in a direct way the factors that contribute most to the failure of DI as a function of their ownership structure.

The question of the reasons behind failures of DI with different corporate governance and levels of ownership diffusion, although tested in this paper on Colombian data only, is of relevance for regulators and supervisors in emerging markets in general. In these countries, regulators and supervisors, influenced by the traditional moral hazard literature, when performing prudential supervision and system crisis prevention focus mostly on the various manifestations of this conflict. Although this may indeed be the appropriate focus in the supervision of stock banks under control of private individuals, it may be misleading when overseeing institutions with a different corporate governance such as state-owned banks and mutual intermediaries. *In other words, they may be deceived by an apparent "safe" management of the institution, missing the warning signals of an incoming failure.* This widening of the focus of prudential supervision is particularly important for banking authorities that must expand their field of action to include state-owned banks, cooperative banks and FC, a development that started in many countries during the 1990's and is expected to continue in the future. The findings in this paper that support the main hypothesis presented above (i.e. moral hazard as dominant cause of failure in concentrated ownership DI and agency costs in DI with diffuse ownership and absence of secondary markets for stock), suggest that prudential supervision of DI needs to be adapted to the characteristics of the corporate governance, the presence or not of a secondary market for stock, and avoid misleading uniform standards of evaluation.

Our analysis, made explicit in the following pages, can be summarized in the following graph (Figure 1). The cause of failure is determined indirectly by corporate governance. Depending on the concentration of ownership one of two types of agency "conflicts" dominates. When the ownership is concentrated *or* when ownership is diffuse and a secondary market for shares exist (privately and publicly held stock banks), the conflict that dominates as cause of failure is the conflict between shareholders and debtholders (*moral hazard*). When ownership is diffuse *and* no secondary market for shares exist (government-owned stock banks and mutual banks) then the conflict that dominates as cause of failure is the one that exist between shareholders/members and
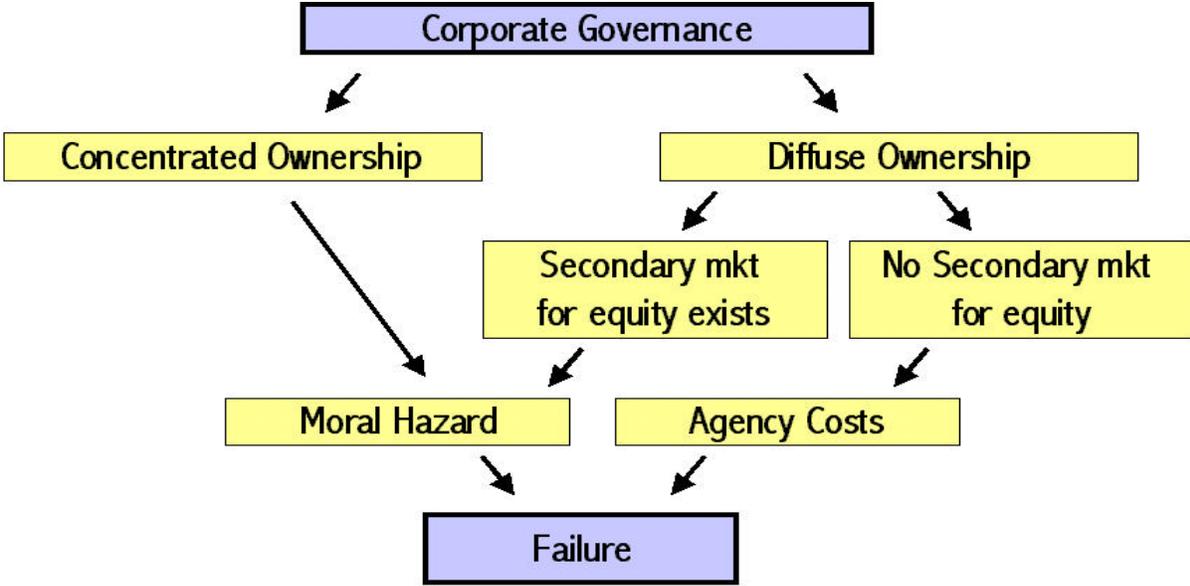
Figure 1:

mangers (*expense preference* or *agency costs*). Now we proceed to support these assertions. We first start with commercial banks that correspond to the left branch of concentrated ownership and the left branch underneat diffuse ownership (with secondary market for equity). Then we analyze in sequence the cases of government owned banks and mutual banks that correspond to the right branch of diffuse ownership with no secondary market for equity.

In this paper we are operating in the intersection of three branches of research literature: i) The mostly stock bank oriented literature that focuses at the theoretical and empirical levels on contracting under asymmetric information and hidden actions between principal depositors/debt holders and agent shareholders (henceforth, moral hazard). In mutual intermediaries the conflict studied is the one that exists between net borrowers and net savers.[3] ii) The literature that covers contracting between shareholders or members of mutuals as principals and managers as agents (henceforth, agency costs). iii) The literature, of mostly empirical nature, that attempts to explain failure of depository institutions, mostly stock banks. We will be more specific about this literature in later sections.

2 Theories of moral hazard and agency costs in DI: a review

2.1 *The case of banks*

The literature on failure of DI, mainly focused on commercial stock-owned banks, takes two main approaches. One approach is to focus on improving quality of failure forecast. The other approach

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[3]The expressions net-borrower and net-savers are terms borrowed from the credit union literature (e.g. Emmons and Mueller, [34] and Shmit, [101] among other) to refer to members whose net position vis-à-vis their cooperative is that of a borrower or a saver.

attempts to explain failure from an economic point of view: what are the fundamental causes of bankruptcies. Examples of the first approach is the "early warning model" litterature based either on accounting datas (represented among other by Lane, Looney and Wansley [61], Korobow and Stuhr [58], West [109], Pettway and Sinkey [81], Martin [63], Sinkey [98]) or market data (Randall [84], [83]). Most of this authors were interested in the statistical procedure that provided the most reliable forecast of failure. Fundamental causes were less of a concern. A detailled review, albeit aged, of the first group is provided by Demirgüc-Kunt [29].

Those authors preocupied with the fundamental causes of banking failures have focused on a few main arguments. Although some take a rather exceptional approach, [4] most have identify two major causes:

- Moral hazard arguments associated to option nature of the deposit insurance

- Moral hazard arguments associated to the option nature of the stock

These result from incentives to which shareholders are subject to exploit either the insurance fund or liability holders. The most transparent theoretical explanation of the existence of these incentives resides in the option nature of stock (as a long position in a call on the bank assets bought from the liability holders, Merton [70]) and the deposit insurance contract (as a long position on a put option bought by the shareholder from the deposit insurance fund, Merton [69]). We will not enter into the details of this theory and its empirical tests since it is well documented in the banking literature.[5]

Agency costs are generally considered to be an issue in the public corporation, but largely under control through markets (for shares and for corporate control) or governance structures.[6] Not surprisingly, the presence of large sharholders in the ownership of the firm, may they be private outside investors, insider investor or instituional investors, plays a positive role in the efficiency of the governance structure.[7] Agency costs or EPB applied to the banking industry have also been subject of considerable attention.[8] While recognizing the similarity of the effect of agency costs on banks and non-bank firms, the researchers have focused on a different twist of the issue. Throughout this litterature on bank and non-bank firms, administrators are perceived as conservative decision makers that seek to preserve their employment through low risk investment decisions (e.g.

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[4]Examples of these less-common approaches are Boyd and Graham [14] who relate failure to merger of the holding company with nonbank firms; Chou and Cebula [24] who study differentials in failure rates accross states in the 1980's Savings and Loans crisis; Short [94] who attributes failure to management quality.

[5]E.g. Boyd, et al. [15]; Berger, Herring and Szegö [10]; Brewer [17]; Besanko and Kanatas [9]; Kambhu [54]; Short [94]; Avery and Hanweck, [6]; Blair and Heggestad [13] are some examples. At the empirical level failures have been associated deposit insurance in the United States (Wheelock and Wilson [111], Alston, Grove and Wheelock [2]) and elsewhere (Milhaupt [73] in Japan). In general authors find that bank failure where highest in environments where and times when deposit insurance exists.

[6]E.g. Fluck [38]; Noel and Tarhan [78]; Schleifer and Vishny [91]; Jensen [51]; Barnea, Haugen and Senbet, [7]; Jensen and Meckling [50].

[7]The presence of private outside investors was studied by Morck [74], McConnel and Servaes [68], [67]; that of insider investors by Holderness and Sheehan [48], Schleifer and Vishny [91] and that of instituional investors by Hansen and Hill [44], Chaganti and Damanpour [22].

[8]Examples of this work are Edwards [32], Hannan [42], Hannan and Mavinga [43], Saunders et al., [89]; Mullins, [76]; Demsetz et al., [31]; Chen et al., [23].

Hirschleifer and Thakor [47] for an elegant theoretical model focusing on managers' risk aversion). If this is so, the thinking goes, manager-shareholder agency conflicts should results in lower insolvency risk in banks. Some authors have argued for and tested the hypothesis that in banks with diffuse ownership managerial risk aversion may in fact offset the excessive risk taking incentive that stems from moral hazard.[9] Results tend to support this hypothesis. For example, Anderson and Fraser [4] report that total and bank specific risk are positively and significantly related to managerial holding. Demsetz et al. [31] document a statistically significant positive relationship between market risk measures and managerial shareholding. Agency costs in stock insurance companies were studied by Mayers and Smith ([66], [65]). Rasmusen [86] for mutuals; Saunders et al. [89], Mullins [76]; Demsetz et al. [31] for stock banks and Cebenoyan, et al. [21] for savings and loans, all have argued that the greater the concentration of ownership, the greater is the incentive to take high risk decisions, while the greater the diffusion of ownership, the greater is the incentive to incur into agency costs and to avoid high risk taking.

Compensation practices also serve to align managers' interest with those of shareholders in JSB. In particular, the introduction of performance incentives through distribution of stock options has increased dramatically since the 1980's. The purpose of these schemes is, of course, to align the incentives of managers with those of shareholders. Thus managerial conservatism in JSB is neutralized, since managers now have an incentive to increase variance in underlying stock prices. Wang [108] and Phelan [82] developed models of optimal compensation for managers to create this alignement of interest. The use of stock options as a particular strategy for incentive schemes was studied by Johnson and Tian ([53] and [52]), Carpenter [20], Rubinstein [88] and Kulatilaka and Marcus [59]. It may be noted that in fiscal year 1998, 97% of S&P 500 firms had issued stock options to their managers. This would suggest a strong presence of similar schemes in the banking industry that would cancel managers' risk aversion. These incentive compatible compensation packages can be, and are, applied not only to top management but also to other jobs where outside observation is hard to achieve. However, the empirical results noted before suggest that the effect is not strong enough to cancel the empirically observed negative realtionship existing between managerial control and bank risk taking.

2.1.1 *The role of industrial groups*

Although our research focuses on the relationship between onweship strcuture and causes of failure,there is a related issue that we cannot ignore: the presence of industrial groups of which banks are often part. Particularly considering that our sample is based on an emerging market such as Colombia. In most countries in the world it is a common feature that commercial banks are part of a "family owned industrial group." This is a form of control, that cannot happen in Northamerican countries due to legal restrictions, but is almost omniprescent throughout the world up to these days. The impact of this particular form of control on bank solvency has not been studied.

Already in the 1970's Shaw [93] proposed that in many "developing countries" banks played the function of channeling financing from the open financial market to the industrial groups. This specialized function necessarily resulted in a high concentration of a bank's credit portolio in the groups related companies. Moral hazard conflicts between liability holders and (group) shareholders

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[9]See Anderson and Fraser, [4]; Demsetz et al., [31]; Mullins, [76]; Saunders et al., [89].

that could result from this "function" were not a point of concern to Shaw. This concentration had two potential effects:

- The correlation of failure and debt servicing capacity of group related companies can be expected to be positive and high. This will increase systematic credit risk in the bank.

- The financing of group-related companies provided the owners of the bank more opportunities to reduce the effective equity stake (to use the term coined by Rojas Suarez and Weisbrod [87]) in the bank's capital. The higher effective leverage that results from this reduced equity stake will result in an increase in the volatility of the residual cash flows and an increase in the number of states of nature where it will be profitable for the owner to exploit the option feature of equity to its benefit. Although, since the 1990's many countries (and Colombia in particular) have increased regulatory control over "related lending", this task is particularly difficult in banks that are part of a family owned industrial group.

Both these arguments suggest that banks that belong to family owned industrial groups will most likely manifest a higher level of moral hazard between the bank's liability holders and its sheareholders. Thus, if the presence of these groups will have an effect, it will be to accentuate the gravity of moral hazard to which are exposed liability holders. Whether this effect is priced in the rate of bank-issued debt instruments and deposits is another question altogether. In some cases this pricing is not possible since interest rates are still controled by the state. Besides, the absence of a variety of instruments in these underdeveloped financial markets, reduces the alternatives available to investors.

From the point of view of agency costs, it is useful to note a common feature of groups: that family members are strategically placed throughout the group (including the bank) providing the owning family a considerable amount of confidential information that serves to control mangers efficiently. This should thus reduce the impact of agency costs on the institution's failure risk.

2.2   The case of mutual DI

Mutual institutions with extreme diffuse ownership have been modeled differently than stock banks and savings and loans. Researchers have over the years made it clear that there are some important contrasts between the way stock banks and DI institutions of diffuse ownership such as mutuals carry out their decisions. Some authors have argued that mutual oganizations achieve a higher efficiency because they avoid the conflict between shareholders and depositor (e.g. Valnek [104]). These are arguments are similar in nature to those presented by Mayers and Smith ([66], [65]) to differentiate stock and mutual insurance companies. They support the hypothesis that the mutual arises to internalize the conflict between cutomers (policy holders) and sharholders. A similar line of argument was used (and modeled explicitly) to explain the appearance of credit mutuals to internalize adverse selection problems in lenders-borrower relations by Smith and Stutzer [99]. However, two other conflicts of interest are identified in the theoretical and empirical literature about mutual organizations and in particular FC. They are, the moral hazard that exists between net borrower members and net creditor members and the agency conflicts that exists between

members (both net borrowers and net creditors) and managers (e.g. Emmons and Mueller [34]).[10] Both types of conflict have been studied with some degree of detail.

The conflict of interest that exist between net borrower members and net creditor members, is related to the fact that both types of members may be represented in the Board of Directors of a typical mutual DI and thus are able to influence the decision process in their benefit. As noted by Smith and Stutzer [99], Smith, Cargill and Meyer[102] and Taylor [103] among others, in a FC members are both owners of the intermediary and consumers (suppliers) of its output (input). Because the FC intermediates between its members-savers and its members-borrowers a conflict of interests arises. Almost all subsequent work recognises that in this type of mutual intermediaries, member (net savers versus net borrowers) conflicts could affect the manner in which it operates.[11] The importance of this conflict is that there is a considerable shift of interests away from savers to borrowers, something that doesn't happen in a stock bank. Borrower dominated FC will tend to overexpose the intermediary to project risk making them more suceptible to failure. By the type of risk to which the DI is exposed, there is an evident parallel in the nature of the conflict between net-borrowers and net-savers of a FC with the depositor-shareholder conflict.

From a more empirical point of view, Smith [101], based on US credit union data, concludes that on average neither net borrowers nor net creditors dominate. Patin and McNiel [80] find evidences that more credit unions display a saver bias rather than the way around. However, one can expect that some degree of variance exists within the population of FC, with some being dominated by net creditors and others by net borrowers. In a study focusing on Latin American FC, Westley and Shaffer [110] find that institutions with a borrower bias display higher credit risk. This finding provides support to the moral hazard hypothesis outside of the United States.

The second conflict within a mutual DI, between members and manager, has been studied under the theoretical umbrella of the expense preference behavior (EPB) theory of Williamson [112] applied to financial intermediaries. Akella and Greenbaum [1] for example, focusing on mutual and stock United States savings and loans, suggests that the larger the ownership diffusion the more accentuated is the EPB. This follows arguments by Vebrugge and Jahera [106] and Verbrugge and Goldstein [105] and Mester [71] in the same direction regarding savings and loans. Mester [72] goes on supporting this line of arguments from a perspective of "agency costs."[12] The central hypothesis behind this group of works is that the greater the diffusion of ownership, the weaker is the monitoring by owners and the greater is the degree of expense preference behavior by managers. Papers by Emmons and Schmid [33], Keating and Keating [56], [57] present similar theoretical and empirical results for the US credit union industry and by Hasan and Lozano [45] for the Spanish "cajas." Another dimension of the member-manager conflict is the one we have already addressed when discussing stock banks: the risk aversion of managers. As noted, througout the litterature on bank and non-bank firms, administrators are perceived as conservative decision makers that seek to

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[10] As noted at the beginning of this article, the use of the terms "moral hazard" and "agency conflict" has been adopted to facilitate the presentation.

[11] E.g. Flannery, [36], Walker and Chandler [107], Smith, et al. [102], Black and Duggar [12], Navratil [77], Smith [100], Emmons and Schmidt [33], Valnek [104].

[12] Strictly speaking there is a clear difference between "agency costs" and "expense preference" that is based on the theoretical roots and modeling techniques used to describe both concepts. However, as Emmons and Schmid [33] and Akella and Greenbaum [1], in this paper we will make a loose use of both terms and consider them essentially equivalent. We can take this liberty since we are not engaging in an explicit theoretical treatment of the issue.

preserve their employment through low risk investment decisions (as modeled by Hirschleifer and Thakor [47]). Ceteris paribus, in the case of a mutual intermediary, the manager-*member* agency conflicts should results in lower insolvency risk for the institution. In fact, Bhattacharya y Thakor [11] argue that the low effective control shareholders wield over managers in mutual intermediaries such as credit unions and mutual S&L, makes these insitutions suitable for financing low risk projects.

The implication of the arguments developed in the banking litterature around this issue is the following: managers of mutual DI have an incentive to engage in a conservative risk strategy in the management of the firm. However, they are also exposed to incentives to engage in expense preference behavior. A consequence of this combination of incentives is that mutual DI failure is less likely to be due to net borrower-net lender moral hazard, and more likely to be due to expense preference behavior exercised by manager. The balance is a purely empirical one, and is the one we will test below. However, the implications for the purpose of regulation and supervision are considerable, since they imply a completely different focus in the monitoring exercice. For example, manager dominated DI are likely to hold considerable capital (as a risk averse strategy by managers), display a safe record in a number of other risk related ratios, giving the supervisor a false sense of security. At the same time, higher than expected fluctuations in cash flows can generate a liquidity crisis that precipitates the institution into a subsequent failure.[13]

2.3 *The case of state-owned banks*

One third category of DI must be considered: state owned bank. While stock banks and mutual DI have been modeled extensively, there is a notable absence of theory to guide us. When the bank is state-owned, both the share price and the market for corporate control disappear as disciplining factors that limit expense-preference behavior. In a state-owned bank, no stakeholders has a direct interest in its performance. Thus, state-ownership can be considered as an extreme case of shareholder diffusion which, as noted by Akella and Greenbaum [1], leads to weaknesses in governance. Thus, unlike privately-owned stock banks (and like mutuals) expense-preference behavior may be considerably more important, and, potential factor contributing to failure.

3 The role of markets and hierarchies to control principal-agent conflicts

Weak internal governance does not, however, necessarily imply runaway agency costs. Markets and institutions have devised market-based or hierachy-based mechanisms that often compensate for weak governance or control principal-agent types of conflicts. The best studied and most obvious case is that of the "widely held" (to use La Porta et al.[60] nomenclature) public corporation, that benefits from *market mechanisms* to compensate for weaknesses in its corporate governance. In the widely-held stock bank, expense-preference behavior is controlled by: i) the stock market

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[13]This is, by the way, exactly the scenario that happened repeatedly in cooperative banks and FC in the Colombian crisis. In the case of UCONAL, a cooperative bank, it ceased payment and had to be nationalized only six months after the Bank Superintendent gave it a clean health slate. Clearly a case of "looking in the wrong direction."

whose price fluctuations reflect the investors perception about the quality of the intermediary's management; ii) the market for corporate control that through mergers and acquisitions removes low performing management teams; iii) the labor market in which each manger must operate and in which reputation plays a role.

The second source of conrol, the market for corporate control, has been subject of a fairly intense research activity. In fact, three main explanations for takeover bids are distinguished in the literature: synergy, discipline and hubris. Disciplinary aquistions are motivated by gains from correcting non-value maximizing practices of managers in target firms (Martin and McConnell [64], Mork *et al.* [75], Grossman and Hart [41]). There is evidence that both the second and third explanations hold for a large number of operations (Mork *et al.* [75], Lang, Stulz and Walkling [62]). Both the market price of the stock and the market for M&A determines the eventual outcome. Several studies relate Tobin's q-ratio–a proxy for the investment opportunity set and an indicator of management capability (e.g. Cudd and Duggal [26], Servaes [92] and Lang, Stulz and Walkling [62])– to the position of firm in mergers and acquisitions. Firms with a $q < 1$ tend to be the target and firms with a $q > 1$ tend to be the bidders in merger activity. These authors also find a positive relationship between cumulative abnormal returns and the difference in the q ratio of the bidder and the target firms, implying that acquisitions undertaken by high quality management firms of other low quality management firms are rewarded by the market.

Unlike stock banks, mutual and community based DI (and government-controlled enterprises) do not enjoy the disciplining effect on management of market traded shares, nor the benefit of a market for corporate control. The labor market remains however as residual market mechanism, although its efficiency to control agency costs is disputed despite Fama's [35] contention. To compensate for the lack market mechanisms, mutuals DI of many countries have created *hierachical mechanisms* that serve to curb agency costs. It is precisely this line of reasoning that lead to the creation of German *auditing federations* –to which every FC must be affiliated by law. These federations were intended by their founders as substitutes for the market induced discipline present in a stock bank.[14] That is, the German auditing federations and other delegated monitoring structures common to federative networks of FC, can be viewed as a hierarchical substitute for the absence of market mechanisms (the stock market and the market for corporate control) that serve to discipline managers of stock companies. We could provide a list of examples of hierarchical mechanisms put into place by mutual and community based DI that appear to serve, among other purposes, that of monitoring agency costs (Austria's Raiffaisen, France's Credit Agricole and Mutuel, French Canada's Desjardins, Germany's Landesbanken and Raiffeisen, Holand's Rabobank, Spain's "Cajas", etc.). Akella and Greenbaum [1] and Rasmusen, [86] see mutual DI as intermediaries where the state –also a hierarchical mechanisms– substitutes shareholders in the supervision function, while in Emmons and Schmid [33] it is another hierarchy, the sponsor, that assumes the role of controlling agency costs. These three studies reflect the United States experience of corporate governance of mutual intermediaries and in all three an emphasis is put on the need of an external supervisory power to control agency costs, something quite at variance of standard supervisory practices for commercial banks. The weakness or absence in developing countries of either market or hierachical mechanisms can thus aggravate the severity of agency conflicts that result from the diffuse control

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[14]Although not in the form of auditing federations, other forms of monitoring of member FC exist in many other movements organized around tightly bound networks. See Jäger [49] for a detailed analysis along this line of thinking.

and resulting weak governance. The absence of both market based or hierarchical mechanisms to curb expense-preference behavior by managers in institutions with weak governance due to diffuse ownership, may thus convert agency conflicts into a powerful destabilizing factor. Unfortunately in this paper we cannot empirically address the role of these mechanisms on the efficiency of corporate governance and the control of agency costs. The only effective mechanisms available in that country is the stock market, and for the purpose of controlling agency costs, largely superfluous due to the closely held nature of the banks. Among mutuals, no hierachical mechanism exists and all mutual DI are subject to the same regime. The only sub-group of DI studied here and subject to some amount of hierarchical control are the state-owned banks. This would suggest that state-owned banks could be less subject to agency costs problems than mutual DI.

This picture of banks (or real sector corporations) with differing degrees of concentration of control by owners, with a continuum of institutions ranging from highly diffuse stock ownership to concentrated ownership, becomes biased in most emerging market. For practical purposes, in most developing countries banks are of closed ownership. Although they are often traded in the local stock markets or in the international stock markets as American Depository Receipts (ADR) or International Depository Receipts (IDR), the floating portion is small, with one or a few shareholders holding substantial portion of the outstanding stock. In this context it is interesting to note the results of Gibson [40] who finds that CEOs of emerging market firms are more likely to lose their jobs when their firms performance is poor, suggesting that corporate governance is not ineffective in emerging markets. The magnitude of the relationship is surprisingly similar to what Kaplan [55] found for the United States. This suggests that concentrated ownership results in corporate governance in emerging markets appears to be as effective as that of a well developed market, despite the absence of deep market for mergers and, presumably, less efficient market for labour. Several other studies (La Porta *et al.* [60] and Claessens *et al.* [25], among others) point to the high concentration of ownership in emerging market firms, and to the fact that the main agency conflict there is not between owners and managers but between majority and minority shareholders. In the Colombian case studied in this paper, all stock banks not owned by the state, a –or a small group of– shareholder(s) control at least 50% of the shares issued. For this reason we have not included measures of concentration in the statistical analysis. Instead, all stock banks not controlled by the state are considered, using La Porta *et al.* [60] code, as "family or individually owned"

4   Data

We use two data set: one for Colombian commercial banks and one for Colombian FC. The first data set covered the Colombian banking system : A total of 38 institutions with data from March 1980 until December 1999, both private and public institution. The data are semiannual up to 1988 and quarterly from 1989 to 1999. To facilitate the convergence process of the nonlinear models, we eliminated both 1% extremes of the distribution of each ratio that was computed. Although this information might be very valuable, we prefer to eliminate some observations to increase the stability of the regressors. For reasons noted above, we have divided the sample of stock banks into privately-owned and government-owned banks. Although for the banking sector the data available allowed the computation of a much larger set of variables than for the FC sector, we only used ratios that were computable for both types of institutions.

The second data set consist of FC that provide data to the Colombian Confederation of Co-operatives (CONFECOOP). We used the annual financial statements (balance sheet and income statement) of 154 financial cooperatives (FC) from 1993 to 1998, and monthly data for June, July, August and September of 1998 (The FC crisis period).[15] We also truncated the distribution to eliminate both 1% tails. The FC in our sample hold over 90% of the sectors' assets but control a proportion considerable smaller of the FC movement membership.

4.1 Definition of variables

We considered 30 candidate variables with which to compute various ratios of interest.[16] In tables 1-a and 1-b we present statistics for key ratios considered in this analysis. There we have included means, standard deviations and some distributional characteristics for each of the ratios that were computed and considered as potential candidates for use in the statistical tests. In tables 2-a and 2-b we also present means and standard errors of all these variables for healthy and failed FC and banks respectively, as well as the results of a test of differences between the means of healthy and failed institutions. The values under the column of "failed" are those obtained when the DI had efectively failed. All observation for the failed intsitution before the failure event were included in the statistics under the "healthy" column.[17] In all tables we have divided the ratios into three groups: control ratios; ratios that measure moral hazard, mostly reflecting risk position of the DI; and ratios that measure agency costs, mostly in the form of type of assets, salaries and operating expenses. We provide more explanations about these three groups later on. Within these groups there are ratios that are a good proxy of one of the conflicts for one of the institutions but not for the other. An example of this is, for reason we will explain later, the ration of Deposits over Credits. However, for comparison purposes we have kept the format of the tables constant. The reader may note that most variables, including control variables, moral hazard and agency costs proxies, display significant differences in mean according to a differences test. The ratios finally chosen in the statistical model are defined below and their interpretation is presented in Table 3. We support our choice of ratios used in the statistical procedures presenting research that considered each of these ratios in different contexts, but in particular in the analysis of DI failures. Given the results of the differences test it is not surprising to see that numerous coefficients of variables that proxy for moral hazard and agency costs are significantly different from zero.

As a first approach it is interesting to comment on the tests of differences presented in tables

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[15]The reader might be uncomfortable with the differences of periods covered for both types of institutions. This is unavoidable. Over the period 1993 to 1998, only four bank failed or run into serious difficulties, thus no meaningful estimation would have been possible. On the other hand, there is no data available for FC before 1993. Thus a comparison of "causes" of failures for the banking and FC sectors can only be made using these different, albeit overlapping, periods.

[16]Much more variables could be available if only latter-year data would be used. However, for the early 1980's for banks and the mid 1990's for FC, data was highly aggregated. The use of these early years are of interest –at the cost of less variables available– due to the large number bank failures in the early 1980's and FC failures starting 1997.

[17]Since the event failure most likely arrives after a period of deterioration in the ratios for the DI in troubles, this means that the statistics shown under the "healthy" column are somewhat biased toward values of failed institutions. This should reduce the power of the difference test. However, as the test statistics show, the differences are robust enough as not to be greatly affected by this bias, showing a high level of significance regardless.

2a-b. Most variables in the three groups pass the test of differences at quite high significance level, with the control variables diplaying less significant differences. However, there are some interesting patterns that present themselves when taking a closer look at the numbers. Take the variables measuring agency costs (the last panel). In the case of FC invariably the failed take values that would suggest a higher level of agency costs and the same is true for banks. Examples are Non-financial costs/Assets, Deposits/Credits and Personnel Expenses/Assets which are all larger for failed DI and significantly different from those of healthy DI. If we analyze the group of ratios used to proxy moral hazard we observe a similar pattern. Examples are the Interest Rate GAP, Financial Income/Assets and Capital Exposure (Reserves+Unperforming Assets+Goods Received in Payment/Capital), all larger and significantly different for the failed DI. However, as we will see later, when both groups of variables are confronted as explanatory of failure one group tends to be overshadowed by the other. This first statistical results suggests that both moral hazard and agency costs may contribute to failure in DI of concentrated or diffuse ownership, however their relative importance as determinant of failure varies between institutions. This, of course, would be consistent with the theory reviewed earlier on.

4.1.1 Dependent variable

Failure

The dependent variables, failure, was obtained by classifying as failed DI those who effectively failed (where intervened or liquidated). Commercial banks were considered as failed when they were intervened, nationalized or a recapitalization was ordered by the Superintendency of Banks (as a result of being technically insolvent).Thus in our case the dummy variable represents official government intervention. The failures of banks happened mostly –but not exclusively- with two crisis in the banking sector around the years 1985 and 1998. The failures of FC happened mostly with a crisis in the sector in 1998. The list of failure events for both the FC and banking sectors are provided in tables 5-a and 5-b. Thus, for each financial intermediary (FC or bank) the dependent variable takes the value of zero as long as the institution is healthy, and if the intermediary fails it takes the value of one and missing from there on to the end of the sample period.[18] If the intermediary does not fail, the data is truncated at the end of the sample period with all observations of the dependent variable set to zero. See Shumway [95] for a detailed description of this sort of arrangement in dichotomous variable data bases. The fact that the data of non-failed intermediaries is truncated at the end of the sample period makes this a censored data. As the reader may note from table 4-a, only two FC were considered as "failed" after December 1998 (last observation in the data base), so they were considered as healthy DI in the estimation.

The reader may also note the long list of "failed" DI over the 20 year period covered in the study. This list reflects the relatively rigorous regulatory and supervisory policy applied by the banking authorities of that country since de beginning of the 1980. In Colombia, unlike many other developing countries, banks are rarely "rescued" with capital injection by the state that keep the institution artificially alive. When banks face either default in payment obligations or do not meet capital standards (or shareholder are unwilling to put up capital to meet standards), they are likely

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[18]Institutions that failed and then, after restructuring, capitalization and perhaps re-privatization, restarted operations, and after allowing a recuperation period of at least 3 years, where listed as a "new" sample with missing values before the reintroduction and the value of zero for the variable failure.

to be intervened, and taken over by the Deposit Insurance Fund. After –not always successful– restructuring these banks are often again sold to private interests. This also explains the repeated listing of some banks in Table 5. A similar policy, although somewhat more lenient due to the social effect of the failure of FC, has been applied to mutual DI. The difference resides in that FC, instead of being nationalized for restructuring and reprivatization, is put under administration of an intervenor appointed by the supervisory body. This policy justifies our choice of dummy variable where "failure" results when the supervisory authority intervenes the institution. This policy presents an additional benefit for the research in terms of quality of the data. In Colombia it is in general unlikely that failed institutions –i.e. DI for which the dummy takes the value of 1.0– are kept under the control of their original owners but are in a state of deterioration, as could be the case in many other developing countries. A certain problem presents itself with state-owned banks, where the government may support ailing institutions with capital injections eliminating the threat of intervention by the banking authority. This may introduce a certain classification error in the data for these banks, in the sense that failing institutions are classified as healthy.

4.1.2 Control variables

The control variables are variables we cannot associate specifically with neither the AC nor the MH hypothesis, but that, as extant literature suggests, may contribute to a financial intermediary's insolvency. We note below some relevant references that justify their use. Under control variables we also included those that may be influenced by both MH and AC, but in opposite directions. For example, the return on assets (ROA) should be lower with high AC or EPB, but higher if with high MH (resulting from de acquisition of high-risk high expected return assets). In these cases, the net effect is not known. We are considering three control variables: liquidity, size and profitability of the institutions:

Liquidity

1. Liquid assets/Total assets (DISPONIB) (Wheelock and Wilson [111], Saunders and Wilson [90], Barth et al. [8]): The variable DISPONIB is measuring the proportion of the liquid assets in the portfolio of assets. We expect a negative relationship between the probability of failure and this measure of liquidity.

Size

2. Logarithm of total assets (LOGA) (Calomiris and Mason [18], Weelock and Wilson [111], Papoulias and Theodossiou [79], Brewer [16], Gallo, Apilado and Kolari [39], Hassan [46], Demsetz, Saidenberg and Strahan [30], Saunders, Strock and Travlos [89]. This ratio is a measure of diversification potential. A diversified institution normally presents a lower credit risk, as its activities are present in a wider range of industries and products, thus reducing insolvency risk. On the other side, the importance of the assets may be associated with excessive real estate investments (in nicer, more prestigious offices), a percking strategy often use by managers that may contribute to insolvency by binding resources in unproductive assets. Further, much of the "expense preference" literature (Akella and Greenbaum [1], Keating and Keating [56], [57]) suggests greater AC through the expansion of inputs and outputs beyond profit maximizing levels.

Profitability

3. Return on assets (ROA) (Flannery and Sorescu [37], Barth et al. [8], Avery and Hanweck [6], Altman [3], Sinkey [98]): The ROA has a different interpretation if considering AC or MH. If

interpreted in the context of *AC*, a lower return means the institution had higher costs, wasting its resources. Thus, a lower return is a sign of greater *AC*. On the other hand, if interpreted in the context of *MH*, a higher return might mean the institution took on more risk, which should result in a higher expected return.

Group control

4. As noted in the introduction, theoretical arguments suggest that banks belonging to a family owned industrial group will be exposed to higher moral hazard. Thus, a dummy was created that took value of 1 for all observations in which the banks was under the control of one of these groups and 0 otherwise. For any one bank, the dummy can take different values throughout the sampling period as banks changed control between domestic private owners, foreign private owners and the state. Banks controled by a foreign banking group were given the value of zero. We expect to observe a positive and significative sign for the coefficient. The inclusion of this variable in the regression could have the effect of reducing the explanatory power of the "moral hazard" measures, since according to theory they should be positively correlated (ownership by group yields higher moral hazard). To control for this eventuality, regressions where run with and without this dummy variable. *This variable was not included in the current estimations since this corporate control histoy data es still in process of being collected.*

Foreign control

5. Banks that are controled by foreign entities (usually foreign banks) were given a value of 1 and all other institutions the value of zero. *This variable was not included in the current estimations since this corporate control histoy data es still in process of being collected.*

4.1.3 Moral hazard (*MH*) variables

The variables used to proxy *MH* had to be chosen carefuly. One of the objecives in choosing proxies should be that they have the same meaning in the different DI under study. There are several issues that affect the choice of an appropiate proxy of *MH*. The three issues we will address are: i) the nature of the incentives; ii) feasibility of using particular forms of risk to engage in *MH*; and iii) potential for measurement errors.

The nature of the incentives

Stock banks (widely held or family owned) are subject to incentives to engage in *MH* by means of any type of risk exposure that may increse the variance and expected value of the return distribution. Any form of risk taking may meet this objective including credit risk, interest rate risk, liquidity risk, off-balance sheet activites, etc. Instead, as noted earlier on, mutual intermediaries the absence of a shareholder-depositor conflict (Valnek, [104]) and the weight of risk averse managers interest in the decision making process, should result in a relatively low-risk style of management (Rasmusen [86]). However, borrower dominate FC bias the decision process in favor of borrowers in terms of information gathering, quality of guarantees, etc. Thus, in FC moral hazard takes a very concrete form: credit risk. Other forms of risk play no role in these models. Thus, a key proxy that takes the same meaniang in the different inswtitutions is credit risk.

Feasibility of using particular forms of risk to engage in moral hazard

A tipical bank may be able to increase exposure to risk with the goal of obtaining higher mean and variance returns by different means. However, the supervisory environment and market conditions may limit opportunities. Most common on-balance sheet means of increasing risk are

through credit risk, interest rate risk, liquidity risk and leverage. Off-balance sheet opporuntities are very limited in a tipical emerging market due to established banking practices, limits in the activites allowed by regulators and availability of contingent claim instruments. The portfolio of loans, due to information advantages available to the bank, is by far the instrument which provides the highest latitude to increase risk exposure without being detected by the supervisor. Speculating with other forms of risk, such as liquidity or interest rate risk, is a less obvious operation in an emerging market, for several reasons. First, they are easier to detect by the supervisor. Second, speculating with interest rate risk requires quick shifts in exposure with instruments that may not be available in the local market. Third –as is the case for the period covered in this study– asset and liability rates may be subject to controls known under the general name of "financial repression". Under these regimes, rates are not allowed to fluctuate and the yield curve that reflect expected future rates in the economy is absent for any practical purpose. Colombia undertook its most serious financial liberalization in the early 1990's, right in the middle of our study period. Thus, for the first portion of our sample, possibilities of speculating with interest rates was very limited to say the least.

One proxy often used in the litteraure on bank failure (Weelock and Wilson [111], Papoulias and Theodossiou [79], Barth et al. [8], Avery and Hanweck [6], Altman [3], Sinkey [97] to cite just a few) and thus important to consider is leverage. In the case of Colombia, capitalization measurable by accounting data (our source of data) is very closely monitored by the Superintendency of Banks. Banks have often been ordered to recapitalize or even intervened on the simple projection of capitalization falling under the standards existing at the time –and the unwilligness of owners to put up fresh capital. Thus banks have relatively little latitude to speculate with leverage. Below we will note other arguments that conspire against the use of leverage data.

A related issue is sophistication of management. Sophistication may not be an issue in stock or state-owned banks, but it is in FC. Speculating with interest rate risk, for example, requires a sophistication on the side of management that may not allways be available in this type of institutions. In fact, it is common among FC managers that they do not manage interst rates risk at all, leave alone to speculate with rates.

Potential for measurement errors

Potential for measurement errors is particularly serious in our situation. The only data available is accounting data as reported to the Superintendency of Banks. Any market-based adjustment, often used in similar research carried out in industrialized countries, is simply not available. Take leverage ratios again. Firt, we have no way to adjust capital to market value. Second, and perhaps more importantly Rojas Suarez and Weissbrod [87] have shown that banks owners can reduce effective capitalization privately leveraging their own equity position with funds originated in the bank iteself. While this practice is explicitly prohibited by the Superintendency of Banks, effective control is difficult in the complex corporate structures of financial and industrial "groups" used in Colombia as in many other emerging markets. Thus shareholders can introduce hidden leverage that is not reflected in the accounting data compiled and observed by the Superintendency of Banks.[19] One further complication is that leverage does not have the same meaning in banks (stock

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[19]It is interesting to note that recently the Colombian Superintendency of Banks has modified its supervision practices shifting from a division by type of institution (banks, insurance companies, pension funds, etc.) into one by financial group. As a result all types of financial intermediaries under same group are supervised by the same team that now is much more capable of detecting practices of supervision arbitrage.

or state-owned) as in FC. In the latter, leverage may, for so-called "closed" FC, be zero since their "liabilities" consist of exclusively share contributions. In fact, the largest FC that failed in Colombia was a "closed" one, with no deposits. A quick perusal of the capitalization ratios shown in Table 1 reveals that average capitalization is several times higher in FC than in private stock banks.

The arguments presented above suggest that the form of risk that should be captured by the proxies for moral hazard are those that measure credit risk exposure. They are the ones that appear to present the least mesurement error and have a consistent interpretation accros the different form of institutions under study. We use two:

Credit risk

4. Unproductive assets as a proportion of total assets (ACTIMPRO) (Calomiris and Mason [18], Angbazo [5], Flannery and Sorescu [37])

Leverage

5. Capital/Deposits (PATDEP). Different measures of leverage were used by Weelock and Wilson [111], Papoulias and Theodossiou [79], Barth et al. [8], Avery and Hanweck [6], Altman [3], Sinkey [97] to cite just a few.

4.1.4 Agency costs (AC) variables

These proxies are somewhat less problematic that the ones used to measure *MH*. First, unfortunately they are not object of particular attention by supervisors, and thus managers are less likely to attempt to mask them. Second, they are easier to observe directly in accounting data, provided that these meet some minimum standards. We kept two variables to measure agency costs. Existing litterature (Emmons and Schmidt [33], Keating and Keating [56] [57], Akella and Greenbaum [1]) while testing EPB in mutuals have focused on variables that reflect size and non-financial expenses. For reasons noted above we have included size under the control variables.

Measures of agency costs

6. Deposits/Credits (DEPCART): This is a quite controversial ratio. In the context of FC this ratio is an indicator of the use managers make of the funds invested by members. A low ratio suggests that most funds are used to provide credit to their members. On the contrary, a high ratio suggests that those funds are used to acquire other assets such as real estate, and other financial investments such as functional subsidiaries. A high ratio has been considered in the Colombian context as an indicator of agency costs and a measure of the extent of "non core business" (credit to members) in which the FC has engaged. The variance on this ratio can be very large. FC are not subject to any limitation on the amount of credit that can be issued. The result is that often FC allocate each dollar of deposits and equity contributions, so they can place more credits than what they receive in deposits yielding very low ratios. Other FC may use important portions of deposits in fixed assets and in corporate investment, yielding very high ratios. In the context of banking, the inverse of this ratio has often been used to measure credit risk in bank failure analysis, a high ratio would suggest a high proportion non risky assets and thus a safer DI (e.g. Wheelock and Wilson [111]). We have kept the ratio as a measure of agency costs because it is a key indicator used by supervisors of FC in appraising quality of management.

8. Intermediation margin/Operating costs (SUFMARG): A measure of the efficiency of management in terms of their success to maintain operating costs with the limits of the intermediation margin available to finance these costs.

5   Statistical methodology

The statistical methodology used in this work is based on the theory of hazard adaptaded for estimation using Logit as proposed by Shumway [96].[20] This methodology allows for the use of dichotomous variables as dependent variable and, as a bonus, permits to estimate the bankruptcy probability for all units in the sample. The definition of failure is to have a last observation (or bankruptcy defined by any other criterion) located before the last period of the sample.

The probability of failure function is defined as:

$$\delta = \frac{1}{1 + e^{\alpha X}} \tag{1}$$

where X is the matrix of variables that explain the probability of failure. α is the parameters vector that is associated to the matrix X. The matrix X will consist of variables measuring MH, AC and other control variables considered essential to explain FC failure. The vector X can thus be decomposed into three major elements:

- proxy variables for moral hazard, X_H

- proxy variables for agency costs, X_A

- control variables, X_C

Thus, equation 1 can be rewritten as[21]

$$\delta = \frac{1}{1 + e^{\alpha_C X_C + \alpha_H X_H + \alpha_A X_A}} \tag{2}$$

5.1   Confronting causes of failures

Both MH and AC are factors that can be expected to influence failure in FC. Whether each of these two factors are indeed important can be established using a Wald variable exclusion test on the variables proxies of MH and AC of equation 1. This test is of interest in itself, and might provide an indication of the relative importance of each factor as a determinant of failure by the relative degree of significance of the Wald test for the MH and AC variables. However, it is a poor instrument to do so. Thus, in order to test the relative influence of the set of variables that represent MH and AC we use three different approaches:

1. *Wald and LR tests.* We assume that the models are nested and test for the significance of eliminating one or the other set of explanatory variables using the Wald and LR tests.

2. *Information criteria* (IC): This approach is suggested for count data as a procedure for testing non-nested models by Cameron and Trivedi [19] among others. The technique consists in computing Akaike type of IC excluding the components in dispute. Then the IC is recomputed

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[20]This simplification is based on the realization that a multiperiod logit model (as used in this work) is equivalent to a discrete-time hazard model. See Proposition 1 in Shumway [96].

[21]Note that 2, augmented by an error term, is also the equation of a *Logit* model.

adding one and the other group of variables. We do not use the standard Akaike information criteria because it does not incorporate into the penalty function the number observations used in the estimation. This number varies slightly from model to model due to availability of data to compute the ratios. Instead we employ two IC, the *Schwarz (bayesian)* (SIC) and the *Consistent Akaike* (CAIC) criteria. The second contains a slightly more sever penalty function than the first. CAIC$= -2\ln L + (1 + \ln n)k$, where L is the value of the log-likelyhood function, n is the number of observations and k is the number of coefficients. As is standard in Akaike information criteria, a smaller CAIC is better, which occurs when the change in value in $\ln L$ is larger than the change in the penalty function $(1 + \ln n)k$. The model displaying the smallest SIC or CAIC is considered to describe better the data.

3. *Gauss-Newton regression* (GNR): Another test of relative influence can be done using artificial or *Gauss Newton* or *artificial* regressions . In essence, the problem of relative weight is similar to a non-nested model specification test. Suppose that the competing models are:

$$H_1 : y_t = \frac{1}{1 + e^{X_{At}\beta_A + u_t}} \text{ and } H_2 : y_t = \frac{1}{1 + e^{X_{Ht}\beta_H + v_t}} \tag{3}$$

We can perform an *artificial nesting,* in which the two competing Logit regressions are embedded into a more general model

$$H_C : y_t = \frac{1}{1 + e^{(1-\alpha)X_{At}\beta_A + \alpha X_{Ht}\beta_H + v_t + v_t}} \tag{4}$$

where α nests the two models. An α close to zero means agency costs variables dominate moral hazard variables for the FC. The problem with this model is that it is not estimable because not all parameters are separately identifiable. In model (4) the intercept and the coefficients of all control variables should be present in either formulation but cannot be part of the two vectors X_{At} and X_{Ht}. One solution to this problem was suggested by Davidson and MacKinnon [27]. Applying this technique to our problem would consist of replacing β_M by $\widehat{\beta}_M$, the Logit estimate of β_M. Thus H_C becomes:

$$H_C : y_t = \frac{1}{1 + e^{(1-\alpha)X_{At}\beta_A + \alpha X_{Ht}\widehat{\beta}_M + v_t}} \tag{5}$$

A test of the nul hypothesis that $\alpha = 0$ is a standard t-test. The objective is to verify the relative power of two alternative models (moral hazard versus agency costs) in which the dependent variable is the same. We make sure that both models are non-nested by including two specific variables of AC in the first model and two specific variables of MH in the second, so that each model has two distinctive regressors. As the right hand side of equation is non-linear, we use a P-tests instead of a J-test (Davidson, MacKinnon [28], p. 384). The P-Test consists studying the relevance of the residuals of the alternative model to explain the probability of failure. Equation 5 was estimated using non-linear least squares, which in the case of the statistical software used in this work, is estimated using the Gauss-Newton algorithm. See Cameron and Trivedi [19] (pp. 88-91) for a discussion on the suitability of using non-linear least squares in the estimation of count data with logistic distribution.

6 Statistical results

We now present the main results on the test that compare the behavior of the three types of institutions. These are presented in Table 6 where we display the estimated coefficients for the private banking, state banking and FC systems. We focus here on the third regression of this table with the title "both effects" presented in the third panel of the table. At a first glance it is possible to note that the signs of the regression coefficients for FC resemble more those of government-owned banks than those of privately-owned banks. As we have noted in Section 3, government-owned banks may display weaknesses in its governance structure similar to those of FC. However, due to the fact that they are subject to some hierarchical controls, the effect could be expected to be weaker. Thus the relevance of agency costs as a factor that contributes to insolvency appears to be related to the strength or weakness of the governance structure, independent of the legal form of the institution. However, in contrast to FC, the coefficient for the control variable *size* (Log of assets) is negative, implying that size reduces significantly the insolvency risk of government-owned banks and that in these the diversification argument dominates. For FC, the coefficient is positive and significant at least 5%. Since the *t*-statistic computed is two-tailed, this means that for the Colombian sample *the expense-preference behavior of mangers dominates the benefits from diversification*. This is a result that is consistent with that of the US-based mutual S&LA studied by Akella and Greenbaum [1]. The other control variables (liquidity and ROA) are not significant for FC, but highly significant (and of expected sign) for government and privately-owned banks.

Of the two *MH* variables only one, proportion of unproductive assets, is significant but of opposite sign than expected! This suggests that unproductive assets (credit risk taking) did not cause failure. Even more, those that failed had *better* assets than those that didn't. Such a result would have made no sense in the case of banks. They are expected to fail because unperforming portfolios of credits (or a liquidity crisis). However, the same result can easily be explained in the case of FC, where expense-preference behavior is so important and difficult to control. Capitalization did not explain failure either. However, both variables have a strong explanatory power for government-owned banks with signs that are consistent with expectation. For private banks the results are less clear but the signs of the coefficients are also as expected.

Both CA variables are significant and with sign consistent with expectations for FC. Both Deposits/Credits and Financial margin/operating costs explain failure. In words this means: i) FC that failed invested their funds in activities and assets other than credit to their members; ii) FC that failed used a larger proportion of the intermediation margin in operating costs. In fact the average failed institution, at the moment of failure was only covering 63.7% of its operating costs from intermediation margin, while the healthy FC used only 25% of its intermediation margin in operating expenses (see table 2-a, last line).[22] The results for banks are the following: in privately-owned

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[22]We have often received a comment to this result, and it is the following: The high value of Deposits/Credits was in part due to large real estate investments, and that these were due to a "speculative" behavior of FC leaders, who acquired real estate assets in a rising markets. We agree generally on this interpretation of the ratio. However, a closer look of those real estate assets actually acquired by the FC suggests that they were mostly in offices and other non-earning real estate assets. Very little of these assets where speculative and marketable real estate assets. Some extreme cases are: golf courts, horse stables and over-sized office buildings totally out of proportion with the size or the economic status of the membership. Another argument advanced was that "nice" and impressive buildings were necessary to attract membership. There is a whole list of reasons that could be presented to demonstrate the fallaciousness of this argument.

banks, neither coefficient is significant suggesting what theory (and regulators) has long sustained, agency conflicts, because they are controllable, do not play a determinant role in bank insolvency. The results are less evident for government-owned banks. The coefficient for Deposits/Credit is significant and takes the sign suggested by expense-preference theory. However that for Financial margin/Administrative costs is opposite to expectation. Only a more careful analysis and the use of alternative ratios in the statistical procedure would allow us to perform a correct interpretation of this result.

To compare in a more direct fashion the relative importance of moral hazard and agency costs factors as an explanation of failure we performed Wald and Likelihood Ratio (LR) tests. The latter requires re-estimation of the restricted models. This is the purpose of presenting regressions "moral hazard models" (first panel) and "cost of agency model" (second panel). It is useful to repeat here the fourth and fifth panels of the table:

Institution		FC	Gov.Bank	Priv.Bank
Wald Test				
Hypothesis: *MH* coefficients = 0	*Value*	4,066	53,174	22,362
	Significance	13,10%	**0,00%**	**0,00%**
Hypothesis: *CA* coeficients = 0	*Value*	8,239	55,817	5,605
	Significance	**1,63%**	**0,00%**	6,07%
Likelihood Ratio (LR) Test				
Hypothesis: *MH* coeficients = 0	*Value*	13,519	100,402	66,265
	Significance	**0,12%**	**0,00%**	**0,00%**
Hypothesis: *CA* coeficients = 0	*Value*	24,447	127,757	5,104
	Significance	**0,00%**	**0,00%**	7,79%

This summary table reveals that in most cases both *MH* and *AC* variables are significant in explaining failure. However, some refinement in the interpretation is possible. For FC the LR tests for the *MH* variables are numerically small compared with banks either private or government-owned. On the other the LR for *CA* variables is relatively large for FC and small for private banks. Government-owned banks display large and highly significant LR for both *MH* and *CA* variables suggesting that both are important determinants of failure. Wald tests do not yield equally clear results, in particular with respect to private banks in that the test statistic is small and non significant in for both the *MH* and CA variables for these institutions. However, for FC the Wald statistic suggests no significance for *MH* variables and significance for the CA variables. Thus this test also supports the hypothesis that CA and not *MH* are the principal determinants of FC failure. To note is also the importance of *AC* variables in explaining failure of government-owned banks.

The interpretation of the AIC tests is that the lesser the Akaike criterion, the more appropriate is the model. As can be seen in panels 6 and 7 of Table 6, the most adequate model for FC considers only the variables measuring the agency costs (imposing that the coefficients associated to variables measuring *MH* are equal to zero). The same behavior is observed for public banks. On the contrary, private banks are more adequately represented by the *MH* model than the *AC* model. Note that the three types of institutions present greater Akaike statistics when including both MC and *AC* variables.

To complete our estimations, we performed Gauss-Newton regressions and computed the J-

tests. We note that for FC the AC variables are still significant although all the variables of the moral hazard were considered in the model, the t-statistic observed was significant at the 5% level (t-statistic of -2,502). The t-statistic was still stronger for State-banks. On the contrary, we see that these variables are not significant (t-statistic of -0,731) in the prediction of the probability of failure of private banks. For these institutions, we see that the moral hazard problem is much more significant (t-statistic of -1,78) than the AC problem.

We can then conclude that, *all tests performede support unambiguously and without contradiction the hypothesis that in financial cooperatives CA variables play a significant and more important role in explaining failure than MH variables*. On the other hand that *the moral hazard problem is of extreme relevance only for private banks*.

7   "Quality" of mangement, an alternative hypothesis explaining failure

It has been argued that the main reason for the failure of mutuals is "poor quality of management (QM)." Indeed, Short [94] attributes failure of United States based Savings and Loans to management quality and multinational orgnizations see in QM as one of the key causes of failure of FC in developing countries (and in particular in Latin America). The rationale behind this explanation is that smaller institutions based in communities do not attract, or are uncapable to pay for, well trained management. By extention, the phenomenon should be particularly serious in rural-based mutual institutions where the pool of trained personnel is limited. The QM hypothesis, while lacking the sophisticated theoretical support that enjoy the MH and AC hypothesis, cannot be ignored in comparing mutual and joint stock banks. A considerable proportion of mutual intermediaries are small and rural based, and often depend on volunteers to integrate their governance bodies such as the Board of Directors. Management will most likely be drawn from a local pool of available skills und it will often be unlikely that these individuals posess the sophisticated training of a large city bank managers or will count with the backing of a bank headquarters technical skills. Under these circumstances it is likely that members of management and governancer bodies lack the training and sophistication required for the positions. This would result in a relatively poorer quality of management among FC and higher likelihood of failure due to errors in management. On the contrary, QM should play no or insignificat role as a determinat of failure of private banks. As usual, predictions are more ambiguous for public banks. They are likely to attract lower quality of management than private banks but better qualified personnel than FC.

We tested and confronted the hypothesis that quality of management (QM) was the dominant factor in explaining failure. Thus all models were run with proxies of QM and the same tests performed confronting this hypothesis with that of AC and MH separately. That is, we confronted pairs QM-AC and QM-MH in addition to AC-MH. As proxies for QM we used the ratio of labor expenses to assets and a size variable orthogonalized for measures of AC (Deposits/credits and intermediation margin/operating costs)[23] Results (not shown) are as follows:

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[23]The use of Tobin's q-ratio as an indicator of management capability (e.g. Cudd and Duggal [26], Servaes [92] and Lang, Stulz and Walkling [62]) is not possible due to the impossibility of computing this ration in FC and many private banks with stock not traded in the exchanges.

- In the case of FC, of the two proxies of QM used, labor expenses is not significant and the orthogonalized measure of size is significant only in the case when all other variables measuring MH and AC are included, and then the sign is positive (the larger the size the higher the risk of failure), which is contrary to what one should expect if QM were a factor. In the case of private banks measures of QM have no effect on failure and in the case of public banks the measures of QM are negatively and significantly related to failure (only case where signs are as expected).

- When confronting QM-AC, quality of management is *less* important than (is dominted by) AC for all three types of institutions and less important than MH in the case of FC and private banks.

- Interestingly, QM is more important than MH in the case of public banks.

For the case of FC the implications is clear, AC dominate as cause of failure, followed by MH, and QM (as proxied) has no impact on failure .

8 Summary and conclusions

In this paper we study the relationship that exists between ownership and governance structure of depository institutions (DI) on one side, and the dominant *cause* of failure on the other. Extant theory implies that while in stock owned DI, where management is either well controled (through markets or board control) or interests are aligned with those of shareholders, the dominant cause of failure will be moral hazard (MH) between shareholders and debtholders, manifested in balance sheet or off-balance sheet risk taking. On the other hand, in DI of diffuse ownership with poor management control or where management's interests are not alligned with those of owners, the dominant cause of failure will be agency costs (AC), manifested in expense preference behavior that leads to failure. We exploit the opportunity that offers the Colombian crisis of banks and financial cooperatives (FC) and the relatively good quality of data available for this country to perform the study. Our objective is to establish empirically the relative importance of these two conflicts as determinants of insolvency in DI. Results suggest that, in the case of Colombia, moral hazard is a key factor in explaining bank failure while agency costs explain insolvencies among FC. In state-owned banks both moral hazard and agency costs are significant in explaining failure.

The results of the analysis presented in this paper suggest that, in the case of Colombia, agency costs are a key factor explaining failure among FC. Furthermore, this is a result that in contrast to privately-owned commercial banks, whose main determinant of failures are factors that can be considered an expression of MH between shareholders and depositors, the classical conflict studied in the banking literature. All statistical tests performed on the data including, Gauss-Newton artificial regressions, used to confornt alternative models, Likelihood Ratio (LR) and Wald test support unambiguously the hypothesis that in financial cooperatives AC variables play a significant and more important role in explaining failure than MH variables. To note is also the importance of AC variables in explaining failure of government-owned banks. These appear to behave in a fashion closer to FC rather than to private banks. Also, when confronting these hypothesis of cause

of failure against the argument that the causes of failure are due to "quality of management (QM)", we find that this is dominated by *AC* and *MH* in explaining failure.

This results have significant implications for regulation and supervision (R&S) of FC. In the case of banks the main conflicts target of R&S is the moral hazard conflict that exists between shareholders and liability (mainly deposits) holders. Most of the so-called Basle standards of bank regulation and supervision tend to control precisely this conflict, while ignoring *totally* agency conflicts. These, implicitly, are assumed to be easily controllable by shareholders and the market. This is so for industrialized as well as developing countries. The results suggest that in the case of FC a focus on the R&S of agency conflicts is needed. As the arguments forwarded by Jäger [49] suggest, this is precisely what some of the models of governance, R&S of FC do in some countries, where federated structures armed with built-in (delegated) monitoring function, are designed to control agency conflicts. This is also consistent with the results of Akella and Greenbaum [1] who conclude that the weakness in the governance of mutual financial intermediaries suggests a need of regulatory and supervisory focus designed to limit the exercise of "expense preference" behavior.

Lastly, in terms of R&S, these results suggest that the increasingly common approach adopted in Africa, Asia and Latin America to fold FC under the same R&S framework used for (stock owned) commercial banks is inappropriate and dangerous. *Basle standards of R&S simply lack the focus on the control of agency conflicts that is so essential to prudential supervision of mutual intermediaries.* Thus, while some of the norms destined to control moral hazard (e.g. capital standards and risk-weighted assets) between share and liability holders of stock banks might be applicable to mutual intermediaries, there is a clear need for an adapted approach that will control the possibly much more serious conflict of interest between administrators and members of a mutual intermediary.

One more interesting interpretation can be made of these results. In some countries, local government-owned banks have been structured around federated structures and have been operating with a considerable success: two examples are the Spanish *Cajas* and the German *Landesbanken.*[24] Both these institutions have reached a considerable presence in terms of market share and stability despite a weakness in the governance structure typical of non-private financial intermediaries. This would suggest that in government-owned and other community banks, hierarchical structures (such as federations with delegated monitoring functions or auditing federations) may serve to compensate for the absence of market-based control mechanisms that help to limit the effect of expense-preference behavior.

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[24] The Spanish Cajas, taken together, represent the largest financial intermediary in the country. In Germany, the Landesbanken share with the FC system the top position of controlling about 1/4 of the country's banking assets.

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Table 1-a: General statistics. *Private Banks*
General Statistics

Variable	Mean	Standard deviation	Distribution				
			1%	25%	50%	75%	99%
Control variables							
Reserves/Assets	1,46%	0,86%	0,01%	0,91%	1,35%	1,89%	4,31%
Disposables/Assets	12,79%	6,50%	1,79%	7,94%	12,03%	16,46%	31,84%
Investments/Assets	26,28%	12,03%	4,98%	19,54%	26,20%	32,30%	63,38%
Log(Assets)	18,76	1,78	14,90	17,52	18,91	19,95	22,32
Change in assets	-21,19%	49,36%	-100,00%	-100,00%	3,23%	9,86%	43,53%
Active assets/Liabilities with a cost	103,84%	81,59%	69,46%	93,72%	99,87%	105,46%	168,36%
ROA	7,50%	254,65%	-7,07%	0,08%	0,68%	1,40%	4,82%
ROE	12,80%	333,64%	-59,00%	0,51%	5,54%	11,58%	33,20%
Results on paid capital and reserves	5,14%	362,40%	-236,25%	1,03%	11,33%	23,73%	174,75%
Cost of external funds	11,19%	10,85%	0,00%	1,64%	11,04%	16,74%	37,27%
Moral hazard variables							
Proportion of pass-due credits	2,87%	5,18%	0,00%	0,00%	1,21%	4,08%	25,80%
Change in the proportion of pass-due cre	18,85%	94,34%	-85,04%	-14,32%	3,14%	25,81%	378,10%
Proportion of unproductive assets	3,57%	21,68%	0,01%	1,54%	2,40%	3,79%	10,85%
Proportion of collateralized credits	37,94%	37,10%	0,00%	0,00%	26,12%	74,39%	99,62%
Coverage of pass-due credits	62,76%	92,69%	0,00%	28,42%	46,83%	70,97%	445,19%
Provisions/Total credits	2,12%	4,16%	0,00%	0,59%	1,27%	2,41%	11,02%
(Capital+Provisions on credits)/Assets	15,69%	25,53%	4,83%	10,09%	12,77%	16,60%	80,50%
Capital exposure	28,12%	219,27%	0,00%	8,86%	21,32%	40,99%	193,80%
(Reserves+paid capital)/Capital	51,43%	326,27%	0,71%	44,90%	58,52%	71,00%	205,57%
Capital/Deposits	28,73%	94,51%	6,54%	14,08%	19,50%	27,95%	160,85%
Financial income/Assets	11,33%	9,18%	0,64%	5,21%	9,28%	16,56%	36,00%
Return on credits	7,14%	8,58%	0,00%	0,55%	2,22%	12,91%	29,96%
Interest rate GAP	-59,00%	13,84%	-79,35%	-67,25%	-61,07%	-53,25%	-3,24%
Agency costs variables							
Credits/Assets	53,75%	12,13%	23,18%	45,57%	54,41%	61,52%	82,16%
Deposits/Credits	119,34%	44,66%	38,66%	89,67%	109,52%	142,05%	256,88%
Fixed assets/Assets	2,80%	2,01%	0,37%	1,76%	2,37%	3,21%	9,67%
Non financial costs/Assets	4,10%	3,87%	0,84%	2,17%	3,17%	4,93%	20,45%
Personnel expenses/Assets	2,23%	1,33%	0,00%	1,32%	2,03%	2,87%	5,89%
Operational margin	-8,50%	661,32%	-45,17%	2,38%	10,62%	18,14%	100,00%
Financial margin/Administrative costs	186,57%	133,50%	37,53%	118,51%	144,89%	234,07%	806,48%

NOTE: This table, as well as Tables 1-b and 1-c, presents the characteristics of the distributions of the independent variables considered. The first section presents the variables that either cannot be associated neither to agency costs nor moral hazard, or that are associated to both conflicts. The second section presents the variables that are more strictly associated to moral hazard, while the last section presents the variables that are more strictly associated to agency costs.

Table 1-b: General statistics. *State Banks*
General Statistics

Variable	Mean	Standard deviation	Distribution				
			1%	25%	50%	75%	99%
Control variables							
Reserves/Assets	1,69%	0,95%	0,00%	1,10%	1,76%	2,35%	3,91%
Disposables/Assets	14,29%	8,59%	0,69%	7,43%	14,44%	20,50%	34,52%
Investments/Assets	25,42%	10,55%	3,77%	17,14%	26,83%	33,24%	45,94%
Log(Assets)	19,61	1,55	15,50	18,62	20,05	20,69	22,31
Change in assets	-22,49%	72,02%	-100,00%	-100,00%	2,20%	7,67%	30,09%
Active assets/Liabilities with a cost	92,72%	13,61%	52,16%	86,74%	94,52%	100,05%	137,07%
ROA	-0,78%	6,63%	-28,47%	-0,68%	0,20%	1,07%	5,82%
ROE	9,16%	173,49%	-324,02%	-1,49%	3,71%	14,08%	386,56%
Results on paid capital and reserves	-39,62%	595,19%	-633,76%	-9,77%	4,75%	19,65%	98,85%
Cost of external funds	8,12%	8,05%	0,00%	0,01%	6,96%	12,49%	30,14%
Moral hazard variables							
Proportion of pass-due credits	4,14%	6,76%	0,00%	0,00%	2,02%	5,59%	29,18%
Change in the proportion of pass-due cre	115,17%	1219,73%	-49,71%	-9,50%	3,15%	16,05%	301,79%
Proportion of unproductive assets	4,74%	5,49%	0,31%	2,13%	3,13%	5,83%	24,44%
Proportion of collateralized credits	43,93%	39,26%	0,00%	0,00%	55,93%	83,40%	99,37%
Coverage of pass-due credits	1805,25%	14126,34%	10,61%	43,86%	64,97%	96,90%	73326,04%
Provisions/Total credits	5,31%	7,80%	0,00%	1,45%	2,97%	5,54%	42,00%
(Capital+Provisions on credits)/Assets	13,93%	14,87%	-4,72%	8,05%	11,81%	15,54%	79,46%
Capital exposure	21,79%	269,15%	-693,86%	12,91%	35,20%	66,16%	281,18%
(Reserves+paid capital)/Capital	34,19%	263,18%	-738,18%	36,76%	47,18%	61,56%	723,28%
Capital/Deposits	236,60%	1520,48%	-67,16%	9,90%	16,75%	21,03%	6895,73%
Financial income/Assets	8,89%	9,44%	0,21%	2,27%	7,10%	12,54%	41,88%
Return on credits	5,50%	8,07%	0,00%	0,44%	1,37%	7,69%	30,68%
Interest rate GAP	-69,07%	55,38%	-277,85%	-71,09%	-62,94%	-55,52%	-26,22%
Agency costs variables							
Credits/Assets	55,78%	32,88%	27,51%	45,72%	51,97%	58,77%	180,94%
Deposits/Credits	125,92%	51,01%	0,19%	104,45%	121,71%	150,21%	270,40%
Fixed assets/Assets	2,48%	1,79%	0,61%	1,43%	2,09%	2,85%	8,65%
Non financial costs/Assets	6,23%	7,21%	1,25%	2,85%	4,31%	6,95%	37,59%
Personnel expenses/Assets	3,36%	2,34%	0,02%	1,89%	2,81%	4,23%	9,66%
Operational margin	-10,22%	57,48%	-200,67%	-11,97%	0,83%	10,01%	53,93%
Financial margin/Administrative costs	147,44%	97,14%	-62,65%	99,13%	126,99%	203,06%	339,02%

Table 1-c: General statistics. *Financial Cooperatives*
General Statistics

Variable	Mean	Standard deviation	Distribution				
			1%	25%	50%	75%	99%
Control variables							
Reserves/Assets	0,99%	0,89%	0,00%	0,38%	0,69%	1,38%	3,76%
Disposables/Assets	4,40%	3,35%	0,67%	1,71%	3,29%	6,54%	13,69%
Investments/Assets	7,62%	6,34%	0,70%	3,28%	5,92%	9,63%	29,27%
Log(Assets)	16,52	1,95	13,84	15,64	16,26	17,54	20,60
Change in assets	18,38%	29,16%	-49,26%	-0,34%	14,21%	34,21%	100,00%
Active assets/Liabilities with a cost	147,67%	151,24%	39,06%	94,36%	111,51%	138,93%	857,44%
ROA	-1,10%	6,50%	-17,00%	-1,83%	-0,29%	0,86%	7,05%
ROE	-6,06%	48,95%	-111,02%	-5,71%	-0,82%	3,34%	17,63%
Results on paid capital and reserves	-235,22%	888,60%	-3539,25%	-179,88%	-47,09%	-6,35%	163,54%
Cost of external funds	16,85%	5,90%	5,49%	12,71%	16,25%	19,68%	34,51%
Moral hazard variables							
Proportion of pass-due credits	18,52%	12,67%	2,17%	10,87%	15,25%	22,72%	65,31%
Change in the proportion of pass-due cred	10,66%	42,89%	-108,54%	-6,00%	5,66%	24,20%	100,00%
Proportion of unproductive assets	7,29%	5,42%	0,05%	3,82%	5,93%	9,98%	24,64%
Proportion of collateralized credits	43,07%	32,60%	5,97%	12,29%	37,68%	62,40%	100,00%
Coverage of pass-due credits	24,53%	15,45%	0,97%	13,67%	22,06%	34,00%	58,61%
Provisions/Total credits	3,98%	4,81%	0,12%	1,33%	2,58%	4,92%	16,81%
(Capital+Provisions on credits)/Assets	35,65%	17,60%	7,52%	23,49%	31,32%	44,18%	82,09%
Capital exposure	49,09%	79,02%	-13,16%	17,25%	36,95%	56,34%	419,26%
(Reserves+paid capital)/Capital	5,80%	9,18%	0,00%	0,00%	2,29%	8,78%	35,76%
Capital/Deposits	455,25%	2443,11%	-3,90%	32,89%	61,71%	140,65%	9528,20%
Financial income/Assets	18,17%	6,43%	8,64%	13,46%	17,08%	21,38%	36,34%
Return on credits	24,28%	7,56%	9,05%	18,99%	23,75%	28,51%	43,05%
Interest rate GAP	-39,89%	23,77%	-76,43%	-57,03%	-43,56%	-25,55%	26,23%
Agency costs variables							
Credits/Assets	61,43%	13,30%	20,08%	54,66%	63,47%	70,19%	88,11%
Deposits/Credits	77,97%	43,71%	0,63%	49,86%	79,64%	99,30%	209,77%
Fixed assets/Assets	10,14%	6,17%	0,65%	5,55%	9,21%	13,50%	30,57%
Non financial costs/Assets	5,93%	4,96%	1,29%	3,68%	5,00%	7,03%	21,13%
Personnel expenses/Assets	4,11%	1,82%	1,18%	2,93%	3,85%	4,94%	10,70%
Operational margin	2,08%	28,03%	-99,11%	-4,78%	1,43%	13,64%	85,81%
Financial margin/Administrative costs	374,36%	413,95%	14,73%	106,36%	173,66%	549,55%	1753,93%

Table 2-a: Statistics for failed and healthy samples. *Private Banks*

Variable	Mean		Standard error		Significance of difference of means
	Failed	Healthy	Failed	Healthy	Significance (%)
Control variables					
Reserves /Assets	1,55%	1,46%	0,01%	0,01%	NA
Disposables/Assets	10,11%	12,86%	0,34%	0,42%	0,00%
Log(Assets)	1830,44%	1876,75%	314,20%	315,73%	0,76%
Change in assets	-41,01%	-20,61%	25,69%	24,23%	0,00%
Active assets/Liabilities with a cost	90,33%	104,18%	2,52%	68,13%	0,00%
ROA	276,05%	0,57%	25822,47%	0,03%	36,24%
ROE	351,81%	4,06%	44252,61%	4,29%	39,77%
Results on paid capital and reserves	-119,62%	8,35%	36098,11%	439,96%	45,40%
Cost of external funds	13,80%	11,13%	1,46%	1,17%	0,00%
Moral hazard variables					
Proportion of pass-due credits	7,33%	2,76%	3,05%	0,19%	0,00%
Change in the proportion of pass-due credits	4,81%	19,24%	32,98%	90,53%	0,71%
Proportion of unproductive assets	29,81%	2,89%	183,71%	0,04%	0,00%
Proportion of collateralized credits	35,93%	37,99%	9,22%	13,89%	0,16%
Coverage of pass-due credits	151,34%	60,41%	1111,67%	57,83%	4,36%
Provisions/Total credits	13,65%	1,82%	4,13%	0,04%	0,00%
(Capital+Provisions on credits)/Assets	48,59%	14,84%	222,22%	0,84%	0,00%
Capital exposure	88,32%	26,57%	366,94%	483,04%	0,83%
(Reserves+paid capital)/Capital	105,97%	50,02%	317,19%	1083,26%	9,37%
Capital/Deposits	31,38%	28,67%	28,53%	90,87%	23,33%
Financial income/Assets	13,43%	11,27%	1,47%	0,83%	0,00%
Return on credits	10,27%	7,06%	1,40%	0,72%	0,00%
Interest rate GAP	-60,02%	-58,98%	4,03%	1,86%	0,00%
Agency costs variables					
Credits/Assets	48,82%	53,88%	2,89%	1,43%	0,00%
Deposits/Credits	125,53%	119,18%	19,32%	19,97%	0,00%
Fixed assets/Assets	3,04%	2,80%	0,10%	0,04%	0,00%
Non financial costs/Assets	10,85%	3,92%	1,89%	0,09%	0,00%
Personnel expenses/Assets	3,32%	2,20%	0,13%	0,01%	NA
Operational margin	-751,17%	10,67%	173197,33%	3,59%	44,23%
Financial margin/Administrative costs	1,11494	1,88502	0,96521	1,7891	0,00%

NOTE: The objective of this table is to compare the distribution of some ratios for failed and healthy institutions, to facilitate the analysis that will be done in the subsequent analyses. The first two columns present the means of both samples, while the third and fourth columns compare the standard deviations. Finally, the fifth column presents the level of significance of a difference of means test. The lower the level of significance, the greater the probability that both distributions are statistically different. Tables 2-b and 2-c present similar results.

Table 2-b: Statistics for failed and healthy samples. *State Banks*   Ta

| Variable | Mean | | Standard error | | Significance of difference of means |
	Failed	Healthy	Failed	Healthy	Significance (%)
Control variables					
Reserves /Assets	1,86%	1,64%	0,00%	0,01%	0,00%
Disposables/Assets	16,49%	13,66%	0,44%	0,81%	0,00%
Log(Assets)	1906,69%	1976,34%	351,99%	199,42%	0,00%
Change in assets	-38,00%	-18,13%	31,19%	56,94%	0,00%
Active assets/Liabilities with a cost	82,95%	95,45%	1,80%	1,53%	NA
ROA	-4,31%	0,22%	1,58%	0,07%	NA
ROE	-9,38%	14,39%	104,79%	355,67%	0,00%
Results on paid capital and reserves	-182,14%	0,60%	15749,25%	66,63%	17,47%
Cost of external funds	9,76%	7,66%	0,93%	0,56%	0,00%
Moral hazard variables					
Proportion of pass-due credits	5,55%	3,74%	1,02%	0,30%	0,00%
Change in the proportion of pass-due credits	6,79%	136,35%	6,73%	17772,33%	40,22%
Proportion of unproductive assets	6,94%	4,11%	0,74%	0,16%	NA
Proportion of collateralized credits	42,35%	44,38%	11,90%	16,43%	0,00%
Coverage of pass-due credits	69,98%	2169,56%	9,83%	2409121,69%	48,68%
Provisions/Total credits	12,78%	3,22%	1,82%	0,08%	NA
(Capital+Provisions on credits)/Assets	21,67%	11,74%	6,84%	0,70%	0,00%
Capital exposure	41,18%	16,32%	90,35%	902,91%	2,13%
(Reserves+paid capital)/Capital	68,39%	24,53%	208,14%	826,31%	0,03%
Capital/Deposits	7,75%	300,40%	87,16%	29373,93%	21,34%
Financial income/Assets	7,91%	9,17%	0,36%	1,04%	0,00%
Return on credits	3,83%	5,97%	0,36%	0,72%	0,00%
Interest rate GAP	-66,75%	-69,73%	6,63%	37,51%	0,00%
Agency costs variables					
Credits/Assets	43,52%	59,26%	1,29%	12,98%	0,00%
Deposits/Credits	161,06%	116,12%	33,92%	19,52%	0,00%
Fixed assets/Assets	2,16%	2,57%	0,07%	0,02%	NA
Non financial costs/Assets	8,46%	5,60%	1,51%	0,22%	0,00%
Personnel expenses/Assets	2,96%	3,48%	0,03%	0,06%	0,00%
Operational margin	-35,32%	-3,14%	112,70%	8,58%	0,00%
Financial margin/Administrative costs	1,34793	1,51002	1,04462	0,91283	0,00%

Table 2-c: Statistics for failed and healthy samples. *Financial Cooperatives*

Variable	Mean		Standard error		Significance of difference of means
	Failed	Healthy	Failed	Healthy	Significance (%)
Control variables					
Reserves /Assets	0,96%	1,13%	0,01%	0,40%	0,10%
Disposables/Assets	4,59%	1,83%	0,14%	0,10%	0,00%
Log(Assets)	1825,74%	1647,65%	56,59%	379,02%	0,00%
Change in assets	-27,45%	19,80%	19,90%	7,54%	0,00%
Active assets/Liabilities with a cost	82,14%	154,87%	3,70%	222,25%	0,50%
ROA	-17,42%	-0,20%	8,67%	0,11%	0,00%
ROE	7,99%	-4,50%	70,90%	19,56%	8,37%
Results on paid capital and reserves	-1237,55%	-175,90%	98762,39%	3853,72%	46,70%
Cost of external funds	18,80%	7,81%	1,75%	0,84%	0,00%
Moral hazard variables					
Proportion of pass-due credits	22,65%	7,50%	1,77%	1,46%	0,00%
Change in the proportion of pass-due credits	10,21%	16,30%	8,02%	22,02%	5,24%
Proportion of unproductive assets	14,05%	3,49%	1,88%	0,56%	0,00%
Proportion of collateralized credits	41,84%	17,50%	4,30%	8,87%	0,00%
Coverage of pass-due credits	42,98%	22,88%	7,50%	2,42%	0,00%
Provisions/Total credits	12,43%	1,45%	2,50%	0,08%	0,00%
(Capital+Provisions on credits)/Assets	19,45%	34,09%	1,21%	3,45%	0,00%
Capital exposure	43,12%	20,58%	62,09%	31,67%	2,72%
(Reserves+paid capital)/Capital	16,52%	4,32%	2,24%	0,66%	0,00%
Capital/Deposits	8,26%	426,48%	13,65%	50899,01%	46,73%
Financial income/Assets	21,54%	7,22%	2,21%	0,92%	0,00%
Return on credits	27,68%	9,76%	1,04%	1,62%	0,00%
Interest rate GAP	-64,35%	-15,94%	1,71%	6,13%	0,00%
Agency costs variables					
Credits/Assets	50,78%	61,95%	1,93%	2,32%	0,00%
Deposits/Credits	162,73%	69,34%	82,85%	16,79%	0,00%
Fixed assets/Assets	15,79%	8,43%	0,47%	0,42%	0,00%
Non financial costs/Assets	16,17%	4,73%	5,71%	0,13%	0,00%
Personnel expenses/Assets	4,40%	3,39%	0,04%	0,05%	0,00%
Operational margin	-31,87%	4,93%	26,09%	6,24%	0,00%
Financial margin/Administrative costs	56,97%	379,22%	15,98%	1709,77%	6,76%

Table 3: Sign of coefficients – *All*

Variable	Logit regression			
	Expected sign	**First interpretation**	**Second interpretation**	**Comment on results**
Control variables				
ROA	-/+	Agency cost hypothesis: Lower ROA are associated to EPB	Moral hazard hypothesis: Higher ROA are associated with moral hazard.	The agency cost argument dominates the moral hazard argument in FC. The coefficient is negative for stock banks also.
Moral hazard variables				
Proportion of unproductive assets	Positive	More unproductive credit suggest a high risk high moral hazard strategy		The coefficient is positive for all DI except FC.
Capital/Assets	Negative	Lesser leverage reduces the risk of failure		The coefficient is negative for all DI (significant for stock banks).
Agency costs variables				
Financial margin /Administrative costs	Negative	Measure of the sufficiency of the financial margin to cover at least the administrative costs. As these get greater, the probability of failure increases too.		The coefficient is negative for FC and for stock banks.
Deposits/Credits	Positive	Agency cost hypothesis: Measure of the use of the financial resources. A ratio above 100% means the institution is using resources for purposes other than intermediation cycle through allocation of credits	Moral hazard hypothesis: A ratio that falls very low might be considered as an indicator of high credit risk and thus a higher risk of failure.	Positive for all DI. The agency cost interpretation dominates the credit risk (Moral hazard) hypothesis.

NOTE: This table present the expected signs of all the variables that were included into our final model. A positive relationship means that the higher the ratio, the greater is the probability of failure. For example, consider the proportion of unproductive assets: The greater that proportion, the greater is the probability of failure. We also included one or two interpretations for each relationship. The first interpretations is always explaining the expected sign, while the second interpretation is giving an alternative interpretation for a relationship contrary to the expected sign. We then present some comments on the observed results, compared to the expected relationship.

Table 4-a: Events of failure – *Financial Cooperatives*

Name of cooperative (1)	Crisis of 1998 Initial date of difficulties	Description
Financial Cooperatives (FC)		
ANCHICAYA	1998-05	Intervened to liquidate by Dancoop (Res. 0948) on May 26 of 1998.[1]
ARKAS	1999-07	Intervened to liquidate by the Superintendence of Banks (Res 1009) on July 1st of 1999.
AVANCEMOS	1997-03	Intervened to administrate by Dancoop (Res. 361) in March of 1997 and to liquidate (Res. 1776) on November 4 of 1997.
CAJA .POPULAR	1997-11	Intervened to administrate by Dancoop (Res. 1889) on November 19 of 1997.
COACREDITO	1998-04	Intervened to administrate by Dancoop (Res. 0663) on April 29 of 1998 and to liquidate (Res. 1368) on August 14 of 1998.
COFIANDINA	1998-07	Intervened to liquidate by the Superintendence of Banks (Res. 0892) on July 15 of 1998.
COFICREDITO	1998-12	Voluntary liquidation in December 1998.
COFIROYAL	1997-12	Intervened to liquidate by Dancoop (Res. 2273) on December 31 of 1997.
CONALCREDITO	1999-05	Intervened to liquidate by Dancoop (Res. 0592) on May 12 of 1999.
CONSTRUYECOOP	1998-07	Intervened to liquidate by the Superintendence of Banks (Res. 2430) on December 11 of 1998, but a special supervision began on July 15 of the same year.
COOEMSAVAL	1998-09	Intervention to administrate (Res. 1198) on September 11 of 1998 and to liquidate by the Superintendence of Banks (Res. 2150) on October 6 of the same year.
COOFINDES	1999-06	Intervened to liquidate by the Superintendence of Banks (Res. 0962) on June 23 of 1999.
COOPERADORES	1998-08	Intervened to liquidate by Dancoop (Res. 1239) on August 3 of 1998.
COOPFERIAS	1998-09	Intervened to administrate (Res. 2000) on September 11 of 1998 and to liquidate by the Superintendence of Banks (Res. 2151) on October 6 of 1998.
COOPIANTIOQUIA	1998-10	Intervened to liquidate by the Superintendence of Banks (Res. 2149) on October 6 of 1998.
COOPSIBATE	1998-12	Merged with Cupocredito and Bancoop, creating a a limited liability society: Megabanco.
COOSERVIR	1997-12	Intervened to liquidate by Dancoop (Res. 1775) on December 30 of 1997.
COOTRABACO	1998-03	Intervened to administrate (Res. 0401) on March 5 of 1998 and then to liquidate by Dancoop (Res. 1056) on July 14 of 1998.
CREDIFENALCO	1998-02	Intervened to Administrate by Dancoop (Res. 0377) on February 27 of 1998.
CREDISOCIAL	1998-07	Intervened to liquidate by the Superintendence of Banks (Res. 0977) on July 29 of 1998.
CUPOCREDITO	1998-12	Merged with Coopsibate and Bancoop, creating a limited liability society: Megabanco
FINANCOOP	1998-08	Intervened to administrate (Res. 1101) on August 21 of 1998 and then to liquidate by the Superintendence of Banks (Res. 1199) on September 11 of 1998.
JOREPLAT	1997-12	Intervened to administrate (Res. 2006) on December 3 of 1997 and then to liquidate by Dancoop (Res 0180) on January 29 of 1998.
SOLIDARIOS	1998-08	Intervened to administrate (Res. 1100) on August 21 of 1998 and then to liquidate by the Superintendence of Banks (Res. 2152) of October 6 of 1998.
Cooperative Banks		
MEGABANCO (COOPDESARROLLO)	1999-12	Shareholders contribution of 184.000 millions of Colombian pesos (approximately US$ 85 millions), credit of Fogafin for 286.000 millions of Colombian pesos (approximately US$ 132 millions) and State contribution through a special tax (1) for 661.000 millions of Colombian pesos in November and December of 1999.
UCONAL S.A. (BANCO UCONAL)	1998-12 and 1999-09	Seizure of assets and liabilities to Banco U.C.N. S.A in July 1998. Nationalized in October 1998. Took over by the Banco del Estado in August 1999 under Decree 1167 of 1999.
BANCOOP	1998-12	Cession of assets and liabilities to Coopdesarrollo in November 1998. Voluntary liquidation on February 26 of 1999.

(1) We only present the failures events. The complete listing of financial cooperatives can be made available by the authors.

[1] Dancoop is the body responsible for the supervision of cooperatives (smaller financial and non-financial).

NOTE: This table reviews all the events of failure observed in the last five years for the principal Colombian cooperatives.

Table 4-b: Events of failure – *Private and State Banks*

| Name of bank | Crisis of 1985 | | Crisis of 1998 | Descripción |
	Initial date	Date resolution	Initial date	
BANCO DE BOGOTA				Acquisition of Banco del Comercio in December 1991. Approbation of the Superintendencia Bancaria under Resolution 4949 of December 2 of 1992.
BANCO POPULAR S.A.				Privatized on November 1996. The government sells to OLCSA.
BANCO DE COLOMBIA	1985-12	1993-12	1998-06	Nationalized on January of 1986 an then privatized on December of 1993. Mergered with BIC in April of 1998.
BANCO DE COMERCIO	1987-06			Nationalized in August 1987 and then sold to Banco Bogotá on December 18 of 1991.
BANCAFE			1999-09	Capitalization of 600.000 millions of Colombian pesos (approximately US$ 275 millions) in September and October of 1999.
BANCO SANTANDER – BANCOQUIA				The Banco Santander buys 55% of the shares of Bancoquia in June 1997.
BANCOLOMBIA S.A. – BIC				Datas of BIC until June 1998 and then of the merger of BIC - BANCOLOMBIA thereafter. Merger authorized on April 2 of 1998.
ABN AMRO BANK COLOMBIA S.A. - REAL			1999-06	BANCO REAL absorbed by ABN AMRO, forming ABN AMRO BANK COLOMBIA S.A. in June 1999.
BANCO AGRARIO (CAJA AGRARIA)			1999-06	Capitalization of 150.000 millions of Colombian pesos (approximately US$ 70 millions) in June 1999. Liquidation authorized in June 1999 with Decree 1065 of 1999 and liquidation under Resolution 1726 of November 19 of 1999.
BBV BANCO GANADERO S.A.				Considered as a private bank from June 1989, for the inflexion in the tendency of the rentability. Acquisition of 40% of shares by Bilbao Viscaya España in June 1996.
BANCO DE CREDITO			1999-12	Shareholders contribution of 15.000 millions of Colombian pesos (approximately US$ 7 millions) and special credit of the Deposits Insurance Fund (Fogafin) of 60.000 millions of Colombian pesos (approximately US$ 28 millions) in December of 1999.
BANCO NACIONAL	1982-06			Liquidated in June 1982.
BANCO ANDINO			1999-06	Liquidated on May 20, 1999 under Resolution 0750.
BANCO SANTANDER			1992-03	Bought by Bancoquia in March 1992, forming the new Banco Santander.
BANCO NACIONAL DEL COMERCIO, BNC			1997-06	Credit-line for capitalization offered by Banco Ganadero Panamá. Merger with Banco Ganadero in October 1998.
RED MULTIBANCA COLPATRIA S.A.			1999-09	In August 1996 acquired the financial corporation CORPAVI. Shareholders contribution to capital of 58.000 millions of Colombian pesos (approximately US$ 25 millions) and credit of Fogafin for 212.000 millions of Colombian pesos (approximately US$ 100 millions) in August 1999. Change of social reason in October 1998: The new institution becomes RED MULTIBANCA COLPATRIA.
BANCO DEL ESTADO	1982-06	1988-12	1996-12	Nationalized in October 1982 after evident problems began in June of the same year. The bank was back to life in December 1988 as its capital got positive again. Received guarantee capital in November 1996 and again in 1999.
BANCO UNION COLOMBIANO			1999-09	Mergered with the financial corporation Unión in December 1996. Shareholders contribution of 5.000 millions of Colombian pesos (a little more than US$ 2 millions) and a credit of Fogafin of 28.000 millions of Colombian pesos (approximately US$ 13 millions) in August 1999.
STANDARD CHARTERED COLOMBIA (EXTEBANDES)				Changed its social reason from EXTEBANDES to STANDARD CHARTERED COLOMBIA in February 1998.
BANCO CENTRAL HIPOTECARIO			1999-09	Capitalization of 550.000 millions of Colombian pesos (approximately US$ 250 millions) in July and September of 1999.
MERCANTIL DE COLOMBIA S.A.(TRABAJADORES)	1985-12	1991-12		Nationalized in April 1986 after evident problems since December 1985. Sold to Banco Mercantil de Venezuela on August 27, 1991.
BANCO TEQUENDAMA S.A.	1985-12	1991-12		Nationalized in March 1986, though problems were evident since December 1985. Sold to Banco Construcción on October 17 of 1991 and then to Credicorp of Perú in December of 1996.
BANCO PACIFICO			1999-06	Liquidated on May 20 of 1999 with Resolution 0751.
BANCO SUPERIOR			1999-09	Shareholders contribution of 17.000 millions of Colombian pesos (approximately US$ 8 millions) and credit of Fogafin for 52.000 millions of Colombian pesos in August 1999. Additional shareholders contribution of 48.000 millions of Colombian pesos (approximately US$ 23 millions) in April 2000.
INTERCONTINENTAL			1999-12	Shareholders capitalization of 15.000 millions of Colombian pesos (approximately US$ 7 millions) and credit of Fogafin for 43.000 millions of Colombian pesos (approximately US$ 20 millions) in October 1999.
BANCO SELFIN			1999-09	Intervention to liquidate on July 16 of 1999, under Resolution 1100.
DAVIVIENDA S.A.				Conversion to commercial bank in March 1998 (Davivienda originally was specializing in the mortgage sector).
ABN AMRO BANK				Authorization to enter the Colombian market in December 1997.

(1) We only present the failures events. The complete listing of banks can be made available by the authors.
(2) "*El 2 por mil*" is a temporary tax of 0,2% that is charged on the complete amount of all financial transactions on current and deposit accounts. The tax is intended to provide Fogafin the sufficient liquidities to capitalize financial institutions in distress in the current financial crisis context.
NOTE: This table reviews all the events of failure of commercial banks observed in the last twenty years.

Table 5-a: Correlation among explaining variables – *Private Banks*

	Disposables /Assets	Log(Assets)	Return on assets	Proportion of unproductive assets	Capital / Assets	Depositos /Credits	Suficiency of margin
Log(Assets)	76,57%						
Return on assets	33,07%	28,19%					
Proportion of unproductive assets	41,51%	71,21%	0,49%				
Capital / Assets	55,95%	77,07%	21,28%	51,15%			
Depositos/Credits	89,06%	83,90%	25,30%	52,79%	62,56%		
Suficiency of margin	61,69%	72,07%	43,53%	33,52%	60,98%	61,76%	
R-square auxiliary regression	90,39%	96,05%	29,12%	80,48%	80,35%	93,43%	73,05%
R-square auxiliary regression (1)	90,13%		28,65%	63,30%	73,91%	92,44%	66,60%
R-square auxiliary regression (2)			25,72%	62,90%	73,90%	76,63%	72,98%

(1) Once Log(Assets) was eliminated from the model.

(2) Once Log(Assets) and Disposables /Assets were eliminated from the model.

NOTE: This table presents in the first part the matrix of Pearson correlation coefficients. The second part present the R-Squared of the regression of the variables presented in the first row as dependent variables against the remaining variables. Due to multicollinearity, we decided to eliminate two ratios: Disposables/Assets and Log(Assets). We also estimated the model without eliminating these two variables, treating the multicollinearity problem with orthogonolization. The same process was done for state banks and FC in Tables 5-b and 5-C respectively.

Table 5-b: Correlation among explaining variables – *State Banks*

	Disposables /Assets	Log(Assets)	Return on assets	Proportion of unproductive assets	Capital / Assets	Depositos /Credits	Suficiency of margin
Log(Assets)	88,76%						
Return on assets	-0,43%	-5,03%					
Proportion of unproductive assets	65,06%	77,34%	-29,83%				
Capital / Assets	73,96%	78,37%	-3,60%	57,63%			
Depositos/Credits	89,61%	93,86%	-2,12%	71,05%	79,20%		
Suficiency of margin	77,90%	88,74%	16,34%	57,05%	65,48%	83,23%	
R-square auxiliary regression	79,04%	93,81%	27,11%	70,21%	59,65%	88,57%	77,64%
R-square auxiliary regression (1)	76,89%		25,60%	57,64%	57,65%	86,27%	64,29%
R-square auxiliary regression (2)			24,82%	57,46%	57,18%	79,63%	64,12%

(1) Once Log(Assets) was eliminated from the model.

(2) Once Log(Assets) and Disposables /Assets were eliminated from the model.

Table 5-c: Correlation among explaining variables – *Financial cooperatives*

	Disposables /Assets	Log(Assets)	Return on assets	Proportion of unproductive assets	Capital / Assets	Depositos /Credits	Suficiency of margin
Log(Assets)	22,31%						
Return on assets	-39,06%	-10,02%					
Proportion of unproductive assets	74,52%	17,02%	-54,80%				
Capital / Assets	23,24%	79,94%	-4,40%	16,03%			
Depositos/Credits	27,63%	83,91%	-19,14%	25,13%	51,76%		
Suficiency of margin	-10,94%	49,83%	27,15%	-12,94%	44,78%	38,04%	
R-square auxiliary regression	64,10%	96,85%	41,21%	74,48%	89,66%	90,87%	65,28%
R-square auxiliary regression (1)	64,10%		41,15%	73,87%	60,36%	66,04%	61,25%
R-square auxiliary regression (2)			40,92%	63,42%	89,54%	90,81%	64,20%

(1) Once Log(Assets) was eliminated from the model.

(2) Once Log(Assets) and Disposables /Assets were eliminated from the model.

Table 6: Tests of Logit Models – *All*

	Financial Cooperatives	Public Banks	Private Banks
Moral Hazard Model			
Constant	-3,331	-2,857	-1,834
	(-3,304)	(-7,260)	(-2,256)
ROA	2,088	2,204	-40,293
	(0,184)	(0,228)	(-2,570)
Proportion of unproductive assets	25,840	23,105	19,002
	(2,468)	(3,819)	(1,802)
Capital/Assets	-8,003	4,441	-30,669
	(-1,951)	(1,855)	(-4,327)
Proportion of cases corect	97,59%	82,85%	98,86%
LogLikelihood	-25,417	-140,652	-58,470
Cost of agency model			
Constant	-7,621	-7,602	-3,241
	(-3,093)	(-6,965)	(-4,348)
ROA	-5,386	-47,826	-32,398
	(-0,410)	(-4,067)	(-2,752)
Deposits/Credits	5,131	3,201	-0,045
	(2,663)	(5,531)	(-0,100)
Financial margin / Operational costs	-0,986	1,230	-0,451
	(-1,173)	(4,591)	(-1,593)
Proportion of cases corect	97,57%	82,57%	98,43%
LogLikelihood	-19,953	-126,975	-89,051
Both effects			
Constant	-7,283	-19,449	1,275
	(-1,375)	(-6,993)	(0,754)
ROA	-7,543	-31,284	-31,940
	(-0,342)	(-1,771)	(-1,872)
Proportion of unproductive assets	-65,655	101,613	9,855
	(-1,920)	(6,552)	(0,857)
Capital/Assets	-11,631	-5,393	-35,628
	(-1,490)	(-1,095)	(-4,712)
Deposits/Credits	13,901	6,703	-1,074
	(2,570)	(5,978)	(-1,574)
Financial margin / Operational costs	-3,808	3,293	-0,685
	(-2,389)	(6,237)	(-1,736)
Proportion of cases corect	97,39%	88,81%	98,82%
LogLikelihood	-13,193	-76,774	-55,918

NOTE : This part of Table 6 presents the estimated coefficients and their t-statistics (in parentheses), for three models : The first one considering moral hazard varables only, the second one considering agency costs variables only, and the third one considering both moral hazard and agency costs variables.

Table 6: Tests of Logit Models – *All* (*Continued*)

Wald Test Statistics (and their significance level)	Financial Cooperatives	Public Banks	Private Banks
Hypothesis: MH coeficients = 0	4,066	53,174	22,362
	(13,10%)	(0,00%)	(0,00%)
Hypothesis: CA coeficients = 0	8,239	55,817	5,605
	(1,63%)	(0,00%)	(6,07%)
Maximum Likelihood Test Statistics (and their significance level)			
Hypothesis: MH coeficients = 0	13,519	100,402	66,265
	(0,12%)	(0,00%)	(0,00%)
Hypothesis: CA coeficients = 0	24,447	127,757	5,104
	(0,00%)	(0,00%)	(7,79%)
Akaike information criterion			
Hypothesis: MH coeficients = 0	1,190	-0,296	0,466
Hypothesis: CA coeficients = 0	1,400	-0,207	0,101
Hypothesis: Both are included	3,759	2,230	2,505
Consistent Akaike information criterion			
Hypothesis: MH coeficients = 0	11,274	9,664	12,816
Hypothesis: CA coeficients = 0	11,469	9,724	12,432
Hypothesis: Both are included	18,682	16,884	20,941
P-test for cost of agency			
Constant	0,943	0,777	0,950
	(40,236)	(13,191)	(72,622)
ROA	0,724	-2,078	1,400
	(2,302)	(-1,183)	(3,404)
Proportion of unproductive assets	-0,487	-3,625	-0,650
	(-2,657)	(-3,560)	(-1,862)
Capital/Assets	0,137	0,841	0,301
	(2,771)	(1,350)	(2,419)
Residual impact of cost of agency	-1,109	-0,371	-0,251
	(-2,502)	-(3,417)	(-0,731)
R-squared	98,58%	92,09%	99,02%
P-test for moral hazard			
Constant	1,030	1,261	0,955
	(62,220)	(8,685)	(61,139)
ROA	0,757	4,093	1,750
	(2,899)	(3,320)	(3,576)
Deposits/Credits	-0,096	-0,264	0,002
	(-5,233)	(-3,569)	(0,307)
Financial margin / Operational costs	0,004	-0,131	0,005
	(1,715)	(-3,261)	(1,316)
Residual impact of moral hazard	0,303	-0,332	-0,524
	(1,877)	(-2,255)	(-1,775)
R-squared	98,64%	93,03%	98,99%

NOTE: This section presents the results of the various tests that were completed. The fourth and fifth sections present the Wald and ML statistics and their level of significance (in parentheses). The sixth and seventh sections present the Akaike and CAIC statistics, and the last two sections present the results of the P-tests, with the level of significance in parentheses.