CORPORATE CONTROL,
PORTFOLIO CHOICE,
AND THE DECLINE OF BANKING


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## ABSTRACT

In the last two decades U.S. banks have become systematically less profitable and riskier

as nonbank competition has eroded the profitability of banks' traditional activities. Bank failures,

insignificant from 1934, the date the Glass-Steagall Act was passed, until 1980, rose

exponentially in the 1980s. The leading explanation for the persistence of these trends centers

on fixed-rate deposit insurance: the insurance gives bank shareholders an incentive to take on risk

when the value of bank charters falls. We propose and test an alternative explanation based on

corporate control considerations. We show that managerial entrenchment, more than moral

hazard associated with deposit insurance, explains the recent behavior of the banking industry.

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## I. Introduction

During the 1980s bank profit, whether measured by return on equity or by return on assets, declined steadily. [1] Not only did banking become less profitable, it became riskier. The ratio of charge-offs to total loans, a measure of risk, rose almost monotonically in the last decade.[2] (See Figure 1). Bank failures, which had averaged six (mostly small banks) per year from 1946 to 1980, rose dramatically in the last decade, averaging 104 banks per year during the 1980s.

These trends in banking coincide with significant changes in corporate finance. Banks, in particular, have lost market share in financing corporations, one of their core lending areas. In the past banks had been the dominant providers of short-term (nonfinancial) corporate debt. But, recently their share of this market has been declining, from about 70 percent in the late 1970s to less than 60 percent in the late 1980s. Theoretical work suggests that bank loans are the most efficient method of supplying capital in the presence of information or monitoring problems.[3] Historically, corporations have been prone to these sorts of problems. Technological change and changes in market structure seem to have reduced the information and monitoring problems for many corporations, meaning there is less need for bank loans to finance these borrowers. These changes allow many large and medium firms to tap nonbank capital markets.[4]

One might predict that banks, affected by the changes in the corporate debt market, should respond by reducing the volume of corporate loans. At the same time, banks might seek out new profit areas to replace lost opportunities. In fact, there has been a shift in bank portfolios. As the corporate debt market has changed, banks have shifted to off-balance sheet activity, such as loan commitments and standby letters of credit for corporations.[5] They have also significantly increased commercial real estate lending in recent years.[6] But, these changes have not been enough to replace lost bank profit.

Why did banking become unprofitable in the 1980s? A large literature in banking has, following Merton (1977), concentrated on the incentives of shareholders to maximize the value of the (fixed-rate) deposit insurance subsidy provided by the government for taking on risk

inefficiently, so-called "moral hazard" risk.[7]   As refined by Marcus (1984) and Keeley (1990), bank shareholders have an incentive to take on risk, increasing the probability of bank insolvency, when the value of the bank charter falls sufficiently (Keeley claims that charter values have fallen recently, this is consistent with the decline in bank profitability).[8]

In this paper we take issue with the view that moral hazard emanating from fixed-rate deposit insurance is the primary explanation for the recent behavior of the U.S. banking industry. The moral hazard view of banking assumes that shareholders make the lending decisions, and can, if they desire, take on risk to increase the value of insurance.    Rather than assume that shareholders directly control bank actions, we assume bank managers, who may also be bank shareholders, make the lending decisions.    If managers have different objectives than outside shareholders, and if disciplining managers is costly, then managerial decisions may be at odds with the decisions outside shareholders would like them to take.[9]   We explore the effect of this conflict on the risk-taking behavior of banks.

The agency relationship between managers and outside shareholders has been widely studied in corporate finance.  Jensen and Meckling (1976) and others argue that managers benefit from control in many ways, including the abilities to draw a salary and to consume nonmarketable perquisites.    To protect future private benefits, and because managers have a large undiversifiable stake in the firm that employs their human capital, managers of nonfinancial firms have been found to avoid risk.

In Sections II and III we present a model of corporate control in banking.  We use a slight variation of a standard model of agency problems, but we focus on two novel aspects of the model. First, we examine "unhealthy" industries, where a large proportion of managers are low quality ("bad").    The risk-avoiding behavior of managers stressed in the corporate finance literature presumes that conservative behavior is sufficient for job and perquisite preservation.  When bad managers predominate, conservative behavior may not allow most managers to keep their jobs and perquisites.    These managers may find it optimal to take excessively risky actions.    Thus, aggregate risk taking, driven by attempts by bad managers to convince shareholders that they are good managers, can be excessive.

The second novel aspect of our model is that we examine flows of capital between banking and other investments. The average quality of managers in banking determines whether, on the margin, investors want to move new money into banking. But, for existing shareholders considering whether to withdraw their capital from banking, the cost of liquidating capital also plays a role. In our model, the cost of liquidating capital includes the cost of firing the existing manager. We provide conditions under which free capital does not flow into banking, that is under which banking is an unhealthy industry, and under which existing shareholders are willing to bear liquidation costs to withdraw capital from banking.

Section II sets out the game between a manager and shareholders. A bank manager chooses either risky or safe loans based on the quality of the loan opportunities available to the manager (the manager's type). The choice of loan portfolio is observed by shareholders, but the manager's type is not. Based on the choice of loan portfolio and its outcome, shareholders decide whether to retain or fire the manager. If the manager is fired, shareholders decide whether to invest in new bank assets (hire a new manager) or move their capital out of banking (capital is liquidated). In any period that they are employed, managers receive a private benefit. One complicating factor is that managers are also shareholders.

Section III presents a sequential Nash equilibrium to the game between managers and shareholders. The equilibrium depends on the distribution of managerial types. If there are enough "bad" managers, the situation that exists in an unhealthy industry, and as long as firing costs are not prohibitive, there are ranges of managerial ownership over which managers take non-profit-maximizing actions to protect their private benefit. As managerial ownership increases, the incentives of managers and outside shareholders become more aligned, and managers become more likely to take profit-maximizing actions. Still, as long as some bad managers take actions to protect their private benefit, resources can move out of banking slowly (compared to a world with no agency problems).

The model in Sections II and III has no role for debtholders or regulators, and restricts managers and outside owners to simple strategic roles. Section IV discusses the importance of these assumptions.

As a prelude to empirical work Section V analyzes the predicted relationship between the extent of equity ownership by bank managers (insider ownership) and portfolio choice. Saunders, Strock and Travlos (1990) estimate a linear relationship between insider ownership and portfolio choice. Several other studies of nonfinancial firms predict (Stulz (1988)) or find (McConnell and Servaes (1990) and Morck, Shleifer and Vishny (1988)) a nonlinear relationship between insider ownership and firm value reflecting the trade-off between private benefits and ownership rewards. Our model predicts a nonlinear relationship that can take on the generally quadratic shape in Stulz (1988) and McConnell and Servaes (1990) or the saw-tooth shape in Morck, Shleifer and Vishny (1988).

In Section VI we rank different categories of bank loans by risk. This provides the basis for Section VII, where we test the predictions of the theoretical model. Using data on the equity ownership structure of large bank holding companies we test the predictions of our corporate control model of banking against an alternative model based on moral hazard problems between banks and regulators. Our findings are consistent with the corporate control problems playing an important role but inconsistent with the moral hazard playing a dominant role in banking. Section VIII concludes.

## II. A Model of Banking

In this section we present a model of banking in which managers, not outside shareholders, make lending decisions. The managers receive private benefit from control of the bank and it is costly for outside shareholders to fire them. The cost of firing faced by outside shareholders depends on the extent to which managers own stock in the bank.

## A) The Lending Environment

There are three periods and many banks. Each bank is run by a manager who has $1 to invest. Investment opportunities in banking vary because managers have different abilities for locating lending opportunities. The distribution of managerial types describes the investment opportunities available in the banking industry and is given below. A manager's type is the private information of the manager. For simplicity all banks are assumed to have the same leverage and cost of funds. [10]

The timing of the model is shown in Figure 2. At date 1 bank managers choose a loan portfolio. At date 2 outside owners observe the outcomes of these loan choices. At this time outsiders may decide to fire some managers, but this is costly. If a manager is fired, shareholders have two choices at date 2. They can replace the fired manager with a new bank manager and continue investing in the banking industry. Or, they can move resources into a nonbanking investment. [11] Finally, also at date 2, new loans or other investments are made that have realizations at date 3. All agents are risk neutral.

There are four kinds of loans in the universe of bank investment opportunities: good and bad risky loans; and good and bad safe loans. To keep the model simple a bank manager chooses to make either safe loans (S) or risky loans (R). An individual manager's type is described by a pair of characteristics, $\{T_R, T_S\}$, which indicates whether the manager's ability to locate opportunities for risky loans is good, bad, or there is no opportunity, $T_R \in \{G,B,0\}$, and whether his lending opportunity for safe loans is good, bad, or no opportunity, $T_S \in \{G,B,0\}$.

Good risky loans earn $R_R$ with probability $\psi_R$ and zero with probability $1 - \psi_R$; bad risky loans earn $R_R$ with probability $\theta_R$ and zero with probability $1-\theta_R$ (where $\psi_R > \theta_R$). Good safe loans earn $R_S$ with probability one; bad safe loans earn $\theta_S R_S$, $0 < \theta_S < 1$, with probability one. (All returns are expressed net of the cost of funds.) We make the following assumptions about expected and realized returns:

(A1) $\theta_R R_R < \theta_S R_S$       Bad safe loans return more than (expected) bad risky loans.

(A2) $R_R > R_S$                Successful risky loans return more than good safe loans.

(A3) $R_S > \theta_R R_R$        Good safe loans return more than (expected) bad risky loans.

(A4) $\psi_R R_R > \theta_R$        (Expected) good risky loans return more than (expected) bad risky loans.

(A5) $\psi_R R_R > R_S$        (Expected) good risky loans return more than good safe loans.

Good loans dominate bad loans; good risky loans dominate good safe loans; and bad safe loans dominate bad risky loans. Note that the realized return on safe loans reveals a manager's type.[12] ((A1) and (A2) imply $\theta_R < \theta_S$.)

There are eight types of managers. We refer to these types as GG, GB, G0, 0G, BG, BB, B0, and 0B, respectively, where the first letter indicates risky loan quality and the second letter indicates safe loan quality. (We often call a manager "good" if he has at least one good loan opportunity and call a manager "bad" otherwise.) While the number of types may seem daunting, our analysis concentrates on the portfolio choices of GG and BB managers. The remaining types of managers have dominant lending strategies. The lending decisions of the those managers with only one choice (0G, G0, B0, and 0B) are obvious. Similarly, GB and BG managers have straightforward decisions, as explained below. The inclusion of these other types makes computation of the equilibrium technically simpler.[13]

Managers receive a private benefit, w, in each period that they are in control of the bank. If managers are fired by the outside owners at the end of date 1, they earn no control rents in date 2.

We assume that a manager's type is the private information of the manager. To complete the description of information sets we need to describe what is learned by outside shareholders from the realized returns at date 2. By assumption, the realized return on safe loans reveals a manager's type. The outcome of risky loans does not reveal the manager's type. Outsiders observe either zero or $R_R$ and form conditional expectations about the manager's type based on this information. (Appendix 1 considers a model where outsiders can produce costly information about a manager's type.)

## B) Firing Managers and Shrinking the Banking Industry

Let $\gamma_{ij}$ be the fraction of type $T_{ij}$ managers in the population, where i stands for risky loan quality (R) and j stands for safe loan quality (S) (i, j = G, B, or 0). Assume that there are enough managers so that the probability of drawing each type corresponds to the population

proportions. Let V be the expected (gross) value of the bank at date 3 when new managers drawn from the initial distribution of types make lending decisions at date 2. At date 2, managers choose the first-best loan portfolio, so GB and GG managers choose risky loans and, similarly, BG and BB types choose safe loans. Then, since $\gamma_{ij}$ is the fraction of managers with risky loan quality i and safe loan quality j:

$$V = (\gamma_{GG} + \gamma_{GB} + \gamma_{G0})\psi_R R_R + (\gamma_{BG} + \gamma_{0G})R_S + (\gamma_{BB} + \gamma_{0B})\theta_S R_S + \gamma_{B0}\theta_R R_R.$$

In deciding whether or not to fire a manager, outside shareholders compare the expected return on their investment in the bank to their alternatives which include hiring another bank manager or investing in a nonbanking alternative with an expected return of $\Gamma$. They must also incur a cost c to fire the current manager (more generally, c is a liquidation cost for capital which includes firing costs). Thus, the opportunity cost of retaining a particular manager is:

$$X = \text{Max}[V - w, \Gamma] - c.$$

Consistent with the above interpretation of the firing costs, firing costs are borne by the bank, *i.e.*, by all owners.

We say that there is overcapacity in banking, or that banking is an unhealthy industry, if outside shareholders, once they have fired a bank manager, invest their resources in the nonbanking alternative at date 2 (and no investors bring resources into banking). If V, the expected value of the bank, conditional on drawing new managers from the population of managers at date 2 is less than $\Gamma$, the value of investing in the nonbanking alternative then banking is unhealthy. A sufficient condition for banking to be unhealthy is:

$$\frac{\gamma_{BB} + \gamma_{0B} + \gamma_{B0}}{\gamma_{GG} + \gamma_{GB} + \gamma_{G0} + \gamma_{BG} + \gamma_{0G}} > \frac{\psi_R R_R - \Gamma}{\Gamma - \theta_S R_S}.$$

which is implied by $\Gamma > V$ and assumptions (A1) - (A5). The banking industry is unhealthy when bad managers (*i.e.*, BB, B0, and 0B) are relatively common causing the expected value of an investment in banking (by an outsider) to be low (relative to the alternative). Assume that when a manager is fired, outsiders move funds from the banking industry at date 2:

(A6)                          $V < \Gamma$                          Banking is unhealthy.

The flow of assets out of banking, if it is unhealthy, depends on the cost of firing existing managers. We assume that outsiders, conditional on knowing a manager's type, fire bad managers and not good managers. This assumption is stated as:

(A7)         $\theta_S R_S < X < R_S$ and $\theta_R R_R < X < \psi_R R_R$         Outsiders fire only bad managers.

## C) Preliminary Analysis

To see how private benefit affects managerial choices, suppose that the outsiders fire all bad managers that make safe loans (their quality is revealed by the realization) and all managers that make risky loans that earn zero. We concentrate on the GG and BB managers and ask what loan portfolios they choose under this firing rule.

By (A5), outside shareholders want GG managers to choose risky loans since the return on good risky loans dominates the return on the good safe loans. But, managers take their private benefit into account when they evaluate loans. If a GG manager makes risky loans, then with probability $\psi_R$, a positive return is earned so the manager is not fired. He earns w this period and w next period. If the risky loan earns 0, which occurs with probability $1 - \psi_R$, then he earns w this period but is fired. Thus, his expected return is $(1 + \psi_R)$ w. If the manager makes safe loans, he is never fired and earns w each period for an expected return of 2w. Thus, a GG manager chooses safe loans and behaves too conservatively (relative to the first-best loan choice) because of the private benefit. A similar calculation shows that a BB manager always chooses risky loans. Risky loans are too risky for a BB manager, since the expected return on bad safe loans exceeds the expected return on bad risky loans, by (A1). (From this point on when we say that a portfolio choice is "too conservative" or "too risky" we always mean relative to first best.)[14]

If the banking industry is unhealthy, so that there are many BB managers, then the aggregate decisions of bank managers reflect the risky decisions of the BB managers. If the industry is healthy (assuming the same firing rule), the conservatism of GG managers drives aggregate level of risk taking.

## D) Managerial Ownership

We now allow managers to be shareholders in the firms they manage. The situation is more complicated than the preliminary analysis above because managers not only receive private benefit from managing but also benefit from ownership of a (publicly observable) fraction of the stock in

the bank, I. Ownership influences portfolio choice because decisions taken to maintain private benefit can reduce the value of stock.

Managerial ownership of banks can affect the cost for outsiders to fire managers. The decision to fire the manager is made by a board of directors. Board membership control (by managers) is likely to depend on managerial stock ownership.[15] Also, to the extent that the manager owns stock he can demand such things as larger severance pay, making firing him more costly. Suppose firing a manager costs $c(I)$ where we assume that $c' > 0$ and $c'' > 0$. If a manager is fired, he still receives his share, I, of the proceeds of the bank value (or alternative investment) at date 3. Note that since the final period is the end of the model, if a manager is not fired, his date 2 portfolio choice is straightforward: the manager, being a shareholder, simply chooses the first-best portfolio.

In the preliminary analysis discussed briefly above, risk taking in the banking industry depends on only the relative proportions of good and bad managers. When managers own stock, however, overall risk taking in banking also involves the distribution of stock ownership across managerial types.

### III. Equilibrium With Costly Firing and Managerial Stockholding

A Sequential Nash equilibrium is: (1) a date 2 firing decision rule that maximizes the utility of outside shareholders given the lending decisions of each type of manager; and (2), a date 1 lending decision rule for each type of manager that maximizes utility given the outside shareholders' rule for firing managers.[16] Remember that only GG and BB managers and owners have interesting strategic decisions (all other managers have dominant strategies).

#### A) Outsiders' Choice of Firing Rule

Shareholders learn the type of managers that make safe loans, but not the type of those that make risky loans. Outside shareholders fire bad managers that make safe loans by (A7). There are three firing strategies outsiders could adopt toward managers that make risky loans. They could use firing rules that: (a) fire all managers that earn zero on risky loans (letting those that earned $R_R$ continue); (b) fire no managers that make risky loans; or (c), fire all

managers that make risky loans. Finding the equilibria of the model is essentially a process of examining the responses of managers to each firing rules. Rather than present all the details, we just analyze the equilibrium where GG managers are too conservative, BB managers take too much risk and owners only fire managers that earn zero on risky loans or are identified as bad managers.

Let $U_i(GG=\alpha, BB=\beta)$ be the expected profit of an outside shareholder (with one share) when outsiders choose firing rule i, GG managers choose lending strategy $\alpha \in \{R,S\}$, and BB managers choose lending strategy $\beta \in \{R,S\}$. Other managers have dominant strategies.

An outsider's expected profit when GG managers choose safe loans and BB managers choose risky loans, and given the rule that all managers are fired if they earn 0 on risky loans (or $\theta_S R_S$ on safe loans), is:

$$
\begin{aligned}
U_a(GG=S, BB=R) = \ & \gamma_{GG} [ R_S + \psi_R R_R - 2 w] \\
& + (\gamma_{GB} + \gamma_{G0}) [ \psi_R (1 + \psi_R) R_R + (1 - \psi_R) (X + w) - 2 w ] \\
& + \gamma_{BB} [ \theta_R (R_R + \theta_S R_S) + (1 - \theta_R) (X + w) - 2 w ] \\
& + \gamma_{BG} [ 2 R_S - 2 w ] \\
& + \gamma_{B0} [ \theta_R (1 + \theta_R) R_R + (1 - \theta_R) (X + w) - 2 w ] \\
& + \gamma_{0G} [ 2 R_S - 2 w ] \\
& + \gamma_{0B} [ \theta_S R_S + X - w ].
\end{aligned}
$$

A GG manager makes safe loans at date 1. The return on these loans is $R_S$, of which shareholders get $R_S$ - w, so the manager is allowed to continue control of the bank at date 2. Because the expected return on good risky loans exceeds the expected return on good safe loans, the GG manager chooses to make risky loans at date 2. The date 2 decision of the GG manager offers the outsider an expected return of $(\psi_R R_R$ -w). A GB or G0 manager chooses (per force) risky loans at date 1. With probability $\psi_R$, the return on these loans is $R_R$, so shareholders get $(R_R$ - w) after the manager take his private benefit. The manager is allowed to continue control of the bank at date 2. If the return on the risky loans selected at date 1 is zero, which occurs with probability $(1 - \psi_R)$, then the manager is fired. The private benefit is paid anyway and the outsider earns his expected opportunity cost X from the date 2 decision. Once again, the manager chooses to make risky loans at date 2 with an expected return to shareholders of $(\psi_R R_R$ - w). A BB manager makes

risky loans at date 1 and, if successful in avoiding being fired, makes safe loans at date 2. Similar results can be derived for BG, OG, BO and OB managers.

The expected profit from firing rules (b) and (c) when GG managers choose risky loans at date 1 and BB managers choose safe loans at date 1 can be similarly calculated. These are omitted for the sake of space. Firing rule (a) is optimal given the above choices for GG and BB managers if

(8)     $U_a(GG=R, BB=S) \geq U_b(GG=R, BB=S)$ and $U_a(GG=R, BB=S) \geq U_c(GG=R, BB=S)$.

It is straightforward to show

**Lemma 1:** A sufficient condition for firing rule (a) to be optimal for outside shareholders when GG managers choose risky loans at date 1 and BB managers choose safe loans at date 1 is

$$\frac{\psi_R}{\theta_R} \geq \frac{\{\gamma_{BB} + \gamma_{B0}\}}{\{\gamma_{GB} + \gamma_{G0}\}} \frac{\{X + w - \theta_S R_S\}}{\{\psi_R R_R - X + w\}} \geq \frac{1 - \psi_R}{1 - \theta_R}.$$

More tedious calculation gives a condition that we use later

**Lemma 2:** A sufficient condition for firing rule (a) to be optimal for outside shareholders when BB managers choose risky loans at date 1 and GG managers choose either risky or safe loans at date 1 or when both GG and BB managers choose safe loans at date 1 is

(9)     $$\frac{\psi_R}{\theta_R} \geq \frac{\{\gamma_{BB} + \gamma_{B0}\}}{\{\gamma_{GB} + \gamma_{G0}\}} \frac{\{X - \theta_S R_S\}}{\{\psi_R R_R - X\}},$$

(10)    $$\frac{\{\gamma_{BB} + \gamma_{B0}\}}{\{\gamma_{GG} + \gamma_{GB} + \gamma_{G0}\}} \frac{\{X - \theta_S R_S\}}{\{\psi_R R_R - X\}} \geq \frac{1 - \psi_R}{1 - \theta_R}$$ and

(11)    $$\frac{\gamma_{B0}}{\{\gamma_{GB} + \gamma_{G0}\}} \frac{\{X - \theta_R R_R\}}{\{\psi_R R_R - X\}} \geq \frac{1 - \psi_R}{1 - \theta_R}.$$

Proof: Use Lemma 1 and an equivalent result assuming both GG and BB managers choose risky loans at date 1. •

### B) GG Managers' Lending Strategies

We compute the optimal response for managers given their beliefs about the firing rule used by outside owners. As a benchmark, by (A5), the first-best loan decision at date 1 for GG managers when there are no distortions due to agency problems is risky loans.

When firing rule (a) is used, a good manager knows that he is fired if and only if he chooses risky loans at date 1 and gets a zero return. Thus, when a GG manager maximizes his expected return, he makes risky loans if:

$$(12) \qquad \psi_R \left[ (R_R - w) I + w + (\psi_R R_R - w) I + w \right] + (1 - \psi_R) \left[ -w I + w + I X \right] >$$
$$(R_S - w) I + w + (\psi_R R_R - w) + w.$$

If the manager makes risky loans, the left-hand-side of (12), then with probability $\psi_R$, the return is $R_R$. The manager gets the private benefit, w. To compute the return on the manager's stock, the private benefit, w, is deducted from the gross return so the manager earns $(R_R - w)$ I on his stock. Since the loan return is $R_R$, the manager is allowed to continue to control the bank at date 2. Because the expected return on good risky loans exceeds the expected return on good safe loans, he chooses to make risky loans at date 2 and expects to earn $(\psi_R R_R - w)$ I + w. If the return on the date 1 risky loan portfolio is zero, which occurs with probability $(1 - \psi_R)$, then the manager is fired. Since the private benefit, w, is paid at date 1 anyway, as a shareholder, the manager must pay w I, his share of the private benefit, to himself, and, as a manager, he receives private benefit of w. While he is fired, he remains a shareholder and receives, I X, his share of the outsiders' best alternative at date 3.

If safe loans are made at date 1, the right-hand-side of (12), the manager receives his share of the return (net of the private benefit), $(R_S - w)$ I, plus the private benefit, w, at date 1. The return on his safe loan portfolio reveals him to be a good manager, so he is allowed to continue at date 2. At date 2 a GG manager makes risky loans (because there is no distortion and these have a higher expected return than safe loans, by (A5)). Simplifying (12) yields:

$$(13) \qquad \Omega(I) \equiv \left[ \psi_R^2 R_R - R_S + (X + w)(1 - \psi_R) \right] I - w(1 - \psi_R) > 0.$$

A GG manager's portfolio choice depends on his ownership share, I. But, this dependence need not be monotonic in I since X can depend on I.

If I is sufficiently large (or w sufficiently small), a GG manager's interests are aligned with those of the outsiders and the distortion due to w is internalized. Let I* be the level of insider holdings such that GG managers choose to make risky loans (*i.e.*, interests are aligned) when I > I*. Then, outside shareholders knowing I*, and understanding the incentives facing managers, would not need to bear the firing cost when I > I*. Thus, c(I) = 0 for I > I*.

Interests between shareholders and managers are aligned over this range. Let $X_0$ be the expected value of the alternative return when $c(I) = 0$. From (13), a GG manager is indifferent between risky and safe loans if his ownership share is such that:

$$I^* = \frac{w\,(1 - \psi_R)}{\psi_R^2\,R_R - R_S + (X_0 + w)\,(1 - \psi_R)}$$

when $R_S - \psi_R^2\,R_R \geq X_0\,(1 - \psi_R)$, else $I^* = 1$. There is a discontinuity in $\Omega(I)$ at $I^*$; when interests become aligned, $\Omega(I)$ jumps upward (becomes more positive).

There is also a range of I over which GG managers are entrenched. When I is sufficiently small, the manager mostly cares about private benefits and behaves too conservatively by making safe loans. The manager makes safe loans because this ensures continuation of his job even though safe loans have a lower expected return. This conservatism appears elsewhere in the literature on corporate control.

**Proposition 3:** Assume outside owners use firing rule (a). There exists a range of I over which a GG manager chooses to make safe loans. The range may not be continuous, but includes a neighborhood of I around $I = 0$ and a neighborhood of I below $I^*$.

Proof: Since $\Omega(0) = - (1 - \psi_R)\,w < 0$, there is a neighborhood around 0 for which $\Omega < 0$. Also, $\Omega(I)$ is continuous over the interval $[0,I^*)$. Thus, by definition of $I^*$ there exists a neighborhood below $I^*$ where $\Omega(I) < 0$ (*i.e.*, a GG manager chooses to make safe loans). •

Proposition 3 says there is a range of insider ownership, I, over which a GG manager avoids risk to protect his private benefit. He makes safe loans having a lower expected return than risky loans. Although the manager does not choose the first-best loan portfolio at date 1, outsiders let him continue to control the bank at date 2. We say that a GG manager is entrenched when the fraction of the bank that he owns, I, is such that he chooses safe loans at date 1.

Proposition 3 does not say that all GG managers with ownership $I < I^*$ choose safe loans. Some GG managers that own a smaller share than $I^*$ may choose risky loans. This ambiguity makes it difficult to justify *a priori* functional forms for the relationship between insider ownership and the risk of the loan portfolio in our empirical work.

For completeness, note that the responses to other firing rules can be derived in a similar fashion. When no managers that choose risky loans are fired (firing rule (b)), a GG manager always chooses risky loans at date 1. When all managers that choose risky loans are fired (firing rule (c)), a GG manager always chooses safe loans at date 1. [17]

## C) BB Managers' Lending Strategies

Again, as a benchmark consider the case where there are no agency costs. Since bad safe loans dominate bad risky loans, when there are no agency costs, BB managers make safe loans (the first-best outcome).

Now consider their decision when there are agency costs. Maintaining the assumption that outsiders only fire managers that make risky loans that realize a zero return and managers that choose bad safe loans (firing rule (a)), BB managers make risky loans if:

$$(14) \qquad \theta_R \left[ (R_R - w) I + w + (\theta_S R_S - w) I + w \right] + (1 - \theta_R) \left[ -w I + w + I X \right] >$$
$$(\theta_S R_S - w) I + w + I X.$$

Examining the left-hand-side of (14), if a BB manager makes risky loans at date 1, then with probability $\theta_R$ these loans realize a return of $R_R$ so the manager receives $(R_R - w) I + w$. The manager is allowed to continue in his position, but makes safe loans at date 2 since he is unconcerned about being fired in the last period and these loans earn a higher expected return than risky loans. If the risky loans made at date 1 realize a return of zero, then he is fired. He earns $-w I + w$ and receives his share of the outsiders' alternative investment choice at date 3, I X.

If safe loans are made at date 1, the right-hand-side of (14), then the manager earns $(\theta_S R_S - w) I + w$ and is fired, earning I X on the investment made at date 2. Simplifying (14):

$$(15) \qquad \Delta(I) \equiv - \left[ \theta_R (X + w - R_R) + (1 - \theta_R) \theta_S R_S \right] I + w (1 - \theta_R) > 0.$$

As before, the portfolio decision of the BB managers need not be monotonic in I.

As above it is useful to first consider how a BB manager behaves at the extreme values of I. Interests between managers and outsiders are closely aligned when the managers' holdings are large. With a large enough ownership share, BB managers "fire themselves" because their share of the alternative expected return is high enough to compensate for the loss of the private benefit in the next period. Let I** be the ownership share such that a BB manager always fires himself

when $I > I^{**}$. Recall that $X_0$ is the expected value of the alternative return when $c(I) = 0$. Substituting $X_0$ into (15) gives:

$$I^{**} = \frac{\theta_R \, w}{\theta_R \, w - \theta_R (R_R - X_0) + (1 - \theta_R) \theta_S R_S}$$

if and only if $\theta_R R_R (1 - \theta_R) > (R_R - X_0) \theta_R$, else $I^{**} = 1$. At fractions of $I \in [I^{**}, 1]$, a BB manager chooses safe loans even though he knows this means he is fired at date 2. Again, there is a discontinuity in $\Delta(I)$ because interests become aligned at $I^{**}$.

If I is sufficiently small, then a BB manager essentially only cares about his private benefit, $w$, and chooses to make risky loans. Risky loans have a lower expected return than safe loans for a BB manager, but there is some chance that a risky loan returns $R_R$. It is only when the BB manager has a risky loan returning $R_R$ that he is allowed to continue managing the bank at date 2. Thus, the goal of a BB manager that makes a risky loan is to maximize his future private benefit.

**Proposition 4:** Assume outside owners use firing rule (a). There exists a range of I over which BB managers choose to make risky loans. The range may not be continuous, but includes neighborhoods around 0 and below $I^{**}$.

Proof: Similar to the proof of Proposition 3. •

Proposition 4 says that there is a range of insider ownership over which BB managers make risky loans in the hopes of protecting their private benefit. BB managers "gamble" that they may realize a positive return on their risky loans, allowing them to continue running the bank at date 2. We label these managers entrenched.

Again, for completeness, the responses to other firing rules can be derived in a similar fashion. When no managers that choose risky loans are fired (firing rule (b)), a BB manager never chooses risky loans at date 1 or chooses to fire himself at date 2.[18] When all managers that choose risky loans are fired (firing rule (c)), a BB manager always chooses safe loans at date 1.

## D) Equilibrium

Lemma 2 provides us with a set of conditions that ensure firing rule (a) is used in equilibrium:

Proposition 5: Assume (9) - (11) hold.  Then a unique equilibrium exists in which outside owners use firing rule (a), GG managers choose risky loans if and only if $\Omega(I) \geq 0$, and BB managers choose risky loans if and only if $\Delta(I) \geq 0$.

Proof:  We need to calculate the equivalent of (8) for each strategy used by managers.  With these calculations, we show that firing rule (a) is optimal by showing that no other firing rule is consistent with managers' actions.  Using Lemma 2, (9) implies that firing rule (c) is never used.  Given (11), owners might use firing rules (a) or (b) against any choice by GG managers when BB managers choose safe loans.  But, the best response of managers to firing rule (a) and (b) is GG managers choosing safe and risky loans, respectively, and BB managers choosing risky loans.  So, there is no equilibrium where BB managers choose safe loans.  If GG and BB managers choose risky loans, by (9) and (10), the best response of owners is firing rule (a).  Thus, firing rule (a) is the only possible equilibrium firing rule.

The equilibrium exists if, given the choices by managers in Proposition 5, outside owners' best response is firing rule (a) since Propositions 3 and 4 state that the managers' choices are optimal given firing rule (a).  When $\Omega(I) \geq 0$ and $\Delta(I) \geq 0$, GG and BB managers are acting in the interests of the owners.  When $\Omega(I) < 0$ and $\Delta(I) < 0$, owners' best response is firing rule (a) by Lemma 1.  When $\Omega(I) \geq 0$ and $\Delta(I) < 0$, owners' best response is firing rule (a) by Lemma 2.  When $\Omega(I) < 0$ and $\Delta(I) \geq 0$, owners' best response is firing rule (a) by Lemma 2.  Thus, firing rule (a) is an equilibrium response to the managers' choices given in Proposition 5. •

The important feature of the equilibrium is that not all the BB managers are detected and fired at date 1.  BB managers that choose risky loans and have a high payoff continue to make loans in the second period.  This is because these BB managers have successfully pooled with the good managers.  Under assumption (A7) the size of the banking industry should (in the absence of agency costs) decline by eliminating low types until $V = \Gamma$.  But, the friction caused by asymmetric information about managers' types can prolong the period of adjustment.  Overcapacity $(V > \Gamma)$ can continue

when some BB managers are successful in prolonging their careers by taking on risk and avoiding detection at date 1. In this sense the unprofitability of the banking industry can persist.

## IV. Discussion of the Model

In this section we briefly discuss several assumptions of the above model. The model does not have debtholders or regulators playing an active role. Also, it uses a simple ownership structure for both insiders and outsiders.

The analysis assumes that bank depositors continue to deposit one dollar in each bank in the banking industry even when $V < \Gamma$. The presence of (possibly) fixed-rate deposit insurance may allow banks to raise funds even when there is overcapacity. Since the interest rate paid to depositors is independent of managers' actions, there is no reason for insured depositors to become informed. Further, insured and uninsured depositors face the same information problems that outside owners do. Allowing debtholders to play an active role (without deposit insurance) would reduce the return to the risky activity because debtholders would demand higher interest rates. But, the qualitative results of the model would not change.

Another effect of deposit insurance may be that it increases the value of the banking investment, $V$ (because the cost of bank debt is underpriced), relative to the alternative nonbanking investment. Outside shareholders may prefer to stay in banking, perhaps hiring new managers, in some situations when they would not in the absence of deposit insurance.

The model assumes outside shareholders have no opportunity to produce information about manager types at date 1. Such information could allow outsiders to make more refined firing decisions. We consider this possibility in Appendix 1. When monitoring, *i.e.*, producing information about manager type at date 1 is possible but costly, the essential features of the equilibrium remain unchanged. In particular, if outsiders monitor managers that make risky loans and earn zero (and do not monitor managers earning $R_R$ on risky loans), then the only difference from the basic model is that GG managers need not fear earning zero on risky loans. But, the incentives of BB managers are unchanged; they are fired if they make risky loans and earn zero, but not otherwise.

The model also assumes outside shareholders act as a single agent. Since outside shares are often widely dispersed, possibly causing a free riding problem in monitoring and firing, the presence of a few block shareholders may be important for initiating monitoring and firing.[19] Firing and monitoring costs may depend on the fraction of outside shares that are held in blocks. Blockholders should reduce firing and monitoring costs. We include this consideration in the empirical work below. It has straightforward implications for the analysis.

We have also not considered the role of bank regulators. Regulators might examine banks (monitor) and close banks (fire managers) under different circumstances than outside shareholders do. As discussed in Appendix 1, if outside shareholders face very high monitoring costs, then they do not monitor, but instead fire managers only based on loan return. Regulators may face lower monitoring costs than outsiders, leading to most monitoring being done by regulators.

Government regulators, in addition, have more power than private citizens. In particular, they can examine banks *ex ante* and impose *ex ante* restrictions on risk taking. Also, regulators can impose punishments *ex post*, such as banning individual bank managers from working in the banking industry. To the extent that these are costless, and that regulators face the right incentives, these actions can mitigate the problems we analyze. Others, however, argue that agency problems between regulators, Congress and the public distort regulators' incentives. (See, *e.g.*, Kane (1991).)

Finally, like previous researchers in this area, we assume that the distribution of equity ownership is given. Obviously, in a larger model ownership would have to be endogenized. Managerial holdings at the start of the model, date 1, can be thought of as representing returns on stock options due to past performance. Managers that at date 1 know, privately, they are good might accept compensation in the form of stock or options rather than wages. A separating equilibrium might exist if BB managers are not willing to mimic the option packages of GG managers. In general, the agency problem we focus on can be mitigated to the extent that compensation contracts for managers can be designed to align their interests with those of outside shareholders. This is a subject for further research.

## V. Predictions of the Model

The model predicts a relationship between the pattern of risky lending and the equity ownership structure of banks (in cross-section) that depends on whether the investment opportunities in banking are mostly good (healthy) or bad (unhealthy). In either case, the relationship is likely to be highly nonlinear because it depends on the exact distribution of manager types and on the distribution of insider stockholding across these types. In this subsection we begin by briefly reviewing the empirical approaches of other researchers and then discuss the detailed predictions of the model.

### A) Previous Studies

Saunders, Strock and Travlos (1990) look at the effect of ownership structure on bank risk taking. For a sample of 38 banking holding companies, they test a linear relationship between risk and ownership structure. They find that "stockholder controlled" banks took on more risk than "managerially controlled" banks. This is the opposite of what Proposition 5 suggests. Their result may have been due to their choice of a linear functional form. Our model, and our empirical results below, show that a linear model can give misleading results.

The possibility that firm performance is a nonlinear function of insider ownership has been looked at elsewhere in the corporate finance literature. Morck, Shleifer and Vishny (1988) examine the effect of insider concentration on nonfinancial firm performance, as measured by Tobin's Q. They impose a piecewise relationship and find that as insider ownership rises up to 5%, Q increases; then Q falls as the insider concentration grows to 25%; finally, it again rises at higher ownership levels. They interpret these results as showing the balance of three factors. For small insider holdings the incentives of insiders become more aligned with those of the outsiders, but management does not have enough power to be entrenched. As insider concentration continues to rise, management becomes entrenched, that is, equity shares are large enough to stave off effective outside disciplining, but not so large that management interests are the same as those of outside owners. A further increase in concentration aligns management interests with outsiders; managers essentially become owners.

McConnell and Servaes (1990), also examining nonfinancial firms, impose a quadratic relationship and find a U-shaped relationship between Tobin's Q and the concentration of both insider and outsider holdings, that is, Q initially rises, and then falls as interests become aligned.

## B) Performance and Equity Ownership in Banking: Testing Hypotheses

In the previous studies Tobin's Q is low in the range of insider holdings where managers are predicted to be entrenched. In the empirical tests, below, we adopt, as part of the null hypothesis, the view that banking during the 1980s was dominated by a lack of good lending opportunities, that is, an industry dominated by bad managers. When bad managers dominate, our model predicts most entrenched managers take on too much risk. This prediction is quite distinct from the predicted behavior of managers when the industry is healthy and this difference allows us to jointly test the corporate control model with the hypothesis of overcapacity.

In a healthy industry, good managers predominate (so the average manager is good). Consequently, at high levels of I, on average, managers' interests are aligned with those of outside shareholders and they choose risky loans; at low levels of I managers are too weak to fight outside owners ($c(I)$ is low), so they also choose risky loans. At intermediate levels of I managers, on average, are entrenched and choose safe loans.

To distinguish the hypothesis of poor performance of entrenched managers due to risk-taking when there is overcapacity, rather than poor performance due to conservatism when the industry is healthy, we do not study Tobin's Q, but rather the portfolio choices of managers. Our model has predictions about the relationship between equity ownership and risk taking in the loan portfolio. We concentrate on these more specific predictions. In particular, the null hypothesis that we test is:

$H_0$ : There is a range of stock holdings less than 50 percent over which banks with managers owning stock in this range make more risky loans than banks with managers owning more than 50 percent of the stock.

Note that this hypothesis assumes that there is overcapacity in banking.

## C) Moral Hazard: An Alternative Hypothesis

The leading alternative hypothesis to the corporate control arguments outlined above is the so-called "moral hazard" model of banking. Moral hazard models concentrate on the conflict between banks and regulators. In the canonical moral hazard model, the banking industry is unhealthy (*e.g.*, Keeley (1990)), but banks are assumed to be controlled by owners (either large outside blockholders or manager/owners). Outsiders attempt to take advantage of fixed-rate deposit insurance by making relatively risky portfolio choices. Low levels of insider holdings increase the ability of outsiders to control managerial decisions, and high levels of insider holdings mean that managers' interests align with those of outsiders. So, moral hazard models predict that owner-controlled banks, and perhaps banks with low levels of insider ownership, make relatively risky portfolio choices compared to banks with entrenched managements:

$H_A$: There is a range of stock holdings greater than 50 percent over which banks with managers owning stock in this range make more risky loans than banks with managers owning less than 50 percent of the stock.

Corporate control and moral hazard predict sharply different patterns of risk taking. Our corporate control model predicts that there is a range of stockholding over which managers are entrenched; these banks make the most risky loans (and the fewest safer loans). Higher levels of managerial stockholding correspond to banks making fewer risky loans (and relatively more safe loans). Moral hazard models essentially predict the opposite.

In a more general model, fixed-rate deposit insurance, through its effect on monitoring by bank depositors, also can influence bank risk in ways that are independent of inside ownership. The absence of active monitoring of banks by depositors may reduce the incentives of bank managers to put in effort screening potential borrowers. Thus, to the extent that bank shareholders do not want their managers spending extra time screening borrowers, fixed-rate insurance increases the overall risk in banking. This is a type of moral hazard. But, more commonly, bank owners have a similar interest as depositors in encouraging monitoring of borrowers by managers. When interests coincide, the pattern of risk taking by managers should be a function of corporate control problems, not moral hazard problems.

## VI. Risk, Return, and the Composition of Banks' Loan Portfolios

As a first step toward testing our predictions on portfolio choice by bank managers, we divide bank loan portfolios into categories that are relatively risky and relatively safe. In the next section, we investigate how portfolio composition is related to the pattern of equity ownership.

The risk of a bank portfolio is estimated by using the proportion of loans that are nonperforming. (Nonperforming loans are those that are past due 90 days or more, not accruing interest, or current chargeoffs.)[20]    By this measure, the risk of bank loans has risen considerably. Panel A of Table 2 shows a breakdown of nonperforming loans by loan category. C&I loans are the riskiest and consumer loans are the safest.    The average real estate loan lies somewhere in the middle, but this category includes different types of loans.

Since the risk figures for real estate loans aggregate loan categories that we would expect to be (relatively) safe (such as home mortgages) with categories that are possibly very risky (such as construction and development loans), we need to find a way to disaggregate real estate loan risk. We have 1991 data on nonperforming real estate loans by the type of loan. For banks over $300 million in assets, 8.4 percent of real estate loans were nonperforming.    Construction and development loans had a nonperforming rate of 20.2 percent; commercial loans had a nonperforming rate of 10.1 percent, and mortgages had a nonperforming rate of 3.2 percent. Thus, construction loans and commercial loans were both riskier than C&I loans and consumer loans. We expect that the pattern in 1991 is representative of the pattern in the 1984-1990 period, although we recognize that 1991 was a bad year for construction and commercial real estate loans.

Examining the return on bank loans provides evidence that banking is a declining industry. Panel B of Table 2 gives the return on loans (ROL) for banks over $300 million in assets. The first column is the gross ROL, while the second column presents the ROL net of the average interest rate on deposits. The average interest rate is deducted from the ROL in an attempt to measure the net return on bank loan portfolios. As the table shows, the gross ROL (column 1) has fallen, but some of the decline occurred at the same time as a decline in interest rates. The ROL net of the average interest rate (column 2) also fell, but by less than the gross ROL.

For a risky loan to be a bad gamble for an entrenched manager, the loan must offer a lower expected return than safer loans. A direct estimate of the return on the categories of bank loans is possible for C&I loans, consumer loans, and (total) real estate loans. To show the relative expected return for the different loan categories clearly, Panel C of Table 2 presents the difference between the return on each loan and the average return on all loans. The return on C&I loans and real estate loans are below average, while consumer loans get an above average return.

Together, the results suggest that if banking is a declining industry and corporate control problems are important, bad entrenched managers should make the most real estate construction loans and fewest consumer loans, with C&I loans somewhere in between. We concentrate on these three loan categories.

## VII. Insiders and Outsiders in Banking: Tests

In this section we test the hypothesis that when there is overcapacity in banking, banks with entrenched managements invest more that other banks in the relatively risky commercial real estate construction and development loans and less in the relatively safe category of consumer loans.

### A) Data on Equity Ownership

In order to distinguish between moral hazard problems and corporate control problems, we collect data on the ownership structure of bank holding companies. Ownership data are a cross-section of holdings in 1988 as described in the Appendix 2.[21] We use two measures of ownership, the holdings of insiders (directors and officers of the bank) and the holdings of outsiders (that is, noninsiders) that hold at least five percent of the outstanding stock.[22] Our measure of outside concentration includes large blockholders and serves as a proxy for the degree of outsider control.[23]

Table 3 provides summary measures of our data together with the summary measures for nonfinancial firms provided by McConnell and Servaes (1990). Our samples are significantly smaller than those for the nonfinancial firms, but a few patterns are worth noting. First, unlike the nonfinancial firm ownership structures, the ownership structure of banking appears to have

changed over the 1980s.  Managerial (insider) concentration rose, while outsider concentration fell.  Second, outsider concentration in nonfinancial firms is larger than in banks throughout the 1980s.  The same is true for insider holdings.

## B) The Estimation Procedure

We empirically analyze the relationship between the share of particular loan types (of total assets) and the share of the firm held by insiders.  As we have seen, this relationship is likely to be highly nonlinear.  Estimating this relationship is, moreover, complicated by the need to control for a number of other factors which can be expected to affect the particular loan share, but for which theory offers little guidance as to the nature of the functional relationship.  Previous researchers, such as McConnell and Servaes (1990), Saunders, Strock and Travlos (1990) and Morck, Shleifer and Vishny (1988), imposed arbitrary functional forms when they studied the relationship between firm actions and insider holdings.  An obvious difficulty with this procedure is that the econometrician must guess a functional form which, it is hoped, at least approximates the true relationship.  McConnell and Servaes estimate a U-shaped pattern, Saunders, Strock and Travlos use a linear model, while Morck, Shleifer and Vishny examine a saw-toothed pattern.  Thus, previous results offer little guidance on what relationship to estimate.

We avoid an arbitrary specification of a functional form by combining parametric and nonparametric procedures.  The goal is to uncover the exact nonlinear relationship (at least, asymptotically) between the particular loan share choice and insider holdings after conditioning parametrically on the other factors.  The nonparametric procedure allows us to be fairly precise about the nonlinearities since the only *a priori* constraint imposed on the function is that it be smooth.

Nonparametric procedures are usually applied in bivariate situations because of stringent data requirements.[24]  In addition, many noneconomic applications are without the complications (of other variables) inherent in our setting.  This motivates our combining parametric and nonparametric procedures.

Let $L_i$ be the fraction of loan type i in the total bank portfolio.[25]  Also define the following variables: the fraction held by outside block shareholders is O; the log of total assets is A; the loans to total assets ratio is N.  Then the hypothesized relationship is of the form:

$$L_i = 1(O, A, A^2, A^3, N, Yr \text{ dummies}) + f(I) + \varepsilon$$

where $1(\bullet)$ is a parametric function, $f(I)$ is a (nonparametric) nonlinear function and $\varepsilon$ is a mean-zero error term.

Our procedure is in two steps. First, we estimate the parametric function:

$$L_i = 1(O, A, A^2, A^3, N, Yr \text{ dummies}) + \eta$$

where $\eta$ is a mean-zero error term. The nonlinear relationship may be approximately quadratic (McConnell and Servaes) or cubic (Morck, Shleifer, and Vishny) so in the first step we include quadratic and cubic terms for total assets to ensure that such nonlinearities are not introduced spuriously in the first step. The data on loan portfolio shares are annual data from the Call Reports for the period 1984-1990. The annual data are not averaged so all right-hand side variables in the first step are measured annually except the outsider holdings (which are always for 1988).[26] The parametric relationship also includes year dummies to account for other factors. To avoid capturing situations where the incentives of managers and outside shareholders are aligned, we exclude observations where the ratio of equity capital to total assets is less than five percent (including these observations does not change the qualitative results). The results of the first step are contained in Appendix 3. As can be seen in Appendix 3, for two of the three loan categories we present, the variable measuring outside holdings is insignificant.[27]

The second step of the estimation procedure uses locally weighted regressions to estimate the functional relationship between the residuals from the first step and insider holdings. (See Cleveland (1979) on locally weighted regression.) The procedure uses a weighted average of the nearest neighboring points (determined by choice of a window size) to estimate a smooth function through each point. The resulting functions through each point are then smoothed. The method provides a consistent estimate of a nonlinear function.

C) Test Results

In Section VI we establish that commercial real estate construction and development loans was a risky loan category during the 1980s while consumer loans was a relatively safe category. Figures 3 and 4 show the estimated nonlinear relationships between the loan shares of these two loan types and the fraction of equity held by insiders. Similarly, Figure 5 shows the estimated

relationship for C&I loans, an intermediate category in terms of risk.[28]    The vertical lines in the figures are 10 percent confidence intervals.[29]

In Figure 3, the results for commercial real estate construction and development loans, the residual estimated share of the loan portfolio initially falls as insider ownership increases.[30] At a fraction of insider holdings of approximately 18 percent the loan share rises steeply, before falling again at holdings of about 50 percent. Confidence bands for higher fractions of insider holdings are very wide because we have few observations in that range. This pattern is similar to the pattern found by Morck, Shleifer and Vishny (1988). As managers' holdings rise initially, giving them some stake in the firm (but not enough to make the costs of discipline very high), they seem to have an incentive to make less risky loans (raising the value of the firm). But, at holdings of about 15 percent managers begin to sharply increase the risk of the bank, corresponding to the prediction of the model that managers become entrenched. Finally, interests between insiders and outsiders become aligned at holdings of about 50 percent and higher.

Figure 4 presents the estimated relationship between the residuals from the regression of consumer loans and insider holdings. Consumer loans are relatively safe (compared to construction and development loans and C&I loans). The pattern in Figure 4 is dramatically different from the pattern in Figure 3. At low levels of insider holdings managers' interests seem to move in the direction of outside shareholders, that is, they make relatively safe loans for holdings between, roughly five percent and 18 percent. But, over the range where managers are entrenched they reduce their holdings of safe loans until a level of insider holdings at which interests become aligned. At holdings of about 40 percent the fraction of the loan portfolio devoted to consumer loans rises. The shape of the function in this case is similar to that found by McConnell and Servaes (1990); it is U-shaped.

Figure 5 presents the results for the intermediate category of C&I loans. As expected the pattern is not as dramatic as for real estate construction and development loans and can be interpreted as falling in between the other two categories.

## D) Robustness of the Results

The advantage of our estimation procedure is that it does not impose a functional form, but this is not without a cost. While the asymptotics of locally weighted regression are understood

(see Stute (1984)), there is (as yet) no well-developed statistical theory about combining parametric and nonparametric procedures as we have done. In particular, it is not known how possible estimation error in estimating the parametric part of the relationship affects estimation of the nonparametric relationship.[31]    Since there is estimation error in the first step, the confidence bands shown in the figures (which do not take this into account) must be larger. Were it possible to calculate the correct confidence bands, the importance of insider holdings might be diminished.

The robustness of our results can be checked as follows. The theory predicts a U-shaped pattern for the relationship between insider holdings and relatively safe loans over the range where insiders are entrenched, and an inverse U-shaped pattern between insider holdings and riskier loans over the range where insiders are entrenched.    By specifying a quadratic relationship between insider holdings and loan shares, restricting the sample to insider holdings between 10 and 80 percent, and including the variables from the first step in a single estimation equation, we can test whether the predicted U-shaped patterns are present over the range of insider holdings where insiders are most likely to be entrenched.

The results of these tests are shown in Appendix 4. Over the range of insider holdings of 10 to 80 percent the pattern for real estate construction and development loans is inversely U-shaped, that is, the entrenched managers make more of these risky loans. On the other hand, the pattern for the relatively safe consumer loans is U-shaped, meaning that entrenched managers make fewer of these loans.    The pattern for commercial and industrial loans is U-shaped, but the coefficients are not significant.    These results confirm our inferences from the two step procedure.[32]

### E) Summary

Overall, the empirical results confirm the pattern of lending behavior that the model of corporate control predicts. Notably, the pattern of the results is not what a pure moral hazard model would predict. The effect of moral hazard on bank decisions can vary. By relieving the need for insured depositors to monitor bank actions, deposit insurance makes it easier for banks to increase risk slightly. Deposit insurance can also lead banks with low charter values to "go for broke." The moral hazard hypothesis $(H_A)$ should hold no matter the degree of moral hazard.

If the effect of moral hazard is slight, however, it potentially could be overwhelmed by the effect of corporate control problems. Thus, while we our results imply that corporate control problems are more important than moral hazard, we cannot conclude that deposit insurance has no effect on bank decisions.

## VIII. Conclusion

In the last fifteen years the U.S. banking industry has systematically trended towards unprofitability and increasing riskiness. The bank failure rate has risen exponentially since 1980. It has been difficult to explain these trends. The previous literature tends to focus on the moral hazard hypothesis as an explanation, but evidence for this view has proved elusive. For example, Furlong (1988) finds that capital deficient bank holding companies in 1981 did not increase their risk over the next five years. McManus and Rosen (1991) do find a negative correlation between risk and return at banks, but only for banks above regulatory capital minimums. Banks with low capital ratios appear to attempt to reduce risk, perhaps under regulatory pressure.

We propose an explanation for these trends based on corporate control problems in banking. There is some prior evidence that there are agency problems in banking, just as there are in other firms. For example, Boyd and Graham (1991) find that in banking, management compensation is positively, and significantly related to asset size, but not significantly related to profitability.[33] We propose a model of bank lending in which outside equity holders do not make the lending decisions directly, but instead rely on managers. When bank managers receive private benefit of control, and outside shareholders can only imperfectly control them, the managers tend to take on excessive risk (relative to no agency costs) when there are declining lending opportunities. This tendency is due to the incentives that managers face when the fraction of the bank they own is large enough for them to make outside discipline costly, but not so large as to cause their interests to be aligned with those of outsiders. This result contrasts with management behavior when the industry is healthy. In that case, the entrenched managers behave too conservatively.

We test the predictions of the model and find that, over the range of insider holdings where managers would tend to be entrenched, they make more riskier loans (commercial real estate construction and development) and fewer relatively safe (consumer) loans. These results are consistent with the corporate control model, but contradict the pure moral hazard model of banking (for banks with equity ownership structures over which the interests of managers and outside shareholders are aligned). While we cannot rule out moral hazard, our findings suggest that corporate controls problems have a bigger impact on bank risk taking. Since a joint hypothesis of the test is that the banking industry is unhealthy, we also provide evidence of overcapacity in U.S. banking.

While our results suggest that corporate control problems are more important than moral hazard problems, our analysis is done for adequately-capitalized banks. If the value of bank equity is low enough, then the interests of inside and outside owners are aligned, so there are no corporate control problems of the sort we model. A reasonable interpretation of our results is that corporate control problems allow unprofitable banks to persist in making risky, low-return, loans. If, in the process, these banks lose enough equity value, then there may come a point at which both inside and outside owners want to take on excessive risk as the moral hazard hypothesis predicts.[34] It may be accurate to say that, for large U.S. banks, corporate control problems have been the cause of the conditions under which moral hazard is an accurate characterization.

The market for corporate control in banking is weaker than it is in markets for unregulated firms since regulation prevents nonbanks from taking over banks. The evidence on takeovers and takeover threats suggests that in the U.S. this is the main mechanism for disciplining managements (see Jensen and Ruback (1983)). Without the threat of nonbank takeovers it may be more difficult to induce bank managers to maximize shareholder value.[35] Consequently, the presence of agency costs suggests that unprofitability may persist. That banking is regulated does not appear to be a sufficient countervailing force.

## Appendix 1: Equilibrium With Monitoring By Outsiders

In this appendix, we examine the impact of allowing outside owners to expend resources and determine the manager's type. At date 1, after the loan realizations have been observed, but before firing decisions are made, assume that outsiders can choose to monitor managers and determine their type, by paying a cost, m(I). Firing decisions can now be conditional on the information revealed by monitoring. We assume that the monitoring cost, unlike the firing cost, is borne entirely by the outside owners and is an increasing function of manager ownership. We do this because it is reasonable to assume that increases in managerial ownership increase the ability of managers to control the flow of information, making monitoring costly.[36]

Outside owners must decide when to monitor a manager that makes risky loans. (Recall that the realizations of safe loans reveal a manager's type.) There are four possible monitoring strategies:

1) Monitor all managers that make risky loans, regardless of the realized return, and fire bad managers;

2) Fire all managers that realize zero on risky loans and monitor managers that earn $R_R$ on risky loans, firing the bad managers detected;

3) Retain managers that earn $R_R$ on risky loans, but monitor those that earn zero, firing bad managers detected;

4) Do not monitor any manager, but fire all managers that earn zero on risky loans.

The first strategy is optimal if monitoring costs are very low, while the fourth strategy is optimal if monitoring costs are very high (and was considered in the main text). The second and third strategies are intermediate cases where outsiders distinguish based on risky loan outcomes. We focus on the third strategy and discuss the second strategy below.

Assume that outsiders monitor managers that earned zero on risky loans, firing bad managers detected (and allowing those that earn $R_R$ to continue). Taking this strategy as given, what are the optimal lending strategies of managers? Compared to the case considered in the main text (where outsiders fire all managers earning zero on risky loans), there is only one change. GG

managers are induced to choose risky loans (first-best) because there is now no chance that they are fired. They have no reason to behave conservatively. All other managers make the same decisions as in the main text.

Given these lending strategies are best responses to the outsiders' monitoring and firing rules, we need to verify that the monitoring rule is a best response to these lending strategies. By comparing cost and benefit, as was done in the main text, it is possible to provide the condition under which the proposed monitoring rule is a best response. This equilibrium has the feature that some bad managers can avoid detection because by gambling for the continuation of their careers they earn $R_R$ and avoid being monitored and fired. As in the case without monitoring, these bad managers persist into the second period.

Monitoring rule (2) offers incentives for good and bad managers to choose safe loans. It generally is not optimal unless there is a large fraction of B0 managers.

## Appendix 2: Equity Ownership Data

The data on the ownership structure of bank holding companies are constructed from 13D and 13G SEC filings as well as proxy statements, compiled by Compact Disclosure. Compact Disclosure was searched for data for the top 1274 bank holding companies. Usable data were found for 456 bank holding companies. In many cases the holding company was not listed, presumably because it is not publicly held. In other cases, the data was not usable because it did not include the holdings of members of the board of directors. In a few cases the holdings added up to more than 100 percent of the outstanding stock; these cases are omitted.

The compilation lists all shareholders with at least five percent of the outstanding stock. To obtain the holdings of outside shareholders (with at least five percent), insider holdings are subtracted. Insider holdings are the amounts of stock held by officers and directors of the bank holding company. In addition, the following are counted as insiders: (1) director nominees; (2) stock in a holding company controlled pension fund or "ownership" plan; (3) stock held in trust for a director; (4) stock held by families of directors or officers; and (5) stock held by the bank's trust department, except when there are no other insiders. Excluded from the holdings of either insiders or outsiders is the stock of the parent company held by subsidiaries or stock of the bank which it holds itself. These two categories are treasury stock.

In the case of shares held by families of insiders, which are counted as inside holdings, the last name was used to identify families. For example, in the case of Jefferson Bankshares, Richard Crowell, Jr. is a director, but Richard Crowell Sr. is not an officer or a director. Richard Crowell Sr.'s stock is counted as an insider holding. Other examples are along the same lines. In general, the amount of inside holdings subtracted from the total outside holdings of those with at least five percent was added to the holdings of the remaining insider holdings.

The 13D and 13G other filing dates often differ from the dates of proxy filings. Sometimes dates were not provided. We used the most recent dates when dates were provided.

## Appendix 3:  Results of the first-stage regressions

Dependent Variable

| | Real Estate Constr. and Develop. Loans | Consumer Loans | Commercial and Industrial Loans |
|---|---|---|---|
| Intercept | 50.24 | 378.17 | 860.15 |
| | (0.47) | (2.32) | (4.54) |
| Outside ownership | 0.004 | -0.003 | 0.04 |
| | (0.63) | (0.27) | (3.47) |
| Log total assets | -16.61 | -128.00 | -277.58 |
| | (0.48) | (2.42) | (4.50) |
| Log total assets squared | 1.85 | 14.82 | 30.21 |
| | (0.50) | (2.59) | (4.54) |
| Log total assets cubed | 0.066 | -0.56 | -1.09 |
| | (0.50) | (2.75) | (4.55) |
| 1985 dummy | 0.35 | 0.02 | -0.003 |
| | (1.16) | (0.04) | (0.01) |
| 1986 dummy | 0.42 | -0.71 | -0.58 |
| | (1.41) | (1.54) | (1.07) |
| 1987 dummy | 1.10 | -1.14 | -0.58 |
| | (3.66) | (2.48) | (1.08) |
| 1988 dummy | 1.35 | -1.29 | -1.09 |
| | (4.46) | (2.77) | (2.01) |
| 1989 dummy | 1.19 | -1.77 | -1.58 |
| | (3.85) | (3.73) | (2.87) |
| 1990 dummy | 0.88 | -2.37 | -2.63 |
| | (2.80) | (4.94) | (4.70) |
| Adj. $R^2$ | 0.019 | 0.023 | 0.027 |

Observations = 2675
T-statistics in parentheses.

**Appendix 4:  Results of quadratic regressions for insider holdings between 10 and 80 percent**

Dependent Variable

| | Real Estate Constr. and Develop. Loans | Consumer Loans | Commercial and Industrial Loans |
|---|---|---|---|
| Intercept | -332.7924 | -55.61 | -233.72 |
| | (1.68) | (0.17) | (0.54) |
| Inside ownership | 0.13 | -0.39 | 0.02 |
| | (4.55) | (8.69) | (0.34) |
| Inside ownership squared | -0.001 | 0.005 | 0.0001 |
| | (4.02) | (8.74) | (0.13) |
| Outside ownership | -0.009 | -0.017 | 0.01 |
| | (0.88) | (0.99) | (0.41) |
| Log total assets | 105.45 | 27.98 | 82.30 |
| | (1.58) | (0.26) | (0.57) |
| Log total assets squared | -11.14 | -3.46 | -9.14 |
| | (1.50) | (0.29) | (0.57) |
| Log total assets cubed | 0.39 | 0.14 | 0.34 |
| | (1.43) | (0.32) | (0.58) |
| 1985 dummy | 0.07 | -0.17 | 0.12 |
| | (0.17) | (0.26) | (0.14) |
| 1986 dummy | 0.22 | -0.96 | -0.30 |
| | (0.54) | (1.48) | (0.34) |
| 1987 dummy | 0.65 | -1.49 | -0.58 |
| | (1.63) | (2.32) | (0.67) |
| 1988 dummy | 0.92 | -1.63 | -1.35 |
| | (2.27) | (2.50) | (1.54) |
| 1989 dummy | 0.63 | -1.84 | -2.05 |
| | (1.53) | (2.78) | (2.31) |
| 1990 dummy | 0.48 | -2.54 | -3.11 |
| | (1.13) | (3.73) | (3.42) |
| Adj. $R^2$ | 0.042 | 0.073 | 0.022 |

Observations = 1202.

T-statistics in parentheses.

## Footnotes

1. Profit for small banks did not decline. This does not affect our assertion that the banking industry got less profitable, since small banks hold only a tiny fraction of bank assets. Also, banks made substantial profit in 1992, primarily because of a shift to an extremely favorable term structure of interest rates. The underlying problems, documented below, were probably not affected by the shift in the term structure.

2. Market value data on the return to bank equity is consistent with the book value data presented above. The Salomon Brothers index of bank stocks significantly underperformed the S&P 500 during the 1980s. Over the 1980s the S&P 500 outperformed the index of bank stocks by 38 percent. Further, Kane and Unal (1988) find that bank stocks became riskier investments in the 1980s.

3. Theoretical work on banking argues that commercial banks can produce information about potential borrowers and monitor the managements of borrowing firms, by enforcing loan covenants, in ways which cannot easily be replicated by marketable, corporate securities. See Boyd and Prescott (1986) and Diamond (1984). Bhattacharya and Thakor (1991) provide a review. The empirical evidence that bank loans are unique includes James (1987) and Lummer and McConnell (1989). Also, see Hoshi, Kashyap, Scharfstein (1990), Gilson, John and Lang (1990), James and Weir (1991), and Fama (1985).

4. However, small firms and retail customers are relatively unaffected by the technological changes. Thus, banks that lend primarily to smaller firms, particularly small banks, might not be subject to many of the problems we discuss here.

5. Standby letters of credit, letters of credit, foreign exchange commitments, commitments to make loans, futures and forward contracts, options, and swaps, all show significant upward time trends over the 1980s. Some of these categories have increased.

6. Commercial real estate more than doubled, as a percentage of total bank assets, between 1980 (when the percentage was 5.36) and 1990 (when it was 11.13).

7. It should be stressed that empirical research has not reach a consensus on whether deposit insurance is underpriced (see Marcus and Shaked (1984), Ronn and Verma (1986), and Pennacchi (1987)).

8. The banking literature has also raised the question of "regulatory forbearance," that is, an alleged inability or unwillingness of regulators to close banks when the market value falls below zero. While this is an important issue, the question of why banks become unprofitable is logically prior to the issue of how regulators behave once they are in that state.

9. If a bank's (market-value) capital ratio is sufficiently low, then both managers and outside shareholders may agree that the bank should maximize the value of deposit insurance.

We do not dispute this argument. Our focus is on the prior question of how the bank came to have a low capital ratio. Consequently, we study banks which generally satisfy regulatory capital requirements. For the banks we study, the interests of managers and outside shareholders may be in conflict and it is not obvious that outside shareholders are able to induce managers to increase risk at the expense of the government (even if they want to).

10. The effects of deposit insurance are discussed in a subsequent section.

11. We assume that the cost of funds and leverage are again the same for all banks at date 2.

12. This assumption clearly could be changed at the cost of more complexity.

13. As will be seen, in equilibrium only the GG, BB, BO types are important. The GG and BB types are important because their loan choice varies with I. The BO type is important only because it allows us to avoid mixed strategies which eases computation. In addition, the presence of the BO types makes Bayes' Rule applicable on off-equilibrium paths, allowing us to avoid refinements.

14. For this to be an equilibrium, the assumed firing rule of the outsiders must be a best response to the lending strategies. We omit this calculation here.

15. Outside directors on the board seem to be important for monitoring management. See Rosenstein and Wyatt (1990). But, in the case of banking, where takeovers are restricted, banks managements can resist their appointment. James and Brickley (1987) find that (state chartered) banks in states where corporate takeovers of banks are allowed have significantly more outsider directors on their boards than (state chartered) banks in states which prohibit takeovers.

16. Sequential Nash equilibrium also requires that beliefs satisfy a consistency requirement (see footnote 13).

17. The condition analogous to (12) is, choose risky loans if $I X > R_S - w$. Since a manager with a good safe loan portfolio is not fired, $R_S > X + w$ so this condition never holds for $I \leq 1$.

18. The condition analogous to (14) is, choose risky loans if $(\theta_R R_R - X - w) I + w > 0$ when the manager does not choose to fire himself. This is positive (compare this to (15)). When a manager chooses to fire himself, the condition analogous to (14) is $\theta_R R_R > \theta_S R_S$ which is never true by (A1).

19. See Shleifer and Vishny (1986). The empirical evidence supports the importance of large blockholders in increasing firm value. See Mikkelson and Ruback (1985), Holderness and

Sheehan (1985), Barclay and Holdemess (1990), and Zeckhouser and Pound (1990).

20. The risk of a loan should be evaluated by the contribution of the loan to overall bank risk, but data limitations prevent this computation. Thus, the risk of each category of loans is evaluated independently. The implicit assumption is that no category of loans contributes significantly more than any other to the diversification of a bank's return stream.

21. The 1980 sample is only 87, all the observations available from that source. The 1988 sample is 458.

22. Data from SEC 10-K reports require that shareholders with at least five percent holdings holdings report their holdings, but the holdings of others with less than five percent are also sometimes reported.

23. The 1980 sample has a slightly different measure of outsider holdings. There outsider holdings are the percentages held by the top five outsiders with at least five percent.

24. In principal the smoothing procedures used in nonparametric analysis can be applied to higher dimensional cases. But, the basic element of nonparametric smoothing is the averaging over neighborhoods. With higher dimensions the number of points in a neighborhood declines rapidly, the "curse of dimensionality."

25. Results are not qualitatively different if the ratio of loan type to total loans is examined instead of the ratio of loan type to total assets.

26. The shapes of the estimated functions are not affected by averaging data or varying window size, and are robust to shorter time periods.

27. Higher order terms are also insignificant.

28. The figures cut off the function at a level of insider holding of 80 percent for presentation purposes. No results are changed by this.

29. Below we discuss robustness of the results with respect to econometric problems associated with these confidence intervals.

30. The pattern is very similar for the category of all commercial real estate loans.

31. See, *e.g.*, Engel, *et. al.*, (1986) for a brief discussion of this problem.

32. Of course, in checking robustness in this way we have, to some extent, engaged in data snooping since the choice of the range over which we restrict the data (the range over which there might be entrenchment) when the quadratic relationships are estimated was influenced by our nonparametric results. But, since Morck, Shleifer and Vishny (1988) and McConnell and

Servaes (1990) both have U-shapes over that range, the data snooping is no worse than is usually done when researchers' beliefs are influenced by the work of others.

33. For further evidence of agency problems in banking see Beatty, Santomero and Smirlock (1987) and Allen and Cebenoyan (1991).

34. In this regard, it is worth reporting that the estimated function describing the relationship between bank (book) capital ratios and insider holdings looks very similar to the pattern for consumer loans, that is, bank capital ratios decline over the range of managerial entrenchment. This result suggests that the banks which suffer losses, which are then reflected in lower capital ratios are the banks with entrenched managements.

35. The importance of the takeover market in banking has been studied by James (1984) and James and Brickley (1987). Both studies examine the differences between two sets of banks: one set consists of states that prohibit corporate acquisitions of commercial banks, while the other set allows corporate acquisitions of banks. James (1984) finds that salary expenses, occupancy expense, and total employment are higher for banks in states which prohibit acquisitions. James and Brickley find that banks in states which allow acquisitions have more outside directors on their boards.

36. For example, Clinch and Magliolo (1991) find a significant relation between bank CEO compensation and accounting income from discretionary transactions.

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## Table 1

**Bank Loan Portfolio, by Type of Loan**
**(Banks over $300 million in assets, 1983–1990)**

| Year | Total Assets | C&I Loans | Consumer Loans | Real Estate | | | |
| | | | | All Real Estate | Construction and Development | Commercial | All Other |
|------|--------------|-----------|----------------|-----------------|------------------------------|------------|-----------|
| 1984 | 1820.88 | 28.77 | 14.97 | 20.79 | 5.39 | 5.19 | 10.20 |
| 1985 | 2019.82 | 27.87 | 16.63 | 22.02 | 5.89 | 5.77 | 10.36 |
| 1986 | 2204.53 | 28.62 | 16.94 | 24.42 | 6.64 | 6.86 | 10.92 |
| 1987 | 2264.23 | 27.29 | 17.19 | 28.13 | 7.27 | 8.16 | 12.69 |
| 1988 | 2385.22 | 27.24 | 17.57 | 30.45 | 7.42 | 8.97 | 14.05 |
| 1989 | 2547.97 | 26.36 | 17.52 | 32.80 | 7.27 | 9.71 | 15.82 |
| 1990 | 2630.03 | 25.53 | 17.07 | 35.10 | 6.49 | 10.64 | 17.97 |

## Table 2

### Bank Loans: Risk and Return
### (Banks over $300 million in total assets)

*Panel A*: Rate of Nonperforming Loans, by Loan Type

| Year | Total Loans | All Real Estate | C&I Loans | Consumer Loans |
|------|-------|----------|-------|----------|
| 1984 | 2.71 | 2.81 | 5.38 | 1.53 |
| 1985 | 2.64 | 2.72 | 4.79 | 2.17 |
| 1986 | 2.97 | 3.27 | 4.96 | 2.62 |
| 1987 | 4.63 | 3.60 | 6.86 | 2.82 |
| 1988 | 4.15 | 3.09 | 5.33 | 2.71 |
| 1989 | 4.48 | 4.05 | 5.30 | 2.92 |
| 1990 | 5.66 | 6.38 | 6.94 | 3.47 |

*Panel B*: Return on Bank Loans

| Year | Return | Return Net of Average Interest Paid |
|------|--------|----------------------|
| 1984 | 11.23 | 2.01 |
| 1985 | 10.19 | 2.35 |
| 1986 | 8.74 | 2.20 |
| 1987 | 8.74 | 2.11 |
| 1988 | 9.28 | 2.01 |
| 1989 | 10.29 | 1.62 |
| 1990 | 9.67 | 1.41 |

*Panel C*: Additional Return on Bank Loans Above Average for All Loans, by Loan Type

| Year | Net Additional Return on All Real Estate | Net Additional Return on All C&I Loans | Net Additional Return on All Consumer Loans |
|------|--------------------|------------------|---------------------|
| 1984 | −.83 | .02 | 1.09 |
| 1985 | −.40 | −.48 | 2.12 |
| 1986 | −.30 | −1.09 | 2.89 |
| 1987 | −.70 | −.51 | 2.47 |
| 1988 | −1.02 | −.64 | 1.74 |
| 1989 | −1.28 | −.24 | 1.27 |
| 1990 | −1.23 | −.54 | 1.88 |

Table 3

Insider and Outsider Positions in Banks and Nonfinancial Firms

| | Nonfinancial Firms[1] | | Bank Holding Companies | | Overlap Bank Holding Companies[7] | |
|---|---|---|---|---|---|---|
| | 1976 | 1986 | 1980[5] | 1988[6] | 1980 | 1988 |
| Sample Size | 1,173 | 1.093 | 87 | 458 | 51 | 51 |
| Average Insider Holdings (%)[2] | 13.9 | 11.84 | 4.76 | 15.25 | 3.56 | 7.70 |
| Median Insider Holdings (%) | 6.0 | 5.0 | 1.61 | 8.33 | 1.13 | 2.98 |
| Range of Insider Holdings (%) | 0–90 | 0–89 | 0–53.5 | 0–99.0 | | |
| Average Outsider Holdings (%)[3] | 32.4 | 25.6 | 16.35[4] | 7.87 | 16.27[4] | 8.85 |

[1] Data on nonfinancial firms are from McConnell and Servaes (1990).

[2] Insider holdings by officers and directors, as a percentage of outstanding shares.

[3] Outsider holdings are shares held by noninsiders with at least five percent as a percentage of outstanding shares.

[4] Note that this number is not strictly comparable to the figures in the row since this is the percentage of outstanding shares controlled by the top five largest outsiders (with at least five percent).
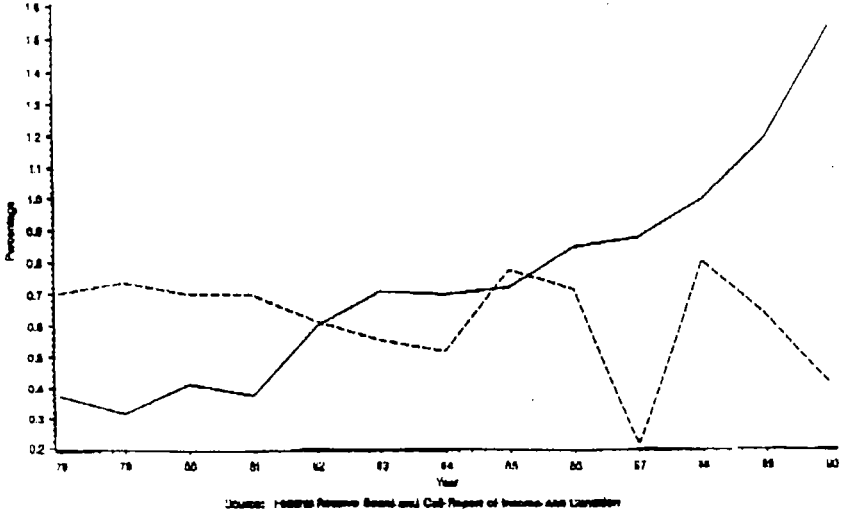
[5] Data from *Corporate Data Exchange Stock Ownership Directory: Banking and Finance*, 1980.

[6] Data from firm SEC filings, see Appendix 2.

[7] Comparisons for the bank holding companies in both the 1980 and 1988 samples.

FIGURE 1

Bank Return on Assets and Bank Chargeoffs,
Banks Larger than $300 Million in Assets, 1978 – 1990



Dotted Line: Return on Assets
Solid Line: Chargeoff Rate
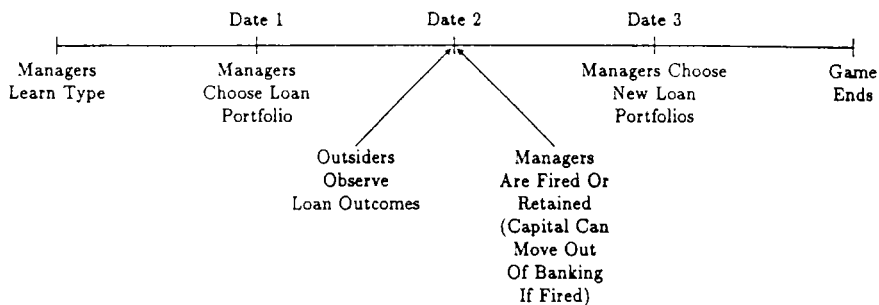
# Figure 2

## Timing of the Model



|  | Date 1 | Date 2 | Date 3 |  |
|---|---|---|---|---|

Managers
Learn Type

Managers
Choose Loan
Portfolio

Outsiders
Observe
Loan Outcomes

Managers
Are Fired Or
Retained
(Capital Can
Move Out
Of Banking
If Fired)

Managers Choose
New Loan
Portfolios

Game
Ends

Figure 3: Real Estate Construction and Development Loan Residuals Against Insider Ownership.

Insider Ownership

1984-1990 data. Regression includes outsider term and nonlinear log asset terms; excludes insider holdings above 80%.
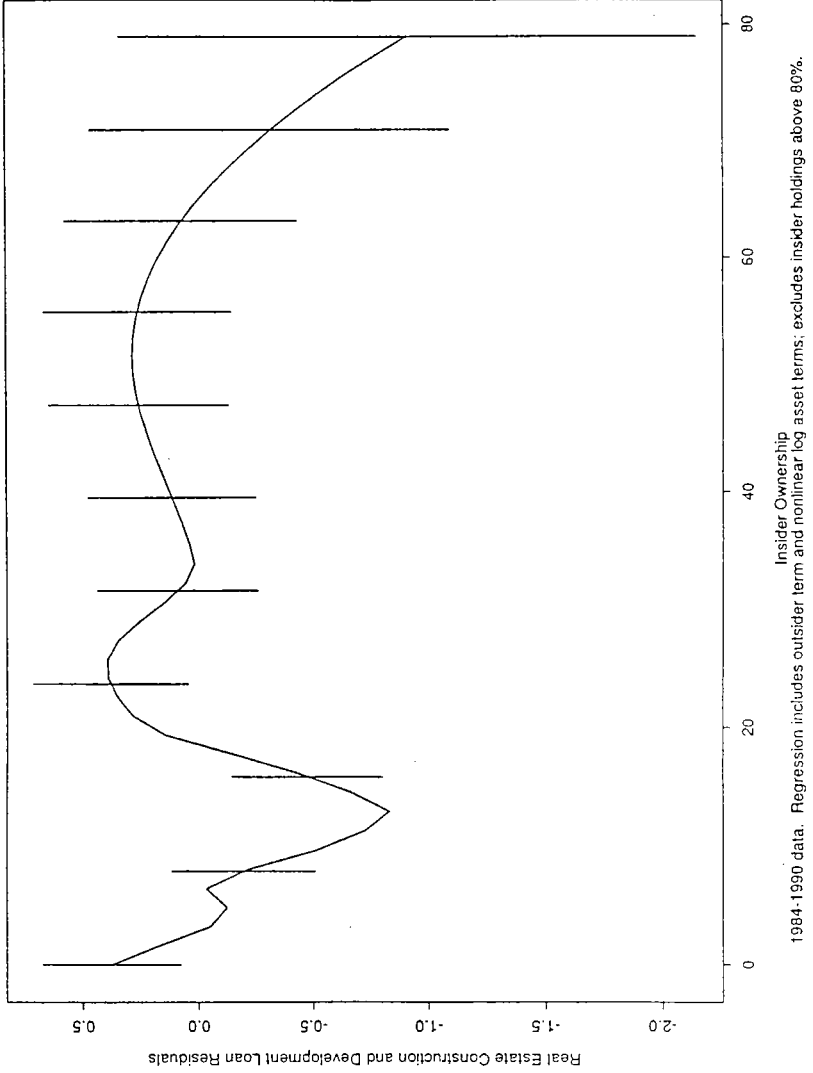
Figure 4: Consumer Loan Residuals Against Insider Ownership.



Insider Ownership
1984-1990 data. Regression includes outsider term and nonlinear log asset terms; excludes insider holdings above 80%.
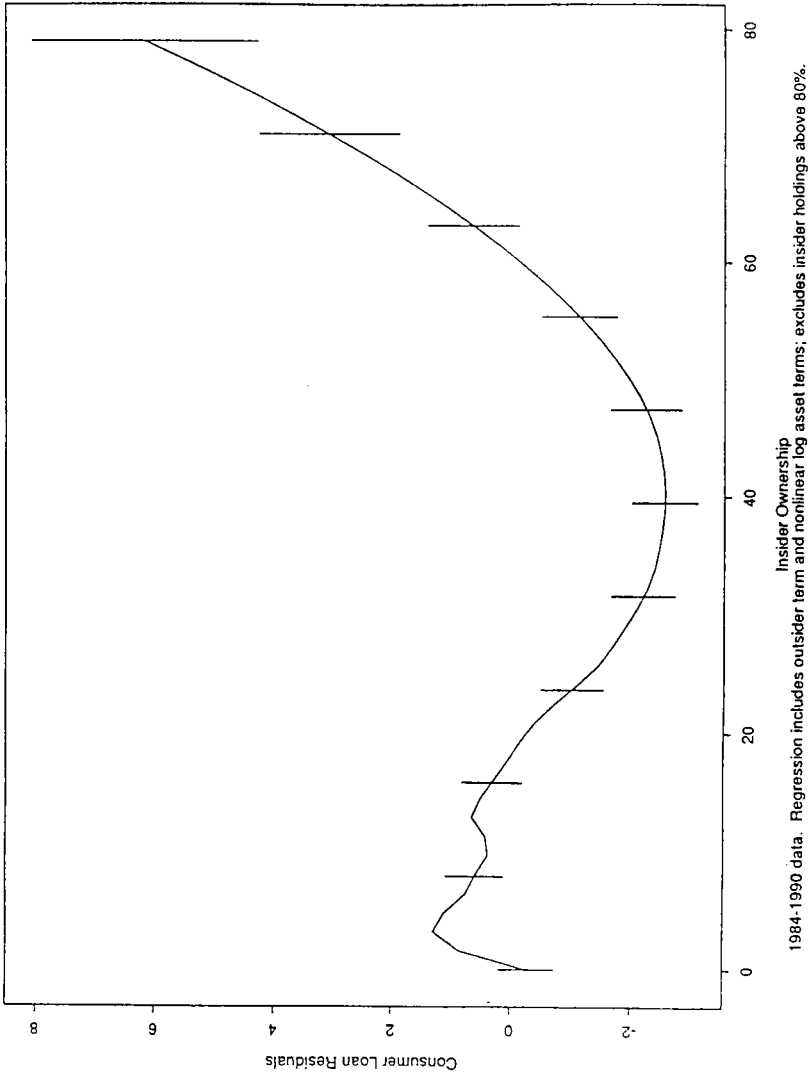
Figure 5: Commercial and Industrial Loan Residuals Against Insider Ownership.

Insider Ownership

1984-1990 data. Regression includes outsider term and nonlinear log asset terms; excludes insider holdings above 80%.