Bank Regulation and Managerial Incentives*

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1.0 Introduction: Banks as Corporations

Most analyses of bank regulation are based on the assumption that banks are profit maximizers -- i.e., they seek to maximize shareholder value. As a result these analyses generally focus on cases in which the interests of owners and managers coincide. Although such unanimity of interest may hold true for small proprietary lending institutions, it is unlikely that the owners and managers of large contemporary banks share the same objectives. Certainly the ownership and control of large banks are separate.

Without exception large Japanese banks are set up as corporations with managers owning but a very small share of total equity. Under such circumstances it is unlikely that managers seek only to maximize shareholder interests -- i.e. stock price. Indeed, bank managers are often accused of sacrificing shareholders' interests. This suggests that our primary concern should be with the motivation of management to act in the best interest of shareholders.

Management's true objectives are relevant not only to shareholders, but also to bank regulators. In so far as fixed-premium deposit insurance encourages risk-taking behavior on the part of managers, these latter are likely to take abnormal risks in order to improve their own rank and salary.[1]

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[1] Indeed, despite the existence of this safety net many managers have expressed reluctance to engage in risk-taking behavior. Although such behavior has been rationally explained by cultural arguments, such attitudes on the part of managers suggest that shareholder interests have not been

Certainly the extreme case in which managers completely neglect shareholder interests is unlikely; notwithstanding, the problem of moral hazard is likely to arise in a variety of forms.

Consequently, we must confirm bank managers' true objectives, before we can begin predicting the effects of bank regulation on bank behavior. Moreover, we must know the current constraints with which managers are faced, and how these constraints change with the introduction of new regulations. Unfortunately the current literature largely ignores these aspects of bank regulation. Hence, it is the purpose of this paper to expand upon this literature and further clarify the aforementioned points.[2]

The remaining portion of the paper is divided into three sections. Section 2 surveys the agency cost approach to corporate finance and clarifies this approach as it applies to incorporated banks. Section 3 examines two issues in particular: on the one hand, factors in addition to deposit insurance that contribute to moral hazard under the assumption of separated ownership and control; and on the other, the optimality of Prompt Corrective Action (PCA) and other (dis)incentive mechanisms to insure appropriate effort on the part of bank managers. The factors related to moral hazard are indispensable to the study of bank regulation. Included among the mechanisms to insure proper effort is the Federal Deposit Insurance Corporation Improving Act (FDICIA) legislated in the United States several years ago to insure the implementation of PCA based on up-to-date monitoring of bank solvency.[3] Section 4 concludes the paper.

2.0 Agency Theory and Banks

It would be irresponsible to ignore the rapidly developing field of financial contract theory when analyzing the effectiveness of bank regulation. This is especially true with regard to the capital structure of incorporated banks and the effects of capital requirements on bank behavior. Section 2.1 explains one of the more standard approaches of contract theory as it applies to

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their primary motivation.

[2] The most comprehensive work on this issue can be found in Dewatripont and Tirole (1994).

[3] See chapter 6 (Ikeo 1995) for a discussion on the necessity of reforming Japanese bank regulation in this direction.

corporate finance.

2.1 Agency Theory in Corporate Finance

A corporation with limited liability consists of various agents each with a different set of interests. Among these agents are shareholders, creditors, managers, employees, business clients, and others. Among these there are two major conflicts of interest which must be considered with regard to corporate finance.

Firstly, agents who finance firms are dissimilar in that their claims given in exchange for capital differ in character. A shareholder's claim is a residual claim that entitles him to the value of the firm's assets only after all outstanding obligations have been met. In contrast, creditors can normally expect to receive all payments to which they are legally entitled, and suffer loss only in the case of default. At such times firms are required to pay only that which they can still afford, and the control rights of the firm are transferred from the firm's stockholders to its creditors. At all other times these rights remain in the hands of stockholders.

Secondly, although professional managers often decide the application of funds, they are seldom the major providers of funds. Furthermore, since the interests of managers and fund providers often differ, there is no guarantee that managers will serve the latter's best interests. This is the long-standing issue of the "separation of ownership and control".[4]

Unless binding contracts can be written that state explicitly the respective obligations of both owners and managers under every possible contingency (complete contracts), conflicts of interest involving some kind of moral hazard are likely to occur. Agency cost is the amount spent on monitoring and/or bonding agents so as to reduce the risks associated with moral hazard, plus the actual losses incurred from the occurrence of these hazards. Examples of such hazards include asset substitution and effort aversion on the part of managers. These two categories of risk correspond respectively to the two

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[4] Certainly these are not the only types of conflict of interest in the firm. Conflicts of interest between managers and employees are another salient example. Moreover, creditors are not uniform but differ with regard to the priority of their claims and the degree to which their credit has been collateralized.

major sources of conflict of interests mentioned above.

In order to focus on problems of moral hazard associated with the first source of conflict it is useful to ignore the existence of the second and assume that managers act in the interest of shareholders. For the sake of simplicity further assume that each debt incurred takes the form of a single no-coupon discount bond whose face value is given by F at time 1. If the value of the firm realized at time 1 is V, the value which accrues to shareholders at this time will be:

$$E_1 = \max\{0, V-F\} \quad (1)$$

while the creditor's share B_1 will be

$$B_1 = \min\{F,V\} = F - \max\{0, F-V\} \quad (2)$$

The value of equity and the value of debt at time 0, E_0 and B_0 respectively, are obtained from the expected present values of E_1 and B_1.[5]

The present value of a firm's assets can be thought of in terms of call and put options. If V is the market value of the firm's equity, and F is the striking price of a call option on that equity, then the difference $\mathbf{V-F}$ is the value of the realized return to the firm's owners -- namely, the value of the call option. (See Eq. #1) Correspondingly, the present value of the firm's outstanding debt can be thought of as the face value F of a risk-free bond less the value of a put option on that bond with exercise price F (See Eq. #2).

Option pricing theory tells us that as the volatility of the underlying asset increases -- ceteris paribus -- the value of the option rises. Hence, as the market value of the firm's stock becomes increasingly volatile, its value to the firm's owners increases. On the other hand creditors suffer a loss as the present value of the firm's outstanding debt declines. If the unrealized gains to stockholders from increased volatility of the firm's stock is significant, then managers may actively pursue a policy which reduces the present value of the firm's outstanding debt. Such a policy is called asset-substitution, and generally takes the form of increased investment in risky assets, which rewards the firm's owners to the chagrin of their creditors.

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[5] We assume here that the prices of financial assets represent the true market worth of the underlying real assets. In other words the assets are neither overpriced, nor underpriced.

Of course, if creditors are able to foresee such behavior, they will be reluctant to supply funds, unless of course the coupon rate on newly issued debt adequately reflects the additional risk. As a result, a policy of asset substitution may, or may not result in additional gains to shareholders at the expense of creditors.

In order to understand better the separation of ownership and control -- i.e. moral hazard of the second type -- consider an unlevered firm financed solely with equity. Furthermore, assume that the management's fractional share of this equity is given by α, where $0 \leq \alpha \leq 1$. Certainly, very few people would be surprised to discover that management's behavior and the value of the firm's equity are highly correlated. Moreover, it is generally expected that firm value *V* and management's effort *e* are directly proportional. If there is no separation of ownership and control, and management owns 100 percent of the firm's equity, then optimal performance for owners and managers is obtained when the marginal increase in firm value brought about by management's effort $\partial V/\partial e$ equals the marginal disutility that managers receive from that same unit of effort $mdu(e)$.

Since managers seldom own the entire value of a firm's stock, the above relationship rarely holds. Indeed, a manager, who owns only the fraction α of a firm's stock, will provide only enough effort to satisfy the below relationship:

$$\alpha \times \frac{\partial V}{\partial e} = mdu(e)$$

When $\partial V/\partial e$ is decreasing and $mdu(e)$ is increasing with changes in *e*, firm value will be sacrificed in favor of management's utility. This is a standard case and is often referred to as *effort-aversion*.

In order to avert the inherent losses brought about by these and other types of moral hazard, various compensation schemes are implemented. Notwithstanding, the compensation scheme which one chooses must take into account the financial policy of the firms in question. Recent studies have shown that the agency costs vary greatly with a firm's financial policy.

2.2 Moral Hazard and Bank Behavior

The various schemes employed by the government to ensure the safety of deposits are called safety nets. Because these programs are in principle

very similar, we need consider only one in order to illustrate the aforementioned problems of moral hazard. Deposit insurance is a system whereby governments insure the payment of deposits on the part of banks to deposit holders. Under such a system no insurance premium is paid by the deposit holders to the guarantor of the deposits.

Whether the bank continues to function or not, both the payment of deposits and any interest accrued on those deposits is paid in full.[6] Because of these guarantees bank deposits are perfectly risk-free assets. Although depositors retrieve the full amount of their deposits in the case of default, equity holders are not required to pay the positive difference $\mathbf{F}-\mathbf{V}$. Thus, the value of the call option $\max(\mathbf{V}-\mathbf{F})$ mentioned in the previous section falls to the holders of the bank's equity. Moreover, insured banks must pay an insurance premium *pD* to the depositors' guarantor. If *D* is the value of the creditor's deposit, and *p* is the premium rate, then *pD* is the value of that premium. Furthermore, where *G* denotes the value of the above mentioned call option, *G-pD* represents the value of the net transfer received by the insured bank from the insurance system. If *G-pD* is positive, the bank is subsidized, and the value of the governmental guarantee is under priced. If *G-pD* is negative, the bank has been taxed, and the guarantee has been over priced.

As mentioned in the previous section an important factor determining option value is the volatility of the option's underlying asset value. In particular bank actions which raise the volatility of the bank's assets also raise the value of options traded on those assets. Thus, under a system of fixed rate premiums $\bar{\mathbf{p}}$ increasing the volatility of a bank's assets also increases the bank's net gain G-pD. In other words fixed rate insurance premiums are an important source of moral hazard, and there exists a clear incentive for bank managers to increase their portfolio risk.

This problem is not a unique phenomenon particular to deposit insurance. Indeed, it is only one instance of an entire range of alternative forms of asset-substitution. Creditors, who knowingly enter into business relationships

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[6] The deposit insurance system in Japan does not formally guarantee the payment of interest. Notwithstanding, judging from the limited number of bank failures full compensation including both principal and interest are likely to be paid.

where asset-substitution is common, often require higher rates of interest to compensate them for their potential losses. In other words, the incentives on the part of managers to increase the volatility of a firm's underlying assets, results in a higher risk-adjusted cost to creditors. Through the introduction of pecuniary cost penalties theses associated risks can be reduced.7 Such penalties often occur automatically when creditor's behave rationally in the market place while seeking to maximize return and minimize their risk.

By substituting a pricing rule which mimics market discipline potential losses brought about by moral hazards and their associated costs can be reduced. Selecting a rate schedule which corresponds to changing values of G reduces the incentive for bank managers to expose their banks to increased risk and automatically insures that deposit insurance premia remain risk neutral. Certainly risk-related premia are not the only mechanism whereby the effects of deposit insurance induced, risk-taking incentives can be neutralized.

In addition to the volatility of the underlying asset, the ratio of the strike price to the underlying asset's present value is also crucial in determining the value of an option. Thus by compelling banks to hold additional reserves and thereby raising total equity E relative to debt B, the ability of the firm to lever its returns against its existing assets declines, and the value G of the option falls.8 In other words by varying the bank's minimum capital requirements the amount of risk to which the firms exposes themselves can also be controlled. With the implementation of appropriate capital adequacy standards fixed insurance premia would not lead to excess risk-taking behavior on the part of bank managers.

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[7] Without a firm commitment not to increase the level of risk, even high rates of interest charged by creditors may result in unnecessary risk on the part of managers.

[8] The ability of the firm to lever its returns depends on the relative proportion of the firm's debt and equity as a function of its total assets. This relationship is given by $B/V = 1 - E/V$, which is obtained by dividing the expression $V = B + E$ (total assets = total liabilities + equity) through by V and rearranging terms. So long as the firm remains solvent this expression must always hold. E/V is the firm's *equity ratio* and B/V is a measure of the firm's ability to lever returns -- i.e., the firm's *debt ratio*.

As stated earlier asset-substitution is not the only source of moral hazard with which banks are confronted; the separation of ownership and control leads to another important source of inefficiency called effort-aversion. Owing to the existence of numerous bank regulations many of the corporate control mechanisms employed to reduce effort-aversion in other industries do not adequately address the problem of effort-aversion in the banking industry.9 Hence, it is indispensable that bank regulators consider the possibility of effort-aversion on the part of bank managers.

If fixed insurance premia were the sole cause of excessive risk, then every effort should be made to introduce risk-related insurance premia or risk-adjusted capital requirements. Not only is this unlikely, but asset-substitution is hardly the sole source of excessive risk-taking behavior on the part of bank managers. In the presence of other factors contributing to excessive risk-taking behavior more appropriate countermeasures must be found.

3.0 Management Behavior and Bank Regulation

This section deals with two issues of moral hazard which are in need of further investigation: one, the tendency of managers to engage in risk-taking behavior as an attempt to conceal inferior management skills; two, the implementation of prompt corrective action (PCA) as a means to control the problem of effort-aversion. This latter issue is based on an FDICIA-type capital adequacy standards program and the implementation of efficient bank closure rules.

An appropriate analytical framework for understanding these issues employs two time periods of equal duration beginning at times t0 and t1. Managers must decide to invest or not to invest at the beginning of each period. The size of the investment in each period is equal to either 0 or 1, and the return on each investment is realized at the end of the period in which the investment is made. For the particular model assume that all agents are risk neutral.

3.1 Moral Hazard with Hidden Information

Now consider the problem of hidden information and assume that banks

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[9] See Prowse (1995) for details.

have no liabilities -- i.e., they are financed only with equity. Further assume that shareholders and managers are both distinct and separate. Although shareholders have no direct control over management's investment decisions, they are able to observe the results of those decisions, and may dismiss management based on these observations.[10]

Further suppose that there are both skilled (good) and unskilled (bad) managers, such that each manager is fully aware of his own ability. Also, assume that others are unable to know the true ability of each manager -- i.e., there is hidden information and potential moral hazard.[11]

Also assume that there are only two kinds of investments: risky and risk-free. The risky investment earns a rate-of-return R, if it succeeds, and a return 0, if it fails. The probability that a skilled manager's investment in a risky asset succeeds may be given by π_g The likelihood of success for an unskilled manager for the same asset is given by π_b. Assume that

$$\pi_g > \pi_b \tag{3}$$

Further assume that the risk-free asset yields a fixed return *S* each period, if it is skillfully managed , and a lesser amount θS, if it is not. Assume that $0 < \theta < 1$ and that the following relationships hold:[12]

$$\pi_g R > S \tag{4}$$

$$\pi_b R < \theta S \tag{5}$$

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[10] Alternatively, we can suppose the following: Banks issue deposits, which are fully guaranteed by governmental deposit insurance (See section 3.2). In return the government reserves the right to close the bank at will. If we interpret the "shareholder" above as the "regulatory authority", the subsequent analysis yields the same insight.

[11] The model in this subsection is a reformulation and simplification of that proposed by Gorton and Rosen (1995).

[12] Even if the gross return on the riskless asset is the same for all investors, the net return after transaction costs may differ. Taking into account that one of the fundamental functions of banks is to contain the cost of transaction, the above assumption implies that skilled managers are better able to transact than unskilled ones.

In other words it is more profitable for the skilled manager to invest in risky assets and the unskilled manager to invest in risk-free assets. Assume that both skilled and unskilled managers receive a fixed amount M from the profits earned on each investment.

In addition suppose that there are two types of skilled managers: type I, those whose first priority is their own position within the company; and type II, those whose first priority is the profitability of their company. Because these latter make the greatest profit for their company by investing in risky assets, they do not make risk-free investments. Also, assume that unskilled managers, like type I skilled managers place first priority on their own position within the company. Let the proportion of type-I skilled managers, type-II skilled managers, and unskilled managers be given by p_1, p_2, and, p_3, respectively.

If shareholder expectations are appropriately met then all managers, each according to his ability, will invest in those assets which obtain the greatest profitability for their company.[13] In the final period unskilled managers invest in risk-free assets and both type-1 and type-2 skilled managers invest in risky assets.

Also assume that shareholders have an alternative investment opportunity with return K, such that

$$\theta S - M < K \tag{6}$$

Accordingly, it will always be in the best interest of shareholders to dismiss unskilled managers. Further suppose that skilled managers who invest in risky assets are generally preferred. This relationship is given by

$$\pi_g R - M > K \tag{7}$$

Now consider the asset selection process at the beginning of the first period and the shareholders' employment decision at the end of that same period.

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[13] This assumption is reasonable when the manager holds some fraction of the bank's stock.

If unskilled managers invest in risk-free assets during the first period, they will surely be detected and discharged at the end of that period. As a result they always invest in risky assets during the first period. Accordingly, only type-I skilled managers are likely to select between risky (r) and risk-free (s) assets during the first period, and each skilled manager's strategy set consists of the two elements r and s.

Whereas managers must decide their strategy at the beginning of the period, the shareholders decision to terminate, or alternatively extend the manager's employment does not occur until the end of the period. Thus, the shareholders' strategy set is given by:

(a) retain manager, if his return was *R* or 0.
(b) retain manager, if his return was *R*, but
    discharge him, if his return was 0.
(c) discharge manager, if his return was R or 0.
(d) discharge manager, if his return was R, but
    retain him, if his return was 0.

Clearly alternative d is dominated by the other strategy alternatives, and represents an uninteresting outcome.

If the shareholder chooses strategy *a*, then the manager is under no obligation to assume a conservative strategy, and out of fear of losing his post selects strategy *r*. If the shareholder chooses either *b* or *c*; however, the manager is confronted with the possibility of discharge, and will opt for the more conservative strategy *s*.

In order for shareholders to profit from strategy a, when managers have opted for strategy r the following condition must hold:

$$(\mathbf{p}_1 + \mathbf{p}_2)(1 - \pi_g)(\pi_g \mathbf{R} - \mathbf{M} - \mathbf{K}) < \mathbf{p}_3(1 - \pi_b)(\mathbf{K} + \mathbf{M} - \theta \mathbf{S}) \qquad (8)$$

The right hand side of the inequality represents the expected profit from employing strategy *b* and thus ridding the firm of unskilled managers. The left-hand side is the expected loss from dismissing a skilled manager. Strategy *a* is strictly dominated by strategy *b*, and the strategy set {a, r} cannot be a Nash equilibrium.

In order for shareholders to prefer strategy *b* over strategy *a*, when type I managers have opted for strategy *r* the following condition must hold:

$$(p_2)(1-\pi_g)(\pi_g R - M - K) < p_3(1-\pi_b)(K + M - \theta S) \qquad (9)$$

Obviously, condition (9) holds, when inequality (8) is satisfied. Moreover, shareholders prefer strategy *b* to *c*, when

$$(p_2)\pi_g(\pi_g R - M - K) > p_3\pi_b(K + M - \theta S) \qquad (10)$$

Using logic similar to that employed when inequality (8) holds we can easily understand the preference ordering which results from expressions (9) and (10).

A unique Nash equilibrium outcome is obtained when both inequalities (8) and (10) are satisfied. This outcome is given by the strategy set {*b*, *s*} and can be described as follows: type-I skilled managers act too conservatively and invest in risk-free assets, whereas unskilled managers invest foolishly and invest only in risky assets. The net result is socially inefficient.

On the other hand, if the inequality given by (9) is reversed and

$$(p_2)(1-\pi_g)(\pi_g R - M - K) \geq p_3(1-\pi_b)(K + M - \theta S) \qquad (11)$$

obtains, then Pareto efficiency in the presence of incomplete information is achieved, and the resulting strategy set becomes {*a*, *r*}.

Depending on the values of the parameters of each inequality two cases are of interest. In the first case inequalities (8) and (9) are both satisfied; and in the second only inequality (10) holds. Under conditions of ceteris paribus increasing p_3 is likely to result in the first result, and decreasing p_3 is likely to result in the second.[14] In other words as the fraction of unskilled managers becomes large, the likelihood of an inefficient equilibrium increases. This implies that socially optimal intervention on the part of government would result in the entry of skilled managers and the exit of unskilled ones.

It is important to note that this model makes no provision for deposit

[14] Compare inequality (8) with inequality (11). So long as π_g is sufficiently large and π_b is sufficiently small, inequalitly (10) continues to holds when p_3 is large.

insurance. In other words, the tendency on the part of unskilled managers to assume high risk portfolios need not depend on the presence of fixed rate deposit insurance. Also noteworthy is the tendency among skilled managers to select lower risk assets, when higher risk assets could contribute more to the profitability of the bank without jeopardizing overall social efficiency. This sort of restricted lending has likely contributed to Japan's current financial crisis

3.2 Moral Hazard with Hidden Action

Another issue of interest can be examined by making a few changes in the above model. Suppose that individual managers acquire their investment skills through on-the-job effort and that this effort is not observable. By endogenizing management's investment skills the model changes from a problem of moral hazard with hidden information to one with hidden effort or action. Consider the following modifications:

At time 0 managers can choose between becoming skilled or unskilled. In order to become skilled, education and training costs C are required. Further assume that the acquisition of these skills, though not directly observable, is socially desirable, such that

$$\left(1+\frac{1}{K}\right)\left(\pi_g R - K - M\right) > C \qquad (12)$$

By assuming that the risk-free rate of interest is 0 we can further simplify the mode by setting K = 1.

By way of further simplification assume that bank deposits are fully insured and a perfectly risk-free asset for depositors. Also suppose that the regulatory authorities reserve the right to mandate suspension of bank activities and dismiss managers in exchange for these deposit guarantees. Since the effort of managers is difficult to observe, interventions are solely based solely on the observed results of their investments. For the sake of simplicity also assume that the insurance premium on secured deposits is zero.

Finally assume that risk-free investments are not selected and that every manager's primary concern is to remain employed. Under this latter assumptions it should be clear that only the fear of dismissal can induce managers to engage in the development of their own investment skills.

Moreover, managers who know that they will be discharged do not engage in education or training. Having understood these new modifications it should be clear that strategy b of the hidden information game outlined in the previous sub-section is the only reasonable alternative for shareholders. Given this strategy the following condition must hold in order for managers to voluntarily invest effort in their own human capital.

$$(\pi_g - \pi_b)M > C \tag{13}$$

Suppose now that shareholders have not sufficiently developed a means to monitor the behavior of individual managers. Then, what criteria are necessary for dismissing non-performing managers?

In the case of ordinary firms that issue short term debt to finance new investments, the failure of management to secure appropriate returns on their borrowed money will force a firm into bankruptcy; whereupon the firm's creditors take control of the firm and fire the poorly skilled managers that shareholders were unable to monitor. Thus control of the firm passes from the shareholders to the creditors.[15]

In the case of banks whose liabilities are secured by the government; however, creditors continue to lend to the bank, even if it the bank's managers fail to make sound investments. As a result, it is not certain that incompetent managers will be removed. In other words unsound investments made at time 0 are not be discovered at time 1, and the resulting inefficiency continues into the next period. In short the deposit insurance safety net provided by government inhibits market discipline, because it removes the threat of bankruptcy generated by inappropriate investments during the initial period.

In order to overcome this absence of market discipline regulatory authorities must monitor bank behavior and compel management to make sound investments. Moreover, if the effort which managers put forth to develop their own investment skills cannot be confirmed ex post facto by others, then the optimal closure rule for regulators in the event of apparent bank failure is closure of the bank at time 1 -- namely, the beginning of the second period. However, if the regulator has slightly better access to

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[15] Such a view is now regarded as standard in the theory of capital structure. By way of example see Aghion and Bolton (1992).

information on bank managers' effort, the optimal closure rule becomes more complicated. By way of example assume that a manager's skill level can be properly tested only at the end of the first period. In such a case automatic closure of the bank in the event of failure is unwise.[16] Indeed, even good managers are occasioned by bad luck and should not be penalized for circumstances which they cannot possibly control. Thus, it is optimal to dismiss the manager and force the bank to surrender its bad investment only at the end of the second period.[17] Such a closure rule is given by

$$\left(1-\pi_b\right)\mathbf{M} > \mathbf{C} \tag{14}$$

This condition is of course weaker than that given by inequality (13) and provides managers with an incentive to invest in their own human capital.

The optimal closure rule just described can be implemented through a combination of capital adequacy requirements and prompt corrective action (PCA). Let $\Delta\mathbf{V} = \pi_g\mathbf{R} - 1 - \mathbf{M}$ and define $\bar{\mathbf{k}}$ as

$$\bar{\mathbf{k}} = \max\left(1-\Delta\mathbf{V},0\right) \tag{15}$$

such that the bank's capital-to-asset ratio *k* must be maintained above $\bar{\mathbf{k}}$ to avoid PCA. Further assume that PCA leaves the bank with the alternative to raise the level of *k* above $\bar{\mathbf{k}}$ or accept liquidation. Since the bank's investment has a non-negative net present value at time 0, there is a general willingness on the part of investors (depositors) to finance the bank's investments. Thus, the closure rule is non-binding and *k* is necessarily greater than $\bar{\mathbf{k}}$. The rule is also non-binding when the investment is successful. In the moment that the investment turns sour, however, the following condition must hold in order to avoid liquidation:

$$1-\mathbf{k} \le \pi_g\mathbf{R} - 1 - \mathbf{M} \tag{16}$$

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[16] Because the safety net continues, banks which enter into bankruptcy need not rely on government for their refinancing of bad debt.

[17] The possibility of a general bank panic triggered by the inability of one bank to make payments is avoided by the existence of full-deposit guarantees.

In addition to the costs of new investment, which were previously assumed at 1, the quantity $(1-k)$ is required to pay down the existing debt (deposits). By definition $k \geq \bar{k}$. If the manager is lacking in the requisite investment skills the following condition prevails, and liquidation takes place.

$$1-k > \pi_b R - 1 - M \qquad (17)$$

Thus, using a combination of capital adequacy standards and prompt corrective action an efficient closure policy can be implemented. Even if regulating authorities are denied access to requisite information about the bank's management, or in a more likely scenario -- have the requisite information, but are unable to verify their observations -- this same rule can be implemented by the bank's owner-stockholders.[18] In brief regulators must only observe the bank's capital-to-equity ratio, which is obviously verifiable, and leave it up to the market -- namely, the shareholders -- to decide which of the two alternatives will be chosen.[19]

4.0 Conclusion

While considering banks as corporations in which ownership and control are separated we have stressed the importance of appropriate managerial incentives as a means to effectuate socially optimal outcomes. To fortify our case several simple models were analyzed in Section 3.0. From these we can now derive some interesting implications concerning the evaluation of forbearance policy.

The hidden information model constructed in section 3.1 showed that policies which actively seek to dismiss unskilled managers may result in restricted lending on the part of skilled managers. Nevertheless, as the fraction of unskilled managers rises, restricted lending is likely to increase.

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[18] Though it is highly possible for the regulator to observe managers' skills, it will be extremely difficult to verify them. As long as this is the case, discharging managers according to their skills cannot be legitimate.

[19] If managers' skills are unverifiable but observable by the regulator, this same decision process can be achieved by transmitting the relevant information directly to investors.

In section 3.2 we showed that a threat of discharge is an important incentive for managers to perform in a socially optimal manner. Indeed, in the absence of this threat managers are likely to shirk their investment responsibilities. What may appear contradictory in this context can be explained by the relative distribution of management skills. When the distribution of management skills is given ex-post a policy of forbearance is desirable. When the distribution is endogenous – namely, ex-ante -- forbearance is likely to be harmful.

In reality management skills are best thought of as endogenous, and policies which take into account incentives to enhance individual manager skill levels are likely to prove productive. Policies which avoid dismissal are likely to bring about shirking on the part of managers, fail to encourage the development of human capital, and lead to a higher ratio of unskilled managers. In short, model 3.2 is preferable to model 3.1.

Accordingly, the ill effects of forbearance policies are not only that they tend to expand the losses of failing financial institutions, but also that they distort managerial incentives and deteriorate the overall quality of bank investments. A basic lessons from economics with regard to long-term social efficiency is that different policies are required depending on the ex-post or ex-ante nature of the choice variables – in this case, the investment in human capital. If we are to gain from these lessons, then the Japanese government should renounce its current style of administration and introduce prompt corrective action (PCA) based on FDICIA-type capital requirements.

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