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Risk-based Deposit Insurance: An Incentive Compatible Plan

DEPOSIT INSURANCE PROVIDED by the Federal Deposit Insurance Corporation (FDIC) violates a basic principle of insurance: premiums are not adjusted for bank risk. Thus, banks have the incentive to take on more risk, increasing the insurer's liability but not the banks' costs (see Keeton 1984). This incentive is heightened further by the FDIC's timidity in closing failed banks. If uninsured depositors and other creditors were able and willing to evaluate bank risk and demand risk-adjusted returns on investments, the incentive for risk-taking would be weakened, since, in such a world, deposit insurance could be fairly priced (see Thomson 1987). When asymmetric information concerning both bank risk-taking and insurer behavior characterizes the banking market [as Crane (1976); Avery, Belton, and Goldberg (1988); Keeton and Morris (1987); and Brewer and Lee (1986) all suggest to be the case], other remedies must be sought.¹

The shortcomings of the FDIC insurance system and the inadequacy of market information have led to a number of proposals for reform of banking system regulations. First, under the present system uninsured creditors' and stockholders' funds are implicitly guaranteed. Thomson (1987) and Kane (1989a) argue that this guar-

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¹Many studies, such as those listed above as well as Gorton and Santomero (1990) and Hirschhorn (1990), have shown that, even in the presence of asymmetric information, the market disciplines banks for excess risk taking. Other studies have shown that the opposite is true. See Gilbert (1990) for an extensive review of the literature on market discipline. Since there is a lack of consensus on this issue, this paper takes the position that the market discipline imposed on banks in the present environment is inadequate.

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antee should be removed. Second, Kane (1989a) and Eisenbeis (1986) suggest that the costs of failure should be shifted onto the shoulders of bank stockholders by reducing the limit on their liability. Third, Kaufman (1986), Kane (1989a), and White (1989) propose that bank regulators should issue statements of bank condition to the public, and banks should be forced to provide this information and defend its accuracy. Finally, all these authors agree that access to the Federal safety net should bear a risk-adjusted price. Thus, deposit insurance coverage and/or bank capital adequacy requirements should be based on bank risk.²

This paper develops a model of a risk-based deposit insurance regulatory regime which encompasses these suggestions. The model employs the self-selection techniques developed in Cooper (1982, 1984) and Stiglitz (1982). To induce self-selection according to portfolio risk, the insurer must credibly precommit to closing all failed banks, paying only the insurance promised under contract, and announcing self-reported bank risk to the public. This removes the implicit guarantee on uninsured creditors' and stockholders' funds, limits the losses banks can impose on the insurance agency, and provides the market with accurate information while imposing risk-based insurance premiums on banks. Further, the insurance contracts are flexible enough to respond to changes in market conditions without requiring change in regulatory statute or causing market disruption.

The paper proceeds as follows. Section 1 describes bank, depositor, and insurer behavior. Section 2 characterizes and examines the properties of the contract, and shows how contract parameters adjust to changes in market conditions. The main conclusions are (i) a secular increase in bank risk, generally, leads to increased insurance coverage and insurance premiums at all banks; (ii) the higher the direct compensation for risk demanded by depositors, the lower insurance coverage and premiums; and (iii) banks that increase the riskiness of their portfolios bear the cost of their actions. Section 3 compares this scheme to the current deposit insurance system and discusses the practical implementation of the proposed regulations. Section 4 concludes with some comments about the effects of this regulatory regime on the banking market.

1. BEHAVIOR OF THE ECONOMIC AGENTS IN THE REGULATED MARKET

The Economic Environment

There are three classes of agents: banks, depositors, and the regulator, and N types of banks, $i = 1, \dots, N$, where type is a measure of managerial risk preference. Individual banks know which type they are; other banks, depositors, and the regulator do not. All agents, however, know the population distribution of bank types, the portfolios of assets available to banks, and the portfolio return distribu-

²See Thomson (1987) for an accounting of the studies concerning the risk-based pricing of deposit insurance, and Avery and Belton (1987) for a comparison of risk-based deposit insurance and risk-based capital requirements.

tions. The risk-free rate of return on lending is α . Depositors are risk neutral. They may initiate runs on banks if they receive a signal of inadequate portfolio returns. The *ex ante* probability of an insolvency causing a run against a bank of any type is common knowledge. The regulator sets the rules under which deposit insurance will be allocated. All market participants know the regulatory structure.

Sources of Bank Failure

There are two sources of bank failure in this model: portfolio risk and depositor runs. Portfolio risk, indexed by σ , is chosen optimally by banks given their preferences toward risk, depositor behavior, and the regulatory regime. While depositor run behavior is not explicitly modeled, it is intuitively plausible that depositor-initiated runs result from adverse signals of banks' portfolio returns. A bank failure resulting from a bank run occurs when illiquid bank assets are sold at a loss to meet depositors' requests for funds. Risk-neutral depositors run only if the expected return from doing so exceeds the expected cost; this difference is decreasing in the amount of insurance per dollar of deposits, I , banks hold. Should a bank fail, each depositor receives I percent of his deposit holdings from the insurer.

Let $\pi(\sigma)$ be the probability that a bank holding a portfolio of risk σ fails, where $\pi(\sigma) \in [0, 1]$ for all σ , and let $\phi(I)$ be the probability that a run against a solvent bank forces it into insolvency, where $\phi(I) \in [0, 1]$ for all I ; $\phi(I)$ summarizes depositor run behavior.³ Assume that the probability of bank failure is increasing convex in bank risk: $\pi_{\sigma} \geq 0$ and $\pi_{\sigma\sigma} \geq 0$. This assumption follows the basic portfolio theory set out by Sharpe (1970). In his framework, expected returns increase with risk at a decreasing rate, so the probability of insufficient cash flows increases at an increasing rate. Further assume that the probability of an insolvency causing run is decreasing convex in insurance coverage: $\phi_I \leq 0$ and $\phi_{II} \geq 0$ ⁴ since there are diminishing returns to being involved in a run the higher the insurance per dollar of deposits provided. The $\pi(\)$ and $\phi(\)$ functions summarizing the causes of bank failure are common knowledge. Since the regulator immediately closes all insolvent banks, the probability of a bank failing is $\pi(\sigma) + (1 - \pi(\sigma))\phi(I)$, while the probability that a bank is profitable is $(1 - \pi(\sigma))(1 - \phi(I))$.⁵

³In this paper the behavioral model of depositor behavior is implicit rather than explicit. However, the ideas underlying depositor behavior and run-induced failure summarized in the $\phi(I)$ function share characteristics with Diamond and Dybvig (1983), in that it is the illiquidity of bank assets that leads to banks being unable to meet excessive early withdrawal requests, and Calomiris and Kahn (1989), in that it is adverse signals of bank returns that set off a run.

⁴The probability of failure is decreasing in I , but it need not decrease to zero when deposits are fully insured since administrative delays in receiving insurance could make the present discounted value of deposits greater than the present discounted value of insurance payments. Clearly, it could be the case that for all $\sigma \geq \bar{\sigma}$, $\pi(\sigma) = 1$, and for all $I \geq \bar{I}$, $\phi(I) = 0$. For the remainder of the paper it will be assumed that all banks choose portfolios with risks such that $\pi(\sigma) < 1$, and that $\phi(I) = 0$ only if a bank carries more than full insurance, an outcome that is impossible given the structure of the insurance contracts derived in section 2.

⁵Implicit in the assumption that the regulator closes all insolvent banks immediately is that banks mark their portfolios to market daily. Even in such a regime, bank runs can occur if depositors receive a signal of future inadequate portfolio returns that causes them to stage a run now to protect their investments.

Depositors

Under the rules governing the regulatory scheme, at the beginning of the period the regulator announces each bank's self-reported indicator of portfolio risk, σ , and its level of insurance coverage per dollar of deposits, I .⁶ Given this information, risk-neutral depositors allocate their funds among banks to equalize expected returns across banks. That is, the return per dollar deposited, D , in a bank with portfolio risk σ and insurance I per dollar of deposits solves

$$[1 - \pi(\sigma)][1 - \phi(I)]D + [1 - \pi(\sigma)]\phi(I)[\epsilon D + (1 - \epsilon)I] + \pi(\sigma)I = \alpha$$

where α is the gross risk free rate and ϵ is the probability a depositor engaged in an insolvency-causing run will receive her deposits from the bank before insolvency is declared and it is shut down. Thus,

$$D(\sigma, I, \alpha, \epsilon) = \frac{\alpha - [(1 - \pi(\sigma))(1 - \epsilon)\phi(I) + \pi(\sigma)]I}{[1 - \pi(\sigma)][1 - \phi(I)(1 - \epsilon)]}$$

where, for $\alpha \geq I$, $D_I < 0$, $D_\sigma > 0$, $D_\alpha > 0$, $D_{II} > 0$, $D_{I\sigma} < 0$, $D_{I\alpha} < 0$, $D_{\sigma\sigma} > 0$, and $D_{\alpha\sigma} > 0$.

Banks

Following the empirical findings of Keeton and Morris (1987), the N types of banks, $N \geq 2$, $i = 1, \dots, N$, are differentiated by their managers' risk preference, which is private information. Assume banks can be ranked by their risk preference parameters, γ_i , where $\gamma_i < \gamma_j$, $i < j$, $\gamma_i \geq 1$ for all i . Thus a type j bank has greater preference for risk than a type i bank, $j > i$. This preference for risk can be represented by an internal bank discount placed on portfolio risk. That is, a bank with risk preference γ that invests in a portfolio of risk σ evaluates its probability of failure at only $\pi(\sigma)/\gamma$. This reduced evaluation of risk may arise from restrictive covenants on loans, inside information, etc.

Following the empirical work surveyed in Clark (1988), assume bank portfolio production functions exhibit constant returns to scale. The analysis is thus conducted in per dollar terms. Conditional on solvency, the market value of the assets of a portfolio of risk σ per dollar of deposits is $A(\sigma)$, $A_\sigma > 0$, $A_{\sigma\sigma} \leq 0$, and the market value of its deposits is $D(\sigma, I, \alpha, \epsilon)$ (as defined above). If a bank is insolvent, the market value of its assets is \bar{A} per dollar of deposits regardless of bank type and cause of insolvency, and the market value of its deposits is I per dollar of deposits. If a bank fails (the market value of its assets is less than the market value of its liabilities) the insurer immediately closes it and sells off the bank's assets. These and insurance funds pay depositors' claims; the bank's stockholders absorb

⁶The insurance scheme is, implicitly, one of co-insurance in which only a percentage of any depositor's funds are insured. However, as will be discussed in section 3, full-insurance schemes are possible outcomes of the model presented and discussed in section 2.

the loss. To receive insurance, I , a bank must pay the insurance premium per dollar of deposits, P . Insurance premiums are prepaid at the beginning of the period. As such, they act like a bond posted prior to engaging in market activity.

Taking as given insurance coverage, I , premiums, P , a type i bank chooses σ , its portfolio risk, to maximize its expected profits:

$$\max_{\sigma} \left[1 - \frac{\pi(\sigma)}{\gamma_i} \right] [1 - \phi(I)][A(\sigma) - D(\sigma, I, \alpha, \epsilon)] - P.$$

The first-order condition is

$$-\frac{\pi'}{\gamma_i} [1 - \phi(\cdot)][A(\cdot) - D(\cdot)] + \left[1 - \frac{\pi(\cdot)}{\gamma_i} \right] [1 - \phi(\cdot)][A_{\sigma} - D_{\sigma}] = 0,$$

which implicitly defines $\sigma(\gamma_i)$, the optimal level of risk. The bank will choose to operate only if its net worth is sufficient to cover its insurance premium. Since the net return to risk bearing, $[A(\sigma) - D(\sigma)]$, is increasing concave ($[A_{\sigma} - D_{\sigma}] > 0$ by the first-order conditions and $[A_{\sigma\sigma} - D_{\sigma\sigma}] < 0$) the second-order condition is satisfied:

$$-\frac{\pi''}{\gamma_i} [A(\cdot) - D(\cdot)] - \frac{2\pi'}{\gamma_i} [A_{\sigma} - D_{\sigma}] + \left[1 - \frac{\pi(\cdot)}{\gamma_i} \right] [A_{\sigma\sigma} - D_{\sigma\sigma}] < 0.$$

Then

$$\sigma(\gamma_i)' = \frac{\pi'[A - D] + \pi(\cdot)[A_{\sigma} - D_{\sigma}]}{\gamma_i\{\pi''[A - D] + 2\pi[A_{\sigma} - D_{\sigma}] - [\gamma_i - \pi][A_{\sigma\sigma} - D_{\sigma\sigma}]\}} > 0;$$

equivalently, banks with greater preference for risk hold more risky portfolios.

A type i bank can be fully described by its indirect utility function:

$$U(P_i, I_i; \gamma_i) = [1 - \pi(\sigma_i)/\gamma_i][1 - \phi(I_i)][A(\sigma(\gamma_i)) - D(I_i, \sigma(\gamma_i), \alpha, \epsilon)] - P_i$$

where

$$U_I > 0, U_P = -1, U_{\alpha} < 0, U_{\gamma} > 0, U_{IP} = 0, U_{I\gamma} > 0, U_{I\alpha} < 0, U_{\alpha\gamma} > 0,$$

and for ϵ small, $U_{II} < 0$.

The Insurer

The insurer is the faithful agent of the taxpayer in the sense of Kane (1989b). It is the monopoly provider of deposit insurance who, under legislative mandate, seeks to provide deposit insurance at minimum expected cost. It faces two types of costs:

administrative costs, such as monitoring banks and informing depositors of bank risk, $C(I_i)$, $C_i > 0$, $C_{ii} > 0$, and the cost per dollar of deposits of paying off the depositors of a failed type i bank, $(I_i - \bar{A})$. The insurer finances these expenditures by assessing a premium per dollar of deposits, P_i , on type i banks (banks with risk preference γ_i). The insurer's expected benefit function is then

$$V(P_i, I_i, i = 1, \dots, N) = \sum_{i=1}^N \mu_i \{ P_i - C(I_i) - [\pi(\sigma(\gamma_i)) + [1 - \pi(\sigma(\gamma_i))] \phi(I_i)(1 - \epsilon)](I_i - \bar{A}) \}$$

where μ_i is the proportion of type i banks. Hence, $V_{P_i} = \mu_i$. Assume $V_{I_i} < 0$ (a sufficient condition for this is that the insurance elasticity of the probability function, $\eta_I = -\phi'/\phi$, is less than or equal to unity), and that $V_{I_i I_i} < 0$.⁷

2. THE MODEL

Derivation

The asymmetric information that characterizes the banking market prevents the insurer (and so depositors) from distinguishing banks by their risk type. Thus, the insurer's objective is to design its insurance contracts so that each bank will self-select the contract consistent with its risk type. The behavior of the banks' indirect utility functions and the regulator's value function, derived above, allows the regulator to apply the standard self-selection model (Cooper 1984; Stiglitz 1982) to this regulatory problem. Under the regulatory contract, information concerning bank risk is passed along to depositors who respond by adjusting their required returns. Since banks anticipate the depositors' responses, they internalize it into their insurance contract choice.⁸

The insurer's problem is to choose $P_i, I_i, i = 1, \dots, N$, to

$$\text{maximize } V(P_i, I_i, i = 1, \dots, N) \tag{1}$$

subject to

$$U(P_i, I_i; \gamma_i) \geq 0 \quad \forall i \tag{2}$$

$$U(P_i, I_i; \gamma_i) \geq U(P_j, I_j; \gamma_j) \quad \forall j \neq i \tag{3}$$

⁷These assumptions on the insurer's value function imply that the dominant type of costs faced by the insurer is administrative. Since the burden of monitoring banks increases with insurance (depositors are less likely to initiate a run against a bank that is heavily insured), and since the insurer must verify that banks' accounting statements are correct and that their net worth is adequate, this could be the case.

⁸The assumption that banks internalize depositors' responses to the announcement of insurance coverage is implicit in the assumption that the deposit cost function is common knowledge.

where (2) is the bank individual rationality (solvency) constraint, and (3) are self-selection constraints ensuring that a bank prefers to choose the insurance contract written for its risk type rather than those written for other risk types.

Cooper (1984) shows that the contracts need satisfy only

$$U(P_i, I_i; \gamma_i) \geq U(P_{i+1}, I_{i+1}; \gamma_i) \quad \forall i \tag{3'}$$

$$U(P_i, I_i; \gamma_i) \geq U(P_{i-1}, I_{i-1}; \gamma_i) \quad \forall i \tag{3''}$$

if bank preferences satisfy the single-crossing property⁹ (the marginal rate of substitution of insurance for premium is increasing in risk preference).¹⁰

LEMMA: *The banks' profit functions exhibit the single-crossing property.*

PROOF: $\frac{\partial}{\partial \gamma} \left[\frac{-U_I(P_i, I_i; \gamma_i)}{U_P(P_i, I_i; \gamma_i)} \right] = U_{I\gamma} > 0$ (since $U_{P\gamma} = 0$ and $U_P = -1$).

PROPOSITION (COOPER 1984): *In a separating solution to (1) subject to (2), (3'), and (3''),*

(a) $U(P_1, I_1; \gamma_1) = 0$ and $U(P_i, I_i; \gamma_i) > 0 \quad i = 2, \dots, N$

(b) $U(P_i, I_i; \gamma_i) = U(P_{i-1}, I_{i-1}; \gamma_i)$

(c) $\frac{V_{P_N}}{V_{I_N}} = \frac{U_P(P_N, I_N; \gamma_N)}{U_I(P_N, I_N; \gamma_N)}$

(d) $\frac{V_{P_i}}{V_{I_i}} < \frac{U_P(P_i, I_i; \gamma_i)}{U_I(P_i, I_i; \gamma_i)}, \quad i = 1, \dots, N - 1.$

PROOF: See Cooper (1984).¹¹

Description of the Contract

The insurer is able to write contracts that induce banks to reveal their riskiness and insure their depositors against this risk. A necessary component of these contracts is the insurer's ability to credibly precommit to all conditions of the contract for all banks. Thus all failed banks are immediately closed, their assets sold, and their depositors' insurance claims paid. Self-selection forces the least risky banks to their minimum profit constraint, while allowing more risky banks to earn positive profits (a). While the least risky banks could choose to withdraw from the system,

⁹The term single-crossing property comes from the fact that the indifference locus in (P, I) space of a bank with risk preference parameter γ_i crosses the indifference locus of a bank with risk preference parameter γ_j only once, when the marginal rate of substitution of insurance for premiums is increasing in risk preference.

¹⁰If bank preferences satisfy the single-crossing property, then the self-selection constraints reduce to (3') and (3''). Proof of this is available from the author upon request.

¹¹Proof of this proposition is available from the author upon request.

and all higher-risk banks could choose the contract designed for banks in the next lower risk class, (b), assume, since they are indifferent, each bank chooses the contract designed for its risk class.¹² Further, only the most risky type of bank is fully insured (c); less risky banks would prefer to carry more insurance, but the precontract information asymmetry forces the insurer to distort the contract parameters away from the full-information optimum (equality of insurer and bank marginal rates of substitution) to induce self-selection (d). This distortion protects low-risk banks from subsidizing high-risk banks, but at the cost of not being fully insured (Stiglitz 1977). Thus while self-selection contracts ensure postcontracting information symmetry, they cannot provide full-information insurance coverage, although they do force banks to pay for the risk they undertake in the form of premiums and risk-adjusted deposit costs. Thus, this regulatory scheme provides depositors with co-insurance.

The general characteristics of self-selection contracts are well known (see Stiglitz 1982; Cooper 1984). There is, however, little discussion in the literature of how contract parameters respond to changes in the exogenous variables that describe the economic environment for a given problem. Such comparative statics are calculated for a system in which there are two types of banks;¹³ the results are presented and interpreted here.¹⁴

Some of these results require that increases in managerial risk preference increase banks' marginal return to insurance by more than they increase the marginal cost to the insurer: $U_{I\gamma} > -V_{I\gamma}$. Call this Condition A.

RESULT 1: Under Condition A, increases in managers' preference for risk at either type of bank implies higher premiums and insurance at that type of bank. Further, the increased premium costs are borne mainly by that type of bank.

In direct contrast to the present system, where low-risk banks pay higher risk-adjusted insurance premiums than high-risk banks (since all banks pay the same per deposit dollar premium), insurance contracts are risk-adjusted so that low-risk banks carry less insurance but at lower unit cost. Also, in contrast with the present system, banks that increase the riskiness of their portfolios bear much of the cost of their actions.

RESULT 2: If managerial risk preference at high-risk banks increases, both insurance coverage and premiums fall at low-risk banks.

Increased risk taking at high-risk banks increases their gain from lying about their risk class, since $U_{I\gamma}(I_1, P_1, \gamma_2) > 0$. To force risky banks to continue to self-select the insurance contract consistent with their risk class, the insurer must decrease the gain from lying by offering low-risk banks less-favorable contracts. This entails reducing low-risk banks' insurance premiums and insurance coverage. As in the present insurance system, risky banks impose a cost on less risky banks. Here,

¹²See Stiglitz (1977) for a discussion of similar models in which insurance is refused by lowest-type agents.

¹³Similar results hold for a system with $N > 2$ banks.

¹⁴Proofs of the results are available from the author upon request.

however, the cost arises from the mechanism which overcomes adverse selection, rather than from the moral hazard that characterizes the current system.

RESULT 3: Increased managerial risk preference at low-risk banks has no effect on insurance coverage and an ambiguous effect on premiums at high-risk banks.

Since high-risk banks are fully insured, an increase in risk at low-risk banks has no effect on their insurance coverage. However, since increased preference for risk at low-risk banks increases the level of insurance offered to them (by Result 1), the gain to a high-risk bank of misrepresenting its risk type is increased. To induce high-risk banks not to lie, the insurer can reduce the premium in the contract designed for them. This action is more likely the higher is the marginal "gain to lying," $U_I(P_1, I_1, \gamma_2) - U_I(P_1, I_1, \gamma_1)$, which is increasing in the difference in the risk preference parameters of adjacent risk classes.

RESULT 4: Under Condition A and if the marginal return to insurance from increased risk taking increases at a decreasing rate, $U_{I\gamma\gamma} < 0$, a secular increase in bank managers' preference for risk implies that insurance coverage rises at both types of banks, and premiums rise at low-risk banks and may rise or fall at high-risk banks.

In this regime, the automatic adjustment of the insurance contracts keeps depositor risk in check while, for the most part, forcing bank stockholders to pay for their risk taking through higher insurance premiums and deposit costs. Condition A and $U_{I\gamma\gamma} < 0$ are sufficient, but not necessary, for this result. They together ensure that the effect of an increase in own risk preference outweighs the effect of an increase in other bank types' risk preference. However, if the marginal gain to lying is sufficiently strong, the insurer may have to reduce premiums at high-risk banks to ensure self-selection.

RESULT 5: If the proportion of low-risk banks is large relative to the proportion of high-risk banks in the system, $\mu_1 > \mu_2$, then increases in the minimum acceptable expected return, α , decrease insurance coverage at both types of banks, decrease premiums at low-risk banks, and may either increase or decrease premiums at high-risk banks.

Because of the increased costs faced by the banks, the insurer is forced to reduce insurance premiums at least at low-risk banks so that they can remain solvent. However, for the insurance fund to remain solvent, insurance coverage is reduced for all banks. Notice that $\mu_1 > \mu_2$ is sufficient but not necessary for this result.

RESULT 6: If the recovery value of banks' assets, \bar{A} , increases, insurance coverage and premiums for low-risk banks will fall, and insurance coverage will fall, but premiums will either rise or fall at high-risk banks.

By closing banks as soon as they are determined to be insolvent, the insurance agency limits its and depositors' exposure to loss and so little insurance is needed. The larger the loss imposed on the insurer and depositors by a bank failure, the higher the required insurance to compensate depositors and premiums to offset the insurer's loss. The adjustment of premiums at high-risk banks to changes in the recovery value of a bank's assets depends, again, on the marginal "gain to lying."

3. COMPARISON AND IMPLEMENTATION

Under the current regulatory structure all banks, regardless of their managers' risk preferences and the riskiness of their portfolios, pay the same insurance premium per dollar of deposits and, technically, receive the same insurance coverage. Thus, the FDIC offers a pooling contract to the market. If, in the banking market characterized above, the regulator chooses to offer a pooling rather than a separating contract,¹⁵ then, as Cooper (1982) shows, if banks in risk class i and $i + n$ are pooled, then all banks in risk classes in between are also pooled, and the most risky banks are never pooled. Thus, if the present FDIC contract is an optimal contract (given the information asymmetry), it must be the case that all banks operating are high-risk banks, all other banks having chosen to withdraw from the market. However, if the contract is not optimally priced, low-risk as well as high-risk banks will find it in their interests to purchase the insurance.

If the insurance contract, and thus risk, is not optimally priced, banks have the incentive to take on more risk than they pay for. This moral hazard problem characterizes the current (Benston and Koehn 1989; Brewer 1990) and many past deposit insurance regulations (Calomiris 1989), but is absent from the regulatory scheme described in this paper since premiums and insurance coverage vary with portfolio risk. This would not be the case, however, if bank risk preference was a choice variable rather than a parameter describing bank managers' tastes for risk. Since banks similar in size, location, portfolio composition (types of loans made, composition of liabilities), etc., have been found to differ in the risks they take (Keeton and Morris 1987), bank managements' tastes for risk taking do appear to be important features of the banking market that any deposit insurance scheme must address.

To implement the regulatory scheme suggested above, the following process would need to be followed. First, regulations would have to be changed to market value rather than book value accounting. Call-report data based on market value accounting could then be used to determine bank risk classes (Avery and Belton 1987), and the market distribution of bank types. This distribution would be announced to the market, and thus become common knowledge. Second, the regulator would devise the deposit insurance contracts described in section 2. These contracts would state three things: premiums and insurance coverage per dollar of deposits, and the duration of coverage. Third, the regulator would offer banks the complete set of contracts from which to choose. Each bank would choose the contract consistent with its portfolio risk, and provide the regulator with its market value accounts to substantiate its claims. Fourth, individual bank insurance coverage (and, implicitly, individual bank risk) would be announced to the market. These announcements would take place on predetermined dates. Fifth, upon contract expiration the process repeats: a bank must, essentially, settle its accounts and apply for and receive a new license to operate.

¹⁵See Stiglitz (1977) for the conditions under which a pooling contract rather than a separating contract will be offered.

Should a bank fail, its assets would be immediately liquidated and its depositors would receive the insurance promised under the contract. All failed banks would be closed without exception. To ensure this, banks' books would be marked-to-market at regular intervals, and this information would be supplied to the regulator. If at an interim date a bank's portfolio risk is different from that contracted for, the bank must reorganize its portfolio or revise its insurance contract. Stockholders would be allowed to recapitalize a failed bank to avert closure, but the insurance agency would be barred by statute from recapitalizing banks since any probability of recapitalization by the insurer removes the incentive for banks to self-select the correct insurance contract.

4. CONCLUSIONS

Under the present FDIC insurance scheme, all banks, no matter how risky, pay the same insurance premium per dollar of deposits. The moral hazard is obvious: banks can take on more risk at no cost to themselves, but at greater cost to the insurer and to their depositors. Further, the FDIC is loath to close large banks for fear of financial system disruption. This too encourages risk taking. In response to these problems this paper presents an insurance scheme in which insurance coverage and premiums are adjusted for bank risk, and in which all failed banks are closed, thus removing the incentive for risk shifting. In this regime, stockholders' and depositors' uninsured funds are explicitly not guaranteed since incentive compatibility bars the insurer from recapitalizing failed banks. Further, this scheme helps the market to work by providing depositors with information about bank risk without instigating bank runs. The banks directly, rather than the insurer indirectly, must pay the depositors for the risk they bear. These features of the regulatory program are all in accordance with the suggestions for banking system reform cited in the introduction.

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