

Deposit Insurance and the Deregulation of Deposit Rates

By William R. Keeton

The federal deposit insurance system has long been regarded as a total success. Since the establishment of federal deposit insurance in 1933, following the worst banking panic in the country's history, the number of bank failures has fallen dramatically. Though banks have continued to fail—because of fraud, unsound investments, or plain bad luck—the bank runs and banking panics that once plagued the financial system seem to have been eliminated.

In the past few years, however, doubts about the federal deposit insurance system have begun to emerge. The number of banks that have been closed or merged with healthier institutions has increased since the early 1970s, and for the first time failures have included some very large banks, such as Franklin National in 1974. In addition, questions have been raised about the quality of some loans made by larger banks in recent years, particularly to developing countries. Finally, as a result of the financial deregulation mandated by the Depository Institutions Deregulation and Monetary Control Act of

1980, the Garn-St. Germain Depository Institutions Act of 1982, and other legislation, there has been considerable concern that banks will take more risks than before and cause the incidence of bank failures to increase.

This article examines the effect on bank risk-taking of a particular aspect of deregulation, the removal of deposit-rate ceilings.¹ Even before deregulation, deposit insurance gave banks an incentive to take risk by shifting part of the costs of their risk-taking to the Federal Deposit Insurance Corporation. It is argued that the deregulation of deposit rates will increase this distortion in bank behavior, both by expanding the opportunities for risk-taking and by increasing the benefits to be derived.

The first section of the article provides an overview of the current federal deposit insurance system. The next section explains how the deposit insurance system distorted banks' behavior even before the recent financial deregulation. The third section considers how

William R. Keeton is a senior economist in the Economic Research Department at the Federal Reserve Bank of Kansas City.

¹ Although this article focuses on deposit-rate deregulation, it should be noted that the recent financial deregulation may also affect banks' risk-taking behavior by liberalizing their lending and investment powers.

the deregulation of deposit rates is likely to increase these distortions. Possible policy responses are discussed in the last section.

The current federal deposit insurance system

Federal deposit insurance was established by the Banking Act of 1933 in response to three years of widespread banking failures. Over that time, many people became fearful about the safety of their deposits and withdrew their funds to hold in the form of currency. In an effort to meet such withdrawals, banks called in loans and liquidated assets, often at substantial losses. Banks that could not satisfy withdrawals in this way were forced to close.

In the period from 1930 through 1932 about 5,100 banks failed, more than one out of five of the commercial banks in existence at the beginning of 1930.² These bank failures brought direct losses to depositors and bank shareholders and to businesses suddenly deprived of a long-standing source of credit. The massive bank failures of the period also were partly responsible for a severe decline in the nation's money supply. To protect themselves against sudden deposit withdrawals, banks that remained in operation held more of their assets in the form of idle reserves. Also, with the increased fear over the safety of bank deposits, the public held more of their liquid assets in the form of currency, which reduced the amount of reserves available to the banking system. Because of these two factors, the money supply fell almost 25 percent from 1929 to the end of 1932, even though the total monetary base—the sum of bank reserves and currency held by the public—did not decline at all.

² Lester Chandler, *America's Greatest Depression, 1929-1941*, Harper & Row, New York, 1970, p. 82.

Banking panics were not new. There had been several in the late 1800s and one in 1907. One of the original purposes of the Federal Reserve System had been to prevent such panics, by lending reserves to banks through the discount window. However, the Federal Reserve's discount lending failed to prevent the banking panic of the early 1930s. One reason for this failure was that the Federal Reserve kept its discount rate relatively high. Another reason was that there were restrictions on the collateral that member banks could use in borrowing from the Federal Reserve. Finally, more than 15,000 banks were not members of the Federal Reserve and were therefore not eligible to borrow.

Before the Banking Act of 1933, the public's fear over the safety of bank deposits had the nature of a self-fulfilling prophecy. Once withdrawals began at a bank, it was in the interest of every depositor to withdraw his funds, no matter how sound he considered the bank's loans and investments. Even a bank with loans that were certain to be repaid on schedule could be forced to close if enough of its depositors withdrew their funds and if enough of its assets were illiquid. One objective of federal deposit insurance was to prevent such runs by giving every depositor the assurance that his funds would be safe, regardless of whether other depositors withdrew their funds.

The 1933 act established the Federal Deposit Insurance Corporation (FDIC) and provided for insurance of deposits up to \$2,500. All commercial banks that were members of the Federal Reserve System were required to take part in the plan. Banks that were not members could join if approved by the FDIC. In 1934, the National Housing Act extended deposit insurance to savings and loan associations by establishing the Federal Savings and Loan Insurance Corporation (FSLIC),

a subsidiary of the Federal Home Loan Bank Board.

The maximum deposit insurance coverage has been increased several times since 1933 and now equals \$100,000. From the beginning, an insured bank has been required to pay a premium to the FDIC equal to one-twelfth of 1 percent of its total deposits, both insured and uninsured. Since 1950, however, the FDIC has refunded part of its annual surplus to insured banks at the end of each year in the form of a credit against their future premiums. Thus, the effective premium paid by banks has been somewhat less than one-twelfth of 1 percent of their deposits.

Along with its obligation to provide deposit insurance, the FDIC has certain regulatory authority over banks. It has the right to examine all insured banks, though it generally examines only banks that are not members of the Federal Reserve System, relying on the Comptroller of the Currency or the Federal Reserve to examine member banks. If the FDIC determines that a bank is in unsound condition or has engaged in unsound or illegal practices, it can issue a cease-and-desist order against the practices or even terminate the bank's insurance. However, the FDIC has rarely had to resort to such extreme measures to get a bank to make changes.

Effects of deposit insurance on banks' risk-taking behavior

The fundamental dilemma of any deposit insurance system is that it cannot protect depositors against bank failures caused by a sudden withdrawal of funds—that is, failures due to illiquidity—without also protecting depositors against bank failures caused by poor performance of a bank's loans and investments—that is, failures due to basic insolvency. Because deposits are guaranteed

against the second type of failure as well as the first, the current deposit insurance system distorted the behavior of banks even before deregulation.³

The anatomy of bank failure

Banks raise funds from two sources: deposits and capital. To attract deposits, a bank can offer an explicit return in the form of interest or an implicit return in the form of gifts or services priced below cost, such as free check-clearing. To increase its capital, a bank can either issue new equity or retain some of its profits. The funds obtained from deposits and capital are used to acquire two kinds of assets: noninterest-bearing reserves held largely to meet reserve requirements and loans and investments held to earn income.

A bank's portfolio of assets usually has some risk, in that the total return on the portfolio can vary.⁴ One reason the total return varies is that some of the bank's borrowers may default on their loans. Another reason is that changes in market interest rates may cause capital gains or losses on some of the bank's holdings of marketable securities. Of course, the variability of the total return on the bank's assets will usually be somewhat less than the variability of returns on its individual loans and investments, because low returns on some

³ Although the discussion here focuses on risk-taking by commercial banks, much of what is said also applies to other depository institutions—in particular to S&L's, mutual savings banks, and credit unions.

⁴ The total return on a bank's assets is the change in the value of the assets from the beginning of the period to the end of the period, including any interest income earned during the period and subtracting any costs incurred in making loans or buying securities. There also will be occasion later to refer to the total expected return on the bank's assets. This is simply a weighted sum of all the possible returns on the bank's assets, with each possible return weighted by its probability of occurrence. The total return to depositors and the total expected return to depositors will be defined analogously.

assets will often be offset by high returns on other assets. Despite this diversification effect, however, most banks have asset portfolios with some risk.

Whether a bank fails depends in part on what happens to the total return on its assets. If the total return on its portfolio of assets exceeds the total return promised on its deposits, the bank earns profits that can either be distributed to shareholders as dividends or retained to increase its capital. However, if the total return on the bank's portfolio falls below the total return promised to depositors, the bank incurs losses that have the effect of reducing its capital. If the losses are great enough to eliminate the bank's capital—and the shareholders are unwilling to contribute new funds—the bank will be forced to close, because it will not have enough resources to repay depositors in full.

When a bank does fail, some parties lose more than others. Who gets what depends partly on whether the FDIC chooses the "pay-off" option or the merger option. Under the payoff option, the bank is placed in receivership, the FDIC pays insured depositors in full, and the proceeds from liquidation of the bank's assets are divided up among uninsured depositors, creditors, and the FDIC in proportion to the claim of each on the bank. Under the merger option, the FDIC arranges for another bank to assume the failing bank's liabilities and in return purchases the "bad" assets of the failing bank. In both cases, the shareholders of the failing bank lose their entire investment but enjoy limited liability in that they are not required to dip into their other assets to cover the bank's obligations. Also, in both cases, the failing bank's insured depositors receive the entire amount due to them. The only real difference between the payoff and merger options is that in payoffs the FDIC covers only insured deposits, while

in mergers the FDIC in effect covers all deposits, including those that were nominally uninsured.⁵

The moral hazard problem

Under the current system of fixed-rate deposit insurance, a bank has too much incentive to take actions that increase its probability of failure. The reason is that an increase in the probability of failure raises the expected cost to the FDIC of insuring the bank's deposits but does not increase the premium the bank has to pay for the coverage. In other insurance markets, this distortion in risk-taking behavior is sometimes referred to as "moral hazard."⁶

A bank makes two important choices that affect its probability of failure and are therefore subject to moral hazard: how much risk to assume in choosing the composition of its assets, and how much capital to seek relative to deposits. If the total rate of return on the bank's assets is highly variable, the bank has a high probability of earning high profits but also a high probability of incurring large losses.⁷ Also, if the bank does not have much

⁵ The fact that the FDIC did not merge Penn Square Bank when it failed in the summer of 1982 has probably increased uninsured depositors' concern over the safety of their funds. In the past, banks that size had always been merged with healthier banks.

⁶ Moral hazard arises whenever the premium a policyholder is charged for insurance fails to reflect the effect of his actions on either the probability or potential magnitude of his loss. For example, if the premium for fire insurance did not vary inversely with the number of smoke detectors or sprinklers in a building, policyholders would have too much incentive to do without such devices, just as a bank that faces a fixed deposit insurance premium has too much incentive to take actions that increase the probability of its failure.

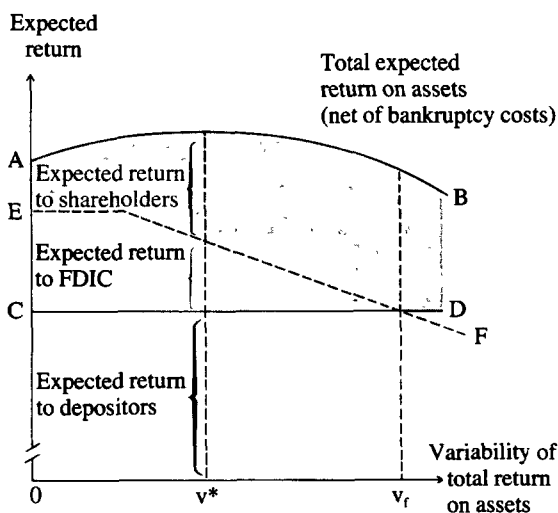
⁷ In this article, an increase in the variability of the total return on assets will refer to a shift in density from the center of the probability distribution toward the tails. For an explanation of this concept, see Michael Rothschild and Joseph E. Stiglitz, "Increasing Risk: I. A Definition," *Journal of Economic Theory*, September 1970, and William R. Keeton, *Equilibrium Credit Rationing*, Garland Publishing, New York, 1979, Ch. 3, Sec. II.

capital, a relatively small loss may be sufficient to wipe out its capital and force it to close. Thus, other things being equal, the probability of failure is greater the riskier the bank's assets and the lower the ratio of capital to deposits.

A bank's decision about how much risk to take in choosing the composition of its assets is illustrated by Figure 1. (The decision about how much new capital to raise is discussed in the Appendix.)⁸ Assumed as given in Figure 1 are the bank's insured and uninsured deposits, its capital, and its set of investment opportunities. The horizontal axis of the diagram measures the level of asset risk—that is, the degree of variability of the total return on assets. Each point on the horizontal axis corresponds to a different mix of assets.

The bank will choose the level of asset risk that is in the best interests of its shareholders. For convenience, it is assumed that the bank's shareholders care only about the expected return on their investment and not about the variability of the return.⁹ Under this assumption, the bank will seek to maximize the total expected return to its shareholders. The total expected return to shareholders equals the total expected return on the bank's assets minus the total expected return to all other parties. The

FIGURE 1
Deposit insurance and asset risk



other parties are the bank's insured depositors, the bank's uninsured depositors, and the FDIC.

For every degree of asset risk, the curve AB in Figure 1 represents the maximum total expected return the bank could earn on its assets. This return is net of any bankruptcy costs that would have to be incurred if the bank failed, such as legal and administrative costs of liquidating the bank or losses from distress sale of the bank's assets. The reason these bankruptcy costs must be subtracted is that they use up part of the bank's assets.

Up to a point, increasing the level of risk makes it possible for the bank to earn a higher total expected return on its assets. Thus, the curve AB initially slopes upward. Some of the bank's loan applicants may be new firms having investment projects with a high potential return but also a significant chance of failure. By making loans to these firms instead of firms with safe investment projects, the bank

⁸ For more difficult treatments, see John H. Kareken and Neil Wallace, "Deposit Insurance and Bank Regulation: A Partial Equilibrium Exposition," *Journal of Business*, July 1978, and William F. Sharpe, "Bank Capital Adequacy, Deposit Insurance, and Security Values," *Journal of Financial and Quantitative Analysis*, November 1978.

⁹ In other words, the bank can act as if its shareholders were "risk-neutral." Even if a shareholder cared about the variability of the return on his total portfolio, he would be indifferent to the variability of the return on his bank shares to the extent that those shares represented a small fraction of his total portfolio and the returns on the other assets in his portfolio were uncorrelated with the return on the bank shares. It is possible, of course, that a bank's managers will act in their own best interests rather than the interests of shareholders. This could lead them to choose a different level of asset risk than the bank's shareholders would prefer.

will increase the riskiness of its asset portfolio. This increase in risk may raise expected bankruptcy costs by making it more likely that the bank fails. However, because the bank will be able to charge a relatively high interest rate on the riskier loans, its expected loan revenues will increase. As long as the increase in expected loan revenues outweighs the increase in expected bankruptcy costs, the total expected return on assets will rise.

Further increases in risk eventually lower the total expected return on assets, causing the curve AB to turn downward. As the bank shifts the composition of its loans toward borrowers with investment projects having still higher potential returns and still higher chances of failure, there will come a point at which the bank cannot fully compensate for the higher probability of default by charging a higher loan rate. The chance of these highly risky projects failing is so great that the bank could not earn as high an expected return on loans made to finance them as on loans made to finance safer projects, even if the bank could receive the entire return from the projects when they succeeded. This reinforces the tendency for increases in risk to lower the total expected return on the bank's assets by raising expected bankruptcy costs. Thus, at point v^* in Figure 1, the total expected return on the bank's assets begins to fall.

The total expected return to depositors is represented by the horizontal line CD in Figure 1. For convenience, it is assumed that uninsured depositors can observe exactly how much risk the bank is taking and, like shareholders, do not care about the variability of the return on their investment. This means that whenever the bank increases its probability of failure by choosing a riskier portfolio of assets, uninsured depositors will demand an increase in the deposit rate just large enough to prevent the expected return on their invest-

ment from falling.¹⁰ The return to insured depositors is also constant because it is guaranteed by the FDIC. Thus, the total expected return to depositors must be independent of the level of asset risk chosen by the bank. This is why CD is horizontal.

The combined expected return to depositors and the FDIC is represented by the curve EF in Figure 1. The expected return to the FDIC equals the total insurance premium paid by the bank minus the expected cost to the FDIC of compensating insured depositors. If a bank does not fail, the cost of compensating insured depositors is zero. On the other hand, if the bank fails, the cost of compensating insured depositors is the total amount due to insured depositors minus the FDIC's share of whatever assets remain after bankruptcy costs. Under the current deposit insurance system, the total insurance premium depends only on the level of deposits and not on the level of asset risk chosen by the bank. If the level of asset risk is sufficiently low, the bank has no chance of failing and the expected return to the FDIC equals the fixed insurance premium. However, as the level of asset risk is increased, the probability of failure eventually becomes positive. At that point, the expected cost of compensating insured depositors rises above zero and the expected return to the FDIC begins to fall. This is why EF starts out as a horizontal line above CD and then turns downward.

To serve the best interests of its shareholders, the bank will try to maximize the difference between the total expected return on its assets and the combined expected return to depositors and the FDIC. In Figure 1, this difference is represented by the gap between the

¹⁰ In contrast to insured deposits, large uninsured deposits were not subject to deposit rate ceilings even before the recent deregulation.

curves AB and EF, or the height of the shaded area. The bank chooses the level of asset risk at which this gap is largest. This is v_r , the point where the curves AB and EF have equal slopes.¹¹

The level of risk chosen by the bank in Figure 1 exceeds the socially optimal level of risk. Since the bank's shareholders and uninsured depositors do not care about the variability of the return on their investment, it is in society's interest for the bank to choose the asset portfolio with the highest total expected return. In Figure 1, this is v^* , the point where the curve AB attains its maximum value. Although this point is optimal for society, it cannot be optimal for the bank's shareholders. Increasing risk beyond v^* reduces the expected return to the FDIC more than the total expected return on assets and thus increases the total expected return to shareholders. In other words, because AB has zero slope where it reaches a maximum while EF has negative slope, the gap between AB and EF can always be increased by moving at least a little bit to the right of v^* .¹² The loss to soci-

ety from the bank's choice of excessive asset risk equals the difference between the total expected return on the bank's assets at v^* and the total expected return at v_r . Part of the social loss is due to an increase in expected bankruptcy costs. The rest is due to a shift in composition of the bank's loans toward borrowers with less productive investment projects.

It should not be inferred from the example above that a moral hazard problem must exist for all banks. Other banks may differ from the bank in Figure 1 in two important respects.

First, other banks may not face the same investment opportunities as the bank in Figure 1. As a result, the curve AB indicating the tradeoff between the total expected return on their assets and the variability of the return on their assets may look different. For example, if a bank faces relatively safe investment opportunities, the point v^* where the curve AB attains its maximum value may lie further to the left. Conversely, if the bank faces highly risky investment opportunities, v^* may lie further to the right. To some extent, these differences in investment opportunities are due to restrictions on interstate and intrastate branching. Even without such restrictions, however, the differences would be likely to exist because the costs of investigating borrowers and monitoring their investment projects make it efficient for banks to specialize in a particular kind of lending or a particular geographical market.

Second, other banks may have shareholders with different attitudes toward variability in the return on their investment. For example, a bank's equity may be concentrated in the hands of a few people.¹³ These shareholders may dislike variability in the return on their bank shares because they dislike variability in the return on their total portfolios and because the bank shares represent a large proportion of

¹¹ The diagram assumes that the fixed premium happens to be just high enough to allow the FDIC to break even at the level of risk actually chosen by the bank. This is the only reason the curve EF crosses the line CD at the same point where the gap between EF and AB is largest. With a different premium, the bank could end up being either overcharged or undercharged for insurance. In general, however, it would still end up choosing more risk than was socially optimal.

¹² Although the bank shown in Figure 1 chooses more risk than is socially optimal, it does not choose the highest possible level of asset risk. There are two reasons this might be the case. First, to keep increasing risk, the bank may have to shift the composition of its loans toward borrowers with investment projects having a much higher chance of failure but almost the same potential return. Second, because some deposits are uninsured and because uninsured depositors demand a large enough increase in the deposit rate to keep their expected return from falling, the rise in expected bankruptcy costs that occurs as the level of asset risk is increased will fall partly on the bank's shareholders rather than entirely on the FDIC. Both factors will tend to make the curve AB fall more sharply than the curve EF as the level of risk gets very high.

these portfolios. In terms of Figure 1, this would mean that the socially optimal level of asset risk would be less than v^* . Alternatively, shareholders may prefer variability in the return on their investment because they like to gamble. In this case, the socially optimal level of risk would exceed v^* .

Whether a moral hazard problem exists for a particular bank depends on both the nature of its investment opportunities and the attitude of its shareholders toward the variability in their return. If the bank faces relatively safe investment opportunities or has shareholders who are highly averse to variability in their return, the socially optimal level of asset risk may be low enough that the bank has no chance of failing at that level of risk. In such cases, a moral hazard problem may not exist — that is, the degree of risk that is optimal for society may also be optimal for the bank's shareholders. This is because the bank may have to increase risk significantly beyond the socially optimal level to shift some of the expected return on its assets from the FDIC to shareholders. An increase in risk that large may entail too great a reduction in the total expected return on assets or too large an increase in the variability of the return to shareholders to leave shareholders with a net gain.¹⁴ However, if the bank faces relatively risky investment opportunities or has shareholders who are not highly averse to variability in their return, the socially optimal degree of risk will be high enough that the bank has

at least some chance of failing at that level of risk. In such cases, a moral hazard problem will necessarily exist, because even a very small increase in risk beyond the socially optimal level will tend to benefit shareholders at the expense of the FDIC.

Regulatory and legislative limits on risk-taking

To some extent, the moral hazard problem that arises under the current system of fixed-rate deposit insurance may have been offset through regulatory and legislative limits on risk-taking by banks. These limits have taken two forms.¹⁵

One way risk-taking has been curbed is through explicit limits on the types of loans and investments banks can make. For example, national banks have always been prohibited from purchasing equities and investing more than a specified percentage of their capital in loans to the same borrower. Also, both national and state banks have faced a number of explicit restrictions on the amount and terms of their real estate loans and their margin loans for the purchase of securities.

The other way risk-taking has been limited is through regulatory supervision aimed at ensuring that each bank remains in sound condition. With the cooperation of other regulatory agencies, the FDIC has tried to limit the amount of risk a bank can take so that the total premiums it collects from all banks will be adequate to cover the total expected costs of insuring deposits. In examining a bank, regulators assess both the quality of the bank's

¹³ In some cases, it may be more efficient for shares to be owned by a few people who can closely control the bank's management than by a large number of investors who cannot exercise such control. See Michael Jensen and William Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure," *Journal of Financial Economics*, October 1976.

¹⁴ In terms of Figure 1, the point at which the curve EF turns downward may lie too far to the right of the socially optimal level of asset risk.

¹⁵ For up-to-date descriptions of the bank regulatory system, see Carter H. Golembe and David S. Holland, *Federal Regulation of Banking, 1983-84*, Golembe Associates, Washington, D.C., 1983, and Kenneth Spong, *Banking Regulation: Its Purposes, Implementation, and Effects*, Federal Reserve Bank of Kansas City, 1983.

assets and the adequacy of its capital. If the bank is found to have too many doubtful loans or too little capital, the FDIC or other agency making the examination requests the bank to enter a written agreement to correct the problem.

Although regulation may have alleviated the problems associated with fixed-rate deposit insurance, it has clearly not eliminated them. Limits on risk-taking cannot be perfectly enforced. And even if limits on risk-taking could be perfectly enforced, they would not result in every bank choosing the correct amount of risk. Because the socially optimal level of risk differs across banks, a uniform upper limit on risk-taking will necessarily be too low for some banks and too high for others. In other words, banks for which the socially optimal level of risk is relatively low will be allowed to take too much risk, while banks for which the socially optimal level of risk is relatively high will be forced to take too little risk.¹⁶ These limitations of regulation are illustrated in the accompanying box.

Effects of deposit-rate deregulation on banks' risk-taking behavior

The only deposits not subject to interest rate ceilings in the 1970s were certificates of deposit in denominations of \$100,000 or more. During this period, however, the maximum deposit insurance coverage remained well below \$100,000. Thus, all fully insured deposits were subject to rate ceilings. Two developments have recently altered this situation. First, in March 1980, the maximum deposit insurance coverage was increased from

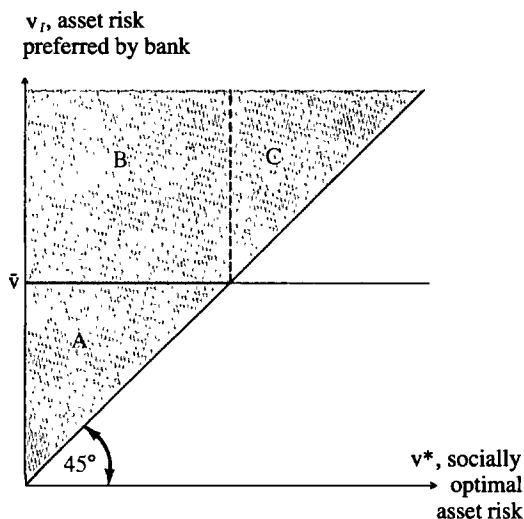
\$40,000 to \$100,000, making available for the first time a deposit that was not subject to rate ceilings and on which the principal was fully insured—\$100,000 CD's.¹⁷ Second, the Depository Institutions Deregulation and Monetary Control Act was passed in 1980, calling for interest-rate ceilings to be gradually phased out on all deposits except demand deposits. The only deposits other than demand deposits that are still subject to rate ceilings are regular NOW accounts, passbook savings accounts, and small time deposits that mature in seven to 31 days. Even ceilings on these deposits are scheduled to be removed soon, and legislation has been introduced in Congress to eliminate the prohibition of interest on demand deposits. Thus, the range of insured deposits for which banks are free to bid has increased dramatically since 1980 and will increase still further in the next few years.

To some extent, banks were able to circumvent deposit-rate ceilings by paying their depositors an implicit return in the form of gifts, convenient locations, free checking, and other services priced below cost. However, the degree to which banks were able to evade the ceilings was limited by the range of services they could provide that were of value to depositors. For business demand deposits, the implicit rate of return paid by banks in the 1970s probably approached the competitive rate of return — the rate that would have been paid in the absence of ceilings — because businesses tended to use a large number of bank services. In the case of household

¹⁶ The latter effect is emphasized in Kenneth E. Scott and Thomas Mayer, "Risk and Regulation in Banking: Some Proposals for Federal Deposit Insurance Reform," *Stanford Law Review*, May 1971, pp. 872-73, 888.

¹⁷ It has long been the practice of the FDIC to cover both the depositor's initial investment and the accumulated interest at the time the bank closes, as long as the total does not exceed the maximum coverage limit. Thus, on a \$100,000 deposit only the principal would be insured, while on smaller deposits both the principal and interest would be insured. This practice was recently formalized in the FDIC's official regulations. See 48 Federal Register 52030-31, November 16, 1983.

Effect of regulation on bank risk-taking



The diagram above illustrates the limitations of regulation. Every bank is represented by a point in the diagram. The horizontal axis measures a bank's socially optimal degree of asset risk, corresponding to point v^* in Figure 1. The vertical axis measures a bank's preferred amount of asset risk, corresponding to

point v_i in Figure 1. Under the assumptions made earlier, every bank will choose at least the socially optimal degree of risk. Thus, all banks will fall in the shaded area in the diagram, with v_i greater than or equal to v^* .

The principal purpose of bank supervision and regulation can be viewed as the imposition of an upper limit on risk-taking. In the diagram, this limit is \bar{v} . To the extent that regulation is effective, it will tend to alleviate the moral hazard problem by forcing banks in region B in the diagram to reduce their risk-taking closer to the socially optimal level. However, regulators may not be able to enforce the upper limit perfectly, so that some banks in region B continue to choose a level of risk greater than \bar{v} . Furthermore, even if the upper limit is perfectly enforced, banks falling in region B will take more risk than is socially optimal and banks falling in region A will not be affected at all. Finally, banks for whom the socially optimal degree of risk is relatively high—those falling in region C—will be forced to reduce their risk-taking below the socially optimal level.

demand deposits and time deposits, however, banks probably did not pay close to the competitive rate because households used relatively few bank services. Thus, despite the fact that banks had been able to pay some implicit interest, the deregulation of deposit rates that began several years ago should increase competition for insured deposits and

result in banks paying a higher total return on insured deposits than if deregulation had not occurred.¹⁸

The controversy over deposit rates and risk-taking

The relationship between deposit rates and

¹⁸ One study has estimated that implicit interest on demand deposits averaged one-third to one-half of the competitive rate in the 1970-74 period. See Richard Startz, "Implicit Interest on Demand Deposits," *Journal of Monetary Economics*, October

1979. A useful survey of the empirical evidence on implicit interest on demand deposits is John P. Judd and John L. Scadding, "Financial Change and Monetary Targeting in the United States," in Federal Reserve Bank of San Francisco, *Interest Rate Deregulation and Monetary Policy*, November 1982, pp. 85-89.

bank risk-taking behavior was a controversial issue among policymakers and economists long before the recent financial deregulation. When deposit-rate ceilings were originally imposed in 1933, one of the reasons given was to prevent a recurrence of the widespread bank failures of the early 1930s. Without ceilings, it was argued, banks would engage in "ruinous competition." In particular, it was felt banks would bid up deposit rates in competition for funds and then try to cover the increased cost of funds by acquiring risky assets with high potential returns. This kind of behavior was thought to be partly responsible for the more than 5,000 bank failures from the end of 1929 to the end of 1932.

The argument that higher deposit rates would induce banks to invest in riskier assets has been widely disputed, on both empirical and theoretical grounds. Influential empirical studies by George Benston and Albert Cox based on the period before ceilings were first imposed found no evidence that banks paying higher deposit rates also took more risk.¹⁹ Furthermore, such behavior has been alleged to be inconsistent with profit maximization by banks. For example, Benston claimed:

The willingness of a banker to invest in assets bearing any perceived degree of risk is a function of the expected returns from the investment and the inclination of the banker toward risk-taking. Thus, the interest rate on deposits offered by a banker is a function of the investment possibilities (and their associated risks) available to the banker, rather than the reverse.²⁰

¹⁹ See George J. Benston, "Interest Payments on Demand Deposits and Bank Investment Behavior," *Journal of Political Economy*, October 1964, and Albert M. Cox, Jr., "Regulation of Interest Rates on Bank Deposits," *Michigan Business Studies*, Vol. 17, No. 4, 1966.

Some years later, Carl Gambs attempted to refute these claims. Drawing on the theory of portfolio behavior developed by Harry Markowitz and James Tobin, Gambs showed that a bank that cared about the variability of the return to its shareholders might respond to an increase in deposit rates by choosing a mix of assets with higher risk but also higher expected return. However, his argument was subsequently shown to hold only under special assumptions about shareholders' attitudes toward the variability of their return.²¹ As a result, support for the notion that the removal of deposit-rate ceilings will increase risk-taking by banks must be found elsewhere.

In the remainder of this section, two alternative reasons are suggested for why bank risk-taking should increase. First, the removal of ceilings on insured deposits should exacerbate the distortion that already exists as a result of the moral hazard problem. Second, it should create a relatively new distortion by making it much easier for risky banks, which are currently undercharged for deposit insurance, to bid deposits away from safe banks, which are currently overcharged for deposit insurance.

Increase in the existing distortion from moral hazard

It was shown earlier that a moral hazard problem exists under the current system of fixed-rate deposit insurance. After ceilings are removed and interest rates on insured deposits

²⁰ Benston, p. 433. For another expression of this view, see Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867-1960*, Princeton University Press, Princeton, N.J., 1963, p. 444.

²¹ See Carl M. Gambs, "Interest-Bearing Demand Deposits and Bank Portfolio Behavior," *Southern Economic Journal*, July 1975, and the comments on Gambs' article by Philippe Caperaa and Louis Eeckhoudt and by Perry D. Quick in the October 1977 issue of that journal.

are bid up, this moral hazard problem should become worse. One reason for this worsening is that the rise in interest rates on insured deposits will directly increase the total payment the FDIC has to make to a bank's insured depositors if the bank fails. Another reason is that the percentage of deposits that are insured will increase.

Direct increase in the FDIC's potential liability. Under current arrangements, the FDIC covers both the principal and interest on insured deposits as long as the total due to the depositor does not exceed the coverage limit of \$100,000. This means that an increase in the interest rates a bank pays on insured deposits smaller than \$100,000 will increase the FDIC's total potential liability to depositors even if the quantities of both insured and uninsured deposits remain unchanged.

Because the rise in rates on insured deposits will increase the FDIC's total potential liability, many banks will have a greater incentive to take risk.²² When a bank chooses a riskier mix of assets or a lower level of capital, it increases its chance of failure and thus also increases the chance that the FDIC's potential liability will be an actual liability. As a result, the increase in the FDIC's potential liability will enhance the tendency for an increase in asset risk or a decrease in capital to shift some of the total expected return on the bank's assets from the FDIC to shareholders. Of course, the rise in rates on insured deposits will also tend to reduce the expected return to the bank's shareholders. If shareholders cared about the variability of the return on their investment, this decline in expected return

could make them more conservative, just as a reduction in a person's wealth could make him less willing to gamble. Unless this effect is large, however, the greater tendency for increases in risk to reduce the expected return to the FDIC will mean that it is in shareholders' best interests for the bank to choose a higher level of risk.²³

The potential increase in the moral hazard problem can be illustrated by Figure 1, the diagram used earlier to explain a bank's choice of asset risk. An increase in interest rates on insured deposits shifts up the curve EF representing the combined expected return to depositors and the FDIC. This tends to reduce the expected return to the bank's shareholders at each level of asset risk by narrowing the gap between EF and the curve AB representing the total expected return on the bank's assets. However, at v_1 , the level of asset risk initially chosen by the bank, EF also becomes steeper relative to AB because of the greater tendency for increases in risk to reduce the expected return to the FDIC. As a result, the bank can widen the gap between the two curves and reduce the adverse impact of the higher deposit rates on the expected return to its shareholders by increasing risk.²⁴

Increase in the percentage of insured deposits. As interest-rate ceilings on insured deposits are removed and rates on those deposits are bid up relative to rates on unin-

²² The tendency for an increase in the rate at which funds are borrowed to exacerbate the moral hazard problem has been used in a different context to explain why banks that are unable to monitor borrowers' investment projects might refrain from raising their loan rates to market-clearing levels. See Keeton, *Equilibrium Credit Rationing*, Ch. 3.

²³ Because banks were able to partially circumvent the ceilings by paying an implicit return on deposits, the removal of ceilings should lead to a decrease in losses from services priced below cost as banks substitute explicit interest for implicit interest. This will work in the opposite direction from the increase in the FDIC's potential liability to depositors. In particular, it will tend to reduce the effect of increases in risk on the expected return to the FDIC by increasing the amount of the bank's assets that will be available to the FDIC to help pay insured depositors if the bank fails. However, because there were limits to the amount of implicit interest banks could pay, it is unlikely that the decrease in losses from below-cost services would be great enough to offset the increase in the FDIC's potential liability to depositors.

sured deposits, many investors will shift from uninsured deposits to insured deposits, causing the percentage of insured deposits to rise.²⁵ Since there is a \$100,000 limit on the size of each insured deposit, some large investors might still prefer to hold uninsured deposits, even if banks pay the same rate on uninsured and insured deposits. However, individuals with large amounts of money to invest can obtain full insurance by splitting up their funds into smaller deposits at different banks. In the last couple of years, the cost of doing this has been significantly reduced by the growth of money brokers acting as intermediaries between investors and banks.²⁶ Thus, under the current system, the percentage of insured deposits could well approach 100 percent.

If uninsured depositors are able to monitor

²⁴ If there are bankruptcy costs, the AB curve will shift down at the same time the EF curve shifts up, because with higher deposit rates the bank will have a greater chance of failure at every level of asset risk. At the bank's initial choice of asset risk, it is also possible that increases in risk will now have a greater tendency to raise expected bankruptcy costs. Although this would make the AB curve steeper, it would also tend to make the EF curve steeper because any increase in expected bankruptcy costs will be borne in large part by the FDIC. Thus, the new EF curve should still be steeper than the new AB curve at the bank's initial choice of asset risk.

²⁵ This is especially likely since the premium a bank has to pay for deposit insurance under the current system depends on its total deposits, including those that are uninsured. Under this arrangement, there is no reason for a bank operating in a highly competitive deposit market without ceilings to pay more on its uninsured deposits than on its insured deposits, assuming they cost the same amount to service. If the bank did pay more on its uninsured deposits, it could always obtain the same total funds at lower cost by taking fewer uninsured deposits and raising its rate on insured deposits slightly so as to bid away insured deposits from other banks.

²⁶ Under current regulations, the \$100,000 coverage limit does not apply to the total amount of funds placed by a money broker at a bank, but instead to an investor's share of the total. In an effort to limit the brokering of insured deposits, the FDIC and FSLIC have recently proposed changing the regulations to make the \$100,000 limit apply to the total amount of funds placed by the broker. See *American Banker*, January 17, 1984, p. 1.

banks' risk-taking, the increase in the percentage of insured deposits should make the moral hazard problem worse. Earlier in the article it was assumed that uninsured depositors could determine exactly how much risk a bank was taking and that they would respond to any increase in risk by demanding a large enough increase in the deposit rate to prevent their expected return from falling. In this extreme case, the effect of an increase in the percentage of insured deposits is clear. A rise in the percentage of insured deposits increases the total amount the FDIC has to pay insured depositors if the bank fails. Thus, given total deposits and total assets, an increase in risk that raises the bank's probability of failure will shift more of the expected return on the bank's assets from the FDIC to shareholders and still leave the expected return to uninsured depositors unchanged. This means banks will have more incentive to increase asset risk and less incentive to raise new capital.²⁷

In practice, uninsured depositors cannot observe all increases in risk and thus cannot always demand a large enough increase in deposit rates to keep their expected return from falling. As a result, increases in risk have a tendency not only to shift the expected return on the bank's assets from the FDIC to shareholders but also to shift the expected return on the bank's assets from uninsured depositors to shareholders.

In these circumstances, an increase in the percentage of insured deposits should still make the moral hazard problem worse, but not as much as when uninsured depositors can monitor risk perfectly. If the percentage of insured deposits rises but total deposits and total assets remain unchanged, an increase in

²⁷ This assumes that uninsured depositors do not already regard their deposits as effectively insured because the FDIC chooses the merger option rather than the payoff option in the event of failure.

risk that raises the bank's probability of failure will produce a larger total shift in expected return from the FDIC to shareholders but a smaller total shift in expected return from uninsured depositors to shareholders. If uninsured depositors had no ability to monitor risk, these two effects would cancel out, leaving the bank with the same incentive to take risk as before. In most cases, however, uninsured depositors probably do have some ability to monitor risk and protect the expected return on their investment. As a result, the somewhat smaller tendency for increases in risk to benefit shareholders at the expense of uninsured depositors should be outweighed by the greater tendency for increases in risk to benefit shareholders at the expense of the FDIC.

In terms of Figure 1, the curve EF representing the combined expected return to the FDIC and depositors will become steeper. As in the case of a direct increase in the FDIC's potential liability to depositors, this means the bank will be able to widen the gap between AB and EF—and thus increase the total expected return to its shareholders—by choosing a higher level of asset risk than before.

Creation of a new distortion from cross-subsidization

The deregulation of deposit rates would exacerbate the moral hazard problem even if all banks were identical. However, banks are not identical. Some will prefer to take more risk than others because they face riskier investment opportunities or because their shareholders are less averse to variability in the return on their investment. Furthermore, some banks that are basically insolvent because their past loans have little chance of being repaid may be able to escape the attention of regulators and remain in operation.

These banks will be especially willing to take risks because their only hope of earning a positive return for their shareholders is to acquire risky assets with potential returns high enough to make up for previous losses. Despite these differences in risk-taking among banks, the FDIC charges all banks the same premium per dollar of deposits, resulting in subsidization of relatively risky banks by relatively safe banks. In other contexts, this phenomenon is often referred to as "cross-subsidization."²⁸

Although cross-subsidization between risky banks and safe banks might be considered unfair, the existence of interest-rate ceilings on insured deposits at least helped keep it from affecting the distribution of deposits. While ceilings were binding, both risky and safe banks would probably have been willing to incur greater costs to obtain insured deposits. In other words, most banks probably could not pay enough implicit interest on insured deposits to circumvent completely the limits on explicit interest. However, because risky banks were receiving deposit insurance below cost and safe banks were receiving deposit insurance above cost, risky banks would have been willing to pay even more than safe banks for insured deposits. By making it more difficult for all banks to bid for

²⁸ Like the moral hazard problem, the cross-subsidization of deposit insurance has close analogies in other insurance markets. For example, it has been proposed that drivers be charged a fixed premium for automobile insurance on every gallon of gasoline consumed. Although a driver's probability of having an accident depends on the amount of driving he does and thus indirectly on the amount of gasoline he consumes, there are many other factors that also influence his chance of having an accident, such as his skill as a driver or the kind of traffic conditions in which he does most of his driving. Thus, if all drivers paid the same premium per gallon of gasoline consumed, risky drivers would be undercharged for insurance and safe drivers overcharged, just as risky banks are currently undercharged for deposit insurance and safe banks overcharged. In this example, a price ceiling on gasoline would play the same role as interest rate ceilings on insured deposits.

deposits, interest-rate ceilings also made it more difficult for risky banks to outbid safe banks for deposits.

The deregulation of deposit rates will remove this constraint on competition for funds and distort aggregate risk-taking behavior. Now banks can not only compete for insured deposits within their own regions but also compete for insured deposits from other regions by selling large CD's and making use of money brokers. From society's point of view, the increased competition for funds will have the advantage of allowing banks with highly productive lending and investment opportunities—those for which the curve AB in Figure 1 is relatively high—to increase their share of total deposits. However, it will also have the disadvantage of allowing banks with highly risky lending and investment opportunities—those for which the curve AB in Figure 1 lies relatively far to the right—to increase their share of total deposits.²⁹ This is a disadvantage from society's point of view because risky banks may end up expanding their lending and investment to a point where the expected return on the last unit of their assets is significantly less than the expected return on the last unit of safe banks' assets. This could happen even if there were no moral hazard problem in the choice of asset risk—that is, even if every bank chose the level of asset risk that was socially optimal given its total assets.³⁰

Alternative policy responses

This article has argued that the deregulation

²⁹ A related problem is that the owners or managers of a bank may seek insured deposits with the intention of diverting the funds to their own uses—either legally in the form of higher salaries and perquisites or illegally through outright theft. The removal of deposit-rate ceilings enables these banks to increase their share of total deposits along with banks that intend to invest depositors' funds in highly risky assets.

of deposit rates will increase the distortion in bank risk-taking behavior that already exists under the current system of fixed-rate deposit insurance. Although a detailed analysis of reforms in the deposit insurance system is beyond the scope of the article, some of the possible policy responses to the problems posed by deposit-rate deregulation can be briefly discussed.

Since deposit-rate deregulation will increase the distortion in bank risk-taking, the question naturally arises whether an appropriate response to the problem would be to reimpose ceilings that have already been removed and maintain those ceilings that are still in effect. Although the removal of ceilings will reduce economic efficiency to some extent by increasing the distortion in banks' risk-taking, it is important to realize that it will increase economic efficiency in other ways. For example, the removal of the ceiling on checkable deposits will eliminate the waste of resources resulting from households and firms trying to economize on their holdings of transactions balances. By making it possible for banks in aggregate to attract more deposits, deposit-rate deregulation will also enable the banking industry to increase its total lending and investment, financing some high-return investment projects that might not otherwise be undertaken. Finally, the removal of deposit-

³⁰ For the removal of interest-rate ceilings on insured deposits to shift the distribution of deposits toward risky banks, it is sufficient that risky banks desire more insured deposits than safe banks at every level of deposit rates and that risky banks be unable to obtain as much insured deposits as they would like with the ceilings. However, because the degree of cross-subsidization between safe banks and risky banks increases with the level of interest rates on insured deposits, the demand of risky banks for insured deposits will not only exceed the demand of safe banks at every level of deposit rates but will do so by a greater amount the higher the deposit rate. This phenomenon, often referred to as "adverse selection," makes the problem described here even worse by causing the distribution of deposits to shift toward risky banks by an even greater amount after ceilings are removed.

rate ceilings will tend to improve the distribution of total deposits to the extent that it enables banks with highly productive investment opportunities to bid funds away from banks with investment opportunities that are equally risky but less productive. For all these reasons, deposit-rate deregulation should on balance increase economic efficiency. Reversing the deregulation of deposit rates would amount to throwing the baby out with the bathwater.³¹

A second response to the increased distortion in bank risk-taking would be to reduce FDIC insurance coverage. For example, the FDIC could lower the maximum coverage below \$100,000 and make less use of the merger option when banks fail. Because uninsured depositors often cannot observe exactly how much risk a bank is taking or would like to take, both a moral hazard problem and a cross-subsidization problem would remain even if deposit insurance were eliminated altogether. However, because uninsured depositors do in most cases have some ability to monitor risk, it is likely that reducing FDIC coverage would at least partially offset the adverse effects of deposit-rate deregulation on risk-taking.³² The major problem with this approach is that it would revive the danger of banking panics by giving depositors more reason to worry about the possibility that other

depositors would withdraw their funds from the same bank. In addition, efforts to reduce the FDIC coverage limit could well be frustrated by increased brokering of insured deposits.

A third response to the problem would be to adopt some form of variable-rate deposit insurance so that the premium a bank paid for deposit insurance depended on the amount of risk it was taking. To the extent it could be implemented, such an approach would reduce both the moral hazard problem and the cross-subsidization problem. Also, unlike a reduction in FDIC coverage, it would not increase the danger of banking panics. The only problem with this approach—but a major one—is the difficulty of measuring risk. The FDIC can determine how much capital a bank has with reasonable accuracy, but it cannot easily determine how risky a bank's loans and investments are. Nevertheless, the fact remains that the FDIC already collects some information about the amount of risk banks are taking. Instead of using that information to impose an upper limit on risk-taking, it could just as well use it to set premiums that varied with risk.³³

Some observers have argued that private insurers would do a better job of measuring

³¹ Although it would be unwise to reimpose deposit-rate ceilings, the FDIC should at least make sure that deposit rates do not end up excessively high because deposit insurance is underpriced. In other words, if deregulation leads to an increase in aggregate risk-taking by banks at every level of total deposits, the FDIC should raise the insurance premium on each dollar of deposits to help cover the increase in the expected cost of compensating depositors. If the premium per dollar of deposits were left unchanged, the removal of deposit-rate ceilings would not only misallocate deposits between safe banks and risky banks but also lead to too high a level of deposits — and thus too high a level of lending and investment — in the banking industry as a whole.

³² A possibility that has not received much attention would be to eliminate FDIC coverage of the interest on insured deposits — that is, restrict coverage to the principal. If depositors could determine exactly how much risk a bank was taking, this change would eliminate the tendency for deposit-rate deregulation to exacerbate the moral hazard problem by directly increasing the FDIC's potential liability on every dollar of insured deposits. Deposit-rate deregulation would still tend to exacerbate the moral hazard problem by increasing the percentage of insured deposits and would still make it easier for risky banks to outbid safe banks for insured deposits. However, both effects would be weaker.

³³ The FDIC has recently come out in favor of some modest variation in insurance premiums. See Federal Deposit Insurance Corporation, *Deposit Insurance in a Changing Environment*, April 15, 1983. In this report, which was submitted to Congress in compliance with the Garn-St. Germain Act, the FDIC also recommended other changes in the deposit insurance system.

and pricing risk than the FDIC because the profit motive gives them a stronger incentive. If this were true, another way of getting banks to bear the true costs of their risk-taking would be to make deposit insurance compulsory for deposits of \$100,000 or less but allow banks to obtain some or all of their coverage from private insurers rather than the FDIC, if they so chose. Because all deposits would still have to be insured up to \$100,000, the danger of banking panics would be much less than it was before the FDIC was established. However, that danger would still be significantly greater than it is now. This is because every depositor at a privately insured bank would have to worry about the insurer's ability to pay claims in the event that withdrawal by other depositors forced the bank to close. Also, even if there were no danger of banking panics, private companies might be reluctant to insure deposits on a large scale because bank failures are not independent risks. Since a nationwide recession increases the probability of failure for all banks simultaneously, private insurers cannot rely on the law of large numbers to reduce risk through diversification, as a life insurer or automobile insurer can.

The final and least dramatic response to the increased distortion in bank risk-taking would be to strengthen bank supervision and regulation—that is, do a better job of enforcing existing limits on risk-taking and perhaps tighten those limits as well. However, if more resources were devoted to bank examinations, it might be better to use those examinations to collect information suitable for setting variable insurance premiums than to use them to enforce an upper limit on the amount of risk banks can take. Also, while a reduction in the upper limit on risk-taking might prevent some banks from taking more risk in response to the deregulation of deposit rates, it would also have the disadvantage of forcing other banks

to reduce their risk-taking still farther below the socially optimal level.

Summary and conclusions

Even before the recent financial deregulation, fixed-rate deposit insurance distorted banks' risk-taking behavior by creating a moral hazard problem. Because the FDIC charges a fixed premium per dollar of insured deposits, banks are not forced to bear the full expected costs of their risk-taking. As a result, banks have had a greater incentive to choose a risky mix of assets and a smaller incentive to raise new capital to provide a cushion against losses.

The removal of deposit-rate ceilings and the subsequent bidding up of interest rates on insured deposits is likely to exacerbate this moral hazard problem by enabling banks to shift more of the costs of their increased risk-taking to the FDIC. The increase in deposit rates should do this in two ways, by directly increasing the potential liability of the FDIC on every dollar of insured deposits and by leading to an increase in the percentage of total deposits that are insured. Besides increasing the moral hazard problem, the deregulation of deposit rates should allow a relatively new distortion in aggregate risk-taking behavior to arise as a result of the cross-subsidization of deposit insurance. In particular, the removal of ceilings should make it much easier for risky banks, which are currently undercharged for deposit insurance, to bid deposits away from safe banks, which are currently overcharged for deposit insurance.

There are no easy ways to prevent this increased distortion in bank risk-taking behavior. Reimposing deposit-rate ceilings would reduce economic efficiency in a number of important ways, while reducing FDIC coverage would increase the danger of banking pan-

ics like those experienced before 1933. A more promising approach would be for the FDIC to use the information it already collects on banks' risk-taking to introduce some variation in insurance premiums, to collect more information about banks' risk-taking, and to encourage a limited degree of competition from private insurers.

Appendix

This appendix explains the moral hazard problem that exists with respect to a bank's choice of capital under the current system of fixed-rate deposit insurance. This distortion is explained in terms similar to those used in the text to explain the distortion in the choice of asset risk.

In deciding how much new capital to raise, a bank will act in the best interests of its present shareholders, the owners of the shares already outstanding. As in the choice of asset risk, it can be assumed that the bank does this by maximizing the total expected return on their investment and not worrying about the variability of the return. In other words, the bank issues that amount of new equity that maximizes the gap between the total expected return on its assets, net of bankruptcy costs, and the combined expected return to all other parties. Those parties now include not only the FDIC and depositors but also the bank's new shareholders, the investors buying the new equity.

Consider the effect of increasing the amount of new capital the bank raises while holding constant both the amount of deposits and the degree of relative asset risk — that is, the degree of variability in the actual return on assets relative to the expected return on assets. This will change the total expected return to the bank's present shareholders in three ways. First, because the bank uses the extra funds to acquire more assets, the

total expected return on its assets will increase. As the amount of capital is increased, this effect should eventually diminish in size because, to increase its total lending, the bank will have to make loans to borrowers with less productive investment projects. Second, because each new share must be sold at a price low enough to guarantee the buyer a positive expected return on his investment, the total expected return to new shareholders will rise. This effect will not diminish in size as the amount of new capital is increased. Third, because the extra capital provides a greater cushion against losses on assets, the bank's probability of failure will fall. Since the insurance premium is fixed, this raises the expected return to the FDIC.

Barring imperfections in the capital markets in which the bank sells its equity, it will be in society's interest for the bank to increase the level of new equity sales to the point where the difference between the total expected return on assets and the total expected return to new shareholders is highest. As the level of new equity sales approaches this point, the first and second effects described above will just offset each other. However, as long as the bank has some chance of failing, the third effect will continue to operate. That is, increases in capital will still have a tendency to reduce the total expected return to the bank's present shareholders by increasing the expected return to the FDIC. Thus, with fixed-rate deposit insurance, it will be in the interest of present shareholders for the bank to stop short of the socially optimal level of new equity sales.

With a few modifications, the same diagram used to illustrate the distortion in the choice of asset risk can also be used to illustrate the distortion in the choice of capital. Let the horizontal axis of Figure 1 now measure the amount of new capital foregone, so that a rightward movement in the diagram corresponds to a reduction in the amount of new capital raised. Also, let the curve AB now represent the total expected return on the

bank's assets minus the total expected return that must be offered to investors to get them to buy the new shares. Finally, let the curve EF continue to represent the combined expected return to the FDIC and the bank's depositors. Under these conditions, the total expected return to the bank's present shareholders equals the gap between the curves AB and EF.

The social optimum occurs at the point where the curve AB reaches its highest value. Reducing the amount of new capital and moving to the right of this point decreases the expected return to the FDIC, as indicated by the downward slope of the curve EF. Thus, the bank maximizes the total expected return to its present shareholders—the gap between curves AB and EF—by raising less than the socially optimal amount of new capital.