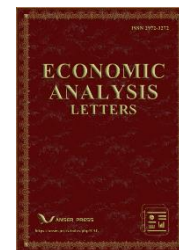




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Bank Runs and Design Flaws of Deposit Insurance

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ABSTRACT

Deposit insurance systems are designed to balance the benefits of preventing bank runs and protecting ordinary savers against the costs of reduced market discipline and potential burdens on taxpayers. Design flaws of deposit insurance make the benefits too low and the costs too high. This paper presents an example in which solvent banks can effectively manage runs, depositors discipline banks to a reasonable extent, and taxpayers have a fair deal. It has three key features: the bank's authority to activate deposit insurance early, a coinsurance scheme that transfer money from those who run on solvent banks to those who stay put, and a shareholder position for taxpayers. Early activation of deposit insurance prevents fire sales of assets and provides opportunities to verify the bank's solvency. The coinsurance scheme weakens the incentive to run and strengthens the incentive to hold on to their accounts. As shareholders, taxpayers receive dividends in normal times in exchange for large payouts in catastrophic events.

KEYWORDS

Bank runs; deposit insurance; market discipline

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1. Introduction

Most countries offer deposit insurance to prevent bank runs and protect the savings of ordinary people. The foremost goal should be preventing widespread bank runs, which can devastate the economy. In the U.S., bank runs recurred like business cycles before the establishment of the Federal Deposit Insurance Corporation (FDIC) in 1933. Although the U.S. has not suffered widespread bank runs since the establishment of FDIC, the threat of bank runs remains, as evidenced by recent runs on Silicon Valley Bank in California and Signature Bank in New York. Without aggressive government intervention, bank runs could spread widely. Furthermore, deposit insurance produces side effects, such as the banks' incentive to take excessive risk (moral hazard).

Apparently, the U.S. deposit insurance system has shortcomings, and those shortcomings may apply to that of most other countries. The shortcomings at least partly result from design flaws of deposit insurance. The most serious problem is that the cost of running on solvent banks is close to zero, while the cost of not running on insolvent banks is large. Thus, a small suspicion of a bank's solvency is enough to prompt bank runs. Other problems include weak market discipline and a high cost to taxpayers.

This paper shows some ways to prevent runs on solvent banks more effectively, preserve meaningful market discipline, and reduce the cost to taxpayers. The key is to change the incentive structure, such that running on a solvent bank can be costly and staying put can be rewarding. Another important point is to put taxpayers in the position of shareholders, who take both profits and losses, as opposed to losses only.

The rest of this paper is organized as follows. The next section reviews key features of deposit insurance. Section 3 analyzes potential problems with those features. Section 4 shows some ways to address those problems, using an example. Section 5 discusses some related issues. Section 6 concludes.

2. Key Features of Deposit Insurance

Key features of deposit insurance include coverage limits, coinsurance, risk-based premiums, bank supervision, mutual structure, and government backings. These features are intended to balance the benefits of preventing bank runs and protecting ordinary savers against the costs of reduced market discipline and potential burdens on taxpayers. This paper focuses largely on the U.S. deposit insurance system. Demirgüç-Kunt, Kane and Laeven (2015) detail the deposit insurance systems around the world.

FDIC insures deposits up to \$250,000 (coverage limit). Within the coverage limit, the insurance payout is 100 percent of the principal and accrued interest (no coinsurance). To build and maintain the insurance fund, FDIC collects premiums from member banks. The premium depends on the rating of safety and soundness examinations and the status of the insurance fund. The premium is higher for banks with a lower examination rating (risk-based premium). FDIC has supervisory authority. FDIC levies surcharges on member banks when the ratio of the insurance fund to insured deposits (reserve ratio) drops below the statutory minimum (1.35 percent) and pays dividends to member banks when the reserve ratio exceeds the level determined by FDIC (2.0 percent in 2022). With the surcharge and the dividend, FDIC resembles a mutual insurance company owned by policyholders. The critical difference is that FDIC has a credit line from the U.S. Treasury. If FDIC runs out of the fund, it can borrow from the U.S. Treasury to pay claims. FDIC is required to repay the Treasury with future premiums and surcharges. The failure to repay the Treasury, however, does not prevent FDIC from making insurance payouts. Thus, in effect, FDIC insurance is backed by the full credit and faith of the U.S. government.

Merton (1977) shows that with limited liability, the equity position of a company is analogous to the put option; shareholders of the company have a right to sell the company's assets at the price of its liabilities. Thanks to the put option, the wealth of shareholders increases with the variance of the return on equity (risk level), holding the funding cost constant. Thus, if deposit insurance unties the funding cost from the risk level, banks have incentives

to increase the risk level. The ways to deal with moral hazard are market discipline and regulation. With market discipline, the funding cost rises with the risk level, offsetting the increase in the put option value. Regulations limit the risk level by requiring capital adequacy and restricting the asset portfolio.

The coverage limit is intended to incentivize large depositors to impose discipline on banks, while protecting the savings of ordinary people. The risk-based premium is another way to tie the funding cost to the risk level. Through regulation and supervision, FDIC directly limits the risk level. Conceptually, the mutual insurance structure can insulate taxpayers from any financial trouble of FDIC. Some countries also use coinsurance to incentivize all depositors to impose discipline on banks.

3. Design Flaws of Deposit Insurance

When U.S. policymakers designed deposit insurance, they might have envisioned the following. Fully protecting ordinary depositors should be enough to prevent bank runs. Large depositors would demand sufficiently high interest rates to risky banks to discourage banks from increasing the risk level. Regulation and supervision would effectively limit the risk level. FDIC would be able to set the risk-based premium accurately to discipline risky banks and control the cost of insurance. The mutual structure would force banks to cover the cost of deposit insurance fully.

The reality has been quite different. The coverage limit seriously undermines the effectiveness of deposit insurance in preventing bank runs, while it may improve market discipline to a very limited extent. Regulation and supervision are far from perfect. It is very difficult to price deposit insurance fairly. The mutual insurance structure is a bad deal for taxpayers.

Banks do not maintain enough reserves to withstand runs by large depositors. Without government intervention, runs by large depositors can lead to widespread bank runs. Upon witnessing runs on Silicon Valley Bank and Signature Bank in March 2023, the U.S. government expanded the coverage of deposit insurance to all deposits at those banks. During the financial crisis of 2008, the U.S. government protected even money market mutual funds to stabilize the financial market. Uninsured depositors may not have sufficient ability and incentive to impose discipline on banks. It takes private information to evaluate the quality of some loans (e.g., small business loans). Thus, it is hard for depositors to evaluate the asset portfolio of banks. Given that runs by uninsured depositors can destabilize the financial market, the credibility of the coverage limit is low. The low credibility may weaken the depositors' incentive to monitor banks. The coverage limit also has some other problems. In the long run, implicit insurance increases the loss to FDIC because FDIC does not collect premiums on the uninsured portion of deposits. The coverage limit gives a competitive advantage to large banks that are perceived to be too big to fail.

The financial market is dynamic. The financial market keeps introducing complex products, and it is subjected to various economic shocks. Thus, regulators and supervisors can easily fall behind. Sometimes, regulators and supervisors overlook even well-known risks, such as the interest rate risk. Silicon Valley Bank had been taking an enormous interest rate risk by loading up its balance sheet with long-term Treasury securities. Regulators and supervisors failed to deal with the obvious risk.¹ The problems with regulation and supervision also apply to risk-based premiums. If regulators and supervisors cannot assess the financial conditions of banks accurately, they cannot set risk-based premiums accurately. Chan, Greenbaum and Thakor (1992) also show in a theoretical model that fairly priced deposit insurance is possible only in very limited circumstances.

The combination of the mutual structure and the government backing creates a situation where taxpayers can only lose. Mutual insurance is appropriate for insurance products pooling regular risks, such as life insurance and

¹ U.S. banks are not required to report the market values of the long-term bonds that they intend to hold to maturity. Mark-to-market accounting applies to the long-term bonds that are held for trading purposes.

auto insurance. For those events, the aggregate outcome (e.g., the death rate and the automobile accident rate) is fairly stable, so there is little need for large third-party capital. For deposit insurance, however, the aggregate outcome is very irregular; bank failures spike during a financial crisis. FDIC does not build a huge reserve needed to sail through a major financial crisis. During normal times, member banks may seriously underpay; they pay low premiums and receive dividends. After a crisis, the FDIC may increase premiums to rebuild the reserve and repay the government. However, there is no guarantee that the government will be fully repaid. Another crisis may occur before the repayment, or the banking industry may successfully lobby politicians to cancel the debt.

The mutual structure has additional problems. It transfers wealth from conservatively managed banks to aggressively managed banks in expected value terms. Banks collectively underpay for deposit insurance before a crisis and overpay after the crisis. Provided that aggressive banks fail during the crisis, conservative banks end up overpaying, while aggressive ones end up underpaying. The wealth transfer can create perverse incentives. Another problem with the mutual structure is that premium changes compound the effects of business cycles. Banks may enjoy low premiums during good times, but they get hit with higher premiums when they struggle to recover from a crisis. High premiums during bad times can delay the recovery of the banking sector and adversely affect economic activities. To be fair and efficient, insurance premiums should always be forward-looking.

Straightforward coinsurance seriously undermines the effectiveness of deposit insurance in preventing bank runs. In the old days, running on a bank would mean standing in line for hours. In these days, depositors can move funds within a few minutes using a smart phone. Since running on a bank is almost costless, a chance of losing even a tiny fraction of deposits may be enough to prompt bank runs. Realizing the impracticality of enforcing coinsurance rules, many countries removed coinsurance after the financial crisis of the late 2000s (Demirgüç-Kunt, Kane and Laeven, 2015).

To be effective and efficient, deposit insurance should be designed based on well-thought goals, principles, and premises. The foremost goal of deposit insurance should be preventing runs on solvent banks. Runs on insolvent banks are acceptable. Liquidating insolvent banks should not cause turmoil in the market and should improve economic efficiency in the long run. For insolvent banks, the role of deposit insurance should be confined to facilitating orderly exits.

Regulation, supervision, and risk-based premiums are important tools to restraint excessive risk taking, but their effectiveness is limited. Thus, market discipline is also important. Nevertheless, measures to improve market discipline should not significantly compromise the goal of preventing widespread bank runs. There may not be a reasonable tradeoff between the two because the consequence of widespread bank runs can be devastating. Furthermore, any measure that contradicts the prevention of bank runs has a low credibility.

The burden of market discipline should fall on those who can impose discipline on banks effectively and efficiently. Large depositors are not necessarily in the best position to impose discipline on banks. Sophisticated investors can obtain and process information cheaply and choose the right bank. For depositors who use banks just for transaction purposes, on the other hand, it may be burdensome to evaluate the financial condition of a bank. Payroll accounts of small businesses can have much more than \$250,000. Individuals who are about to close a homebuying contract may need to park more than \$250,000 in the bank account. If those depositors have to worry about the solvency of banks, it will translate into higher transaction costs and lower economic efficiency.

Given that taxpayers have to be involved in one way or the other, they should be like shareholders of the insurance company. FDIC might set the premium based on the long-term average cost of insuring deposits, pass on profits to taxpayers during normal times, and uses taxpayers' money in a crisis. On average, taxpayers might break even. In addition, prudently managed banks would not have to be holding the bag after a crisis.

4. Incentive to Not Run on Solvent Banks

Bank runs occur because those who run ahead win and those who fall behind lose. Bank runs might not occur if those who run ahead could lose and those who stay put could win. Consider the following arrangements. Deposit insurance features unlimited coverage and modest coinsurance, say 2 percent. Banks are authorized to activate deposit insurance without seeking an approval from the insurer. If a bank detects unusual withdrawal activities, it simultaneously notifies the public and the insurer of a suspension of payments. Then a workout period begins. The insurer temporarily takes over all assets and insured liabilities and makes insurance payouts (98 percent of balance) to those who want the withdraw during the workout period. The bank continues its operation other than debt payments under close supervision.

Classify depositors into 4 groups: those who withdraw before the workout period (early runners), those who withdraw during the workout period (late runners), those who stay with the bank throughout the workout period (stayers), and those who make new deposits during the workout period (new comers). For simplicity, let the interest rate be zero. Early runners receive 100 percent of the balance. The insurer pays 98 percent of the balance to late runners, and deposits 2 percent into a contingent account. The deposit insurer conducts an in-depth examination of the bank during the workout period. If the insurer finds that the bank is insolvent, it pays 98 percent of balance to stayers and new comers, and uses the contingent money to cover its loss. In the case that bank is solvent and adequately capitalized, the bank resumes normal operation. In the case that the bank is solvent but undercapitalized, the insurer orders recapitalization before the resumption of normal operation. When the bank resumes normal operation, the insurer distributes the contingent money to stayers and new comers. It credits each account based on the deposit share (the amount of money in each account divided by the total amount of deposits at the bank) at the end of the workout period. For example, if a depositor has \$100,000 in his account and the total deposit at the bank is \$10 million, the depositor receives 1 percent of the money in the contingent account.² Under these arrangements, stayers of a solvent bank get even if there are no late runners or better off if there are some late runners. Thus, unless the bank has absolutely no chance to be solvent, staying is clearly a better strategy than running late. If the bank has a good chance to be solvent, staying can be even better than running early. Table 1 tabulates the rate of return for each group of depositors.

Table 1. Table 1: Rates of Return for Depositors (Percent)

	Early Runners	Late Runners	Stayers	New Comers
Bank is insolvent.	0	-2	-2	-2
Bank is solvent.	0	-2	$0+\alpha$	$0+\alpha$

Note: $\alpha \geq 0$. It increases with the proportion of late runners and decreases with the proportion of new comers.

The bank can even attract new deposits. Suppose that some depositors inexplicably panic to become late runners. Since late runs increase the size of the contingent account, it can be optimal to open a new account if the bank is likely to be solvent. Let's consider a bank that enters the workout with 1,000 deposit accounts of the equal size (\$100 per account). A depositor estimates the following: 300 late runners, 700 stayers, and 100 new comers. With 300 late runners, the contingent money is \$600 ($\2×300). If the bank turns out to be solvent, 700 stayers and 100 new comers equally share \$600. The share per depositor is \$0.75 ($\$600/800$), and the return to new comers is 0.75 percent. If the solvency probability is 0.5, new comers lose 2 percent with a 50 percent chance and gain 0.75 percent with a 50 percent chance. Then the expected return to new comers is negative ($0.5 \times (-2) + 0.5 \times 0.75 = -0.625$ percent). If the solvency probability is 0.9, however, the expected return is positive ($0.1 \times (-2) + 0.9 \times 0.75 = 0.475$ percent). The expected return to new comers also increases with the proportion of late runners. If 900 depositors

² I assume the equal reward for stayers and new comers for simplicity. One can make a case for a higher or lower reward for new comers. New comers take a new risk of losing 2 percent. On the other hand, they can make a decision with much more information toward the end of the workout period. It is a complex implementation issue.

become later runners, 200 depositors (100 stayers and 100 new comers) share \$1,800 ($\2×900). If the bank turns out to be solvent, each depositor receives \$9 ($\$1,800/200$). Then even with a solvency probability of 0.5, the expected return to new comers is significantly positive ($0.5 \times (-2) + 0.5 \times 9 = 3.5$ percent). Thus, depositors who estimate a high solvency probability or a high proportion of late runners may open a new account. When new comers are better off, staying is also better than early running because the expected return to stayers before the workout is equal to the expected return to new comers.

In typical bank run models (e.g., Bryant (1980) and Diamond and Dybvig (1983)), bank runs occur when depositors expect others to withdraw. Since bank assets are illiquid, liquidating assets (fire sales of assets) makes otherwise solvent banks insolvent. Thus, if bank runs force a bank into liquidation, remaining depositors suffer a huge loss. In this case, the optimal strategy of depositors is to run before others run. Well-designed deposit insurance can break the link. In the arrangements above, depositors can gain when others run on solvent banks. It is suboptimal to run on solvent banks in the first place. If irrational depositors run anyway, rational depositors may counter the runs with new deposits.

Two key features in this example are the bank's authority to activate deposit insurance early and a coinsurance scheme that transfer money from late runners to stayers. Early activation of deposit insurance prevents fire sales of assets and provides opportunities to verify the bank's solvency. The coinsurance scheme weakens the incentive to run and strengthens the incentive to stay put.

Once the insurer finds that the bank is solvent and let the bank resume the normal operation, depositors can withdraw the full balance. Then a key question is whether depositors would run on the bank again. Based on the U.S. banking history, they would not. The suspension of payments was often practiced before the establishment of FDIC. When banks reopened after the suspension, runs on those banks did not recur in most cases (Friedman and Schwartz, 1963, p.329). Park (1991) explains that bank runs did not recur because the suspension served as a process of verifying solvency information. The suspension was highly effective in stopping bank runs in cases where regulators examined banks during the suspension and allowed only solvent banks to reopen. As a safeguard, the insurer may provide temporary credit lines to all banks that resume normal operation.

5. Other Considerations

Undoubtedly, preventing bank runs is very important. Still, mechanisms designed to prevent bank runs should not seriously interfere with the banks' ability to perform their key roles. One of the key roles is liquidity creation. Punishing withdrawals, however, reduces the liquidity of deposits. A reasonable solution is to insure transaction accounts fully. The burden of market discipline should fall on savers and investors rather than convenience users who park money in the bank for transaction purposes. To prevent the abuse of transaction accounts, the insurer may impose an interest rate ceiling on transaction accounts. Realistically, the price of liquidity cannot be zero. For the coinsurance purpose, fund transfers from other types of accounts to transaction accounts during the workout period should be counted as withdrawals. In this way, banks can provide liquidity at a modest price (a lower interest rate received by holders of transaction accounts outside of the workout period).

Alternatively, the insurer may make the percentage of coinsurance for an account proportional to the interest rate on the account. Then the choice is up to banks and depositors. If a depositor wants a 100 percent coverage, he can choose a transaction account paying no interest. This scheme will also make depositors more careful with risky banks that aggressively bid up interest rates.

By reducing competition among banks, an interest rate ceiling increases the charter value (long-term profitability) of banks and decreases depositor welfare. A larger charter value has a positive economic effect of discouraging banks from taking excessive risk (Keeley, 1990). An interest rate ceiling confined to transaction accounts should not reduce depositor welfare significantly. With electronic fund transfers, depositors can easily

manage account balances.

Banks are financial intermediaries. In particular, banks make loans to some borrowers who can hardly obtain credit elsewhere, such as small businesses. Thus, an interruption in bank lending can have a significantly negative effect on the economy. The continuation of operation during the workout period is a good way to preserve the banks' ability to carry out financial intermediation. The insurer should disallow excessive risk taking during the workout period, but it may still allow regular activities.

Another important issue is whether a very low level of coinsurance can meaningfully promote market discipline. Park and Peristiani (1998) find that fully insured depositors, as well as uninsured depositors, avoid risky banks, possibly because of the cost of inconvenience caused by bank closures. Based on this result, a very low level of coinsurance like 2 percent can be fairly effective in promoting market discipline. Furthermore, a high level of coinsurance may not be credible. Given that enforcing a high level of coinsurance can cause economic turmoil, depositors may not take large coinsurance seriously. The expectation of a bailout can significantly reduce the effectiveness of coinsurance as a tool to promote market discipline and distort the market by advantaging "too-big-to-fail" banks. It is also important to protect the savings of ordinary people. Thus, coinsurance should be at a low level that can be easily absorbed by depositors.

Market discipline with small coinsurance should not be substantially weaker than that with a coverage limit. With small coinsurance, the amount at risk is small, but all depositors should be concerned about the solvency of banks. Large depositors can bypass the coverage limit by spreading their deposits among many banks. The coverage limit may also have lower credibility. Considering these factors, market discipline can even be stronger with small coinsurance than with the coverage limit.

For the purpose of protecting small savers, coinsurance is less complete than the coverage limit. Although protecting small savers is a worthy policy goal, the protection does not have to be 100 percent. Coinsurance is very common for other insurance products, and it does not raise serious social or economic issues. For most depositors, losing a small fraction of deposit should be bearable. The government may help really vulnerable populations through other means such as a tax credit for the loss of deposit.

6. Conclusion

Key features of deposit insurance include coverage limits, coinsurance, risk-based premiums, bank supervision, mutual structure, and government backings. These features are intended to prevent bank runs and protect savings of ordinary people, while preserving the depositors' incentive to discipline banks, restraining the banks' ability to take excessive risk, and minimizing the cost to taxpayers. They don't work as intended.

Coverage limits and coinsurance make banks vulnerable to runs, while they may promote market discipline to a very limited extent. Regulation and supervision are far from perfect. It is very difficult to price deposit insurance fairly. The mutual insurance structure with government backings is a bad deal for taxpayers.

Realistically, it is impossible to eliminate all shortcomings. Thus, policymakers should set priorities, and the first priority should be preventing widespread bank runs, which can devastate the economy. Other goals are less important, and any scheme that compromises the main goal may not work as intended due to a low credibility for enforcement.

This paper has constructed an example in which solvent banks can effectively manage runs, depositors discipline banks to a reasonable extent, and taxpayers have a fair deal. It has three key features: the bank's authority to activate deposit insurance early, a coinsurance scheme that transfer money from those who run on solvent banks to those who stay put, and a shareholder position for taxpayers. Early activation of deposit insurance prevents fire sales of assets and provides opportunities to verify the bank's solvency. The coinsurance scheme weakens the incentive to run and strengthens the incentive to hold on to their accounts. As shareholders, taxpayers receive

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

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