

Bank Liability Insurance Schemes in the United States Before 1865*

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Abstract

Prior to 1861, several U.S. states established bank liability insurance schemes. One type was an insurance fund; another was a mutual guarantee system. Under both, member banks were legally responsible for the liabilities of any insolvent bank. This paper hypothesizes that moral hazard was better controlled the more power and incentive member banks had to control other members' risk-taking behavior. Schemes that gave member banks both strong incentives and power controlled moral hazard better than schemes in which one or both features were weak. Empirical evidence on bank failures and losses on assets is roughly consistent with the hypothesis.

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1. Introduction

Moral hazard is inherent in all insurance. Bank liability insurance is not an exception, as our recent financial experience attests.

Today, bank deposit liabilities are insured by the Federal Deposit Insurance Corporation (FDIC), established by the Banking Act of 1933. However, the FDIC was not the first bank liability insurance scheme in the United States. Six states enacted such schemes prior to the Civil War. Although the banking industry in the first half of the 19th century was quite different from what it is today, the moral hazard problems generated by these schemes were similar.¹

Although there were differences in the exact details of these six state bank liability insurance schemes, they were of two basic types. One type was an insurance fund, sometimes called a safety fund. The other type was a mutual guarantee system.

In the insurance fund schemes, member banks paid a percentage of capital into a fund controlled by a state banking authority. This authority would then use this fund to make payments to creditors of failed banks. Payments were capped initially by the amount in the fund. However, after such payments were made, there was mutualization of losses because the remaining solvent banks (survivors) potentially could be required to once again contribute to the fund to restore it to its requisite level. The responsibility for supervising member banks lay with a state banking authority, which had limited powers. Individual banks had little or no ability to control or modify the risk-taking behavior of other banks in the system.

The mutual guarantee systems did not have insurance funds. Instead, creditors of member banks that became insolvent were reimbursed directly and immediately out of the assets of surviving banks. The body overseeing these systems was a Board of Directors, and its powers were greater than those of the banking authorities in the insurance fund states. Further, individual banks had direct power to control or modify the risk-taking behavior of other banks in the system because each bank in the system had a representative on the Board.

Insurance funds schemes were enacted in three states: Michigan, New York, Vermont. Indiana, Iowa, and Ohio set up mutual guarantee systems. Here I focus on only four of these states: New York, Vermont, Indiana, and Ohio. I omit the schemes in Michigan and Iowa because they were in operation for only a short period of time.

I find that the experience of the four states was markedly different in terms of their ability to control moral hazard. The hypothesis in this paper is that these differences are consistent with the notion that how well a bank liability insurance scheme controlled moral hazard depended on (i) how much power the banks involved in the scheme had to take actions to control or modify other member banks' risk-taking behavior and (ii) how strong were the incentives for the member banks to use this power. Further, the hypothesis is that both the power and the incentive to directly affect other member banks' risk-taking behavior are important. Schemes with both features control moral hazard better than schemes with only one.

¹That moral hazard could be a problem with bank liability insurance schemes was recognized from the beginning. According to Chaddock (1910), 265, during the debate on the New York Safety Fund law, "another representative, Mr. Hubbell, pointed out that the very existence of such a fund would relax 'public scrutiny and watchfulness which now serve to restrain or detect misconduct.' "

Differences in how well moral hazard was controlled under these different bank liability insurance schemes has been studied previously, most notably by Calomiris (1989) and Calomiris (1990). In those studies, Calomiris explicitly recognized that there were differences in the ability to control moral hazard between the insurance fund and mutual guarantee schemes. Further, he argued that the power to directly affect other member banks' risk-taking behavior, which banks had under the mutual guarantee schemes but not under the safety fund schemes, was important for controlling moral hazard.

This paper, like Calomiris' studies, examines the extent to which the power that member banks had to directly affect other member banks' risk-taking behavior was important for controlling moral hazard. However, this paper goes further and presents a quantitative measure of how strong were the incentives that member banks had to use this power. It finds that the strength of these incentives varied not only between insurance fund schemes and mutual guarantee schemes, but also between states with the same type of insurance scheme. In particular, banks in the Vermont insurance had a stronger incentive to control the behavior of member banks than did banks in the New York insurance fund. And, more interesting, banks in the Indiana mutual guarantee system had a far stronger incentive to control the behavior of other member banks than did banks in the Ohio mutual guarantee system. As a result, I treat each of the four state bank liability insurance schemes as separate observations for testing the paper's hypothesis. This approach is one contrast between this study and those done by Calomiris. He groups states with safety funds together and states with mutual guarantee schemes together. A second difference between this study and those done by Calomiris is that this paper presents more detailed empirical evidence than he presented on how well moral hazard was controlled under each of these schemes.

The paper proceeds as follows. In the next section, I describe how the two types of insurance schemes differed in terms of how much power banks had to affect the risk-taking behavior of each other and show that the banks in mutual guarantee systems had more power over other banks than did banks in the insurance funds. In the third section, I rank the four insurance schemes by how large the incentives were for individual banks to control or modify the risk-taking behavior of other banks in the system. I show that the banks in the New York Safety Fund had the weakest incentives and that those in Indiana's mutual guarantee system had the greatest. In Section 4, I analyze how well these schemes controlled moral hazard by examining empirical evidence on bank failures and the losses on banks' asset portfolios. For the most part the evidence supports the predictions of my hypothesis. The exception is Ohio's mutual guarantee system which my hypothesis predicts should have controlled moral hazard better than it did. The final section has a summary and concluding remarks.

2. Power to change risk-taking behavior

2.1 Insurance funds

The New York Safety Fund, that state's insurance fund, was established in 1829. Banks chartered after the Safety Fund law was passed were required to join the fund.² Although the New York fund technically lasted until 1863, it effectively stopped providing insurance after 1842.

The Vermont insurance fund was established in 1831. Banks chartered after 1831 were required to join the fund. However, after 1841 newly chartered banks could choose whether or not to join, and rechartered banks could choose whether or not to continue in the fund.³ The result was that beginning in 1859 the Vermont fund had no participating banks.

Both insurance funds had virtually the same basic structure. Upon joining, member banks were required to pay a percentage of their capital into a fund managed by the state. These rates were 0.5% of capital per year up to a maximum of 3% in New York and 0.75% of capital per year up to a maximum of $4\frac{1}{2}\%$ of capital in Vermont. Both funds guaranteed all of the liabilities of banks in the fund.⁴

The activities of the banks in the fund were supervised by bank commissioners employed by the state.⁵ The bank commissioners, of which there were only three in each state, were given full access to bank records. However, the power of these commissioners was limited. In New York, a bank could be closed only if it were "insolvent, or shall have violated any of the provisions of their act or acts of incorporation" (New York law, sec. 18). Similarly, the bank commissioners in Vermont could close banks only if they were insolvent or had violated the provisions of the act establishing the safety fund. Banks in the New York and Vermont insurance funds could not be closed simply for bad management or taking on too risky a portfolio.

More importantly, from the point of view of this paper, in neither state did the laws contain any provision for member banks to directly affect the risk-taking behavior of the other banks in the system. In New York, for example, the most that a bank could do was get a bank examined "more frequently than once every four months, if required to do so by any three of the moneyed corporations subject to the provisions of this act" (sec. 16). Vermont's law contained no provisions concerning member banks' ability to monitor each other.

²Banks chartered before the law was passed did not have to join. However, 16 of the 40 banks in existence when the law was passed chose to be rechartered and be a part of the system.

³If a bank chose not to participate in the fund, the bank's directors had to post personal bonds equal to the bank's capital. If a rechartered bank chose not to rejoin the Vermont fund, its contribution was returned as was the case with New York Safety Fund banks.

⁴The exception was that beginning in 1837 New York provided that note holders, but not depositors or other creditors, would be paid immediately. However, payments from the New York Safety Fund to note holders could only continue as long as one-third of the capital of the fund (which amounted to \$914,342.24 on January 1, 1841) was held to meet debts other than notes of insolvent banks.

⁵The establishment of such supervisory agencies was an innovation at the time.

2.2 Mutual Guarantee Systems

The mutual guarantee systems went under the name of “State Bank of . . .,” or “Bank of the State of . . .” Banks that were members of the systems were called branches. For example, the bank in Indianapolis that was a member of the Indiana system was called the Indianapolis Branch of the State Bank of Indiana. The State Bank of Indiana had 13 branches. The State Bank of Indiana was in existence from 1834 until 1857, when it ceased doing business before its charter expired in 1859. It was replaced by the Bank of the State of Indiana, which was another mutual guarantee system. The State Bank of Ohio began in 1845 and lasted until 1863, when its branches converted to national banks. The State Bank of Ohio had 41 branches, although throughout most of its existence fewer than 41 were in operation at the same time.

Despite being called branches, the member banks of these systems were independent banks, not branches of a parent bank. Each branch had its own stockholders and issued its own notes that were redeemable only at that branch. Further, “its own profits [were to] be divided among its own Stockholders” (sec. 14 of the Indiana law). The entity known as the “State Bank of . . .” did no actual banking business whatsoever.

These systems were mutual guarantee schemes because each branch was responsible for at least some of the liabilities of the other branches. In Indiana, the branches mutually guaranteed “all debts, notes, and engagements of each other.”⁶ In Ohio, the law stated that “[e]ach solvent branch shall contribute . . . to the sum necessary for redeeming the notes of the failing branch.”⁷

Each system was overseen by the Board of Directors of the State Bank. The powers of the Board of Directors in both Indiana and Ohio were greater than that of the bank commissioners of the insurance funds. For example, the Board of Directors of the State Bank of Indiana was required to suspend a branch’s operations if a branch was “insolvent, or *is mismanaging its affairs, whereby the interest of other Branches is endangered, . . . or [has] refused to comply with any legal order or directions of the Board of Directors of the State Bank.*” (sec. 44, italics added). Further, it had the “power to limit and control the amounts of discounts and loans of the Branches after they amount to once and a quarter the amount of capital stock paid in” (sec. 40) and to “regulate and control the dividends of profits so that the capital stock shall never be diminished” (sec. 54).⁸

⁶State of Indiana (1849), sec. 9, p. 6.

⁷State of Ohio (1845), sec. 26, p. 35.

⁸As an example that the Board of Directors of the State Bank of Indiana utilized these powers, it wrote to the Lafayette Branch in 1838:

The requirement of Mr. [the cashier of the branch]’s resignation was not considered by any one of the State Board as a matter personal towards him, but he had been guilty of several matters which the Branch board had refused to disapprove. . . . All that the State board expect is that your branch shall by its safe, prudent and honorable management recover and retain public confidence. . . . I suppose this might be done much more effectually even than by removing the Cashier if your Directors who are large borrowers would resign and the places could be supplied by prudent sensible men, not borrowers. . . . The State Board must have assurance that matters will be managed otherwise or your branch must and will be suspended. (from Golembe and Warburton (1958), IV-20)

The cashier resigned. Others examples are that the Lawrenceburg branch was suspended for a time for

More importantly, from this paper’s viewpoint, the laws under which the mutual guarantee systems operated gave individual banks the direct ability to regulate the behavior of the other member banks. The Board of Directors of the State Bank in both systems was comprised of members appointed by the state legislature and *one director from each branch*.

3. Incentives to change risk-taking behavior

Under both of these systems, each bank had a direct, one-sided financial stake in the outcome of the other banks. A bank did not share in the profits (the upside) of another bank. Those profits went strictly to the shareholders of that bank. However, a bank could possibly share the losses (the downside) incurred by another bank. In the insurance fund scheme, this occurred because banks were potentially subject to additional assessments whenever the fund was reduced by payments to creditors of failed banks. Further, these assessments could continue until the funds returned to their requisite amounts, so that, in effect, banks could continue to be assessed without limit. In the mutual guarantee scheme, this occurred because any losses were paid immediately out of the assets of the surviving branches. If the losses were large enough, a surviving branch’s capital could be completely wiped out by the failure of another branch.

As a result, it would seem that the banks in all four of these schemes had incentives to control and modify the risk-taking behavior of other banks. To determine the extent to which banks in these schemes were exposed to the risks taken by other banks, I estimate the potential exposure to loss of an average bank that was a member of one of these insurance schemes if an average bank in the scheme failed.

3.1 New York

I estimate an average New York Safety Fund bank’s potential exposure to loss from the failure of an average Safety Fund bank as follows. First, for each Safety Fund bank, I assume that the amount that would have to be paid out of the Safety Fund if that bank failed to be the failing bank’s total liabilities less half the value its assets at the time of failure. That is, letting A_i and L_i denote the assets and liabilities of bank i , I assume the dollar amount that would have to be paid out of the Safety Fund from the failure of a member bank i , which I denote F_i , is $F_i = L_i - 0.5A_i$. I subtract half the value of assets from liabilities to account for the fact that not all of the assets of a failed bank would necessarily be worthless and that under the Safety Fund system creditors would be paid first out of any receipts from the sales of assets of a failed bank.

Next, I average these dollar amounts over all banks to obtain an estimated average dollar amount that would have to be paid out of the Safety Fund from the failure of a random member bank. That is, I estimate the average dollar Safety Fund payment to creditors from the failure of a random member bank to be $\bar{F} = \frac{1}{N} \sum_{i=1}^N F_i$, where N is the number of banks in the insurance scheme before any failures. Then, because the losses due to the failure of

showing favoritism to certain stockholders and directors in making loans and the Bedford, Michigan City, and South Bend branches were also criticized for their lending practices. Golembe and Warburton (1958), IV-21

a member bank were shared evenly by all surviving banks, I divide \tilde{F} by $N - 1$ to obtain an estimate of the expected dollar payout by a member bank due to the failure of a random member bank. Finally, to determine whether these dollar losses were large or small for an individual bank, I divide $\frac{\tilde{F}}{N-1}$ by the capital of bank i and average over all member banks. This number is my estimate of the potential exposure of banks in the New York Safety Fund. Specifically, I estimate potential exposure as

$$\text{potential exposure} = \frac{1}{N-1} \left[\frac{1}{N} \sum_{i=1}^N \frac{\tilde{F}}{K_i} \right],$$

where K_i is the capital stock of bank i .

Table 1 displays the number of banks in the Safety Fund for which I have data, their average capital, the average amount due from the Fund from the failure of an average bank, and the potential exposure such a failure would mean both in dollars and as a fraction of an average member bank's capital.⁹ The table shows that for a New York Safety Fund bank, the exposures were quite small. If an average Safety Fund bank were to fail and its assets were only enough to cover half of its outstanding liabilities, then an average surviving bank would be liable for an amount equal to between 0.6 percent and 1.8 percent of its capital stock to restore the Fund. These potential exposures remain small: 5.5 percent of capital (or less) for New York banks even under the extreme assumption that no assets of the failed bank were ever available to pay off creditors. These estimates are given in parentheses in Table 1. Of course, the assumption that failed banks would have no assets to pay creditors is extreme because all failing banks had some specie on hand that could be used to pay creditors.

Date	Number of banks reporting	Average due creditors from Fund (\$)	Potential Exposure			
			\$		% of capital	
1/1/1835	76	165,435	2,206	(8,937)	1.2	(4.4)
1/1/1836	77	241,979	3,184	(10,902)	1.8	(5.5)
1/1/1837	89	249,637	2,837	(9,651)	1.5	(4.4)
1/1/1838	87	110,438	1,285	(6,618)	0.6	(3.0)

Table 1: Potential exposure of banks in the New York Safety Fund, 1835-1838

However, in actuality the potential exposures of New York Safety Fund banks were less than the estimates in Table 1 for two reasons. The first is that there was a cap of 0.5% of capital per year on how much a bank could be required to contribute. The second is that by law the additional assessments on surviving banks could not begin until the process for liquidating the failed bank had been completed, which could take a long time. In fact, the delay between failures and assessments turned out to be substantial. New York experienced

⁹The table is limited to the years 1835-1838 because these are the only years during which the Fund was operating and for which good data exist. The number of banks does not equal the number of banks in the Fund because not all banks reported at the times given in the table.

one bank failure in 1837 and six more in 1840 and 1841. Yet, banks that were still members of the Safety Fund were not subject to special assessments until January 1842, and although the Fund had not been restored to its requisite level, almost no special assessments took place in 1844. Additional assessments began again in 1845 only after special state bonds to be paid off by these assessments were issued to pay off the creditors of the failed banks. The assessments continued until 1866 when these bonds were fully paid off.

3.2 Vermont

I estimate the potential exposures of banks in the Vermont Safety Fund using the same method used for the New York Safety Funds banks. The potential exposures are displayed in Table 2. The potential exposures of a Vermont Safety Fund bank were larger than those of New York Safety Fund banks, but they are still mostly below 5 percent of capital. However, they rise to between 10 percent and 40 percent under the assumption that none of assets of a failed bank were available to pay off creditors. These numbers are given in parentheses in the table.

Date	Number of banks reporting	Average due creditors from Fund (\$)	Potential Exposure			
			\$		% of capital	
1833	7	23,660	3,943	(15,030)	9.2	(39.4)
1834	8	71,327	1,984	(10,190)	5.0	(25.5)
1835	9	28,490	3,561	(13,164)	8.4	(31.2)
1836	9	118,305	3,957	(14,788)	8.8	(32.9)
1837	11	19,493	1,949	(9,419)	4.1	(20.0)
1839	11	29,510	2,951	(11,534)	6.0	(23.5)
1840	10	12,534	1,393	(8,734)	2.6	(16.1)
1843	15	16,533	1,181	(6,812)	2.0	(11.7)
1845	13	17,692	1,474	(8,288)	2.6	(14.4)
1848	14	13,699	1,054	(7,975)	1.6	(12.3)
1850	10	31,435	3,493	(16,871)	4.9	(23.6)
1852	10	42,158	4,684	(20,202)	5.8	(24.9)
1855	7	34,839	5,806	(26,476)	7.5	(34.0)

Table 2: Potential exposure of banks in the Vermont Safety Fund, selected years, 1833-1855

However, the potential exposures of Vermont Safety Fund banks also were actually smaller than those shown in Table 2 for the same two reasons that the potential exposures of New York Safety Fund banks were actually smaller than indicated by the estimates in Table 1. Vermont banks, like New York banks, had a cap (0.75% of capital per year) on how much a bank could be required to contribute to restore the fund after a bank failure.

Also, as was the case with New York, there could be a long delay between bank failures and assessments on the remaining solvent banks. In fact, the delay was substantial and even greater than that for New York Safety Fund banks. The first failure of a Vermont Safety

Fund bank was the Essex County Bank. It failed in 1839. However, the remaining banks that were members of the Vermont insurance fund did not face special assessments until 1852. Further, these assessments ended in 1855. No assessments were made after the only other failure, that of the Danby Bank in 1857, because there were no banks remaining in the fund at this point.

3.3 State Bank of Indiana

I estimate the potential exposure of the branches of the State Bank of Indiana differently than I did for the banks in the New York and Vermont insurance fund schemes. I assume that the cash on hand, but only the cash on hand, in the failing branch of the State Bank of Indiana could be used to pay creditors. The reason for excluding other assets from what could be used to pay a failed bank's creditors is that creditors have to be paid immediately. Any amount due creditors after "cash and cash items" had been exhausted had to be paid immediately from the assets of the surviving branches. Specifically, in estimating the potential exposure of branches of the State Bank of Indiana, I assume $F_i = L_i - C_i$, where F_i and L_i are defined as above and C_i is the "cash and cash items" on the balance sheet of the failed branch. The rest of estimation of potential exposure was done as in the case of New York.

Table 3 displays the potential exposures of the branches of the State Bank of Indiana. Although these numbers vary between 5% and 29%, for the most part they are around 16%. The major reason why the exposure was so high is that there were only a few branches (the maximum was 13) over which to spread the losses.

3.4 State Bank of Ohio

I estimate the potential exposure of the branches of the State Bank of Ohio differently than I did for the banks in the previous three cases, because the State Bank of Ohio mutual guarantee scheme only covered note holders. Specifically, I assume that the total amount that would have to be paid out by the other branches from the failure of branch i was $F_i = N_i - C_i$, where N_i is the notes issued by the failed branch and C_i is defined as in the case of the State Bank of Indiana. In other words, I assume that the notes were the only liabilities that had to be paid off and that the "cash and cash items" in the failing branch could be used to immediately pay note holders. The remainder had to be paid immediately from the assets of the surviving branches. The rest of estimation of potential exposure was done as in the case of Indiana.

Table 4 displays the exposures of the branches of the State Bank of Ohio. For the most part, they are between 3.4% and 4.1%, substantially lower than the exposures of the branches of the State Bank of Indiana. There are two reasons for this. First, only notes were covered; second, there were more branches over which to spread potential losses. These exposures are also greater than those of the banks in the New York Safety Fund, but are on the order of those in the Vermont Safety Fund. Nonetheless, I would argue that the exposure of the branches of the State Bank of Ohio was greater than that of the Vermont Safety Fund banks. The reason is that the branches could be called on immediately to pay the insured creditors of the failed branch. There was no delay, as was the case with the Vermont insurance fund. If a receiver were to subsequently get something for the assets of the failed branch, these

Date	Number of Branches reporting	Average due creditors from Branches	Potential Exposure \$	% of capital
11/21/1835	10	258,454	27,828	23.3
11/26/1836	11	423,440	42,344	31.0
9/2/1837	11	317,544	31,754	19.5
11/17/1838	13	210,692	17,558	10.3
11/21/1840	13	218,920	18,243	9.9
11/21/1841	13	220,989	18,416	8.7
11/21/1842	13	134,620	11,218	5.4
11/21/1843	13	152,968	12,747	7.8
11/21/1844	13	212,390	17,699	11.0
11/21/1845	13	254,438	21,203	13.7
11/21/1846	13	269,842	22,487	15.0
11/20/1847	13	301,638	25,136	16.8
11/17/1849	13	287,097	23,925	16.0
11/16/1850	13	290,272	24,185	16.2
10/31/1851	13	313,202	26,100	16.3
11/2/1852	13	360,099	31,008	18.7
10/31/1853	13	366,230	30,519	20.0
10/31/1854	13	300,641	25,053	15.2
10/31/1855	13	346,788	28,899	19.0
10/31/1856	13	368,905	30,742	20.1

Table 3: Potential exposure of branches of the State Bank of Indiana, 1835-1856

receipts would be rebated to the other branches. However, that process could take a long time, but the payments to the creditors of the failed bank immediately went out the doors of the surviving branches.

4. Empirical evidence

The above discussion and its implications for my hypothesis can be summarized as follows. At one extreme, banks in the New York and Vermont Safety Fund schemes had no power to control or modify the behavior of other banks and even if they had had the power, they would have had only weak incentives to do so. Under my hypothesis, moral hazard should have the least well-controlled in these systems. At the other extreme, branches of the State Bank of Indiana had both strong power and incentives to control other branches, and according to my hypothesis, moral hazard should have been well controlled in this scheme. The State Bank of Ohio was somewhere in the middle. Its branches had the same power to control other branches as did the branches of the State Bank of Indiana, but their incentive to do so was weaker because only notes were insured and the risk was spread over more branches. Therefore, the control of moral hazard should have been better in the State Bank of Ohio system than under the two safety fund schemes, but, under my hypothesis, it should not have

Date	Number of branches reporting	Average due noteholders from Branches	Potential Exposure \$ % of capital
1/1/1849	38	119,817	3,238 3.7
1/7/1850	41	138,330	3,458 3.6
2/3/1851	41	161,722	4,043 3.8
2/9/1852	41	155,702	3,893 3.5
2/7/1853	40	160,203	4,108 4.0
2/9/1854	39	159,146	4,188 3.9
2/5/1855	35	135,417	3,983 3.7
2/4/1856	36	159,429	4,555 4.2
2/2/1857	36	149,701	4,277 4.0
2/1/1858	36	120,499	3,443 3.2
1/3/1859	36	153,835	4,395 4.1
1/2/1860	36	159,286	4,084 3.7

Table 4: Exposure of branches of the State Bank of Ohio, 1846-1860

been as good as for the State Bank of Indiana. This emphasis on the difference between the incentives of branches of the State Bank of Indiana and those of the branches of the State Bank of Ohio to control the behavior of other branches is an aspect that differentiates this study from other studies of these different bank liability insurance schemes.

I now present some evidence on how well moral hazard was controlled under these insurance schemes. I measure the degree of control of moral hazard by by the number of bank failures and by the size of losses on the asset portfolios of failed banks. Also, I present some evidence on non-insured bank bank failures as a baseline against which to determine the degree of moral hazard under the various bank liability insurance schemes.

4.1 Bank failures

The moral hazard problem with bank liability insurance could show up as insured banks holding riskier asset portfolios than noninsured banks. Therefore, insured banks should be more likely to fail than noninsured banks. Other banks in the insurance scheme, however, should have the incentive to regulate the riskiness of other banks' portfolios, because they could potentially share the losses due to a bank's failure but not share any gains if a bank were to continue in business. Further, this incentive should be greater, the greater the potential loss that they could face. Following this reasoning, my hypothesis predicts that the State Bank of Indiana should have had the lowest failure rate, followed by the State Bank of Ohio. New York and Vermont safety fund banks should have had the highest failure rates.

The bank failure experiences of the four insurance schemes is displayed in Table 5. The experience of the State Bank of Indiana is consistent with my hypothesis. No branch of the State Bank of Indiana ever failed. However, the bank failure evidence from the other three schemes aligns only moderately well with the predictions of my hypothesis. The State Bank

	Number	Failed	Failure Rate	Received Aid
State Bank of Indiana	13	0	0	0
State Bank of Ohio	36	4	11.1	6
New York Safety Fund	90	10	11.1	0
Vermont Safety Fund	22	2	9.1	0

Table 5: Failure rates for safety fund and mutual guarantee banks

of Ohio, which should have had a lower failure rate than that of banks in the New York and Vermont insurance funds, did not. Its failure rate was about the same or even higher if the number of banks that required additional assistance were included. The reason for this may be that even though the incentive for a branch of the State Bank of Ohio to regulate the behavior of other branches was stronger than that for safety fund banks in New York and Vermont to regulate the behavior of other safety fund banks, it was still not very strong. Recall that the estimates of potential exposure of branches of the State Bank of Ohio in Table 4 were mostly four percent of capital or less.

However, the failure rates in Table 5 are computed over time periods that differ not only in length, but also in the economic events that occurred during these periods. Further, there are differences in economic and demographic characteristics of the four states that might account for the differences in failure rates. Thus, it may be more relevant to compare the failure rates in these states relative to the failure rates over similar time periods of banks that are similar but not insured banks. The thinking here is that note holders, depositors, and other creditors have less of an incentive to monitor banks that are insured than banks that are not insured. Hence, consistent with the hypothesis of this paper, creditors of noninsured banks should act more strongly to control the risk-taking behavior of the banks with which they do business and the failure rates of noninsured banks should be lower as a result.

New York

During the period 1830-1843, which is roughly the time period when the New York Safety Fund was actually insuring banks, two other types of banks were in existence in New York: the chartered banks that were in existence before the Fund was put in place and had been exempted from participating in it and free banks. The number of each of these types of banks that were in existence, the number that failed, and the failure rates during this period are shown in Table 6.

The evidence in the table is mixed as to how well risk-taking behavior was controlled for the Safety Fund banks as compared with the control exercised by creditors of noninsured banks. In support of the argument that risk-taking behavior was comparably not well controlled, the failure rate for Safety Fund banks was higher than that for chartered banks, which had no failures. However, the failure rate for Safety Fund banks was much lower than that for free banks, more than a quarter of which failed.

Also shown in Table 6 are the failure rates for banks in Massachusetts, New Jersey, and Pennsylvania over the same period. These states were similar to New York in that they

	Number	Failed	Failure Rate
New York Safety Fund, chartered	90	10	11.1
New York Non-Safety Fund, chartered	10	0	0
New York free	91	24	26.4
Massachusetts	134	9	6.7
Pennsylvania	52	5	9.6
New Jersey	32	4	12.5

Table 6: Failure rates for New York Safety Fund and non-Safety Fund banks, and for Massachusetts, New Jersey, and Pennsylvania banks, 1830-1843

had large populations and well-developed banking systems since at least the early 1800s. Further, Massachusetts and Pennsylvania each had a major financial center. None of these three states had a bank liability insurance scheme.

The evidence from these states also is mixed as to how well risk-taking behavior was controlled for the Safety Fund banks as compared with the control exercised by creditors of noninsured banks. On the one hand, the failure rate for Safety Fund banks was almost twice the failure rate for banks in Massachusetts. On the other hand, the failure rate for New York Safety Fund banks was approximately the same as that for banks in New Jersey and Pennsylvania.

Vermont

During the period 1832-1858, Vermont had banks that were part of the insurance fund and banks that were not. The failure rates of the two types of banks are given in Table 7. This comparison indicates that the risk-taking behavior banks was not well controlled in the Vermont Safety Fund. The failure rate of insured banks was also twice that of non-insured banks.

	Number	Failed	Failure Rate
Vermont in bank fund	22	2	9.1
Vermont not in fund	41	2	4.9
New Hampshire	28	2	7.1
Maine	60	7	11.7

Table 7: Failure rates for Vermont banks both in and not in the insurance fund and for Maine and New Hampshire banks, 1832-1858

In Table 7, I also compare the failure rates of insured Vermont banks with those of noninsured banks in Maine and New Hampshire. I choose these two states for comparison because they are in the upper part of New England and were similar to Vermont in terms of

demographics. Neither state had an insurance fund. The evidence here is mixed as to how well risk-taking behavior was controlled. The failure rate of Vermont Safety Fund banks was higher than that of New Hampshire banks, but lower than that of Maine banks.

Ohio

During the period 1845-1860 when the State Bank of Ohio was in existence, there were effectively two other types of banks in the state:¹⁰

1. Independent banks – The law establishing the State Bank of Ohio also permitted banks to be organized under the same general restrictions as branches of the State Bank of Ohio except that they were not part of the mutual guarantee system. Instead, they had to “deposit with and transfer to the treasurer of state certificates of the funded debt of this state, or of the United States, at least equal in amount to the amount of its capital stock. . . .”(State of Ohio (1845), sec. 30, p. 36)
2. Free banks – These were banks established after 1851 that operated under free banking laws.

	Number	Failed	Failure Rate	Received Aid
State Bank branches	36	4	11.1	6
Independent banks	13	2	15.4	0
Free banks	15	1	6.7	0

Table 8: Failure rates for Ohio banks by type, 1845-1860

The failure rate evidence in Table 8 is also mixed as to how well risk-taking behavior was controlled for the Safety Fund banks as compared to the control exercised by creditors of noninsured banks. In support of the argument that risk-taking behavior was comparably well controlled, the branches of the State Bank of Ohio had lower failure rates than the Independent banks. In support of the argument that it was not well controlled: If the number of number of branches that received aid is combined with the number failing, the failure rate of branches of the State Bank of Ohio becomes almost 28%. Further, Ohio free banks had a low rate of failures, 6.7 percent.

In summary, the evidence from bank failure rates is mixed in terms of how well it aligns with the predictions of my hypothesis. The fact that there were no failures of branches of the State Bank of Indiana and there were failures of banks in all three other schemes, is consistent with the hypothesis. However, the bank failure experience of branches of the State Bank of Ohio compared with that of the Safety Fund banks in New York and Vermont is not. According to my hypothesis, branches of the State Bank of Ohio should have had lower failure rates. Both in terms of a system-by-system comparison and of failure rates of insured banks relative to similar, noninsured banks, branches of the State Bank of Ohio had about the same rate of bank failures as banks in the New York and Vermont Safety Funds.

¹⁰I ignore the “Old banks,” – banks chartered before 1845 that operated under their old charters – because most of them were in shaky financial condition when the State Bank of Ohio went into operation.

4.2 Losses on assets of failed banks

The moral hazard problem with bank liability insurance not only could show up as insured banks being more likely to fail than noninsured banks, but it could also show up as there being larger losses on a bank's portfolio when it failed. Other banks in the insurance scheme, however, should have the incentive to regulate other banks' portfolios to keep down such losses, because they could potentially share in them. Further, this incentive should be greater, the greater the potential loss that they could face. Following this reasoning, my hypothesis predicts that the State Bank of Indiana should have had smallest losses on the portfolios of failed branches, followed by branches of the State Bank of Ohio. New York and Vermont Safety Fund banks should have had the largest losses on the portfolios of failed member banks.

The experience of the State Bank of Indiana is consistent with my hypothesis. There were no losses on the asset portfolios of failed branches because the State Bank of Indiana experienced no branch failures. However, as was the case with the bank failure evidence, the evidence on losses on the asset portfolios of failed banks under the other three schemes aligns only moderately well with the ranking suggested by my hypothesis.

New York

To estimate the amount of losses on the asset portfolios of the New York Safety Fund banks, I first estimate the amount of good assets that a bank had by subtracting the "Claims against the insurance system" as estimated by Golembe and Warburton (1958), Table 12 from the bank's total liabilities. My reasoning is that liabilities that were not paid by the Fund had to have been paid out of the assets of the bank, which meant that these assets would have been good. I then estimate the losses on the asset portfolio at time of failure as the difference between total assets and good assets. I use two measures of total assets at time of failure. The first, shown in column 3 of Table 9, is "Obligations at the last report prior to suspension or difficulty, Total" (Golembe and Warburton (1958), Table 11) plus total capital taken from the bank balance sheets in Weber (2012). The second, shown in column 4, is total assets from the last available balance sheet in Weber (2012).¹¹

My estimated losses in dollar terms are shown in column 5 of the table and in percentage terms in columns 6 and 7. The losses were large, averaging about 80% to 85% of a failed bank's assets.¹²

¹¹The dates of the last balance sheets are 1/1/1837 for the Lockport Bank, 1/1/1840 for the City Bank of Buffalo, 1/23/1841 for the Wayne County Bank and all the banks listed under 1841, and 1/1/1842 for all the banks listed under 1842. For the 1/23/1841 banks, the item used is total liabilities (which includes capital) rather than total assets because it appears that several asset items are omitted from assets on the available balance sheets.

¹²I exclude the Lafayette Bank and Oswego Bank from these calculations. Given that the failures of these banks did not require payouts by the Safety Fund, it is not possible to estimate their losses by my method except to say that they must have been less than the capital stocks of these banks which are the entries given in column 5 of the table.

Year	Bank	Assets		Estimated losses		
		Estimated (see text)	Balance sheets	Estimated losses (\$)	% (1)	%(2)
1837	Lockport Bank	237,000	348,608	136,000	57.4	39.0
1840	City Bank, Buffalo	884,000	864,987	717,000	81.1	82.9
	Wayne County Bank	312,000	312,221	229,000	73.4	73.4
1841	Commercial, NY	1,089,000	936,674	786,000	72.2	83.9
	Bank of Buffalo	868,000	653,920	785,000	90.4	100
	Commercial Bank, Buffalo	1,213,000	1,072,182	1,012,000	83.4	94.4
	Commercial Bank, Oswego	572,000	595,316	491,000	85.8	82.5
1842	Watervliet Bank	480,000	509,981	461,000	96.0	90.4
	Lafayette Bank	665,000	665,797	<500,000	<75	
	Clinton County Bank	506,000	540,398	428,000	84.6	79.2
	Bank of Lyons	349,000	445,012	296,000	84.8	66.5
	Oswego Bank	327,000	337,086	<150,000	<45	
	Total 10 banks	6,510,000	6,279,299	5,341,000	82.0	85.1

Table 9: Estimated loss rates for New York Safety Fund banks, 1830-1843

Vermont

I estimated losses on the asset portfolios of the two Vermont insurance fund banks in the same way as I estimated the losses for the New York Safety Fund banks. The data come from Golembe and Warburton (1958) Table 19 and Weber (2012). In the calculation of good assets I use “Payments from insurance fund: Claimed” from Table 19. The estimated losses are displayed in Table 10. The estimated losses are between 50% and 60% of the failing bank. Even though these losses are lower than the average losses on the portfolios of New York Safety Fund Banks, they are still quite large.

Year	Bank	Assets		Estimated losses		
		Estimated (see text)	Balance sheets	Estimated losses (\$)	% (1)	%(2)
1839	Essex Bank	99,000	98,838	59,000	59.6	59.7
1857	Danby Bank	133,000	156,729	81,000	60.9	51.7

Table 10: Estimated loss rates for Vermont insurance fund banks, 1839-1857

The State Bank of Ohio

Estimating the losses on the asset portfolios for the four branches of the State Bank of Ohio that failed is not as straightforward as it was for the case of failed banks in New York and Vermont. The difficulty is that only note holders were covered under the State Bank of Ohio mutual guarantee system, and the information in Golembe and Warburton (1958) is the “Assessment for redemption of notes of failed Branch Banks, Amount collected” in Table 37. There is no information on the losses experienced by shareholders, depositors, or other creditors which would be required to estimate the losses on the asset portfolio.

Year	Branch	Assets less Safety Fund	Estimated loss	percentage loss
1852	Licking County	276,967.22	265,135.97	95.7
1854	Akron	403,666.42	262,843.42	65.1
1854	Mechanics & Traders	390,059.27	335,201.50	85.9
1854	Commercial, Toledo	592,141.66	401,445.66	67.8
Average		415,708.64	316,156.64	76.1

Table 11: Estimated loss rates for State Bank of Ohio Branches, 1852-1854

Because of this difficulty I estimated the losses on the assets of failed branches of the State Bank of Ohio as follows. First, I assumed that a branch had good assets equal to the difference between the circulation of the branch and the amount assessed other branches to pay off its notes and that all the rest of its assets were bad. I then computed the ratio of bad assets to total assets. This estimate is what appears in Table 11 for the Akron and Commercial, Toledo branches.

However, for the Licking County and Mechanics & Traders branches, the amount of good assets estimated by this method was less than the sum of the branch’s holdings of “Coin,” “Notes on hand, branches,” and “Due from banks, branches.” As these assets are ones on which the probability of loss should be small, I computed the value of bad assets as the branch’s total assets less the sum of these three items to obtain the estimates that appear in Table 11 for these branches.

5 Summary and conclusion

This paper examines the experience of New York, Vermont, Ohio, and Indiana under the different schemes for insurance bank liabilities that were in place in each state. It finds that the experience of these states in terms of the control of the moral hazard problem associated with any kind of insurance scheme was quite different. The paper’s hypothesis in this paper is that the differences are consistent with the notion that how well a bank liability insurance scheme controlled moral hazard depended on (i) how much power the banks involved in the scheme had to take actions to control or modify other member banks’ risk-taking behavior and (ii) how strong were the incentives for the member banks to use this power. Further, the hypothesis is that both power and incentives to directly affect other member banks’

risk-taking behavior are important. Schemes with both features control moral hazard better than schemes with only one.

Under this hypothesis, the control of moral hazard should have been the least in New York and Vermont, because banks had little power or incentive to control the risk-taking behavior of other banks in the system. The control over moral hazard should have been the greatest in the State Bank of Indiana system, because branches had both strong incentives and power to control the risk-taking behavior of other branches. The control of moral hazard in the State Bank of Ohio system should have been somewhere in between. Branches of the State Bank of Ohio had the same power to control other branches as the branches of the State Bank of Indiana. However, their incentive to do so was far weaker; about the same as that of banks in New York and Vermont Safety Fund systems.

The evidence from the State Bank of Indiana is consistent with the hypothesis, because according to my measures, moral hazard was best controlled in that system. There were no failures of its branches, whereas banks in the New York and Vermont Safety Funds failed with large losses on their asset portfolios. Branches of the State Bank of Ohio also failed.

The evidence comparing the experience of the State Bank of Ohio with of the two safety fund schemes is mixed with respect to the hypothesis, however. Consistent with the hypothesis, branches of the State Bank of Ohio held portfolios that were slightly less risky than those held by banks in the New York and Vermont safety funds. Inconsistent with the hypothesis, the branches of the State Bank of Ohio had about the same failure rates as banks in the New York and Vermont safety funds.

The lesson to be drawn from this exercise is that moral hazard in bank liability insurance schemes can be well controlled if the individual participants have both significant "skin in the game" and the power to change the behavior of other participants. However, as the contrast between experience of the branches of the State Bank of Ohio and the branches of the State Bank of Indiana shows, the power to change the behavior of other participants alone is not enough. Banks also have to have the incentive to modify the behavior of other banks. Unfortunately, there was no insurance scheme in existence in this period that would provide evidence about how well moral hazard would be controlled in a scheme in which member banks had strong incentives to modify the behavior of other member banks, but had little power to do so. Perhaps such systems did not arise because they were not feasible.

Bibliography

- CALOMIRIS, C. W. (1989): “Deposit Insurance: Lessons from the Record,” *Economic Perspectives*, *Federal Reserve Bank of Chicago*, pp. 10–30.
- (1990): “Is Deposit Insurance Necessary? A Historical Perspective,” *The Journal of Economic History*, pp. 283–295.
- CHADDOCK, R. E. (1910): *The Safety Fund Banking System in New York State, 1829-1866*. S. Doc. No. 581, 61st Cong., 2nd sess., Government Printing Office, Washington, DC.
- GOLEMBE, C. H., AND C. WARBURTON (1958): “Insurance of Bank Obligations in Six States During the Period 1829-1866,” Federal Deposit Insurance Corporation.
- STATE OF INDIANA (1849): “An Act Establishing a State Bank,” in *Charter of the State Bank of Indiana*. Chapmans & Spann, Indianapolis.
- STATE OF OHIO (1845): “An Act to Incorporate the State Bank of Ohio and Other Banking Companies,” in *Acts of a General Nature Passed by the Forty Third General Assembly of the State of Ohio*, vol. 43. Samuel Medary, Columbus.
- WEBER, W. E. (2012): “Balance sheets for U.S. Antebellum State Banks,” Research Department, Federal Reserve Bank of Minneapolis, <http://www.minneapolisfed.org/research/economists/wewproj.cfm>.