Alternatives for Distressed Banks and the Panics of the Great Depression

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Several studies have explored whether the banking panics of the Great Depression caused some institutions to fail that might otherwise have survived. This paper adopts a different approach and investigates whether the panics resulted in the failure and liquidation of banks that might otherwise have been able to pursue a less disruptive resolution strategies such as merging with another institution or suspending operations and recapitalizing. Using data on individual state-chartered banks, I find that many of the banks that failed during the panics appear to have been at least as financially sound as banks that were able to use alternative resolution strategies. This result supports the idea that the disruptions caused by the banking panics may have exacerbated the economic downturn.

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During the Great Depression, the U.S. banking system came under enormous stress. Thousands of banks failed and were liquidated by receivers. A considerable portion of these bank failures occurred during the banking panics, which were unprecedented in their severity (Calomiris and Gorton 1991).[1] A number of studies have examined whether the banks that failed during the panics were somehow different than other banks that failed and whether there is evidence that they might have been able to survive the Depression in the absence of the panic. These studies have generally found that the panics did not appear to result in the failure of banks that would have been expected to survive the Depression. Two prominent examples are White (1984) and Calomiris and Mason (1997). White (1984) finds little evidence that Nationally chartered banks failing during the Panic of 1930 were very different than the ones failing during the 1920s. Calomiris and Mason (1997) find that, while banks that failed during the Chicago Panic of 1932 may have been stronger than other banks in Chicago that failed, they were weaker than banks that survived the Depression.

The practice of previous work of comparing banks that failed to banks that survived however may not provide a complete picture. Banks could pursue resolution strategies other than being closed and then liquidated by a state-appointed receiver, such as merging with another institution or suspending and recapitalizing. It is possible that the sheer number of institutions under pressure and the financial turbulence associated with the banking panics may have prevented some banks from finding another bank with which to merge or investors to recapitalize the bank. This paper explores this hypothesis by comparing banks that failed during panics to banks that merged with other banks and to banks that suspended temporarily, reorganized, and reopened. The analysis is conducted using a newly constructed dataset consisting of individual state-chartered banks from twenty-one states located around the United States.

Finding that some banks that failed during panics could have resolved their difficulties less disruptively has important implications for understanding the depth and

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[1] The definition of a panic varies somewhat in the literature; some scholars focus on changes in the money supply (Friedman and Schwartz 1963) while others focus on large and sudden changes in risk spreads (Mishkin 1991). This paper, like Calomiris and Gorton (1991), focuses on periods when large numbers of banks were the subject of bank runs.

severity of the Depression. Several papers have examined the relationship between bank survival and economic output. Bernanke (1983) argues that bank failures increased financial intermediation costs and restricted output growth in the Depression. Calomiris and Mason (2003a) find that states that had larger declines in bank lending during the early 1930s had slower income growth in subsequent years. Anari, Kolari, and Mason (2005) show that the accumulated stock of deposits at banks that were being liquidated reduced economic output. They argue that the liquidation process, which took six years on average, kept resources from being used productively.[2] Thus, finding that panics prevented banks from using alternative resolution strategies, which either would have kept assets within the banking system (merging), or returned them to the banking system faster (suspending and reorganizing), would suggest that the banking panics contributed to the severity of the economic collapse during the Depression.

To examine whether the banks that failed during the panics might have instead been able to merge or to suspend and reorganize, I first identify these banks using both the historical record and patterns in the data. The historical record is drawn largely from Wicker (1996), who provides a detailed account of the length and breadth of the major panics of the Depression. The data driven measure looks for clusters of bank failures or suspensions; this measure picks up many of the periods identified by Wicker, as well as a few smaller regional events. Using these two different methods provides a robustness check of the results.

The next step involves estimating the effect of different balance sheet measures and other characteristics on bank survival using banks that failed outside of panic periods and banks that survived the Depression. The estimation is conducted using both logit and survival analysis. The comparison of banks failing during panics to other groups involves comparing balance sheet and other factors so the regression results provide an indication of whether the balance sheet and other items increase or decrease the likelihood of survival and points out which factors mattered more. Further, out-of-sample survival probabilities provide a way of aggregating the different factors to provide an overall measure of the financial viability of the bank.

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[2] Anari, Kolari, and Mason (2005) find that for the banks in their sample that the average liquidation period was 6 years. This is similar to contemporary reports; Whitsett (1938) reports that for state banks in Ohio the average liquidation period was about 5 years.

Based on the determination of which banks failed during panics and the regression results, I compare several groups of banks. First, I compare the banks that failed during panics to other banks that failed and to banks that survived. Similar to Calomiris and Mason (1997), I find that banks that failed during panics appear to have been more financially viable than other banks that failed but were less viable than banks that survived. Next, I look at banks that merged and banks that suspended and reorganized. These banks also appear to have been, on average, somewhat more viable than banks that failed but less viable than banks that survived.

Finally, I compare banks that failed during panics to banks that merged and banks that suspended to determine whether the former group might have been able to adopt an alternative resolution strategy. I find that banks that failed during panics were roughly on par with these other two groups. Indeed, a notable share of banks that failed were at least as strong as the typical bank that merged or suspended. This finding suggests that the financial turbulence associated with the panics may have resulted in some banks being placed in receiverships and liquidated instead of being able to resolve their troubles less disruptively.[3] Rough estimates suggest that, at least for the states included in the sample, banks failing during panics that might have been able to pursue an alternative resolution strategy accounted for around 10 percent of failed banks and, as these banks tended to be larger, 30 percent of the assets of failed banks. Thus, to the extent that the panics caused these banks to fail rather than merge or suspend and reorganize, the panics may have had detrimental effect on the economy via the channels suggested by Bernanke (1983) or Anari, Kolari, and Mason (2005).

The paper is organized as follows. Section 1 introduces the data used in this paper. Section 2 discusses the banking panics and reviews how the panic periods were selected. In addition, I discuss previous work comparing banks that failed during the panics to other banks that failed and present results of similar exercises using the data set introduced in this paper. Section 3 reviews the alternative resolution strategies available to banks in the Depression, discusses their use by the banks in the data set, and compares

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[3] It is worth being clear that I identify banks that closed during the panics and not which banks experienced runs or were otherwise negatively affected by the panics. As the historical narratives and case studies of panics make clear, many banks were affected by the panics which ultimately did not fail or close their doors, often due to assistance from other banks. Thus, this study does not necessarily shed much light on the sources of the panics or the reasons that they spread.

balance sheets and estimates of viability of banks that merged and banks that suspended and reorganized to banks that survived and banks that failed outside of the panics. In Section 4, I explore whether banks that failed during panics might have been able to use one of the alternative resolution strategies. Section 5 concludes.

Section 1. Description of the data

There has recently been a surge in the use of data sets containing information on individual banks to examine different aspects of the troubles in the banking sector during the Great Depression. These data sets have ranged from all Federal Reserve member banks (Calomiris and Mason 2003a, Calomiris and Mason 2003b} or all banks consolidating, suspending, or otherwise changing their operating status (Richardson 2006a) to smaller data sets such as samples of banks with National charters (White 1984) or banks from Chicago (Calomiris and Mason 1997). This study introduces yet another data set, one which includes information on all state-chartered commercial banks from twenty-one states.[4]

The states used in the sample include Alabama, California, Colorado, Georgia, Idaho, Louisiana, Maine, Maryland, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Oregon, South Carolina, South Dakota, Vermont, West Virginia, and Wisconsin. These states are spread fairly widely across the United States and are shown in Figure 1. These states were selected largely because of the level of detail regarding balance sheet data as well as the availability of information regarding the timing and manner in which banks exited the system. Geographical representativeness also played a role in the selection of the states.

The sample consists of 6,076 individual banks. Balance sheet information is drawn from the annual reports published by the state banking authorities that most closely precedes the stock market crash in 1929---typically either December 31, 1928 or

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[4] According to the Federal Reserves *Banking and Monetary Statistics* (1943), 80 percent of banks that failed or suspended and over 70 percent of deposits of such banks were accounted for by the closure of state-chartered banks. The sample of banks in this study includes 37 percent of these banks (30 percent of all banks that closed). By comparison, nationally chartered banks accounted for 17 percent of all banks that suspended or failed and about 25 percent of deposits. (The remainder was accounted for by the failure of private banks.)

June 29, 1929---and includes information such as assets, loans, securities, cash, capital, deposits, and bills of rediscount. In addition to the balance sheet information, I record the age of the bank, and whether the bank was a member of the Federal Reserve System. If this latter data is missing from the annual report, I obtain it from the Rand-McNally Banker's Directory for the period most closely matching the data from the annual report.

I follow the banks from the date for which the balance sheet data is recorded until March 1, 1933, just prior to the national bank holiday. Banks that remained open throughout the sample period are considered to be survivors. Otherwise the date and method by which the bank exited the banking system, albeit sometimes temporarily, is recorded. Changes in bank status were classified as failing, merging with another bank, voluntarily liquidating, or suspending temporarily and reopening later.[5] I refer collectively to these four methods as exits.

Table 1 reports the distribution of banks across states and exit type.[6] Clearly, the states vary considerably by size. There are not very many banks in the New England states, nor were there many exits. A significant share of banks is located in the Midwest or the Plains. About 65 of the banks in the sample survive the Depression, a bit more than 20 percent fail, 8 percent merge with another bank, and a bit less than 5 percent suspend and reorganize. Just over 100 banks in the sample liquidated voluntarily, although most states had a few banks exit in this way. The dearth of observations for this category makes comparisons regarding this resolution strategy difficult and I do not attempt to explain whether banks that voluntarily liquidated were different from other banks. It is interesting to note that although this was a possible way for banks to exit the banking system, relatively few opted to use it.

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[5] For all states except Nebraska, the date of failure is the date the bank was closed. For Nebraska, the date of failure is the date when a receiver was appointed. Information from other states suggests that this was typically fairly close to the day the bank was closed.

[6] A few banks suspended and reopened but failed later. These banks are treated as suspensions in the analysis since it is the way they first exited the banking system. The results do not vary depending on how these banks are treated. A few banks close but are reopened much later strictly for the purpose of being sold to another institution. These banks are treated as failures. Again the results do not depend on how these banks are treated.

Section 2. Banks that failed and banks that survived

In this section, I investigate whether banks that failed during panics were somehow different than other banks that failed. First, I identify which banks were the ones that failed during panics. Then I use regression analysis to determine whether different balance sheet or other factors are associated with failure. Based on those results, I compare the banks that failed during the panics to other banks that failed and to banks that survived the Depression.

Section 2.1. Selecting the panic periods

One of the most detailed examinations of the timing and extent of the panics of the Great Depression is Wicker (1996). He describes four panic periods. The first, in 1930, was triggered by the failure of Caldwell and Company, a financial conglomerate, and was largely a regional panic set in the upper South-East that occurred as speculation about insolvency spread through Caldwell and Company's large correspondent banking network. Wicker also discusses two panics centered in the Midwest that occurred during 1931, a relatively minor one in the spring and a severe one in the fall, that he attributes largely to the collapse of a real estate bubble.[7] In his discussion of the fourth panic of the Depression, Wicker generally follows Friedman and Schwartz (1963) who describe a panic that swept the country at the beginning of 1933 as people hoarded specie out of fear that the incoming administration would devalue the currency.[8] States attempted to prevent panics by declaring statewide bank holidays, which had the effect of increasing the withdrawal pressures on banks in nearby states. The dates and the locations described by Wicker for these four panics are taken as the first set of panic periods.[9]

The second method for selecting panic periods uses patterns in the data. The description of panics in Wicker (1996) suggest that panics are associated with many

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[7] Friedman and Schwartz (1963) attribute this panic to an attack on the currency as concern arose that U.S. would follow Great Britain and leave the gold standard. Wicker, however, argues that the lack of instability in the New York money market indicates that Britain's departure was not the source of the panic.
[8] See also Kennedy (1973) for a discussion of the panic occurring in 1933.
[9] In their study of bank failures, Calomiris and Mason (2003b) find elevated failure rates during the dates and locations Wicker reports for the panic of 1930 and the second panic of 1931. The analysis here uses the same dates and locations for the panic periods as Calomiris and Mason with slight modifications so that that several banks pointed to by Wicker (1996) or McFerrin (1939) as failing during the panic of 1930 or by Wicker (1996) as failing during the panic of 1931 are included in the panic periods.

banks closing their doors at the same time and in relatively close proximity. Accordingly, I look for situations with these characteristics. Specifically, I calculate the number of banks failing or suspending during rolling 10-day windows. A panic is considered to have occurred if one of two conditions has been met. The first condition is that the statewide rate of bank failures or suspensions becomes relatively elevated during the window and some clustering of failure--at least three failures or suspensions in the same county or more than one county with at least two suspensions or failures.[10] The second condition is that at least four banks fail or suspend in the same county during the window. The start of the panic is the first day that an institution closes during the first rolling window in which one of the two conditions is satisfied.[11] The end of the panic is the last day of the last consecutive 10-day rolling window in which one of the two conditions has been met. (There may be several overlapping windows in which one of the conditions is met.) If one of the two conditions for a panic have been met for a particular window, then all banks failing or suspending in the state during that window are considered to have closed during the panic. This data driven method might be more properly thought of as picking up periods in which the banking system in a particular location was under considerable stress due to bank closures. Nevertheless, because these are periods in which atypically large numbers of banks failed and because there is notable overlap between this indicator and the historical indicator, I refer to the periods selected by the data measure as panic periods.

The periods identified as panics under each method are listed in Table 2. There is considerable overlap. The data driven method picks out panics associated with the panics described by Wicker (1996) in 1930 and in the September and October of 1931, although this method suggests that the second panic of 1931 was stressful for a somewhat broader area than that suggested by Wicker. I also find a few regional events, such as during

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[10] The rate that is considered to be elevated varies by the number of banks in the state. For states with at least 500 banks, a closure rate of 1.8 percent over a ten day window is considered elevated. For states with between 250 and 500 banks, the rate was set at 2 percent. For states with less than 250 banks, the closure rate needed to be at least 3 percent to be considered elevated.

[11] I also explored whether a continuous measure of stress based on the amount of assets or deposits of recently closed institutions as a share of county or state aggregates influenced survival or the resolution strategy. The results were inconclusive, likely reflecting the difficulties in comparing changes in the accumulation of assets and liabilities at closed banks across areas that differ substantially in the size of their banking sectors.

Wisconsin in July 1932, which is concentrated around Milwaukee and coincides with the panic in nearby Chicago. Overall, about 20 percent of banks that failed did so during a period identified as a panic. About 47 percent of the banks considered to have failed during a panic using the historical record are also considered to have failed in a panic using the data driven method.

Section 2.2. Comparing banks that failed to banks that survived

To determine which factors have the most impact on survival, I regress bank failure on the several balance sheet variables and other bank and location factors. I conduct these regressions using logit and survival analysis. With logit analysis, failure (versus survival) is treated as a dichotomous outcome. Duration analysis exploits the data a bit further by employing the length of time until failure as the dependent variable while still taking into account the fact that the survival time of many of the banks are truncated at March 1, 1933.[12] When conducting the regressions, I use only the banks that survived the Depression and the banks that failed outside of the bank periods. The results from the regressions indicate whether different factors are associated with increased or decreased survival and how large these effects are. Further, I can use the results of the regressions to generate expected probabilities, from the logit analysis, or expected survival times, from the duration analysis, that may serve as overall measures of the viability of each bank including out-of-sample institutions such as those failing during panics.[13] This procedure is quite similar to the one used by Calomiris and Mason (1997).

The regression analysis and comparisons of different banks include a variety of balance sheet ratios. The ratio of interest-earning assets (securities plus loans and discounts) to total assets provides a measure of the potential for the banks to earn income on their assets and, a priori, might be expected to be positively associated with survival. I

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[12] Survival analysis explores whether independent variables affect the time until an event through their effect on the conditional probability of transitioning from one state to another (in this study, from being operational to failing) via a hazard function. The hazard function is the event rate at time *t*, conditional on having survived until time *t* or later. Because the hazard function is conditional and because it considers failure rates over particular intervals of time, survival analysis is able to account for subjects entering at different points and having truncated, or censored, lifespans. For further detail on survival analysis, see Cox and Oakes (1984) or Kalbfleisch and Prentice (2002).

[13] The expected survival time should not be interpreted literally, but should instead be seen as reflecting the relative expected survival length.

also include the ratio of securities to interest-earning assets. Securities, especially U.S. government bonds, may have provided banks with liquidity. Further, White (1984) and Ramirez (2003) argue that loans were the riskiest part of the bank balance sheet, which suggests that having more securities relative to loans might boost survival probabilities.[14] A higher ratio of net worth (capital plus surplus plus undivided profits) to assets might be expected to be a sign of more sound bank. Bills and rediscounts were often used by banks having difficulties raising funds so higher ratios of these liabilities to assets might indicate a troubled institution (White 1984). The ratio of cash and items due from other financial institutions, such as banks or clearinghouses, to total deposits might reflect the liquidity situation of the bank and be associated with increased odds of survival.[15] Larger banks may have been more able to diversify their asset portfolios which would make them more resistant to shocks, so I include the log of total assets.

Other characteristics of individual banks are also worth examining. Being a member of the Federal Reserve System meant that the bank was subject to additional regulation and was also able to access the discount window, which may have better enabled the bank to survive. Older banks may have been more experienced or had a stronger reputation, so I include a dummy indicating whether the bank is more than 10 years old. Characteristics of the banks' operating locale are included as well. Similar to Ramirez (2003), I include the bank's share of a county's assets as a measure of the bank's market power. As Alston, Grove, and Wheelock (1994) find that bank failures tended to be in rural areas, I include the share of county population located in an urban area.[16] I also include the ratio of unemployed individuals as reported on the 1930 census to total population as this ratio might reflect the economic situation of the community. There may be characteristics unique to different states, such as the regulatory regime, so I include state dummies in the regressions as well.[17]

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[14] However, Temin (1970) argues that the decline in the market value of securities may have adversely affected bank solvency. Wigmore (1985) suggests that this may have especially been the case for securities other than U.S. Treasury securities.

[15] Unfortunately, I am not able to separate cash from items due from other financial institutions for many of the banks in the sample.

[16] Temin (1976) suggests that difficulties in the agricultural industry may have contributed to bank failures. To focus on the possible impact of a decline in agriculture, I tried including the ratio of agricultural income to manufacturing, but found no effect.

[17] Given that there are relatively few banks in Maine, New Hampshire, and Vermont, I group these states together. See Mitchener (2005) for a discussion of the importance of the regulatory regime.

Regression results appear in Table 3 and are generally similar to previous work, especially with respect to the balance sheet variables (Calomiris and Mason 1997, Calomiris and Mason 2003b, Carlson 2004, Ramirez 2003, and White 1984). For ease of exposition, I point to the results of the logit analysis, but the results from the survival analysis are similar. Larger banks were more likely to survive, as was found by Carlson (2004) and Calomiris and Mason (2003b). More interest-earning assets as a share of total assets was also found to boost survival, probably as this increased the income of the bank. A one percentage point increase in this measure, one-tenth of a standard deviation, increased the probability of survival by almost 5 percent. Consistent with argument that loans are higher risk, and the results of other studies, a higher ratio of securities within interest-earning assets is positively associated with survival; a one percentage point increase in this measure, one-twentieth of a standard deviation, is associated with a 3 percent increase in survival. Also similar to the results of Calomiris and Mason (2003b) and Ramirez (2003), banks with higher net worth relative to assets were more likely to survive. As expected, banks with more bills and rediscounts relative to assets were notably less likely to survive with a one percentage point increase in this ratio, one-fourth of a standard deviation, decreasing the probability of survival by 10 percent. More liquid banks appear to have done better as higher ratios of cash to deposits boosted the odds of survival, consistent with the findings of Calomiris and Mason (1997) and White (1984).

In addition, I find that older banks also fared better as banks more than 10 years old were 17 percent more likely to survive than banks less than 10 years old. I do not find a significant benefit from being a member of the Federal Reserve, although the sign of the coefficient is positive. Unlike other studies, such as Calomiris and Mason (2003b) and Ramirez (2003), I do not find an effect from greater market power. Nor do I find a detrimental effect from being in an area with higher unemployment, though the sign of the coefficient suggests that unemployment was not beneficial. I find a slight positive effect from being in a more urban area using survival analysis, but no significant effect when using the logit analysis.

Section 2.3. Comparing Banks Failing in Panics to Other Failures

Comparisons of balance sheet items and predicted survival probabilities and times for banks that survived the Depression and banks failing during and outside of panic periods appear in Table 4. In general, banks failing during panics appear to be somewhere between the other groups; the results are similar for both methods of selecting panics, which is probably not surprising given the degree of overlap. Supporting the idea that they were generally stronger than banks failing outside panics, banks failing during panics were larger, had more interest-earning assets relative to total assets, higher portions of securities within interest-earning assets, and lower ratios of bills and rediscounts to assets. Banks failing during panics did, however, hold a bit less cash relative to deposits than other failing banks, which suggests that illiquidity may have been a problem. Consistent with the notion that they were weaker than banks that survived, I find that banks failing during panics had higher ratios of bills and rediscounts, and lower ratios of securities relative to interest-earning assets.

The predicted probability of survival and expected length of survival, the measures used to provide a summary of overall financial viability, are also between those of banks that failed and banks that survived. Taking into account their importance in the regression analysis, and the difference in the average values, the variables that appear to have contributed most to improved survival were the ratios of interest-earning assets to total assets and portions of securities within interest-earning assets. The size of the bank and the ratios of bills and rediscounts to assets were also important, though a bit less so than the two asset composition measures. The even higher ratios of securities within interest-earning assets at banks that survived appears to have been most significant factor in lifting the expected survival probabilities of these banks above that of banks that failed.

These results are thus similar in tone to previous work, such as White (1984) and Calomiris and Mason (1997). White (1984) looks at banks that failed in the Panic of 1930 and finds that the same factors that caused banks to fail in the 1920s caused these banks to fail. Calomiris and Mason (1997) examine the panic that occurred in Chicago in 1932. They find that the balance-sheet ratios and other measures that were lower or higher than average at banks that failed outside the panic are similarly lower or higher than average at

banks that failed during the panic. In particular, market-to-book values of net worth were lower and interest rates paid were higher at banks that failed than at banks that survived. The panic may have shortened the time until some banks failed, but Calomiris and Mason argue that it did not cause banks to fail that likely would have been able to avoid financial distress.

Section 3. Alternative methods for resolving financial difficulties

While many studies of banking in the Depression have tended to focus on banks that survived and banks that failed there were other ways in which banks could attempt to resolve financial distress. Two of the most common where merging with another institution or suspending operations temporarily, reorganizing and recapitalizing the institution, and then reopening. A contemporaneous study of these alternatives was written by Upham and Lamke (1934) of the Brookings Institute.

Mergers were the second most common way for banks to exit the banking system after failures (as indicated by Table 1, about 25 percent of all exits in this data set consisted of mergers).[18] Banks purchased during mergers may or may not have been in distress. Indeed, Carlson and Mitchener (2007) find that the banks taken over in California as part of the growth of branch bank networks did not appear to be weaker than other banks. However, Upham and Lamke (1934) report that some states actively encouraged the merge of troubled banks with other institutions. Upham and Lamke further argue that other banks may have been amenable to these mergers in part because this procedure allowed customers uninterrupted access to the banks' services and helped maintain depositor confidence. Some mergers, especially in California and South Carolina, were related to the expansion of branch bank networks, and involved the purchase of a small bank by a much larger one. In other cases, especially in the Midwest, mergers were often between banks of similar size and there were even a few cases in which a smaller bank by assets purchased a larger one.

About 10 percent of ``exiting'' banks in the sample suspended temporarily, reorganized, and reopened. According to Upham and Lamke (1934) reorganizations were

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[18] There are a variety of terms used to denote the merger of two institutions including, ``merged,'' ``purchased,'' and ``taken over by.'' This analysis treats these terms as equivalent.

generally undertaken on a voluntary basis with the bank's stockholders or directors contributing additional funds. Depositors may also have been asked to relinquish a portion of their claims. Before the bank reopened, approval of the state banking authority was required (Paton 1932). For banks in this sample that suspended and reorganized for which the date of reopening is also known, about 60 percent of the suspensions in the sample, the median length of suspension was 120 days (about 4 months), although some banks were closed for as short a period as four days. It is important to note that the suspensions in the sample are by individual banks; banks that closed as part of a city or statewide banking holiday are not included. In fact, banks closing during such holidays were generally not recorded by the state regulators as suspensions.

Figure 2 plots the timing of bank mergers and suspensions over time (with failures shown for comparison). Mergers tend to be higher around the end of most years. Bank suspensions are particularly high during the panic in the latter part of 1931, but otherwise tended to be relatively moderate in number. While the definitions of status changes are not exactly the same, the patterns here are broadly in line with those discussed in Richardson (2006b).

Table 4 presents a comparison of the average balance sheet positions, location characteristics, and predicted survival probabilities and lengths for banks that merged and banks that suspended with those of banks that survived and banks that failed outside of panics. Banks that merged were relatively financially sound and had higher ratios of net worth to assets than other banks and lower average ratios of bills and rediscounts to liabilities than banks that failed outside panics. The ratio of securities to interest-earning assets at these banks was also between that of banks that failed and banks that survived. As indicated by their cash holdings, banks that merged were also as liquid as the other banks. A smaller share of banks that merged was more then 10 years old than was the case for other groups. Interestingly, banks that merged with other banks were a bit more likely than other banks to have been located in more urban areas, which might have improved the likelihood of finding a merger partner, and to have had a smaller market shares, possibly indicating that there was a higher likelihood that a nearby bank was capable of absorbing them. The strength of banks that merged was also apparent in their

expected survival time which, while shorter than that of surviving banks, is substantially longer than the expected survival time of banks failing outside panics.

Banks that suspended and reopened had roughly the same expected survival probability and length as banks that merged. This result occurs despite lower ratios of net worth to assets and less liquid balance sheets, as suggested by the ratio of cash and items due from other institutions to total deposits. The strength of banks that suspended, appears to be in their larger size, which may have allowed them to diversify; the larger share more than 10 years old, which may indicate greater experience; and the measures of asset holdings, such as interest-earning assets to total assets and securities holdings as a share of interest-earning assets.

Section 4. Comparison of banks that failed during panics to banks pursuing alternative resolution strategies

The final comparisons are between banks that failed during panics and banks that either merged or suspended and reorganized; these comparisons are shown in Table 6. The differences between these groups are not very large. Banks that failed during panics appear to have cash to deposit ratios and ratios of net worth to assets that are between those of banks that merged and banks that suspended. Banks failing during panics tended to have a bit higher ratios of interest-earning to total assets.

Consistent with there being little difference in the balance sheet ratios, the overall measures of financial viability, expected survival probability and survival time, are quite similar across these groups. The expected survival probabilities are, on average, about the same. Banks that failed during panics had a touch lower average expected survival lengths than the other groups, but the difference is not statistically significant.

These samples are smaller than the previous ones. As a robustness check, I combine the banks that merged and banks that suspended into one group and compare them to banks that failed during a panic according to either panic selection method. The results (Table 7) are the same. There are no appreciable differences in the balance sheet ratios between the groups. Further, the expected survival probabilities and times are the same.

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Section 4.1. Size of the impact

Here I provide some rough calculations regarding the size of the impact that the panics might have had by pushing some banks into liquidation. Looking at all the banks found to have failed during a panic by at least one of the two selection methods, I consider institutions to have been pushed into pursuing liquidation under a receivership as the method for resolving financial difficulties as a consequence of the panic if their expected probability of survival or length of survival was greater than the median predicted probability of survival of banks that pursued either of the two alternative resolution strategies discussed in this paper. Such banks represented 10 percent of all bank failures in the sample of banks from twenty-one states examined here. However, these banks were generally larger than other banks, and represented roughly 30 percent of the assets of all failed banks in the sample, regardless of whether the logit or survival analysis is used. While these numbers should be considered only rough estimates of the impact of panics, they do suggest that the panics may have had a notable impact on the fraction of the banking industry assets that ended up in receivership rather than remaining in the system had the banks been able to use an alternative resolution strategy.

Section 4.2. Possible reasons that panics might have resulted in more receiverships

One potential reason that restructuring may have been more difficult for banks that failed during panics is that the surge in the number of failing banks during panics increased the competition for new capital. It seems quite reasonable that, at least in the short run, the pool of resources available to investors to recapitalize banks is fixed. As the number of troubled institutions competing for those resources rose, only a small fraction might have been able to obtain them. Thus, even though some banks might have been able to attract capital during ordinary times, there were simply too many banks seeking that capital during panics.[19]

A second reason that panics may have inhibited the ability of banks to pursue alternative resolution strategies is that the number of banks in trouble during panics may have made rescuing the banks more expensive or difficult. Allen and Gale (2000) show

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[19] The elevated level of suspensions during some panics suggests that at least some banks were successful in obtaining the resources to recapitalize. It could still be the case that these successful reorganizations exhausted the supply of available capital.

how interbank claims can cause losses to spread across banks. Diamond Rajan (2005) present a model in which illiquidity problems at one bank can reduce the liquidity of the banking system and cause problems for other banks. In these models the more banks affected in the initial state, the greater will be the problems for the other banks. Ferderer (2006) finds evidence that market liquidity did decline at times during the Depression. Donaldson (1992) also illustrates how that value of a bank can fall as the number of other banks in distress increases.

A third potential for the difficulty in attracting capital in crises might be an increased difficulty in valuing banks during a panic. Wilson, Sylla, and Jones (1990) noted that asset price volatility increases during panics. If investors had a more difficult time than usual valuing the bank, especially with risks likely tilted to the downside, they may not have been as willing to assist in restructuring the bank.

All three of these reasons could potentially contribute to a reduction in the ability of banks to recapitalize after suspending or to merge with another bank during a panic. The data used in this paper does not allow us to explore which, if any, of these reasons appears particularly important. This area may be fruitful ground for further research.

Section 5. Conclusion

The empirical literature on banking panics finds that banks that failed during panics were generally economically weaker than the ones that survived. The analysis here comes to a similar conclusion, but argues that this comparison provides an incomplete picture of the effects of panics on the banking system. Banks had alternatives to failing during regular times; they could either suspend and reorganize or merge with other banks. This study examines whether banks that failed during panics might, had the panic not occurred, have been able to pursue these other options. Through a series of comparisons, I find evidence that the balance sheets of banks that failed during panics were at least as strong as those of banks that were able to pursue alternative resolution strategies. These findings suggest that the panics may have played a role in preventing banks from suspending and reorganizing or from finding other banks to merge with, possibly due to the increase in the number of problem banks and uncertainty in pricing financial assets during panics.

The period of liquidation following bank failure caused assets to be taken out of the banking system and frozen for extended periods. During a bank merger, the assets stay in the banking system continuously. For banks that suspended temporarily, the median length of suspension in this sample was about 5 months. By comparison, Anari, Kolari, and Mason (2005) find that the average length of liquidation of a bank that failed in the early 1930s was about 6 years. The loss of the bank expertise and the freezing of bank assets and deposits have been found to have had negative effects on output (Bernanke 1983, Anari, Kolari, and Mason 2005}. Thus, to the extent that the panics prevented banks from pursuing less disruptive resolution strategies, then the panics of the early 1930s may well have played a role in prolonging and deepening the Great Depression.

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Table 1
Banks and bank exits by state

State	Banks	Percent of total	Banks that survived	Banks that failed	Banks that merged	Banks that suspended	Banks that voluntarily liquidated
Alabama	244	4.0%	143	63	20	8	10
California	183	3.0%	119	43	21	0	0
Colorado	156	2.5%	96	38	8	6	8
Georgia	341	5.5%	204	88	9	8	32
Idaho	92	1.5%	57	25	2	8	0
Louisiana	188	3.1%	139	15	25	8	1
Maine	49	0.8%	40	2	7	0	0
Maryland	133	2.2%	105	9	8	10	1
Missouri	1158	18.8%	683	311	129	20	15
Montana	130	2.1%	90	20	9	0	11
Nebraska	674	11.0%	401	195	24	48	6
New Hampshire	14	0.2%	13	1	0	0	0
New Jersey	227	3.7%	155	21	37	7	7
North Carolina	342	5.6%	178	126	30	6	2
Ohio	614	10.0%	448	101	38	25	2
Oregon	137	2.2%	77	30	27	1	2
South Carolina	174	2.8%	70	62	29	7	6
South Dakota	270	4.4%	156	104	9	0	1
Vermont	37	0.6%	35	1	1	0	0
West Virginia	193	3.1%	111	45	26	11	0
Wisconsin	789	12.8%	581	111	55	38	4
Total	6145	100.0%	3901	1411	514	211	108
Share of all banks			63.5%	23.0%	8.4%	3.4%	1.8%
Share of exits				71.5%	26.0%	10.7%	5.5%

Table 2
States and Months in Which Panics Occurred

	Using Historical Record*	Using Prevalence of Bank Failures
Alabama	Jan.-Feb. 1933	No panics
California	Jan.-Feb. 1933	Jan. 5-25, 1932; Jan. 13-Feb. 2, 1933
Colorado	Jan.-Feb. 1933	Dec. 22, 1932–Jan. 11, 1933
Georgia	Jan.-Feb. 1933	No panics
Idaho	Jan.-Feb. 1933	Aug. 21-Sept. 9, 1932
Louisiana	Jan.-Feb. 1933	No panics
Maine	Jan.-Feb. 1933	No panics
Maryland	Jan.-Feb. 1933	Sept. 23–Oct. 8, 1931
Missouri	Sept.-Oct. 1931; Jan.-Feb. 1933	Oct. 9–Nov. 5, 1931; Dec. 21, 1931–Jan. 3, 1932; Jan. 2-26, 1933
Montana	Jan.-Feb. 1933	No panics
Nebraska	Jan.-Feb. 1933	Apr. 6-25, 1930
New Hampshire	Jan.-Feb. 1933	No panics
New Jersey	Jan.-Feb. 1933	Dec. 14, 1931-Jan. 2, 1932
North Carolina	Nov. 1930-Jan. 1931, Jan.-Feb. 1933	Nov. 11-29, 1930; Dec. 6-16, 1930; Dec. 19, 1931-Jan. 7, 1932
Ohio	Apr.-Oct. 1931; Jan.-Feb. 1933	Aug. 7-27, 1931; Oct. 12-Nov. 1, 1931
Oregon	Jan.-Feb. 1933	No panics
South Carolina	Jan.-Feb. 1933	No panics
South Dakota	Jan.-Feb. 1933	Dec. 12-25, 1930; Sept. 12-Oct. 1, 1931
Vermont	Jan.-Feb. 1933	No panics
West Virginia	Sep.-Oct. 1931; Jan.-Feb. 1933	Sept. 28-Oct. 20, 1931
Wisconsin	Jan.-Feb. 1933	July 11-31, 1931; July 8-24, 1932

Note. Dates are inclusive.
*These are dates characterized by Wicker (1996) as panic periods. That does not necessarily imply that there were any actual bank failures during these periods.

Table 3
Survival Analysis Using Banks that Survived and Banks that Failed Outside Panics

Dependent variable: Bank fails (logit analysis); Number of days until the bank fails (survival analysis)

	Logit analysis coefficients	Logit analysis significance	Logit analysis standard errors	Survival analysis coefficients	Survival analysis significance	Survival analysis standard errors
Intercept	-8.01	***	0.92	3.19	***	0.48
Log assets	0.25	***	0.06	0.12	***	0.03
Interest earning assets to total assets	0.05	***	0.01	0.03	***	0.00
Securities to interest earning assets	0.03	***	0.00	0.02	***	0.00
Cash to deposits	0.06	***	0.01	0.04	***	0.00
New worth to assets	0.02	***	0.01	0.01	*	0.00
Bills and rediscounts to assets	-0.11	***	0.01	-0.06	***	0.00
Federal Reserve member	0.11		0.19	0.05		0.10
More than 10 years old	0.17	**	0.08	0.09	**	0.04
Share of population considered urban	0.00		0.00	0.00	*	0.00
Banks share of the county assets	0.01		0.21	0.02		0.11
Unemployment rate	-0.02		0.02	-0.02		0.01
State dummies included	yes			yes		
Memo: Failures	*1121*			*1121*		
Memo: Observations	*5011*			*5011*		
Memo:Log Likelihood	*-2236.95*			*-2939.1*		
Memo: Somer's D	*0.54*					

Note. Coefficients, β, estimated using logistic analysis can be transformed by $100*(\exp(\beta) - 1)$ to indicate the percentage change in the expected time until the even occurs for each one-unit increase in the independent variable. Coefficients, γ, estimated using survival analysis can be transformed by $100*(\exp(\gamma)-1)$ to indicate the percentage change in the expected time until the even occurs for each one-unit increase in the independent variable. Survival analysis estimated using a log-logistic distribution. Standard errors are in parentheses. The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors are in parentheses. Bank data are from annual reports of state banking authorities or Rand-McNally. County demographic data is from the 1930 census.

Table 4
Comparison of Average Balance Sheet Ratios and Location Characteristics of Banks Failing in Panics
to Those of Banks that Survived or Failed Outside a Panic

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Banks that survived	Banks failing outside panic periods	Banks failing during panics (using historical record)	Does (3) differ from (1)?	Does (3) differ from (2)?	Banks failing during panics (using data patterns)	Does (6) differ from (1)?	Does (6) differ from (2)?
Log Assets	13.05	12.54	13.04	no	^^^	13.12	no	^^^
Interest earning to total assets	76.93	74.54	78.93	***	^^^	78.21	no	^^^
Securities to loans and securities	22.03	11.89	16.65	***	^^^	18.26	***	^^^
Cash to total deposits	20.62	19.61	18.59	**	no	18.67	**	no
Net Worth to Assets	15.28	16.37	14.81	no	^^^	14.52	no	^^^
Bills to total assets	1.33	3.42	2.49	***	^^	2.41	***	^^
Member of the Federal Reserve	0.07	0.04	0.07	no	^	0.10	no	^^^
More than 10 years old	0.58	0.51	0.60	no	^^	0.59	no	^^
Share Population in Urban Settings	30.48	22.56	35.55	**	^^^	36.58	***	^^^
Bank's Share of County Deposits	0.20	0.19	0.17	*	no	0.17	no	no
County unemployment rate	4.25	3.57	4.80	***	^^^	4.61	*	^^^
Survival Probability	0.82	0.64	0.76	***	^^^	0.76	***	^^^
Survival Time	4955.19	2631.05	3798.58	***	^^^	3716.91	***	^^^
Memo: number of banks	3890	1121	216			174		

Note. The symbols (***), (**), and (*) indicate the average is statistically different from the average for banks that failed during nonpanic periods at the 1, 5, and 10 percent level, respectively. The symbols (^^^), (^^), and (^) indicate the average is statistically different from the average for banks that survived at the 1, 5, and 10 percent level, respectively. Bank data are from annual reports of state banking authorities or Rand-McNally. County demographic data is from the 1930 census.

Table 5
Comparison of the Average Balance Sheet Ratios and Location Characteristics of Banks that Merged or
Banks that Suspended with those of Banks that Survived or Failed Outside a Panic

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Banks that survived	Banks failing outside panic periods	Banks that merged	Does (3) differ from (1)?	Does (3) differ from (2)?	Banks that suspended	Does (6) differ from (1)?	Does (6) differ from (2)?
Log Assets	13.05	12.54	13.03	no	^^^	13.30	***	^^^
Interest earning to total assets	76.93	74.54	76.60	no	^^^	77.75	no	^^^
Securities to loans and securities	22.03	11.89	18.25	***	^^^	17.57	***	^^^
Cash to total deposits	20.62	19.61	20.31	no	no	16.54	***	^^^
Net Worth to Assets	15.28	16.37	16.93	***	no	12.30	***	^^^
Bills to total assets	1.33	3.42	2.40	***	^^^	2.57	***	^^
Member of the Federal Reserve	0.07	0.04	0.08	no	^^^	0.07	no	^
More than 10 years old	0.58	0.51	0.47	***	^	0.65	**	^^^
Share Population in Urban Settings	30.48	22.56	34.87	***	^^^	26.68	*	^^
Bank's Share of County Deposits	0.20	0.19	0.15	***	^^^	0.21	no	no
County unemployment rate	4.25	3.57	4.58	**	^^^	3.94	no	^
Survival Probability	0.82	0.64	0.76	***	^^^	0.74	***	^^^
Survival Time	4955.19	2631.05	4360.77	**	^^^	3983.56	***	^^^
Memo: number of banks	3890	1121	509			210		

Note. The symbols (***), (**), and (*) indicate the average is statistically different from the average for
banks that failed during nonpanic periods at the 1, 5, and 10 percent level, respectively. The symbols (^^^),
(^^), and (^) indicate the average is statistically different from the average for banks that survived at the 1,
5, and 10 percent level, respectively. Bank data are from annual reports of state banking authorities or
Rand-McNally. County demographic data is from the 1930 census.

Table 6
Comparison of the Average Balance Sheet Ratios and Location Characteristics of Banks that Failed During
Panics with Those of Banks that Suspended

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Banks that merged	Banks that suspended	Banks failing during panics (using historical record)	Does (3) differ from (1)?	Does (3) differ from (2)?	Banks failing during panics (using data patterns)	Does (6) differ from (1)?	Does (6) differ from (2)?
Log Assets	13.03	13.30	13.04	**	no	13.12	no	no
Interest earning to total assets	76.60	77.75	78.93	no	^^^	78.21	no	^
Securities to loans and securities	18.25	17.57	16.65	no	no	18.26	no	no
Cash to total deposits	20.31	16.54	18.59	***	^	18.67	**	no
Net Worth to Assets	16.93	12.30	14.81	***	^^^	14.52	***	^^^
Bills to total assets	2.40	2.57	2.49	no	no	2.41	no	no
Member of the Federal Reserve	0.08	0.07	0.07	no	no	0.10	no	no
More than 10 years old	0.47	0.65	0.60	no	^^^	0.59	no	^^^
Share Population in Urban Settings	34.87	26.68	35.55	***	no	36.58	***	no
Bank's Share of County Deposits	0.15	0.21	0.17	*	no	0.17	no	no
County unemployment rate	4.58	3.94	4.80	***	no	4.61	**	no
Survival Probability	0.76	0.74	0.76	no	no	0.76	no	no
Survival Time	4360.77	3983.56	3798.58	no	no	3716.91	no	no
Memo: number of banks	509	210	216			174		

Note. The symbols (***), (**), and (*) indicate the average is statistically different from the average for banks that merged at the 1, 5, and 10 percent level, respectively. The symbols (^^^), (^^), and (^) indicate the average is statistically different from the average for banks that suspended at the 1, 5, and 10 percent level, respectively. Bank data are from annual reports of state banking authorities or Rand-McNally. County demographic data is from the 1930 census.

Table 7

Comparison of the Average Balance Sheet Ratios and Location Characteristics of Banks that Failed During Panics with Those of banks that used an alternative resolution strategy

	(1)	(2)	(3)
	Banks that merged or suspended	Banks failing during a panic	Does (2) differ from (1)?
Log Assets	13.11	12.99	no
Interest earning to total assets	76.94	77.97	no
Securities to loans and securities	18.06	17.09	no
Cash to total deposits	19.21	18.74	no
Net Worth to Assets	15.58	14.76	no
Bills to total assets	2.45	2.32	no
Member of the Federal Reserve	0.08	0.06	no
More than 10 years old	0.52	0.59	**
Share Population in Urban Settings	32.48	34.82	no
Bank's Share of County Deposits	0.17	0.16	no
County unemployment rate	4.39	4.53	no
Survival Probability	0.76	0.75	no
Survival Time	4250.59	3666.52	no
Memo: number of banks	719	288	

Note. The symbols (***), (**), and (*) indicate the average is statistically different from the average for banks that used an alternative resolution strategy at the 1, 5, and 10 percent level, respectively. Bank data are from annual reports of state banking authorities or Rand-McNally. County demographic data is from the 1930 census.
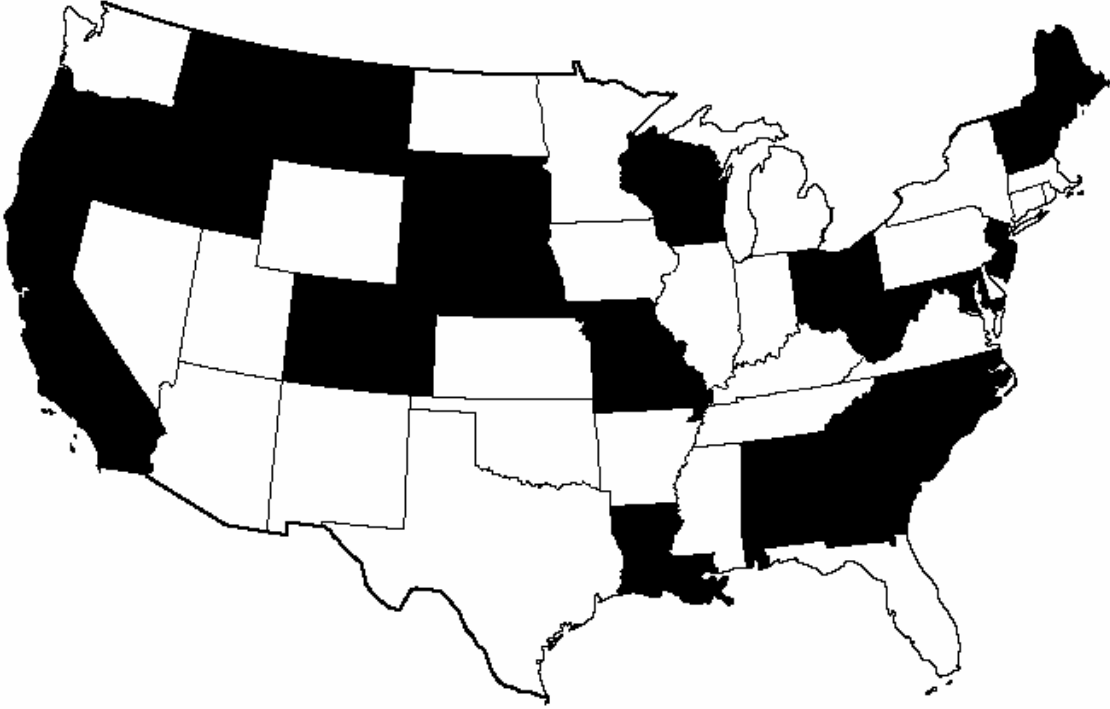
Figure 1
States included in the dataset

Figure 2
Timeline of bank failures, mergers, and suspensions