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ABSTRACT

Bank distress was a defining feature of the Great Depression in the United States. Most banks, however, weathered the storm and remained in operation throughout the contraction. We show that surviving banks cut lending when depositors withdrew funds en masse during panics. This panic-induced decline in lending explains about one-third of the reduction in aggregate commercial bank lending between 1929 and 1932, more than twice as much as attributed to the failure of banks.

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Introduction

Banking panics and bank failures were defining characteristics of the Great Depression in the United States. According to monetary theory, panics drained deposits from banks, reduced the money supply, raised prices, triggered debt deflation, and inhibited purchasing and investment (Friedman and Schwartz 1963, Fisher 1933). According to the information theory, bank failures disrupted bank-borrower relationships that facilitated financial flows and destroyed information that had been compiled by failed banks, raising the costs of credit and reducing the availability of funds to firms to small- and medium- sized firms that needed to borrow from banks (Bernanke 1983). An important question, however, remains unanswered. How did the banking panics of the early 1930s impact the lending of banks that weathered the storm and survived the deepest downturn in U.S. history?

To answer this question, this paper provides new estimates of the decline in commercial bank lending during the contraction of the early 1930s due to banking panics. Previous scholarship has shed little light on this issue because of data and methodological constraints. We introduce new data and utilize recent innovations in identifying panics to show that lending by banks that remained in operation fell precipitously during panics. From July 1929 and December 1932, we find that, in aggregate, panics forced banks to reduce lending by $6.1 billion, which was 17% of all loans outstanding on the eve of the Depression and 38.9% of the total decline in lending over that span. Comparing our findings to other channels, loans trapped in failed banks summed to $2.6 billion or approximately 7.4% of loans outstanding in June 1932 and 16.8% of the decline in lending from peak to trough (Richardson 2008; Cohen, Hachem, and Richardson 2020). In other words, the deposit crunch explored in this paper accounts for more than twice the decline in lending due to failed banks. It is also greater than the retrenchment of interbank networks, which reduced aggregate lending by about 12% (Mitchener and Richardson 2019).[1]

Our methods rest upon four observations. First, the majority of commercial banks (more than 15,000) survived the financial crises of the 1930s. Second, local and regional panics featured prominently in the banking distress of early 1930s (Friedman and Schwartz, 1963; Wicker, 1996; Jalil, 2015). Banks experienced these shocks in different locations and at different times. We use the variation in timing and location of panics to identify how these shocks reduced aggregate lending independent of other factors. Third, since deposit insurance did not exist during this era, we can observe banks' responses in a setting where depositors were known to have monitored banks and where withdrawals would be the normal response when bank runs occurred (Diamond and Dybvig 1983).[2] Fourth, except for a few Federal Reserve banks, the Federal Reserve System did little to counteract the panics, allowing us to analyze how banks respond to a deposit crunch free of modern policy responses.

Our analysis draws on two new data sets. The first is composed of the balance sheets of all commercial banks in the United States aggregated by: (i) call report date, which is the highest frequency possible using nationally representative data; (ii) Federal Reserve district, which enables us to control for economic shocks observed at the district level and the policies of Federal Reserve banks; and (iii) membership in the Federal Reserve, which is necessary because member and nonmember banks had different specialties and responded differently to

[1] Mitchener and Richardson (2019) examined how events on the periphery of the financial system that forced country banks to draw down their interbank balances influenced lending by correspondent banks at the core of the US financial system. This paper builds on that earlier work but considers an entirely different question. It asks how runs on banks, which were typically regional events but occasionally nationwide, influenced lending by banks operating in the region where the panic occurred and that remained in operation throughout the contraction of the early 1930s.

[2] National deposit insurance was enacted only in response to the banking crisis of the early 1930s. Eight states had deposit insurance systems that were established between 1908 and 1917, but all were abandoned by 1930. Excluding data from the two Fed districts containing states that abandoned in 1930, Nebraska and Mississippi, does not change the results in the paper.

shocks during the depression. Member and nonmember banks also reported to different regulators, and their reports were tabulated differently, so more detailed data are available for the balance sheets of Fed member banks. The second new data set is a panel containing balance-sheets from weekly-reporting banks aggregated by Fed District, which has been corrected for sampling biases. We use this high-frequency data set in event studies to document the decline in deposits and lending that occurs during panics.[3]

Our method identifies panics' impact on lending by comparing highly treated observations (districts which have more intense panics at time *t*) to less treated observations (districts with less intense panics at time t), and untreated observations (districts without panics at time t). We control for changes in lending that are explained by the downward trend in deposits from 1929 to 1932, by the capital crunch, by shocks that impacted all districts at a point in time, and by factors unique to districts. We also control for changes in lending that could be explained by Federal Reserve policies (proxied by movements in each Reserve Bank's discount rate), changes in aggregate economic activity (proxied by changes in consumption, the largest component of GDP), and changes in expectations of future economic activity (proxied by changes in district-level equity returns and building permits).

To control for other unobserved shocks that may have affected lending and clustering of suspensions, including those that investors and businessmen did not anticipate or that

[3] Mitchener and Richardson (2019) analyzed information from: (1) a panel of Fed member banks in reserve cities in the 12 Fed districts and the two central reserve cities (of New York and Chicago) and (2) weekly reporting banks in New York City and the sum of weekly reporting banks in 100 cities outside New York City. Those data are from the Board of Governors (1943). Here, we expand both of those data sets, drawing on information from an array of additional sources that we describe in the online Data Appendix. First, we analyze aggregate data from *all* Fed member banks and non-member banks in each Fed district. In other words, we provide new data on Fed member country banks (that is Fed members operating outside reserve and central reserve cities) and non-member banks aggregated by Fed district and call interval. For all these banks, we then explicitly distinguish at the district-call-member-city level changes in aggregates due to the closure of banks and changes in the balance sheets of banks remaining in operation by collecting information on deposits, loans, and investments in individual banks on the date of failure. Second, we analyze data from weekly reporting banks aggregated in 14 groups: (a) New York City, (b) Chicago Loop (the central reserve institutions in Chicago), and (c) for each of the 12 Fed districts, the aggregate of weekly reporting banks in their reserve cities. We correct this information for sampling bias using a procedure described in the online Data Appendix.

consumers as well as the possibility that depositors panicked when they anticipated lending to decline in their Fed district, we employ an instrumental variable approach inspired by Friedman and Schwartz (1963) and Jalil (2015). The first stage of our IV specification predicts panic intensity using narrative evidence of exogenous events triggering panics in a particular Fed district during a particular call interval, such as the financial crisis in Europe in 1931 and the counter-party cascade following the unexpected collapse of Caldwell and Company in 1930. The historical record reveals 26 such events during the contraction of the early 1930s. We check the robustness of our estimates by demonstrating that our conclusions do not depend upon any particular Fed district, time period, or reading of the historical literature. The IV estimates are slightly smaller than our baseline estimates, although we cannot reject the null hypothesis that the baseline and IV estimates of panics' impact on lending are equal.

We combine the IV estimates with data on the suspensions during panic periods to generate an estimate for the aggregate decline in lending due to the deposit crunch. We then compare the importance of the deposit crunch relative to other factors scholars have identified as reducing lending during this period, including the failure of banks and contractions in the interbank network.

In addition to deepening our understanding of the Great Depression, our analysis relates to the growing literature on credit supply shocks (Chodorow-Reich 2014; Khwaja and Mian 2008), and in particular, research exploring how shocks to banks' balance sheets alter the aggregate supply of lending. In the deposit channel literature on monetary policy, deposit outflows depend upon the market power of banks; the response to changes in monetary policy is strongest where the concentration of local deposits is greatest (Drechsler, Sakov, and Schnabl 2017). Our research relates to this literature's emphasis on deposit flows, but the source of the shock differs (unexpected funding shocks in our case versus monetary policy shocks in theirs) as does the transmission mechanism (changes in bank risk premia versus changes in risk-free rates). Moreover, in our setting, the magnitude of the deposit crunch depends upon the severity of the panic and banks' ability (or inability) to replace withdrawals with other borrowed funds. During a financial crisis, a deposit crunch and the deposits channel of monetary policy may both be in operation if the crisis induces the central bank to alter the discount rate, either downward, as is typical today, or upwards, as in the fall of 1931 and as called for in Bagehot's classic rule.

Our research also relates to broader literature exploring credit-supply shocks arising from financial crises. Research on the Great Recession uses firm-level data to identify changes in employment and investment in tangible assets (,) or looks at how particular markets for loans, such as syndicated lending or shadow banking, fell in response to the financial crisis of 2008 (Ivashina and Scharfstein 2010). Our research complements these studies, but our focus and methodology differ in that we analyze the aggregate decline in lending across the entire commercial banking system due to exposure from well-defined panics as opposed to proxies meant to measure the exposure to credit-supply shocks or the exposure to a single, distressed financial institution, such as Lehman Brothers.

The Banking Panics of the 1930s

Scholars have long recognized the regional nature of bank runs during the Great Depression (Wicker 1996). Analysis proceeded either by aggregating regional data and analyzing national aggregates, as in Friedman and Schwartz (1963) and Bernanke (1983), or by focusing on subsets of events whose unique features aided statistical identification, as in Calomiris and Mason (1997, 2003) and Richardson and Troost (2009). We combine these approaches by using regional panics for identification and then aggregating those estimates to the national level.

During banking panics, large numbers of banks suspended operations in short periods of time, like two to four weeks, in small areas, like a single county, state, or Federal Reserve district. Scholars can clearly observe these spatial-temporal clusters, making them useful indicators of panics' incidence. To detect these clusters, we apply the approaches of Davison and Ramirez (2014) and Mitchener and Richardson (2019). The former characterizes panics by (i) a distance, measured in miles; (ii) a rolling window, measured in days since the last suspension of a bank within the potential cluster; and (iii) a threshold for a minimum number of banks. The latter characterizes panics by join counts. A join indicates the number of pairs of banks that suspended operations within a given distance (measured in miles) and given interval of time (such as a week). This method identifies spatial and temporal clusters of events exceeding those expected by random chance. Both methods provide a measure of the severity of panics relative to each other and relative to the large number of banks failing for other reasons.

We apply these methods to geocoded data from the Federal Reserve Board's Division of Bank Operations collected from the National Archives of the United States. Both methods detect all the panics discussed in leading accounts of the era and smaller regional shocks which those accounts overlooked. Table 1 depicts the distribution of bank suspensions in 10-mile, 30-day joins.[4] Higher numbers of joins indicate tighter clustering of bank suspensions over time and across space. The number of clusters peaked in the fourth quarter of 1930 and third and

[4] Table 1 and our econometric analysis throughout use a definition of panics (10-mile, 30-day join) that Bayesian model averaging indicates was most highly correlated with declines in lending after controlling for relevant factors. For more details on the Bayesian model averaging results, see our working paper Mitchener and Richardson (2020). Alternative definitions of panics, yield similar results. The data shown in the table are aggregated by periods between call dates, which are roughly quarterly. In each year, the summer call data fell on the last business day of June, typically June 30. The winter call date fell on the last business day of December, typically December 31. In 1929, the spring call occurred on March 27 and the fall call on October 4. In 1930, the spring call occurred on March 27 and the fall call on September 24. For 1931, the spring call occurred on March 26 and the fall call on September 29. In 1932, there was no spring call. The fall call occurred on September 30.

fourth quarters of 1931. Smaller clusters occurred often. These marked local banking panics, when depositors rushed to withdraw funds from the banks in a single municipality or county.

Most of the clusters of suspensions enumerated in Table 1 coincide with contemporary reports and academic accounts of runs on banks. The clusters in Fed District 6 in the spring and summer of 1929, for example, began when fears of financial instability due to a fruit-fly infestation triggered runs on banks outside the afflicted area (Carlson, Mitchener, and Richardson 2011). The clusters in Districts 5 through 9 in the last quarter of 1930 reflected runs that spread through the center of the United States following collapse of Caldwell and Company and the Bank of United States (Richardson and Troost 2009, Wicker 1996, Friedman and Schwartz 1963). The clusters in District 7 emerged when a series of panics struck the central reserve city of Chicago (Friedman and Schwartz 1963, Calomiris and Mason 1997, Vickers 2011, Wicker 1996, Postel-Vinay 2006). The clusters in late 1931 were associated with financial crises that afflicted continental Europe in the summer of that year and the United Kingdom in the fall. Historical accounts emphasize that during these events, bank distress was due to a broad flight to liquidity rather than information about the solvency of particular banks or information that lending would decline in particular banks or localities. In other words, historical narratives indicate that, in these events, causality ran from deposits to lending rather than the other way around.

This observation concerning causality is consistent with the relationship between clusters of suspensions and two key monetary ratios presented in Table 2. Columns 1-4 regress the log change in the currency-deposit ratio on the join-count for each observation divided by 120, or in other words, the number of clustered suspensions divided by the size of the largest cluster. The results reveal a strong correlation between suspensions clustered in time and space and currency flowing out of commercial banks. Depending on the specification, when the size of the suspension cluster increased by 1%, the flow of currency out of commercial banks increased from 0.37% to 0.64% (depending on the specification). These large currency outflows, which are the defining feature of bank runs, only occurred at the time suspensions were tightly clustered. They did not precede clusters, follow clusters, or coincide with suspensions that were not clustered in time and space. The same strong-consistent relationship does not exist for the loan-to-deposit ratio (Columns 5-8). This second result implies that during panics, when bankers scrambled to gather cash to satisfy depositors' demands, they did so by shedding cash, reserve deposits, bonds, and loans in roughly equal proportions. Panics were not periods when bankers altered their investment behavior or when borrowers for some reason decided to default, cease borrowing, or repay loans *en masse*.

Panel-Data Evidence Panics' Impact on Lending

Given a measure of panic intensity, we are now equipped to explore the correlation between panics and lending. We employ a treatment and control model where treatment intensity varies across observations and over time. Our outcome variable is lending for commercial banks. Our estimates are obtained from comparisons between the flow of deposits in Fed districts exposed to different intensities of treatment (panics of different intensities) controlling for factors that influenced deposit flows. Our baseline model takes the following form:

$$(1) \qquad L_{it} = \sum_k \beta_k S_{kit} + \varphi X_{it} + \alpha_i + \gamma_t + \varepsilon_{it} \, .$$

L_{it} indicates the change in lending in banks in operation on date *t-1* that survive to date *t* in observation *i*, where the dates are the call dates from June 1929 to December 1932.[5] The lowest level of aggregation available for estimating lending at the frequency of the call report (roughly quarterly, indexed by *t*) for all commercial banks is at the Federal Reserve District level.

[5] The last call date is on the last day of 1932 because the federal and state governments did not collect call report data during the winter and spring of 1933. Because of this lacuna, the panel methods that we employ do not include the impact of the banking panic in January and February of 1933.

Because the reporting categories of balance-sheet data differs by bank charter, we present estimates for Fed member and nonmember banks separately.

The principle explanatory variable is the number of banks suspending operations. Commercial bank suspensions include all member and non-member banks. S_{kit} indicates the number of commercial bank suspensions in Federal Reserve district *i* from call *t-1* to call *t*. In our key specifications, we disaggregate suspensions by type $k = \{panic, non\text{-}panic\}$. Our measure of panic intensity is the number of banks suspending operations during banking panics. The number of banks suspending operations outside of panics measures financial distress for other reasons, primarily declining asset values and increasing loan losses. The coefficient, β_k, indicates the average change in lending in banks remaining in operation in response to a suspension of type *k*. Suspensions during panics are defined as in Table 1. The number of banks in these clusters is our measure of panic intensity.[6]

The number of non-panic suspensions captures banking distress occurring for reasons other than depositor runs. The preponderance of banks suspending outside of panics failed with losses to stockholders and depositors. Almost all were insolvent. Few reopened. The number of non-panic suspensions controls for the range of factors that influenced bank failure rates, including increases in loan defaults and declines in asset values, which are the root cause of the capital crunch (Calomiris and Wilson, 2004).

Fixed effects for each Federal Reserve District are captured by the intercept term, α_i. These fixed effects remove averages for each variable for each unit of observation, *i*, yielding the within estimator. Time fixed effects remove averages for all variables in each period. In other words, our estimator reveals whether lending changed more (or less) than trend in

[6] We retain the raw number of clustered suspensions as our intensity scale because the coefficients in the resulting regressions have an intuitive interpretation: the total (dollar) decline in deposits at operating banks triggered by each panic-induced bank suspension.

districts experiencing larger (or smaller) panics relative to other districts at that time and their own district average over all periods.

The matrix of controls, X_{it}, includes time and district-varying factors that may have influenced lending. These factors include (i) the change in the discount rate in Federal Reserve district *i* from date *t-1* to *t*; (ii) the change in consumption in each Fed district from date *t-1* to *t*, which we derive from the Fed's index of department store sales; (iii) the change in building permit applications filed per month between call dates *t* to *t-1*; and (iv) the change in the return to common stocks issued by firms operating in each Federal Reserve district in the three quarters preceding date *t*.[7] Discount rates summarize the range of policies used by Reserve Banks in this era, including the open-market purchase rate, the quantity of open-market purchases, and quantity rationing at the discount window.[8] The consumption index is the best extant measure of regional economic activity for the era we study. It proxies aggregate output, since consumption is the largest component of gross domestic product.

Building permits and stock returns control for economic expectations of two types. Building permits reflect expectations of real estate developers and the firms and households that finance them. Permit requests increase when developers and financiers anticipate economic expansions will raise rental incomes and decline when those economic agents anticipate the economy will contract. Equity returns reflect investors' expectations regarding the profitability of public corporations and often also reflect short-term sentiment, which venerable scholars of the Great Depression and recent Nobel Laureates termed "animal spirits" (Keynes 1936, Akerlof and Schiller 2009). Expectations of both types update rapidly to reflect

[7] The regional stock-return data comes from *Global Financial Data*. We process the data as described in Mitchener and Richardson (2020).

[8] Goldenweiser (1925), Friedman and Schwartz (1963), Chandler (1971), and Wheelock (1991) indicate that the Reserve Banks often used these tools simultaneously or moved them sequentially over a period of weeks, which would fall within a single period of our panel. The discount rate, therefore, serves as a sufficient statistic for this package of policies. Our research indicates that adding additional measures of policy does not alter our results.

new information and economic events. To ensure that our measures of expectations do not reflect endogenous responses to banking panics, we use lagged values which reflect information possessed by firms, households, and investors at the onset of each interval.

Interpretation of the coefficients that we estimate depends in part on how they compare to the balance sheet of typical member and nonmember banks. Table 3 presents information drawn from *Rand McNally Bankers Directory* in 1932. Lending by nonmember banks averaged $760,000, while lending by member banks averaged over $2,100,000. For both, the average was much larger than the median because distribution of bank sizes was skewed, with many small banks of similar size (near the median in the table) and smaller numbers of much larger banks.

Table 4 shows how panics affected credit extended by nonmember banks. Columns 1 and 5 demonstrate that when suspensions rose, the quantity of loans on balance sheets of nonmember banks typically declined, while the quantity of bonds (typically termed "investments" in contemporary documents) on average remained about the same. Columns 2 and 6 differentiate between the impact of suspensions during panics and outside of panics. As the results show, panics typically triggered declines in lending and bondholding whereas suspensions outside of panics had little impact on lending but were correlated with increased bondholding. The latter result seems to be driven by the reallocation of bonds from banks short of cash to banks with surpluses, particularly during quarters when panics occurred in some districts, whose banks sold bonds to raise cash, but not in others, whose banks bought bonds being sold by cash-strapped institutions.

Columns 3, 4, 7, and 8 compare the lending of banks that remained in operation to those that ceased operations.[9] For each bank that suspended operations during a panic, lending at banks that remained in operation declined by $1.3 million dollars, while lending trapped in failed banks amounted on average by $0.6 million.[10] The correspondence between these estimates from aggregate data and the average size of nonmember banks from microdata (see Table 3) is noteworthy. The former indicates that on average each suspension during a panic trapped $600,000 in a failing nonmember bank, which is reasonable since banks that failed tended to be below average size. Each suspension coincided with a decline of lending in banks that remained in operation by $1.3 million, which is the size of two average banks. The latter shows that the average nonmember bank held $760,000 in loans.

These results indicate that panics had about double the impact on lending at banks that remained in operation versus banks that failed. A different pattern prevailed for bondholding. For each bank in their district that suspended operations during panics, banks that remained in operation in that district shed about $0.8 million in bonds, presumably because the panic forced them to liquidate their secondary reserves to satisfy depositors' demand. Banks in neighboring districts that were not run, however, acquired those bonds, so that on aggregate, the value of bonds on banks' balance sheets did not change.

A placebo group – mutual savings banks – is examined in columns 9 and 10. Mutual banks could not be run since they did not issue demand deposits and could compel depositors to wait for the maturity of their shares before redeeming withdrawal requests and because they

[9] We calculate the change in lending between calls at banks remaining in operation and at closing banks as follows. On the date of each call, we know total lending by all banks in operation. Between one call and the next, we know lending on the date of suspension for each bank that suspends operations and remains suspended at the date of the next call. We sum those loans in those suspended banks. Call this sum $C_{t,t-1}$ for loans at banks closed between dates t-1 and t. We calculate the change in lending at operating banks (denoted $\Delta O_{t,t-1}$) between t-1 and t as $\Delta O_{t,t-1} = O_t - (O_{t-1} - C_{t,t-1})$ where O_t is total lending by banks in operation at date t.

[10] A total of $2.7 billion in loans were trapped in banks on the date of failure. Those failed banks shed less than $300 million in loans from the peak of the business cycle in 1929 until failure. Since this is less than 2% of the $15.6 billion decline in bank lending, we do not distinguish the decline in loans in banks that were in operation but would eventually fail from the decline in lending at banks that operated throughout the contraction.

only invested in public debt and safe mortgages on real estate. It is thus not surprising that the reported coefficients show that lending by mutual savings banks was uncorrelated with distress among commercial banks.

Table 5 examines Fed member banks. Its structure reflects the more detailed data available for member banks' balance sheets. Column 1 indicates that total assets declined substantially in Fed districts during panics. Columns 2, 9, and 10 indicate that during panics most of the decline in assets was due to declines in lending, and most of the decline in lending occurred at banks that remained open for business. Banks' holdings of corporate bonds and interbank balances (including reserves at the Fed) also declined (Columns 3, 5, 6). However, banks' holdings of their most liquid assets, government bonds and vault cash (Columns 4, 8), did not decline because banks typically used the former as collateral for discount loans and replenished the latter by selling less-liquid assets. Our data on bond holdings at banks that closed do not distinguish corporate from government bonds, which limits what we can conclude on this topic, but the hypothesis that the decline in bondholding at banks that remained open equaled the decline at banks that closed cannot be rejected.

Outside of panics, experiences varied for member banks. Those located in money centers, especially Manhattan, received large inflows of deposits, often the result of funds fleeing from financial institutions caught up in panics located elsewhere. Others experienced outflows. So, the standard error on the coefficient for non-panic suspensions is large and the null hypothesis that the coefficient is zero cannot be rejected.

Instrumental Variables Estimates

Our baseline results indicate that lending by commercial banks that remained in operation fell substantially during panics, even after controlling for the state of the economy, Fed policies, agents' expectations, and shocks (both observed and unobserved) to Fed districts or across time. It is possible, however, that rather than panics causing lending to decline, a decline in lending triggered outflows of deposits and clusters of bank suspensions. Perhaps deposits and loans declined because local businesses used funds on call to repay outstanding debts. Perhaps depositors withdrew funds because they anticipated lending would decline due to negative shocks to firms' profits that might put their survival at risk.

To address these possibilities, we present instrumental variables (IV) estimates of the effects of suspensions on commercial bank lending. The first stage of the IV predicts panic intensity using narrative and qualitative evidence describing banking panics triggered by exogenous events in certain Fed districts at certain dates. Friedman and Schwartz (1963) introduced this approach for analysis of national aggregates. Wicker (1996) and Jalil (2015) expanded this identification strategy to a broader range of panics. We focus on events for which a consensus exists among these scholars as well as other researchers including Calomiris and Mason (1997), Meltzer (2003), Richardson (2007b), Carlson, Mitchener, and Richardson (2011), and Vickers (2011).

For each event, the consensus must have two parts. First, a banking panic occurred. Contemporaries characterized panics as periods when runs on banks were widespread. Runs struck banks indiscriminately. Depositors rapidly drew funds from strong as well as weak banks. Banks acted to allay the drawdown of deposits either by borrowing from the Fed and money-center correspondents or slowing withdrawals by refusing early-withdrawals of time deposits, invoking the 30-day clause for demand deposits, or suspending payments entirely. Second, the panic had a trigger which was (i) observed, (ii) exogenous to most or all of the banks in that district, and (iii) not the anticipation that commercial lending in the district would suddenly and substantially decline more than trend and more than expected given the decline in consumption and investment in the district at that time. The latter condition would be fulfilled if observers noted that depositors participating in the runs had little direct information about the financial health of banks from which they withdrew funds and were inspired to run on their bank after observing withdrawals of other depositors or after hearing news of financial difficulties at banks in other cities, states, Fed districts, or nations. Twenty-six of the clusters of suspensions that we identify in Table 1 reflect exogenous panics that fit these criteria. These events include the financial crisis in Europe in 1931, which weakened confidence in commercial banks throughout the United States in the summer and fall of that year; the Chicago banking crises in spring 1931 and 1932; the initial banking crisis of the Depression, which was triggered by the counterparty cascade following the collapse of Caldwell and Company; and the Mediterranean fruit fly infestation in Florida, which triggered runs in the 6th Federal Reserve district in 1929. Our instrument is a variable which equals zero for all observations except those affected by the events described above for which it equals our measure of panic intensity. Table 1 indicates the panics deemed exogenous with bold highlights and grey shading.

Our IV estimates utilize two-stage least squares (2SLS). The first stage regresses panic intensity on our instrument plus controls. It yields a measure of exogenous panic intensity. The second stage regresses changes in lending on panic intensity predicted by the first stage. 2SLS estimates for the effects of panics on lending are presented in Table 6. The coefficient on our instrument is substantial and statistically significant, and the first-stage F-statistic exceeds 50. All tests reject the possibility of a weak instrument. The first stage remains statistically significant with an F-stat well above 10 for any permutation of our control variables.

The second stage regresses lending on instrumented exogenous panic intensity plus controls as in equation (1). All specifications in Table 6 indicate that panics reduced lending. In the full specification, the failure of one additional bank during a panic reduced lending by nonmember banks that remained in operation about $1.4 million and member banks that remained in operation about $2.6 million. For both members and nonmember, the null hypothesis that the IV coefficients for panic intensity equal the corresponding baseline coefficients cannot be rejected. These tests compare the coefficients for nonmember banks in column 4 of Table 6 to column 3 of Table 4 and the coefficients for member banks in column 8 of Table 6 to column 9 of Table 5. The similarity between the reduced-form and IV coefficients suggests our baseline estimates in Tables 4 and 5 are unbiased.

The bottom half of Table 6 reports a series of exercises that examine the robustness of the 2SLS estimates. One question is whether the existing literature correctly identifies exogenous panics. A related question is whether our estimates stem largely from a few outlying observations or events in a single period or Federal Reserve district. To address the first issue, we re-estimate our 2SLS iteratively, dropping each call interval in turn, collecting the coefficients on the variable "Suspensions During Panics," and then reporting the average of those coefficients and the standard error of those estimates. We next conduct a similar exercise where we iteratively drop each Fed district.

To address the second issue, we re-estimate our 2SLS iteratively, in turn switching each indicator of an exogenous panic to an endogenous panic. We then repeated this exercise switching two panics at a time from exogenous to endogenous. This iterative procedure addresses the concern that our sources (or our reading of our sources) might mischaracterize some panics as having an external trigger, when in fact the cluster of suspensions might have been generated by the decline in lending, rather than the other way around.

Almost all the coefficients on suspensions resulting from these robustness permutations have the same sign and significance level as the coefficients reported in the upper half of Table 6. When we iteratively drop districts in columns 3, 5, 7, and 8, for example, all twelve of the resulting coefficients are negative and significant for three columns and all but one in the fourth. When we iteratively drop time periods, all fourteen of the resulting coefficients are negative and statistically significant in two cases and all but one in the other two. Similar results arise when we iteratively reclassify panics from exogenous to endogenous. While the magnitudes of the resulting coefficients vary, with roughly half larger and half smaller than the coefficient that we report in the top of the table, we cannot reject the null hypothesis that the coefficients resulting from these permutations on average are equal to the coefficients reported in our preferred specification. In other words, our results do not stem from events in a single call interval or Federal Reserve district and do not depend on a particular reading of the historical record.

Aggregate Impact of Panics on Commercial Bank Lending

Our estimates allow us to calculate the aggregate decline in lending due to banking panics from 1929 through 1932 and compare those figures to declines in lending for other reasons. The economy-wide decline implied by our estimates is the coefficient on suspensions during panics (for example, -2.649 in column 8 of Table 6 for member banks) multiplied by the number of suspensions during panics during the contraction of the early 1930s (1,522 according to the join counts in Table 1). These estimates and their standard errors appear in the first and second rows of Table 7. The remaining rows compare our estimates of panics' impact on lending to the overall decline in lending by commercial banks.

The overall decline is documented by data from call reports. The last call before the Depression occurred on June 29, 1929. On that date, aggregate lending by commercial banks amounted to $35.7 billion, with nearly $25.6 billion of those loans on the books of Fed member banks and $10.1 billion on the books of nonmembers. On December 31, 1932, the last call before the Banking Holiday in the winter of 1933, aggregate commercial bank lending totaled $20.1 billion, nearly 44% below its value at the start of the contraction. Member bank lending stood at $15.2 billion, 41% below its pre-Depression level, and nonmember bank lending stood at $4.9 billion or 52% below its pre-Depression level. Between the beginning of June 1929 and the end of December 1932, roughly $2.7 billion in loans were trapped in banks that entered liquidation.

Rows 3-5 of Table 7 compare our estimates to total commercial lending at the onset of the Depression (row 3), the aggregate decline in bank lending (row 4), and loans trapped in all failed banks (row 5). The first four columns present estimates for nonmember banks while the latter columns present estimations for member banks. Panics' total impact on lending is thus the sum of its impact on nonmember and member banks. So, our IV estimate with all controls (in columns 4 and 8), indicates the total decline in lending due to panics amounted to 17% (6% + 11%) of commercial bank lending on June 1929, 39% (13% + 26%) of the decline in bank lending from June '29 to December '32, and 231% (78% + 153%) of lending trapped in failed banks. The penultimate estimate, 39%, is the headline result for our paper, and varies between 30% to 40%, depending on the specification. In other words, roughly one- third of the decline in bank lending during the Great Depression took place at banks that remained in operation. The final estimate, 231%, means that lending at banks in operation declined $2.31 for every dollar of lending trapped in banks entering liquidation.

A natural question is how much of the decline in lending at banks in operation occurred in banks that (a) remained in operation from peak to trough of the contraction versus (b) were in operation at the peak in June 1929 but that failed and entered liquidation before the end of December 1932. Banks that eventually failed held about $3 billion in loans on June 30, 1929. Those banks held about $2.7 billion on the data of failure. So, they shed about $300 million in loans from June 1929 until the date of failure. This amount is less than 10% of the decline in loans eventually attributed to bank failures, less than 5% of the total decline in lending due to panics, and less than 2% of the total decline in bank lending during the Depression.

Our findings illuminate an important but overlooked dynamic during the banking crises of the 1930s. All banks lost deposits during the depression. Deposits declined in part because the economy contracted, leaving firms and households with fewer funds to place in banks. Deposits also declined due to shifting preferences for or perceptions of liquidity and risk, which induced firms and households to hold cash, bonds, and other assets instead of deposits in banks. To withstand the drain in deposits, banks on average needed one-third of their loans to be repaid. Banks whose borrowers could repay a substantial share of their loans survived the storm. Banks whose borrowers could not eventually entered liquidation. Banks that failed on average converted 10% of their loans to cash before they ceased operations – a fraction far too small to survive the nationwide deposit drain.

The aggregate lending estimates also allow us to compare the dollar decline in lending due to panics versus declines due to other reasons. The member bank decline in lending of $10.4 billion included $4 billion shed by operating banks due to panics, $1.1 billion trapped in failed banks, and $5.3 discontinued for other reasons, including borrowers' declining demand for loans and bankers' increasing desire for reserves. The nonmember bank decline in lending of $5.2 billion decline included $2 billion shed by operating banks due to panics, $1.6 billion trapped in failed banks, and $1.2 discontinued for other reasons. The drawdown of loans during panics was clearly a substantial cause of the decline in lending by member banks that remained in operation and the predominant reason for the decline lending by nonmember banks that remained in operation during the Depression.

Why Panics Forced Operating Banks to Cut Lending

During panics, banks reduced lending. They did so because they lacked viable alternatives for paying depositors who were demanding cash *en masse*. This section explains why. We first discuss the nature of banking in the 1930s, particularly the short-term structure of commercial lending. We then explore banks' responses to panics using higher frequency data. Finally, we examine banks' aggregate response to panics using balance-sheet regressions based on methods from previous sections.

On the eve of the Great Depression, banks held few liquid assets on their balance sheets. For example, in July 1929, the assets of commercial banks consisted about 1% of cash in their vaults and 10% of bankers' balances (Table 8). Nearly half of those interbank deposits were reserves on deposit at the Fed. Member banks could not use reserves at will. Almost all were needed to satisfy reserve requirements. Typically, less than 10% of reserves kept at the Fed could be withdrawn to satisfy drawdowns in demand deposits; a smaller proportion, typically under 3%, could be used to satisfy withdrawals of time deposits.[11]

Bonds comprised about a quarter of the assets on commercial banks' balance sheets, but rising defaults lowered the market value of many bonds. Selling depressed assets required banks to realize losses. U.S. government bonds could be sold near and sometimes above face value, but banks preferred to use those assets as collateral for loans from correspondent banks or the Federal Reserve. While banks sold bonds in response to local panics, the banking system as a whole could not shed bonds without lowering prices because banks held much of the outstanding supply (particularly of U.S. government bonds).[12] While our estimates indicate the quantity of bonds on banks' balance sheets fell during panics, we find that outside of panics, banks generally bought bonds. During panics, in other words, bonds shifted

[11] The Federal Reserve Act required member banks to hold as reserves 5% of time deposits and 12% (for country banks), 15% (reserve city), or 18% (central reserve city) of demand deposits. The fraction of those reserves that had to be deposited at the Fed equaled 5/12 for country, 6/15 for reserve city, and 7/18 for central reserve city banks with the rest held as cash in their vaults. Board of Governors (1943, p. 396) indicates that less than 10% of all reserves were excess prior to May 1932, and after that, most excess reserves were held by banks in New York City. Since member banks had few excess reserves at the Fed to draw upon, they could only meet a small fraction of depositors' withdrawals from their reserves accounts without paying penalties, curtailing lending, and ceasing dividends, which were the sanctions imposed upon banks failing to meet their reserve requirements. An example would be a $1 time deposit withdrawn from a bank in Chicago which would reduce its reserve requirement by $0.02 (=$1*5/100*7/18). Without excess reserves or paying penalties, the Chicago bank could meet 2% of the withdrawal from its reserve account at the Fed. The Federal Reserve Board could waive these penalties for periods of up to 30 days and did so during several large panics, but those waivers never stretched for spans of three months, which is the frequency of our data.

[12] Goldsmith (1958) indicates that commercial banks held around 19% of US government bonds in 1929 and 35% in 1933. Financial institutions overall held 51% of US government bonds in 1929 and 68% in 1932. For municipal and state bonds, commercial banks held 14% and 15% in 1929 and 1932 respectively, while financial institutions overall held 55% and 56%, respectively (see Goldsmith 1958, Table 77, p. 269 and Table 75, p. 260). Goldsmith (1965) indicates that commercial banks held a substantial share of bonds issued by utilities, but limited amounts of bonds issued by other private corporations.

through the banking system, with banks being run shedding bonds, and stronger banks buying bonds. On net, the aggregate quantity of bonds held by banks (which we measure at the Fed district level) seldom declined.

Loans comprised more than half of the assets on banks' balance sheets. Except in New York and Chicago, where money-center banks loaned substantial funds to brokers, most of these loans were commercial since member banks loaned almost no funds directly to consumers and made few loans upon real estate. Commercial lending was almost entirely short term (Cohen, Hachem, and Richardson 2020). Commercial loans typically matured in a year or less, with an average maturity of about six months, which was the maximum maturity of loans eligible for discount at Federal Reserve banks.

Given the short maturities of commercial loans, banks' loan books turned over frequently, with one-quarter to one-half of a typical banks loan book rolling over each quarter. Short maturities allowed banks to reduce lending substantially over a couple of months simply by not renewing loans. Banks that needed cash quickly could call loans since commercial lines of credit were commonly callable, which means that banks could require firms to repay their loans with only a few days' notice. It was also possible for banks to sell loans during a crisis. However, loans that could be marketed most readily were loans with standardized paperwork making them eligible for discount at the Federal Reserve; loans backed by real estate collateral (mortgages), which could not be issued or held by banks in many states; and loans to brokers collateralized by stocks and bonds, although these loans were concentrated in New York, Chicago, and a few other cities with equity and commodity exchanges.

Banks, however, seldom sold loans during panics since the eligible paper could be used as collateral when borrowing at the Fed's discount window, the mortgage market froze during the early 1930s, and loans to brokers could be called quicker than they could be marketed. Since information was asymmetric and collateral had to be transferred physically, sales of loans tended to be between banks operating in the same cities. If banks sold loans to nearby banks, however, those sales would not reduce the sum of lending within a Fed district, which is what we measure. Thus, selling loans locally could not be the reason for the decline in lending that we observe in our data. Banks might also sell loans to out-of-district correspondents, but standardized loans could also typically be used as collateral for interbank loans and may have been eligible for discount at the Fed. For that reason, interdistrict loan sales were likely to have been limited. Our estimates indicate flows of loans from districts with panics to districts without were too small to be statistically significant in our data.

Therefore, lending during panics declined because, when depositors withdrew funds, banks had to reduce lending to repay them. Banks could repay only a small fraction of deposits with the cash they kept in their vaults and on call at reserve repositories. After those sources of ready funds ran out, banks could borrow funds from money-center correspondents or Federal Reserve banks, if they had sufficient collateral and if these lenders were willing to extend loans and had the resources to do so. If potential lenders failed to provide sufficient funds, however, then banks had to liquate assets – usually loans and usually by calling them.

We illustrate the liquidation of loans during crises by examining high-frequency data on the behavior of banks' balance sheets during the panics that struck commercial banks in the South and Midwest during the fall of 1930 and spring of 1931. The data come from weekly reporting banks in the reserve cities of each Fed district. We correct the weekly-reporting data for sampling biases using a method described in the online Data Appendix. Figure 1 depicts events in November and December 1930 following the failure of Caldwell and Company. Runs initially afflicted banks in the Sixth Federal Reserve District. Deposits rapidly flowed out of weekly reporting banks in Tennessee and adjacent states. In the first few weeks, all types of deposits flowed out, but after a few months, demand and interbank deposits returned to pre-panic levels; permanent declines consisted almost entirely of time deposits. The Federal

Reserve Bank of Atlanta immediately responded to the panic by rushing credit to afflicted institutions. After a few weeks, the Atlanta Fed encouraged state and local governments to support member banks in panic regions with new deposits. These new liabilities partially offset outflows of deposits, but in response to the substantial, prolonged decline in time deposits, member banks eventually cut lending, with each $1 decline in time deposits triggering roughly $0.60 decline in lending.

The post-Caldwell panic took a different course in the Eight Federal Reserve District. The St. Louis Fed limited discount lending during the panic. The Fed's reluctance to counteract the crisis forced commercial banks to cut lending swiftly and substantially. Banks that could not raise cash by calling loans or convincing borrowers to repay at maturity had to shut their doors to depositors. The Fed's reluctance to act as a lender of result, in other words, not only forced many banks out of operations and into liquidation (as described in Richardson and Troost (2009)), but also forced banks that remained in operation to reduce lending more than in adjoining districts.

Six months later, depositors ran banks in Chicago (Figure 2) and other locations in the Seventh Federal Reserve District. The Chicago Fed's response to these deposit outflows was limited and delayed. Circumstances once again force banks to raise the funds to repay depositors by cutting lending to commercial clients.

These event studies clearly illustrate the rapid decline in lending during panics in the early 1930s. Weekly reporting banks, however, amounted to a minority of banks in operation at the time, and the data which they voluntarily provided did not encompass all the categories on the balance sheet. Table 9 overcomes these limits by examining the broadest possible data on the balance sheets of all commercial banks, which is the panel of data initially analyzed in Tables 4 to 7. In Table 9, we report coefficient from regressions of each balance sheet category that we measure on panic intensity and control variables, as per equation (1). In other words, each number in the table represents a larger regression from which we report only the coefficient indicating the relationship between panic intensity and the change in the variable of interest. For brevity, we only report coefficients whose magnitudes were large enough to be economically meaningful.

The table shows that each suspension during a panic resulted in an average loss of about $1.2 million dollars in deposits from member banks in reserve cities. Half of the decline came from time deposits; the remainder was evenly split between demand and interbank deposits. On average, reserve-city bankers funded about half of these withdrawals (0.598/0.1214) by cutting lending at banks that remained in operation. They funded about 15% ((0.108+0.063)/0.1214) of the withdrawals with a combination of borrowing from banks (typically Federal Reserve banks) and deposits from the postal savings system. Country member banks lost roughly the same amount of deposits. They funded these withdrawals by borrowing a bit more from the Fed and correspondent banks, receiving a little less in deposits from the postal savings system, and cutting loans a little less. The data do not allow us to discern nonmember banks borrowing from other institutions. The data do reveal, however, that nonmembers funded about half of the deposit outflow by reducing lending to businesses.

Overall, the three types of data examined in this section yield a consistent message: lending declined during panics because banks had to cut lending in order to raise enough cash to satisfy depositors' demands.

Conclusion

Our analysis focuses on how commercial banks that survived the financial tsunami of the early 1930s responded to the crisis. We use detailed information on the timing and location of suspensions to compare panic periods with non-panic periods of distress to identify how banks responded to periods when depositors suddenly changed their behavior and withdrew funds *en masse*. We show that panics of the early 1930s were characterized by a deposit crunch, with households shifting from deposits to currency and banks shedding loans and investments in response to depositor withdrawals. Surviving banks significantly reduced lending in response. This panic-induced deposit crunch accounted for over one-third of the decline in aggregate lending during the Depression, making it one of the largest shocks to credit supply in the early 1930s. In contrast, while bank failures played a role in the contraction of credit to firms and households during this same period, they accounted for less than a fifth of the aggregate decline in lending.

Our findings shed more light on the Federal Reserve mistakes of the 1930s. Arguments over the Fed's inaction during panics focus on whether the Fed could have or should have prevented banks from failing (see Richardson and Troost, 2009, for a summary of this literature). Some scholars argue that the Fed should have acted more forcefully to forestall failures. Other scholars, however, argue that the Fed could not have stemmed the failures because it lacked the financial resources to do so since the gold standard tied the Fed's hands or because the banks that failed were insolvent, and therefore, could not legally borrow at the Fed's discount window and could not be saved my the type of assistance – providing liquidity – that the Fed could provide. Other scholars argue that even if the Fed could have prevented banks from failing during panics it should not have done so since such actions would have spawned zombie banks in the short term and engendered moral hazard in the long run.

Our finding, that the panics impacted aggregate lending largely by forcing banks that remained in operation to curtail lending to businesses, undercuts arguments against an aggressive Federal Reserve response to the banking panics that occurred in the early 1930s. Banking panics triggered deposit crunches that forced banks operating banks to cut lending. These banks that remained in operation were indisputably solvent since they survived the deepest downturn in modern American history. Their commercial customers who repaid loans were also indisputably healthy. In the midst of the maelstrom, they came up with the cash needed to cover their obligations. The Fed was set up as a lender of last resort to ensure that loans from healthy banks to healthy borrowers did not need to be curtailed during a contraction. The Fed did not perform this function. It certainly had the resources to do so, since profitable loans to operating banks would have increased its profits and relaxed the gold constraint. Recognition of the magnitude of the deposit crunch strengthens arguments that the Fed should have acted more aggressively as a lender of last resort during the Great Depression.

References

Akerlof, George A., and Robert J. Shiller. *Animal spirits: How human psychology drives the economy, and why it matters for global capitalism.* Princeton: Princeton University Press, 2009.

Bernanke, Ben S. "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression." *American Economic Review* 73(3): 257-276, 1983.

----- *The Federal Reserve and the Financial Crisis*. Princeton: Princeton University Press, 2013.

Board of Governors of the Federal Reserve System. *Banking and Monetary Statistics 1914-1941*. Federal Reserve Board: Washington, D.C, 1943.

----- *All Bank Statistics, United States, 1896-1955.* Federal Reserve Board: Washington, D.C, 1959.

Calomiris, Charles W., and Joseph R. Mason. "Contagion and Bank Failures During the Great Depression: The June 1932 Chicago Banking Panic." *American Economic Review* 87: 863-83, 1997.

----- "Consequences of Bank Distress During the Great Depression." *American Economic Review* 93: 937-47, 2003.

Calomiris, Charles W., and Berry Wilson. "Bank Capital and Portfolio Management: The 1930s "Capital Crunch" and the Scramble to Shed Risk," *Journal of Business* 77(3): 421-56, 2004.

Carlson, Mark, Kris J. Mitchener, and Gary Richardson. "Arresting Banking Panics: Federal Reserve Liquidity Provision and the Forgotten Panic of 1929." *Journal of Political Economy* 119(5): 889-924, 2011.

Chandler, Lester V. *American Monetary Policy, 1928 -1941*. New York: Harper and Row, 1971.

Chodorow-Reich, Gabriel. “The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008–9 Financial Crisis.” *The Quarterly Journal of Economics* 129 (1): 1–59, 2014.

Davison, Lee K., and Carlos D. Ramirez. “Local Banking Panics of the 1920s: Identification and Determinants.” *Journal of Monetary Economics* 66 (September): 164–177, 2014.

Diamond, Douglas W., and Philip H. Dybvig. “Bank Runs, Deposit Insurance, and Liquidity.” *Journal of Political Economy* 91 (June): 401–19, 1983.

Drechsler, Itamar, Alexi Sakov, and Philipp Schnabl. “The Deposits Channel of Monetary Policy.” *The Quarterly Journal of Economics* 132(4): 1819-76, 2017.

Fisher, Irving. “The Debt-Deflation Theory of Great Depressions.” *Econometrica* 1(4): 337-56, 1933.

Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867–1960*. Princeton, NJ: Princeton University Press, 1963.

Goldenweiser, E. A. *Federal Reserve System in Operation*. New York: McGraw-Hill, 1925.

Goldsmith, Raymond. “The Role of Financial Intermediaries in Financing the Main Investor Groups,” in Raymond Goldsmith, *Financial Intermediaries in the American Economy Since 1900*, Cambridge: National Bureau of Economic Research, pp. 180-276, 1958.

-----. *Institutional Investors and Corporate Stock: A Background Study*. Cambridge: National Bureau of Economic Research, 1965.

Ivashina, Victoria and David Scharfstein. “Bank lending during the financial crisis of 2008,” *Journal of Financial Economics* 97 (3): 319–338, 2010.

Jalil, Andrew. “A New History of Banking Panics in the United States, 1825-1929: Construction and Implications.” *American Economic Journal: Macroeconomics*, 2015.

Keynes, J. Maynard. *The General Theory of Employment, Interest and Money*. New York: Harcourt, Brace, 1936.

Khwaja, Asim Ijaz, and Atif Mian. “Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market.” *American Economic Review* 98(4): 1413–42, 2008.

Mitchener, Kris James and Gary Richardson. “Contagion of Fear.” NBER Working Paper 26859 (March), 2020.

Mitchener, Kris J. and Gary Richardson. “Network Contagion and Interbank Amplification during the Great Depression.” *Journal of Political Economy* 127(2): 465-507, 2019.

Postel-Vinay, Natacha. “What Caused Chicago Bank Failures in the Great Depression? A Look at the 1920s.” *Journal of Economic History*. 76(2): 478-519, 2016.

Richardson, Gary. “Categories and Causes of Bank Distress during the Great Depression, 1929-1933: The Illiquidity-Insolvency Debate Revisited,” *Explorations in Economic History* 44(4): 586-607, 2007.

----- “The Check is in the Mail: Correspondent Clearing and the Banking Panics of the Great Depression,” *Journal of Economic History* 67(3): 643-71, 2007.

----- “Quarterly Data on the Categories and Causes of Bank Distress during the Great Depression,” *Research in Economic History* 25 (January): 37-115, 2008.

Richardson, Gary, and William Troost. “Monetary Intervention Mitigated Banking Panics During the Great Depression.” *Journal of Political Economy* 117(6): 1031-1073, 2009.

Vickers, Raymond B. *The Panic in the Loop: Chicago’s Banking Crisis of 1932*. New York: Lexington Books, 2011.

Wheelock, David C. *The Strategy and Consistency of Federal Reserve Monetary Policy, 1924-1933*. Cambridge: Cambridge University Press, 1991.

Wicker, Elmus. *The Banking Panics of the Great Depression*. Cambridge: Cambridge University Press, 1996.

Table 1: Bank Suspensions during Panics, March 1929–- December 1932

		Federal Reserve District												Suspensions in U.S.		
Year	Months	1	2	3	4	5	6	7	8	9	10	11	12	Total During Panics	% of All	% Fed Member
1929	Apr – Jun	0	0	0	2	0	**15**	0	0	2	0	0	0	19	17.0	26.3
	Jul – Sep	0	0	0	0	2	19	2	0	3	2	0	0	28	22.6	7.1
	Oct – Dec	0	0	1	0	2	0	14	0	0	14	0	0	31	19.9	16.1
1930	Jan – Mar	0	0	2	0	2	8	9	0	2	0	4	0	27	11.0	18.5
	Apr – Jun	0	0	0	0	9	15	7	7	2	7	0	0	47	21.0	12.8
	Jul – Sep	0	0	0	4	2	2	29	2	0	8	0	0	47	24.0	10.6
	Oct – Dec	2	2	4	0	30	**13**	**37**	**118**	**16**	5	5	2	234	34.7	17.5
1931	Jan – Mar	0	2	7	2	**4**	**11**	**37**	**23**	**3**	6	0	2	97	25.9	14.4
	Apr – Jun	0	2	6	8	6	0	75	0	9	0	0	0	106	31.5	25.5
	Jul – Sep	1	10	5	28	4	5	**72**	**6**	**25**	**15**	3	2	176	33.6	22.2
	Oct – Dec	**21**	**24**	**40**	**34**	**55**	3	**98**	**52**	**15**	**31**	**11**	**10**	394	37.8	24.1
1932	Jan – Jun	4	0	4	4	2	5	**120**	33	3	19	2	32	228	27.6	25.9
	Jul – Sep	0	0	0	2	4	2	25	2	4	4	0	5	48	16.9	27.1
	Oct – Dec	0	0	0	3	0	7	31	2	2	6	0	8	59	16.7	23.7
Total During Panics		28	40	69	87	122	105	556	245	86	117	25	61	1,541		
% of All		50.9	39.2	48.9	30.3	26.6	23.6	37.0	30.7	14.0	18.1	14.5	24.1	28.2		
% Fed Member		21.4	57.5	17.4	36.8	28.7	21.0	18.3	16.7	17.4	9.4	44.0	32.8	21.4		

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.
Note: The table reports bank suspensions occurring during panics in each Federal Reserve District where panics are defined as suspensions occurring within a 10-mile radius, no more than 30 days apart, and statistically different from being spatially random ("10-30 joins" as described in the text). The column labeled % of all is share of panic suspensions relative to all suspensions for a given period or district. The column labeled % Fed member indicates share of panic suspensions that were Fed members. Totals reflect suspensions from April 1929 through end of 1932. The cells with bold text and grey shading indicate panics that academic literature and contemporary observers deemed exogenous as described in text.

Table 2: Panics, Currency, and Lending

	$\Delta \log(\frac{currency}{deposit})$				$\Delta \log(\frac{loans}{deposit})$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Suspensions during panics	0.371***	0.430***	0.478***	0.635***	-0.0188	-0.0298	-0.0392*	-0.0126
	(0.0646)	(0.110)	(0.152)	(0.192)	(0.0206)	(0.0213)	(0.0186)	(0.0352)
Suspensions during panics, lagged		-0.113**	-0.0727	0.0616		0.0211	-0.0152	-0.0832*
		(0.0553)	(0.0578)	(0.114)		(0.0151)	(0.0191)	(0.0398)
Suspensions outside panics				-0.165				-0.0390
				(0.137)				(0.0335)
Suspensions outside panics, lagged				-0.138				0.0757**
				(0.130)				(0.0296)
Time FE			Yes	Yes			Yes	Yes
District FE			Yes	Yes			Yes	Yes
Additional controls				Yes			Yes	Yes
Robust standard errors		Yes	Yes	Yes		Yes	Yes	Yes
Estimation method	OLS	FE	FE	FE	OLS	FE	FE	FE
Observations	156	156	156	156	156	156	156	156
Adjusted R-squared	0.176	0.188	0.241	0.317	0.005	0.010	0.131	0.176

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.
Notes: Data panel covers 12 Fed districts and 14 call intervals from July 1929 to December 1932. Estimation methods are ordinary least squares (OLS) or panel fixed effects (FE). Panic intensity for each observation is the number of suspensions in 10-30 joins divided by the maximum join count over all observations (120). Distress outside panics intensity is the number of suspensions outside of 10-30 joins (that is # not clustered in time and space). Time fixed effects are indicators for all but one call interval. Fed district fixed are controlled for using panel fixed-effects methods. Additional time-varying district-level controls include the change in each districts' consumption index, building permits, stock-price index, and Fed reserve bank discount rate. Standard errors are in parentheses: *** p<0.01, ** p<0.05, and * p<0.1.

Table 3: Commercial Bank Balance Sheets in 1932

		Liabilities				Assets			
		Capital	Surplus	Deposits	Other	Loans and Discounts	Bonds and Securities	Cash and Exchange	Misc.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nonmember	Average	117,600	141,818	1,188,791	174,974	760,203	498,562	241,408	125,517
	Median	25,000	16,130	193,830	17,000	147,330	53,625	32,770	15,720
Member	Average	303,201	337,522	3,536,487	384,342	2,142,513	1,410,959	699,626	290,496
	Median	60,000	51,090	575,895	79,820	349,980	258,045	93,365	36,320
All	Average	182,623	210,620	2,011,283	262,581	1,245,246	840,794	402,094	184,117
	Median	40,000	24,000	284,050	35,485	198,840	102,860	46,665	21,000

Source: Rand McNally *Bankers' Directory*, July 1932

Table 4: Panics and Assets at Nonmember Banks

	Lending				Investments				Mutual	
Type of Banks	All	All	Open	Closing	All	All	Open	Closing	All	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Suspensions, all	-0.693**				-0.0705				-0.0373	
	(0.299)				(0.114)				(0.0519)	
Suspensions during panics		-1.926**	-1.304**	-0.619**		-0.966**	-0.802**	-0.163		-0.276
		(0.725)	(0.571)	(0.217)		(0.379)	(0.330)	(0.114)		(0.197)
Suspensions outside panics		0.484	0.423*	0.0580		0.714*	0.726*	-0.0141		0.208
		(0.281)	(0.223)	(0.154)		(0.350)	(0.348)	(0.0625)		(0.140)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	156	156	156	168	156	156	156	168	156	156
Adjusted R-squared	0.192	0.304	0.182	0.524	0.094	0.209	0.194	0.486	0.024	0.109

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.
Notes: Data panel covers 12 Fed districts and 13 call intervals from September 1929 to December 1932. Estimation method is panel fixed effects. The number of suspensions during panics is defined as the count of all suspensions in each district in each interval that are in 10-30 joins. Suspensions outside panics are all suspensions minus suspensions during panics. Time fixed effects are indicators for all but one call interval. Fed district fixed are controlled for using panel fixed-effects methods. Additional time-varying district-level controls include the change in each districts' consumption index, building permits, stock-price index, and Fed reserve bank discount rate. Standard errors are in parentheses: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Table 5: Panics and Assets at Member Banks

	Total	Lending	Bonds, Private	Bonds, Public	Reserves with Fed	Balances with Domestic Banks	Balances with Foreign Banks	Cash in Vault	Lending		Bonds, Public + Private		
									Open	Closing	All	Open	Closing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Suspensions during panics	-3.46***	-2.91***	-0.82***	0.20	-0.22*	-0.44*	0.10*	0.10	-2.62**	-0.55***	-0.79*	-0.37	-0.23***
	(0.93)	(0.87)	(0.17)	(0.40)	(0.12)	(0.23)	(0.05)	(0.10)	(1.07)	(0.12)	(0.43)	(0.45)	(0.05)
Suspensions outside panics	2.155	2.168	0.444	-0.44	0.159	0.339	-0.06	-0.04	2.45	0.18	0.17	-0.11	0.07*
	(1.624)	(1.473)	(0.267)	(0.40)	(0.140)	(0.206)	(0.04)	(0.05)	(1.81)	(0.10)	(0.54)	(0.53)	(0.04)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	156	156	156	156	156	156	156	156	156	156	156	156	156
Adjusted R-squared	0.39	0.38	0.52	0.377	0.35	0.56	0.25	0.53	0.37	0.29	0.40	0.36	0.37

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.

Notes: Data panel covers 12 Fed districts and 13 call intervals from September 1929 to December 1932. Estimation method is panel fixed effects. The number of suspensions during panics is defined as the count of all suspensions in each district in each interval that are in 10-30 joins. Suspensions outside panics are all suspensions minus suspensions during panics. Time fixed effects are indicators for all but one call interval. Fed district fixed are controlled for using panel fixed-effects methods. Additional time-varying district-level controls include the change in each districts' consumption index, building permits, stock-price index, and Fed reserve bank discount rate. Standard errors are in parentheses: *** p<0.01, ** p<0.05, and * p<0.1.

Table 6: Instrumental Variable Estimates

	Decline in Lending in Banks Remaining in Operation							
	Nonmember				Member			
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Second Stage								
Suspensions during panics	-0.99***	-1.49***	-1.44**	-1.35**	-1.56***	-2.60***	-1.82***	-2.65**
	(0.18)	(0.35)	(0.58)	(0.56)	(0.57)	(0.99)	(0.68)	(1.18)
Suspensions outside panics		0.43*	0.57*	0.46		1.46**	1.20	2.19
		(0.24)	(0.32)	(0.32)		(0.68)	(1.11)	(1.54)
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes
District FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	156	156	156	156	156	156	156	156
Adjusted R-squared	0.156	0.186	0.314	0.359	0.046	0.238	0.423	0.512
First Stage								
Panic suspensions * Exogenous indicator			0.56***	0.56***			0.55***	0.55***
			(0.08)	(0.08)			(0.07)	(0.02)
First-Stage F			56.0	56.0			57.8	57.8
Robustness of Coef. on Suspensions During Panics								
Iterative drop - call interval								
average coefficient			-1.45***	-1.36***			-1.83***	-2.61***
se			(0.14)	(0.14)			(0.112)	(0.208)
Iterative drop - Fed districts								
average			-1.42***	-1.35***			-1.82***	-2.65***
se			(0.098)	(0.107)			(0.07)	(0.14)
Iterative switching 1 indicator from exogenous to endogenous								
average			-1.43***	-1.35***			-1.82***	-2.67***
se			(0.18)	(0.19)			(0.042)	(0.082)
Iterative switching 2 indicators from exogenous to endogenous								
average			-1.41***	-1.35***			-1.83***	-2.69***
se			(0.08)	(0.08)			(0.02)	(0.03)

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.

Notes: For the first and second stages, notes for columns 1 to 4 are identical to those for Table 4. Notes for columns 5 to 8 are identical to Table 5. The robustness results at the bottom of the table indicate the average coefficient on suspensions during panics from a set of first stage regressions generated by iteratively altering the IV indicator or sample as indicated in the row headings.

Table 7: Decline in Lending Due to Panics Nationwide from July 1929 to December 1932

	Aggregate Decline in Lending in Banks Remaining in Operation based on specifications in Table 5							
	Nonmember				Member			
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ $ Million	-1,511	-2,272	-2,201	-2,059	-2,380	-3,963	-2,769	-4,032
Standard Error	(283)	(533)	(878)	(851)	(877)	(1499)	(1027)	(1794)
Δ $ Million as a % of …								
Total commercial bank lending June 1929	4%	6%	6%	6%	7%	11%	8%	11%
Aggregate decline in bank lending	10%	15%	14%	13%	15%	25%	18%	26%
Loans in all failed banks	58%	86%	84%	78%	91%	151%	105%	153%
Decline in nonmember bank lending	29%	44%	42%	40%				
Loans in failed nonmembers	97%	145%	141%	132%				
Decline in member bank lending					23%	38%	26%	39%
Loans in failed members	.	.	.	.	224%	373%	261%	379%

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.

Note: Estimates based on coefficients in Table 5 and suspensions during panics in Table 1.

Table 8: Banks' Asset Composition in 1929 and 1932

	Member Banks			All Commercial Banks	
	June 30, 1929 (1)	Dec. 31, 1932 (2)		June 30, 1929 (3)	June 30, 1932 (4)
Loans	56.4	42.0	Loans	57.9	47.5
Bonds - US government	9.1	18.0	Bonds - US government	7.9	13.6
Bonds - all others	13.0	15.8	Bonds - state and municipal	4.8	5.0
			Bonds - all others	11.1	12.3
Cash in vault	1.0	1.2	Cash in vault	1.2	1.5
Reserves with the Fed	5.2	6.9	Bankers balances	9.5	10.6
Balances with foreign banks	0.3	0.2			
Balances with domestic banks	4.1	6.7			
All other assets	10.9	9.2	Other assets	7.8	9.5
All assets	100.0	100.0	Total	100.0	100.0

Sources: Data for member banks from Board of Governors (1943). The data are tabulated from comprehensive call reports. Data for all commercial banks from Board of Governors (1959).

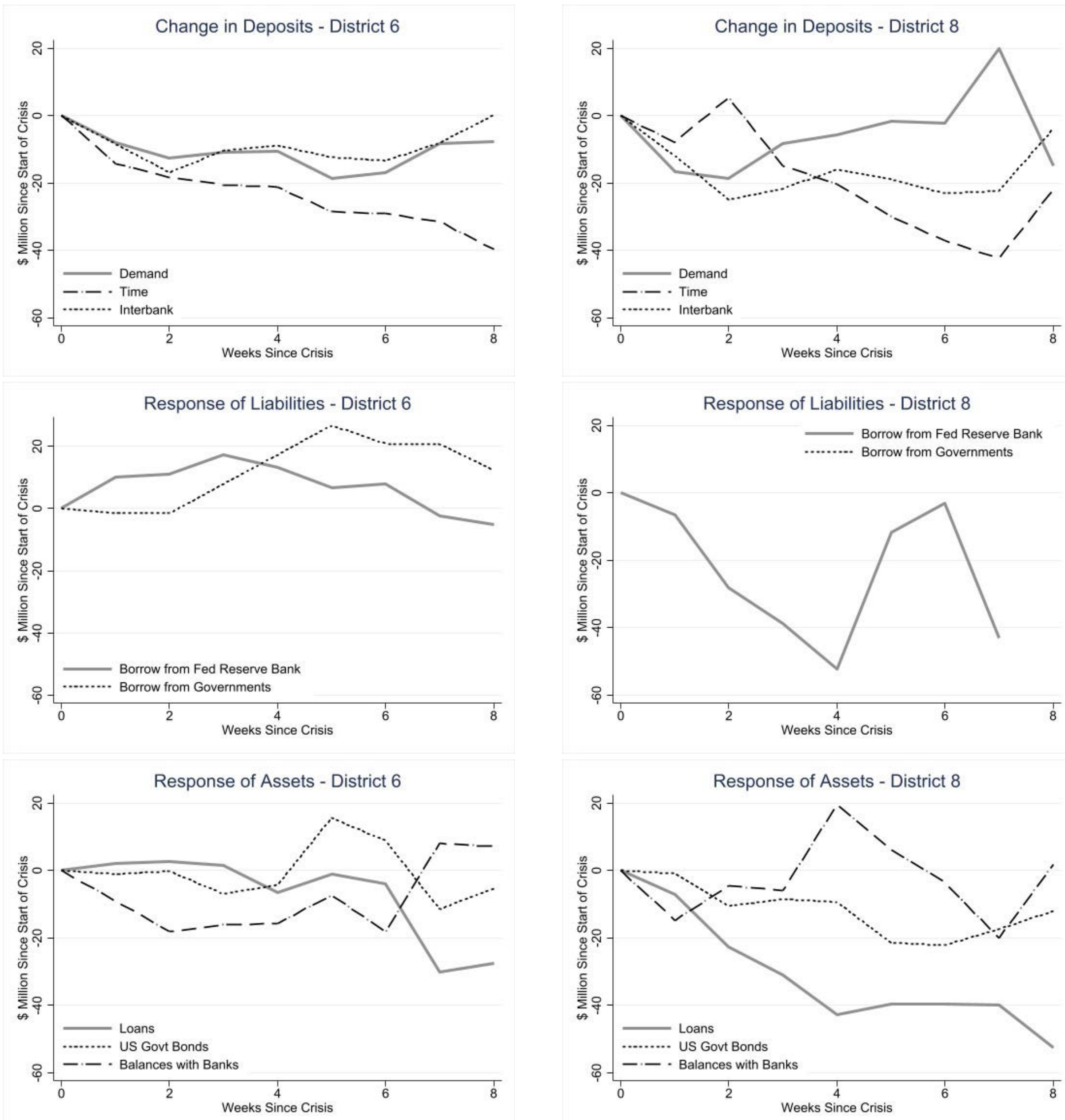
Notes: These data, particularly the division of bonds into three types and the separation of cash in vault and bankers' balances, is estimated in part for nonmember banks. All commercial banks include all national and state chartered commercial banks.

Table 9: Principal Changes in Bank Balance Sheets in Response to Panics

	Nonmember	Member	
		Country	Reserve City
	(1)	(2)	(3)
Change in deposits between calls			
Total	-2.220	-1.147	-1.214
Demand		-0.317	-0.325
Time		-0.723	-0.644
Interbank		-0.068	-0.293
Changes in other liabilities			
Borrowings from reserve and correspondent banks		0.155	0.108
Postal Savings Deposits		0.031	0.063
Changes in assets			
Loans of operating banks	-0.993	-0.411	-0.598
Loans of failed banks	-0.634	-0.221	-0.104

Source: Authors' calculations from database created for this study from sources described in the online Data Appendix.

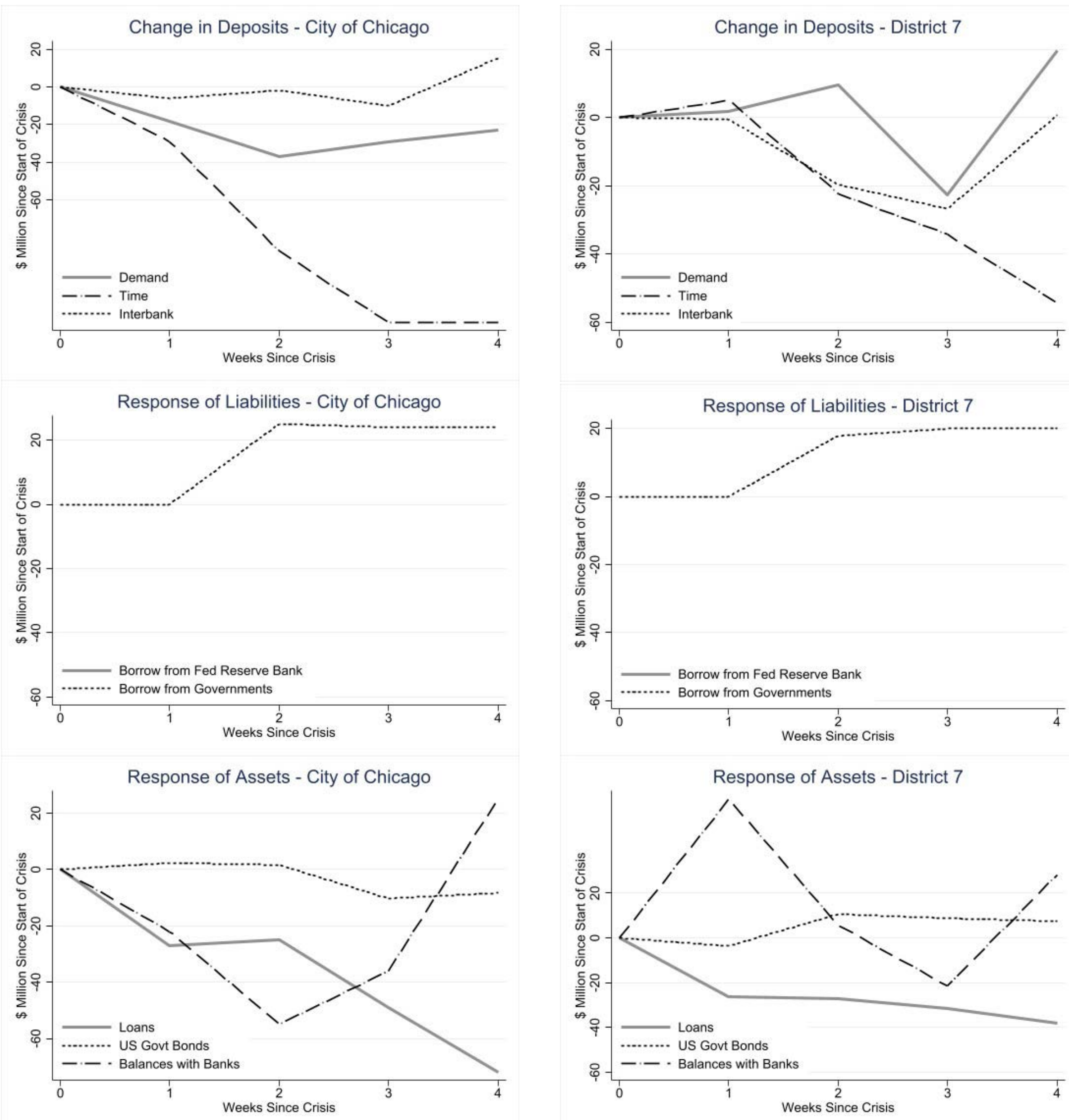
Figure 1: Weekly Reporting Banks During the Panic in the Fall of 1930



Source: Authors' calculations from data on weekly reporting Fed member banks corrected for changes in sample composition as described in the online Data Appendix.

Notes: Data reflects balance sheets of all Fed member banks in reserve cities in the indicated district.

Figure 2: Weekly Reporting Banks During the Panic in June 1931



Source: Authors' calculations from data on weekly reporting Fed member banks corrected for changes in sample composition as described in the online Data Appendix.

Notes: Data reflects balance sheets of all Fed member banks in reserve cities in the indicated district. All member banks in Chicago appear to be member banks. Several member banks in Chicago suspended operations during the panic. Data for suspended banks appears to be held constant after the date of suspension.

Data Appendix (for Online Distribution Only)

This appendix describes data sources and calculations. The description proceeds in the following order: (i) bank balance-sheet information aggregated by call, district, and level of the reserve pyramid; (ii) bank balance-sheet information from weekly reporting banks by district; and (iii) micro data on bank distress. The bank-balance sheet information extends data introduced by Mitchener and Richardson (2019), which only compiled balance sheets of Fed member banks in reserve and central-reserve cities. In June 1929, those banks held over 95% of the nations' interbank deposits, but only 46% of all deposits held in commercial banks and only 39% of all deposits held in depository institutions (commercial plus mutual-savings banks). This paper adds new data on Fed member country banks, non-member banks, and mutual savings banks. Adding this coverage allows us to correct for sampling bias in data from weekly-reporting banks. Scholars have long been aware of this existing bias but have not been able to address it because they lacked information about the underlying sampling process originally used to create the weekly-reporting bank data and/or information about population characteristics to which they could compare the sample. Our new database on balance-sheets provides benchmarks that can be used to compare the weekly-reporting sample at each call report date, from which we can infer movements in the balance sheets of all banks between those points in time (discussed below).

Data on bank balance sheets by Federal Reserve District and by level of the reserve pyramid comes from *Banking and Monetary Statistics of the United States, 1914 to 1941* (Federal Reserve Board of Governors 1943, hereafter abbreviated BMS). BMS presents information from the call reports of Federal Reserve member banks aggregated by Federal Reserve District, including counts of banks in each district as well as detailed summaries of assets (15 categories) and liabilities (17 categories) for banks located in reserve cities and for banks located outside reserve cities (called country banks). Book values of loans and investments are reported. BMS also contains detailed classifications of the loans, investments, and deposits of banks from 1928 through 1941. For the second and seventh Federal Reserve Districts, we calculate the balance sheets of banks in the central reserve cities of New York and Chicago by subtracting reserve and country banks from all banks. We check these calculations against tables presenting aggregates of information for central-reserve cities.

Data are for each call date. The nature of the calls raises statistical issues. Many modern time series tests assume observations arise from stable data generating processes with consistent spacing, which is not characteristic of these data. The spacing of the calls was long and variable. In 1929, calls occurred on March 27, June 29, October 4, and December 31; in 1930, on March 27, June 30, September 24, and December 31; in 1931, on March 25, June 30, September 29, and December 31; in 1932, on June 30, September 30, and December 31; and in 1933, not until June 30. Across our sample period, calls occurred an average of every 96 days, but the standard deviation of that average, 35, was high. Restricting the analysis to regularly spaced calls, December and June, eliminates more than half the observations from the data set, leaving six during the Great Depression – far too few to employ statistical tests based on asymptotic arguments. Moreover, the December and June calls almost always occurred on the last day of the month. Banks' balance sheets on these dates may have differed systematically from balance sheets on other dates, when the calls were intentionally unpredictable. We overcome these complications with the methods typical in the literature. We present results assuming the calls were equally spaced. We check this assumption by re-estimating our regression with daily rates of change between calls rather than rates of change between calls, and we obtain similar results.

The advantages of these data are that they are reported consistently over time and at a higher frequency. The disadvantages are that the tables do not present complete balance sheets, only figures for selected assets and liabilities. Moreover, the data come from a non-random set of banks. The chosen banks were meant to create a representative sample, but the sample changes in size over time, as banks merge, fail, or, for some other reason, depart the data set. Changes in the sample occasionally represent changes in the sample composition or sampling methodology. It is impossible to know the size of this problem because the Federal Reserve does not indicate the identities of the reporting banks or the exact proportion of all assets represented by these banks. For the entire nation, the Federal Reserve reports that they attempted to keep that proportion around 70%. When we compare the weekly reporting data for New York City for the last week of 1932 to the call report data from the same week (although on a different day), we find that the interbank balances for the weekly reporting banks represented 82 percent of all interbank balances in the city. The fraction of other components of the balance sheet represented by weekly reporting banks ranges from 74 percent (net demand deposits) to 96 percent (reserves with the Fed).

Weekly reporting data for the twelve Federal Reserve districts and from the city of Chicago comes from the Federal Reserve *Bulletin*. Tables with this information appear from roughly 1919 through 1939. After digitizing these data, we created consistent balance-sheet categories using the procedures outlined in BMS. The weekly-reporting banks represented a different share of banking resources across districts and over time. For example, in one district at one date, the weekly-reporting banks might contain 40% of all bank deposits whereas at some other date they might contain 60% of all deposits or, in some other district, they might constitute 80%. These differences arose due to differences in sample composition across districts and over time. We offset these differences and create a weekly-reporting data set that accurately depicts aggregate movements in bank balance sheets using district-level call-report data from BMS. At each call date, BMS reports bank balance-sheet information aggregated by Fed District. These aggregates are totals for the population from which the weekly-reporting data samples. Comparing the call-report and weekly-reporting data reveals how much we need to scale up the weekly-reporting data to recover accurate aggregate values. Weekly-reporting data was collected on Wednesday of each week. Call reports could be collected on any weekday. In weeks with call reports, we create the scale- up factor using the call-report data that from that week. In weeks without call reports, we create the scale-up factor by linearly interpolating between scale-up factors from weeks with call reports.

Linear interpolation enables us to calculate aggregate balance sheets week-by-week using the formula:

$$(A.1) \qquad X_{zict}^{All\ Banks\ Estimated} = \left((1 - t/T_c)\left[X_{zic}^{All\ Banks\ in\ Call\ Report}/X_{zic}^{WR\ Banks}\right] + t/T_c\left[X_{zi,c+1}^{All\ Banks\ in\ Call\ Report}/X_{zi,c+1}^{WR\ Banks}\right]\right) X_{zict}^{WR\ Banks}$$

where $X_{zict}^{All\ Banks\ Estimated}$ indicates our estimate of the aggregate total of balance sheet item *z* for all Fed member banks in district *i* in week *ct*. The letter *c* indexes weeks with call reports. The letter *t* indexes weeks from one call report to the next. Since the number of weeks varies between call reports, dating entails complicated notation. For each *c*, the sequence *t(c)* indexes weeks beginning with call-report date c and ending with call-report date *c+1*, where $t \epsilon [0,1, \ldots, T_c]$. The week indicated *c*0 is the week of call *c*. The weeks indicated by c1 to $c, T_c - 1$ are the weeks between the call dates *c* and *c+1*. The week indicated cT_c is the week of call *c+1*. It can also be denoted as week *c*+1,0, which is the initial week of the interval beginning at call *c*+1 and ending at call *c*+2. $X_{zic}^{All\ Banks\ in\ Call\ Report}$ is the aggregate total in the call report of balance sheet item *z* for all Fed-member banks in district *i* at the call report date c. $X_{zic}^{WR\ Banks}$ is the total for all weekly reporting Fed-member banks of balance sheet item *z* in district *i* in the week of call report *c*. Note that for simplicity, we dropped the 0 at the end of the date c0 when describing data from weeks with call reports. $X_{zict}^{WR\ Banks}$ is the total for all weekly reporting Fed member banks of balance sheet item *z* in district *i* in week *ct*.

The most accurate source for information about bank suspensions and failures during this period is the micro-level data from the Board of Governors' bank suspension study. These are described in

Richardson (2007a, 2008). The Board's Division of Bank Operations completed a form ST 6386b for each bank that suspended operations. From these forms, we extract an array of information: a bank's location, whether it was a Fed member or non-member, whether it possessed a state or national charter, the date of its suspension, the date of its reopening (if any), the deposits that it possessed on the date of suspension, whether it was suspended by a decision of its board of directors or under the authority of a state or national bank examiner, and whether it suspension was triggered by a run. The latter piece of information was elicited by asking opinions of examiners and other authorities and according to the assessment procedures used by the division of bank operations. Documents describing these procedures indicate that while depositors lined up outside a bank pleading to withdraw funds was one symptom of a run, the determination of whether a run occurred should be based upon the volume of withdrawals and their impact on the bank as well as evidence of significant withdrawals via check or wire transfer which usually occurred before ordinary individuals panicked over the safety of their funds. Researchers at the Federal Reserve called these events "invisible runs." For 1929-32, we tabulate the ST 6386 micro data by call date and Federal Reserve district, creating an accurate analog for our panel of bank balance sheets by call date.