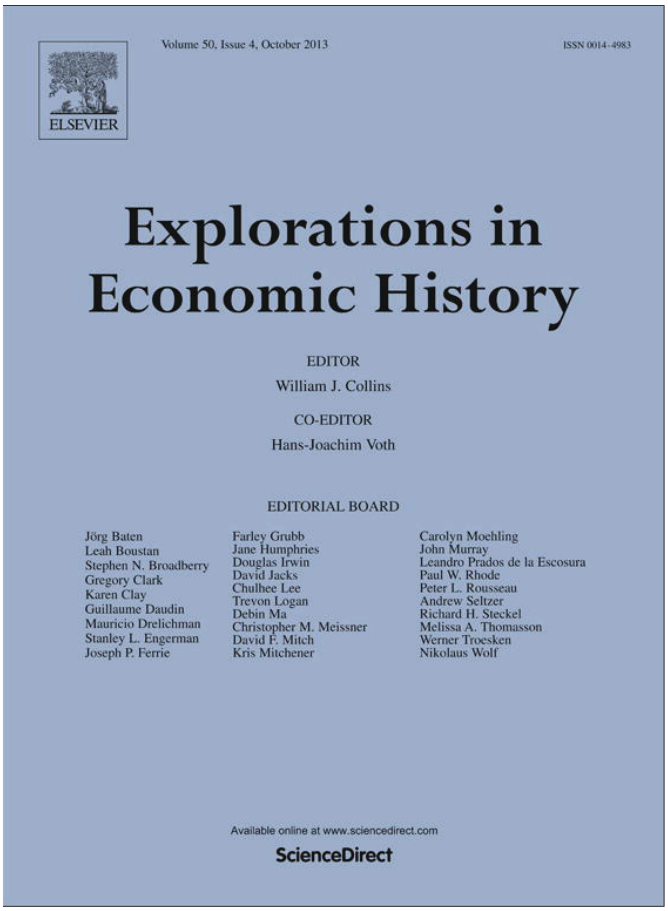

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The effects of reconstruction finance corporation assistance on Michigan's banks' survival in the 1930s☆

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Abstract

We examine the effects of the Reconstruction Finance Corporation's (RFC) loan and preferred stock programs on bank failure rates in Michigan during the period 1932–1934, which includes the important Michigan banking crisis of early 1933 and its aftermath. Using a new database on Michigan banks, we employ probit and survival duration analysis to examine the effectiveness of the RFC's loan program (the policy tool employed before March 1933) and the RFC's preferred stock purchases (the policy tool employed after March 1933) on bank failure rates.

We find that RFC's purchases of preferred stock—which did not increase indebtedness or subordinate depositors—increased the chances that a bank would survive the financial crisis, but RFC loans did not. Preferred stock assistance not only contributed to loan supply by reducing failure risk; conditional on bank survival, RFC preferred stock assistance was associated with significantly higher lending by recipient banks from 1931 to 1935.

JEL classification: G21; G28; N12; N22; E53; E58
Keywords: Reconstruction Finance Corporation; Great Depression; Banking crises

1. Introduction: RFC assistance to banks during the Depression

This paper examines the effects of the Reconstruction Finance Corporation's (RFC) loan and preferred stock programs on failure rates of Michigan banks during the period 1932–1934, which includes the important Michigan banking crisis of early 1933. Using a new database collected from primary sources, we employ probit and survival duration models to examine the effectiveness of the government's loan program and preferred stock purchases on bank survival and failure rates, and on loan growth of surviving banks. We study Michigan banks because the failure to stem Michigan's statewide banking

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crisis has been viewed by some historians of the Depression as a critical precipitator of the national financial crisis of 1933 (Kennedy, 1973). The prevalence of bank failures in Michigan during the period 1932–1934 provides a rich data set to examine the determinants of failure, and the potential salutary effects of government assistance.

The Reconstruction Finance Corporation (RFC) was a government-sponsored enterprise founded to stem bank failures and reduce the economic costs of financial disintermediation. RFC assistance for banks marked the first attempt by the federal government to assist distressed banks. At the height of its activities, the RFC owned more than one third of the capital of U.S. banks (Mason, 2001b). The RFC was originally established to lend funds to troubled firms. However, beginning in March 1933, the Corporation shifted from lending to banks to directly recapitalizing banks by purchasing their preferred stock. The program disbursed approximately $200 billion in current U.S. dollars (Lohr, 2008). When the RFC ceased operations in the early 1950s, the government-sponsored entity sold its preferred stock and recovered the funds provided by taxpayers.

Mason (2001a) and Calomiris and Mason (2004) conduct in-depth analyses of the operations of the RFC in the Chicago Federal Reserve District, distinguishing between the effects of RFC loans and preferred stock purchases on Chicago Federal Reserve member banks. The analysis suggests that as the RFC assumed greater default risk, its aid programs more successfully limited bank failures. RFC loans to banks did not lower bank failure rates. RFC loans, like Fed discounting, could address illiquidity problems, but not shocks that threatened bank solvency. Indeed, senior loans from the Fed or the RFC actually raised the insolvency risk on other debts, which were junior to them. In contrast, the RFC preferred stock program helped prevent banks from failing because it channeled resources to banks in the form of subsidized injections of capital (which were junior to bank debts) that reduced default risk on bank debt. Mason (2001a) suggests that marginally solvent banks receiving preferred stock assistance could operate more efficiently and regain strength as a result of government infusions of capital stock.

While these findings are important and suggestive, it is not clear whether they apply to other regions of the country, which suffered different histories of bank distress during the Great Depression. Chicago's deepest moment of crisis was its panic of June 1932, long before the nationwide panic that gripped the banking system in March of 1933 (Calomiris and Mason, 1997, 2003a). In this study, we examine whether similar consequences of RFC assistance can be discerned for Michigan banks. Michigan is a particularly interesting case to examine because the timing and extent of Michigan banking distress perhaps most closely tracked the sudden and widespread panic that gripped the U.S. in early 1933, and therefore, provides a crucially important testing ground for the effectiveness of RFC preferred stock assistance in reducing the costs of banking distress in 1933 and its aftermath.

2. Historical background

2.1. The Reconstruction Finance Corporation

Herbert Hoover established the RFC on February 2, 1932.[1] The RFC was originally established to stimulate the economy by increasing liquidity in the financial system by loaning funds to troubled financial institutions. The RFC was an agency of the executive branch of the federal government that had the ability to increase its lending capacity and oversight powers by executive order. Its operations did not depend on Congressional approval (Mason, 2003).

During the Great Depression, the RFC conducted four major aid programs: a loan program for financial institutions, a preferred stock program for financial institutions, a railroad loan program, and a commercial and industrial loan program.[2] The loan program for financial institutions was the first program initiated by the RFC, and it was largely replaced by a preferred stock program; there were few RFC loans made to banks after March 1933, with the exception of loans made to assist the liquidation of failed banks.

While the RFC's charter permitted the Corporation to make loans with maturities of up to three years, most loans had maturities of less than six months. The threat of non-renewal was perceived as giving the RFC necessary

[1] This history of the Reconstruction Finance Corporation is based on Mason (2001b).

[2] The RFC's railroad loan program, like its bank loan program, was part of the original RFC Act. However, unlike its loans to banks, the RFC's railroad loans did not need to be fully secured. The RFC also lent to railroads at below market rates. As a result of these lax lending policies, the RFC's railroad loan program was abused, and funds were used for the benefit of railroad company insiders (Mason, 2001b). The commercial and industrial loan program was the final economic stimulation program undertaken by the RFC during the Great Depression. Because the banks had ceased lending, the RFC made loans directly to businesses. The RFC encouraged banks to purchase the right to participate in commercial and industrial loans instead of originating the loans themselves in order to stimulate private sector lending. Thus far, to our knowledge, no detailed empirical study has been undertaken of the effectiveness of the RFC's commercial and industrial loans or its commercial loan participation program. Existing RFC histories tend to view its commercial and industrial loan programs as relatively unimportant.

influence over bank management practices. The RFC also demanded high-quality and liquid collateral for its loans, charged an interest rate higher than the rates charged on Federal Reserve loans, and required recipient banks to limit the salary of employees for the life of the loan.

The short duration, strict collateralization rules, and high interest of RFC loans may have protected the RFC from loss, but it also may have limited the effectiveness of RFC lending. Banks that received such assistance became more indebted as a consequence of it, and were not given much additional time to restore market confidence in their solvency. Because the RFC demanded high-quality collateral, the RFC's loans also effectively stripped banks of their best assets, thereby effectively subordinating depositors—who retained general claims on the remaining assets of the bank, an asset pool of lower quality than RFC collateral. Increased leverage, short maturity, and the subordination of depositors increased the riskiness of recipient banks' deposits, and may have encouraged depositor runs, as many critics of the RFC lending program contended (Olson, 1977; Mason, 2001a). The strict terms of RFC lending and the control the RFC exercised over bank management also allegedly discouraged financial institutions from using the RFC's loan program. According to Olson (1972), the RFC's loan conditions were generally perceived as bringing "more problems than solutions." In Olson's (1972, p. 177) view, RFC loans "helped only those basically sound enterprises that needed temporary liquidity." James (1938) corroborates this view: "High collateral requirements forced [banks] to isolate their most liquid assets as security for RFC loans. In April 1932, for example, the Reconstruction Finance Corporation loaned the Reno National Bank over $1,100,000, but in the process took as collateral over $3,000,000 of the bank's best securities. This in itself left the bank unable to meet any future emergency demands for funds by depositors." The only econometric analysis of the loan program's effectiveness, based on the failure experience of banks in the Chicago Federal Reserve District, suggests that the decision to borrow from the RFC did not prevent bank failures, and may have contributed to the risk of failure (Mason, 2001a).

To correct the perceived flaws of the loan program, the RFC moved from a policy designed primarily to increase short-term liquidity to one that reduced the default risk of deposits by increasing the capital of assisted banks. On March 9, 1933, Congress passed the Emergency Banking Relief Act, altering the original mandate of the RFC to permit the government-sponsored entity to purchase preferred stock in financial institutions in conjunction with the National bank holiday.[3] RFC assistance was not available to all banks; only to those that were deemed sufficiently likely to survive as the result of receiving the assistance. Statistical analysis by Mason (2001a) of Chicago Fed District recipients indicates that the banks that issued preferred stock to the RFC were of middling risk compared to other banks at the time they received assistance.

RFC preferred stock was junior to deposits and other debts, but senior to common stock upon liquidation of a bank. After the issuance of the RFC's preferred stock, common stock dividends were strictly limited, and the RFC undertook additional measures to ensure that banks accumulated additional capital and did not abuse government protection (Upham and Lamke, 1934; Cho, 1953). RFC preferred stock carried voting rights that gave it the power to institute changes that would increase the solvency and profitability of a bank. The bank's earnings were placed in a retirement fund that would be used to buy back the RFC's preferred stock.

The RFC's rules and control rights over financial institutions that participated in the preferred stock program seem to have discouraged some banks from participating. Furthermore, banks also expressed concern that participating in the aid program would make them seem weak, causing depositors and shareholders to lose confidence and withdraw their funds from banks. As a result, widespread participation in the preferred stock program occurred only when the FDIC began backing some of the deposits in solvent banks in 1934. For large banks, FDIC insurance limits meant that only a small proportion of their deposits were insured, but for small banks in rural areas, FDIC coverage insured a much larger proportion of deposits.

Insurance coverage was offered only after many insolvent banks were prohibited from reopening after the holiday in 1933, leaving the remaining banks to be insured by the FDIC and/or assisted by the RFC.[4] Deeply insolvent banks were closed; marginal banks were assisted and

[3] Emergency Banking Relief Act, Section 304. 73rd Congress, 1933.

[4] According to Jesse Jones, the chairman of the RFC, more than 5000 banks which had previously claimed to be solvent "required considerable added capital to make them [sufficiently] sound" to join the FDIC (Jones and Pforzheimer, 1951, p. 27). Jones personally appealed to the managers of all banks to join the RFC's stock program "so that depositors would not be induced to switch out of…banks when their names were published" (p. 26–27). Mason (2001a) finds that such publicity did not result in problems for participating banks. This may have reflected depositors' confidence in regulatory discipline (regulators' demonstrated willingness to close insolvent banks), or the ability of weak banks to avoid publicity by participating at times when Congress was in recess (which avoided the disclosure of participants' names). Thanks in large part to the preferred stock program, the vast majority of banks that were permitted to reopen were able to join the FDIC in 1934 (Federal Deposit Insurance Corporation, n.).

insured, and clearly solvent banks were insured without assistance.

Managers of relatively strong and weak banks alike sold preferred stock to the RFC, purportedly to protect the identities of the institutions that were too weak to join the FDIC without additional investment. Econometric analysis of Chicago Fed District banks suggests that recapitalizing the banks with preferred stock helped to stabilize the banking sector, although the program did not increase lending by those banks (Mason, 2001a).

The ambitious programs and immense resources of the RFC subjected the agency to political pressure and public scrutiny. State and federal politicians, recognizing the benefits of RFC aid, often pressured the government-sponsored enterprise to grant assistance to their constituents. Concerns about RFC accountability ultimately led Congress to require the publication of the names of its aid beneficiaries.

Econometric analysis of the identities and characteristics of the recipients of aid distributed by the RFC have not been able to identify evidence that the Corporation was swayed by political influence in its lending policies, where political influence is defined as systematic biases related to political partisanship, Congressional committees and the like (Mason, 2003).[5] The potential for the manipulation of the RFC by Congress or the Administration was mitigated by three main factors. First, the loans made by the RFC to financial institutions had to be fully and adequately secured.[6] This restriction was also incorporated into the RFC's credit and capital programs, which ensured that aid recipients were good candidates for recovery. Second, the RFC was funded as a government-owned corporation with an initial appropriation from Congress and capital subsidies from the Treasury. The managers of the RFC relied upon this capital base rather than regular Congressional appropriations, which freed the RFC's managers from having to concern themselves about ongoing political pressure from Congress. Finally, RFC aid decisions were made at the regional level; each region's field office was largely independent from the others and appears to have been largely immune to political influences from Washington. Field offices were given a large degree of autonomy over assistance decisions, but also were held accountable to the central office if their decisions adversely affected RFC earnings (Delaney, 1954).

2.2. Michigan banks and the nationwide panic of 1933

The Great Depression saw the worst waves of banking distress that had gripped the country since the late 1830s. Calomiris and Mason (2003a) review the history, and causal influences, relating to the waves of failures that occurred from 1930 to 1933. From November 1932 to February 1933, banking distress accelerated, and systemwide banking crises gripped Nevada, Wisconsin, Pennsylvania, Minnesota, Tennessee, Ohio, Arkansas, Alabama, Missouri, Maryland, Louisiana, and Michigan. Calomiris and Mason (2003a) show that the nationwide panic of early 1933 differed from prior waves of bank failure[7]; unlike prior episodes of distress, the probability of failure rose dramatically in early 1933, not only for banks with weak fundamentals, but for all banks.

The banking crisis in Michigan in February 1933 was of particular importance; indeed, Kennedy (1973) describes the Michigan banking crisis as a "prelude to the national banking disaster three weeks thereafter." The turmoil experienced in Michigan, the home of the American automobile industry, also highlights the devastating effects of banking crises on the national economy.

In Detroit, significant amounts of money began to flow out of the largest banks with the onset of the Great Depression (Awalt, 1969). The Guardian Detroit Union Group and First National People's Wayne Group, the two major local bank holding companies, were under additional pressure because of their banks' heavy investment in local real estate (New York Times, 1933a).[8] Between 1930

[5] This study does not test for the personal influence of particular bankers on the allocation of RFC funding. Not surprisingly, given the extent of RFC lending, some of the banks that received RFC assistance were associated with politically influential individuals, who were also connected to the RFC, including Jesse Jones and Charles Dawes. Whether the likelihood of assistance was affected by such personal connections remains unexplored empirically. Doing so would require the mapping of the personal and business connections of bank officers and board members, which is beyond the scope of this paper.

[6] The RFC did not specify the level of collateral that was necessary and only its staff could evaluate whether a bank had sufficient assets to secure a loan (Mason, 2001b).

[7] See Calomiris (2010) on the size of depositor losses during the 1930s. On the policy reaction to the banking distress of the Depression and its aftermath, see Calomiris and White (1994), White (1998) and Calomiris (2010). See Calomiris and Mason (2003b) on the credit supply consequences of banking distress during the Depression.

[8] The Detroit Banks Company Group held the First National Bank of Detroit, Peoples' Wayne County Bank, Detroit Trust Company, eight suburban banks, and a local investment company, the First Detroit Company. The Union Guardian Group, also called the Ford Group, held the National Bank of Commerce, Guardian Union Trust Company, and other local banks (Awalt, 1969, 350). First National Bank had book assets of $485,846,627 and 146 branch offices outside of its main office in Detroit at the time of the crisis; the Guardian Union Group held book assets of $432,797,434, nine bank components in Detroit and 11 bank branches in other Michigan cities (New York Times, 1933b).

and February 1933, approximately $250 million was withdrawn from the First National Bank of Detroit; its local competitors, the Union Guardian Trust Company and the Guardian National Bank of Detroit, also sustained massive withdrawals. By January 1933, these banks were losing between $2.5 million and $3 million in deposits each week (Awalt, 1969).

These banks not only were large Detroit banks, they were at the center of the largest two banking groups in Michigan. In Michigan, two holding companies—the Guardian Detroit Union Group, and First National People's Wayne Group—controlled 56 banks (35 and 21, respectively), including the First National Bank of Detroit, Union Guardian Trust Company, and Guardian National Bank of Detroit. As of December 1929, the two banking groups accounted for $1.1 billion of the $1.2 billion in loans and investments that were housed within group and chain banks in Michigan.[9] In 1929, Michigan banks affiliated with groups or chains represented 15.9% of all Michigan banks, and 54.4% of the loans and investments of Michigan banks.[10] The problems of the Detroit banks, therefore, had broader potential ramifications elsewhere in Michigan.[11]

To meet the demands of its depositors, the Guardian Trust Company requested additional funds from the RFC. Henry Ford had already attempted to bolster the bank's liquidity with a $7 million deposit. With deposits of approximately $32.5 million in the Guardian Banks and an additional $18 million in the Detroit Bankers' group, Ford had a strong personal incentive to assist the local financial institutions (Awalt, 1969). However, Ford's infusion of cash was not enough to sustain the Guardian Trust Company, and the bank requested an additional $60 million from the RFC, which was already lending to a number of local banks (New York Times, 1933a, 1933c).

As the RFC considered the application of the Guardian Trust Company, Michigan Senator James Couzens realized that the bank lacked sufficient collateral to justify a standard loan (New York Times, 1933a).[12] Couzens asked Henry Ford to grant the government a lien on his $7 million deposit, subordinating his claim to that of the RFC. Ford rejected this plan and an alternative plan that would have required him to sign a personal note for the difference between the bank's collateral and the amount to be loaned by the RFC. Contemporary sources indicate that the Ford family and company had already advanced local banks $12 million and considered further efforts to save the banks futile (Awalt, 1969). Angered by the increasing pressure from government officials to personally recapitalize the struggling banks, Ford threatened to withdraw $25 million from the system at the first opportunity. Because it was feared that such a withdrawal would cause a panic and threaten the survival of the local banks, Francis Awalt, acting Comptroller of the Currency at the US Treasury, felt compelled to prevent the national banks of Detroit from opening (Awalt, 1969).

While Awalt recognized the need to keep all Michigan banks closed, his authority was limited to national banks. Thus, federal officials conferred with Michigan Governor William A. Comstock, who declared a statewide bank holiday on February 14, 1933. The holiday was originally intended to last eight days (Awalt, 1969). However, the complex problems plaguing the financial system prompted officials to extend the holiday until March 6 (Awalt, 1969).

On February 18, soon after the Michigan bank holiday was declared, news circulated of a potential merger of the Guardian Trust Company and the Central Hanover Bank and Trust Company of New York. Supposedly, "local pride" motivated Detroit bankers to reject the assistance of the New York banks, and local rivalries supposedly prevented the mergers of Detroit banks (New York Times, 1933d).

On February 24, Henry Ford and his son Edsel, a Chairman of the Union Guardian Trust Company, offered to provide capital for two new banks to help liquidate the assets of the distressed banks. The aid of the Ford family was offered on the condition that they could select the new bank directors and officers (Awalt, 1969). Initially, it seemed that the Ford offer, accompanied by an additional $20 million from New York

[9] Group and chain banks were banks controlled by a centralized governance system, either related to a bank holding company, a main bank, or individual stock holders. US House of Representatives (1930) identifies the number and size of groups and chains in the United States as of December 1929, but it does not list the banks that belonged to chains or groups.

[10] Federal Reserve Board (1943), p. 312.

[11] In our empirical work we considered trying to take account of a bank's position in a group or chain, either as a leader of a group or chain, or as a member of one, to see whether leadership of a chain or membership in one might have affected the probability of receiving RFC assistance, or the probability of failure. The only important group or chain leaders, however, were the banks in the Guardian Detroit Union Group and First National People's Wayne Group, both of which were reorganized in 1933. Furthermore, we could not locate a reliable source for identifying members of groups or chains. Bank encyclopedias (like *Polks*) do sometimes refer to group and chain connections, but it is not clear whether this is done consistently.

[12] Couzens and Ford were former business partners in the Ford Motor Company. Couzens was also the chairman of the Senate committee responsible for investigating the RFC's loans, so his concerns about the need for proper collateralization were sufficient cause to block the Union Guardian Trust Company's aid package (New York Times, 1933a).

bankers and an RFC pledge of $54 million, would allow depositors to access at least 35% of their deposits immediately (Los Angeles Times, 1933). However, the New York bankers withdrew their offer of assistance because of concerns that they might not have clear legal claim to the failing banks' assets. The Ford family then withdrew its contribution, and the bailout plan failed (New York Times, 1933e). The failure of the bailout plan helped to precipitate a panic across Michigan, which contributed to the panic gripping the rest of the country (Mason, 2003; Butkiewicz, 1995).[13]

The situation in Michigan and the concurrent exposure of allegedly disreputable business practices among New York bankers exacerbated financial instability across the country. The instability of the Detroit banking system worried officials in Washington, as the public withdrew deposits from banks nationwide. Over 5500 banks with deposits totaling $3.4 billion had temporarily closed by March 3. New York banks lost $200 million in gold and $150 million in currency; Chicago also lost $100 million in gold the same day (Awalt, 1969). The Federal Reserve banks admitted "they could not support member banks indefinitely, especially those drained by the troubles in Michigan, Maryland, and Ohio" (Kennedy, 1973). However, outgoing President Hoover was unwilling to declare a national bank holiday, so comptroller Awalt and other government officials pressured the governors of several states to declare state banking holidays and institute banking restrictions. On March 6, the first business day following President Roosevelt's inauguration, he declared a national bank holiday to try to stem the panic.

On March 9, Congress passed the Emergency Banking Relief Act drafted by Roosevelt and his advisors. The Act granted the federal government power over the banking system.[14] Under this act, the RFC would directly capitalize banks by purchasing preferred stock.

The Emergency Banking Act of 1933 is widely regarded as having helped to resolve the banking crisis. During the national holiday, government officials confirmed the solvency of national banks, which were gradually reopened to their depositors beginning March 13 (although many banks would remain suspended for a much longer time, and some banks never were able to reopen their doors).[15] Roosevelt's innovative banking plan and first "fireside chat" soothed depositors to such an extent that when banks reopened, deposits actually exceeded withdrawals. Five thousand three hundred eighty-seven of the Federal Reserve's 6694 member banks reopened by the end of March; 7654 of 11,455 state institutions also reopened during that time. By June, 91% of deposits in Federal Reserve member banks were available to the public. Confidence in the banking system encouraged stock market values to increase; the values of government bonds, corporate bonds and commodities also increased (Kennedy, 1973).

After successfully reopening the first set of banks, Roosevelt's administration addressed the long-term capital needs of the banking system. Through investments made by local businessmen and the RFC, the government engineered the direct recapitalization of certain weak banks. The RFC invested more than $1.2 billion in over 6000 institutions during its 18 years of operations.[16] Ultimately, the agency lost only $13.7 million and only 206 of the banks that received RFC preferred stock investments were later forced to close (Kennedy, 1973).[17] The subsidies received by banks (and the implicit taxpayer costs of RFC assistance) should be measured using ex ante costs (the cost savings enjoyed by banks by virtue of their access to government assistance), not the ex post losses.[18] Nonetheless, the limited losses are indicative of the care with which RFC funds were allocated.

[13] The effects of the financial crisis were felt acutely in the real economy during the weeks between the initial crisis in Detroit and President Roosevelt's inauguration. Detroit was threatened with a milk shortage and grocers were unable to sell food since they could not cash checks (New York Times, 1933f, 1933g). Twenty-eight thousand local families supported by the Detroit Public Welfare Department were unable to use their aid checks from the city's accounts with the Guardian Group and First National; Wayne County, Michigan was unable to support 10,000 ill and insane patients because its deposits in the bank groups were unavailable (New York Times, 1933g). In late February, the Detroit Clearing House Association considered issuing scrip to provide a medium of exchange during the banking emergency (New York Times, 1933g).

[14] The Act also contained provisions for reorganizing national banks and issuing preferred stock for banks. It formalized lending by the Federal Reserve to banks, and created a Presidential discretionary fund of $2,000,000 to help carry out the Act.

[15] The 1933 Act created the concept of bank "conservatorship," which was a way station between a normal state of affairs and receivership. Many banks that received assistance from the RFC in 1933 were in conservatorship.

[16] Equivalent to approximately $19.5 billion in the year 2008 (Officer and Williamson, 2009).

[17] Equivalent to approximately $227 million in the year 2008 (Officer and Williamson, 2009).

[18] This approach to measuring cost is now widely recognized. For example, the Emergency Economic Stabilization Act of 2008, which was the empowering legislation for the Troubled Asset Relief Program (TARP), requires the Congressional Budget Office (CBO) and Office of Management and Budget (OMB) to measure subsidies by including the cost of market risk when estimating the budgetary cost of TARP.

In Detroit, the RFC orchestrated a "Spokane sale" of the assets of the banks.[19] General Motors and the RFC announced the creation of a new bank on March 21. Half the capital for this new corporation was provided by the RFC, which received preferred stock. The other half of the necessary capital was provided by local interests, including General Motors and Chrysler, which were granted common stock in the company (New York Times, 1933c). The RFC supervised the management of this new bank, the National Bank of Detroit.

The National Bank of Detroit immediately took control of the assets and liabilities of the Guardian group and the National group. On April 24, the National Bank of Detroit distributed 30% of its holdings to the old depositors and began liquidating the assets of the Guardian and National groups in May. The efficiency of the RFC's "Detroit plan" spurred numerous applications for reorganization in other communities. In total, the RFC and Treasury Department authorized 257 similar relief operations. These rehabilitations were significant aspects of the repair begun with the passage of the Emergency Banking Act, which allowed the banking system to be rebuilt on stronger foundations following the banking crisis of 1933.

3. Data construction and summary statistics

The purpose of this analysis is to measure the effect of the RFC's loan and preferred stock programs on bank failure rates, after controlling for other factors. The models use a cross-sectional set of bank-level data describing RFC loans and preferred stock investments in each bank, local economic conditions, individual bank financial characteristics, and the incidence and timing of bank failure.

Individual bank financial data come from the Federal Reserve member bank *Reports of Condition and Income*. For our period, regulators of state nonmember banks did not publish comparable and detailed data on individual banks' balance sheets, or earnings and expenses. Bank-level data for Fed member banks are available in the Reports of Condition and Income of the Federal Reserve, which were preserved only in part for our period (Mason, 1996, 2001a). This means that our sample of banks is restricted to Federal Reserve member banks, and that the dates at which we observe financial information about all Fed member banks is restricted (we will rely on annual data observed in the December 1931 call report). Federal Reserve banks include all national banks and some (typically, the largest) state-chartered banks, which provides some institutional diversity in the sample. Our sample is roughly equally divided between national banks and state-chartered Fed member banks.

We collected detailed data on the individual characteristics of Michigan banks, as well as the characteristics of Michigan counties in which the banks operated. The database includes county-specific data on various aspects of the economic environment, as well as bank-specific data on bank balance sheet and income statement characteristics, dates of bank failure, the number of bank correspondent relationships of various kinds (which link the subject bank to banks operating elsewhere in the country), and the history of loans and preferred stock assistance each bank received from the RFC. Previous studies have identified bank and county characteristics that have been shown to be important either in forecasting failure risk or in determining access to RFC assistance, and those earlier studies informed our selection of variables for this study. We also include additional variables that have not been identified in earlier studies. The list of variables we employ are defined in Table 1, and the summary statistics for these variables are reported in Table 2.

Many Michigan banks relied on RFC loans prior to March 1933, and Michigan banks also made substantial and early use of the RFC's preferred stock program. As a result, Michigan banks provide a rich data set to examine the impact of RFC assistance. As shown in Table 3, of the 209 Michigan Fed member banks in our sample as of December 1931 (not all of which are included in our regression specifications due to some missing observations), 92 received RFC loans from March 1932 through February 1933. Of the 195 banks in the sample as of March 1933, 11 received preferred stock assistance in 1933 and another 43 received preferred stock assistance in 1934.[20] Fig. 1 provides a more detailed picture of the timing of the receipt of RFC loans and preferred stock assistance by Michigan banks in our sample.

As we have seen, the RFC played a central role in the reorganization of Detroit banking through its assistance to the newly formed National Bank of Detroit. That

[19] "Spokane sales" were used to dissolve banks that provided valuable services to the community but whose assets covered less than half of their debt. Conservators arranged the sale of "desirable assets in bulk…to an existing bank or a bank newly organized for that purpose," and creditors were immediately paid from the revenue generated by the sale (Kennedy, 1973). After the sale and allocation of the proceeds, the old banks could be dissolved.

[20] Three banks in the sample also received RFC loans after March 1933, but these are not included in Table 3 or in our regression analysis for the later period, as discussed further below.

Table 1
Variable definitions.

National bank dummy	Bank is a national bank (1 = Yes, 0 = No)
Other reserve city bank	Bank is in a non-central reserve city (1 = Yes, 0 = No)
Total assets	Total bank assets
Illiquid assets	Total assets−US gov. securities−Reserves with Fed−Cash and due from banks−Outside checks and other cash items
Illiquid assets over total assets	Illiquid assets divided by total assets
Real estate owned over illiquid assets	Real estate owned other than banking house divided by illiquid assets
Loans and discounts over illiquid assets	Loans and discounts divided by illiquid assets
Net worth over total assets	Bank net worth over total assets
Total debt	Due to Banks + Demand Deposits + Time Deposits + US Government Deposits + Bills Payable and Rediscounts
Bills payable and rediscounts over total debt	Bills Payable and Rediscounts divided by total debt
Demand deposits and due to banks over total debt	(Demand deposits + Due to banks) divided by total assets
Net due to banks over total assets	(Due to banks − due from banks) divided by total assets
Interest cost over total debt	Interest expense divided by total debt
Loans eligible for rediscount over total loans and discounts	Loans eligible for rediscount at the Fed divided by total loans
Interest and discounts on loans over total earnings	Interest and discount on loans divided by total earnings
Recoveries over total earnings	Total recoveries divided by total earnings
Losses over total expenses	Total losses divided by total expenses
Crop income share in county in 1930	Value of crops divided by sum of value of crops + value added by manufacturing
Total number of correspondents	Total number of correspondent relationships
Number of correspondents in New York and Chicago	Number of correspondent relationships in New York and Chicago
County population in 1930	Total population in the county in 1930
Unemployment rate for county in 1930	Unemployment rate for the county in 1930
Suspended deposits share of 1931 county deposits	(Suspended deposits in 1930 + Suspended deposits in 1931) divided by total deposits in 1931
Mortgage loan share of total loans for county	Amount of mortgage loans divided by total loans for the county
FERA share of grants for county	Amount of FERA grants divided by total grants for county
Manufacturing employment share in county in 1930	Number of wage earners in manufacturing divided by total number of gainful workers in county
Loan growth Dec 1935–Dec 1931	ln (Loans and discounts Dec 31 1935) − ln (loans and discounts Dec 31 1931)

observation, however, is not included in our database, because RFC assistance was provided in a special form as part of asset liquidation and the creation of a new bank.[21] The predecessor and successor banks were separate entities. Our sample, in contrast, analyzes the effects of RFC loans and preferred stock assistance to open banks. Of course, given the potentially important stabilizing consequences of RFC assistance for the National Bank of Detroit, it is important to recognize that its omission from our sample unavoidably understates the systemic contribution of the RFC to Michigan banking.

The bank failure data for the national banks are taken from the Comptroller of the Currency's *Annual Report*. The *Rand–McNally Bankers' Directory* provides the failure data for state banks, supplemented in one case by an observation reported by the RFC. For the purposes of the analysis, receiverships and voluntary liquidations are treated as bank failures. Suspension and "conservatorship" are not treated as failure events. (Recall that all Michigan banks suspended in February of 1933, as required by law, and many banks received RFC assistance as part of their "conservatorship" to enable them to reopen.) Fifty seven of the banks in our sample failed, 7 of which received RFC loans and 4 of which received RFC preferred stock assistance.[22]

County-level data for most characteristics are taken from the Inter-university Consortium for Political and Social Research (ICPSR, 2001) database. Additionally, we rely on Fishback and Kantor (2003) for county data on New Deal disbursements and loans. We collected data on each bank's correspondent relationships (number of

[21] The RFC at all times had special lending arrangements for the purpose of liquidating deposits in closed banks, but those would not be expected to affect directly the survival of open banks (See Mason, 2001b).

[22] In Table 3, only 3 RFC recipients are shown as failures, owing to the nature of the timing described in the table, but one of the RFC preferred stock assistance recipients in 1933 failed in 1934.

Table 2
Summary statistics.

Variable	Mean	Median	sd	Min	Max	N
Total assets	6,829,000	1,099,000	42,620,000	110,635	582,300,000	209
Illiquid assets over total assets	0.826	0.833	0.086	0.322	0.978	209
Real estate owned over illiquid assets	0.0152	0.00911	0.0188	0	0.126	209
Net worth over total assets	0.13	0.124	0.0407	0.0344	0.332	209
Bills payable and rediscounts over total debt	0.0474	0.0286	0.0563	0	0.288	209
National bank dummy	0.493	0	0.501	0	1	209
Demand deposits and due to banks over total debt	0.261	0.231	0.139	0	0.981	209
Loans and discounts over illiquid assets	0.584	0.606	0.159	0.132	0.917	209
Loans eligible for rediscount over total loans and discounts	0.156	0.131	0.123	0	0.688	209
Interest cost over total debt	0.0237	0.0135	0.0398	0.0000	0.323	204
Interest and discounts on loans over total earnings	0.593	0.591	0.201	0.0803	0.992	204
Recoveries over total earnings	0.0208	0.00146	0.0464	0	0.277	204
Losses over total expenses	0.242	0.209	0.202	0	0.787	205
Crop income share in county in 1930	0.978	0.997	0.0703	0.656	1	202
Total number of correspondents	3.756	3	3.65	1	37	209
Number of correspondents in New York and Chicago	1.88	2	1.383	0	11	209
County population in 1930	140,739	49,849	375,707	8451	1,889,000	209
Unemployment rate for county in 1930	0.0789	0.0771	0.0296	0.0218	0.137	209
Suspended deposits share of 1931 county deposits	0.287	0.107	0.459	0	2.871	209
Net due to banks over total assets	−0.0267	−0.0195	0.0316	−0.158	0.0962	208
Mortgage loan share of total loans for county	0.434	0.439	0.13	0.169	0.664	209
Other reserve city bank	0.0383	0	0.192	0	1	209
FERA share of grants for county	0.175	0.177	0.0574	0.0502	0.283	209
Manufacturing employment share in county in 1930	0.174	0.137	0.12	0.00518	0.474	209
Loan growth Dec 1935–Dec 1931	−0.651	−0.648	0.527	−2.146	1.489	116

correspondents in New York, Chicago, and elsewhere) from the *Polk's Bankers' Encyclopedia*.[23]

RFC loans and preferred stock purchases were hand-coded from the monthly *Reports of Activities of the Reconstruction Finance Corporation*.[24] The *Reports* include the amount of each loan and preferred stock purchase. Many banks received multiple loans or infusions of capital in the form of preferred stock. According to Mason (2001a), 32% of banks in the United States received more than one loan from the RFC and 12% borrowed from the government-sponsored entity more than twice. Previous studies have examined the average amount of each loan or preferred stock purchase by dividing the amount of each by the number of loans or preferred stock purchases (Friedman and Schwartz, 1963; Butkiewicz, 1995; Keehn and Smiley, 1988, 1993). However, because so many banks received several loans or preferred stock purchases, the averages of RFC outlays may be biased downward.

Typically, a bank receiving one RFC loan received subsequent loans, as the loans were rolled over. This was not the case for preferred stock, which was typically received only once (all of our Michigan recipients received preferred stock assistance only once during the period March 1933–December 1934). In our study, we identify the date at which the bank received its first loan or its first preferred stock injection.

In measuring the effects of RFC preferred stock assistance we only include assistance received prior to the end of December 1934. We are aware that three banks in our sample received RFC preferred stock assistance in 1935, but failure risk was virtually nil in 1935 and 1936, so we do not consider assistance received during these years.

Our analysis treats the period January 1932–February 1933 separately from the period March 1933–December 1934. February 1933 is a natural dividing line for a separate two-period analysis of RFC assistance policies' effects in Michigan for two

[23] Almost all of the correspondent information was taken from the September 1931 issue of Polk's. In two cases, the subject bank was not listed in the September 1931 issue, and in those two cases we obtained correspondent information from the March 1932 issue.

[24] These reports were published when Congress was in session after fall 1932. The reports were reproduced in the *Congressional Serial Set* and, until 1933, in the *Commercial and Financial Chronicle*. The Archive of the Clerk of the House of Representatives preserved the reports submitted while Congress was in recess and remains the only source for these reports.

Table 3
Banks receiving RFC loans and preferred stock assistance, and their failure outcomes.

	# of banks at beginning	# of RFC assistance recipients	# of RFC assistance recipients that failed	# of RFC assistance non-recipients	# of RFC assistance non-recipients that failed
Period 1	01/32	03/32–02/33	03/32–02/33	03/32–02/33	03/32–02/33
Loans	212	94	9	118	8
Period 2	03/33	03/33–12/33	03/33–12/33	03/33–12/33	03/33–12/33
Preferred stock	195	11	0	184	23
Period 3	01/34	01/34–12/34	01/34–12/34	03/33–12/34	01/34–12/34
Preferred stock	172	43	3	118	13

reasons. First, RFC policy changed from lending to preferred stock purchases in March 1933. Second, Michigan banks suspended in February 1933, and reopened from March 1933 through early February as part of the RFC/FDIC process of sorting institutions into the healthy (which could reopen without assistance), the curably sick (which received preferred stock assistance), and the dead (which were closed). In our regression analysis, therefore, the effects of RFC loans are estimated for the early failure period, while the effects of RFC stock purchases are estimated for the later period. As Table 3 shows, failure rates were higher for the later period; from January 1932 through February 1933, 17 Michigan banks out of the 209 present as of December 1931 failed, while for the later period 40 out of 195 banks present as of March 1933 failed.[25]

Table 4 presents simple characteristic comparisons —analogous to those discussed in Calomiris and Mason (1997) for Chicago banks in the 1930s—across bank failure cohorts. Here we compare four groups of banks: those that failed in the early period (January 1932–February 1933), those that failed in the first part of the later period (March 1933–December 1933) during which many suspended banks were either closed or reopened, those that failed in the second part of the later period (January 1934–December 1934), and those that survived beyond December 1934.

The first characteristic we compare across these four groups is their ex ante failure risk. To capture ex ante failure risk we estimate a simple probit model of failure risk for the early period. The column labeled "Predicted failure" in Table 4 reports the estimated probability of failure from a probit model that is identical to the one reported in the first column of Table 5, except that RFC assistance is not included as an explanatory variable in the regression specification used to construct the predicted failure probabilities reported in Table 4. Clearly, and not surprisingly given the way predicted failure probabilities are constructed, the banks that failed in the period January 1932–February 1933 display the highest mean probability of failure (30.9%). Predicted failure risk is lower for the other three sub-groups, and declines over time (from a mean of 7.3% for the banks that failed March–December 1933 to 6.2% for those that failed in 1934). Survivors had an average predicted failure risk of 3.9%.

Table 4 also examines differences across the four cohorts in the structure of bank liabilities as of December 1931 and related differences in bank funding costs for 1931. As in Calomiris and Mason (1997), the differences are striking, and confirm that banks at greater risk of failure tended to experience a contraction in their demand deposits held by the public and in the deposits owed to other banks, and an expansion in their "Borrowed money" (a shorthand for bills payable and rediscounts as a proportion of total bank debt). In other words, as the market perceived banks to be at greater risk of default, demand deposits contracted and were replaced in part by higher-cost risky funding. That higher cost is reflected in the column labeled "Cost of funds" (defined as the total interest expense for 1931 divided by total debt). The cost of funds so defined averaged 4% for Michigan banks that ended up failing in the period January 1932–February 1933. For other banks, their average cost of funds in 1931 was roughly half as high.

The data reported in Tables 3 and 4 show that the connections between the receipt of RFC assistance and failure risk are potentially complex and must be analyzed carefully. As Table 3 indicates, roughly equal numbers of Michigan banks received or did not receive RFC loans in the early period, and the failure rate for the two groups was similar (9/94 and 8/118). This does not

[25] Again, only 3 RFC recipients are shown as failures during Period 3 in Table 3, owing to the nature of the timing described in the table, but one of the RFC preferred stock assistance recipients in 1933 also failed in 1934.

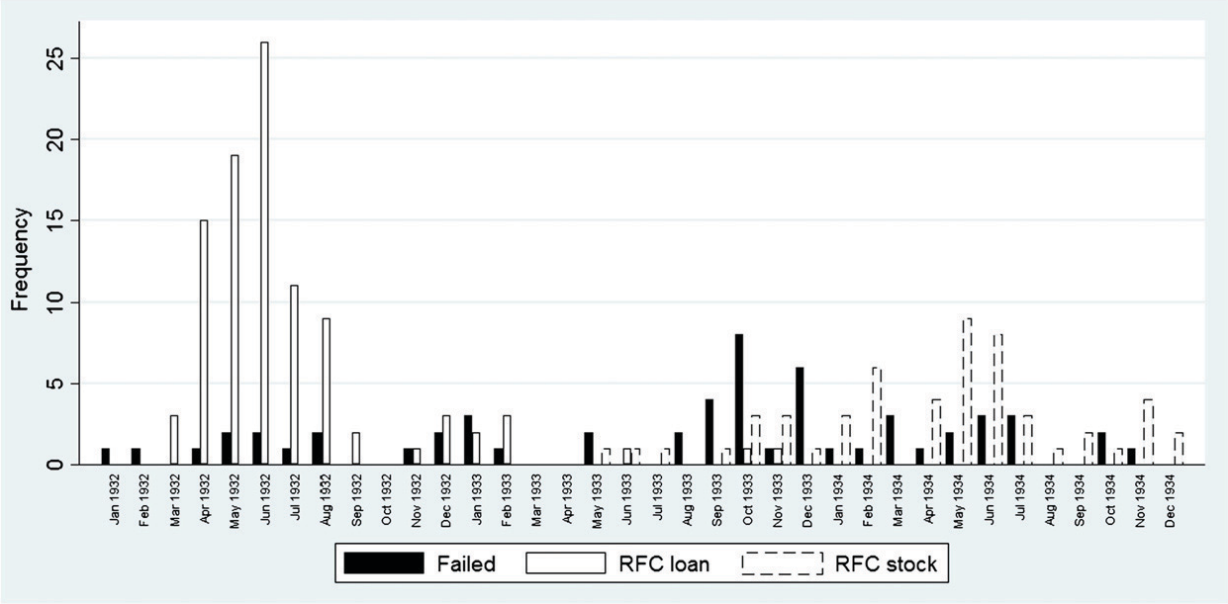

Fig. 1. Bank failures and RFC loan and preferred stock assistance recipients, January 1932–December 1934.

necessarily imply anything about the effectiveness of RFC loans in reducing failure risk, since the ex ante risk characteristics of recipients were not necessarily the same as those of non-recipients. Indeed, as Table 4 indicates, failed banks (which had higher ex ante failure risk) were more likely to receive RFC loans than banks that failed later or that survived. Similarly, only 4 out of 54 preferred stock issuing banks failed in the period March 1933–December 1934, compared to 23 out of 184 failures for non-recipients during 1933 and 13 out of 118 failures for banks that received no preferred stock assistance at any time in 1933 or 1934. Before reaching conclusions about the effectiveness of RFC preferred stock assistance, however, one must control for differences in the riskiness of banks targeted for assistance, and model the relationship between exogenous variation in RFC assistance and the consequences of that assistance for bank failure risk.

4. Regression Methods and Empirical Results

To analyze the relationship between RFC assistance of both types and bank failure risk we construct various regression models. We begin with simple probit and survival duration modeling of the consequences of RFC assistance. Loans are the form of RFC assistance in the early period and preferred stock purchases are the form of assistance in the later period. In these simple models, we consider either the probability of failure over the entire specified period (in the probits) or the continuous survival duration hazard during the period. We model these initially as a simple function of the receipt of RFC assistance and various controls that capture the failure risk of the banks (based on 1931 bank characteristics and county characteristics).[26] In the simple probit and survival models, reported in Tables 5 and 6, RFC assistance takes a value of 1 if the bank receives assistance during the period and zero otherwise. In the case of the simple survival duration models, reported in Table 6, the receipt of assistance is related to the timing of subsequent failure (if any) within the period. In Table 5, we only examine failures within the relevant periods (ending in December 1934), while in Table 6 we utilize information about failure risk—which influences the shape of the survival duration function—through December 1936.

The main advantage of survival hazard models is that they allow one to distinguish between early and late failures, permitting earlier failure to reflect higher

[26] We assume cross-sectional independence—that is, that RFC assistance only affects the probability of failure of the recipient bank. Although it is possible that other banks with close linkages to the subject bank might also benefit from the assistance received by the subject bank, we are unable to identify such links. Spatial modeling of bank spillover effects is possible (as in Calomiris and Mason (2003a), in principle, but this is not feasible in our sample as the result of the small size and similar geographical proximity of many of the banks to one another.

Table 4
Ex ante failure risk, liability structure, and funding cost for different bank failure cohorts.

GROUP	Statistic	Predicted failure	Demand deposits	Due to banks	Time deposits	Borrowed Money	Cost of funds	% RFC loans
Failed	Mean	0.309	0.140	0.006	0.767	0.087	0.041	0.500
Jan 32–Feb 33	Variance	0.234	0.115	0.009	0.130	0.063	0.077	0.522
	N	12	12	12	12	12	12	12
Failed	Mean	0.073	0.300	0.020	0.620	0.061	0.013	0.783
Mar 33–Dec 33	Variance	0.125	0.177	0.037	0.187	0.052	0.007	0.422
	N	23	23	23	23	23	23	23
Failed	Mean	0.062	0.240	0.007	0.676	0.075	0.020	0.750
Jan 34–Dec 34	Variance	0.090	0.086	0.009	0.114	0.064	0.020	0.447
	N	16	16	16	16	16	16	16
Survivors	Mean	0.039	0.251	0.011	0.693	0.037	0.024	0.331
	Variance	0.080	0.129	0.017	0.139	0.050	0.041	0.472
	N	145	145	145	145	145	145	145
Means tests	Diff 1–4	0.2693***	−0.111***	−0.0048	0.0734*	0.0503**	0.0169	0.169
	Diff 2–4	0.0339	0.0489	0.0085	−0.0736*	0.0236**	−0.0113***	0.4516***
	Diff 3–4	0.0231	−0.0113	−0.004	−0.0167	0.0376**	−0.004	0.419***

Note: See Table 1 for variable definitions.

failure risk.[27] When constructing a model of survival hazard, one has to choose the functional form of the survival function. We found that the choice between a log-logistic and a log normal functional forms did not affect our estimation results. For the sake of consistency, we report results for log normal specifications in Table 6 because using that approach permits us to perform subsequent estimation—which takes account of the endogeneity of RFC assistance—using bivariate tobit, joint maximum likelihood estimation (MLE) modeling, as we discuss further below.

Many of the bank characteristics selected as determinants of failure (our "controls") have been widely analyzed in the literature (Alston et al., 1994; Calomiris and Mason, 1997, 2003a; Cole and Gunther, 1995). Each bank characteristic is included at its value as of December 31, 1931.[28] Net worth/total assets should be associated with lower failure risk. The riskier or less liquid a bank's assets, the greater its risk of failure. Bonds, stocks, securities owned, and loans and discounts are defined as risky and relatively "illiquid assets," and loans and discounts are distinguished from other illiquid assets, since they are likely to be particularly illiquid and risky. Paper eligible for rediscount at the Federal Reserve indicates lower credit risk assets which can produce greater liquidity (from Fed lending) and thus should be associated with a decreased risk of bank failure. "Real estate owned" indicates the level of foreclosed and nonperforming assets on the balance sheet of the bank, and should be associated with higher failure risk. Because interest and discount rates should be higher for riskier borrowers, the proportion of interest and discount income relative to earnings has sometimes proven to be a useful predictor of failure risk. Higher interest rate risk on liabilities compensate bank depositors and other debtholders for bearing higher expected default risk and thus should be associated with higher predicted failure rates. Recoveries, which may capture a sudden recovery in bank asset values following a macroeconomic downturn, may also be positively associated with failure risk.[29] Larger bank size has been found to be associated with lower failure risk, reflecting potential gains from loan diversification or lower risks associated with locations in which banks are larger (bigger cities). National banks faced stricter limits on real estate lending than state-chartered bank and a different supervisory regime. We employ several county characteristics as regressors, including a county characteristic that Calomiris and Mason (2003a) identified as an important predictor of bank failure risk: the "Crop income share" in the county in 1930. Other county characteristics include population,

[27] Probit models, which address the censoring and structural problems that arise in OLS estimation, do not address "the differences in time in which each person is at risk of experiencing the event" (Jenkins, 2005). The statistical techniques used in survival analysis were developed to address "the sequential nature of the data, and are able to handle censoring and incorporate time-varying covariates" (Jenkins, 2005). As a result, survival analysis allows us to incorporate the most information in our study of the relationship between RFC aid policies and bank failure rates. In the case of the bank survival times in this data set, duration is measured in days.

[28] This analysis uses time-fixed covariates. Modeling these bank characteristics as time-varying covariates might better describe their effect on the likelihood of failure and bank failure rates.

[29] Mason (2001a) notes, "recoveries may be positively associated with failure risk, if they capture a rebound in bank asset values following a trough."

Table 5
Simple probit model. Dep Var = Failure dummy (0,1).

	Jan32–Feb33	Jan32–Feb33	Mar33–Dec34	Mar33–Dec34
Variables	Full	Parsimonious	Full	Parsimonious
RFC assistance dummy	−0.2835	−0.1934	−0.9137***	−1.0432***
	(0.4430)	(0.3552)	(0.3542)	(0.3381)
Log of total assets	−0.0085	−0.0246	−0.0149	0.0962
	(0.3227)	(0.1580)	(0.1361)	(0.0955)
Illiquid assets over total assets	11.9580***	11.1871***	3.9747*	0.5229
	(3.3129)	(3.5871)	(2.1088)	(1.9701)
Interest and discounts on loans over total earnings	−0.4671	0.2031	0.1775	1.1631*
	(0.9419)	(0.7452)	(0.8582)	(0.7041)
Real estate owned over illiquid assets	3.0943	5.6137	9.8571	14.6889**
	(9.1593)	(6.2419)	(6.1427)	(5.7347)
Net worth over total assets	−2.5494	−2.1377	−8.0140**	−6.4637*
	(6.0170)	(3.9031)	(3.7060)	(3.3092)
Bills payable and rediscounts over total debt	8.0112**	6.9044***	6.6911***	6.0777**
	(3.5054)	(2.2588)	(2.4248)	(2.3609)
National bank dummy	0.8904**	0.4519	1.9572***	1.6888***
	(0.4323)	(0.3386)	(0.3590)	(0.3411)
Demand deposits and due to banks over total debt	−0.2642		2.3692**	
	(2.7967)		(1.1969)	
Loans and discounts over illiquid assets	0.6671		0.7941	
	(1.3206)		(1.1433)	
Loans eligible for rediscount over total loans and discounts	−1.7806		−0.7611	
	(2.2041)		(1.2761)	
Interest cost over total debt	5.3827*		−0.4974	
	(3.1056)		(3.6181)	
Recoveries over total earnings	−10.1245		−5.7724*	
	(7.8874)		(2.9732)	
Losses over total expenses	−2.5622**		0.4343	
	(1.2546)		(0.6736)	
Crop income share in county in 1930	4.5907		−0.0852	
	(4.7082)		(3.2192)	
Log of county population in 1930	0.5603		0.2481	
	(0.4162)		(0.2501)	
Unemployment rate for county in 1930	−6.3868		−0.5169	
	(7.9296)		(4.9086)	
Mortgage loan share of total loans for county	5.1611**		1.2775	
	(2.6180)		(1.0987)	
Manufacturing employment share in county in 1930	−2.6135		−1.8472	
	(1.7060)		(1.3560)	
Constant	−24.0398**	−11.3735***	−8.2462	−3.8734
	(10.7394)	(3.2644)	(5.8097)	(2.4445)
Pseudo R2	0.447	0.291	0.366	0.312
Log-likelihood	−24.98	−36.18	−60.30	−66.34
Log-likelihood constant only	−45.14	−51.02	−95.04	−96.45
LR Chi-2 test for zero coefficients (pval)	8.19e−08	0.000449	5.58e−09	3.80e−07
Number of banks	196	204	184	190
Number of failures	12	14	39	39
Number of banks receiving RFC assistance	84	89	50	53

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

the share of government lending to the county that took the form of mortgage lending (which we assume is indicative of the lending composition of the county), the unemployment rate, and the manufacturing share of the population. This variable is meant to capture the extent to which banks are exposed to agricultural loan risk, which for the nation as a whole, was associated with greater risk of bank failure. We report "full" model specifications as well as "parsimonious" models that conserve on degrees of freedom by eliminating some regressors.

Table 6
Simple log-normal duration model. Dep Var = log (days to failure).

	Jan32–Feb33	Jan32–Feb33	Mar33–Dec36	Mar33–Dec36
Variables	Full	Parsimonious	Full	Parsimonious
RFC assistance dummy	0.7891	0.4707	1.3489***	1.7528***
	(0.5838)	(0.5078)	(0.4721)	(0.5025)
Log of total assets	0.1069	0.0668	−0.0692	−0.2147*
	(0.3724)	(0.2242)	(0.1757)	(0.1300)
Illiquid assets over total assets	−14.2042***	−15.9708***	−4.2245*	0.4903
	(4.7412)	(5.3028)	(2.4471)	(2.9077)
Interest and discounts on loans over total earnings	−0.0319	−0.5441	−0.2118	−1.7044
	(1.1608)	(1.1296)	(1.1568)	(1.0416)
Real estate owned over illiquid assets	−5.6162	−10.3785	−12.2780*	−21.5124***
	(11.0124)	(9.2536)	(6.6354)	(6.8833)
Net worth over total assets	9.1233	4.3247	9.7592**	9.0642*
	(7.4952)	(5.5559)	(4.6830)	(4.9237)
Bills payable and rediscounts over total debt	−9.5160**	−9.3789***	−9.0130***	−9.1754***
	(4.3797)	(3.0146)	(2.9080)	(2.9250)
National bank dummy	−1.0905*	−0.5583	−2.6540***	−2.5641***
	(0.5703)	(0.4381)	(0.4173)	(0.4403)
Demand deposits and due to banks over total debt	1.4727		−2.9497**	
	(3.7148)		(1.4965)	
Loans and discounts over illiquid assets	−0.8244		−0.6371	
	(1.7168)		(1.4681)	
Loans eligible for rediscount over total loans and discounts	2.2653		0.5540	
	(2.5224)		(1.6309)	
Interest cost over total debt	−6.4820*		1.0863	
	(3.6156)		(5.4640)	
Recoveries over total earnings	9.5593		7.6494*	
	(7.1576)		(3.9049)	
Losses over total expenses	2.5582		−0.1702	
	(1.7554)		(0.8725)	
Crop income share in county in 1930	−7.0432		0.6606	
	(5.8451)		(3.6721)	
Log of county population in 1930	−0.7396		−0.4037	
	(0.5380)		(0.3041)	
Unemployment rate for county in 1930	11.2672		1.6069	
	(9.7560)		(6.3567)	
Mortgage loan share of total loans for county	−6.5144**		−1.6769	
	(3.0705)		(1.4554)	
Manufacturing employment share in county in 1930	2.2337		2.9998*	
	(2.1727)		(1.8078)	
Constant	35.1717**	21.8209***	18.3751**	12.9518***
	(13.8450)	(5.4202)	(7.2984)	(3.6128)
Log-likelihood	−35.24	−48.51	−109.2	−116.1
Log-likelihood constant only	−56.28	−64.06	−148.6	−150.2
Wald Chi-2 test for zero coefficients (pval)	0.000446	0.00531	0	0
Number of banks	196	204	184	190
Number of failures	12	14	40	40
Number of banks receiving RFC assistance	84	89	50	53

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Many of the balance sheet and county indicators are often insignificant—hence the use of the parsimonious specification. Given that these various controls are correlated, we do not expect all of them to prove significant in our regression specifications; nevertheless, because our main interest in including these variables is to control for differences in bank characteristics, not to estimate coefficients on the controls, per se, we include them in our "full" specifications.

Coefficients related to RFC assistance in the probit and survival models in Tables 5 and 6 should have opposite sign, as one measures the effect on failure risk, and the other measures the effect on the number of days of survival. The simple probit and survival models,

which control for bank and county characteristics that are likely to affect failure risk, show a large and statistically significant effect from RFC preferred stock assistance on failure risk, but no significant effect from lending assistance. In the probit models, the coefficients on RFC preferred stock assistance (when evaluated at the means of the other variables' values) imply a 17 percentage point reduction in failure risk in the full model, and a 20 percentage point reduction in the parsimonious model. In the survival models, the number of days of survival is raised by preferred stock assistance by 135% and 175%, respectively, in the full and parsimonious models. These findings are consistent with the results of Mason (2001a), and with the hypothesized difference between the ineffectiveness of RFC loans (which increased bank indebtedness and subordinated depositors) and the effectiveness of RFC preferred stock assistance (which did not increase debt and did not subordinate depositors).

In the simple probit models reported in Table 5, the illiquid asset ratio and the proportion of funding from bills payable and rediscounts proved to be the most robust and significant predictors of failure risk for both periods. In the later period, real estate owned and net worth also prove significant in the probits. Somewhat surprisingly, the national bank indicator variable has a positive sign in the probits, although it is challenging to interpret any partial correlation of a control variable given the correlations among control variables. As in the probit analysis, in the survival models illiquid assets tends to be associated with faster failure (especially in the early period), and the same is true for real estate owned (in the later period), and the proportion of funding in bills payable and rediscounts. Higher net worth prolongs failure (significantly so in the later period), and national banks (ceteris paribus) tend to fail faster than state member banks, ceteris paribus (in the later period).

4.1. Controlling for the endogeneity of RFC assistance

The estimates reported in Tables 5 and 6 may be biased due to the endogeneity of RFC assistance to bank failure risk. For example, there is a possibility of reverse causation: if the RFC assisted relatively low-risk banks, then its assistance might appear to "cause" reduced failure risk. It is difficult to say how plausible reverse causation might be as an interpretation of our results. As discussed in Calomiris and Mason (2004), it is generally true that the RFC did not lend to deeply insolvent banks, but at the same time, RFC lending brought many constraints on recipients—thus, very healthy banks that were not in need of assistance would have faced strong incentives to avoid preferred stock issues to the RFC. Overall, therefore, it is unclear how endogeneity should affect the coefficient estimates for RFC assistance.

To control for potential endogeneity bias, in subsequent regressions reported in Tables 7 and 8, we model the effects of RFC assistance on failure risk by estimating a bivariate Tobit model using a maximum likelihood estimator (MLE).[30] Table 7 reports various versions of the first-stage Tobit, which predicts the time until receipt of RFC assistance. The second-stage Tobit estimates the effect of instrumented RFC assistance on the time until failure. In the second-stage regressions, a negative coefficient on RFC assistance indicates that getting RFC assistance sooner makes failure happen later. In Tables 7 and 8, we report four versions of the model, two of which are analogous to the "full" specification of Table 6, and two to the "parsimonious" specification. For each of those specifications, we report two regressions, which differ according to the instruments employed.

The two-stage regression procedures we employ require the identification of "instruments" as well as "controls." Controls are variables that potentially affect both the probability of receiving RFC assistance and the probability of failure. Instruments are variables that are assumed to affect the probability of failure only through their effect on the probability of receiving assistance.

Our primary instruments—the variables we employ as exogenous determinants of RFC assistance that are not directly related to bank failure risk measure the correspondent relationships of banks, which indicate the extent to which the bank was important within the national network of banking.

Specifically, to capture a bank's importance for other banks in the network, we measure the extent to which the subject bank maintained deposits in, and engaged in other transactions with, banks elsewhere. This captures the liquidity risk that the subject bank could pose to other banks, especially those in major cities. It is possible that the RFC was more likely to approve assistance for banks that were regionally or nationally important as depositors in other banks. In particular, the RFC may have wanted to limit the withdrawal pressures that Michigan banks might have exerted on Chicago, New York, or other reserve centers. To capture this, we

[30] We exploit the fact that Tobit is the appropriate functional form for estimating a log normal survival model. Thus, the dependent variables in Tables 7 and 8 should be interpreted, respectively, as the natural logarithm of days until receipt of RFC assistance and the days until failure.

Table 7
First stage, bivariate tobit log-duration. Dep Var = log (Days to RFC assist).

	Mar33–Dec36	Mar33–Dec36	Mar33–Dec36	Mar33–Dec36
	Full	Full	Parsimonious	Parsimonious
Variables	2 IV	3 IV	2 IV	3 IV
Log of total assets	0.0324	0.0344	−0.0364	−0.0332
	(0.0517)	(0.0532)	(0.0408)	(0.0415)
Illiquid assets to total assets	0.8645	0.9305	0.3182	0.3266
	(0.7691)	(0.7666)	(0.6782)	(0.6775)
Interest and discounts on loans over total earnings	−0.3496	−0.3697	−0.3646	−0.3673
	(0.2639)	(0.2636)	(0.2373)	(0.2371)
Real estate owned to illiquid assets	1.1691	1.0564	1.8778	1.8683
	(2.6380)	(2.6400)	(2.6934)	(2.6870)
Net worth over total assets	1.3378	1.3149	1.2163	1.2242
	(1.2593)	(1.2617)	(1.2054)	(1.2039)
Bills payable and rediscounts over total debt	1.1622	1.1719	0.8595	0.8534
	(0.8890)	(0.8902)	(0.9170)	(0.9159)
National bank dummy	−0.1895*	−0.2006*	−0.1847*	−0.1809*
	(0.1117)	(0.1115)	(0.1045)	(0.1048)
Demand deposits and due to banks over total debt	0.4715	0.5300		
	(0.4249)	(0.4214)		
Loans and discounts to illiquid assets	−0.3097	−0.3016		
	(0.3605)	(0.3619)		
Loans eligible for rediscount over total loans and discounts	0.8898**	0.8985**		
	(0.4300)	(0.4307)		
Interest cost over total debt	−0.1756	−0.1857		
	(1.2527)	(1.2538)		
Recoveries over total earnings	0.3622	0.3648		
	(0.9824)	(0.9839)		
Losses over total expenses	0.2937	0.2751		
	(0.2423)	(0.2417)		
Crop income share in county in 1930	2.1921**	2.0655*		
	(1.0686)	(1.0648)		
Log of county population in 1930	0.2208**	0.1935**		
	(0.0876)	(0.0828)		
Unemployment rate for county in 1930	4.3030**	3.7803**		
	(1.9339)	(1.8657)		
Mortgage loan share of total loans for county	0.8323**	0.8904**		
	(0.4104)	(0.4066)		
Manufacturing employment share in county in 1930	−1.5202***	−1.4654***		
	(0.4870)	(0.4833)		
FERA share of grants for county	−1.3059	−0.5102		−0.2361
	(1.0037)	(0.6056)		(0.4373)
Total number of correspondents	0.0411	0.0483*	0.0556**	0.0577**
	(0.0280)	(0.0268)	(0.0258)	(0.0257)
Number of correspondents in New York and Chicago	−0.0758	−0.0932	−0.1054	−0.1104*
	(0.0678)	(0.0705)	(0.0653)	(0.0661)
Constant	0.9500	1.2254	7.3285***	7.3268***
	(1.9803)	(1.9764)	(0.9627)	(0.9633)

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

collected data on the number of correspondent relationships of each Michigan bank, and separately counted the number of correspondents of our subject banks in New York, Chicago, and elsewhere.

We regard correspondent relationships of Michigan banks as obvious candidates for valid instruments because they capture the extent to which problems suffered by Michigan banks might have threatened to spread elsewhere through the cashing in of Michigan banks' deposits held in other banks. Furthermore, Michigan banks' correspondent relationships should be orthogonal to the default risk of Michigan banks;

Table 8
Second stage, bivariate tobit log-duration. Dep Var = log (days to failure).

	Mar33–Dec36	Mar33–Dec36	Mar33–Dec36	Mar33–Dec36
	Full	Full	Parsimonious	Parsimonious
Variables	2 IV	3 IV	2 IV	3 IV
Log of days to RFC assistance	−2.0920	−1.7512*	−1.7556**	−1.6873**
	(1.4002)	(1.0193)	(0.8075)	(0.7568)
Log of total assets	0.0240	0.0101	−0.1317**	−0.1305**
	(0.1176)	(0.0976)	(0.0661)	(0.0638)
Illiquid assets to total assets	0.6600	0.4947	0.5367	0.5245
	(1.9826)	(1.6666)	(1.2022)	(1.1613)
Interest and discounts on loans over total earnings	−0.7754	−0.6971	−0.8474*	−0.8236*
	(0.7651)	(0.6361)	(0.5035)	(0.4821)
Real estate owned to illiquid assets	−1.7051	−2.2973	−2.6020	−2.8022
	(5.9815)	(5.0177)	(5.2347)	(5.0281)
Net worth over total assets	4.8420	4.3257*	3.6486	3.5743
	(3.1322)	(2.5343)	(2.2986)	(2.2118)
Bills payable and rediscounts over total debt	0.4558	0.0864	−0.2477	−0.3126
	(2.5336)	(2.0550)	(1.7896)	(1.7200)
National bank dummy	−0.9898***	−0.9509***	−0.8441***	−0.8311***
	(0.3535)	(0.2924)	(0.2393)	(0.2284)
Demand deposits and due to banks over total debt	0.0594	0.0076		
	(1.1293)	(0.9653)		
Loans and discounts to illiquid assets	−0.4178	−0.2901		
	(0.8095)	(0.6648)		
Loans eligible for rediscount over total loans and discounts	1.8239	1.5393		
	(1.6298)	(1.2848)		
Interest cost over total debt	−0.1024	−0.0696		
	(2.6412)	(2.2672)		
Recoveries over total earnings	2.3299	2.2192		
	(2.1634)	(1.8438)		
Losses over total expenses	0.4978	0.3581		
	(0.6701)	(0.5228)		
Crop income share in county in 1930	3.9587	2.9726		
	(3.3977)	(2.4363)		
Log of county population in 1930	0.2912	0.1621		
	(0.3724)	(0.2433)		
Unemployment rate for county in 1930	7.9189	5.3716		
	(7.2240)	(4.7412)		
Mortgage loan share of total loans for county	1.0337	0.8717		
	(1.4410)	(1.1893)		
Manufacturing employment share in county in 1930	−2.4404	−1.8038		
	(2.4953)	(1.8117)		
FERA share of grants for county	−2.0806			
	(2.8216)			
Constant	13.2056***	13.4056***	20.9091***	20.4284***
	(4.3576)	(3.7880)	(5.9098)	(5.5523)
Log pseudolikelihood	−303.6	−304.0	−332.7	−332.5
Number of banks	184	184	190	190
Number of failures	39	39	39	39
Number of banks receiving RFC assistance	50	50	53	53

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

they capture the liquidity risk that Michigan banks posed for other banks, not the liquidity risks of Michigan banks themselves (which we capture with other control variables in our default risk regressions). For purposes of estimation, we divided correspondent relationships according to whether they involved

money center banks in New York and Chicago, or other banks. These two variables are the primary instruments used in our regressions.

We also considered an additional instrument, which we included in additional specifications: the proportion of relief expenditures from the Federal Emergency Relief Administration (FERA) received by the county in which the bank was located. FERA assistance was administered by state and local officials, who determined the allocation of funding. In the presence of the various other county controls, the amount of FERA assistance received can be interpreted as indicating greater economic or political importance of a county, which may have also been reflected in the RFC's interest in protecting banks located there. We recognize that the FERA share alternatively could reflect fundamentals that are related directly to failure (not just to RFC assistance), which would render it an invalid instrument. For that reason we report results that alternatively treat the FERA share as an instrument and as a control. We think it is unlikely that FERA programs would have had a material effect on bank failures in Michigan. The bank failure wave was concentrated in 1932, 1933, and early 1934. The cash flows associated with FERA programs during our period (which began in the spring of 1933) were in the form of general poor relief, and should have had minimal effects on economic activity or bank survival in 1933 or 1934.[31]

In Tables 7 and 8, we report bivariate Tobit MLE results. We obtained similar results to those reported here for bivariate probits, but do not report those results to conserve on space, and because, as we discussed above, survival models tend to contain more information because they distinguish outcomes by failure dates. Table 7 reports results for the first-stage estimation of the RFC assistance decision, and Table 8 estimates the effect of RFC assistance on survival. We report results for full and parsimonious specifications. The parsimonious specifications use the smaller number of regressors (as shown in Tables 5 and 6). We report results with and without including FERA assistance included as an instrument.

The most statistically significant instrument in Table 7 is the number of correspondents. The magnitudes of the effects of instrumented RFC preferred stock assistance (expressed as the instrumented log of days until receiving RFC assistance) are consistent across the four specifications, although the levels of statistical significance of the coefficients are higher in the parsimonious specifications. The coefficient of roughly negative 1.7–1.8 implies that a 1% decrease in the time delay of RFC assistance increased a bank's survival duration by a little less than 2%.

4.2. RFC preferred stock effects on lending by survivors

Finally, we investigate whether, conditional on survival, the receipt of RFC preferred stock over the period March 1933 through December 1934 increased the supply of loans and discounts for the period December 1931 through December 1935. We emphasize that our reported coefficients here understate the overall effect of RFC assistance on loan supply. Presumably, an important part of the effect of RFC assistance on loan supply resulted from mitigating the risk of bank failure, thereby increasing the supply of loans. Here we necessarily abstract from that important effect because lenders observed at the end of the period can only include banks that survived through December 1935 (the only ones for which lending is observed).

In theory, the effect of RFC preferred stock assistance on the loan supply of surviving banks could be either positive or negative. On the one hand, the receipt of preferred stock assistance, per se, reduced insolvency risk and should have encouraged banks to lend more. On the other hand, the RFC required recipient banks to retain earnings and increase their capital ratios. The strings attached to RFC assistance could have caused recipients to reduce loan supply relative to surviving banks that did not receive assistance. A simple comparison of mean loan growth from 1931 to 1935 for surviving banks that received RFC preferred stock and those that did not suggests that receiving RFC preferred stock may have boosted loan growth of recipients substantially. Recipients' lending declined by 51% over the period, while non-recipients' lending declined by 74%. Of course, that simple comparison does not control for other differences between the two groups of banks.[32]

We measure loan-supply effects from preferred stock assistance using a two-stage MLE estimation method, where the first-stage equations are either probits (for receiving RFC preferred stock assistance or not) or Tobits (as in Table 7), and the second stage are OLS regressions of loan growth from 1931 to 1935. In the loan growth regressions, we employ only our two correspondent instruments; FERA assistance could

[31] For a review of the nature, administration, and amounts of FERA assistance, see FERA (1942).

[32] The standard deviation of loan growth for recipients is 35%, and for non-recipients, 60%.

have had direct effects on the local economy, and therefore on the supply and demand for lending, by 1935, making it unlikely that it could serve as a valid instrument for RFC assistance in our loan growth regressions.

Our first-stage probit and Tobit results are reported in Table 9, and our second-stage instrumented OLS results are reported in Table 10. Comparing Tables 9 and 7, we find that, for the smaller sub-sample of surviving banks, the correspondent instruments are not as statistically significant as predictors of RFC assistance. In Table 10, we find that—using the first-stage probit regressions to instrument for RFC assistance—there is a large and statistically significant effect of RFC assistance on bank lending by surviving banks. The second-stage results that use the Tobit in the first-stage instrumenting are less significant statistically but are also large. The coefficients on instrumented RFC assistance in

Table 9
Loan growth, Probit/Tobit-OLS 1st stage, includes survivors through 1935.

	Probit-OLS	Probit-OLS	Tobit-OLS	Tobit-OLS
Variable	Full	Parsimonious	Full	Parsimonious
Dep Var	RFC assistance dummy		log(RFC assistance duration)	
Log of total assets	−0.4757***	−0.0107	0.0850	−0.0151
	(0.1833)	(0.1325)	(0.0858)	(0.0717)
Illiquid assets to total assets	−2.2221	−1.6259	1.0625	0.4250
	(2.3968)	(1.9906)	(0.9503)	(0.8375)
Interest and discounts on loans over total earnings	2.4198***	1.9120***	−0.7251**	−0.7724**
	(0.8946)	(0.6750)	(0.3659)	(0.3073)
Real estate owned to illiquid assets	−13.2867	−9.3963	3.9192	2.7631
	(8.7409)	(7.7348)	(4.1908)	(3.9428)
Net worth over total assets	−8.3876*	−5.8825*	3.4516**	2.7748*
	(4.3317)	(3.2596)	(1.7400)	(1.4676)
Bills payable and rediscounts over total debt	3.7556	3.0502	−0.4606	−0.2465
	(2.7374)	(2.5402)	(1.2880)	(1.2879)
National bank dummy	0.1887	0.1910	−0.0635	−0.1833
	(0.3815)	(0.3269)	(0.1704)	(0.1406)
Demand deposits and due to banks over total debt	−1.4705		0.1000	
	(1.3763)		(0.6166)	
Loans and discounts to illiquid assets	0.1800		−0.3808	
	(1.0195)		(0.4681)	
Loans eligible for rediscount over total loans and discounts	−1.6171		0.6686	
	(1.7565)		(0.6708)	
Interest cost over total debt	−1.9520		−0.0707	
	(3.4151)		(1.7115)	
Recoveries over total earnings	−3.2565		1.0341	
	(4.9640)		(1.3055)	
Losses over total expenses	0.3229		−0.1544	
	(0.9910)		(0.3757)	
Crop income share in county in 1930	−4.4271		2.5067	
	(3.6313)		(1.6170)	
Log of county population in 1930	−0.3989		0.1400	
	(0.2983)		(0.1214)	
Unemployment rate for county in 1930	7.2398		0.2680	
	(7.0899)		(2.7468)	
Mortgage loan share of total loans for county	−0.6271		0.8263	
	(1.3688)		(0.5704)	
Manufacturing employment share in county in 1930	3.5219**		−0.8921	
	(1.5404)		(0.6626)	
Total number of correspondents	0.1970	0.1300	−0.0518	−0.0728
	(0.1248)	(0.1030)	(0.0497)	(0.0596)
Number of correspondents in New York and Chicago	0.1421	0.0328	−0.0688	−0.0454
	(0.1625)	(0.1436)	(0.0733)	(0.0802)
Constant	15.1837**	0.1960	0.8622	7.0909***
	(7.4211)	(2.7455)	(3.2000)	(1.3080)

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Table 10
Loan growth, Probit/Tobit-OLS 2nd stage, includes survivors through 1935.

	Probit-OLS	Probit-OLS	Tobit-OLS	Tobit-OLS
Dep Var: Loan growth	Full	Parsimonious	Full	Parsimonious
RFC assistance dummy	1.0431***	0.9972***		
	(0.1523)	(0.1946)		
RFC_dur_log			−1.0157	−0.6439
			(0.6399)	(0.4441)
Log of total assets	−0.0150	−0.0902*	−0.0335	−0.1028
	(0.0645)	(0.0517)	(0.0780)	(0.0674)
Illiquid assets to total assets	−2.3996***	−2.1749***	−2.2432*	−2.4064***
	(0.8925)	(0.7683)	(1.2445)	(0.7607)
Interest and discounts on loans over total earnings	−0.5892*	−0.4657	−0.5985	−0.3835
	(0.3550)	(0.2992)	(0.6132)	(0.4251)
Real estate owned to illiquid assets	0.5478	−1.7401	0.5013	−2.5094
	(3.9316)	(3.5976)	(5.6509)	(3.7666)
Net worth over total assets	3.1119*	2.6576*	4.3760	2.5605
	(1.6515)	(1.3633)	(2.9328)	(1.6665)
Bills payable and rediscounts over total debt	−0.8783	−0.4577	−0.3192	0.2139
	(1.2004)	(1.1661)	(1.4542)	(1.1130)
National bank dummy	−0.1743	−0.1870	−0.2703	−0.2427
	(0.1568)	(0.1270)	(0.1990)	(0.1559)
Demand deposits and due to banks over total debt	−0.1154		−0.4017	
	(0.5630)		(0.6846)	
Loans and discounts to illiquid assets	−0.1029		−0.2898	
	(0.4291)		(0.5395)	
Loans eligible for rediscount over total loans and discounts	0.8391		1.0185	
	(0.6275)		(0.8923)	
Interest cost over total debt	1.4495		1.1856	
	(1.5932)		(1.9265)	
Recoveries over total earnings	1.2555		1.9261	
	(1.2099)		(1.6881)	
Losses over total expenses	0.1856		0.1097	
	(0.3502)		(0.4348)	
Crop income share in county in 1930	0.1291		0.7380	
	(1.5222)		(2.3524)	
Log of county population in 1930	0.0440		0.0239	
	(0.1153)		(0.1624)	
Unemployment rate for county in 1930	−3.5188		−1.4356	
	(2.5042)		(3.0751)	
Mortgage loan share of total loans for county	0.2395		0.7903	
	(0.5274)		(0.8688)	
Manufacturing employment share in county in 1930	0.1493		0.3110	
	(0.6362)		(0.9388)	
Constant	0.5262	2.0409*	7.1356*	7.1139*
	(2.9933)	(1.1120)	(3.7231)	(3.7121)
Log-likelihood	−110.6	−131.7	−152.6	−172.9
Number of banks	107	113	107	113
Number of banks with RFC stock assistance	40	43	40	43

Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Table 10, when using the first stage probit, imply that an increase in the probability of RFC assistance by one percentage point raised loan growth by one percent. Under the Tobit first-stage formulation, delaying RFC assistance by one percent above the mean (measured in log days) reduces loan growth over the period 1931 to 1935 by 0.6 to one percent.

5. Conclusion

The operations of the Reconstruction Finance Corporation in Michigan during the Great Depression provide an opportunity to investigate the effects of government loan and preferred stock programs on distressed financial institutions during a time of substantial failure risk. Our

time period—January 1932 through December 1934—covers a period in which many bank failures occurred, and during which the RFC initially made loans to assist banks, and subsequently purchased banks' preferred stock to assist them.

The empirical analysis suggests that collateralized short-term loans from the RFC made bank failure no less likely, and possibly made it more likely, while direct recapitalizations in the form of preferred stock injections increased the likelihood of bank survival. The preferred stock program owed its success to several factors: (1) It did not burden the bank with increased debt, increased liquidity risk, or collateral requirements that subordinated the claims of depositors, (2) the RFC was selective, and apparently chose viable cases, not basket cases, when granting assistance, and (3) the RFC implemented effective measures to ensure that government assistance was not abused by banks receiving assistance. These results suggest that during a banking crisis, effective assistance requires the government to assume a significant share of the risk of bank failure.

Our results are robust to controlling for potential endogeneity bias by modeling the determinants of RFC assistance alongside the determinants of failure. In doing so we are able to identify several instruments that predict RFC assistance, including the importance of the subject bank to the national network of banks. Michigan banks with a greater number of correspondent relationships with money-center banks, or which were "other reserve city" banks, were more likely to receive assistance than other banks. Furthermore, banks located in counties with a greater proportion of manufacturing employment, and with other harder to interpret county attributes, also were more likely to receive assistance.

We also explore the links between RFC assistance and loan supply. The sizes of estimates effects on loan growth over the period 1931 to 1935 are large, even after conditioning on bank survival.

Our results reinforce the conclusions of earlier work on the effects of RFC assistance in Illinois by Mason (1996, 2001a, 2001b, 2003) and Calomiris and Mason (2004). That comparison is important because Illinois banks' experience differed from Michigan's later and more severe banking problems. Furthermore, our empirical estimation techniques improve upon the list of instruments and the econometric efficiency of earlier estimates, which accounts for the fact that we are able to find large and statistically significant effects of RFC preferred stock assistance not only on bank failure risk but also on the loan supply of surviving banks. Earlier research for Illinois had found positive and insignificant loan–supply effects; our estimated effects on loan supply are larger and statistically significant.

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