Monetary Policy Shocks and Financial Stability: Evidence from the Great Depression

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Monetary tightening impacts the economy through several channels, notably by influencing the health and lending of banks. We examine these channels during the sharpest tightening in U.S. history: the Fed rate hike in October 1931 following Britain's abandonment of the gold standard. We find this sudden, unanticipated, and sizeable shock forced hundreds of banks out of business. Banks holding more bonds — once valued for their liquidity and safety — were more likely to close. Thousands of additional banks reduced lending to businesses. The banking retrenchment triggered declines in investment and construction, pushing the economy deeper into depression.

Keywords: Monetary tightening, interest rates, bank-lending channel, monetary policy transmission, financial and banking stability

JEL Codes: E50; G21; N22

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1. Introduction

Monetary tightening by central banks affects the economy through several channels, notably by influencing commercial banks' health and their willingness to lend. The magnitude of this bank lending channel is subject to debate. Some studies conclude monetary tightening substantially reduces bank lending (e.g. Romer and Romer 1990, Bernanke and Blinder 1992, Kashyap and Stein 1995, 2000, Ashcraft 2006). Others doubt that monetary tightening influences bank lending even question whether a correlation exists between these two variables (e.g., Morris and Sellon 1995, Oliner and Rudebusch 1995). A similar debate concerns the impact of monetary tightening on financial stability. On the one hand, research has shown that monetary tightening reduces banks' capital and, if sufficiently large and sudden, can force some banks towards insolvency and precipitate runs (Haddad et al. 2023; De Marzo et al. 2024; English et al. 2018; Jiang et al. 2023). On the other, Drechsler et al. (2021) find that increasing interest rates raises banks' franchise value, which offsets the negative impact of monetary tightening on banks' asset values and net capital.

Discerning the effects of central bank policy rates on bank lending and financial stability is challenging from a statistical inference perspective. The endogeneity of monetary policy, interest rates, and bank lending complicate efforts to generate unbiased causal estimates (English et al. 2018). So does bank size heterogeneity (Kashyap and Stein 1995) and the time-varying impact of monetary policy on bank health (Brunetti et al. 2023). The impact of monetary tightening on bank health also depends on the regulatory and monetary regime, the nature of the deposit franchise and bank lending, and the frictions underlying financial institutions and maturity transformation (De Marzo et al. 2024; Drechsler et al. 2017, 2021; Jiang et al. 2023).

Our research, which examines a setting free from most of these threats to accurate inference, sheds light on the circumstances under which monetary shocks alter bank lending and health.

This paper examines the impact of an exogenous, unanticipated, and extremely adverse interest-rate shock. In response to Britain's decision to abandon the gold standard in late September 1931, the New York Fed raised its discount rate by 200 basis points between October 9 and October 16. All other Federal Reserve banks followed New York's lead and raised rates. Although Chicago and New York eased their rates slightly in 1932, the Fed discount rates of all the districts remained elevated from their September 1931 values through the end of 1932. This policy reversal was one of the largest and most rapid interest rate increases in the Fed's history. The sudden and unanticipated rate hike followed two years of reductions in policy rates. The policy reversal was a direct response to exigent international monetary events and provides a laboratory free from endogeneity. We demonstrate that commercial banks did not anticipate this policy pivot and were caught unprepared, leaving them exposed to significant interest-rate risk. Further, unlike modern times, they could not hedge due to the period's limited financial technology or offset by raising net interest margins due to the competitiveness of local and national banking markets.

Using detailed weekly information on all U.S. commercial banks, Figure 1 shows that bank exits surged the week of the monetary policy shock and remained elevated for an extended period. A further increase in commercial bond yields in late December 1931 is associated with another surge of exits. Taken together, the months following this unanticipated monetary tightening account for a large share of the exits in the Depression and a higher rate of exits than during the initial banking crisis of the Depression in the fall of 1930. Moreover, the pattern of

exits differed from other surges in bank suspensions during the Depression, which were tightly clustered in both time and space (Mitchener and Richardson 2019).

We begin our analysis of the 1931 monetary policy shock by examining high-frequency data on bank and economic outcomes. These data allow us to analyze how bank balance sheets responded to the shock by week and how changes in bank health and behavior impacted local communities. Local-projection estimates show that the October 1931 rate shock propagated rapidly to banks and then to the real economy. At the Fed district level, bank portfolios contracted quickly, with bond holdings falling in a few weeks by roughly 10% and total loans declining over a longer period by about 4% in response to the Aaa bond yield increase. Bank exits increased by between 1 and 2 closures per state per week at short horizons. On the local side, weekly bank debits moved down, and monthly building permits weakened in the same direction. Overall, the effects of the monetary tightening on banks and economic activity were swift and sizable, tracing a clear transmission from tighter financial conditions to bank lending, bank exits, and economic activity.

Next, we examine the susceptibility of banks to the decline in long-term asset values by constructing the first ever database containing the annual balance sheets of *all* U.S. commercial banks from 1928 through 1932. Given banking practices at the time (particularly the short duration of commercial bank loans), we know that each bank's bond portfolio contained most of its interest-rate risk. We therefore use the security-to-asset ratio as a proxy for an individual bank's potential exposure to interest-rate risk. Our estimates indicate that from 1929 through the middle of 1931, bond holdings were positively associated with bank survival. However, after the Fed district banks raised their rates in October 1931, banks holding a higher proportion of bonds in their portfolios exited at a higher frequency.

Our paper relates to the large literature on interest-rate risk, particularly research written after the collapse of Silicon Valley Bank in 2023 (De Marzo et al. 2024; Drechsler et al. 2021; Jiang et al. 2023). This literature indicates that, under a broad range of conditions, significant monetary tightening can impair the health of the banking system, perhaps enough to generate moderate contractions in lending and the failure of institutions. When local banking markets are less competitive and the deposit-franchise value is high, however, monetary tightening may have little impact on banks' health, and the banking channel of monetary policy transmission may be attenuated. Our research examines a setting where competition for deposits kept franchise value low in most places. This setting resembles one that has arisen recently and will become more prevalent in the near future as the emerging fintech industry erodes the market power and threatens the depositor base of commercial banks. In this rapidly evolving landscape, our results suggest that monetary tightening can substantially impact commercial bank lending and health.

Our analysis also expands the literature on financial stability during the 1930s. Scholars (Friedman and Schwartz 1963; Romer 1993) have shown that waves of bank failures that are synonymous with the severity of the Great Depression were triggered by a variety of factors. For example, the initial wave of failures in 1930 emanated from the collapse of the Caldwell financial conglomerate and then spread through its correspondent system (Richardson and Troost 2009; Wicker 2009). When the U.S. economy was contracting, regulatory and supervisory differences across states are important for explaining bank survival rates (Carlson 2004; Mitchener 2005, 2007; Carlson and Mitchener 2006, 2009). This paper identifies a new reason for a large temporal clustering of failures beginning in the fall of 1931 and winter of 1932 (and only recently identified using statistical methods in Mitchener and Richardson 2025). Our analysis suggests that the temporal clustering was caused by the sudden and unanticipated

decision by the Fed to defend the gold standard without regard for the interest-rate risk that built up in the commercial banking system.

Finally, our results shed light on the spread of European banking distress across the Atlantic, particularly the transmission of the financial panic of 1931 to the United States. Some researchers have argued that the Fed's increase in interest rates reduced aggregate investment and consumption, forcing the economy into renewed contraction that eventually impacted banks (Temin 1993; Friedman and Schwartz 1963; Eichengreen 1992). On the other hand, Richardson and Van Horn (2013) demonstrate that financial institutions with substantial European exposure not only survived the crisis but expanded lending relative to other domestic banks in the face of the foreign shock. Our research thus demonstrates that policy shock that occurred in response to England's exit from gold and the Fed's attempt to prevent capital outflows had an unintended consequence beyond just the known investment and consumption channels: the interest-rate hike impacted the health of domestic banks, particularly small and medium-sized regional banks, whose efforts to accumulate highly-liquid bonds in the early years of the contraction raised the interest-rate risks on their balance sheets.

2. The Unanticipated Monetary Policy Reversal of 1931

The Great Depression took the United States by storm, forcing the whole country to re-evaluate their strategies. The Federal Reserve's early policies were focused on domestic concerns, leading to the steady decline in the discount rates seen in Figure 2. Commercial banks also responded to the worsening economic conditions and lower rates by moving into more liquid asset portfolios. Specifically, banks cut lending and purchased more bonds, which they could liquidate quickly when depositors withdrew *en masse* (Edwards 1929; Mitchener and

Richardson 2019, 2025).[1] The top panel of Figure 3 shows that the ratios of loans and securities to assets at national banks were stable until late-1929 at which point the loan ratio started to steadily fall and securities ratio started to steadily rise. Trade publications encouraged bankers to purchase longer-term and liquid bonds when interest rates were declining to capture the market generated capital gains, but cautioned them "to avoid too heavy a depreciation in investment holdings on the next upturn in money rates" (Gephardt 1929, p. 29; Edwards 1929, p. 516). Indeed, the bottom panel of Figure 3 shows that much of the increase in securities arose from additional purchases of US government bonds – the benchmark safe asset.

The accumulation of bonds created a problem for banks when the Fed's interest rate policy suddenly changed due to unanticipated events abroad. Specifically, a financial crisis engulfed Europe and impacted capital flows across the Atlantic. In May 1931, the largest bank in Austria, the Credit-Anstalt, suddenly failed. Its failure weakened confidence in Central European banks, triggering runs on banks in Germany in July 1931 and forcing many to suspend operations (Blickle et al. 2024). The German crisis impacted merchant banks from the United Kingdom, which had loaned substantial funds to central European concerns. Distress among merchant banks and large outflows of funds from London banks led the Bank of England to lower its policy rate, support domestic banks, and abandon its gold peg on September 20, 1931.

After England abandoned gold, investors repatriated funds from the U.S. to Europe due to fears that the U.S. might devalue the value of the dollar in terms of gold. Investors also shifted funds particularly toward Britain due to expectations that its monetary expansion would initiate economic recovery. Primarily due to flows of gold abroad, the Fed's supply of monetary gold

[1] Since branching restrictions, banking conventions, and government regulations largely limited bank lending to short-term loans made to firms in the region where banks operated, bankers used bonds for three purposes: (1) to diversify lending geographically and across industries; (2) to lend at longer terms and reap the financial rewards of maturity transformation; and (3) to establish a secondary liquidity reserve (Atkins 1930a, 1930b).

plummeted, from more than $5 billion just before Britain abandoned gold to a low of about $4.2 billion a few weeks later (*Federal Reserve Bulletin* Dec 1931, pp. 659-660).

The *Commercial and Financial Chronicle*, a leading business weekly, described the situation on October 3, 1931. "The reason for these huge withdrawals is not all together clear" (p. 2139). Investors appeared to be panicking and pulling gold from the U.S.. Prices of financial assets – both equities and bonds – declined due to foreign outflows and the "feeling of despondency" (p. 2142). "Confusion prevailed everywhere" about the ultimate effects of the crisis (p. 2143). Anticipation of Fed action caused investors "anxiety." The *Chronicle* observed that the Fed appeared to be attempting "to offset the loss of gold by expansion of Federal Reserve notes in circulation," raising concerns that it would embark upon "a new policy of inflation" (p. 2141).

Even though the U.S. had large reserves relative to most other central banks, Fed officials feared that flows of funds abroad could reduce its holdings of gold below the statutory requirement to back all the currency and deposits on its balance sheet. If gold fell below the legal ratio, then the Fed would have to suspend operations and request government assistance to allow it to alter its backing ratio or abandon the gold peg altogether. The Bank of England's decision thus put the Fed into an uncertain position regarding its policy path: the Fed could maintain its low interest rate policy but potentially jeopardize its pegged exchange rate if international investors pulled funds from the United States and sold dollars (as they had done to the pound sterling prior to its devaluation) or the Fed could defend hard money, raise interest rates, and commit to maintaining its fixed exchange rate under the interwar variant of the gold standard.

Ex ante, the choice that the Fed would make was not obvious. Its leaders disagreed on the best response (Chandler 1971; Friedman and Schwartz 1963). Some policymakers and

prognosticators advocated that the Fed initiate a strategy of monetary expansion (Senate 1935; Fisher 1932; Wheelock 1992). Policymakers of that era, however, associated devaluations and floating rates with the high inflation following World War I (Wandschneider 2008). Contemporaneous news accounts reported uncertainty about how the Fed would respond.

Within the Fed, advocates for raising interest rates to defend the gold standard won out. On October 9, 1931, the New York Fed increased its rate from 1.5% to 2.5%, and on October 16, raised it again to 3.5%. The New York Fed rate increases were among the most rapid in Fed history (See discussion in Appendix 1). As seen in Panel A of Figure 2, all the other Fed districts also raised their policy rates. Rates for all the Fed districts remained higher than they were in September 1931 through the end of 1932, although Chicago and New York eased them during 1932. The rate increase achieved its primary goal. Flows of gold from the U.S. ceased, and the Federal Reserve retained its preeminent gold position.

The Fed's monetary tightening had a substantial impact on market interest rates. A broad spectrum of government and corporate bond yields rose, as shown in Figure 2, Panel B. These market rates remained elevated through July of 1932. The rapid rise in market interest rates following the increase in policy rates indicates, like the qualitative evidence described above, that the Fed's actions were unanticipated. If market participants accurately forecast the Fed's policies, then market interest rates would have increased before and in anticipation of the those policy changes. An example of this occurred in early 1929, when the Fed telegraphed its policies far in advance.[2] Then, the market's response to the Fed's policy rate was muted. Market rates for bonds rose, but the magnitude and speed of adjustment were much less than in 1931. Comparing

[2] The Fed's leaders – both at the Board in Washington, DC and in the Banks, particularly New York – engaged in an extensive public discussion about the best way to rein in speculative investments. The New York Fed advocated raising the discount rate. It and other Fed banks repeatedly requested permission to raise their rates, which the Board repeatedly refused. Eventually, after months of discussion, which was widely reported in the press, the Fed Board relented and allowed the Fed banks to raise their discount rates.

this earlier episode to 1931 suggests that anticipation and endogeneity could play a role in estimating monetary policy shocks on bank health – hence our focus on the exogenous and unanticipated monetary policy shock of 1931.

In addition to influencing market rates on bonds in 1931, the Fed's monetary tightening increased interest rates that commercial banks paid on time and demand deposits. These increases occurred due to the two features of commercial banking at that time. First, local banking markets were often extremely competitive (For evidence and discussion see Appendix B.) Most states prohibited branching, and those that permitted branching typically allowed it only in a single city or county containing a bank's headquarters. Travel and communications were costly, so most of a bank's depositors and borrowers came from the city or county in which the bank operated. In these local markets, numerous banks competed for customers (see Figure 4). This competition kept deposit rates near policy rates – a fact that market participants were aware of at the time. Second, in the central money markets (New York and Chicago), major banking centers (e.g. Boston, Los Angeles, Pittsburg, and San Francisco), and even country locations (e.g. Monmouth County, NJ), clearing houses established maximum rates that banks belonging to the organization could pay to depositors. During the 1920s and 1930s, clearing houses set these deposit-rate caps as a fixed markup over the discount rate of the nearest Federal Reserve bank (*Bankers Magazine* 1932; *Daily Boston Globe* 1932; *New York Herald Tribune* 1930, 1932a, 1932b; *New York Times* 1931a; *Wall Street Journal* 1931a, 1931b, 1932a, 1932b). For most of the Great Depression, therefore, deposit rates moved almost 1-for-1 with the Fed's policy rate, and commercial banks – even the largest – had little ability to keep their deposit rates low when the policy rate was increased.[3]

[3] Appendix B discusses how the cost of funds for Depression-era banks responded to changes in policy rates differently than modern commercial banks, i.e., from the 1970s until 2020s, as a result of these factors.

The monetary policy shock and subsequent increase in interest rates put pressure on commercial banks. Figure 1 shows that exits spiked sharply following the Fed's surprise increase in the discount rate. The week of the announcement registered among the most exits between 1929 and 1932. Exits remained elevated in subsequent weeks and months—many of which rank in the top decile of weekly exits during our period. A further rise in commercial bond yields in late December 1931 and January 1932 is associated with another surge in exits. Taken together, the months following the unanticipated monetary tightening contain a disproportionate share of the highest-exit weeks in our sample. To put the figures in context, the post-October 1931 period features a higher pace of bank exits than the much-discussed panic in the fall of 1930, which was the initial panic of the Great Depression.

The geography of exits also warrants consideration. Figure 5 compares the distribution of exits during the initial banking panic of the Depression (November–December 1930) with the distribution during the weeks following the Fed's unexpected tightening in October 1931. While the initial panic in 1930 was concentrated regionally—especially in the South (Richardson and Troost 2009; Wicker 2000)—the post-October-1931 surge in suspensions was far more dispersed across the country. The latter pattern appears consistent with an economy-wide shock rather than localized financial distress. This spatial pattern strengthens the interpretation that the rate hike exerted broad pressure on banks almost immediately, rather than simply amplifying pre-existing regional weaknesses.

This descriptive evidence motivates our empirical approach. The timing of the monetary policy shock aligns tightly with market rates and banks exits. The rest of the paper tests whether and how the shock influenced banks and the real economy. In the next section, we estimate impulse-response functions that trace dynamics over the weeks following the shock while

controlling for time-invariant heterogeneity across units and common time effects. The following section then looks at individual bank data to see what types of banks exited after the shock.

3. Effects of Monetary Tightening on Banks and Broader Economic Activity

The exogenous and unexpected impetus for the Fed's policy change in October 1931 allows us to use the timing of the tightening to identify its effects on banks and broader economic activity. This section implements that idea using panel local projections. Section 3.1 documents sources of high-frequency data and the construction of our panel datasets. Section 3.2 describes our local-projection methodology. Section 3.3 reports dynamic responses of bank exits, bank portfolios, and broader economic activity to the interest rate shocks.

3.1 High-Frequency Data

We assemble high-frequency measures to pin down the timing and propagation of the interest-rate shock. The first ingredient is bank exits. Using the Federal Reserve's Division of Bank Operations St. 6386 forms (July 1929–March 1933; Richardson 2007), we identify the week in which each commercial bank first suspended operations—whether a temporary suspension, liquidation/receivership, or merger. We treat the first suspension as the exit date because few banks exited and reentered in this period and intervening balance-sheet changes were unobserved.

Second, we track balance sheet adjustments using data from the Federal Reserve's weekly reporting banks. This series covers large, reportedly representative institutions in roughly one hundred sizable cities, including all reserve and central-reserve cities. The Federal Reserve Board published district-level weekly aggregates and reported New York City separately from the remainder of the Second District and Chicago separately from the remainder of the Seventh.

We adjust the weekly-reporting series for sampling bias following Mitchener and Richardson (2025), providing Federal Reserve-district–week aggregates for bonds, loans, and total deposits that are informative about banks' near-term portfolio responses to interest-rate movements.[4]

Third, we obtain local activity measures at the city level. Weekly bank debits for 264 cities are from Pedemonte (2024) and Candia and Pedemonte (2025). Bank debits scale with transactions activity and provide a timely proxy for local spending. We also use monthly building permit data for 229 U.S. cities from Cortés and Weidenmier (2019). Following Cortés and LaPoint (2024), we view permits as a forward-looking indicator of local investment.

Finally, we capture changes in interest rates with three measures. We use the Federal Reserve discount rate averaged across districts to capture the national stance of policy, and Fed district-specific discount rates to exploit regional variation in rates that may be relevant for district-level balance-sheet responses. We also use Aaa corporate bond yields to capture the high-frequency market rates that are directly tied to changes in the value of banks' securities portfolios.

Aaa yields are the most consistently available weekly market series in our sample, respond sharply to the October 1931 episode, and comove closely with yields on other bank-held debt instruments (Figure 2; Appendix Table A1). This emphasis matches banks' asset composition. In June 1931, national banks' security portfolios were concentrated in U.S. Treasuries (42%) and corporate bonds (32%), with additional holdings of state and municipal bonds (13%) and a small foreign share (3%). Corporate bonds held by banks were generally investment-grade issues of large firms and utilities that bankers considered to be high-quality investments (Atkins 1930b, p. 347; Edwards 1929, p. 514; Gephardt 1929, pp. 27–29). Most

[4] Given the size and status, very few weekly reporting banks closed before the end of the 1932. Therefore, changes to the balance sheets represent dynamics within surviving banks rather than changes due to bank exit.

banks in our sample period did not hold stocks (with national banks being legally prohibited from directly buying and selling them from their own accounts and only being able to do so through securities affiliates).

These rates play complementary roles in our analysis. The discount rate captures the policy instrument: the sharp increase in October 1931 and the persistence of elevated rates provide a clean timing anchor. This allows for an event-study style approach that examines the impact of an unanticipated shock exogenous to the domestic economy: Britain's departure from gold. The Aaa yield captures the market-rate transmission of the policy shock and the resulting repricing of bank securities, including the depreciation of bond portfolios induced by higher rates. Increases in the discount rate matter for banks primarily through their effects on market yields and asset prices. Figure 2 illustrates this distinction: discount rates remain high through 1932, while Aaa yields begin to decline late in the year.

To align with our weekly outcomes, we construct weekly and monthly versions of each interest-rate series. We digitize weekly district discount rates from the *Annual Report of the Federal Reserve Board* and compute the discount rate averaged across districts each week. We digitize weekly Aaa corporate bond yields from the *Commercial and Financial Chronicle*. Because the weekly Aaa series begins in February 1930, our weekly panels start in that month. For the monthly outcomes, we compute within-month averages of both discount-rate series and use the monthly Aaa corporate bond yield series from the NBER Macrohistory Database.

These data sources provide four distinct panel datasets that span February 1930 to December 1932. The balance-sheet data merged with the interest-rate data yields a weekly panel at the Federal Reserve District level. The debits data merged with the interest rate data yields a weekly panel at the city level. The building permit data merged with the interest rate data yields

a monthly panel of cities. Lastly, we aggregate the exit data to the state-week level and merge in interest rates to create a balanced state-level panel. The aggregation avoids towns or counties with few banks where fewer exits would be expected or possible.

3.2 Local-Projection Methodology and Empirical Setup

We estimate dynamic responses to the interest-rate shock with local projections (Jordà 2005) using the four high-frequency panels introduced above. All samples begin in February 1930, when weekly Aaa yields become available and end in December 1932. The analysis ends when regulatory authorities, rather than bank's boards of directors or individual bank examiners, began shutting down banks in large groups by declaring local banking holidays in the run up to the national banking holiday that began in March 1933 (Jaremski et al. 2025).

We start by considering the two nation-wide rate shocks: the Aaa bond yield and the average Federal Reserve District discount rate. These two vary only over time and are common across units. For each horizon *h = 0, 1, …, H*, we run separate regressions of the form:

$$(1)\ y_{i,t+h} = \alpha_h + \beta_h Rate_{i,t} + \sum_{l=1}^{L} \phi_{h,l}\, y_{i,t-l} + \sum_{l=1}^{L} \gamma_{h,l}\, Rate_{i,t-l} + \delta_i + \tau_{year(t)} + \varepsilon_{i,t+h},$$

where $y_{i,t}$ is the outcome for unit *i* at time *t*; $Rate_t$ is the Aaa yield or the average discount rate; δ_i and $\tau_{year(t)}$ denote unit and year fixed effects, respectively; and *L* lags of both the outcome and the shock are included. The coefficient β_h traces the impulse response *h* periods after a one-unit change in the interest rate at time *t*.

Specification choices follow the frequency of each panel. For weekly panels (Federal Reserve-district bonds, loans, and deposits; city debits; cumulative state exits), we use *H = 26* and *L = 4*. For the monthly building-permit panel, we use *H = 10* and *L = 2*. Because the

average discount rate and Aaa yield are common across units, inference is based on a wild cluster bootstrap (clustered at the time level), where we report 95% confidence intervals from 500 replications.

We apply equation (1) to six outcomes, with the results presented in the following order to maintain a consistent narrative from bank balance sheets to the broader economy: (1) logarithms of bonds, loans, and deposits at the FR-district–week level; (2) bank exits (cumulative counts) at the state–week level; (3) logarithms of bank debits at the city–week level; and (4) logarithms of building permits at the city–month level. For log outcomes, β_h is interpreted as the approximate percent change in the outcome following a one-percentage-point increase in the Aaa yield, average Fed discount rate or district-specific discount rate (unless otherwise noted). For exits, β_h is the cumulative level change in weekly counts.

3.4 Local Projection Results

For the Aaa bond yield and the average Federal Reserve discount rate respectively, Figures 6 and 7 display the local projections for ln(bonds), ln(loans), ln(deposits), cumulative exits, debits, and building permits. Within these figures, each panel presents the impulse response of the outcome variable to a one-percentage-point increase in the interest rate. This one-percentage-point increase is roughly the changes in the Aaa bond yield and average Fed discount rate between August and December 1931.

Starting with Panel A (the top left panel in each figure), a shock to the interest rate series led to a rapid and pronounced decline in bond holdings reported on banks' balance sheets. This drop is visible at the time of the interest-rate shock. It then deepened in the first four weeks, hitting its nadir around the first quarter, before reverting over the following 10 weeks. At the

trough, the decline in bonds was on the order of 12.5 percent for a one-percentage-point increase in Aaa yield and 10 percent for a one-percentage-point increase in the average Fed discount rate. The persistent negative pattern aligns with the fact that rising interest rates erode the market value of bonds, especially for institutions with longer-duration exposures. The decline in bond values probably reduced banks' ability to weather the monetary policy shock since regulators in many states required banks to mark bonds to market and since banks lacked mechanisms – like interest-rate swaps – that enable institutions to hedge interest-rate risk today. The decline in bond holding also reflects the fact that banks used bonds for liquidity management; when depositors withdrew funds, banks often came up with the cash to cover withdrawals by selling bonds. These estimates provide evidence that a bank's bond exposure was a source of vulnerability arising from the 1931 tightening episode.

Panel B (the upper right panels in Figures 6 and 7) shows how lending responded to the monetary policy shock. The near-term response is modest, but loans reported on banks' balance sheets declined gradually four to eight weeks after the shock and remained depressed through the medium horizon. At its deepest point, the decline in bank loans arising from a one-percentage-point rate increase was about 4 percent for the Aaa yield shock and 3 percent for the average Fed discount rate shock. The delayed effect on loans is consistent with the terms of loans during our sample period, i.e., banks could not immediately renegotiate them, so they would not be able to immediately change or decrease their lending. The estimates further suggest that the monetary-policy shock is associated with a tightening credit environment in response to rising borrowing costs or deteriorating economic conditions, and are consistent with studies using data from more recent periods (Romer and Romer 1990; Bernanke and Blinder 1992; Kashyap and Stein 1995, 2000; Ashcraft 2006). Further, they point to the potential for bond market stress to transmit into

the real economy through reduced loan supply by banks or lower loan demand from borrowers, hypotheses we test in panels E and F.

Panel C reveals the effects on total deposits, which is the sum of time and demand deposits. Total deposits declined at the time of the shock and then fell further in the middle horizons, followed by a partial recovery starting four months after the shock. At their trough, deposits fell by nearly 11 percent after the Aaa yield shock and 6 percent after the average Fed discount rate shock. Therefore, despite the rise in interest paid on deposits, depositors still worried enough about the health of their banks that they withdrew their funds. The decline in deposits closely coincides with the decline in bonds, which is consistent with historical reports that banks liquidated bond holdings to acquire cash to cover withdrawal requests.

Panel D shows that closures (exits) rise notably in the weeks following the shock, with the cumulative number of exits peaking at about 14 per state at short-to-medium horizons in the Aaa yield specification and about 10 per state in the average Fed discount rate specification. The peak increase is roughly 1–2 additional exits per state, per week – a front-loaded pattern consistent with vulnerable institutions exiting as tighter funding conditions are realized. The trajectory echoes the descriptive evidence in Section 2: the post-October 1931 months contain many of the highest-exit weeks of the Depression and were geographically dispersed rather than concentrated in a single region.

Panels A through D in Figures 6 and 7 trace out a clear balance-sheet effect propagated in part by depositors' reactions to the interest rate shock. The shock rapidly reduced deposits and bond holdings at commercial banks. The number of commercial bank exits rose. A gradual contraction in lending followed. These findings are consistent with evidence indicating increases in the number of bank runs in October and November of 1931. At that time, for example, Wicker

(2000) and Correia et al. (2025) document spikes in newspaper reports of bank runs. Richardson (2007) and Mitchener and Richardson (2019) report a simultaneous increase in bank examiners' reports of runs on banks. As such, it seems that depositors put pressure on banks' liquid reserves after the monetary policy shock, potentially forcing them to realize losses on bond sales to remain in business and avoid suspending payments. We examine the connection between balance-sheet distress and panic-induced bank exits later in the paper by testing for a link between bond holdings and bank exits using a panel data for each U.S. bank.

Finally, the city-level indicators point to transmission to the broader economy. Panel E shows that bank debits—a high-frequency proxy for local economic activity (Pedemonte 2024; Candia and Pedemonte 2025; Velde 2020)—decline on average after the shock, though the path is jagged in keeping with week-to-week volatility in payments data from this era. The middle horizon is well below the baseline, consistent with reduced local spending and liquidity as lending tightens. Panel F examines the effect on building permits—a forward-looking measure of investment. It falls sharply over the first few months, partially rebounds, and then remains below pre-shock levels over the 10-month window displayed in the figures. The results indicate that tighter financial conditions and heightened uncertainty reduced expectations of future investment and building activity. This pattern highlights the sensitivity of forward-looking investment behavior as interest rates and financial conditions change.

Together, Figures 6 and 7 can be seen as describing what happens to banks and financial markets during our sample period when the Fed unexpectedly raised rates. Our local projection estimates show that a one-unit rate shock delivers immediate valuation losses on securities, quickly leads to declines in total deposits, and then propagates to loan supply. Closures spike as weaker banks are forced out, and local economic activity (first transactions, then investment)

declines. The ordering and magnitudes across Panels A–F thus link the monetary tightening to balance-sheet adjustment and real outcomes within a few weeks.

Notably, even though each captures a different aspect of the tightening, Figures 6 and 7 suggest that the key findings are robust to whether we proxy the shock using market yields or the aggregate policy instrument. The Aaa yield provides the richest time-series variation, with larger week-to-week movements than the policy rates, and thus closely tracks the high-frequency repricing of market yields that mattered for banks' securities portfolios. The discount rate averaged across Federal Reserve districts summarizes the national stance of policy: all districts raised their discount rates in October 1931, so the average series cleanly reflects the timing and persistence of the system-wide tightening.

The interest-rate effects on economic outcomes are also consistent across the different panel datasets we analyze. We see the same qualitative patterns whether the unit of observation is the Federal Reserve district (weekly balance-sheet aggregates), the city (weekly debits and monthly building permits), or the state (weekly bank exits). This matters because each panel emphasizes different sources of heterogeneity and different slices of the economy: district panels capture regional variation in monetary tightening and banks' portfolio responses; city panels capture local spending and investment; and state panels capture extensive-margin banking distress. Despite differences in cross-sectional coverage, measurement, and aggregation, the estimated responses line up closely across samples and outcomes. This robustness suggests that the October 1931 tightening propagated broadly, showing up in bank balance sheets, local activity, and bank distress, rather than being driven by a particular dataset, geography, or level of aggregation.

The analysis so far has utilized nation-wide interest rates as the bonds that most banks held were traded in nation-wide security markets. However, while the various Federal Reserve districts all increased their discount rates during October 1931, they did not all increase them by the same amount. We can make use of these differential monetary policy changes across districts. We, therefore, augment the specification in equation (1) using the Federal Reserve District specific discount rates, adding cross-sectional variation to the policy shock measure while retaining its high-frequency timing. The results provided in Figure 8 are similar to those in Figures 6 and 7 though the magnitudes are reduced. Specifically, a shock to a location's Federal Reserve discount rate leads to a quick decline in bonds and deposits, a rise in bank exits, and declines in bank debits and building permits. The only result that does not carry through when using the cross-sectional variation in the policy rate is for loans.

4. Testing for a Mechanism Using Individual Bank Data

The high-frequency analysis shows that the unanticipated monetary policy shock of 1931 affected the stability and balance sheets of American commercial banks in the weeks following the unanticipated rate change. In this section, we examine the mechanism in more detail: whether the banks that were forced out after the policy shock were those with larger security portfolios. To do this, we isolate the effect of the policy shock through asset-price depreciation from the common shock to all banks and depositors. The approach allows us not only to examine the mechanism by which banks were pushed out of the market, but also to introduce additional controls and robustness checks that require bank-level data.

4.1 Sources and Methods

To obtain each bank's portfolio position, we collected, compiled, and digitized the balance sheets for each U.S. commercial bank at the June call in 1928, 1929, 1930, 1931, and 1932 come from *Rand McNally's Bankers Directory* published in July of each year. This directory was the most widely used compendium of bank balance sheets available to the public during the 1930s and contains information on broad balance sheet categories (e.g., total loans, total deposits, etc.).[5] We drop branches, private banks, cash depositories, and mutual savings banks as defined in *Rand McNally*, and determine which state banks were Fed members using the *Annual Report of the Federal Reserve Board*. We then generate a quarterly panel for each commercial bank from July 1929 through December 1932 and allow each bank's balance sheet to adjust when additional information is available.

A main variable of interest is a bank's asset exposure to interest rates, in particular a bank's securities holdings, since lending to businesses during this era was typically short-term (with maturities always under one year and frequently as short as 90 days) so loans to businesses had little inherent interest-rate risk. Although *Rand McNally* does not provide a detailed breakdown of a bank's securities portfolio, other contemporary sources suggest that security portfolios were typically made up of long-term and high-quality bonds. The ratio of total securities to assets thus reliably measures a bank's exposure to interest rates on the asset-side of its balance sheet during our sample period.

In the bank-level analysis, we utilize time-fixed effects to capture the general effect of interest rates on all banks and interact each bank's securities ratio with either the average Fed

[5] Staff of the Federal Reserve Board's Division of Bank Operations frequently consulted *Rand McNally* for balance sheet data. Neither it nor other contemporary sources such as the Federal Reserve's call reports provide information on underperforming loans or management quality. We drop all banks whose total liabilities total were 5% larger or smaller than its assets, as those banks likely had other assets or liabilities that were not reported in *Rand McNally*.

discount rate or the Aaa corporate bond yield in the same quarter to proxy for interest-rate risk. This interaction term allows the effect of bond holdings to vary with the prevailing interest rate. In particular, it allows us to see if the impact of holding a large portfolio of bonds during periods of declining interest rates (e.g. summer 1929 to summer 1931), when bonds' values and liquidity would rise, differed from the impact of holding bonds during a period of rapidly increasing interest rates (i.e. October 1931 onwards), when bonds' values and liquidity would fall.

We use market- and bank-specific characteristics to control for other factors that could have led to a bank's exit. Characteristics measured at the bank level include the bank's age as well as balance-sheet items and ratios shown to be predictors bank survivorship in this era (White 1984; Richardson and Troost 2009; Calomiris and Mason 2003) and similar to those used by modern-day bank regulators: the logarithm of total assets, loans to assets[6], paid-in capital, surplus, and undivided profits to assets, and surplus and undivided profits to paid-in capital, surplus, and undivided profits. We also include the annual (log) change in deposits to capture the pre-trends of bank performance. While the number of banks in most counties limits the amount of franchise value possible, we include two variables to control for any spatial variation in market power: the Herfindahl-Hirschman Index of deposits for the bank's local market (county), and each bank's share of total deposits in that market. Finally, we include indicators as to whether a bank was: (1) a national bank or a state Fed member bank (with state non-member banks as the excluded group) to capture differences in regulation and access to the Fed's discount window; (2) located in a city designated as a Central Reserve City or Reserve City; and (3) located in a city with a clearinghouse.

[6] We include loans to assets instead of cash to assets because we want to compare bank's two more risky assets in the model and including all three would lead to a problem of perfect collinearity given banks had very few "other assets" on their portfolio in our sample period. Appendix Table A3 shows the results do not change if we drop loans to assets or replace it with either cash to assets or cash to deposits.

County-level census data from Haines (2008), Haines et al. (2018), and Fishback et al. (2005) allow us to control for the characteristics of the counties in which each bank operated.[7] These measures, which capture differences in markets and customers, include the logarithm of population in 1929, the fraction of the county living in an urban location of 2,500 or more people in 1929, the fraction of the adult population that was illiterate in 1929, the fraction of the population that was non-white in 1929, the logarithm of the number of farms per capita, the logarithm of the number of manufacturing establishments per capita, and the logarithm of retail sales in 1929.

Finally, we include state-fixed effects to account for differences in regulatory regimes and risk preferences across states, since these variables predict state-level bank failure rates in this period (Mitchener 2005, 2007). Our analysis thus focuses on variation in bank outcomes within the same state over time.

We model the probability of exit using a linear probability framework and estimate it using ordinary least squares:

$$(2)\ Exit_{i,t} = a + Securities_{i,t}\beta_1 + (Securities_{i,t} * Rate_t)\beta_2 + BalanceSheet_{i,t}{}'\beta_3 + OtherBanks_{i,t}{}'\beta_4 + County_i{}'\beta_5 + State_i{}'\beta_6 + Time_t{}'\beta_7 + \epsilon_{i,t}$$

where $Exit_{i,t}$ is an indicator for whether bank *i* exited in quarter *t*, $Securities_{i,t}$ is the ratio of total securities to assets of bank *i* which is updated each June, $Rate_t$ is the average Aaa corporate bond yield or average Fed discount rate for quarter *t*, $BalanceSheet_{i,t}$ is a vector of other balance sheet measures, the logarithm of bank age, and the change in the logarithms of deposits of bank *i* all of which are updated each June. $OtherBanks_{i,t}$ is a vector that controls for HHI of deposits in bank *i*'s county in quarter *t*, as well as the share of deposits in that county specifically

[7] These data are at: https://eller.arizona.edu/sites/default/files/Datasets%20Available%20on%20OPENICPSR_0.pdf.

held by bank i. $County_i$ is a vector of county demographic and locational controls in 1929 described above, $State_i$ is a vector of state fixed effects, and $\epsilon_{i,t}$ is the error term which is clustered by county. Time-fixed effects, $Time_t$, fully absorb the effect of $Rate_t$ on all banks and thus it does not enter into the regression separately.

4.2 Bank-Level Estimates

Table 1 reports the estimates of equation (2). The table starts with regressions that do not include the interaction between the securities ratio and the interest rates. The results show that, during the Great Depression, the coefficient on the securities ratio is negative and statistically different from zero. This result, which is the typical finding in the academic literature on this topic, reflects the value of holding liquid assets during periods of panic, when liquidity was valuable, and the benefits (on average) of holding bonds in a span of years when interest rates (on average) declined. The magnitude of the negative coefficient on the securities ratio greatly increases when including in the regression the interaction of the securities-to-asset ratio. The interaction coefficients are positive and statistically significant regardless of using the Aaa yield or average Fed discount rate. This pattern indicates that holding more bonds when interest rates were low and declining substantially increased banks' chances of survival. Holding more bonds, however, during periods when interest rates were increasing, lowered a bank's chances of survival. This makes sense because banks had limited ability to hedge interest-rate risk. Many banks had to mark to market their bonds (particularly those issued by corporations or entities other than the federal government). The declining value of bonds reduced the cash they raised if

sold on the open market, used as collateral for an interbank loan from a money-center bank or used as collateral for a discount window loan from the Fed.[8]

The magnitude of this interest rate effect was substantial. In August 1931, when interest rates were low and had declined steadily over the previous two years, a one-standard-deviation percentage point increase in the securities ratio decreased the probability of exit each by 0.20 percentage points per quarter when using the Aaa yield interaction. In December 1932, a few months after the monetary tightening, however, the same bond holdings increased the probability of exit by 0.08 percentage points per quarter when using the Aaa yield interaction. Compared to a mean quarterly exit rate of 1.7 percent, the increase is meaningful, especially since the model is saturated with control variables. In other words, holding securities reduced the likelihood of exiting during periods of steady or declining interest rates, but this salutary effect was reversed during high interest-rate periods.[9] As such, the depreciation of long-term bonds caused by the monetary policy shock appears to have forced many banks out of the market.

A way to visualize this result is to estimate the regression in Table 1, column 1, separately for each quarter. This repeated cross-section approach allows all coefficients to adjust in each quarter. Figure 9 reports the coefficient and two standard-error bands for the securities-to-asset ratio. This coefficient reveals the relationship between bond holding and the probability of bank exit. In most quarters (including all the quarters from 1929 through 1931 when interest rates were declining), the coefficient on the securities ratio is negative or zero, indicating that during most of the Depression, banks with large securities ratios exited at lower rates than banks with smaller securities ratios. During the two quarters following the Fed's monetary tightening at

[8] The Federal Reserve banks may have discounted US government debt at face value even when trading below market value.

[9] Appendix Table A4 provides some robustness checks. First, we show the results are not being driven by banks in the largest financial centers. Second, we show the results are robust to using each bank's security ratio in 1929 instead of their contemporaneous one. Finally, we show the largest effects are for involuntary exits.

the end of 1931 and only during those two quarters, however, the coefficient on the securities ratio was positive, indicating that for two quarters after the Fed's rapid increase in the interest rate, banks' that held more bonds as a proportion of their portfolio exited at higher rates than banks which held less. In the summer of 1932, when the New York and Chicago Fed lowered their discount rates and market rates of interest began to fall, the point estimate on the coefficient fell towards zero and then returned to being negative, although the estimate is not statistically different from zero. The fact that the interest-rate shock took time to influence banks is not surprising since the erosion of values and marking to market were not instantaneous (See Panel A of Figures 6 and 7.)

Both our high-frequency and bank-level analyses utilize the Aaa corporate bond yield as representative of the long-term securities that most banks held and the average Fed discount rate as representative of the monetary-policy shock. Within the lower-frequency, bank-level panel, however, we can test whether our results are sensitive to this choice. We estimate equation (2) for other market interest rates that are available at the monthly level and report the coefficient on the interaction between the securities ratio and each rate in Figure 10. With sources described in Appendix Table A2, the figure shows the interaction coefficient for Aaa corporate bonds and average Fed discount rate (baseline results), high grade corporate bonds, railroad bonds, utility bonds, industrial bonds, Bbb corporate bonds, junk bonds, long-term and short-term US bonds, municipal bonds, the average interest rate on consumer loans in New York City, the average interest rate on consumer loans in other Northern and Western cities, and the average rate on consumer loans in other Southern and Western cities. Nearly all the interest rates produce positive and statistically significant interactions but with varying magnitudes. The only interest rate interactions that are not significant are the Bbb rate, the junk bond rate, and short-term US

notes. Given that most banks did not hold lower rated or short-term bonds, the results match the asset holdings common to banks during our sample period.

As in Section 3, we can also make use of the cross-sectional variation in Federal Reserve discount rate changes. This approach allows us to see if banks that held more bonds were more likely to exit in those places that changed their policy rates by more. Table 2 displays the results of equation (2) using the district-specific discount rates. Given Fed district-level variation, we can include it as a separate regressor. By itself, the coefficient is not statistically different from zero; however, the interaction of the discount rate with the securities ratio is positive and statistically significant as before. Additionally, when we include state-by-quarter fixed effects in the model, the results remain positive and statistically significant, and the magnitude of the coefficient increases. This result indicates that after the twelve Fed banks raised discount rates in the fall of 1931, commercial banks with more bonds in their portfolios exited our sample at a higher rate in Fed districts that raised their discount rates by a larger amount.

We construct placebo tests using interest-rate changes over other intervals. Our baseline analysis matched whether a bank exited in the first quarter of 1932 with the average Aaa yield across January, February, and March of 1932. We can also estimate the specification in column 3 of Table 1 using a variety of leads or lags and display the results in Figure A1. For instance, we can match whether a bank exited in the first quarter of 1932 with the average Aaa bond yield across October, November, and December 1931 (a one-quarter lag) or the average yield across July, August, and September 1931 (a two-quarter lag). The results show that the positive coefficient disappears when looking at interest rates beyond the exit window or more than three quarters before the exit window. The largest coefficient on the interaction is the one-quarter lag (i.e., the quarter before the exit window).

The results using bank-level data show that the monetary policy shock was working through changes in assets and that many of the exits in our sample period were likely a result of the depreciation of bond prices. Moreover, it suggests that the exits after the shock were not necessarily due to poor initial bank fundamentals, nor were they clustered in particular areas. Rather they arose from the depreciation of long-term assets that were previously helpful for surviving other periods of the Great Depression.

5. Conclusion

While monetary tightening by central banks has the potential to impact the economy through commercial banks' health and willingness to lend, the exact magnitudes and channels by which it does are subject to much debate. The effects of monetary-policy shocks on commercial banking depend upon the structure of the financial system, the economics underlying maturity transformation, and the nature of the monetary policy regime. But estimating the relative importance of these different factors can be difficult due to their state contingency and the endogeneity of bank lending and monetary policy. We shed light on these questions by examining the most rapid monetary tightening in U.S. history: the Federal Reserve's discount-rate increases of October 1931, which followed Britain's surprising abandonment of the gold standard. We find this sudden, sizeable, and unanticipated shock to monetary policy forced hundreds of banks out of business and thousands more to cut lending. Banks with more bonds on their balance sheets bore the brunt of this policy shock.

High-frequency data on bank and local economic outcomes allows us to show that the interest rate shock spilled over to the real economy as well. Within a month, we find that the value of a bank's securities declined and, after a few months, the value of its loans also declined.

Moreover, we find that measures of economic health at the city level fell and remained low for many months in response to the upward spike in interest rates. Specifically, within 3 months, bank debits (which proxy local economic activity by measuring the volume of transactions) declined by 1% and building permits (which proxy for investor sentiment) declined by 1.5%. In this way, the effects of the interest rate shock were quick and significant, and there were spillover effects to the real economy.

References

Ashcraft, Adam. 2006. "New evidence on the lending channel." *Journal of Money, Credit and Banking* 38: 751-775.

Atkins, Paul. 1930a. "Difference Between Bank Secondary Reserve and Investment Accounts," *Bankers Magazine* 120 September: 343-8.

Atkins, Paul. 1930b. "Difference between bank secondary reserve and investment accounts." *Bankers Magazine* 121 July-Dec: 343.

Bankers Magazine. 1930. "An Active Competitor with Banks". 121 July-Dec: 802.

Bankers Magazine. 1932. "New York Banks Deposits Increase." 125 July: 54.

Basile, Peter, Sung Won Kang, John Landon-Lane, and Hugh Rockoff. 2017. "An Index of the Yields of Junk Bonds, 1910–1955." *Journal of Economic History* 77: 1203-1219.

Bernanke, Ben S., and Alan S. Blinder. 1992. "The Federal Funds Rate and the Channels of Monetary Transmission." *American Economic Review* 82: 901–21.

Blickle, Kristian, Brunnermeier, Markus. and Luck, Stephan. 2024. "Who can tell which banks will fail?" *Review of Financial Studies 37*: 2685-2731.

Brunetti, Celso, Nathan Foley-Fisher, and Stéphane Verani. 2023. "Measuring Interest Rate Risk Management by Financial Institutions," Finance and Economics Discussion Series 2023-067. Washington: Board of Governors of the Federal Reserve System.

Calomiris, Charles W., and Joseph R. Mason. 2003. "Fundamentals, Panics and Bank Distress During the Depression." *American Economic Review* 93: 1615-47.

Candia, Bernardo, and Mathieu Pedemonte. 2025. "Export-led Decay: The Trade Channel in the Gold Standard Era." *Journal of the European Economic Association* 23: 1173-1201.

Carlson, Mark. 2004. "Are Branch Banks Better Survivors? Evidence from the depression era." *Economic Inquiry* 42: 111-126.

Carlson, Mark, and Kris Mitchener. 2006. Bank Branching, Bank competition, and Financial Stability." *Journal of Money, Credit, and Banking* 38:1293-1328.

Carlson, Mark, and Kris Mitchener. 2009. "Branch banking as a Device for Discipline: Competition and Bank Survivorship during the Great Depression." *Journal of Political Economy* 117: 165-210.

Chandler, Lester. 1971. *American Monetary Policy 1928-1941*. Harper and Row.

Christian Science Monitor. 1931. "Los Angeles Interest Rate Up." October 21: 11.

Cincinnati Enquirer. 1918. “An End to Mad Competition for Bank Deposits, Is Sought by Harding. Plan Would Limit the Rate on Deposits. Clearing House Desirous of Some Regulation. To Stop Scramble No Going On. Which Holland Compares to Railroad Rate Cutting.” March 15: 6.
Commercial and Financial Chronicle. Various Issues. New York: William B. Dana Company. https://fraser.stlouisfed.org/title/1339
Correia, Sergio, Stephan Luck, and Emil Verner. 2026. "Bank Runs With and Without Bank Failure." Working Paper.
Cortes, Gustavo and Cameron LaPoint. 2024. "Housing is the financial cycle: Evidence from 100 years of local building permits." Working paper available at SSRN 4855353.
Cortes, Gustavo and Marc Weidenmier. 2019. “Stock volatility and the Great Depression.” *Review of Financial Studies* 32: 3544-3570.
Daily Boston Globe. 1932. “New York Clearing House Banks Cut Interest Rates.” May 11.
DeMarzo, Peter, Arvind Krishnamurthy, and Stefan Nagel. 2024. “Interest Rate risk in Banking”. No. w33308. National Bureau of Economic Research.
Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2017. “The deposits channel of monetary policy,” *Quarterly Journal of Economics* 132: 1819–1876.
Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2021. “Banking on deposits: Maturity transformation without interest rate risk,” *Journal of Finance* 76: 1091–1143.
Edwards, George. 1929. “Should a Bank Invest in Bonds: A Discussion of Four Important Questions of Investment Policy Confronting the Commercial Bank.” *Bankers Magazine* 119 October: 513-6.
English, William, Skander Van den Heuvel, and Egon Zakrajšek. 2018. “Interest Rate Risk and Bank Equity Valuations,” *Journal of Monetary Economics* 98: 80–97.
Eichengreen, Barry. 1992. *Golden Fetters: the Gold Standard and the Great Depression, 1919-1939*. Oxford: Oxford University Press.
Einzig, Paul. 1930a. “The Financial Situation Abroad: A Monthly Survey of Current Financial, Economic, and Political Events in Great Britain and the Nations of Europe.” *Bankers Magazine* 120 July: 100-109.
Einzig, Paul. 1930b. “Banks Should Keep a Weather Eye on the Bond Market.” *Bankers Magazine* 120 December: 831-7.
Federal Reserve Board. Various Years. “Annual report of the Federal Reserve Board.” Washington: United States Government Printing Office.
Fishback, Price, William Horrace, and Shawn Kantor. 2005. "The Impact of New Deal Expenditures on Local Economic Activity: An Examination of Retail Sales, 1929-1939." *Journal of Economic History* 65: 36-71.
Fisher, Irving. 1932. *Booms and Depressions*. New York: Adelphi Press.
Friedman, Milton, and Anna Jacobson Schwartz. 1963. *A Monetary History of the United States,1867-1960*. Princeton: Princeton University Press.
Gephart, W. F. 1929. “Balancing the Investment Program: Consideration of the More Important Factors in the Establishment of a Sound Investment Policy for a Commercial Bank.” *Bankers Magazine* 119: 27-9.
Haddad, Valentin, Barney Hartman-Glaser, and Tyler Muir. 2023. “Bank Fragility when Depositors are the Asset.” Working paper available at SSRN 4412256.
Haines, Michael. 2010. “Historical, Demographic, Economic, and Social Data: The United States.” Inter-university Consortium for Political and Social Research. Ann Arbor, MI,. ICPSR Study 2896.

Haines, Michael, Price Fishback, and Paul Rhode. 2018. “United States Agriculture Data, 1840 - 2012. 2018”. Inter-university Consortium for Political and Social Research. Ann Arbor, MI. ICPSR Study 35206.
Jaremski, Matthew, Gary Richardson, and Angela Vossmeyer. 2025. “Signals and stigmas from banking interventions: Lessons from the Bank Holiday of 1933.” *Journal of Financial Economics* 163: 103968.
Jiang, Erica Xuewei, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2023. “Monetary tightening and us bank fragility in 2023: Mark-to-market losses and uninsured depositor runs?” Working paper, National Bureau of Economic Research.
Kashyap, Anil, and Jeremy Stein. 1995. “The Impact of Monetary Policy on Bank Balance Sheets.” *Carnegie-Rochester conference series on public policy* 42: 151-195.
Kashyap, Anil, and Jeremy Stein. 2000. "What do a million observations on banks say about the transmission of monetary policy?" *American Economic Review* 90: 407-428.
Lee, Virgil. 1930. “The Revolution in Country Banking: Increased Ratio of Loans and Investments to Capital Has Aided Country Banks to Meet Increased Expenses.” *Bankers Magazine* 121 July-Dec: 9-15.
Mitchener, Kris. 2005. “Bank Supervision, Regulation, and Instability During the Great Depression.” *Journal of Economic History* 65: 152-185.
Mitchener, Kris. 2007. “Are Prudential Supervision and Regulation Pillars of Financial Stability? Evidence from the Great Depression.” *Journal of Law and Economics* 50: 273-302.
Mitchener, Kris and Gary Richardson. 2019. “Network Contagion and Interbank Amplification during the Great Depression.” *Journal of Political Economy* 127: 465–507.
Mitchener, Kris and Gary Richardson. 2025. “Bank Lending and Deposit Crunches during the Great Depression.” *Journal of Economic History* 85: 442-474.
Morris, Charles and Gordon Sellon. 1995. “Bank lending and monetary policy: Evidence on a credit channel.” *Federal Reserve Bank of Kansas City Economic Review* 80: 59-75.
New York Herald Tribune. 1930. “Clearing House Cuts Interest Rate on Deposits.” December 27: 1.
New York Herald Tribune. 1932a. “Clearing House Cuts Rates on Deposits by ½%. New Schedule, Effective Friday, at Record Low Due to Open Market Decline.” May 11: 26.
New York Herald Tribune. 1932b. “City Banks Rule To Cut Interest 1/8 of 1 Per Cent: Clearing House Issues New Regulation on Reserves; Thrift Accounts Exempted.” Apr 20: 24 .
New York Times. 1931a. “The Lowest Discount Rate in History.” May 11.
New York Times. 1931b. “Bank Rate Advanced to Combat Hoarding.” October 16: 1.
Oliner, Stephen and Glenn Rudebusch. 1995. "Is there a Bank Lending Channel for Monetary Policy?” *Federal Reserve Bank of San Francisco Economic Review* 2: 3-20.
Pedemonte, Mathieu. 2024. “Fireside Chats: Communication and Consumers’ Expectations in the Great Depression.” *Review of Economics and Statistics* 106: 997-1011.
Richardson, Gary. 2007. “Categories and causes of bank distress during the great depression, 1929–1933: The illiquidity versus insolvency debate revisited.” *Explorations in Economic History* 44: 588-607.
Richardson, Gary and William Troost. 2009. “Monetary intervention mitigated banking panics during the great depression: quasi-experimental evidence from a federal reserve district border, 1929–1933.” *Journal of Political Economy* 117: 1031-1073.

Richardson, Gary and Patrick Van Horn. 2018. “In the eye of a Storm: Manhattan's money center banks during the international financial crisis of 1931." *Explorations in Economic History* 68: 71-94.
Romer, Christina. 1993. “The Nation in Depression.” *Journal of Economic Perspectives* 7: 19–39.
Romer, Christina. and David Romer. 1990. “New Evidence on the Monetary Transmission Mechanism.” *Brookings Papers on Economic Activity* 1: 149-213.
Temin, Peter. 1993. “Transmission of the Great Depression.” *Journal of Economic Perspectives* 7: 87-102.
Velde, Francois. 2020. “What happened to the US economy during the 1918 Ifluenza pandemic? A view through high-frequency data.” Federal Reserve Bank of Chicago Working Paper 2020-11.
Wall Street Journal. 1918. “Clearing House Settles Deposit Interest Question.” March 20, 1918. P. 10.
Wall Street Journal. 1922. “Clearing House Revises Interest Rate on Deposits.” Jun 14, 1922. P. 15.
Wall Street Journal.1931a. “Monmouth County Interest Rates.” March 4: 18.
Wall Street Journal. 1931b. “Frisco Banks Interest Rates Up.” Oct 20: 6.
Wall Street Journal. 1931c. “Demand Deposits Interest Rate.” October 20: 16.
Wall Street Journal. 1932a. “Banks Plan 3% Interest Rate.” May 23: 8.
Wall Street Journal. 1932b. “Interest Reduced. Los Angeles Clearing House Members Cut Rates on Bank Funds.” May 25: 6.
Wandschneider, Kirsten. 2008. “The Stability of the Interwar Gold Exchange Standard: Did Politics Matter?” *Journal of Economic History* 68: 151-181.
Washington Post. 1932a. “Bank Interest Cost Cut in Credit Thaw. New York Clearing House Move is Linked to U.S. “Easy Money” Drive. April 20: 4.
Washington Post. 1932b. “New York Will Cut Deposits Interest: Clearing House Announced Banks Reduce Rates ½ Percent on Today.” May 11: 17.
Wheelock, David. 1992. “Monetary policy in the Great Depression: What the Fed did, and why.” *Federal Reserve Bank of St. Louis Review* 74: 3-28.
White, Eugene. 1984. “A Reinterpretation of the Banking Crisis of 1930.” *Journal of Economic History* 44: 119-138.
Wicker, Elmus. 2000. *The Banking Panics of the Great Depression*. Cambridge: Cambridge University Press.

Appendix A: The Magnitude of the Shock

The New York Fed's interest rate increases in October 1931 were sudden, sizeable, and by most people, unanticipated. On some dimensions, they could be characterized as the largest policy rate increases in the history of the Federal Reserve System, although from some perspectives, they might be classified as among the largest increases ever but not the maximum.

The New York Fed's October surprises were clearly the largest percent increase in the discount rate in a single day or over a span of eight days. On October 9, the NY Fed raised its discount rate from 1.5% to 2.5%, an increase of 66 percent (i.e. (2.5-1.5)/1.5). On October 16, the New York Fed raised its discount rate from 2.5% to 3.5%, an increase of 40 percent. The numerator in this calculation is not unique. Federal Reserve banks raised interest rates by increments of 1% (i.e. 100 basis points) or more on numerous occasions. The denominator, however, is unique. Never before and never since did the Fed raise discount rates so much when the discount rate was so close to zero.

The New York Fed's 100-basis-point discount rate increases on October 9 and 16 were not the largest single-day percentage point increases in the discount rate in Fed history. The rate increases in January 1920 may hold this title. On 23 January 1920, the Boston, New York, Philadelphia, and Richmond Feds raised their discount rates by 125 basis points. The next day, the Chicago and St. Louis Feds also raised their rates by 125 basis points. Two days later, the Atlanta and Minneapolis Fed's followed suit.

Other candidates for the largest single-day discount rate increase come from the Volcker era. On 14 November 1980, the Federal Open Market Committee (FOMC) announced "an increase in Federal Reserve discount rates from 11 to 12 per cent and a surcharge of 2 percentage points on frequent borrowing of large institutions (FOMC RPA 1980)." On December 5, the

Federal Reserve announced another discount rate increase of 1% and an additional surcharge of 1% for large banks. The surcharge applied to the largest banks in the United States, which operated in New York City, for whom the discount rate rose 5% over 21 days. The surge in the surcharge rate should be compared to the New York Fed's discount rate increases in 1931, 2% over 8 days, which only applied to discount lending by the New York Fed. The New York Fed's action in 1931 increased the discount rate by a higher percent (66% on the first day and 133% over 8 days) but the Volcker era increases were higher percentage or basis point increases (3% or 300 basis points on the first day and 5% or 500 basis points over 21 days).

Comparing discount rates may not be the best measure of changes in policy rates. In the 1930s, the discount rate was the Fed's principal policy rate. By the 1970s, however, the Fed funds rate was a better measure of the Fed's policy stance. By the 1990s, the Fed had learned change the funds rate gradually, particularly in the upward direction. The largest rate increase since 1993 appears to be the 75-basis point increase to 5.5% on 15 November 1994.

In the late 1970s and early 1980s, rather than targeting the Fed funds rate, as the Fed had done in the past, the Fed adopted new operating procedures, which Volcker announced in October 1979. The procedures focused on controlling the quantity of nonborrowed reserves in order to limit the growth of the money supply and inflation. With these procedures, the Fed set the quantity of nonborrowed reserves and let the market set the price of borrowed reserves (i.e. the Fed funds rate). In the two years after adopting these procedures, the Fed funds rate gyrated, with numerous daily increases exceeded 100 basis points and at least six exceeding 200 basis points. The largest increases appear to have occurred on 30 December 1980, when the Fed funds rate climbed 296 basis points in a single day.

Additional References for the Appendix A

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

Board of Governors of the Federal Reserve System (US), Federal Funds Effective Rate [DFF], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DFF, October 11, 2025.

Board of Governors of the Federal Reserve System. 1980. "Record of Policy Actions, December 22, 1980." https://www.federalreserve.gov/monetarypolicy/files/fomcropa19801118.pdf

Burk, Nicholas and David H. Small. 2022. "The FOMC's Committee on the Directive: Behind Volcker's New Operating Procedures," Finance and Economics Discussion Series 2022-063. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2022.063.

National Bureau of Economic Research, Discount Rates, Federal Reserve Bank of New York for United States [M13009USM156NNBR], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/M13009USM156NNBR, October 11, 2025.

Appendix B: *Commercial Banking in the 1920s and 1930s*

Historically, American banking was atomistic. Roughly 25,000 commercial banks were in operation in 1929, and most of them operated out of a single building in a single city. Some states permitted branching within the city or county of the headquarters but only a few permitted branching statewide. Interstate branching was prohibited throughout the country (Carlson 2004; Mitchener 2005, 2007). Communication and transportation improvements, such as the automobile and telephone, had widened the reach of banks, but most of their depositors and borrowers still came from the city and county in which they operated. As shown in Figure 1, most of these markets were competitive, since within them numerous banks competed for customers, especially in urban areas. The south and northwest were heavily overbanked (Lee 1930), while the few counties with only one or two banks were typically in rural areas (e.g., Nevada and New Mexico).

Bankers and regulators of that time believed that many locales had an "excessive" number of banks, with "overbanked' conditions leading to vigorous competition for deposits. The Comptroller of Currency testified to the U.S. Senate that "overbanking" raised financial institutions' costs and increased financial fragility, since competition for deposits lead to "speculative and destructive practices in an effort to earn sufficient income to pay expenses" (United States Senate 1935, p. 31-2). Congress concluded deposit competition was a contributing factor to thousands of bank failures during the early 1930s and prohibited the payment of interest on demand deposits in the Banking Act of 1933. The Act reduced banks' average annual interest payments by about $1.05 per $100 in deposits within six months of its passage (United States Senate 1935, pp. 30, 47).

Market rates on banks' liabilities and assets moved with changes in Federal Reserve District banks' discount rates – a fact that market participants were aware of at the time. Deposit rate movements were particularly tightly linked to policy rates (very different from today). From 1929 to 1931, interest rates paid to depositors fell sharply, as the Federal Reserve banks reduced their discount rates. For example, *Bankers Magazine* reported that "as a result of the rapid reduction of the" central bank policy rate "there is a fair amount of discontent among business firms against the banks on the ground that while deposit rates kept pace with the reduction of the bank rate, the rates of interest on loans did not change in sympathy with the official rediscount rate" (Einzig 1930a, p. 102).

This discussion indicates that the cost of funds for Depression-era banks responded to changes in policy rates differently than commercial banks more recently, i.e., from the 1970s until 2020s. For modern banks, most of which have far larger market shares than banks in our sample period (e.g., the largest U.S. bank in 1929 held less than 3.5% of all bank assets whereas the largest today holds over 14%), changes in policy rates have limited effects on the cost of funds (Hoffmann et al. 2019; Luck et al. 2023; Greenwald et al. 2023; Metrick 2024; Bolton et al. 2023).

While the response of deposit rates to changes in Fed policy rates differed in the past and the present, the response of lending rates in the 1930s resembled the response in recent decades. For modern banks, lending rates respond rapidly to changes in the Fed's policy rate. For Depression-era banks, monthly data on bank assets also indicate a tight, positive correlation between the policy rate and lending rate.[10] Rates on brokers' loans and commercial paper were

[10] The Federal Reserve Act prohibited Fed banks from discounting or purchasing commercial bank loans with maturities longer than 90 days (or 180 days for agricultural paper). Fed bank examiners discouraged banks from making longer-term loans, as did regulators in most states, who discouraged (and in many cases prohibited) banks from extending mortgage loans.

quite responsive to changes in the discount rate: a 100-basis-point increase in the policy rate raised rates on those loans by roughly 85 basis points within two months. Rates on commercial loans responded more slowly, with a 100-basis-point increase in the policy rate raising commercial loan rates by approximately 40-50 basis points over a four-month horizon (Cohen et al. 2021).

Additional References for the Appendix B

Bolton, Patrick, Ye Li, Neng Wang, and Jinqiang Yang. 2023. "Dynamic banking and the value of deposits," Working paper National Bureau of Economic Research.

Cohen, Jon, Kinda Hachem, and Gary Richardson. 2021. "Relationship Lending and the Great Depression." *Review of Economics and Statistics* 103: 505–520.

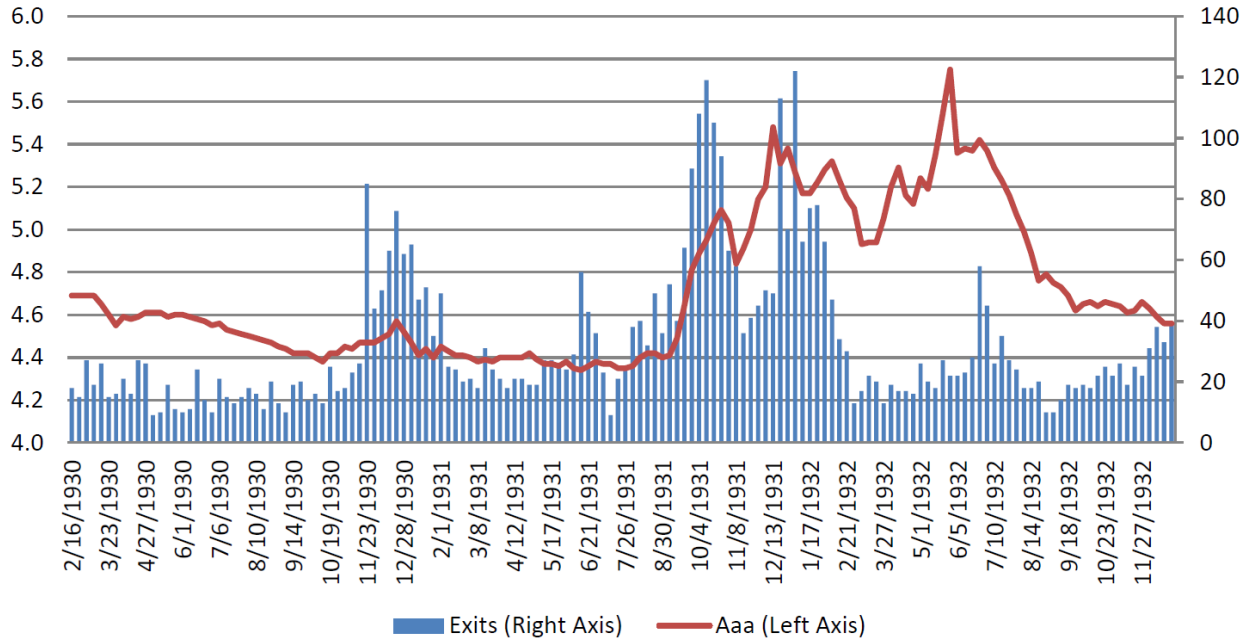
Greenwald, Emily, Sam Schulhofer-Wohl, and Josh Younger. 2023. "Deposit convexity, monetary policy and financial stability." Federal Reserve Bank of Dallas Working Paper.

Hoffmann, Peter, Sam Langfield, Federico Pierobon, and Guillaume Vuillemey. 2019. "Who Bears Interest Rate Risk?" *Review of Financial Studies* 32: 2921–2954.

Luck, Stephan, Matthew Plosser, and Josh Younger. 2023. "How do interest rates (and depositors) impact measures of bank value?" No. 20230407b. Federal Reserve Bank of New York.

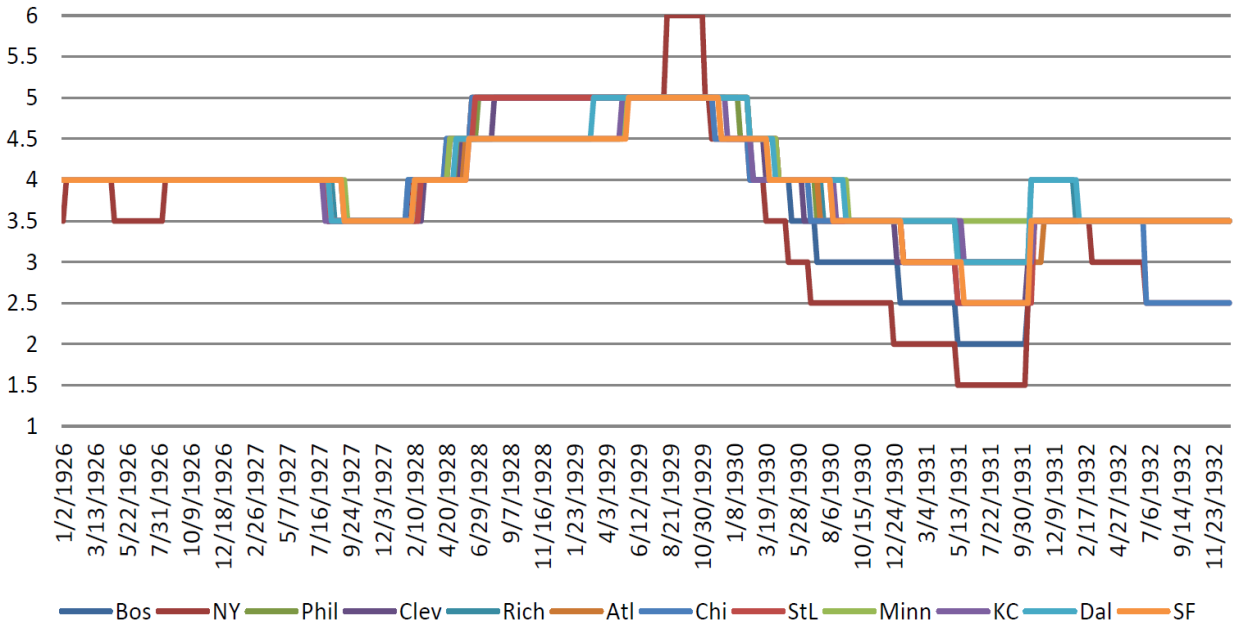
Metrick, Andrew. 2024. "The failure of silicon valley bank and the panic of 2023." *Journal of Economic Perspectives* 38: 133–152.

Figure 1: Number of Bank Exits By Week

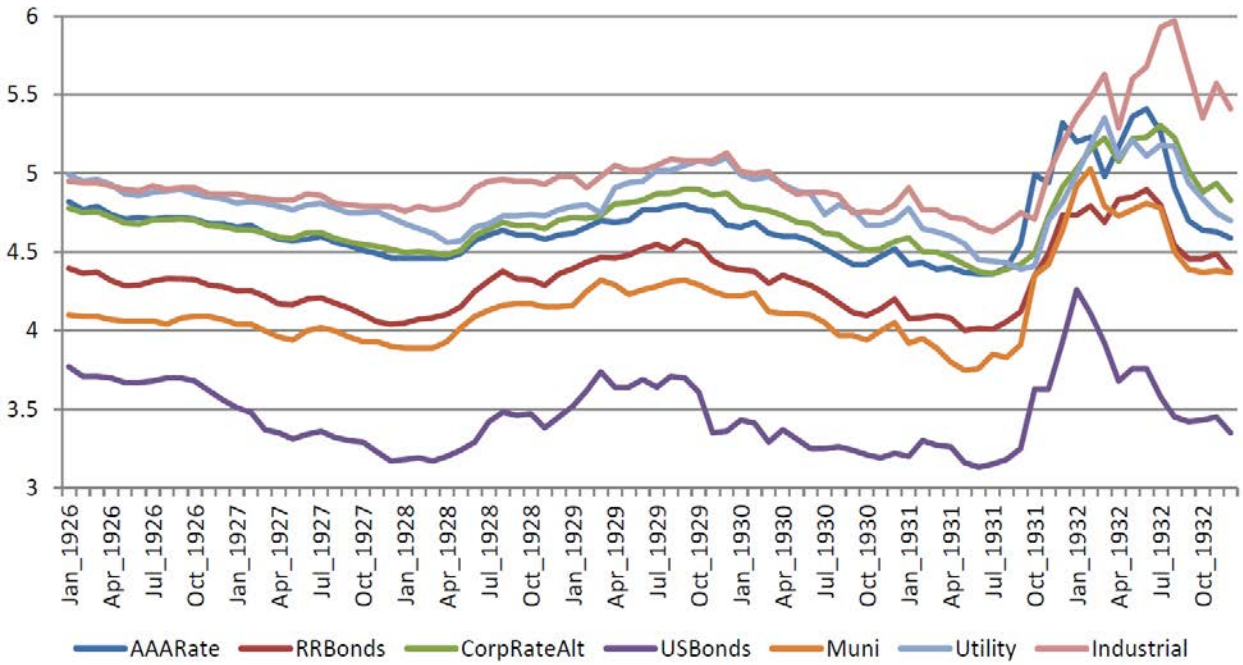


Notes: Figures provide the number of US commercial banks that exited and the Aaa commercial bond yield in each week.

Figure 2: Interest Rates (1926-1932)
Panel A: Discount Rates by Fed Reserve Bank



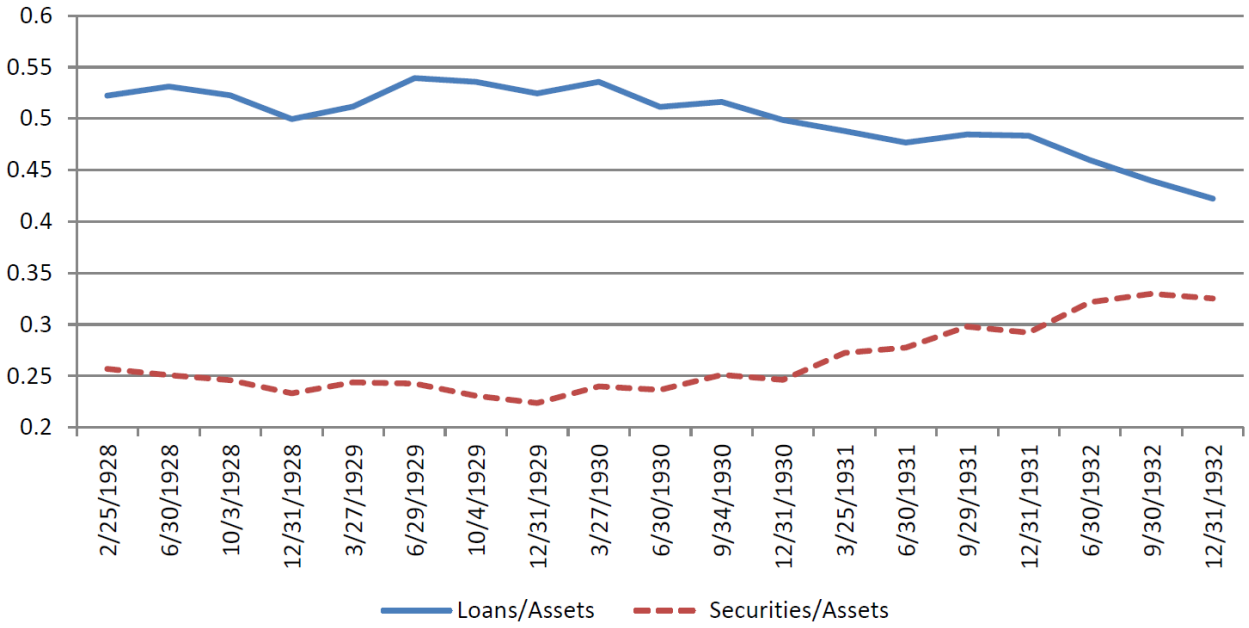
Panel B: Bond Yields



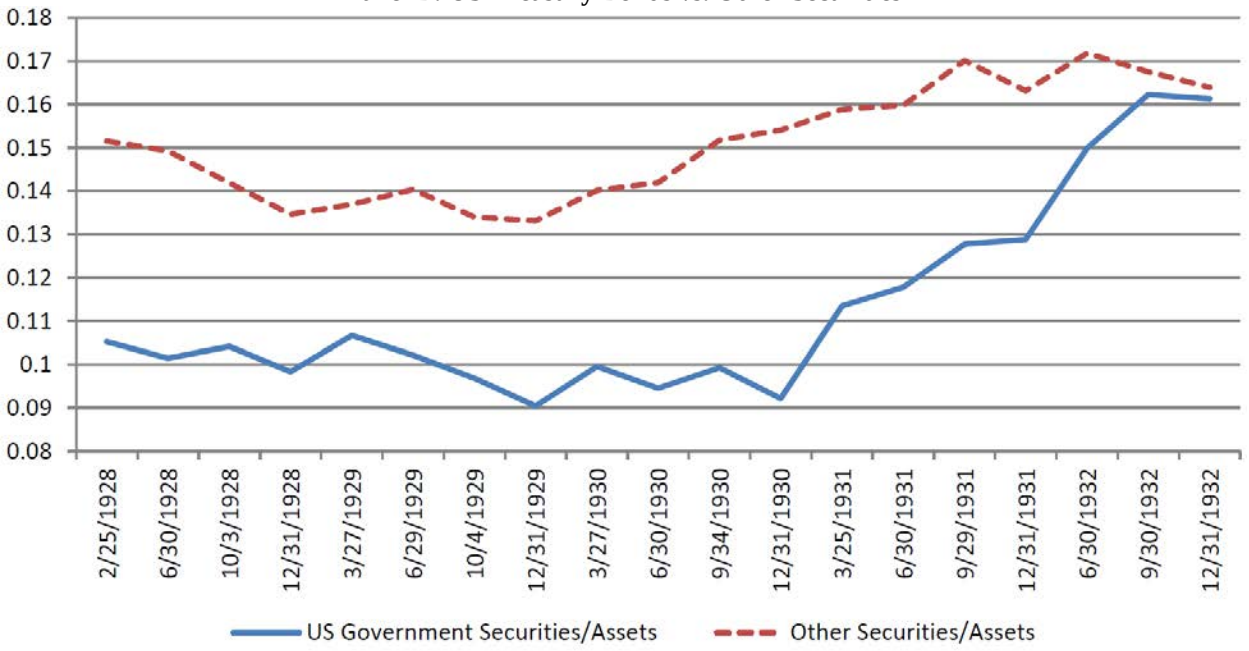
Notes: Figures present interest rate data. The top panel contains the weekly discount rate for each of the Federal Reserve Banks. The bottom panel contains the average monthly yield on various corporate and government bonds.

Figure 3: Commercial Bank Investment Compositions

Panel A: Loans vs. Securities

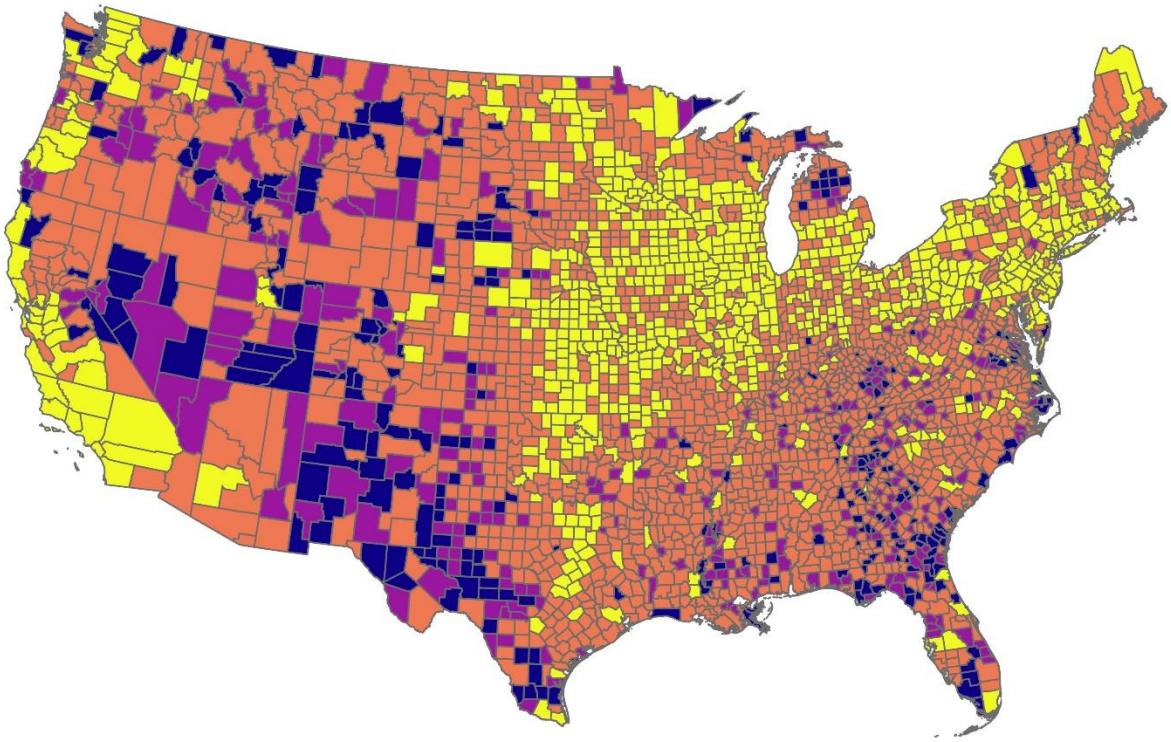


Panel B: US Treasury Bonds vs. Other Securities



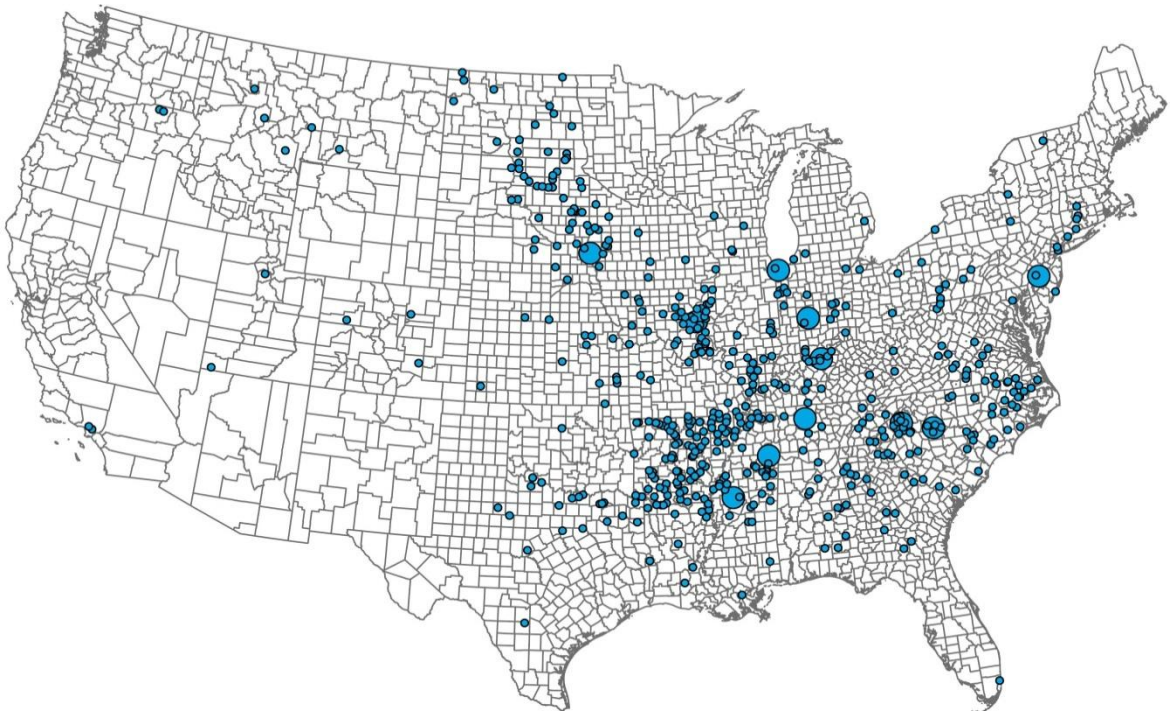
Notes: Figures present aggregate ratios for all national banks. The top panel contains the ratios of loans and securities relative to assets. The bottom panel contains the ratio of US Treasury bonds and other securities to total assets. Data were obtained from the Office of the Comptroller of the Currency's *Annual Report*.

Figure 4: Number of Banks by County in 1929

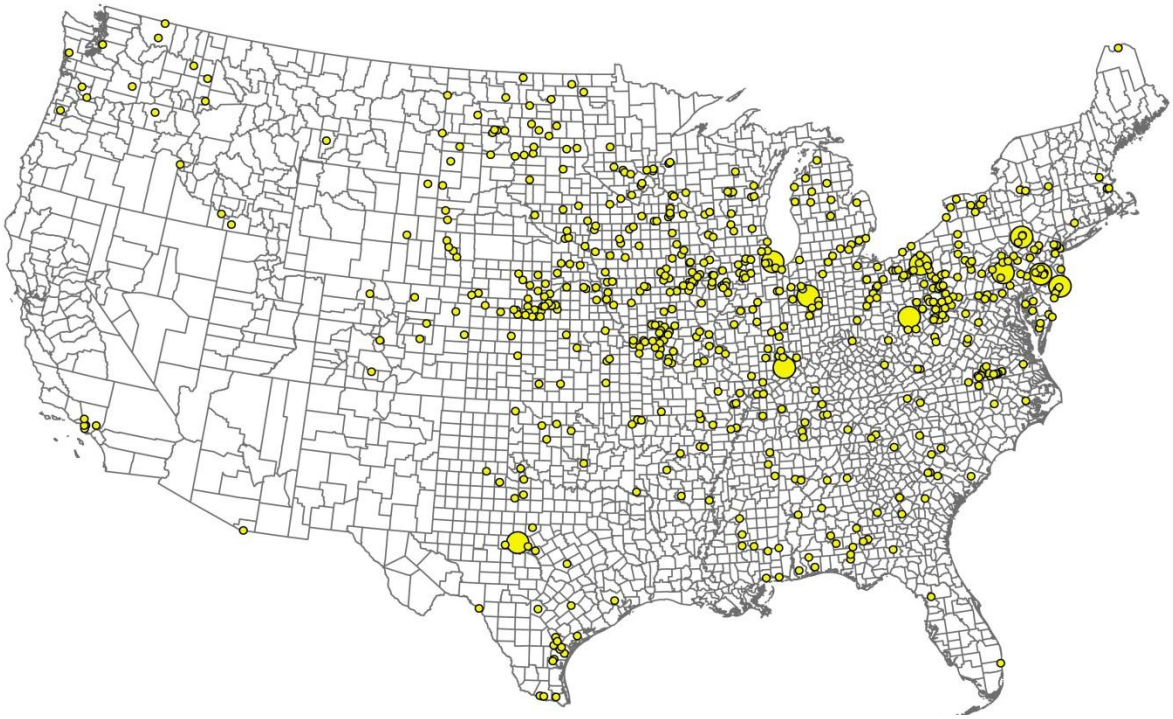


Notes: Map is shaded based on the number of banks in each county (starting with the darkest color and moving to lighter ones). The categories are 0-1 bank, 2 banks, 3-10 banks, 11+ banks. The number of banks was obtained from the January 1929 edition of *Rand McNally Bankers Directory*.

Figure 5: Geographic Distribution of Bank Exits
Panel A: Nov-Dec 1930

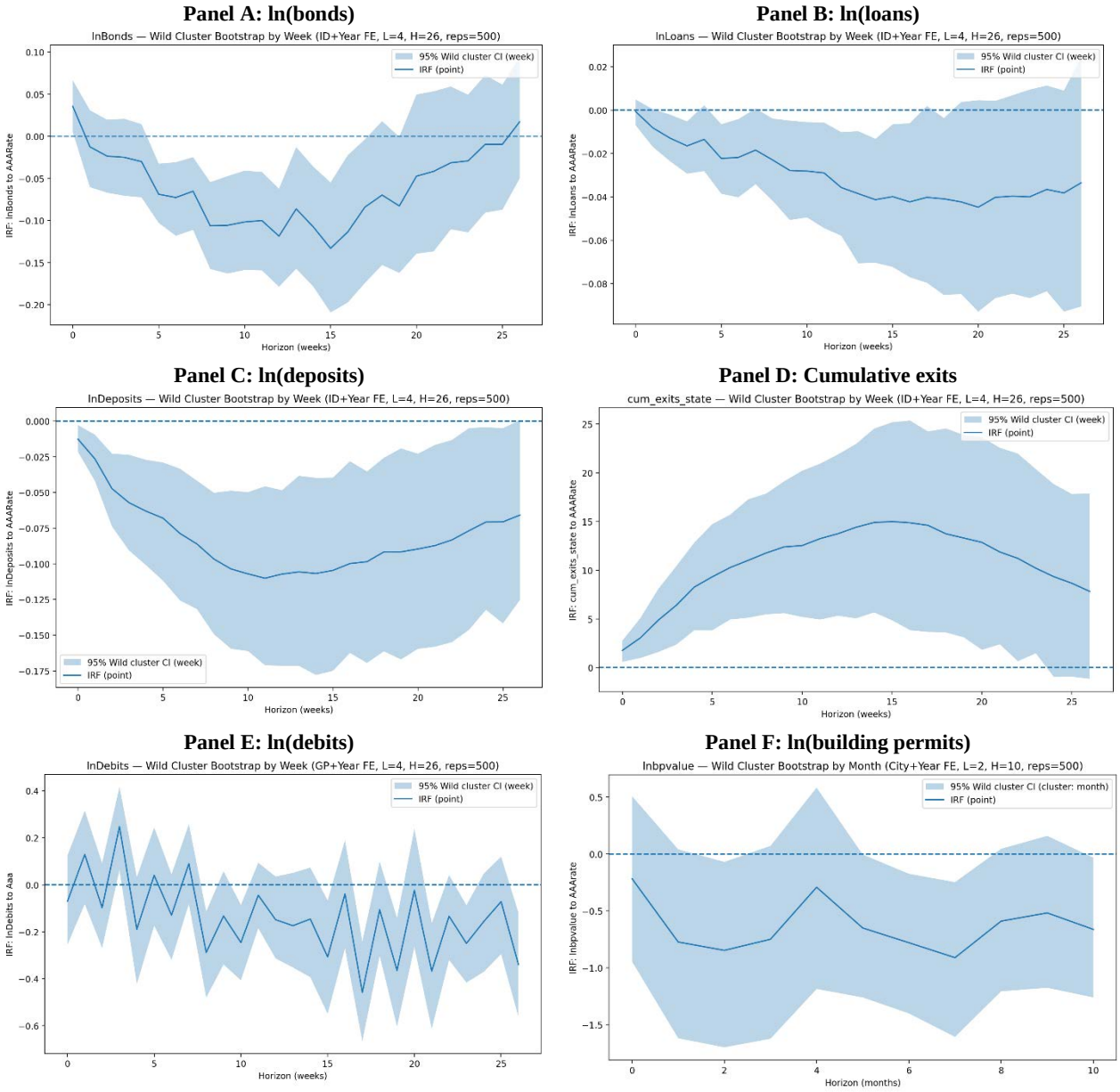


Panel B: Oct-Nov 1931



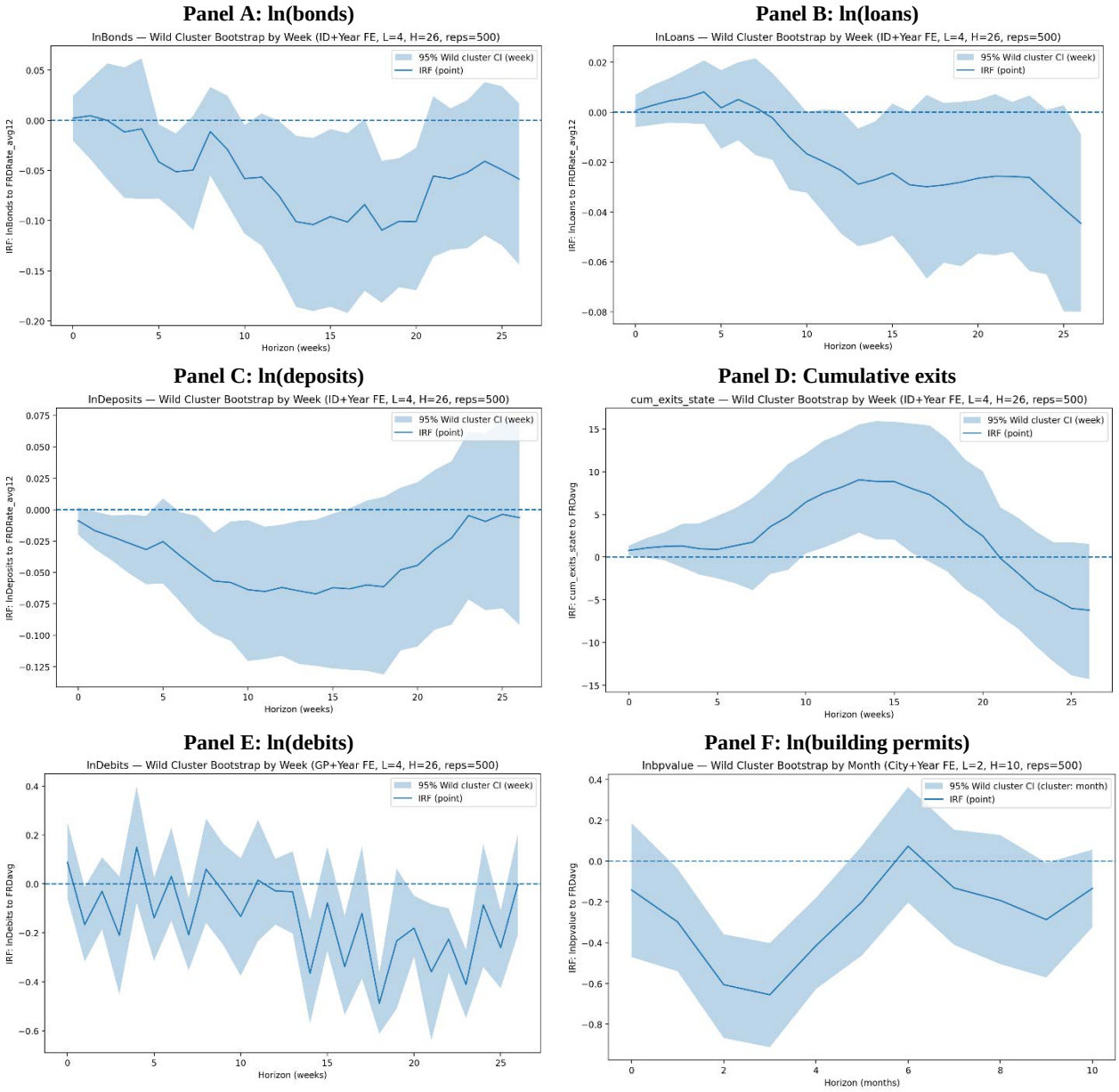
Notes: Figures provide a count of the number of banks exiting in the specified months by location. Larger circles denote more exits. The top panel only displays exits in November and December 1930 and the bottom panel only displays exits in October and November 1931.

Figure 6: Impulse Responses to Positive Aaa Yield Shock



Notes: The six panels display the estimated response of the specified variable to a one-percentage-point increase in the Aaa corporate bond yield. They show local projection estimates of equation (1) in the text. The shading represents 95%-confidence intervals from a wild time-clustered bootstrap over 500 repetitions.

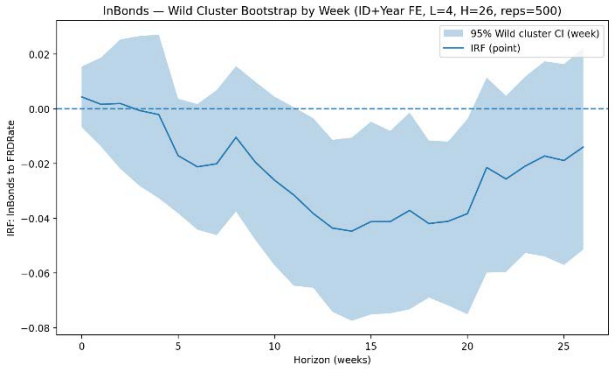
Figure 7: Impulse Responses to Positive Avg. Fed Discount Rate Shock



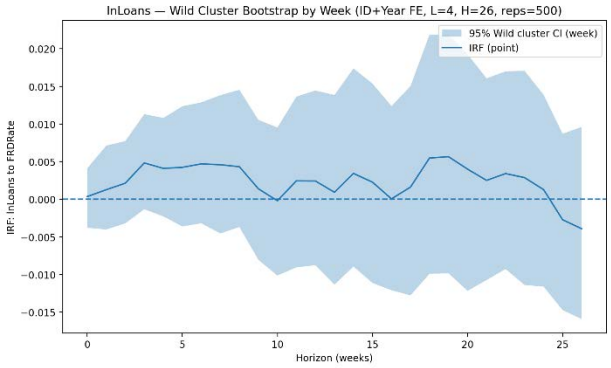
Notes: The six panels display the estimated response of the specified variable to a one-percentage-point increase in the average Fed discount rate. They show local projection estimates of equation (1) in the text. The shading represents 95%-confidence intervals from a wild time-clustered bootstrap over 500 repetitions.

Figure 8: Impulse Responses to Positive Federal Reserve Specific Discount Rate Shock

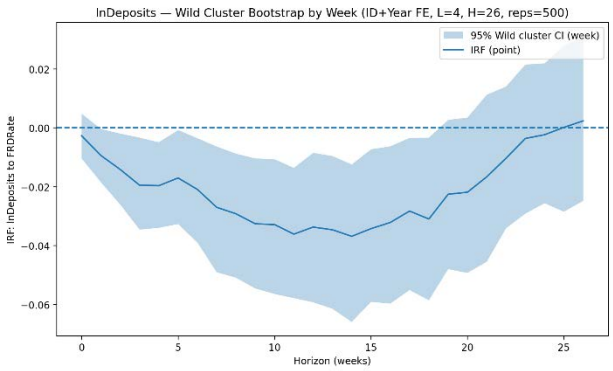
Panel A: ln(bonds)



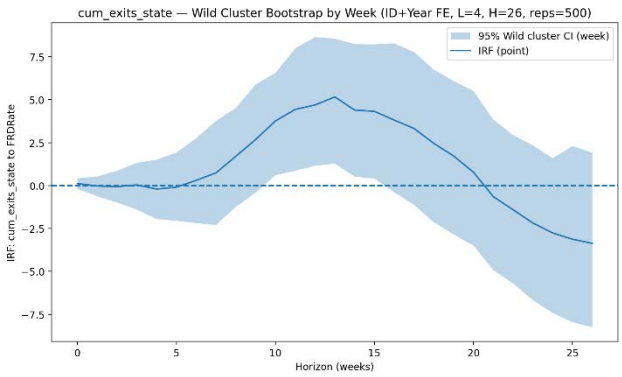
Panel B: ln(loans)



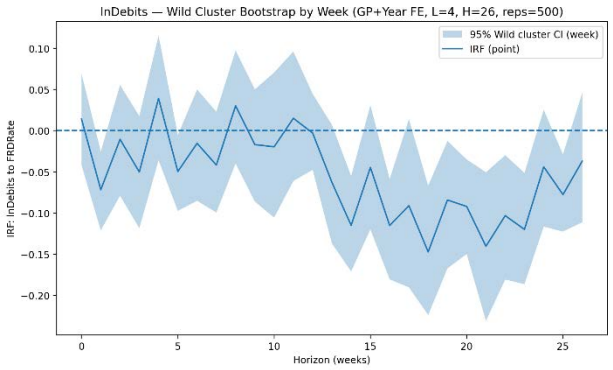
Panel C: ln(deposits)



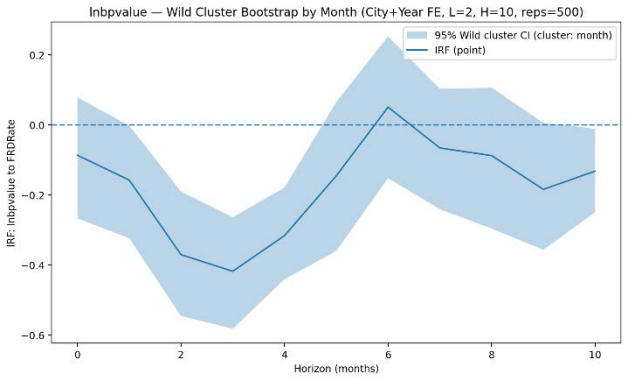
Panel D: Cumulative exits



Panel E: ln(debits)

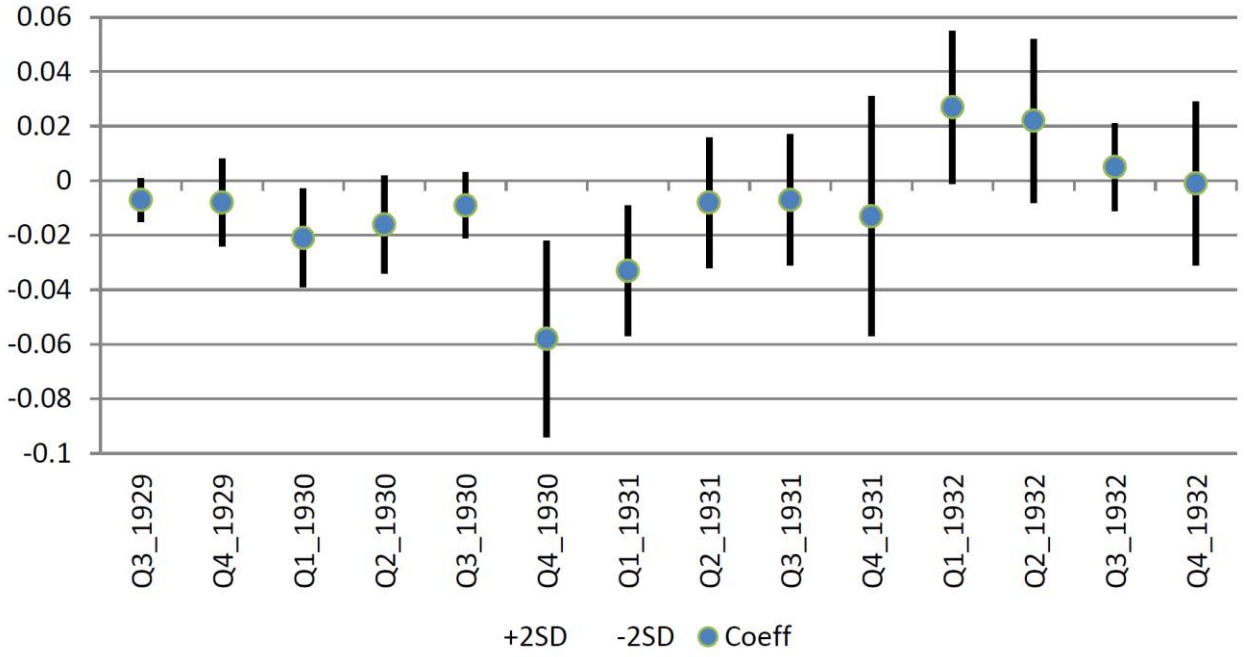


Panel F: ln(building permits)



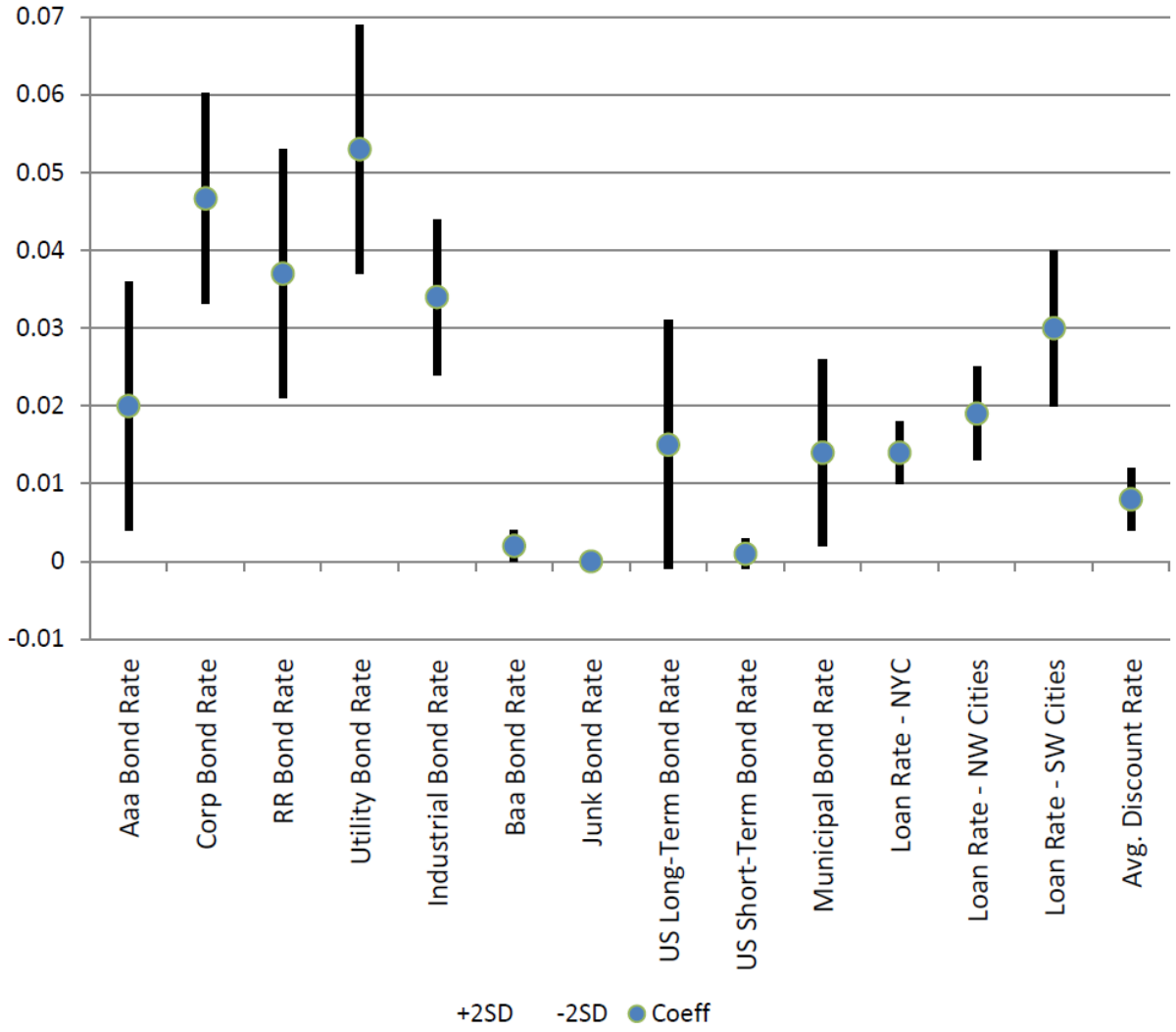
Notes: The six panels display the estimated response of the specified variable to a one-percentage-point increase in the specific Federal Reserve District's discount rate of the observed unit (Fed District, state, or town). They show local projection estimates of equation (1) in the text. The shading represents 95%-confidence intervals from a wild time-clustered bootstrap over 500 repetitions.

Figure 9: Predicting Quarterly Bank Exits - Coefficient on Securities/Assets by Quarter



Notes: Figure presents the coefficient (and two standard error bands) on each bank's security-to-asset ratio from equation (2) but estimated separately for each quarter.

Figure 10: Predicting Quarterly Bank Exits - Other Interest Rate Measures



Notes: Figure presents the coefficient (and two standard error bands) on the interaction between bank's security-to-asset ratio and the specified interest rate from equation (2).

Table 1: Predicting Quarterly Bank Exits - July 1929-Dec 1932

	Closed During Quarter		
	(1)	(2)	(3)
Assets (log)	-0.001	-0.001	-0.001
	[0.000]	[0.000]	[0.000]
Securities/Assets	-0.009***	-0.102***	-0.042***
	[0.003]	[0.036]	[0.010]
Securities/Assets * Aaa Yield in Quarter		0.020**	
		[0.008]	
Securities/Assets * Avg. Fed Discount Rate in Quarter			0.009***
			[0.002]
Loans/Assets	0.025***	0.025***	0.025***
	[0.003]	[0.003]	[0.003]
Capital+Surplus/Assets	-0.030***	-0.029***	-0.030***
	[0.005]	[0.005]	[0.005]
Surplus/(Capital+Surplus)	-0.045***	-0.045***	-0.045***
	[0.002]	[0.002]	[0.002]
HHI of County Deposits	-0.001	-0.001	-0.001
	[0.004]	[0.004]	[0.004]
Fraction of County's Total Deposits	-0.003	-0.003	-0.004
	[0.003]	[0.003]	[0.003]
Lagged Change in (log) Deposits	-0.003***	-0.003***	-0.003***
	[0.000]	[0.000]	[0.000]
County Controls in 1930?	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes
Quarter Fixed Effects?	Yes	Yes	Yes
Observations	267997	267997	267997

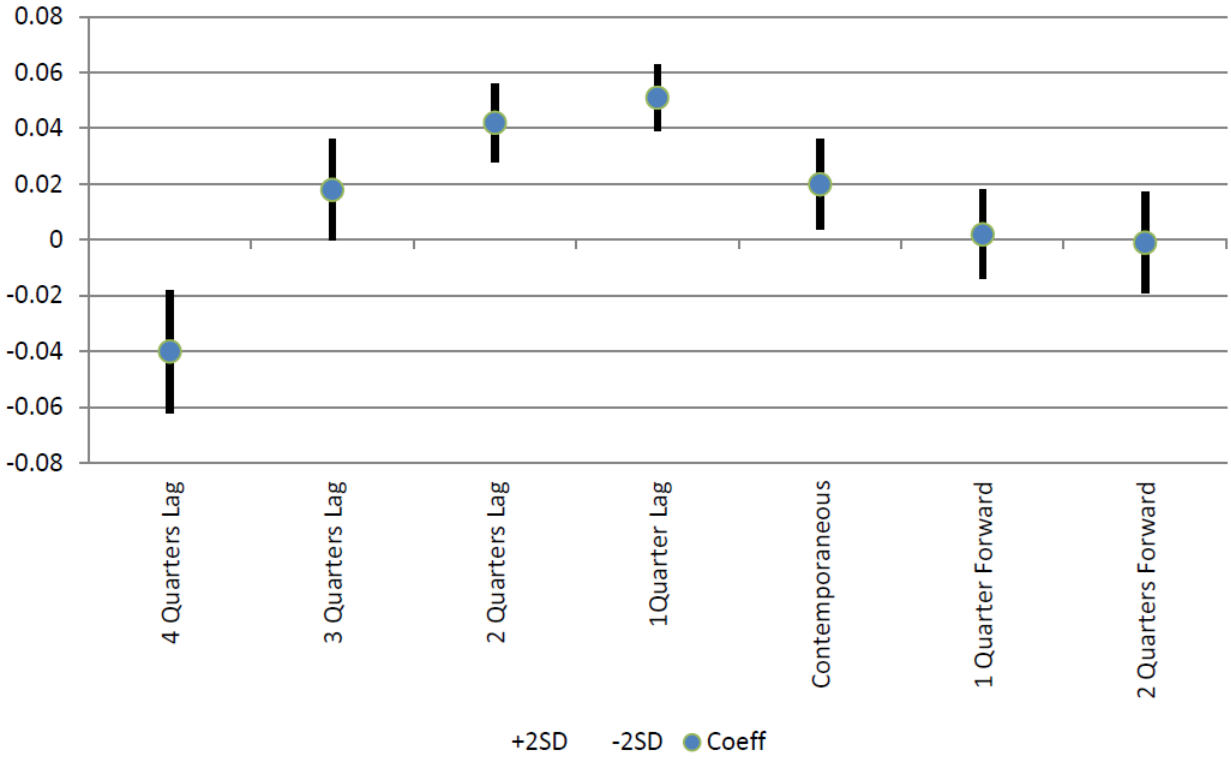
Notes: Table presents the estimated coefficients from the linear probability model of equation (2). Each observation is a bank quarter, and the outcome is whether the observed bank exited in the quarter. County controls include the logarithm of population in 1929; the fraction of the county living in an urban location of 2,500 or more people in 1929; the fraction of the adult population that is illiterate in 1929; the fraction of the population that is non-white in 1929; the logarithm of the number of farms per capita; the logarithm of the number of manufacturing establishments per capita; and the logarithm of retail sales in 1929. The regression also includes the logarithm of the bank's age, indicators for whether it was a national bank or a state Fed member, and indicators for whether it was in a Central Reserve City, a Reserve City, or a city with a clearinghouse. Standard errors clustered by county are provided in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 2: Predicting Quarterly Bank Exits Panel - Using Fed District Specific Discount Rate

	Closed During Quarter		
	(1)	(2)	(3)
Assets (log)	-0.001	-0.001	-0.001
	[0.001]	[0.001]	[0.001]
Securities/Assets	-0.009***	-0.022**	-0.027***
	[0.003]	[0.009]	[0.009]
Fed Discount Rate in Quarter	0.001	-0.001	
	[0.001]	[0.002]	
Securities/Assets *		0.003*	0.005**
Fed Discount Rate in Quarter		[0.002]	[0.002]
Loans/Assets	0.025***	0.025***	0.025***
	[0.003]	[0.003]	[0.003]
Capital+Surplus/Assets	-0.030***	-0.030***	-0.028***
	[0.005]	[0.005]	[0.005]
Surplus/(Capital+Surplus)	-0.045***	-0.045***	-0.046***
	[0.002]	[0.002]	[0.002]
HHI of County Deposits	-0.001	-0.001	-0.001
	[0.004]	[0.004]	[0.004]
Fraction of County's Total Deposits	-0.003	-0.004	-0.002
	[0.003]	[0.003]	[0.003]
Lagged Change in (log) Deposits	-0.003***	-0.003***	-0.003***
	[0.001]	[0.001]	[0.001]
County Controls in 1930?	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes
Quarter Fixed Effects?	Yes	Yes	Yes
State X Quarter Fixed Effects?	No	No	Yes
Observations	267997	267997	267997

Notes: Table presents the estimated coefficients from the linear probability model of equation (2). Each observation is a bank quarter, and the outcome is whether the observed bank exited in the quarter. County controls include the logarithm of population in 1929; the fraction of the county living in an urban location of 2,500 or more people in 1929; the fraction of the adult population that is illiterate in 1929; the fraction of the population that is non-white in 1929; the logarithm of the number of farms per capita; the logarithm of the number of manufacturing establishments per capita; and the logarithm of retail sales in 1929. The regression also include the logarithm of the bank's age, indicators for whether it was a national bank or a state Fed member, and indicators for whether it was located in a Central Reserve City, a Reserve City, or a city with a clearinghouse. Standard errors clustered by county are provided in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Figure A1: Predicting Quarterly Bank Exits - Using Different Timing of the Quarterly Aaa Bond Yield



Notes: Figure presents the coefficient (and two standard error bands) on the interaction between bank's security-to-asset ratio and the Aaa bond yield for various leads in lags from equation (2).

Table A1: Correlations Between Monthly Bond and Interest Rate Series

	Aaa bond yield	Corp Bond Yield	RR Bond Yield	Utility Bond Yield	Industrial Bond Yield	Baa Bond Yield	Junk Bond Yield	US Long-Term Bond Yield	US Short-Term Bond Yield	Municipal Bond Yield	Loan Rate - NYC	Loan Rate - NW Cities	Loan Rate - SW Cities	Avg. Discount Rate
Aaa bond yield	1.000													
Corp Bond Yield	0.845	1.000												
RR Bond Yield	0.956	0.941	1.000											
Utility Bond Yield	0.696	0.897	0.828	1.000										
Industrial Bond Yield	0.710	0.931	0.803	0.715	1.000									
Baa Bond Yield	0.734	0.544	0.620	0.185	0.632	1.000								
Junk Bond Yield	0.395	0.317	0.306	-0.072	0.529	0.890	1.000							
US Long-Term Bond Yield	0.888	0.762	0.878	0.668	0.603	0.563	0.254	1.000						
US Short-Term Bond Yield	0.101	0.084	0.180	0.416	-0.227	-0.535	-0.759	0.296	1.000					
Municipal Bond Yield	0.891	0.901	0.915	0.718	0.851	0.719	0.526	0.869	-0.002	1.000				
Loan Rate - NYC	0.278	0.379	0.414	0.632	0.113	-0.327	-0.557	0.363	0.886	0.221	1.000			
Loan Rate - NW Cities	0.316	0.499	0.485	0.705	0.279	-0.244	-0.435	0.369	0.781	0.326	0.975	1.000		
Loan Rate - SW Cities	0.228	0.432	0.406	0.677	0.208	-0.359	-0.536	0.272	0.803	0.236	0.969	0.986	1.000	
Avg. Discount Rate	0.206	0.357	0.369	0.622	0.103	-0.409	-0.595	0.278	0.873	0.187	0.976	0.966	0.986	1.000

Notes: Table provides the correlation coefficients for the various bond and loan rates from July 1929 through December 1932.

Table A2: Source and Description of Monthly Interest Rate Series

Series	Source	Description
Aaa bond yield	NBER Macrohistory	U.S. Yields On Corporate Bonds, Highest Rating
Baa Bond Yield	NBER Macrohistory	U.S. Yields On Corporate Bonds, Lowest Rating
Loan Rate - NYC	NBER Macrohistory	U.S. Rates On Customer Loans, New York City
Loan Rate - NW Cities	NBER Macrohistory	U.S. Rates On Customers' Loans, Northern and Western Cities
Loan Rate - SW Cities	NBER Macrohistory	U.S. Bank Rates On Customers' Loans, Southern and Western Cities
RR Bond Yield	NBER Macrohistory	U.S. American Railroad Bond Yields, High Grade
Corp Bond Yield	NBER Macrohistory	Unweighted average of Utility, Industrial, and RR bond yields
US Long-Term Bond Yield	NBER Macrohistory	U.S. Yield On Long-Term United States Bonds
US Short-Term Bond Yield	NBER Macrohistory	U.S. Yields On Short-Term United States Securities, Three-Six Month Treasury Notes and Certificates, Three Month Treasury
Municipal Bond Yield	NBER Macrohistory	U.S. Index of Yields Of High Grade Municipal Bonds
Utility Bond Yield	NBER Macrohistory	U.S. Index of Yields Of High Grade Public Utility Bonds
Industrial Bond Yield	NBER Macrohistory	U.S. Yield On High Grade Industrial Bonds, Aaa Rating
Avg. Discount Rate	Federal Reserve Bank	Unweighted average of monthly discount rates in each district
Junk Bond Yield	Basile et al. (2025)	Yields of Junk Bonds

Notes: Table provides the source of each of the monthly interest rate series used in the paper.

Table A3: Predicting Quarterly Bank Exits Panel - Other Balance Sheet Controls

	Closed During Quarter							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Assets (log)	-0.001	-0.001	-0.001	-0.001	-0.001***	-0.001***	-0.001**	-0.001**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Securities/Assets	-0.102***	-0.042***	-0.121***	-0.064***	-0.132***	-0.067***	-0.130***	-0.067***
	[0.036]	[0.010]	[0.035]	[0.009]	[0.036]	[0.009]	[0.036]	[0.009]
Securities/Assets *	0.020**		0.019**		0.020***		0.020***	
Aaa Yield in Quarter	[0.008]		[0.008]		[0.008]		[0.008]	
Securities/Assets *		0.009***		0.009***		0.008***		0.008***
Avg Fed Discount Rate in Quarter		[0.002]		[0.002]		[0.002]		[0.002]
Loans/Assets	0.025***	0.025***						
	[0.003]	[0.003]						
Cash/Assets					-0.073***	-0.073***		
					[0.004]	[0.004]		
Cash/Deposits							-0.050***	-0.049***
							[0.003]	[0.003]
Capital+Surplus/Assets	-0.029***	-0.030***	-0.030***	-0.030***	-0.038***	-0.039***	-0.018***	-0.019***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.006]	[0.006]
Surplus/(Capital+Surplus)	-0.045***	-0.045***	-0.044***	-0.044***	-0.042***	-0.043***	-0.043***	-0.043***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
HHI of County Deposits	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Fraction of County's Total Deposits	-0.003	-0.004	-0.004	-0.004	-0.002	-0.002	-0.003	-0.003
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Lagged Change in(log) Deposits	-0.003***	-0.003***	-0.003***	-0.003***	-0.002***	-0.002***	-0.003***	-0.003***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
County Controls in 1930?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	267997	267997	267997	267997	267997	267997	267844	267844

Notes: Table presents the estimated coefficients from the linear probability model of equation (3). Each observation is a bank quarter, and the outcome is whether the observed bank exited in the quarter. County controls include the logarithm of population in 1929; the fraction of the county living in an urban location of 2,500 or more people in 1929; the fraction of the adult population that is illiterate in 1929; the fraction of the population that is non-white in 1929; the logarithm of the number of farms per capita; the logarithm of the number of manufacturing establishments per capita; and the logarithm of retail sales in 1929. The regression also includes the logarithm of the bank's age, indicators for whether it was a national bank or a state Fed member, and indicators for whether it was in a Central Reserve City, a Reserve City, or a city with a clearinghouse. Standard errors clustered by county are provided in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A4: Predicting Quarterly Bank Exits - Robustness Checks

	Closed During Quarter							
	Dropping RC and CRC Cities		Using 1929 Securities Ratio		Dropping Voluntary or Temporary Closures		Dropping Involuntary Closures or Mergers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Assets (log)	-0.000	-0.000	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000
	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Securities/Assets	-0.093***	-0.048***	-0.093***	-0.040***	-0.079**	-0.035***	-0.025*	-0.009**
	[0.035]	[0.009]	[0.033]	[0.009]	[0.033]	[0.009]	[0.014]	[0.004]
Securities/Assets * Aaa Yield in Quarter	0.017**		0.018**		0.015**		0.005	
	[0.007]		[0.007]		[0.007]		[0.003]	
Securities/Assets * Avg Fed Discount Rate in Quarter		0.010***		0.009***		0.008***		0.002**
		[0.002]		[0.002]		[0.002]		[0.001]
Loans/Assets	0.026***	0.025***	0.027***	0.028***	0.024***	0.024***	0.002	0.002
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]
Capital+Surplus/Assets	-0.035***	-0.036***	-0.030***	-0.031***	-0.029***	-0.030***	-0.001	-0.001
	[0.005]	[0.005]	[0.005]	[0.005]	[0.004]	[0.004]	[0.002]	[0.002]
Surplus/(Capital+Surplus)	-0.045***	-0.045***	-0.045***	-0.046***	-0.040***	-0.041***	-0.006***	-0.006***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]
HHI of County Deposits	0.001	0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000
	[0.004]	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.002]	[0.002]
Fraction of County's Total Deposits	-0.007**	-0.007**	-0.003	-0.004	-0.003	-0.003	-0.001	-0.001
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.001]	[0.001]
Lagged Change in (log) Deposits	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.002***	-0.000***	-0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
County Controls in 1930?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	253652	253652	263131	263131	266038	266038	257935	257935

Notes: Table presents the estimated coefficients from the linear probability model of equation (3). Each observation is a bank quarter, and the outcome is whether the observed bank exited in the quarter. The column headings describe what banks are dropped from the regressions or what other variables are used. County controls include the logarithm of population in 1929; the fraction of the county living in an urban location of 2,500 or more people in 1929; the fraction of the adult population that is illiterate in 1929; the fraction of the population that is non-white in 1929; the logarithm of the number of farms per capita; the logarithm of the number of manufacturing establishments per capita; and the logarithm of retail sales in 1929. The regression also includes the logarithm of the bank's age, indicators for whether it was a national bank or a state Fed member, and indicators for whether it was in a Central Reserve City, a Reserve City, or a city with a clearinghouse. Standard errors clustered by county are provided in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.