# Did the Reserve Requirement Increments of 1936-1937 Reduce Bank Lending? Evidence from a Natural Experiment*

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**Abstract**

We analyze the impact of contractionary monetary policy through increases in reserve requirements on bank lending. In a natural experiment setting, we compare the lending behavior of banks that were subject to the requirement increases in 1936-1937, Federal Reserve member banks to a group of banks that were not subject to the reserve increase, Federal Reserve nonmember banks. After implementing the difference-in-difference estimators, we find that the increases in reserve requirements did not create financing constraints for member banks and lead them to reduce lending. Therefore, the actions of the Federal Reserve concerning the required reserve ratios cannot be blamed for instigating the economic downturn of 1937-38.

**Keywords:** bank lending, reserve requirements, monetary policy transmission, dual banking system

**JEL Classification Numbers:** E51, E58, G21, G28, N12, N22

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# 1 Introduction

In 1936-37, the Federal Reserve doubled reserve requirements as an insurance policy against inflation. The first increase came on August 16, 1936. The Fed increased reserve requirements again on March 1, 1937 and a third and final time on May 1, 1937. After the third increase, reserve requirements had doubled from what they had been from June 21, 1917 to August 1936.

Scholars debate how the Federal Reserve's reserve requirement increases of 1936-37 affected the lending behavior of member banks. Some contend that the doubling of reserve requirements led member banks to hold more precautionary balances and subsequently reduced the availability of bank credit, causing the U.S. economy to relapse into recession (Friedman and Schwartz, 1963; Frederic Mishkin, 1989; Cargill and Mayer, 2006). Others argue that the increase in reserve requirements did not cause the recession (Telser, 2001; Stauffer, 2002; Calomiris, Mason, and Wheedlock 2011).

The question of whether the increases in reserve requirements of 1936-1937 affected bank lending remains unresolved because a lack of data has prevented scholars from designing a research framework that directly examines the effect of higher reserve requirements on bank lending. As a result, most empirical studies rely on aggregated data and focus on liquid assets such as cash and securities rather than loans. Many studies examine the paths of the cash-deposit ratio to understand the relationship between the onset of the recession and the tightening of monetary policy (Friedman and Schwartz, 1963; Frederic Mishkin, 1989). Others use more disaggregated data, but compare the changes in bank asset composition (Telser, 2001; Stauffer, 2002). The lack of an analysis at a disaggregated level makes it difficult to assess the behavior of individual banks in response to the increase in reserve requirements. More recently, Calomiris, Mason, and Wheedlock (2011) break from that tradition and examine reserve demand using bank-level balance sheets on Federal Reserve Member banks. However, they examine the effect of the doubling of reserve requirements on bank reserve demand rather than bank lending.

This paper directly examines the effect of the changes in reserve requirements by comparing the lending behavior of member banks to that of nonmember banks. When the Federal Reserve System was established in 1913, it permitted state-chartered banks to become Federal Reserve members if they met the standards of the Federal Reserve System. In 1936 and early 1937, when the Federal

Reserve increased the required reserve ratio, the policy affected the reserves of member banks while it did not affect the reserves of nonmember banks. If member banks faced a financing constraint due to the doubling of reserve requirements, the lending behavior of member banks would differ from that of nonmember banks.

Our study utilizes a new quarterly-level dataset on all state-chartered commercial banks and trust companies in New York from 1935 through 1938.[1] The state of New York offers an ideal environment to examine how the increases in the reserve requirements affected the lending behavior of member banks. New York had a diverse economy with various types of banks. Banks in rural agricultural areas, which operated as unit banks, accepted small deposits which were protected by deposit insurance and provided loans to local farmers. Banks in manufacturing cities such as Buffalo and Albany served as correspondent banks for unit banks in rural areas and issued industrial loans. And finally, banks in New York City, many of which had branches within the city and its boroughs, served as the ultimate depositories of the banking systems' reserves and lent to large, industrial clients.

We capture the impact of the Federal Reserve's reserve requirement increments in difference-in-difference estimators. The use of the difference-in-difference estimators alleviates econometric concerns due to the difficulty in controlling for loan demand and profitable investment opportunities. In addition, using 1930's bank-level balance sheet data mitigates biases arising from tests using modern institutional balance sheet data, as balance sheets in our data are for unit banks that operated locally.[2] In addition, we add county fixed effects to control for heterogeneous loan demand across different regions.

We find that the lending behavior of member banks did not differ from that of nonmember banks. Member banks were able to mitigate the contractionary effects of the Fed's reserve requirement increases by selling securities. Our results cast doubt on claims that member banks faced financing constraints and reduced lending after the doubling of reserve requirements.

This study enhances our understanding of the recession of 1937-38. Due to the timing of the onset of the recession and a tightening of the monetary policy, Friedman and Schwartz (1963)

[1] We cannot go farther back in time because there is a lacuna in the data. During the years 1933 and 1934, when the banking holiday closed many commercial banks for prolonged periods of time, New York's legislature suspended laws requiring banks to submit call reports and publish balance sheet information.

[2] Banks in New York City were allowed to have branches in New York City and its boroughs.

suggested that the Fed's doubling of reserve requirements was a major policy mistake that caused the recession of 1937-1938.[3] Recent studies have found evidence conflicting with their claim. For example, Telser (2011) shows that member banks were able to mitigate the contractionary effects of doubling reserve requirements by selling their government securities and conducted lending activity as usual. Irwin (2011) argues that reserve requirements were not binding for member banks during this period since they continued to contract lending after reserve requirements were relaxed in 1938. Lastly, Calomiris, Mason, and Wheelock (2011) also find that the increase did not constrain bank lending, as the higher reserve requirements were not binding. Our results corroborate the view that the increase in reserve requirements did not directly lead to the recession of 1937-38.

The remainder of this paper is organized as follows: Section 2 provides a review of the literature concerning the recession of 1937-1938. Section 3 describes the regulatory structure in place in New York State during the 1930s and discusses why New York State serves as an ideal testing ground for the reserve requirement effects. Section 4 describes our data sources and presents summary statistics of those data. Section 5 presents the methodology employed in interpreting that data. Section 6 discusses the results of those methods and Section 7 provides a conclusion.

## 2 The Federal Reserve's Reserve Requirement Increments and the Recession of 1937-38

We now turn to the literature concerning the role of the reserve requirement increases in generating the recession of 1937. In the mid-1930s, excess reserves in the U.S. banking system grew rapidly after the banking holiday in March 1933. The increase in excess reserves continued after federal deposit insurance was introduced with the Banking Act of 1935, coupled with an increase in gold inflows into the U.S. between 1934 and 1936. Banks accumulated abnormally large excess reserves due to a combination of low interest rates, government spending and borrowing, large gold

[3]Many scholars have blamed the premature tightening of monetary policy, fiscal policy, or both (Fridman and Schwartz, 1963; Romer, 1992; Eggertson, 2008; Velde, 2009; Irwin, 2011). On the monetary side, the Federal Reserve doubled reserve requirements, and the Treasury sterilized gold inflows from Europe to the U.S. On the fiscal side, the Roosevelt administration attempted to achieve a balanced budget by reducing the growth in government spending and increasing taxes. Other scholars have proposed alternative explanations, such as labor policies and a shift in expectations. Cole and Ohanian (2001, 2009) and Hausman (2012) argue that New Deal Industrial and labor policies, New Deal industrial and labor policies raised wages in the manufacturing sector and stunted economic recovery. Eggertsson (2008) argue that a shift in beliefs about future inflation and income caused the recession.

inflows, and increased demand for liquidity after the banking panics of the early 1930s. Between the banking holiday in 1933 and September 1935, member banks experienced an $8 billion increase in demand deposits. Excess reserves peaked in the fourth quarter of 1936 and comprised more than 50 percent of total reserves.

Federal Reserve officials considered excess reserves a serious future inflationary threat. More specifically, they feared that gold inflows at the current levels of $1 billion per year would threaten their ability to control credit conditions if banks began to lend those funds. But the Federal Reserve felt it was in a disadvantageous position to reduce this threat. The tools typically used by the Federal Reserve, the discount rate and open-market operations, were likely to have little impact on the level of excess reserves. Raising the discount rate would not have been effective since banks were not borrowing from the discount-window at the time, even at low discount rates. Member banks were by and large out of debt to the Reserve banks in 1935 and 1936. The total amount of the Reserve System's earning assets, which they could have sold to contract the amount of credit in the banking system, was $2.5 billion. Due to low interest rates on these assets, nearly half of that was needed to cover its expenses and dividends (Harrison papers, 1935). The Federal Reserve decided that if they were going to have any influence on the credit situation in the U.S., they would need "to bring the member banks into close contact with the Reserve Banks by removing the buffer of excess reserves and then to leave the Reserve Banks with a substantial portfolio for exerting further pressure." They decided to increase the reserve requirements for member banks in order to bring the member banks within the reach of the size of the Reserve System's portfolio.

Table 1 contains the changes in reserve requirements between 1936 and 1938. The Federal Reserve doubled reserve requirements for its member banks, from 13 percent of demand deposits for banks in the principal financial centers of Chicago and New York City to 26 percent. This occurred in three stages: August 1936, March 1937, and May 1937. There were corresponding but smaller increases for banks in smaller reserve cities. Later in April 1938, the Federal Reserve reduced reserve requirements. The Federal Reserve considered the reserve requirement increments a preventive action rather than a change in the stance of monetary policy, as they viewed the large volume of excess reserves as superfluous balances due to a low demand for loans. They expected the reserve requirement increments to simply alter the relative shares of excess reserves and government securities in banks' portfolios, rather than have an impact on interest rates or reduce loan supply.

Their objective was to make their traditional policy tools more effective for future use by lowering the volume of excess reserves.

[Table 1]

The third and final increase in reserve requirements coincided with the beginning of the recession of 1937-1938. The recession was one of the sharpest contractions in economic activity in the history of the U.S. This harsh but short-lived recession occurred while the U.S. economy was recovering from the Great Depression of 1929-1932. After expanding for 50 months, from March of 1933 to May 1937, real GDP fell by 11 percent from May 1937 to June 1938. Industrial production fell by a staggering 32 percent.

Scholars have debated whether this policy increased reserve demand, and through that increase, caused a reduction in the supplies of credit and money. Friedman and Schwartz (1963) argued that the Federal Reserve's doubling of reserve requirements was responsible for the recession of 1937-1938. According to them, the high level of excess reserves were not excess in the sense that these reserves reflected banks' desire to hold liquid assets and prepare for possible deposit withdrawals in the aftermath of the banking panics in the early 1930s. After reserve requirements were increased, member banks tried to restore their excess reserves and subsequently reduced lending. Friedman and Schwartz fault the Federal Reserve's focus on credit, not the behavior of high powered money, for contracting economic activity:

"..the system failed to weigh the delayed effects of the rise in reserve requirements in August 1936, and employed too blunt an instrument too vigorously; this was followed by a failure to recognize promptly that the action misfired and that a reversal of policy was called for. All those blunders were in considerable measure a consequence of the mistaken interpretation of excess reserves and their significance."
(Friedman and Schwartz, 1963, p. 526)

Their view was supported by other economists (Romer, 1992, 2009; Mishkin, 1989, pp. 399-400). There are those, however, who contest this view. These scholars argue that reserve requirement increases had a limited effect on the money multiplier and the supply of money and credit. For instance, Calomiris, Mason, and Wheelock (2011) find that the changes in reserve requirements

were not an important factor in creating the downturn, as they did not increase banks' demand for reserves. Telser (2001) and Stauffer (2002) argue that member banks were able to mitigate the contractionary effects of the Fed's reserve requirement increments by substituting securities with loans. Irwin (2011) argues that higher reserve requirements had little effect on money supply and finds that the sterilization of gold inflows was a significant factor in creating the downturn by lowering equity prices and raising interest rates. The conflicting nature of these previous studies originates from the fact that none examine the impact of the changes in reserve requirements on bank loan supply. Exploiting this unique aspect of our data set, we specify our empirical framework and compare the lending behavior of member and nonmember banks after the doubling of reserve requirements.

# 3 Background

## 3.1 Dual Banking System and Federal Reserve Membership

In the U.S. banking system in the 1930s, there were distinct differences in the governing bodies of state banks that were members of the Federal Reserve System and state banks that were not. As this is central to our control and treatment groups, we provide a brief review of the development of that banking system and the regulations during the period under study.

Until 1864, bank chartering was solely a function of the states, and the level of regulation differed from state to state. With the passage of the National Banking Act of 1864, a federal role in the banking system was introduced. The intent of the legislation was to establish a system of national banks and assert federal control over the monetary system in an endeavor to create a uniform banking and currency system, facilitate a market for government bonds, and promote more commerce through a sound financial system. To supervise nationally chartered banks, the act created the Office of the Comptroller of the Currency (OCC).

After the National Banking Act was passed, commercial banks could choose to organize as either national banks with a federal charter or as state banks with a charter issued by state governments. The choice of charter dictated the law under which the bank would operate and the agency that would act as the bank's supervisor. The decision to choose a federal or a state charter determined a bank's powers, capital requirements, and lending limits.

The National Banking Act failed to establish a banking system consisting of only federally chartered banks, as it did little to push state banks to convert to national banks or discourage the circulation of state bank notes. As of October of 1863, there were only 63 national banks chartered (Atack and Passell, 1994) and it little effect on the volume of state bank notes in circulation. In June of 1864, a revision of the act was passed to encourage more state banks to apply for a national bank charter. The revision imposed a tax on all bank notes issued by state banks of 2 percent, which increased to 10 percent in March of 1865. After the revision, many state banks obtained a national charter. In 1868, the number of state banks decreased from 1,466 in 1863 to 247, while the number of national banks increased from 66 to 1,640. However, in the 1880s, this trend reversed as checks became more commonplace for commercial transactions and bank notes were used at a decreasing rate. State banks became increasingly more devoted to discount and deposit, and their numbers surged. By 1913, there were 16,841 state banks and 7,467 national banks in operation.

In 1913, Congress passed the Federal Reserve Act in part to bring state banks under a more unified system of regulation. Under the Act, national banks were required to become members of the Federal Reserve System; by contrast, state banks could choose whether or not to join. Becoming a member bank, however, meant becoming subject to both state and federal supervision. Accordingly, relatively few state banks chose to join. The act was modified in 1917 to make membership in the Federal Reserve System more attractive to state banks. By 1930, there were 7,247 national banks, 1,068 state banks with Federal Reserve membership, and 14,730 state banks without Federal Reserve membership. In total, roughly 30 percent of banks in the U.S. were held accountable to the regulatory requirements facing Federal Reserve member banks, and 64 percent were liable to the state requirements where they were chartered.

Table 2 presents the regulatory requirements facing Federal Reserve member banks and non-member banks in New York State in 1935. State members and nonmembers faced similar regulation concerning loans, stock purchases, and branching restrictions. While there were differing requirements concerning capital, the largest discrepancy between the two groups was in reserves against deposits. Not only were there differences in the required reserves on deposits, but also in the types of deposits against which the two groups had to hold reserves. State nonmember banks were required to hold deposits against only demand deposits, up to a rate of 18 percent in 1935. Member banks began the period under study with a maximum reserve ratio of 13 percent on demand deposits,

but also had to hold 3 percent reserves against their time deposits.

[Table 2]

### 3.2 Structure of New York's Commercial Banking System

New York is an ideal state to study the effect of the increases in reserve requirements for two reasons. First, the state represented a large share of total loans in the U.S. As shown in Figure 1, during the 1935-1938 period, national and state-chartered banks in New York held an average of over 21 percent of all loans in the United States. In addition, as shown in Figure 2, state-chartered banks played an important role in the banking industry, as they represented about 60 percent of total loans in New York State.[4] Second, New York State established a banking system with a great diversity. New York's banking industry consisted of large money center and global banks in New York City, medium-sized banks with active manufacturing and industrial bases, and small banks in rural areas.

[Figure 1]

[Figure 2]

New York City was the financial center of the U.S. and a central reserve city for the Federal Reserve and national banking system. National banking law required banks in a central reserve city to hold 15 percent of deposits as reserves. Banks in central reserve cities held these reserves either as cash in their vaults or, for member banks, as deposits at the Federal Reserve Bank of New York. Albany and Buffalo were designated as reserve cities. Banks in reserve cities were required to hold 12 percent of deposits as reserves, but could hold those reserves either as cash in their vaults, deposits at the Fed, or deposits in banks in central reserve cities. Banks outside of reserve cities were collectively referred to as "country banks." These banks had to hold 10 percent of deposits as reserves, and could hold those reserves either as cash in their vault or deposits in banks in reserve or central reserve cities.[5] These legal-reserve requirements reinforced and reflected

[4]Sources: National figures come from *All Bank Statistics* and New York figures come from *Rand McNally Bankers Directory*.

[5]The small percentage of country banks that joined the Federal Reserve System held their reserves as deposits at the Fed.

a reserve pyramid in which country banks around the U.S. deposited reserves in banks in reserve cities, which in turn deposited reserves in New York City, which served as the central money market for financial institutions throughout the U.S. This long-standing structure shaped the clientele of banks in different locations and the structure of their balance sheets.

For reasons just discussed, banks in New York State fall into three classification categories based on location. However, for our study we separate banks in the state into two regional groups: banks in New York City and banks outside New York City. Three facts specific to the baking structure of New York State motivate this choice. First, there were a smaller number of large banks located within New York City, and a larger number of small banks outside the city. Second, due to the difference in clients between banks in and out of New York City, banks in New York City were more likely to be influenced by a wide array of factors, whereas banks outside New York City were much more likely to be affected by local market conditions. Last, but most importantly, state banking authorities classified state banks and trust companies under their supervision as 'state banks and trust companies in Greater New York' and 'state banks and trust companies outside Grater New York' in their official reports. Clearly, the banking authorities of the state found it prudent to classify banks in the same manner as we do.

Approximately 65 percent of the loans in New York State were issued in New York City. Of the banks in New York City, state-chartered banks that were Federal Reserve members held the largest amount of bank assets, accounting for 53 percent. Nationally chartered banks were next, and held 37 percent of the loans in the city. Finally, state nonmember banks were the smallest group, with 10 percent. In comparison, over 22 percent of the total loans in New York State resided in state banks outside of New York City. State member banks in these areas held 32 percent of those assets, with state nonmember banks holding 25 percent and national banks holding 43 percent. In total, state banks (both member and nonmember) account for over 55 percent of all bank assets held outside New York City, a sizeable portion of the credit channel in that region.

The banks that operated in New York City served local, national, and international markets. Many interior banks in the U.S. maintained deposits in banks in New York City in exchange for the services these banks provided, including access to bond and securities markets as well as advice on other banking matters (Gregory, 1933). Based on a random sample of 5 percent of all banks in the U.S., 29 percent conducted business in one form or another with a New York City

bank.[6] In addition, banks in New York City served many national corporations, which used these banks to finance business activities through their easy access to debt and equity markets. On the international front, foreign governments and municipalities also borrowed from banks in New York City (Gary Richardson and Patrick Van Horn, 2009, 2012). These characteristics of the banks in New York City are critical when considering the ability of banks to mitigate the increase in reserve requirements. Banks in New York City had the opportunity to offset the increase in reserve requirements by raising capital funds from international sources or from sources in other parts of the country. A large percentage of correspondence with banks outside the city and such a diverse pool of potential borrowers meant that banks in New York City had the opportunity to diversify their portfolios with domestic as well as international investments. Turning to the importance of a contraction in loan supply from these banks, the activities of banks in New York City would have an impact on economic activity not only in the Northeast, but across the country through their correspondent relationships.

By contrast, banks outside the city of New York had few avenues to offset the increase in reserve requirement. Banks outside of New York City served a vastly different clientele and potential set of borrowers that ranged from manufacturing companies in smaller cities such as Buffalo to orchard farmers in the northwestern part of the state. Agriculture was an important part of the state economy outside of New York City. Thirty-five of the sixty-two counties in New York State had more than fifty percent of their populations in rural settings. These counties accounted for more than seventy percent of the total agricultural goods produced in the state.[7] In light of these characteristics, it is reasonable to assume that banks in these regions served smaller depositors than those in New York City and faced different loan demand schedules due to those local economic conditions.

[6]The sample comes from the *Rand McNally Bankers Directory* (1929). For each bank, the directory reported the correspondent banks that they held deposits with. Five percent of the total banks in the United States were sampled and the correspondent banks recorded. The estimate comes from extrapolating the numbers in the sample to the total number of banks in the United States.

[7]Data for the total value of farm goods comes from the 1930 Census.

# 4 Data

## 4.1 Data Sources

Data for this project was collected on all state banks and trust companies in New York from 1935 to 1938. Quarterly balance sheets for all state banks and trust companies were published every year by the State of New York Banking Department, which conducted inspections of all financial intermediaries that held a state charter. The resulting information was published in the *Annual Report of the Superintendent of Banks*. We computerized this data for the years relevant to our study.

The structure of state banks and trust companies in New York provides a unique dataset that contains both banks affected by higher reserve requirements and unaffected banks. Our micro-sample consists of data on 291 state-chartered banks and trust companies, 183 of which are non-member banks and 108 are member banks.[8] While over 50 percent of the sample consists of nonmember banks, those banks are much smaller than member banks, averaging almost 60 million in assets versus just over 1 million in assets for nonmember banks. Our data on state-chartered banks represents a large share of all loans in the state of New York. Returning to Figure 2, we see that state-charted banks were important financial intermediaries in New York during this period; they represented 60 percent of total loans.

Table 3 displays the aggregate balance sheet of state commercial banks in 1935. On the asset side, we focus on four types of asset categories that represent loans. The first category is 'mortgages owned,' which are loans on real estate secured.[9] Banks were allowed to make mortgage loans for farmland within one hundred miles of the city, though these mortgage loans accompanied several restrictions. The second category is 'loans and discounts secured by bond and mortgage, deed and other real estate collateral,' which are loans backed by mortgage security and deeds. However, a deed was taken as a mortgage, but not an absolute transfer of ownership. Moreover, well-managed banks avoided deeds. The third category is 'loans and discounts secured by other collateral.' These are loans secured by anything except for real estate security, Liberty Bonds, stocks and bonds listed on the stock exchanges, and unlisted securities. The fourth category is 'loans, discounts, and bills

[8] We have removed 10 banks that switched their membership status.

[9] National banks were prevented from making mortgage loans until the passage of the Federal Reserve Act.

purchased not secured by collateral'. These are loans represented by promissory notes.

[Table 3]

### 4.2 Balance Sheet Trend and Summary Statistics

To determine whether the Federal Reserve's decision to manipulate reserve requirements affected the lending behavior of member banks, we begin with an analysis of asset portfolios of member and nonmember banks in the state of New York. In accordance with previous studies, we focus on trends in cash, securities, and loans.

Figure 3, Panel A shows the path of the cash-deposit ratio from 1935Q1 to 1938Q4. If the change in reserve requirements had an immediate impact on bank balance sheets, we would expect the cash-deposit ratio to fall after the increase in the requirements and that ratio to rise after a decrease in reserve requirements. For member banks, the cash-deposit ratio slowly rises over this period, regardless of the amount of reserves required on deposits. For non-member banks, the cash-deposit ratio remains rather constant over the same time period. The gap between member and nonmember bank ratios increased after reserve requirements were increased as a result of a higher cash-deposit ratio for member banks.

In order to verify if banks with securities were able to able to mitigate contractionary policy efforts by liquidating these assets to counter lost reserves, we examine the path of the securities-deposit ratio, as shown in Figure 3, Panel B. The securities-deposit ratio for member banks declines steadily during the period after their reserve requirements were increased. In comparison, for nonmember banks the securities-deposit ratio exhibits the same behavior as their cash-deposit ratio and does not fluctuate in response to the increases in reserve requirement. The behavior of the ratio for member banks supports Telser (2001)'s argument that member banks were able to mitigate the contractionary effect of higher reserve requirements by liquidating government securities.

[Figure 3]

Next, we examine the trend behavior of loans from 1935Q1 to 1938Q4 in Figure 4 demonstrate the similarity between the behavior of member and nonmember banks. Two distinct patterns emerge. First, growth in loans for member and nonmember banks followed a uniform pattern.

Second, bank lending actually increased due to the rise in the amount of loans secured by other and unsecured loans. Not until 1937Q4, well after the final increase in reserve requirements and the start of the recession, does bank lending begin to decline.

[Figure 4]

Table 4 contains sample means and standard deviations for member and nonmember banks before and after the Federal Reserve's adjustments in reserve requirements in 1936. Because the difference-in-difference estimation we later employ uses member banks as a treatment group and nonmember banks as a control group, it is important that banks in both groups have similar characteristics. Overall, the summary statistics confirm that member and nonmember banks are on average relatively similar. In particular, banks in both groups hold similar levels of loan-deposit ratios of approximately 50 percent before the increases in reserve requirements. We observe similar patterns for cash-deposit ratios and securities-deposit ratios. In general, member banks held more cash reserves while nonmember banks held more securities. However, the mean values for both ratios are not significantly different.

[Table 4]

In summary, the patterns in bank balance sheets are not consistent with higher reserve requirements leading to a reduction in bank lending in the latter 1930s. The evidence also indicates the relaxation of reserve requirements did not lead to an increase in the cash-reserve ratio and an increase in bank lending in 1938, as we might expect. The data so far support the findings of Telser (2001) and Calomiris, Mason, and Wheelock (2011) that the higher reserve requirements were not binding. In order to shed light on this issue, we implement difference-in-difference estimators. In this manner, we isolate loan supply effects from loan demand effects and assess whether the lending behavior of member banks differed from that of that of nonmember banks after the Federal Reserve manipulated reserve requirements.

## 5 Econometric Methodology

We now outline the methods we use to compare bank lending responses to the exogenous increase in reserve requirements. First, we address the issue of selection bias in regards to Federal Reserve

membership and then develop the regression models that underlie our core results.

### 5.1 Selection Bias

A potential pitfall for this analysis is that the non-random nature of Federal Reserve membership may bias the effect of reserve requirement increases on banks' loan supply schedules. Commercial banks are not randomly assigned to membership in the Federal Reserve System and this could create a selection bias issue. We address three main areas of concern in this regard. The first relates to the idea that banks not opting for membership would do so in order to issue riskier loans that member banks could not. Second, we might expect reserve demand to differ for nonmember banks relative to member banks. Finally, if nonmember banks faced different loan demand schedules than member banks, our results would not accurately reflect the effects of an increase in reserve requirements.

If banks not electing membership into the Federal Reserve System did so in order to issue riskier loans than member banks, this would bias our loan growth estimation.[10] However, the regulatory environment in New York State would have prevented this. The loan regulations listed in Table 2 contain the restrictions on loans that state nonmember banks had to abide by, which restricted the relative amount those banks could loan to one entity either in or outside the state, as well as what could be taken as collateral. Furthermore, as Mitchener (2007) finds, New York State was one of the most stringent state banking authorities and experienced one of the lowest failure rates of any state in the 1929-1933 period. When considering the rigorous regulations facing nonmember banks in New York, it is not apparent that banks would sort into member or nonmember status to take advantage of lenient or lax rules regarding loans or reserves against deposits.

The second selection issue is banks may have encountered different reserve demand. In this case, banks would choose to elect membership in the Federal Reserve System in order to access to the discount window and supply credit. While discounting was supposed to attract state-chartered banks to the federal system, White (1983) finds that access to the discount window did not draw state banks into the Federal Reserve System. Instead, nonmember banks could rely on a correspondent network instead of the discount window for additional liquidity needs. As a result,

[10] A major expansion in the admission of banks to the Federal Reserve System occurred between 1918 and 1922 as a result of bankers' desire to strengthen the nation's financial system fueled by World War I, the Federal Reserve System's effort to expand its membership, and banks' desire to borrow from the Federal Reserve System during the Slump of 1919-1920. After that date, the admission of banks to the Federal Reserve membership decreased.

nonmember banks did not have problems accessing funds to meet their reserve demands and thus did not face difficulty in loan supply.

The third issue involves member and nonmember banks facing different loan demand schedules. However, this should not bias our results as joining the Federal Reserve System may have changed the incentives of bank managers, share-holders, and depositors, but not borrowers. As shown in Table 2, the membership status affected capital and reserve requirements. Since both member and nonmember banks were regulated by state-authorities, borrowers would face the same requirements by banks when seeking loans. Moreover, regulatory structure ensured the two types of banks would face homogenous borrowers. State banking law in New York specified that banks could only operate branches within the town the main office was located. For example, a bank in Buffalo could own and operate branches within the city of Buffalo, but not the nearby town of Tonawanda. Banks in New York City were permitted to operate branches in the city and the surrounding boroughs, as long as the branch resided in the same county as the main office. In this type of an environment, both member and nonmember banks should experience the same loan demand as borrowers should not discriminate amongst state banks based on membership when deciding whom to borrow from.

While we are able to observe bank characteristic such as Federal Reserve membership, town or city, and a host of other traits, there are admittedly some characteristics we do not observe. The advantage of the differences-in-differences empirical strategy is that it ensures any unobserved characteristics that remain constant over time and are correlated with the selection decision and bank loan supply will not bias the estimated effect. The unobservable characteristics are simply differenced out. In the following section, we implement a differences-in-differences estimation technique to assess the impact of higher reserve requirements.

### 5.2 Difference-in-Difference Identification

We employ difference-in-difference estimators to identify the causal effect of reserve requirement increments on bank lending. Supervisory features of the U.S. allow us to define a treatment and a control group: some state-chartered banks chose membership in the Federal Reserve System while others did not. This empirical strategy ensures that any unobserved characteristics that remain constant over time and are correlated with the selection decision and bank lending will not bias the estimated effect.

We include time fixed effects that control for any aggregate shocks in the evolution of loan demand and bank fixed effects that control for time-invariant influences. Controlling for time and individual effects, our difference-in-difference estimators measuring the effect of higher reserve requirements on bank lending are obtained using the following model:

$$\Delta ln(L_{i,t}) = \beta_1 INCREASE_t + \beta_2 MEMBER_i * INCREASE_t + \beta_3 X_{i,t-1} + Z + \mu_{i,t} \tag{1}$$

where the dependent variable is the growth rate of loans for bank $i$ located at time period $t$. $\Delta ln(L_{i,t})$ represents each of the dependent variables: the growth rate of total loans, the growth rate of loans secured by bonds, the growth rate of loans secured by mortgage, the growth rate of loans secured by other, and the growth rate of unsecured loans. The dummy variable, $MEMBER_i$, takes on the value of one if the observation is for member banks. The other dummy variable, INCREASE, takes on the value of one if the observation is recorded after the increase in reserve requirements. $X_{i,t-1}$ represents a vector of bank-level controls that varies over time and across banks. These include the capitalization ratio, loan-to-deposit ratio, loan quality, and log of asset size. Each of these controls is entered directly as well as with three separate interaction terms per the difference-in-difference estimation. The additional repressors are designed to capture a number of factors that can potentially bias the diff-in-diff estimator. The vector of controls $Z$ includes time dummies and bank-specific fixed effects to control for unobserved heterogeneity at the bank level.

A natural question with respect to our empirical approach is how member banks responded to the new reserve requirements since they were adjusted on three different occasions. In 1936, the Fed raised reserve requirements of member banks on both demand and time deposits by 50 percent. In 1937 it further raised the requirements on demand and time deposits by another 33 percent, thus doubling them from their 1935 level. Lastly, in April 1938 the Federal Reserve relaxed reserve requirements on demand deposits by about 13 percent and on time deposits by 17 percent although the 1938 level was still 71 percent higher than the 1935 level. The following regression captures how the changes in reserve requirements affected member banks' loan supply behavior:

$$\begin{aligned} \Delta ln(L_{i,t}) = {} & \beta_1 MEMBER_i * CHANGE1_t + \beta_2 MEMBER_i * CHANGE2_t \\ & + \beta_3 MEMBER_i * CHANGE3_t + Z + \mu_{i,t} \end{aligned} \tag{2}$$

where the variable Change1t is a time dummy with a value of zero for all quarters before the

increases in reserve requirement (t $\leq$ Q2 1936) and a value of one for all quarters after the first increase in reserve requirement (Q3 1936 $\leq$ t $\leq$ Q1 1937). Similarly, Change2t and Change3t indicate time dummies that take a value of one for all quarters after the second increase in reserve requirements (Q2 1937 $\leq$ t $\leq$ Q2 1938) and relaxation in reserve requirements (Q3 1938 $\leq$ t $\leq$ Q4 1938), respectively. The coefficients $\beta_1$, $\beta_2$, and $\beta_3$ represent the difference?in?difference estimates of the effect of reserve requirement increments. If member banks reduced loan supply because reserve requirements were binding for them, their loan supply would have been less than nonmember banks. As a result, we would expect the coefficients on deposit growth to have negative signs.

# 6 Empirical Results

In Table 5, we report the difference-in-difference estimation after simply dividing the sample period before and after the change in reserve requirements, as illustrated in Equation (1). Column 1 contains the difference-in-difference estimation without bank fixed effects. The variable Memberi otherwise interferes with bank fixed effects that enters the equation. Column 2 reports results with bank fixed effects, and column 3 reports results with bank characteristics that are regarded as relevant for bank lending in the banking literature. With regard to our main variable of interest, the interaction term $INCREASE_t * MEMBER_i$, we find the coefficient to be statistically insignificant in all three columns. These results suggest the changes in reserve requirements did not cause member banks to change their lending behavior.

[Table 5]

Next, we rerun our models to investigate whether the lending behavior of member banks changed after each time the Federal Reserve changed reserve requirements. In Table 6, we report the results. Results in Table 6 are similar to those in Table 5. Our main variable of interest, interaction terms $CHANGE1_t * MEMBER_i$, $CHANGE2_t * MEMBER_i$, and $CHANGE3_t * MEMBER_i$ are insignificant in every regression. As shown in columns 2 and 3, including bank specific dummies and bank characteristics adds some explanation to our regression, but does not change the effect of the interaction terms. Taken together, these results suggest that the changes in reserve requirements

did not cause member banks to reduce lending.

[Table 6]

These two sets of results strongly advocate that member banks did not reduce loan supply after the Federal Reserve manipulated reserve requirements. The lending behavior of member banks was not statistically different from that of nonmember banks, which confirms the suggestion that the Federal Reserve's doubling of reserve requirements did not affect member banks. This finding is in line with Calomiris, Mason, and Wheelock (2011) who suggest that increases in reserve requirements had little impact on member banks because they held abundant excess reserves. According to their results, banks did not increase their reserve demand after the new requirements took effect. Our results, which instead focus on bank lending, strongly support their findings that the doubling of reserve requirements may not have been a major component of the recession.

However, there are other possible effects that the increase in reserve requirements might have on bank behavior than simply reducing loan supply. Perhaps it was not the total loan supply that changes after the reserve requirement increases, but the composition of member banks' loan portfolios. Member banks might have reduced the supply of one type of loan and substituted it with a different type of loan, with the total amount of loans outstanding constant. Simply focusing on the aggregate amount of loans at each bank would not allow us to rule out the possibility that these coefficients are hiding the changes in the composition of loan portfolios. The detailed structure of our bank data allows us to investigate this issue. To mitigate such concerns, we compare whether the supply of different types of loans differ between member and nonmember banks. In particular, we consolidate data for loans secured by bonds, loans secured by mortgage, loans secured by other and unsecured loans.

Table 7 presents regression results for the collapsed sample for different loan categories. Table 7 is quantitatively similar to those in Table 6. The coefficients on the interaction terms, $CHANGE1_t * MEMBER_i$, $CHANGE2_t * MEMBER_i$, and $CHANGE3_t * MEMBER_i$ are statistically insignificant for all regressions when we separately run the estimation for different types of loans. In other words, increases in reserve requirements did not cause member banks to reduce any types of loans. These results reinforce our conclusions that the change in reserve requirements did not alter member banks' lending behavior.

[Table 7]

Next, we investigate whether responses of large banks differed from those of small banks. Bank-holding groups were not permitted in New York State. Unlike banks today, banks in New York at the time could not rely on a large banking group to raise funds to meet loan demand. This is especially true for banks located outside of New York City. Banks in rural areas of the state, whether member or nonmember banks, had to rely on the fundraising of their own management to offset any loss of loanable funds if they had loan demand that they could not meet. Banks in New York City, as mentioned earlier, did have a higher probability of raising funds externally in such a situation given their international clients as well as correspondent banks in the U.S. We assume this was correlated with bank size, which we can control for given our bank-level data. Our results on the difference between member and non-member banks cannot be robust without controlling for their size differences. If the main results are largely driven by small five banks, the effect on higher reserve requirements on bank lending may be overestimated. Thus, we examine sub-samples of large and small banks separately.[11] Following Cetorelli and Goldberg (2012), we define a large bank as any bank that is in the 90th percentile or higher of banks sorted by asset size, and a small bank as any bank that is in the 90th percentile or lower.[12]

Table 8 shows that even after controlling for bank size, our results are consistent with our earlier findings. We find that most coefficients on interaction terms are insignificant. For big banks, the coefficient on $CHANGE3_t * MEMBER_i$ is significant for total loans and loans secured by other at the 5 percent level. Hence, member banks' lending did not decrease until after 1938Q2 after the final adjustment in reserve requirements and the start of the recession. For small banks, coefficients on interaction terms are significant for all types of loans. Collectively, these results indicate that increases in both types of banks were not affected by the increases in reserve requirements and our results are not driven by the behavior of small banks.

[Table 8]

[11] In the bank lending literature, bank size might play in the transmission of policy effects could be that large banks were more able to raise external funds than smaller banks were. Large banks had access to equity markets and other sources of external funding that smaller banks did not. In this scenario, large banks were able to maintain levels of credit while small banks were not and were forced to reduce loan supply. This would be similar to the results that Ashcraft (2006) found for banks that were members of a bank-holding group.

[12] Cetorelli and Goldberg (2012) define a large bank as any bank that is in the 95th percentile or higher of banks sorted by asset size, and a small bank as any bank that is in the 90th percentile or lower. They create a gap between the two in order to make the distinction between the two types of banks more clear.

In addition, we compare the lending behavior of banks located in New York City and banks located outside New York City. As noted by Velde (2009), banks in New York City held a high proportion of required reserves out of total reserves than banks outside New York City, and the reaction of member banks in New York City was markedly different from that of the banking system overall. It is also possible that banks in New York City had access to external funds that banks outside of the city did not. Additionally, we expect the customer base for banks in each region to differ due to the nature of the economic and demographic structure in each respective area. One might question whether member and nonmember banks faced different loan demand schedules in each region.

As previously discussed, the regulatory structure in New York State and the unit banking system ensured that the two types of banks would face similar loan demand schedules. Loan demand is time variant, and one might suspect that member and nonmember banks would respond differently to these variations in loan demand over time. However, the state nonmember banks of New York faced strict regulations similar to that of state member banks. Therefore, we assume that the only variation in loan demand that banks was across regions but not across bank membership. To control for the factors affecting loan demand that varied by region, we separate banks into two groups: banks that operated in New York City and banks that operated outside New York City.

Table 9 indicates that the member banks' lending behavior did not change after the increases in reserve requirements, regardless of the location of member banks. All coefficients on interaction terms are insignificant, suggesting that member banks did not reduce lending after the increases in reserve requirements. This result has important implications for the effect of the reserve requirement increases on the lending behavior of U.S. banks that are located in areas with large populations. These results suggest that neither banks in large urban centers nor rural agricultural regions reduced lending and incited the recession that followed.

[Table 9]

However, it is possible that banks whose reserve holdings were relatively lower may have reduced lending in order to restore their precautionary reserves above required reserves. Since many banks had a large amount of excess reserves during this period, we define constrained banks as those that have a ratio of excess reserves to required reserves of less than 1.5 in 1936 Q2, the period before the

beginning of reserve requirements increases, and compare the lending behavior of member banks to that of nonmember banks.[13]

Table 10 displays results. In most cases, the coefficients are insignificant. While the coefficients on the interaction terms Change2t*Memberi, and Change3t*Memberi$CHANGE2_t * MEMBER_i$ and $CHANGE3_t * MEMBER_i$ are significant for the growth of total loans, they are significant at the 10 percent level. We find that the behavior of member banks that had a relatively lower level of excess reserves before the Federal Reserve increased reserve requirements did not differ from that of nonmember banks which held the similar level of excess reserves after the doubling of reserve requirements.

[Table 10]

Finally, we examine whether the impact of reserve requirements manifested itself on cash and securities rather than loans as argued by Telser (2001), Stauffer (2002) and Velde (2009). Since the reaction of member banks in New York City was different from that of the banking system overall, consider banks in New York City and outside the city separately.

The results in Table 11 indicate member banks responded to increases in reserve requirements by increasing cash holdings and decreasing securities. For the sample for all banks in New York State, the coefficients on the interaction terms for cash are positive while those for securities are negative. Interestingly, results for the sub-samples of banks do not follow those for the entire sample of banks. For banks in New York City, the coefficients on the interaction terms are insignificant. In comparison, for banks outside New York City, the coefficients on the interaction terms for cash are positive while those for securities are negative. In other words, results for all banks in New York State are driven by the results for banks outside New York City.

[Table 11]

Taken together, our study indicates that the changes in reserve requirements did not lead member banks to reduce lending. Member banks were able to mitigate the contractionary effect of reserve requirement increases by selling securities. Our results confirm the conclusions of Calomiris, Mason, and Wheelock (2011) and Irwin (2012) while it finds little evidence for the explanation offered by Friedman and Schwartz (1963).

[13]There are 12 member banks and 49 nonmember banks that fall under this category.

# 7 Conclusion

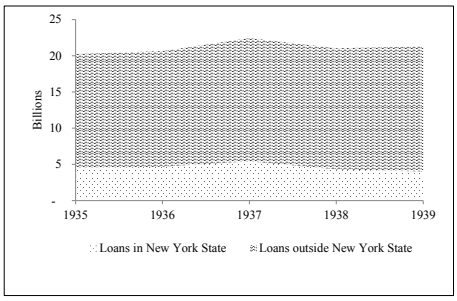
Scholars have debated on whether the changes in reserve requirements affected the lending behavior of member banks. The Federal Reserve, concerned with growing levels of excess reserves and their ability to control credit, assumed that raising required reserve levels would enable the usual policy tools of the discount window and open market operations to be more effective. Extensive discussions within the Fed indicate policymakers did not believe higher reserve ratios would seriously reduce loan supply and the availability of credit. Friedman and Schwartz (1963) contested this view, arguing the Federal Reserve's actions in 1936 and 1937 reduced high-powered money and the supply of credit, which led to the recession of 1937-38. Recently, the Friedman and Schwartz (1963) view of the origins of the recession of 1937-1938 has been challenged. Currie (1980), Calomiris and Wheelock (1998), Calomiris, Mason, and Wheelock (2012) and Irwin (2012) have argued that the increase in reserve requirements did not change the lending behavior of member banks because member banks held excess reserves sufficient to meet the new requirements.

This paper is the first study on the bank level data to examine how the Federal Reserve's doubling of reserve requirements affected member banks' lending behavior. We assembled a unique dataset on the state-chartered banks and trust companies in the state of New York from 1935 to 1935 to compare the lending behavior of member banks to that of nonmember banks. Previous studies were unable to address this issue from the perspective of bank lending due to the lack of availability of a control group as we do in the 1930s.

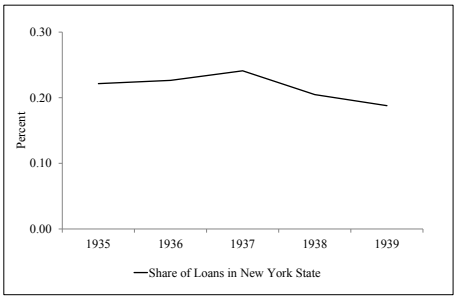
Our findings indicate that bank lending did not contract after reserve requirements were raised, and the lending behavior of member banks is indistinguishable from that of nonmember banks. While this policy was long believed to be responsible for the onset of the great recession of 1936-1937 amongst academics, our study offers strong support that Federal Reserve officials were correct in their assessment of credit conditions and policy effects surrounding the reserve requirement increase. Since the actions of the Federal Reserve are often cited as a catalyst for much of the turmoil in the banking system after 1930, some of it deservedly so, their decision to increase reserve requirements does not deserve to be grouped into that category. Instead, their decision to pull member banks within arms' reach of the open market policy tools available to them appears to be a decision made on sound policy considerations.

Our study on the Federal Reserve's doubling of reserve requirements in 1936-1937 has an important implication for monetary policy today. Following multiple rounds of successive quantitative easing, excess reserves increased dramatically in the U.S. banking system beginning at the end of 2008. Currently, excess reserves in U.S. banks total over $1.6 trillion. Recent statements by Chairman Ben Bernanke indicate the Fed might choose to hold certain assets that the Federal Reserve has purchased for an extended period of time, reducing the available portion of the Fed's balance sheet that it could use in an exit strategy from current policies. Two available policy options in such an environment are raising interest payments on excess reserves, and increasing reserve requirements against deposits. While the effectiveness of the former depends on the Federal Reserve's ability to gauge the interest elasticity of reserve demand and raise interest rates accordingly, the latter can immediately affect excess reserves. Our study shows that increases in reserve requirements can control excess reserves without immediately affecting the lending behavior of banks.

Figure 1: Loan Totals, New York State and Rest of the U.S., 1935-1939.



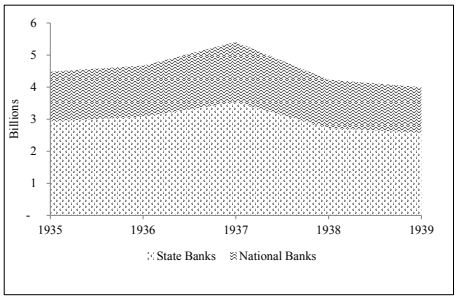

(a) Total Volume



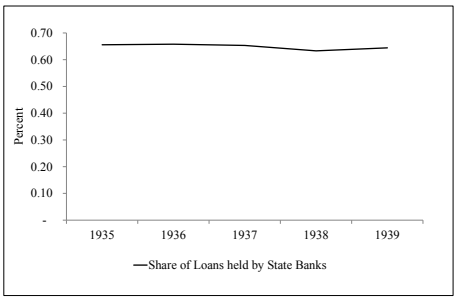

(b) Percentage

*Source: All Bank Statistics, 1896-1955.*

Figure 2: Loan Totals, by Bank Charter New York State, 1935-1939.



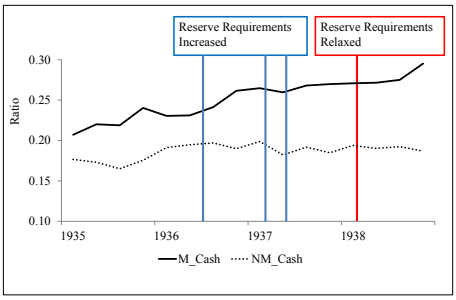

(a) Total Volume



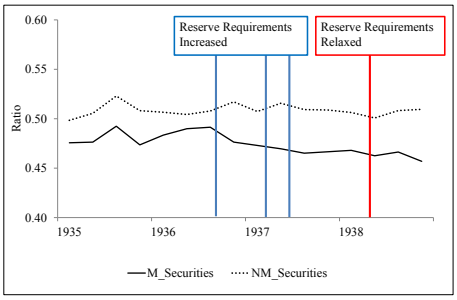

(b) Percentage

*Source: All Bank Statistics, 1896-1955.*

Figure 3: Liquidity Ratios, State Banks in New York State, 1935-1938.



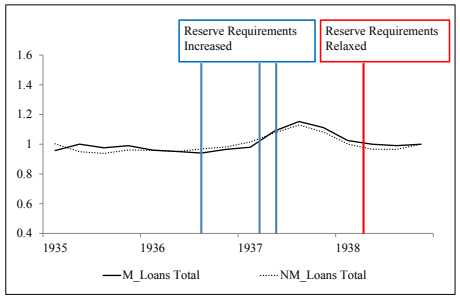

(a) Cash-Deposit Ratio



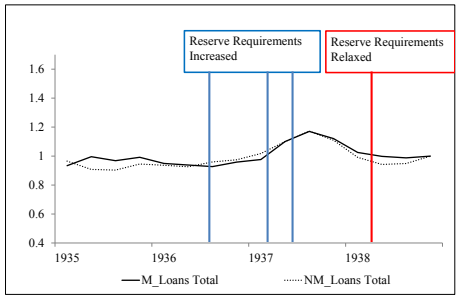

(b) Securities-Deposit Ratio

*Source: Authors' calculations.*

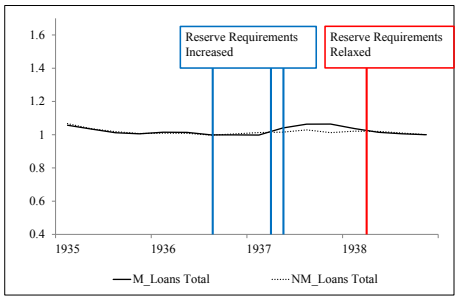
Figure 4: Loan Activity Indexed to Average of 1935, State Banks in New York State, 1935-1938.




(a) All Banks in New York State




(b) All Banks in New York City




(c) All Banks outside New York City

*Source*: Authors' calculations.

Table 1: Federal Reserve Member Bank Reserve Requirements Against Deposits, June 21, 1917 - October 31, 1941.

| Class of Deposits and Bank (Percent of Deposits) | June 21, 1917 - Aug. 15, 1936 | Aug. 16, 1936 - Feb. 28, 1937 | Mar. 1, 1937 - Apr. 30, 1937 | May 1, 1937 - Apr. 15, 1938 | Apr. 16, 1938 - Oct. 31, 1941 |
|---|---|---|---|---|---|
| Net Demand Deposits: | | | | | |
| Central reserve city | 13 | 19.5 | 22.75 | 26 | 22.75 |
| Reserve city | 10 | 15 | 17.5 | 20 | 17.5 |
| Country | 7 | 10.5 | 12.25 | 14 | 12 |
| Time Deposits: | | | | | |
| All member banks | 3 | 4.5 | 5.25 | 6 | 5 |

*Source*: Board of Governors of the Federal Reserve System (1943). *Banking and Monetary Statistics*, 1914-41. Washington, DC.

Table 2: Regulatory Requirements, New York State Federal Reserve Member and Nonmember Banks.

| | ***State Members*** | ***State Nonmembers*** |
|---|---|---|
| Capital Stock | Population of town less than 3,000 : $25,000<br><br>Population of town greater than 3,000 but less than 6,000 : $50,000<br><br>Population of town greater than 6,000 but less than 50,000 : $100,000<br><br>Population of town more than 50,000 : $200,000<br><br>In an outlying district of a town with a population more than 50,000 : $100,000 | Population of town less than 2,000 : $25,000<br><br>Population of town greater than 2,000 and less than 30,000 : $50,000<br><br>Population of town over 30,000 : $100,000 |
| Reserves against Deposits | If not in a reserve or central reserve city: 7% demand deposits and 3 percent time deposits<br><br>If in a reserve city: 10 % demand deposits and 3 % time deposits<br><br>If in a central reserve city: 13 % demand deposits and 3 % time deposits<br><br>(Banks were allowed to count interbank balances as part of their reserves.) | Population of town less than 1,000,000 : 12% of demand deposits with 4 % on hand<br><br>Population of town over 1,000,000 but less than 1,500,000 : 15 % of demand deposits with 10 % on hand<br><br>Population of town over 1,500,000 : 18% of demand deposits with 12 % on hand |
| Surplus Fund | NA | Up to 20% of the value of capital stock can be used to pay losses. |
| Can hold stocks or bonds from United States Government? | Yes | Yes |
| Can hold stocks or bonds from State of NY? | Yes | Yes |
| Amount to be loaned to one individual or company | NA | Not more than 10% of Paid-up Capital and Surplus. |
| Amount to be loaned to any entity outside of NY State, if bank is in NYC | NA | Not more than 25% of Paid-up Capital and Surplus |
| Amount to be loaned to any entity outside of NY State, if bank is outside NYC | NA | Not more than 40% of Paid-up Capital and Surplus |
| Highest Amount Bank Can Hold of Capital Stock in Another Corporation as Loan Collateral | NA | Not more than 10% of the Capital Stock of the Other Corporation |
| Can operate branches? | Yes, as long as it is in the same town as the main office. | Yes, as long as it is in the same town as the main office. |

*Sources*: Data for Federal Reserve members come from the *Federal Reserve Bulletins*. Data for the New York State requirements come from the New York State Banking Department (1930).

Table 3: Assets and Liabilities Reported, 1935-1938.

| Assets | Liabilities |
|---|---|
| Specie | Capital |
| Other currency authorized by the United States government | Surplus, including all undivided profits |
| Cash Items | Reserves for taxes, expenses, contingencies, etc. |
| Due from NY Federal Reserve Bank, less offsets | Deposits |
| Due from other approved reserve depositories, less offsets | Preferred |
| Due from other banks, bankers, and trust companies | Demand |
| Stocks and bond investments | Time |
| Loans and discounts secured by bond, mortgage, deed, or other real estate collateral | Not preferred |
| Loans and discounts secured by other collateral | Demand |
| Loans, discounts, and bills purchased but not secured by collateral | Time |
| Own acceptances purchased | Due trust companies, banks, and bankers |
| Overdrafts | Bills payable |
| Bonds and mortgages owned | Rediscounts |
| Real estate | Acceptances of drafts payable at a future date or authorized by commercial letters of credit |
| Customers liability on acceptances (per contra, see liabilities) | Bills purchased sold with endorsement |
| Customers liability on bills purchased and sold with endorsement | Other liabilities |
| Other Assets | |

*Source*: New York State Banking Department (1935-1938).

Table 4: Summary Statistics, New York State Banks, Before and After the First Reserve Requirement Increase

| | Member Banks | | Non-member Banks | |
|---|---|---|---|---|
| | Before | After | Before | After |
| Cash-Deposit Ratio | 0.22 | 0.26 | 0.18 | 0.19 |
| | (0.11) | (0.13) | (0.10) | (0.10) |
| Securities-Deposit Ratio | 0.49 | 0.47 | 0.51 | 0.51 |
| | (0.16) | (0.14) | (0.18) | (0.17) |
| Loan-Deposit Ratio | 0.47 | 0.41 | 0.50 | 0.46 |
| | (0.15) | (0.13) | (0.18) | (0.16) |
| Capital-Deposit Ratio | 0.20 | 0.18 | 0.24 | 0.20 |
| | (0.09) | (0.07) | (0.14) | (0.10) |
| Asset | 70,200,000 | 77,100,000 | 9,667,634 | 10,900,000 |
| | (237,000,000) | (255,000,000) | (44,200,000) | (49,300,000) |
| Cash | 16,000,000 | 23,500,000 | 2,103,654 | 2,947,552 |
| | (60,600,000) | (82,700,000) | (11,700,000) | (16,500,000) |
| Securities | 30,000,000 | 27,900,000 | 3,453,700 | 3,518,063 |
| | (103,000,000) | (92,300,000) | (14,100,000) | (12,700,000) |
| Excess Reserves | 10,700,000 | 13,000,000 | 1,195,358 | 1,900,968 |
| | (42,900,000) | (48,900,000) | (6,688,995) | (10,600,000) |
| Total Loans | 20,900,000 | 22,300,000 | 3,411,200 | 3,753,781 |
| | (69,300,000) | (75,800,000) | (16,100,000) | (19,000,000) |
| Loans Secured | 482,610 | 350,941 | 153,608 | 112,206 |
| | (1,343,151) | (883,824) | (503,589) | (316,466) |
| Loans Secured by Mortgage | 1,432,882 | 15,23,188 | 579,469 | 591,759 |
| | (3,562,880) | (3,588,525) | (2,185,311) | (2,178,470) |
| Loans Secured by Other | 12,400,000 | 12,100,000 | 1,594,947 | 1,771,147 |
| | (46,400,000) | (47,300,000) | (8,006,521) | (9,580,364) |
| Loans Unsecured | 6,508,037 | 8,299,106 | 1,083,176 | 1,278,669 |
| | (21,800,000) | (28,100,000) | (7,103,805) | (8,847,592) |
| Total Deposits | 47,100,000 | 52,500,000 | 7,248,558 | 8,353,395 |
| | (150,000,000) | (163,000,000) | (32,300,000) | (36,900,000) |
| Demand Deposits | 40,800,000 | 44,900,000 | 5,434,652 | 6,071,852 |
| | (142,000,000) | (152,000,000) | (29,800,000) | (33,300,000) |
| Time Deposits | 6,367,910 | 7,627,813 | 1,813,906 | 2,281,542 |
| | (13,600,000) | (15,800,000) | (4,307,293) | (5,737,629) |

*Notes:* Authors' calculations. 'Before' and 'After' are defined as the periods 1935Q1-1936Q2 and 1936Q3-1938Q4, respectively.

Table 5: Effects of Reserve Requirement Increases on Total Bank Loans, State Banks in New York State

| | (1)<br>Δ Total loans | (2)<br>Δ Total loans | (3)<br>Δ Total loans |
|---|---|---|---|
| *Increase* | 0.00 | -0.00 | 0.00 |
| | (0.005) | (0.007) | (0.007) |
| *Increase*Member* | -0.00 | -0.00 | -0.01 |
| | (0.003) | (0.004) | (0.004) |
| *Loans to deposits (t-1)* | | | 0.08*** |
| | | | (0.031) |
| *Capital to deposits (t-1)* | | | -0.05 |
| | | | (0.032) |
| *Ln(Asset) (t-1)* | | | -0.08*** |
| | | | (0.020) |
| *Loan quality (t-1)* | | | 0.07 |
| | | | (0.043) |
| Bank FE | No | Yes | Yes |
| Time FE | Yes | Yes | Yes |
| Observations | 4,161 | 4,161 | 4,161 |
| R-squared | 0.018 | 0.020 | 0.033 |

*Notes*: This table shows results for the regressions of Equation (1) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. *Increase* is a dummy variable that is zero for the pre-reserve requirement increments period and one after the reserve requirement increments. Loans to deposits and Capital to deposits are the ratios of loans and capital, for each bank, relative to its total deposits. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 6: Effects of Each Reserve Requirement Increases on Total Bank Loans, State Banks in New York State

| | (1)<br>Δ Total loans | (2)<br>Δ Total loans | (3)<br>Δ Total loans |
|---|---|---|---|
| *Change 1*Member* | -0.00 | -0.00 | -0.00 |
| | (0.006) | (0.006) | (0.006) |
| *Change 2*Member* | -0.00 | -0.00 | -0.00 |
| | (0.004) | (0.006) | (0.006) |
| *Change 3*Member* | 0.00 | -0.00 | -0.00 |
| | (0.007) | (0.008) | (0.008) |
| *Loans to deposits (t-1)* | | | 0.08*** |
| | | | (0.031) |
| *Capital to deposits (t-1)* | | | -0.05 |
| | | | (0.032) |
| *Ln(Asset) (t-1)* | | | -0.08*** |
| | | | (0.018) |
| *Loan quality (t-1)* | | | 0.07 |
| | | | (0.044) |
| Bank FE | No | Yes | Yes |
| Time FE | Yes | Yes | Yes |
| Observations | 4,161 | 4,161 | 4,161 |
| R-squared | 0.018 | 0.020 | 0.032 |

*Notes*: This table shows results for the regressions of Equation (2) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Loans to deposits and Capital to deposits are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 7: Effects of Reserve Requirement Increases on Bank Loans by Loan Type, State Banks in New York State

| | (1) Δ Loans secured by bonds | (2) Δ Loans secured by mortgage | (3) Δ Loans secured by other | (4) Δ Loans unsecured |
|---|---|---|---|---|
| *Change 1*Member* | 0.04 | -0.01 | 0.02 | 0.00 |
| | (0.024) | (0.010) | (0.016) | (0.015) |
| *Change 2*Member* | 0.03 | -0.02* | 0.02 | -0.01 |
| | (0.020) | (0.011) | (0.016) | (0.014) |
| *Change 3*Member* | 0.03 | 0.00 | 0.00 | 0.01 |
| | (0.030) | (0.013) | (0.020) | (0.022) |
| Balance Sheet Controls | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes |
| Bank | Yes | Yes | Yes | Yes |
| Observations | 3,855 | 3,977 | 4,157 | 4,151 |
| R-squared | 0.009 | 0.008 | 0.065 | 0.112 |

*Notes*: This table contains the results for the regressions of Equation (2) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Balance sheet control variables are loan-deposit ratio, capital-deposit ratio, total assets, and loan quality ratio. Loans to assets and Capital to assets are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 8: Effects of Reserve Requirement Increases on Total Bank Loans, By Bank Size, State Banks in New York State

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | Big Banks | | | Small Banks | |
| | Δ Total loans | Δ Loans secured by other | Δ Loans unsecured | Δ Total loans | Δ Loans secured by other | Δ Loans unsecured |
| *Change 1*Member* | 0.01 | -0.00 | 0.14** | -0.01 | 0.03* | -0.02 |
| | (0.018) | (0.041) | (0.059) | (0.006) | (0.018) | (0.016) |
| *Change 2*Member* | 0.02 | -0.01 | 0.10** | -0.00 | 0.04** | -0.02 |
| | (0.029) | (0.042) | (0.038) | (0.005) | (0.017) | (0.015) |
| *Change 3*Member* | -0.03** | -0.07** | 0.05 | 0.00 | 0.02 | 0.00 |
| | (0.013) | (0.027) | (0.055) | (0.009) | (0.023) | (0.024) |
| Balance Sheet Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 424 | 420 | 419 | 3,737 | 3,737 | 3,732 |
| R-squared | 0.244 | 0.173 | 0.247 | 0.027 | 0.072 | 0.106 |

*Notes*: This table contains the results for the regressions of Equation (2) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Balance sheet control variables are loan-deposit ratio, capital-deposit ratio, total assets, and loan quality ratio. Loans to assets and Capital to assets are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 9: Effects of Reserve Requirement Increases on Total Bank Loans and Loan Categories, By Location, State Banks in New York State

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Banks in New York City | | | Banks Outside New York City | | |
| | Δ Total loans | Δ Loans secured by other | Δ Loans unsecured | Δ Total loans | Δ Loans secured by other | Δ Loans unsecured |
| *Change 1*Member* | 0.01 | 0.06 | 0.06 | -0.01 | 0.02 | -0.00 |
| | (0.020) | (0.051) | (0.076) | (0.006) | (0.018) | (0.013) |
| *Change 2*Member* | 0.00 | 0.04 | -0.04 | -0.00 | 0.03** | -0.01 |
| | (0.025) | (0.039) | (0.080) | (0.005) | (0.017) | (0.014) |
| *Change 3*Member* | -0.03 | 0.02 | -0.11 | 0.00 | 0.01 | 0.01 |
| | (0.029) | (0.044) | (0.104) | (0.008) | (0.023) | (0.023) |
| Balance Sheet Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 522 | 518 | 512 | 3,594 | 3,594 | 3,594 |
| R-squared | 0.124 | 0.225 | 0.137 | 0.037 | 0.066 | 0.140 |

*Notes*: This table contains the results for the regressions of Equation (2) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Balance sheet control variables are loan-deposit ratio, capital-deposit ratio, total assets, and loan quality ratio. Loans to assets and Capital to assets are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 10: Effects of Reserve Requirement Increases on Bank Loans, for Banks with Low Liquidity Buffers

| | (1) Δ Total loans | (2) Δ Loans secured by other | (3) Δ Loans unsecured |
|---|---|---|---|
| *Change 1*Member* | 0.01 | 0.01 | 0.04 |
| | (0.017) | (0.035) | (0.033) |
| *Change 2*Member* | -0.03* | -0.01 | -0.04 |
| | (0.017) | (0.042) | (0.029) |
| *Change 3*Member* | -0.04* | 0.02 | -0.04 |
| | (0.026) | (0.045) | (0.049) |
| Balance Sheet Controls | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes |
| Observations | 867 | 867 | 862 |
| R-squared | 0.074 | 0.125 | 0.099 |

*Notes*: This table contains the results for the regressions of Equation (2) in which the change in the average stock of loans is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Balance sheet control variables are loan-deposit ratio, capital-deposit ratio, total assets, and loan quality ratio. Loans to assets and Capital to assets are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

Table 11: Effects of Reserve Requirement Increases on Cash and Securities, State Banks in New York State

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | All Banks | | Banks in New York City | | Banks Outside New York City | |
| | Δ Cash | Δ Securities | Δ Cash | Δ Securities | Δ Cash | Δ Securities |
| *Change 1*Member* | 0.06*** | -0.03*** | -0.01 | -0.04 | 0.06*** | -0.02** |
| | (0.022) | (0.010) | (0.055) | (0.034) | (0.024) | (0.010) |
| *Change 2*Member* | 0.08*** | -0.04*** | -0.03 | -0.08** | 0.11*** | -0.03*** |
| | (0.025) | (0.009) | (0.044) | (0.031) | (0.026) | (0.009) |
| *Change 3*Member* | 0.14*** | -0.05*** | 0.08 | -0.09* | 0.15*** | -0.04*** |
| | (0.032) | (0.011) | (0.066) | (0.044) | (0.034) | (0.011) |
| Balance Sheet Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 4,161 | 4,161 | 522 | 522 | 3,594 | 3,594 |
| R-squared | 0.231 | 0.150 | 0.367 | 0.174 | 0.268 | 0.162 |

*Notes*: This table contains the results for the regressions of Equation (2) in which the change in the average stock of cash and securities is the dependent variable. The sample includes all state-chartered banks and trust companies in New York. The regression examines the marginal impact of reserve requirement changes implemented on three different occasions. Change 1 is a dummy variable that is zero for the pre-reserve requirement increments period and one after the first increment period 1936Q3-1937Q1. Change 2 is a dummy variable that is zero for the pre-requirement increment and the first reserve requirement increment periods and one after the second reserve requirement increment period 1937Q2-1938Q2. Change 3 is a dummy variable that is zero for the pre-reserve requirement increment period, first reserve requirement increment period, and second reserve requirement increment period and one after the third reserve requirement increment 1938Q3-1938Q4. Balance sheet control variables are loan-deposit ratio, capital-deposit ratio, total assets, and loan quality ratio. Loans to assets and Capital to assets are the ratios of loans and capital, for each bank, relative to its total assets. Ln(Asset) is the natural logarithm of each bank's total assets. Loan quality is the ratio of safe loans (loans secured by bonds and loans secured by mortgage) relative to total loans. We also include bank fixed effects and time dummies in the regressions. We show clustered standard errors on bank levels in parenthesis. Statistical significance levels of 10%, 5%, and 1% are denoted by ***, **, and *, respectively.

## References


Ashcraft, Adam. 2006. "New Evidence on the Lending Channel." *Journal of Money, Credit, and Banking*, 38(3): 751-76.

Bernanke, B., M. Gertler and S. Gilchrist. 1996. "The Financial Accelerator and the Flight to Quality." *Review of Economics and Statistics*, 78(1): 1-15.

Calomiris, Charles W., Joseph Mason, and David Wheelock. 2011. "Did Doubling Reserve Requirements Cause the Recession of 1937-1938? A Microeconomic Approach." NBER Working Paper 16688.

Cargill, Thomas F. and Thomas Mayer. 2006. "The Effect of Changes in Reserve Requirements During the 1930s: The Evidence from Nonmember Banks." *Journal of Economic History*, 66 (2): 417-432.

Cetorelli, Nicola and Linda S. Goldberg. 2012. "Banking Globalization and Monetary Transmission." *Journal of Finance*, 67(5): 1811-1843.

Eggertsson, Gauti B. 2008. "Great Expectations and the End of the Depression." *American Economic Review*, 98(4): 1476-1516.

Eggertsson, Gauti B. and Benjamin Pugsley. 2006. "The Mistake of 1937: A General Equilibrium Analysis." *Monetary and Economic Studies*, 24: 151-90.

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

Gan, Jie. 2007. "The Real Effects of Asset Market Bubbles: Loan- and Firm-Level Evidence of a Lending Channel." *Review of Financial Studies*, 20(6): 1941-1973.

Gertler, M. and S. Gilchrist. 1994. "Monetary Policy, Business Cycles, and the Be- havior of Small Manufacturing Firms." *Quarterly Journal of Economics*, 109(2): 309-340.

Gregory, T.E. 1933. The Banking Situation in the United States. *International Affairs*, 12: 291-312.

Harrison Office Memoranda, 1928-1932. Federal Reserve Bank of New York.

Hausman, Joshua. 2012. "What was Bad for GM was Bad for America: the Automobile Industry and the 1937-38 Recession." Working paper, University of California at Berkeley.

Imai, Masami, and Seitaro Takarabe. 2011. "Bank Integration and Transmission of Financial Shocks: Evidence from Japan." *American Economic Journal: Macroeconomics*, 3(1): 155-83.

Irwin, Douglas A. 2011. "Gold Sterilization and the Recession of 1937-38." Dartmouth College Working Paper.

Jayaratne, Jith, and Donald P. Morgan. 2000. "Capital Market Frictions and Deposit Constraints at Banks." *Journal of Money, Credit and Banking*, 32(1): 74-92.

Kashyap, Anil K., and Jeremy C. Stein. 2000. "What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?" *American Economic Review*, 90(3): 407-428.

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

Kim, Dasol. 2011. "Deposit Flows, Lending, and Securitization: Evidence from Bank Fraud." Case Western Reserve University Working Paper.

Kishan, Ruby P, and Timothy P. Opiela. 2000. "Bank Size, Bank Capital, and the Bank Lending Channel." *Journal of Money, Credit and Banking*, 32(1): 121-141.

Meltzer, Allan H. 2003. A History of the Federal Reserve, Volume 1: 1913-1951. Chicago: University of Chicago Press.

Mishkin, Frederic S. 2012. The Economics of Money, Banking and Financial Markets. Toronto: Pearson Addison Wesley.

Oliner, S. and G. Rudebusch, 1996a, "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance: Comment." *American Economic Review*, 86(1): 300-309.

Paravinisi, Daniel. 2008. "Local Bank Financial Constraints and Firm Access to External Finance." *Journal of Finance*, 63(5): 2161-2193.

Richardson, Gary, and Patrick Van Horn. 2009. "Intensified Regulatory Scrutiny and Bank Distress in New York City During the Great Depression." *Journal of Economic History*, 69: 446-465.

Richardson, Gary, and Patrick Van Horn. 2011. "When the Music Stopped: Transatlantic Contagion During the Financial Crisis of 1931." NBER Working Papers 17437.

Romer, Christina. 1992. "What Ended the Great Depression?" *Journal of Economic History*, 52(4): 757-784.

Romer, Christina. June 18, 2009. The Lessons of 1937. *The Economist*.

Stauffer, Robert F. 2002. "Another Perspective on the Reserve Requirement Increments of 1936 and 1937." *Journal of Post Keynesian Economics*, 25(1): 161-179.

Telser, L.G. 2001. "Higher Member Bank Reserve Ratios in 1936 and 1937 Did Not Cause the Relapse into Depression." *Journal of Post Keynesian Economics*, 24(2): 205-216.

Velde, Francois R. 2009. "The Recession of 1937 - A Cautionary Tale." *Federal Reserve Bank of Chicago Economic Perspectives*, 33: 16-37.