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Regulatory Changes in Depository Institutions

DISSERTATION

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for the degree of

DOCTOR OF PHILOSOPHY

in Management

by

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Dissertation Committee:
Professor Lu Zheng, Chair
Professor Gary Richardson
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2016

DEDICATION

To

My parents, my wife Kyoung Eun, and my son Seungwoo

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ABSTRACT OF THE DISSERTATION

Regulatory Changes in Depository Institutions

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Professor Lu Zheng, Chair

In this dissertation we investigate the effect of monetary policy and regulatory changes on asset pricing and investor behavior. In the first chapter, using unique data on over-the-counter bank stock prices and balance sheet information from 1940 to 1968, we find that the largest commercial bank stocks, ranked by market value or gross deposits, have significant lower risk-adjusted annual returns than do small sized bank stocks even after controlling for standard risk factors including size. This return difference can be attributed to the Banking Act of 1935. Failures of larger institutions tended to be resolved by purchase and assumption, which is preferred because it preserves the value of the going concern, while failures of smaller institutions tended to be resolved by payoff and liquidation. This policy is interpreted as an implicit bailout by the government for large banks and we find it is one of the first instances of preferential treatment for large banks. When examined during the period of 1926 to 1939, when there are no such guarantees, we do not find any significant risk-adjusted returns differences between banks of different sizes.

In the second chapter we examine the relationship between deposit insurance and its effect on depositor behavior. Using two classes of depositors we ask how introduction of deposit insurance influenced depositor behavior using treatment-and-control estimation strategy. New York's commercial banks accepted two classes of deposits, preferred and regular deposits. If a bank failed, preferred depositors received complete repayment before regular depositors received any repayment. The preferred depositors would serve as the control group because they would be minimally affected by deposit insurance. Before deposit insurance, regular depositors reacted to news about banks' balance sheets much more than preferred depositors did. After deposit insurance, the behavior difference between regular and preferred depositors was reduced. This difference in differences indicates that deposit insurance reduced depositor monitoring.

Chapter 1

Banking Reforms and U.S. Bank Stock Returns

1.1 Introduction

During the 2008 economic crisis, the largest U.S. banks enjoyed lower funding costs than did smaller rivals. International Monetary Fund's (IMF, 2014) *Global Financial Stability Report* states that premiums, in terms of a lower cost of financing that large banks typically receive, were approximately 15 basis points in the United States, 25–60 basis points in Japan, 20–60 basis points in the United Kingdom, and 60–90 basis points in the euro area. Fisher (2014) reports the estimated premium in the United States was higher at the height of the financial crisis and has been declining since in response to the regulatory reform agenda.

One reason that large banks can finance themselves more inexpensively could be that they are more efficient; that is, that there are certain economies of scale in banking. For some time, the common wisdom was that there was no evidence of such economies beyond relatively modest-sized banks that had balance sheets of approximately $100 billion. More recently, several papers have found that economies of scale may continue beyond that level. Hughes and Mester (2011) suggest that large institutions may be better able to manage risk more efficiently due to technological advantages, such as diversification and the spreading of information and other costs that do not increase proportionately with size.

Another reason could be that, under financial distress, the largest banks are more likely to receive benefits from the financial and economic policies of governments and central banks. This would result in lower expected returns for the largest banks as compared to smaller banks with similar risk that would not receive the government benefits.

In this regard, we find new evidence that the lower risk-adjusted returns for large banks appear after the government and the Federal Deposit Insurance Corporation (FDIC) implemented certain policies. Before the introduction of the FDIC in 1933, no government guarantees existed, and banks of all sizes failed before 1933. For example, the Second Bank of the United States, which was the largest financial institution in the nation, failed in 1839 (Bray, 1957). In 1907, Knickerbocker Trust, New York City's third largest trust, failed after it was denied assistance and considerations from the clearing house and state regulators. Then, in 1931, the fourth largest bank in Manhattan and the eighth largest bank in the United States, the Bank of the United States, failed.

The Banking Act of 1933, commonly called the Glass-Steagall Act, created the FDIC. After receiving a permanent charter in The Banking Act of 1935, the FDIC became the sole liquidator for all insured banks. In the 1930s, the FDIC resolved most failures by deposit payoffs. However, in the 1940s, the board of the FDIC switched to a policy of effectively providing 100% insurance by handling all failures through purchase and assumption transactions without closing the bank, regardless of the law or the circumstances. Failures of larger institutions tended to be resolved by purchase and assumption, which is preferred because it preserves the value of the going concern. Failures of smaller institutions tended to be resolved by payoff and liquidation (FDIC, 1998; Mishkin, 1992; Peltzman, 1984; Sprague, 1986). This policy effectively provided larger banks with a higher rate of survival after failure.

Using a unique dataset of bank stock prices from 1940 to 1968, we find that the largest commercial bank stocks, ranked by market value, have 11.75% lower risk-adjusted annual returns than do small- and medium-sized bank stocks. Our findings show that from 1926 to 1938, when no government guarantees are present, we do not find any evidence of bank-size implicit subsidies for large banks.

In the next section, we review the related literature on bank subsidies. In Section 3, we discuss creation of the FDIC and bank acts during 1930 to 1970 and how they affected commercial banks. In Section 4, we detail the data sources and collection procedures. In Section 5, we show the model for abnormal returns analysis and discuss the empirical results. Finally, in Section 6, we provide a summary and discussion of the results and their implications.

1.2 Historical Background and Related Literature

When did regulators start treating large banks more favorably when faced with financial difficulties? Preferential treatment of this type began during the 1930s, when the Roosevelt administration recapitalized and reformed the financial system. Preferential treatment evolved over time, as legislators and regulators reacted to a series of events from the 1930s through the 1980s. Before the Banking Holiday in the winter of 1933, banks were treated as neither too big nor too connected to fail. The recapitalization and deposit-insurance programs established in the 1930s preferentially treated large institutions, in some cases, within months of their creation, in other cases, within years. By the 1950**s**, regulators clearly treated large institutions preferentially. Prominent examples of bailouts of big banks in the 1970s and 1980s produced public and academic discourse on these issues that continues to this day. In this section, we describe the evolution of these institutions.

1.2.1 Before the Banking Holiday

In the nineteenth century, banks of all sizes failed, and those failures had harsh consequences, including debtors' prison, for owners and managers. Regulators treated banks neither as too large nor too connected to fail and large banks did fail. Failures included the Second Bank of the United States, the largest financial institution in the nation, chartered in 1816 as a private corporation to serve as the national bank. During the recession that began in 1837, its assets declined in value, and, in 1839, heavy withdrawals forced it to suspend payments. It requested extraordinary support from the state and federal governments but was denied, and it was liquidated two years later (Hammond, 1957).

The panic of 1907 started after the leaders of Knickerbocker Trust, a bank in New York City, tried but failed to corner the copper market. The failure threatened their solvency, leading to runs on their bank, on firms that had loaned them funds, on similar institutions in New York City, and eventually on the entire U.S. financial system. Knickerbocker and many other large firms failed. While Knickerbocker and other firms connected to the corner of the copper market requested assistance and considerations from the clearing house in Manhattan and state and federal regulators, they received no special treatment. All were liquidated using the same laws and procedures that were applied to their more typical counterparts.

In response to the panic, Congress established the National Monetary Commission. Its reports contain procedures for dealing with insolvent financial institutions chartered by the national and all state governments (Welldon, 1910). In all jurisdictions, banks that could not pay depositors on demand (or make other scheduled payments) had to cease operations. Those that could neither swiftly resume payments nor pass official examinations entered liquidation. In this process, a court appointed a receiver who shut down the bank, liquidated its assets, and repaid depositors (and other creditors) to the extent possible. The National Monetary Commission's reports do not indicate, however, that larger banks received preferential treatment under the law (Huntington, 1910), from clearing houses (Cannon, 1911), from state governments (Barnett, 1911), or from the U.S. Treasury (Kinley, 1910). During any financial crisis in the United States up to that point, preferential treatment was not reported (Sprague, 1910).

The creation of the Federal Reserve did not change this system. The Federal Reserve Act of 1913 authorized reserve banks to extend only discount loans collateralized by short-term self-liquidating paper for the purpose of funding working capital for manufacturing, agriculture, and commerce. Limited lending authority prevented reserve banks from bailing out banks and other financial institutions threatened with insolvency.

The Fed and other regulators eschewed bailouts during the contraction of credit from the summer of 1929 to the winter of 1933. During that time, the Bank of the United States, the fourth largest bank in Manhattan and the eighth largest bank in the United States, was in financial distress in terms of investment losses, depositor pressure, and difficulty merging. The bank belonged to the Federal Reserve System, and the New York Fed encouraged merger negotiations; however, when the talks stalled and runs began, the New York Fed refused requests for assistance, as did the New York Clearing House (Richardson and Van Horn, 2009). Regulators shuttered the afflicted institution and, after emergency examinations, placed them in the hands of court-appointed receivers.

1.2.2 Origins of Large Bank Subsidies: 1933 to 1984

Prior to 1933, regulators lacked the tools, incentives, or desire to bail out large banks that faced financial difficulties. Institutions and attitudes began to change in the 1930s. In this decade, Congress passed an array of legislation that provided regulators, particularly the Federal Reserve, with the ability and authority to bail out banks and the motivation and mindset to treat large and systemically important banks differently from smaller institutions. The four discretionary tools that regulator and central bankers received were the power to (a) inject capital into financial institutions, (b) loan funds to any institution in unlimited quantities, collateralized by assets of any type, (c) pay depositors (whether insured or not) in failing banks, and (d) resolve failing institutions in different ways.

In 1932, a series of acts created the Reconstruction Finance Corporation and expanded the powers of the Federal Reserve, including inserting Section 13(3) in the Federal Reserve Act, which gave the Fed the authority to loan funds to any individual, partnership, or corporation in the United States against any collateral deemed acceptable to the governors of the system. This authority, of course, was used when the Fed bailed out banks big banks in the 1970s, 1980s, and 2008–2009. The Fed did little with these powers initially because the Fed's leaders eschewed expansionary activities and feared setting precedents that encouraged poor behavior (Chandler, 1971).

Preferential treatment of large institutions began during the Banking Holiday in March 1933. The Emergency Banking Act authorized the administration to shutter all commercial banks, determine which could reopen, insure deposits at those that resumed operations, and recapitalize banks deemed worthy of assistance. Federal authorities decided to quickly reopen at least one bank in each town and city in the United States, based on the recommendations of examiners, who were encouraged to select institutions deemed the largest and healthiest (Badger, 2008; Komai and Richardson, 2014). The Reconstruction Finance Corporation (RFC) injected capital into hundreds of institutions that reopened, typically by purchasing preferred stock, with the larger allocations' being made to larger institutions (Vossmeyer, 2014).

Table 1.1 presents the banks in New York City and Chicago's financial centers that received capital injections by the end of 1933. Banks in Manhattan received a total of $214.7 million, and banks in Chicago's Loop (downtown) received $75 million. These 17 banks received over 68% of the total of $425 million injected into 1,293 banks throughout the United States.

Table 1.1: Reconstruction Finance Corporation capital injections by end of 1933

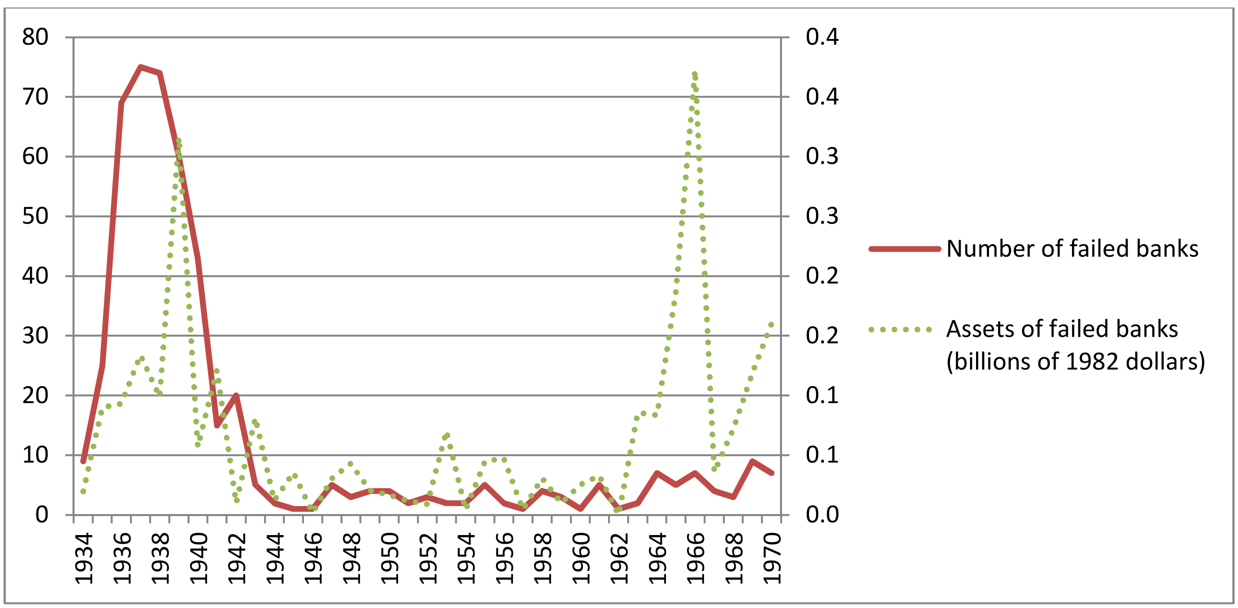
	Preferred, $ millions
Manhattan	
Bank of Manhattan Company	3
Bank of New York	1
Bankers Trust	5
Central Hanover	5
Chase National	46
Chemical	5
Corn Exchange	3
Fifth Avenue	0.2
Fulton	0.25
Guaranty Trust	20
Lawyers County	0.25
Manufacturers Trust	25
Marine Midland	1
National City	50
Savings Bank and Trust	50
Manhattan Total	214.7
Chicago Loop	
Continental Illinois	50
First National	25
Chicago Total	75
US Total	425

Source: Jones (1951), *New York Times* (1933)

The Banking Act of 1935 authorized the FDIC to act as the liquidator for all insured banks. Previously, it's worth recalling, that courts directed liquidations of financial institutions and applied the same standards to all firms, regardless of size. The Banking Act of 1935 provided the FDIC with three methods for resolving troubled institutions: straight deposit payoffs, insured deposit transfers, and purchase and assumption. Purchase and assumption is typically preferred because it preserves the value of the going concern (Buck, 1984).

Although few banks failed between the 1930s and 1970s (Figure 1.1), a pattern of resolving failure emerged during this time. In the 1930s, the FDIC resolved most failures by deposit payoffs, whereas, in the 1940s, the FDIC board switched to a policy of effectively providing 100% insurance by handling all failures through purchase and assumption transactions without closing the bank, regardless of the law or the circumstances. Since then, failures of larger institutions tended to be resolved by purchase and assumption, and, in these transactions, all depositors, both insured and uninsured, received remuneration for all deposits. Failures of smaller institutions tended to be resolved by payoff and liquidation, and, in these transactions, uninsured depositors suffered losses (FDIC, 1998; Mishkin, 1992; Peltzman, 1984; Sprague, 1986).

Figure 1.1: Bank Failures in the United States, 1934-1970



Source: Federal Deposit Insurance Corporation (2015). The total nominal assets of the failed banks have been deflated by the GNP implicit deflator using 1982 as the base year.

This pattern arose for several reasons. Larger institutions were easier to merge than were smaller institutions. Larger institutions attracted more bidders and higher bids, making them better candidates for purchase and assumption. Larger institutions also received priority when the FDIC needed to conduct simultaneous liquidations. The FDIC has constraints on personnel and funds that can be used for liquidations, and the FDIC directed those resources toward larger institutions.

Institutions and investors may have recognized this pattern in the 1960s and certainly understood it in the 1970s. Peltzman's (1970, 1984) analysis shows that bankers and businessmen acted on this information. Beginning in the early 1970s, large banks reduced capital coverage of uninsured depositors (i.e., preference for repayment guaranteed by contract backed by assets and capital). Uninsured deposits shifted toward larger banks, and capital-to-asset ratios fell at larger banks relative to smaller banks. Moreover, Kane and Unal (1990) find evidence of implicit too-big-to-fail subsidies at the nation's 25 largest banks during the interest-rate spike of 1979-1982.

1.2.3 Related Literature

Size effects on non-financial stocks returns have been extensively studied (Banz, 1981; Basu, 1983; Lakonishok et al., 1994; Fama and French, 1993). Research on how returns of financial stocks vary with size, however, is limited. Ghandi and Lustig (2015), using data from 1970 to 2009, find that the largest commercial banks received an extra 1.97% of their market capitalization, which amounts to $2.76 billion per bank in 2005 dollars. This finding is consistent with government guarantees that protect the shareholders of large banks, but not small banks, in bank crises. Acharya et al. (2014) find that large banks' funding cost advantage was 28 basis points annually for the period of 1990 to 2010. Balasubramnian and Cyree (2012) find that, prior to the 2008 crisis, large bank bonds exhibited a 136 bps funding advantage relative to smaller counterparts, although this reversed to a 33 bps premium after the Dodd-Frank Act. Kareken and Wallace (1978) find that the anticipation of future bailouts of bondholders and other creditors always benefits shareholders, indicating that bailouts can have positive effects on the equity of large banks. These researchers show evidence of the concern of equity holders, not just debt holders, about the probability of bailouts.

1.3 Data

Our principal data include bid-ask price information, capital stock, and total deposit information for commercial banks in the State of New York from 1915 to 1969. We collect bank stock bid-ask prices from multiple sources. Before the 1970s, many banks traded over the counter and were not listed on any of the stock exchanges. The *Commercial and Financial Chronicle* (C&FC) provides bid-ask data for all New York Stock Exchange (NYSE) stocks and many over-the-counter stocks, including those of banks and trust companies. We use the C&FC to record weekly bid-ask prices for New York City banks from 1915 to 1938. Dividend information was collected and published weekly from C&FC for this period.

Between 1928 and 1969, bank quotes were published monthly in the *Bank and Quotation Record*, a separate monthly publication from C&FC. We record bid-ask prices of all banks in New York State for this period. Dividend information for this period is found by looking up *Moody's Dividend Record* for each bank.

From these sources, we compile weekly bid-ask prices for New York City banks from 1915 to 1938 and monthly bid-ask prices for banks in New York State from 1928 to 1969. These closing bid-ask data have been utilized previously by Arnold, Hersch, Mulherin, and Netter (1999), Jones (2002), and Calomiris and Wilson (2004).

Bank size information is drawn from multiple sources. One source is the *Annual Report of the Superintendent of Banks*, for which we draw information from 1915 to 1939, published quarterly level balance sheet information for all state-chartered commercial banks and trust companies in New York State. We collect the capital, total asset, and total deposit information from the balance sheet data. For the national banks, we use the *Annual Report of the Comptroller of the Currency* to gather annual balance sheet information on national-chartered New York banks. For the period between 1928 and 1959, we use the *Bank and Quotation Record*, which published size information, such as capital, surplus, and gross deposits, along with the bid-ask quotes. We use *Moody's Bank and Finance Manual* to look up each bank's balance sheet information for 1959 to 1968, as the *Bank and Quotation Record* stopped publishing such information in 1959.

We focus on New York State banks because New York has the largest banks, and these banks represent a fair market share of the overall banking industry. As of 1941, New York banks represented 5.8% of the total number of banks in the United States but also represented 35% of all deposits in the United States (Federal Reserve Board, 1943). We are interested in the differences between the largest banks' returns as compared to those of smaller ones but not how returns differ by individual states. Restricting the sample to New York State helps us to identify the effects of bank size because all banks are affected by the same local effects. In other words, restricting the sample will help us to control for any local biases.

The newly constructed balance sheet has some advantages. It is accurate because it came from legal submissions whose veracity was checked by independent auditors and bank examiners. Further, incorrect submissions exposed corporate officers to civil and criminal liability. This information also was widely disseminated, as state law requires banks to publish these balance sheets in local newspapers. The bank superintendent published all of this information in monthly bulletins and in an annual report published early in the following year (e.g., 1912 data appeared in print in early 1913). The annual report presented these data in a consistent format for several decades.

We manually convert price data and size data from the source books into digital formats. In this case, two types of errors may emerge: One is a transcription error, which occurs during the digital conversion, and the other is an error introduced during the original book printing. To prevent transcription errors, we utilize double data entry, also known as two-pass verification. Two independent datasets are entered, and the two are compared. If the two entries do not match each other, we refer back to the source to determine the correct one. Even though the information that banks submit to the superintendent is accurate, there is the possibility of printing mistakes. We track percentage change over time for all the entries to ensure that the source data are valid. Inaccuracies are rare, but, once found, they are corrected using all other available data.

From the collected closing bid-ask prices of bank stocks, we calculate the closing price by taking the average of the bid-ask price. Zhang et al. (2008) find that an unusual excess of buyers (sellers) relative to sellers (buyers) tends to increases the ask (bid) price. We need to have the order-flow information to determine whether there are excess buyers or sellers. We do not have any information on the orders, and, therefore, we assume symmetry among bid and ask orders. We use the average of the bid-ask price and dividend records to calculate monthly returns. Market value is calculated by multiplying stock price with number of shares outstanding, which we calculate by dividing capital stock from the balance sheet by par value.

Overall, our 1915–1939 weekly bank data consist of data on 186 unique New York State and national chartered banks and trust companies over 1,790 bank-years. Our 1928–1968 monthly data consist of 355 unique New York State and national chartered banks and trust companies over 5,166 bank-years.

1.3.1 Summary Statistics

Table 1.2 shows the total market capitalization (total deposits) of firms in each size-sorted portfolio as a percentage of total market capitalization (total deposits) for banks in New York City (1915–1939) or in New York State (1940–1968). We stop collecting data at 1968 because, after 1968, we can refer to Center for Research in Security Prices (CRSP) for the data. The market values (total deposits) are measured in January of each year. The mean represents the average value of this percentage over the years specified, and *N* is the average number of banks in each portfolio over the same period. We see that, before 1940, the banks in the highest decile in terms of market value or total deposits held about 45 to 54%. During 1950s and 1960s, the largest banks steadily gained market share, and, by the end of 1960s, the largest 10% of the banks had 74 to 81% of the market.

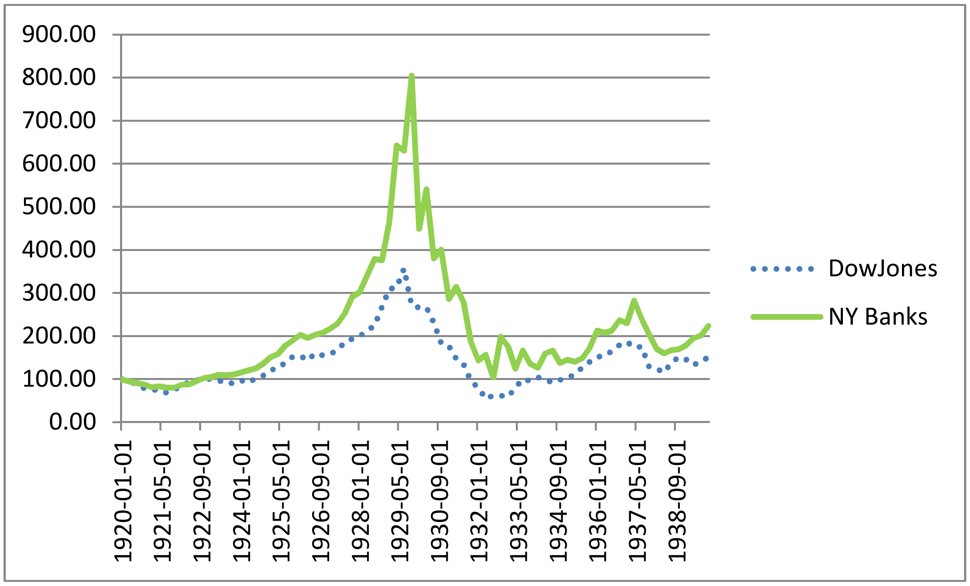
Figure 1.2 shows the index created from market value-weighted New York State Banks for 1920 to 1968. The Dow Jones Industrial Average is included to show how the New York State bank prices moved with the market. For 1920 to 1939, the New York State Bank index was much more volatile than was the market, suggesting that these banks had higher systematic risk than did the market. From 1940 to 1968, the New York Banks prices were much less volatile. This is in line with our conjecture that, after 1940, when the FDIC resolution policy changed favorably for large banks, the largest banks had lower systematic risk.

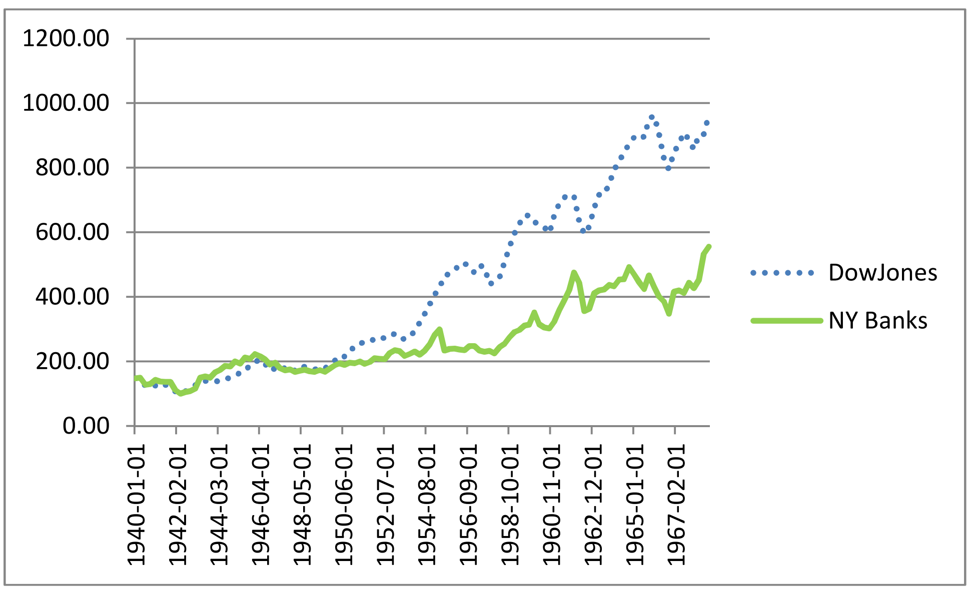
Table 1.2: Market capitalization and total deposit value for size-sorted portfolios of commercial banks

This table presents the total market capitalization (total deposit) of firms in each size-sorted portfolio as a percentage of total market capitalization (total deposit) for banks in New York City (1915-1939) or in New York State (1940-1969). The market values (total deposits) are measured in January of each year. Mean represents the average value of this percentage over the years specified. N is the average number of banks in each portfolio over the same period.

	1	2	3	4	5	6	7	8	9	10
Panel A: Market Capitalization										
1915-1928										
Mean	0.20	0.40	0.74	1.37	2.19	3.77	7.13	11.85	19.35	53.20
N	7.93	7.29	7.21	7.64	7.14	7.36	7.64	7.21	7.29	7.07
1929-1939										
Mean	0.08	0.15	0.25	0.52	1.07	2.07	5.31	11.58	25.47	54.47
N	4.91	4.55	4.64	4.55	4.45	4.64	4.55	4.64	4.55	4.00
1940-1949										
Mean	0.05	0.13	0.24	0.41	0.62	1.10	2.22	5.40	21.80	68.17
N	7.30	6.90	7.00	7.00	6.80	6.90	7.10	6.90	7.00	6.40
1950-1959										
Mean	0.21	0.42	0.64	0.87	1.17	1.99	4.05	9.57	25.18	56.31
N	5.40	4.80	5.10	4.80	4.80	5.00	5.10	4.80	5.10	4.40
1960-1969										
Mean	0.19	0.38	0.62	0.83	1.10	1.59	2.39	4.58	14.57	74.19
N	5.70	5.40	5.50	5.30	5.20	5.50	5.40	5.40	5.50	4.90
Panel B: Total Deposit										
1915-1928										
Mean	0.35	0.68	1.20	2.08	3.00	4.80	7.93	12.48	21.86	45.76
N	7.93	7.29	7.14	7.71	7.07	7.36	7.71	7.14	7.29	7.07
1929-1939										
Mean	0.13	0.24	0.41	0.85	1.34	2.66	6.17	14.18	23.93	51.00
N	4.45	4.00	4.00	4.18	3.64	4.18	4.18	4.00	4.00	3.55
1940-1949										
Mean	0.15	0.36	0.51	0.67	0.92	1.29	1.96	4.00	11.33	78.90
N	13.40	12.80	12.90	12.90	12.80	13.00	13.00	12.80	12.90	12.40
1950-1959										
Mean	0.18	0.46	0.65	0.93	1.20	1.81	2.64	4.47	13.35	74.34
N	11.00	10.80	10.50	10.90	10.20	10.90	10.90	10.50	10.80	10.00
1960-1969										
Mean	0.18	0.33	0.46	0.62	0.91	1.36	2.19	3.53	9.13	81.38
N	7.60	7.30	7.40	7.30	7.20	7.40	7.30	7.40	7.30	6.90

Figure 1.2: Market value weighted New York State Bank Index vs Dow Jones Industrial Average





New York bank Index prices are set to equal Dow Jones Industrial Average at the start of each period. New York Bank Index returns calculated from market value weighted returns of all New York Banks quoted in the *Commercial and Financial Chronicle.*

We show how the returns of banks differed by size over time in Table 1.3. The mean returns for each market capitalization-sorted portfolio of banks are shown in Panel A. The monthly mean returns are annualized by multiplying by 12 and are expressed in percentages. Before the Great Depression, the largest banks seemed to have higher average returns than did the smaller banks. The average return increased as the size grew from 8.89% annual for the smallest banks to 15.47% for the largest banks. During the Great Depression, larger banks still had higher returns, while the smaller banks suffered from negative returns, possibly due to bank runs and overall depression. After the Great Depression ended, the large and small banks showed patterns of reversal; the largest banks had lower average returns than did the smallest banks.

Table 1.3: Mean returns for size-sorted portfolios of commercial banks in New York

This table presents the mean returns for each size-sorted portfolio of banks sorted by market capitalization in the top panel and by total deposit in the bottom panel. The monthly mean returns have been annualized by multiplying by 12 and are expressed in percentages.

	1	2	3	4	5	6	7	8	9	10
Panel A: Market Capitalization 1916-1968										
1915-1928	8.89	10.01	11.16	10.30	14.23	18.46	11.92	13.27	13.15	15.47
1929-1939	-4.20	-11.14	-10.24	-17.15	-3.28	-7.94	2.67	0.31	0.09	0.38
1940-1968	9.78	3.34	8.97	9.43	5.79	6.89	6.79	4.86	4.27	5.62
Panel B: Total Deposits 1916-1968										
1915-1928	6.89	14.52	10.35	13.42	16.96	13.64	24.23	9.03	14.42	15.65
1929-1939	5.37	-6.19	-4.25	-17.04	-10.51	-13.15	-11.11	-11.06	-6.10	-4.52
1940-1968	7.29	4.57	5.30	11.76	6.86	7.15	3.17	5.80	3.19	5.56

Market capitalization captures bank size but expected returns as well. Berk (1995) argues that there should be a relationship between expected returns and market capitalization. We use total deposits as another measure of size that is not affected by expected returns. Panel B shows returns for portfolio sorted by total deposits. The results from the deposit-sorted portfolios also show some pattern of lower returns for the largest banks after the 1940s.

1.4 Empirical Methods and Results

To adjust for risk in the size-sorted bank portfolio returns, we calculate the exposure to the standard risk factors that explain cross-sectional variation in average returns on other portfolios of nonfinancial stocks and bonds. Following the approach by Gandhi and Lustig (2015), we use the five-factor model that includes the Fama and French (1993) three-factors and two bond-risk factors. We find that, after 1940, small banks, measured either by market cap or total asset, outperformed the benchmark portfolio of bonds and stocks, while large banks underperformed.

The three stock -risk factors are *market* and *smb*, *hml,* and the two bond risk factors are *ltg*, and *crd*. The terms *market, smb*, and *hml* represent the returns on the three Fama-French stock factors, namely, the market, small minus big, and high minus low factors, respectively. The Fama French stock factors are constructed using the six value-weight portfolios of all stocks on the NYSE, Amex, and NASDAQ (including financials) formed on size and book-to-market. The market return is captured using the value-weighted return on all NYSE, Amex, and NASDAQ stocks (from CRSP) minus the one-month Treasury bill rate from Ibbotson Associates.

Because banks manage a portfolio of bonds of varying maturities and risk, we include the two bond-risk factors, *ltg* and *crd*. We use *ltg* to denote the excess returns on an index of 10-year bonds issued by the U.S. Treasury as the first bond-risk factor, which is available from Global Financial Data. We use *crd* to denote the excess returns on an index of investment grade corporate bonds, maintained by Dow Jones, as our second bond-risk factor, which also is available from Global Financial Data.

1.4.1 Risk-Adjusted Returns on Commercial Bank Stock Portfolios

We regress monthly excess returns for each size-sorted portfolio on the three Fama-French stock factors and two bond factors. For each portfolio, we run the following time-series regression to estimate the vector of betas *i*:

$$R^i_{t+1} - R^f_{t+1} = \alpha^i + \beta^i f_{t+1} + et + 1i. \quad (1)$$

where $R^i{}_{t+1}$ is the monthly return on the *ith* size-sorted portfolio. The five risk factors at time t are denoted as $f_{t.}$ The estimated residuals in the time series regression are estimates of the normal risk-adjusted returns.

Table 1.4 provides the results of the regression specified in Equation 1 for 1940 to 1968. The portfolios are ranked from smallest (1) to largest (10). Panel A presents the results based on sorting by market capitalization. The table reports the regression coefficients for each size-sorted portfolio, along with their statistical significance and the adjusted R^2.

Table 1.4: Mean risk-adjusted returns in size-sorted portfolios of commercial banks 1940-1968

This table presents the estimates from OLS regression of monthly excess returns of size-sorted portfolios on Fama-French Three Factors and two bond factors. *market, smb, hml* represents market, small minus big, high minus low respectively. *ltg* represents excess return on an index of long-term government bonds and *crd* represents excess return on an index of investment grade corporate bonds. The alphas have been annualized by multiplying 12 and are shown in percentages. Panel A shows portfolios sorted by market value and Panel B shows portfolios sorted by total deposit. The standard errors are adjusted using Newey-west with 3 lags. ***, **, * denote 1%, 5%, and 10% level of statistical significance respectively

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
	Panel A: Market Capitalization 1940-1968												
α	6.39**	0.00	4.28**	6.39***	0.60	3.36	1.75	-2.60	-5.13**	-5.41**	-6.89**	-5.14**	-11.81***
	(2.86)	(1.91)	(1.93)	(2.35)	(2.48)	(2.35)	(2.65)	(2.71)	(2.20)	(2.32)	(3.06)	(2.60)	(3.65)
mktrf	0.07	0.10**	0.15***	0.19***	0.26***	0.31***	0.35***	0.36***	0.58***	0.66***	0.22***	0.49***	0.59***
	(0.055)	(0.042)	(0.051)	(0.048)	(0.053)	(0.050)	(0.072)	(0.061)	(0.064)	(0.062)	(0.070)	(0.068)	(0.089)
smb	0.18*	0.15**	0.11	0.15*	0.21*	0.20***	0.06	0.25**	0.01	-0.14	0.15	-0.14	-0.32*
	(0.099)	(0.073)	(0.082)	(0.077)	(0.107)	(0.076)	(0.074)	(0.105)	(0.084)	(0.137)	(0.133)	(0.111)	(0.169)
hml	0.10	0.17*	-0.06	0.03	0.04	-0.12	-0.08	-0.03	0.11	0.22**	0.03	-0.06	0.12
	(0.071)	(0.097)	(0.071)	(0.079)	(0.090)	(0.077)	(0.094)	(0.062)	(0.085)	(0.097)	(0.077)	(0.122)	(0.113)
ltg	-0.16	-0.16	-0.01	0.26	-0.19	-0.42*	0.11	-0.02	0.34	0.49*	-0.01	0.51	0.65*
	(0.214)	(0.227)	(0.194)	(0.277)	(0.234)	(0.221)	(0.223)	(0.224)	(0.239)	(0.280)	(0.309)	(0.317)	(0.384)
crd	0.36	0.24	0.26	0.10	0.42*	0.93***	0.36	0.27	-0.04	-0.19	0.01	-0.28	-0.55
	(0.271)	(0.219)	(0.187)	(0.208)	(0.248)	(0.242)	(0.261)	(0.193)	(0.234)	(0.262)	(0.244)	(0.335)	(0.421)
Observations	348	348	348	348	348	348	348	348	348	348	348	348	348
R-squared	0.060	0.099	0.085	0.097	0.191	0.313	0.233	0.206	0.384	0.356	0.052	0.161	0.158

Table 1.4: Mean risk-adjusted returns in size-sorted portfolios of commercial banks 1940-1968 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
						Panel B: Total Deposit 1940-1968							
α	8.64	2.64	1.44	8.76***	2.64	2.76	-0.36	0.48	-3.24	-4.8**	-1.08	-5.88*	-14.88**
	(5.54)	(2.39)	(2.57)	(2.74)	(2.94)	(2.52)	(2.48)	(2.35)	(2.57)	(2.20)	(3.16)	(3.42)	(5.84)
mktrf	-0.04	0.06	0.12**	0.13**	0.20***	0.29***	0.22***	0.35***	0.39***	0.64***	0.24***	0.33***	0.72***
	(0.076)	(0.040)	(0.051)	(0.057)	(0.074)	(0.049)	(0.068)	(0.055)	(0.072)	(0.061)	(0.071)	(0.076)	(0.100)
smb	-0.12	-0.01	-0.03	0.16	0.02	0.04	0.18**	0.19**	0.21**	-0.13	0.20*	0.22*	-0.08
	(0.137)	(0.070)	(0.112)	(0.097)	(0.074)	(0.085)	(0.074)	(0.072)	(0.091)	(0.131)	(0.121)	(0.118)	(0.217)
hml	0.09	-0.00	0.19**	-0.01	-0.11	-0.04	0.02	-0.09	0.03	0.20**	-0.27***	0.04	0.15
	(0.115)	(0.081)	(0.094)	(0.094)	(0.076)	(0.080)	(0.100)	(0.064)	(0.073)	(0.092)	(0.093)	(0.105)	(0.162)
ltg	-0.88	-0.01	0.12	-0.15	0.32	-0.06	-0.04	-0.04	-0.05	0.50*	-0.18	-0.04	1.49**
	(0.533)	(0.240)	(0.323)	(0.255)	(0.231)	(0.249)	(0.269)	(0.181)	(0.203)	(0.268)	(0.365)	(0.296)	(0.597)
crd	1.14*	0.26	0.20	0.30	-0.17	0.31	0.61**	0.29	0.31	-0.15	0.09	0.05	-1.31*
	(0.634)	(0.204)	(0.245)	(0.246)	(0.240)	(0.264)	(0.263)	(0.192)	(0.202)	(0.260)	(0.273)	(0.302)	(0.689)
Observations	302	348	330	348	344	348	348	348	348	348	330	348	302
R-squared	0.039	0.020	0.059	0.046	0.046	0.166	0.195	0.296	0.244	0.377	0.073	0.107	0.160

In Panel A of Table 1.4, the estimated intercepts decrease monotonically with bank size, from 6.39% for the first portfolio (smallest) to -5.41% for the tenth portfolio (largest). A long-short position that goes long $1 in a portfolio of the largest market capitalization banks and short $1 in a portfolio of the smallest market capitalization banks loses 11.81% over the sample period. This return spread is statistically significant at the 1% level. The average normal risk-adjusted return on a 9-minus-2 position is -5.14% per annum, and -6.89% per annum for the 8-minus-3 portfolio. These results are statistically significant at the 5% level.

The coefficients on excess market return, *mktrf*, for each size-sorted portfolio shows that the market beta increases monotonically with bank size. Over the entire sample, a portfolio of large banks has a market of 0.66, as compared to 0.10 for a portfolio of the second smallest banks. The largest banks are much more exposed to market risk as compared to the smallest banks. The loadings on *smb* vary with size but show a weak systematic pattern. The loadings on *smb* are the biggest for the fifth and sixth portfolio, at 0.21 and 0.20, respectively, while the largest banks are not affected by *smb*. In other industries, we expect the exposure to *smb* to decrease with size, and, in these data, we find that the two largest deciles are not exposed to *smb*. The loadings on *hml* do not show any systematic pattern. We do, however, find a size pattern in the loadings on the bond-risk factors. The coefficient on *ltg* is negative but statistically insignificant for small banks and statistically significantly positive for the largest banks. A $1 long position in large banks and a $1 short position in small banks results in a net exposure of 65 cents to long-term government bonds over the entire sample. The loadings on the investment-grade corporate bonds factor, *crd*, are positive over all sizes. The exposure difference between large banks and short banks to *crd* seem be negative but not statistically significant.

Panel B in Table 1.4 shows the results for total deposit-sorted portfolios. As market capitalization may be associated with stock returns (Berk, 1995), we use total deposits as a proxy for bank size. Total deposits is a possible measure of bank size that is not directly correlated with stock returns. The results show that abnormal returns decrease monotonically with total deposits, consistent with the findings in the previous Panel A. The alphas for the smallest banks are insignificant but positive, and alphas for the largest banks are statistically significant and negative. The largest banks at the tenth decile have abnormal returns of negative 4.8% per annum, statistically significant at the 5% level. The portfolio that goes long in the largest banks and short in the smallest banks loses 14.88% per year over the sample period. This return is statistically significant at the 5% level and even lower than the results that we see in Panel A. The exposure to market risk increases monotonically with total deposits, and the difference in exposure between the largest and the smallest banks is 0.72, significant at the 1% level. The coefficients for *smb* are insignificant except for the largest banks. The small banks' average returns are not associated with average small firms' return over larger firms' in the market. Loadings on *hml* are not significant, and, again, do not show any systematic pattern. The largest banks have positive exposure to long-term government bonds at 0.5 and have a negative but insignificant exposure to corporate bonds. A portfolio that goes $1 long in the largest banks and $1 short in the smallest banks will have a net exposure of $1.45 to long-term government bonds and -$1.31 in investment-grade corporate bonds.

Table 1.5 shows market capitalization-sorted portfolio returns using quintiles rather than deciles. Panel A shows results for 1940 to 1968. The portfolio return results that use quintiles provide results consistent with our previous ones. During the period of 1940 to 1968, the top 20% of banks by market capitalization have -5.04% risk-adjusted returns per annum. A portfolio that invests long in the largest quintile of banks and short in the smallest quintile will yield -7.32% risk-adjusted returns per annum. This result is consistent with our previous result of -11.81% for a 10-minus-1 position and -5.14% for a 9-minus-2 position for decile grouping.

Panel B in Table 1.5 shows results from 1935 to 1968. The reason that we start all our previous analysis in 1940 is that this was the year when the FDIC changed its policy to resolve larger institutions by purchase and assumption rather than by liquidation. In addition, 1940 is outside the Great Depression era, an era by which we do not want our data to be affected. We start our year from 1935 in this panel because the FDIC became a permanent agency of the federal government through the Banking Act of 1935, and we wanted to see the full effects of the FDIC creation. The first row of Panel B shows that the largest banks still have a negative risk adjusted return of -5.88%, even if we extend our sample to 1935. The 5-minus-1 portfolio return is -8.04%, which is consistent with investors' being aware of the large bank advantage even before the FDIC changed its policy.

For comparison, we have included the size-sorted portfolio returns for 1970 to 2013 in Table 1.6. This is one of the results in Gandhi and Lustig (2015), and our estimates for the 1970–2013 period show essentially the same result as that of Gandhi and Lustig. A portfolio that goes long in the largest banks and short in the smallest bank by market capitalization has -9.72% risk-adjusted returns per annum. U.S. commercial banks in this sample are firms with a current SIC code equal to 60 or a historical SIC code equal to 6712 (bank holding companies). Foreign banks with share codes ending in 2 or 5 are excluded. Stock return data is from CRSP.

Table 1.5: Size-factor-adjusted returns for size-sorted portfolios of commercial banks

This table presents the estimates from OLS regression of monthly excess returns on each size-sorted portfolio of commercial banks on the Fama-French stock factors, bond factors, and the second principal component weighted returns. mkt, smb, and hml are the three Fama-French factors: the market, small minus big, and high minus low respectively. ltg is the excess return on an index of long-term government bonds and crd is the excess return on an index of investment-grade corporate bonds. PC2 is the time-series of the returns of the size-sorted portfolios weighed by the loadings of the second principal component. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. The alphas have been annualized by multiplying by 12 and are expressed in percentages. The standard errors were adjusted for heteroscedasticity and auto-correlation using Newey-West with 3 lags.

	(1)	(2)	(3)	(4)	(5)	(5)-(1)
			Market Capitalization 1940-1968			
α	2.28	5.16***	3	-1.08	-5.04**	-7.32***
	(1.81)	(1.75)	(2.26)	(2.32)	(2.20)	(2.53)
mktrf	0.09**	0.17***	0.28***	0.36***	0.64***	0.55***
	(0.035)	(0.040)	(0.045)	(0.058)	(0.060)	(0.067)
smb	0.14**	0.15**	0.20***	0.18**	-0.11	-0.26*
	(0.068)	(0.064)	(0.076)	(0.078)	(0.123)	(0.140)
hml	0.16**	-0.01	-0.04	-0.07	0.20**	0.04
	(0.075)	(0.063)	(0.077)	(0.062)	(0.090)	(0.106)
ltg	-0.13	0.08	-0.32	0.03	0.47*	0.60**
	(0.140)	(0.210)	(0.198)	(0.182)	(0.261)	(0.294)
crd	0.31*	0.15	0.84***	0.28	-0.13	-0.45
	(0.175)	(0.167)	(0.213)	(0.176)	(0.255)	(0.333)
Observations	348	348	348	348	348	348
R-squared	0.138	0.142	0.340	0.276	0.383	0.215
	(1)	(2)	(3)	(4)	(5)	(5)-(1)
			Market Capitalization 1935-1968			
α	2.16	4.8***	0.24	-2.16**	-5.88***	-8.04***
	(1.68)	(1.84)	(2.33)	(2.08)	(2.12)	(2.42)
mktrf	0.09**	0.13***	0.27***	0.34***	0.65***	0.56***
	(0.035)	(0.045)	(0.050)	(0.059)	(0.057)	(0.060)
smb	0.11*	0.14**	0.20**	0.17***	-0.03	-0.15
	(0.067)	(0.061)	(0.086)	(0.062)	(0.097)	(0.115)
hml	0.08	0.10	0.13	0.02	0.27***	0.19*
	(0.064)	(0.074)	(0.106)	(0.066)	(0.094)	(0.109)
ltg	-0.13	0.02	0.04	0.15	0.46*	0.59**
	(0.195)	(0.195)	(0.219)	(0.176)	(0.255)	(0.298)
crd	0.42*	0.14	0.30	0.12	-0.14	-0.56*
	(0.222)	(0.169)	(0.256)	(0.169)	(0.225)	(0.286)
Observations	408	408	408	408	408	408
R-squared	0.160	0.158	0.308	0.329	0.465	0.250

Table 1.6: Mean risk-adjusted returns in size-sorted portfolios of commercial banks 1970-2013

This table presents the estimates from OLS regression of monthly excess returns of size-sorted portfolios on Fama-French Three Factors and two bond factors. *market, smb, hml* represents market, small minus big, high minus low respectively. *ltg* represents excess return on an index of long-term government bonds and *crd* represents excess return on an index of investment grade corporate bonds. The alphas have been annualized by multiplying 12 and are shown in percentages. U.S. Commercial banks in the sample are firms with HSICCD equal to 60 or historical SICCD equal to 6712. Foreign banks with share codes ending in 2 or 5 are excluded. Panel A shows portfolios sorted by market value and Panel B shows portfolios sorted by total deposit. The standard errors are adjusted using Newey-west with 3 lags. ***, **, * denote 1%, 5%, and 10% level of statistical significance respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
							Market Capitalization 1970-2013						
α	5.40*	4.08	3.12	1.80	2.76	1.8	0.36	-2.76	-4.32*	-4.20**	-5.88***	-8.40***	-9.72***
	(3.17)	(2.69)	(2.52)	(2.03)	(2.50)	(2.35)	(2.26)	(2.42)	(2.34)	(2.04)	(2.09)	(2.40)	(3.24)
mktrf	0.49***	0.49***	0.53***	0.57***	0.61***	0.66***	0.78***	0.83***	0.90***	1.11***	0.30***	0.42***	0.63***
	(0.055)	(0.048)	(0.047)	(0.041)	(0.048)	(0.047)	(0.042)	(0.046)	(0.047)	(0.065)	(0.046)	(0.051)	(0.081)
smb	0.38***	0.43***	0.41***	0.38***	0.45***	0.42***	0.53***	0.51***	0.44***	0.20	0.10*	0.01	-0.18
	(0.090)	(0.079)	(0.074)	(0.067)	(0.082)	(0.076)	(0.057)	(0.066)	(0.061)	(0.147)	(0.059)	(0.088)	(0.194)
hml	0.44***	0.49***	0.41***	0.47***	0.47***	0.51***	0.68***	0.68***	0.63***	0.56***	0.27***	0.14*	0.12
	(0.086)	(0.071)	(0.070)	(0.061)	(0.065)	(0.061)	(0.066)	(0.074)	(0.069)	(0.066)	(0.067)	(0.080)	(0.096)
ltg	-0.29**	-0.15	0.04	0.04	0.23	0.11	0.19	0.38***	0.50***	0.26**	0.35**	0.65***	0.56***
	(0.137)	(0.111)	(0.111)	(0.092)	(0.155)	(0.116)	(0.122)	(0.129)	(0.146)	(0.118)	(0.143)	(0.161)	(0.178)
crd	0.46***	0.34*	0.21	0.20*	0.01	0.11	0.03	-0.21	-0.28	-0.08	-0.42*	-0.62***	-0.54**
	(0.173)	(0.176)	(0.159)	(0.121)	(0.189)	(0.154)	(0.184)	(0.189)	(0.214)	(0.183)	(0.214)	(0.230)	(0.220)
Observations	528	528	528	528	528	528	528	528	528	528	528	528	528
R-squared	0.279	0.423	0.426	0.511	0.480	0.535	0.637	0.638	0.624	0.646	0.110	0.160	0.176

Finally, we look at the period in which there are essentially no government subsidies for banks. Before the Banking Act of 1935, which made the FDIC the sole liquidator for banks, there were no systems in place for rescuing banks. But even after 1935, the FDIC resolved most failures by deposit payoffs, which would wipe out the shareholders. It was only during the 1940s, when the FDIC board switched to a policy of handling failures through purchase and assumption transactions, that bank shareholders would benefit. The larger banks were more likely to be resolved by purchase and assumption, which would preserve the value of the going concern. Table 1.7 shows the mean risk-adjusted returns of market capitalization-sorted portfolios of commercial banks for 1926 to 1939.

Panel A of Table 1.7 shows that the estimated intercepts tend to increase with bank size, from -9.48% for the first portfolio to 3.84% for the tenth portfolio. The results are statistically insignificant but do show signs of increasing abnormal returns with size increase. A long-short position that goes long $1 in a portfolio of the largest market capitalization banks and short $1 in a portfolio of the smallest market capitalization banks gains 13.20% over the sample period. This return spread also is statistically insignificant. The average normal risk-adjusted return decreases for a 9-minus-2 portfolio at 9.12% and an 8-minus-3 portfolio at 8.28%, but all are statistically insignificant. We do not find any significant lower risk-adjusted return for large bank in this sample period. In fact, it is more likely that the largest banks have higher risk-adjusted returns than do smaller banks.

Table 1.7: Mean risk-adjusted returns in size-sorted portfolios of commercial banks 1926-1939

This table presents the estimates from OLS regression of monthly excess returns of size-sorted portfolios on Fama-French Three Factors and two bond factors. *market, smb, hml* represents market, small minus big, high minus low respectively. *ltg* represents excess return on an index of long-term government bonds and *crd* represents excess return on an index of investment grade corporate bonds. The alphas have been annualized by multiplying 12 and are shown in percentages. Panel A shows portfolios sorted by market value and Panel B shows portfolios sorted by total deposit. The standard errors are adjusted using Newey-west with 3 lags. ***, **, * denote 1%, 5%, and 10% level of statistical significance respectively

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
Panel A: Market Capitalization 1926-1939													
α	-9.48	-7.80	-8.04	-10.92*	1.32	-5.64	2.04	-0.60	1.32	3.84	8.28	9.12	13.20
	(7.74)	(7.84)	(9.06)	(6.31)	(6.31)	(6.59)	(5.87)	(6.68)	(6.16)	(7.01)	(8.40)	(7.88)	(9.74)
market	0.16	0.19**	0.27***	0.30**	0.29**	0.46***	0.42***	0.47***	0.50***	0.65***	0.20**	0.31***	0.49***
	(0.130)	(0.081)	(0.093)	(0.124)	(0.118)	(0.128)	(0.118)	(0.138)	(0.118)	(0.131)	(0.099)	(0.088)	(0.184)
smb	-0.10	0.23	0.39*	0.36***	0.05	0.24	0.18	0.05	0.02	-0.12	-0.33	-0.22	-0.02
	(0.131)	(0.169)	(0.224)	(0.104)	(0.171)	(0.163)	(0.126)	(0.142)	(0.145)	(0.145)	(0.210)	(0.242)	(0.200)
hml	-0.15	-0.14	-0.31**	-0.24*	0.07	0.02	0.07	0.11	0.11	0.18	0.41***	0.25*	0.33
	(0.206)	(0.128)	(0.151)	(0.137)	(0.137)	(0.132)	(0.170)	(0.147)	(0.140)	(0.155)	(0.144)	(0.129)	(0.253)
ltg	1.78	-0.53	0.16	-1.04	-0.59	0.36	0.04	0.25	-0.04	-0.42	-0.04	0.49	-2.20
	(1.376)	(0.555)	(0.678)	(0.916)	(0.774)	(0.561)	(0.755)	(0.774)	(0.761)	(0.830)	(0.699)	(0.694)	(1.618)
crd	0.45	0.50	-0.03	0.14	0.57*	0.06	0.84**	0.70*	0.73**	0.85**	0.72*	0.23	0.40
	(0.558)	(0.411)	(0.506)	(0.436)	(0.323)	(0.305)	(0.383)	(0.414)	(0.304)	(0.383)	(0.429)	(0.455)	(0.649)
Observations	161	161	161	162	162	162	162	162	162	162	161	161	161
R-squared	0.092	0.181	0.093	0.203	0.264	0.339	0.481	0.430	0.498	0.547	0.209	0.192	0.333

Table 1.7: Mean risk-adjusted returns in size-sorted portfolios of commercial banks 1926-1939 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
						Panel B: Total Deposit 1926-1939							
α	-1.92	-1.20	-13.44	-9.72	-2.76	-7.68	10.08	-2.28	1.08	5.16	11.16	2.28	8.28
	(7.26)	(7.52)	(6.60)	(7.45)	(6.89)	(7.39)	(9.43)	(6.98)	(5.93)	(7.44)	(6.97)	(7.69)	(9.08)
mktrf	0.08	0.18*	0.30**	0.27***	0.24**	0.27**	0.53***	0.48***	0.49***	0.68***	0.18*	0.31***	0.60***
	(0.071)	(0.107)	(0.131)	(0.094)	(0.106)	(0.126)	(0.173)	(0.122)	(0.129)	(0.128)	(0.099)	(0.102)	(0.147)
smb	0.01	0.35**	0.05	0.28***	0.14	0.14	0.11	0.01	0.05	-0.10	-0.04	-0.30	-0.15
	(0.097)	(0.134)	(0.124)	(0.105)	(0.113)	(0.119)	(0.151)	(0.121)	(0.160)	(0.155)	(0.118)	(0.202)	(0.161)
hml	-0.03	-0.13	-0.13	-0.23**	-0.27**	0.14	0.03	0.02	0.10	0.18	0.14	0.23*	0.22
	(0.135)	(0.149)	(0.148)	(0.088)	(0.121)	(0.171)	(0.194)	(0.137)	(0.145)	(0.151)	(0.127)	(0.132)	(0.209)
ltg	-0.47	-0.39	0.94	-0.06	0.14	0.49	0.03	0.76	0.14	-1.13	-0.18	0.52	-0.92
	(0.539)	(0.769)	(0.726)	(0.708)	(0.682)	(0.818)	(0.818)	(0.668)	(0.758)	(0.903)	(0.791)	(0.751)	(1.117)
crd	0.35	0.39	-0.02	0.29	0.18	0.52	0.56	0.69**	1.02***	0.83**	0.71*	0.63	0.44
	(0.340)	(0.366)	(0.406)	(0.435)	(0.406)	(0.507)	(0.420)	(0.311)	(0.347)	(0.361)	(0.377)	(0.409)	(0.435)
Observations	153	162	162	150	155	162	162	162	162	162	162	162	153
R-squared	0.046	0.138	0.125	0.198	0.099	0.309	0.322	0.415	0.521	0.549	0.197	0.251	0.388

The coefficient on excess market return, *mktrf*, for each size-sorted portfolio shows that the market beta increases monotonically with bank size. Over the entire sample, a portfolio of large banks has a market of 0.65, as compared to 0.16, for a portfolio of the second smallest banks. The largest banks are much more exposed to market risk as compared to the smallest banks. The loadings on *smb* show a reverse U-shape. The loadings on *smb* are the positive for the third and fourth portfolio, at 0.39 and 0.36, respectively, while the smaller and the largest banks have negative or close to zero coefficients for *smb*. The net exposure to *smb* is negative but insignificant for the 10-minus-1, 9-minus-2, and 8-minus-3 portfolios. The loadings on *hml*, however, show some systematic pattern. The net exposure to *hml* is positive for the 8-minus-3 and 9-minus-2 portfolios and significant at the 1% and 10% levels, respectively. The coefficient on *ltg* is overall insignificant and does not show a pattern. The loadings on the investment-grade corporate bonds factor, *crd*, are mostly positive over all sizes. The exposure difference between large banks and short banks to *crd* seem to be positive, but only the 8-minus-3 portfolio is statistically significant at the 10% level.

Panel B in Table 1.7 shows the results for total deposit-sorted portfolios. The results show that abnormal returns are not systematically correlated with total deposits, consistent with the findings in Panel A. The alphas for all of the bank portfolios are insignificant, with negative alphas for the smallest banks and positive alphas for the largest banks. The portfolio that goes long in the largest banks and short in the smallest banks gains 8.28% per year over the sample period, but this return is statistically insignificant. The exposure to market risk increases monotonically with total deposits, and the difference in exposure between the largest and the smallest banks is 0.60, significant at the 1% level. The coefficients for *smb* do not show any pattern for different sizes. Loadings on *hml* are significant only for the fourth and fifth decile, both at the 5% level, and mostly negative for the smaller banks and positive for the larger banks. All of the portfolios show lack of exposure to long-term government bonds, and the 8-minus-3 portfolio shows exposure to investment-grade corporate bonds at the 10% significance level.

1.4.2 Bank Size Factor and Size Factor-adjusted Returns

Gandhi and Lustig (2015) provide evidence that the largest commercial bank stocks, ranked by market capitalization, have significantly lower risk-adjusted returns than do small- and medium-sized bank stocks for 1970 to 2013. They also find that the risk-adjusted return difference between the smallest and largest banks can be captured by the bank size factor that they define using principal components. The second principal component extracted from risk-adjusted returns on size-sorted portfolios of bank stock has loadings that explain the return variation over different sizes of banks. This factor is the slope factor mentioned in Cochrane and Piazzesi (2005) when using principal component analysis to find level and slope factors. We intend to calculate this size factor for our sample period and test whether it captures the bank size effect and whether it explains patterns in our risk-adjusted return results.

Size factor is constructed by first computing the residual from the time series regression of returns of size-sorted portfolios on the five risk factors, the Fama-French three factors, and the two bond-risk factors. The loadings for the first and the second principal component are extracted from the residual and are saved. Table 1.8 shows the extracted loadings for the first and second principal components for our data.

Table 1.8: Principal components of residual from market value sorted portfolios of banks stock returns

	1926-1939		1940-1968		1970-2013	
Portfolio	w1	w2	w1	w2	w1	w2
1	0.1319	0.6485	0.1556	0.4241	0.2051	0.4169
2	0.2043	0.3887	0.1716	0.3183	0.3051	0.2565
3	0.1975	0.3192	0.1482	0.4535	0.2873	0.3987
4	0.2840	0.3311	0.2211	0.2897	0.3398	0.2058
5	0.3416	0.1300	0.3986	0.1488	0.3405	0.0900
6	0.3364	-0.0948	0.3233	0.2062	0.3664	-0.0347
7	0.3673	-0.2238	0.3876	0.0707	0.3701	-0.0873
8	0.3932	-0.2023	0.3549	-0.2587	0.3545	-0.2596
9	0.3845	-0.2422	0.4044	-0.3796	0.3337	-0.361
10	0.3924	-0.2030	0.4151	-0.3854	0.2067	-0.5869
%	52.36%	13.29%	30.50%	14.96%	50.30%	12.69%

Loadings for the first and second principal components (w1, w2) extracted from the residuals of the risk adjusted return regression. Last row indicates % explained by the principal component

The first two principal components (w1, w2) explain 65.65% of the variation in the residual for 1926 to 1939, 45.46% for 1940 to 1968, and 62.99% for 1970 to 2013. The first principal component is the level factor, which explains the overall banking industry-level factor. The second principal component is the size factor, which loads positive on portfolios of small banks and negative on the portfolios of large banks. The loadings monotonically decrease with size for all periods. Our results in Tables 1.4 and 1.6 show that, from 1940 to 1968 and 1970 to 2013, the risk-adjusted returns are higher for small banks and lower for large banks. This result suggests that the second component is a suitable candidate for a risk factor because the loadings align with the risk-adjusted returns for size-sorted portfolios. For 1926 to 1939, however, this relation does not hold, as the results in Table 1.7 show that the risk-adjusted returns are uncorrelated or, rather, increasing with size. For 1926 to 1939, the first principle component could be a size factor.

After extracting the second principle component, we proceed to constructing the size-asset pricing factor. We take the (T × 10) matrix of estimated residuals from the time series regression and multiply it by the loadings of the second principal component (10 × 1) to construct the asset pricing factors. This results in (T × 1) bank size asset pricing factors. We denote this factor as *PC2*; it is the normal risk-adjusted return on a portfolio that is long in the smallest banks and short in the largest banks. The weights for the portfolio are given by the second principle component.

We show the results for including the *PC2* size factor for the period of 1940 to 1968 in Table 1.9. The risk-adjusted returns are all statically insignificant for all of the market capitalization-sorted portfolios, and the return difference between the large banks and small banks also is insignificant. The loadings on the *PC2* factor are mostly significant, showing evidence that most of the residuals have been explained by the new *PC2* size factor. From this result, we find evidence that the bank size factor identified by Gandhi and Lustig (2015) for 1970 to 2013 existed from the 1940s.

Table 1.9: Size-factor-adjusted returns for size-sorted portfolios of commercial banks 1940-1968

This table presents the estimates from OLS regression of monthly excess returns on each size-sorted portfolio of commercial banks on the Fama-French stock factors, bond factors, and the second principal component weighted returns. mkt, smb, and hml are the three Fama-French factors: the market, small minus big, and high minus low respectively. ltg is the excess return on an index of long-term government bonds and crd is the excess return on an index of investment-grade corporate bonds. PC2 is the time-series of the returns of the size-sorted portfolios weighed by the loadings of the second principal component. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. The alphas have been annualized by multiplying by 12 and are expressed in percentages. The standard errors were adjusted for heteroscedasticity and auto-correlation using Newey-West with 3 lags.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(8)-(3)	(9)-(2)	(10)-(1)
	Market Capitalization 1940-1968												
α	1.44	-1.92	0.84	3.48	-0.03	2.64	2.52	2.64	0.48	1.80	1.80	2.40	0.36
	(2.400)	(1.992)	(1.920)	(2.160)	(2.448)	(2.328)	(2.592)	(2.340)	(1.932)	(2.136)	(2.364)	(2.220)	(2.316)
mktrf	0.23***	0.16***	0.26***	0.28***	0.28***	0.33***	0.33***	0.19**	0.40***	0.42***	-0.07	0.24***	0.19***
	(0.073)	(0.047)	(0.054)	(0.053)	(0.052)	(0.050)	(0.068)	(0.094)	(0.050)	(0.045)	(0.096)	(0.061)	(0.068)
smb	0.09	0.11	0.04	0.09	0.20*	0.18**	0.07	0.35***	0.12*	-0.00	0.31***	0.01	-0.09
	(0.081)	(0.073)	(0.073)	(0.079)	(0.108)	(0.075)	(0.078)	(0.114)	(0.068)	(0.104)	(0.115)	(0.087)	(0.091)
hml	0.14**	0.18**	-0.04	0.05	0.04	-0.11	-0.09	-0.07	0.07	0.17**	-0.03	-0.12	0.04
	(0.062)	(0.092)	(0.070)	(0.077)	(0.089)	(0.076)	(0.096)	(0.064)	(0.072)	(0.083)	(0.075)	(0.089)	(0.076)
ltg	0.03	-0.09	0.12	0.37	-0.17	-0.39*	0.08	-0.23	0.12	0.21	-0.35	0.21	0.17
	(0.185)	(0.219)	(0.182)	(0.264)	(0.234)	(0.225)	(0.223)	(0.168)	(0.184)	(0.207)	(0.223)	(0.239)	(0.235)
crd	0.13	0.16	0.10	-0.03	0.39	0.89***	0.39	0.51***	0.22	0.13	0.40*	0.06	-0.00
	(0.226)	(0.205)	(0.195)	(0.224)	(0.243)	(0.245)	(0.261)	(0.179)	(0.177)	(0.198)	(0.235)	(0.243)	(0.241)
pc2	0.19***	0.07***	0.13***	0.11***	0.02	0.03	-0.03	-0.20***	-0.21***	-0.27***	-0.32***	-0.28***	-0.45***
	(0.047)	(0.024)	(0.017)	(0.024)	(0.020)	(0.017)	(0.020)	(0.071)	(0.021)	(0.022)	(0.070)	(0.036)	(0.042)
Observations	348	348	348	348	348	348	348	348	348	348	348	348	348
R-squared	0.259	0.141	0.253	0.177	0.195	0.318	0.238	0.390	0.609	0.630	0.443	0.468	0.691

1.4.3 Other Industry Analysis

In order to attribute the funding cost differences between large and small banks to perceptions government support for large banks, we need an approach that shows the measured difference between large and small banks is primarily due to perceptions of government support and not due to other factors that might be associated with size but are unrelated to perceptions of government support.

There is a possibility that there is a general size advantage when it comes to funding. For example, Greater liquidity of debt issues, better access to capital markets, and better diversification. In order to isolate the funding cost benefit of government support we look at risk adjusted returns of non-financial firms.

As a first test we can compare the returns by large firms versus small firms for the market as a whole versus banking. Table 1.10 shows that the difference between large and small firms ranges from 78 basis points to 18 basis points over the years. Banks have a much higher difference in raw returns of 416 to 164 basis points as shown in Table 1.2. These comparisons suggest that funding cost differentials appear to exist generally between large and small firms in many industries, but perhaps more in banking.

Next step would be to introduce controls for risk and other factors to determine whether this general size advantage remains. In Table 1.11 we show difference in risk adjusted returns between large firms and small firms using tertiles (column 1), quintiles (column 2,3), and deciles(column 4,5,6). Applying the controls we've used before, we find that although insignificant, large firms generally do enjoy lower risk-adjusted returns than smaller firms as a whole. In addition, comparing with Table 1.4 we find that for non-financial firms the size advantage tends to be much smaller than in banking.

Table 1.10: Mean returns for market value-sorted portfolios of non-financial firms

This table presents the mean returns for each market value-sorted portfolio of firms. The monthly mean returns have been annualized by multiplying by 12 and are expressed in percentages

	1	2	3	4	5
Market Capitalization 1916-1968					
1926-1939	1.53	1.26	1.22	0.91	0.75
1940-1968	1.75	1.53	1.37	1.25	1.02
1970-2013	1.09	1.13	1.13	1.10	0.91

Table 1.11: Risk adjusted returns for size-sorted portfolios of non-financial firms

This table presents the estimates from OLS regression of monthly excess returns on each size-sorted portfolio of commercial banks on the Fama-French stock factors, and bond factors. mkt, smb, and hml are the three Fama-French factors: the market, small minus big, and high minus low respectively. ltg is the excess return on an index of long-term government bonds and crd is the excess return on an index of investment-grade corporate bonds. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. The alphas have been annualized by multiplying by 12 and are expressed in percentages. The standard errors were adjusted for heteroscedasticity and auto-correlation using Newey-West with 3 lags.

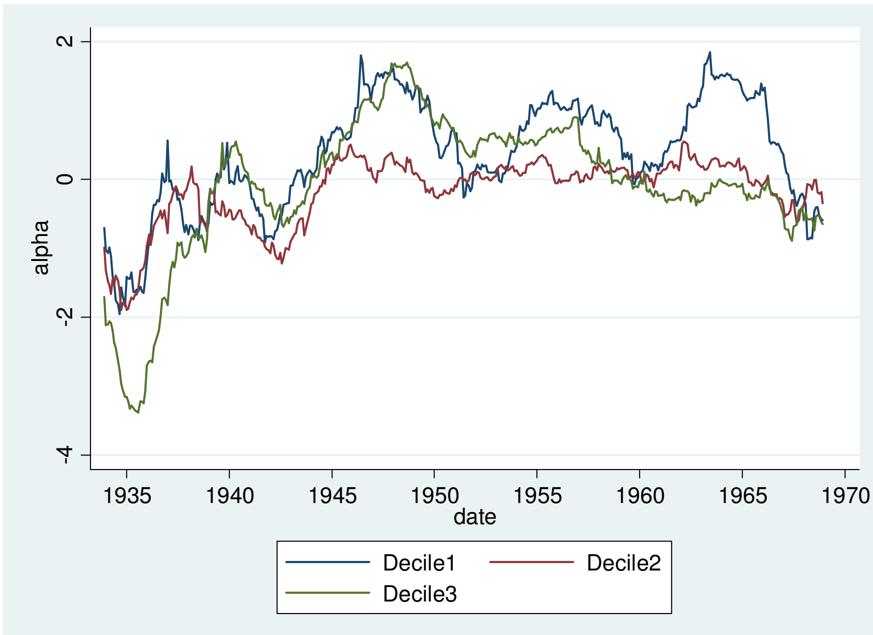
	(3)-(1)	(4)-(2)	(5)-(1)	(8)-(3)	(9)-(2)	(10)-(1)
			Market Capitalization 1926-1939			
α	1.22	-2.04	-0.09	-0.09	-0.32	-3.42
	(1.752)	(1.476)	(2.856)	(2.436)	(3.204)	(5.568)
mktrf	-0.0626	0.0653**	-0.0566	0.0221	-0.0127	0.0224
	(0.042)	(0.027)	(0.058)	(0.053)	(0.072)	(0.092)
smb	-1.3929***	-0.7286***	-1.7091***	-0.9513***	-1.4876***	-2.0749***
	(0.045)	(0.057)	(0.089)	(0.055)	(0.129)	(0.151)
hml	-0.5186***	-0.2485***	-0.6848***	-0.2371***	-0.4538***	-0.9726***
	(0.062)	(0.041)	(0.078)	(0.059)	(0.073)	(0.155)
ltg	0.2254	0.4331***	0.6968*	0.5227**	0.5252	1.3048
	(0.205)	(0.134)	(0.397)	(0.243)	(0.379)	(1.029)
crd	-0.0495	-0.3496***	0.1732	-0.3672**	0.2616	0.0622
	(0.118)	(0.089)	(0.175)	(0.166)	(0.217)	(0.239)
Observations	162	162	162	162	162	162
R-squared	0.956	0.887	0.926	0.857	0.866	0.860
			Market Capitalization 1940-1968			
α	-0.83	-0.82	-0.15	-1.12	0.78	-1.08
	(0.732)	(0.600)	(0.936)	(0.864)	(0.960)	(1.764)
mktrf	0.0101	0.0294*	0.0216	0.0074	-0.0013	0.0616
	(0.014)	(0.017)	(0.019)	(0.017)	(0.022)	(0.039)
smb	-1.2681***	-0.5716***	-1.5169***	-0.6694***	-1.0534***	-1.8433***
	(0.025)	(0.036)	(0.049)	(0.044)	(0.053)	(0.100)
hml	-0.4679***	-0.1658***	-0.6536***	-0.2136***	-0.4660***	-0.8724***
	(0.028)	(0.031)	(0.052)	(0.035)	(0.044)	(0.109)
ltg	0.0453	0.1420**	0.0245	0.1822*	0.2138**	0.0516
	(0.044)	(0.071)	(0.091)	(0.095)	(0.097)	(0.172)
crd	-0.0509	-0.0202	-0.0371	-0.0898	0.0224	-0.1949
	(0.062)	(0.098)	(0.095)	(0.096)	(0.097)	(0.200)
Observations	348	348	348	348	348	348
R-squared	0.947	0.706	0.910	0.670	0.795	0.802

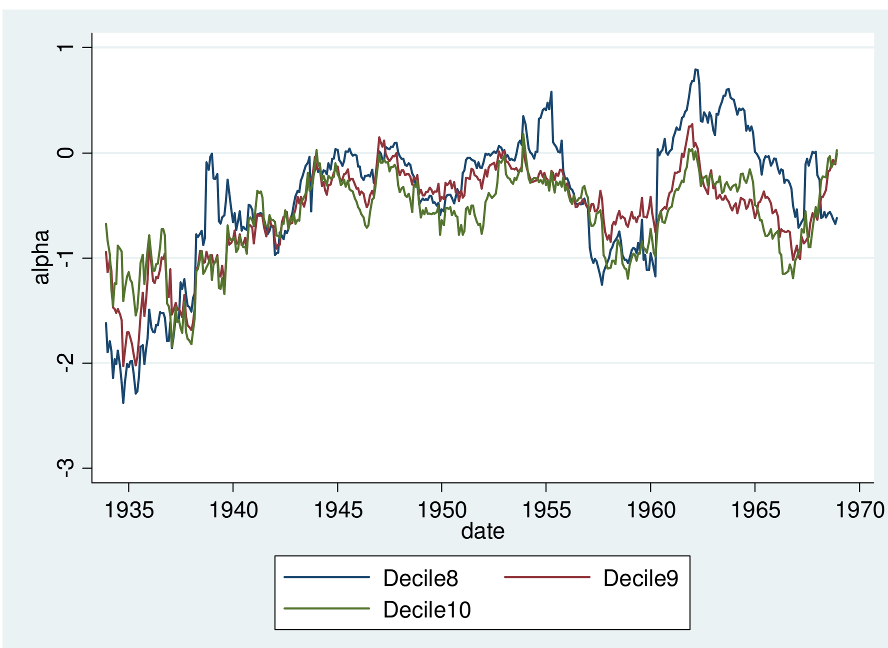
1.4.4 Rolling Window Estimation

In order to detect the regime shift from FDIC's policy change in 1940, we employee a rolling window estimation of the risk adjusted alphas. Using a window of 60 months we estimate the abnormal returns for six of the market value sorted deciles. Figure 1.3 shows the results of the estimation. Abnormal returns of decile 1(smallest banks) through decile 3 shows that before mid-1940s the abnormal returns were mostly negative for the small banks and afterwards they have mostly positive values and stay above zero. On the other hand the decile 10(largest banks) through decile 8 had fairly negative abnormal returns before 1940s and still stays below zero even after mid-1940s. This evidence shows that after mid-1940s the smaller banks required a higher risk adjusted return than the larger banks.

Figure 1.3: Rolling Abnormal returns of Market value sorted deciles

This figure presents the rolling estimates from OLS regression of monthly excess returns on each size-sorted portfolio of commercial banks on the Fama-French stock factors, and bond factors. mkt, smb, and hml are the three Fama-French factors: the market, small minus big, and high minus low respectively. ltg is the excess return on an index of long-term government bonds and crd is the excess return on an index of investment-grade corporate bonds. The alphas have been annualized by multiplying by 12 and are expressed in percentages. The standard errors were adjusted for heteroscedasticity and auto-correlation using Newey-West with 3 lags. Rolling window size is 60 months.





1.5 Conclusions

Using unique data on over-the-counter bank stock prices and balance sheet information we explore bank funding cost differentials using the risk-adjusted return gap between the largest and the smallest depository institutions. We find that the largest commercial bank stocks, ranked by market value or gross deposits, have 11.75% lower risk-adjusted annual returns than do small sized bank stocks even after controlling for standard risk factors including size. This return difference is one of the first instances of preferential treatment for large banks and can be attributed to the Banking Act of 1935 which authorized the FDIC to act as the liquidator for all insured banks, and to choose which bank would be resolved by purchase and assumption and which by liquidation. Failures of larger institutions tended to be resolved by purchase and assumption, which is preferred because it preserves the value of the going concern, while failures of smaller institutions tended to be resolved by payoff and liquidation. This policy is interpreted as an implicit bailout by the government for large banks. When examined during the period of 1926 to 1939, when there are no such guarantees, we do not find any risk-adjusted returns differences between different sizes of banks.

Chapter 2

Deposit Insurance and Depositor Monitoring: Quasi-Experimental Evidence from the Creation of the Federal Deposit Insurance Corporation[1]

[1] Joint work with Gary Richardson and Haelim Park

2.1 Introduction

Deposit insurance is a pillar of financial architecture in modern economies, yet the policy remains controversial. Advocates assert that deposit insurance fosters financial stability and forestalls financial panics (Demirguc-Kunt and Kane, 2002; Folkerts-Landau and Lindgren, 1998; Garcia, 1999). Critics claim that deposit insurance distorts incentives of savers and financiers, encourages moral hazard and excessive risk-taking, and spawns systemic financial crises. The controversy revolves around different perceptions about whether depositors monitor banks' performance in the absence of insurance; how monitoring influences banks' behavior; how, when, and to what extent insurance distorts monitoring; and whether it is possible to design a deposit insurance system that preserves (at least to some extent) depositor monitoring (Calomiris, 1999; Gorton, 2007). Empirical studies examining the effect of deposit insurance on depositor monitoring have produced mixed results. Some studies detect monitoring, even in nations with explicit and extensive insurance (e.g. Park and Peristiani (1998) and Martinez-Peria and Schmukler (2001)). Other studies find little monitoring (Demirguc-Kunt and Huizinga 2004).[2]

These empirical inconsistencies arise for several reasons. Scholars study different nations with different insurance systems which may, in fact, function differently. Scholars often lack direct data on the phenomenon of interest; and scholars often study data from periods that lack clearly defined control and treatment groups. So, in many cases, scholars may not be able to precisely determine the ways in which depositors behaved. Our essay overcomes many of these difficulties by examining a policy experiment: the creation of a national deposit insurance system in the United States during the 1930s.

[2] Recently, Karas, Pyle and, Schoors (2013) overcome these constraints by investigating an experimental setting in Russia; where they observe changes in the behavior of a newly insured group relative to an uninsured control group.

The structure of New York's commercial banking system provides a unique analytic opportunity. New York's commercial banks accepted preferred and regular deposits. Preferred depositors received interest fixed by law, and when a bank failed, received repayment before regular depositors. Regular depositors received interest set by the market, which usually exceeded that paid to preferred depositors, but when a bank failed, received repayment after preferred depositors. During the 1930s, a series of federal laws (particularly the Banking Acts of 1933 and 1935) limited interest that banks could pay upon demand deposits and established the Federal Deposit Insurance Corporation (FDIC). The FDIC insured deposits in commercial banks up to $5,000. Before these reforms, the incentives of preferred and regular depositors differed sharply. For preferred depositors, regulations fixed the risks and returns at a low level; while for regular depositors, the market set the risks and returns at a higher level. After these reforms, regulations dictated risks and returns for both groups, setting the risk of loss for all depositors near zero and capping interest on deposits at a low rate (zero for demand deposits). This change in the incentives of one group relative to another facilitates our treatment-and-control estimation of the impact of deposit insurance.[3]

Our general approach is to compare the behavior of preferred and regular depositors within a bank before and after the introduction of deposit insurance. The preponderance of the banks that we study were unit institutions, located in a single building; all of them, including those with branches, operated within a single municipality (and we analyze the headquarters and branches as single balance sheet). We control for bank and municipality fixed effects. Our within

[3] Our dataset focuses on the period between 1929 and 1938. The period from 1929 to 1932 is characterized by the Great Depression and banking panics. In comparison, the period from 1934, when deposit insurance was enacted, until the current crisis, is known as the "Quiet Period" in U.S. banking (Gorton, 2010). A banking panic occurs when information-insensitive debt becomes information-sensitive. In other words, depositors intensify monitoring the health of their banks. However, deposit insurance made deposits information-insensitive debt. By comparing depositors' responses to bank risk before and after deposit insurance, we identify how deposit insurance influenced depositor monitoring.

bank approach, therefore, controls for the dramatic changes in the structure of the financial industry during the 1930s and the wide range of factors – observable and unobservable – that impacted depositors in each institution but did not differentially impact regular and preferred depositors.

The remainder of this essay describes our analysis. Section 2 establishes the historical foundations of our estimation strategy. It is based on the unique structure of New York's commercial banking system and the adoption of deposit insurance in the United States, one of the first and largest institutional changes of this type. Section 3 describes the data set that we examine for this study, which includes the balance sheets of all state-chartered banks and trust companies in New York from 1929 through 1938. Section 4 presents a model of depositor behavior which informs our statistical analysis.

Section 5 presents our statistical methods and empirical results. We focus on two types of information two which depositors typically react. The first is information about economic conditions, which informs depositors about the risks of depositing in banks and the opportunity cost of doing so. The second is information specific to individual banks, such as information about their balance sheets, which reveals information about banks' health and the benefits of possessing a relationship with an institution in the future. We assess depositors' reactions to both types of information.

Our assessment requires us to overcome a key threat to inference: endogeneity. Both types of information that we examine arise, in part, through decisions of depositors. The most widely reported information about the state of the economy, such as the Dow Jones Industrial Average, arose from financial markets in New York City. Prices in those markets reacted to flows of deposits in and out banks in Manhattan, because commercial banks in the Big Apple invested a substantial share of their resources in call money markets, which funded purchases of stocks and bonds. The impact of this information, therefore, can be accurately assess only for banks outside of New York City; so this portion of our analysis excludes banks in all boroughs of the city.

Information about banks' balance sheets also depended on the collective choices of depositors. This is particularly true of the balance-sheet ratios that depositors typically monitored, such as (in today's terminology) measures of banks' liquidity and leverage. In the cash to deposits ratio, for example, the denominator is total deposits, which is obviously a function of depositors' decisions, and the numerator is cash, which also depended directly and indirectly on depositors' choices. Withdrawals directly reduced cash on hand in the bank, while managers' anticipation of withdrawals induced them to change the level of cash holdings. We control for endogeneity of this type using prevalent solution in the literature: lag and functional form restrictions that separate how ratios reacted to depositors' decisions from how depositors reacted to changes in ratios. The structure of our data provides an obvious lag structure. Depositors received information about banks' balance sheets with a lag, several weeks after the end of a fiscal quarter, when financial institutions published their quarterly reports in local newspapers. We incorporate this timing into our estimates by assuming that changes in deposits prior to the arrival of information could not have been caused by information not yet available.

Section 6 discusses the limitations and implications of our estimates. Our results show that deposit insurance reduced, but may not have eliminated, depositor monitoring. Pre FDIC, regular depositors reacted more than preferred depositors to information about economic aggregates and bank balance sheets. Post FDIC, regular and preferred depositors reacted similarly (generally, not at all) to information about banks' balance sheets. Regular depositors' reactions to information about aggregate economic conditions diminished, but did not entirely disappear.

2.2 Historical Background

Our empirical research rests upon factual foundations. This section summarizes the essential information. It focuses on three topics. The first is the structure of the commercial banking system in the state of New York, which shaped depositors' incentives to monitor banks. The second is depositors' ability to obtain and process information, which shaped the ways in which they could monitor the safety and soundness of deposits. The third is reforms of the commercial banking system during the 1930s, principally the creation of deposit insurance, which influenced depositors' incentives to monitor financial institutions.

In New York during the 1920s and 1930s, hundreds of commercial banks operated under state charters. Almost all of these banks operated as unit institutions, under a single charter, within a single building, and summarizing their activities with a single balance sheet. Unit banks' depositors typically resided within a short distance, most less than 20 miles, of the bank. Most loans were made to borrowers within a similar radius. A small number of banks operated branches, which according to state law, had to operate within the same municipality as their headquarters. For these branch networks, corporate balance sheets summed the assets and liabilities of the headquarters and branches. A small number of banks in Manhattan also operated within holding corporations. Holding corporations typically owned multiple institutions. A common structure included a commercial bank, an investment bank, a trust company, and sometimes a building-and-loan or an insurance corporation. This essay analyzes the commercial banking component of each holding corporation.

New York City possessed a special position in the banking hierarchy of the United States. New York was a central reserve city. Banking law required banks in a central reserve city to hold 13 percent of net demand deposits as reserves. The banks held these reserves either as cash in their vaults or, for member banks, as deposits at the Fed. Albany and Buffalo were reserve cities. Banks in reserve cities had to hold 10 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 called country banks. These banks had to hold 7 percent of net demand deposits as reserves, and could hold those reserves either as cash in their vault or deposits in banks in reserve or central reserve cities.[4] These legal-reserve requirements reinforced and reflected a reserve pyramid in which country banks around the United States 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 United States. This long-standing structure shaped the clientele of banks in different locations and the structure of their balance sheets. We discuss these details in the next section of this paper.

New York's commercial banks accepted preferred and regular deposits. Regular depositors received interest set by the market, but when a bank failed, received repayment after preferred depositors. During the 1920s, interest rates on demand deposits in banks in New York City ranged from one to four percent. Interest rates on time deposits averaged one to two percentage points higher.

Preferred depositors received interest fixed set by law, generally a few percentage points lower than the rate for regular deposits. When a bank failed, preferred depositors received

[4] Note that the small number of country banks that joined the Federal Reserve System held their reserves as deposits at the Fed. Also note that these reserve requirements rose in 1936 and 1937. For details, see the Federal Reserve Bulletin..

repayment before regular depositors. Preferred deposits were safe. Banks had to invest preferred deposits in long-term government bonds. The nominal value of those bonds guaranteed eventual repayment of the nominal value of the preferred deposits. Liquidators of failed banks tended to expedite repayment of preferred deposits. Newspapers indicate that repayment typically began within a few months and finished within one year. We have found no evidence that preferred depositors lost funds in banks that failed in New York State.

Most depositors could choose between depositing as preferred or regular depositors (just as most depositors could choose to make time or demand deposits). The law, however, required some depositors to only make preferred deposits. The required group included custodians of funds, such as lawyers overseeing trusts; New York state chartered savings banks and savings and loans; credit unions; land banks; the government of the State of New York and its business entities; and municipal and county governments. In 1929, the last year for which we have detailed data on the breakdown, approximately 97% of preferred depositors came from those required groups. It is possible that some regular depositors shifted funds into preferred deposits during the financial crises in New York in 1931 through 1933. This shift would inflate the apparent reaction of preferred depositors before deposit insurance, which would reduce the apparent impact of deposit insurance, which we are measuring based upon the convergence of the behavior of these groups after deposit insurance. We do not think that this bias is large, but we cannot completely control for it, given the structure of the data. The nature of preferred deposits meant that banks held, on average, 6 percent preferred deposits; and one-quarter of all banks held no preferred deposits.

Deposits served as banks principal source of funds. Deposits amounted to 80% of the liabilities of the banks that we study. Banks' secondary source of funds consisted of owners' equity. Funds raised via sales of stock amounted to 8% of the liabilities of the banks that we study. Retained earnings amounted to 8% of the liabilities. Borrowings from banks (and other institutions) amounted to a small fraction of banks' balance sheets. Banks' lacked the ability to raise funds via many methods common today, including the Fed funds, repo, and commercial paper markets; by selling securities; or via special purpose vehicles. Most of those institutions did not exist during the 1930s, and banks could not legally raise funds through the few that did.

In New York, several systems existed for chartering and regulating institutions that accepted deposits. These included nationally chartered banks, state-chartered banks, unchartered (private) banks, and building and loans. Our study does not directly analyze these complementary and competing institutions, because of differences in data sources, data frequency, deposit structure, and regulations. Our experimental design applies only to state-chartered commercial banks which could accept both regular and preferred deposits.

In the 1920s and 1930s, depositors possessed substantial information about the health of banks. State law required commercial banks to submit four balance sheets each year to the superintendent of state banks. All banks submitted these balance sheets on the same days, selected by the superintendent, on which he called for the reports, hence the name of call reports. Each year, one call occurred on the last business day of June. Another call occurred on the last business day of December. Another call occurred in the spring, somewhere near the end of the first quarter of the year. Another call occurred in the fall, somewhere near the end of the third quarter. Randomizing the spring and fall calls prevented banks from 'window dressing' their balance sheets, by engaging in financial activities that improved the appearance sheet of their balance sheet on specific days.

The law required commercial banks to publish their balance sheet in their local newspapers. Publication typically occurred within a few days of a call. Many banks published balance-sheets at higher frequencies and in greater detail than that required by law, by purchasing advertising space in hometown newspapers. In these advertisements, banks described their assets, liabilities, profits, dividend payments, services offered, interest rates, and the names of their officers and directors. Information about banks' balance sheets also appeared in the publications of business information firms, such as Rand McNally, Polk, Moody, and the Commercial and Financial Chronicle. Rand McNally published its *Bankers' Directory* in January and July of each year, focusing on information from December and June call reports. Polk published its *Bankers' Encyclopedia* in March and September, focusing on information from the calls at the end of the first and third quarters. Moody's published a rating book for financial firms – including large commercial banks – each quarter. The Commercial and Financial Chronicle contained monthly section summarizing bank balance sheet information and bank stock prices. In 1928, this period section became a stand-alone publication entitled the *Bank and Quotation Record*.

For most banks in New York City, information was available at high frequency. Each week, numerous newspapers – including the New York Times and Wall Street Journal – published a table containing balance-sheet information for all banks belonging to the New York City Clearing House. Pages surrounding these tables typically contained advertisements for banks throughout in the city.

Newspapers also published articles about difficulties besetting banks in Manhattan, throughout the state, and around the United States. These articles often appeared prominently, frequently on the first page. Newspapers also published detailed descriptions about fluctuations in financial markets and the health of the economy.

This inundation ensured that depositors possessed information about the health of their banks. Since depositors' ability to collect and synthesize information was limited, we restrict our analysis to information publicly available in newspapers. This information closely corresponded with basic information available to regulators since laws required all banks to publish quarterly call reports. Depositors' ability to analyze information was also limited. In the 1920s, depositors (and even academic economists) lacked electronic computers, statistical spreadsheets, mathematical microeconomic theory, and sophisticated statistical theory.

To ensure that we examine the evidence with these limitations in mind, we focus our analysis on quantitative methods popularized by *Banker's Magazine* during the 1920s and Garcia's *How to Analyze a Bank Statement* in the 1930s. These sources described how depositors, investors, and other interested analysts could assess the health of banks' balance sheets. Signs of bank health included steady increases in equity, measured by paid-up capital, surplus, and retained earnings; diversified portfolios, including cash, bonds, and loans; and consistent payments of interest and dividends. The sources also taught the public how to conduct simple ratio analysis. These sources taught readers to calculate useful ratios. Examples include equity ratio, which equaled paid-up capital plus retained earnings divided by total assets. Another was the cash ratio, which equaled cash, cash items, and reserves deposited at other banks divided by total deposits. A third was the ratio of collateralized or otherwise secured loans to total assets. The sources told depositors to compare these ratios to past measures for the same bank and average ratios for all banks. Safe banks were institutions with more capital and more liquidity.

Depositors also possessed information about the state of the economy. The Dow Jones Industrial Average (DJIA) was one of the most widely reported statistics. It appeared everyday in newspapers around the state. Large movements in the DJIA were typically highlighted on newspapers' first pages and by newspapers' street salesmen. Large movements in the DJIA also generated discussion on radio news shows, which commanded growing audiences during the 1930s.

Our paper employs three types of data to control for economic conditions. The first is a leading economic indicator: construction contracts awarded. The second is a contemporaneous economic indicator: the New York Fed's index of retail trade. The third is a lagging economic indicator: business failures by month. We collect all of this information monthly, and use it to distinguish depositors' reactions to information about the state of the economy (represented by the DJIA) and actual economic activity. We know depositors were inundated with information about the DJIA, while depositors lacked information about construction, sales, and failures. Generating that information involved a lag of several months. Reports of that information seldom appeared in the popular press, and in general, appeared deep within publications of interest to bankers and businessmen.

The Banking Act of 1933, commonly called the Glass-Steagall Act, created Federal Deposit Insurance Corporation (FDIC). The FDIC initially insured all deposits up to $10,000 and of larger deposits, 100% of the first $10,000; 75% of the next $40,000; and 50% of any deposit over $50,000. The FDIC was originally created as an emergency, temporary measure. It began with backing from the Federal government, raised funds from fees charged on participating banks, and possessed the power to impose assessments on healthy banks to pay for losses from insolvent banks. The law required all nationally chartered and Federal Reserve member banks to join the FDIC. State-chartered institutions could join the FDIC, but most state-chartered banks in New York eschewed its original incarnation.

The Banking Act of 1935 (passed in August of that year) amended the earlier act. The FDIC received a permanent charter. The FDIC insured the first $5,000 of all deposits and nothing over that amount. The FDIC collected an annual assessment of 1/12 of 1 percent of all deposits in insured banks with no provision for collecting 'special assessments' to cover larger-than-expected losses. The FDIC became the receiver for all troubled commercial banks. New resolution procedures ensured the prompt payoff of all insured depositors, either directly through the FDIC or indirectly, after the FDIC brokered a transfer of the deposits (and underlying assets) to a healthy bank. These changes made the FDIC palatable to most depository institutions. Almost all state-chartered banks in New York quickly joined the program. The swift adoption of deposit insurance was motivated, in part, by a change in New York's banking law, which eliminated double liability of stockholders and reduced liability of directors for banks that joined the FDIC.

The Banking Acts of 1933 and 1935 changed the financial system in many ways. For our study, the most important changes were those that differentially influenced the incentives of preferred versus regular depositors. Insurance was a transcendent change. Prior to its existence, incentives of preferred and regular depositors differed, with regular depositors exposed to greater risk. After deposit insurance, incentives converged, with both classes of depositors promised rapid access to funds held by failing banks. Rules regarding interest payments on deposits worked in the same direction. Before 1935, rates paid to preferred and regular depositors differed. Afterwards, these rates converged, with the interest rates on demand deposits set near zero and interest rates on time and savings deposits capped at six percent.

2.3 Data Sources and Summary Statistics

Data for this study come from several sources. The principal data consists of quarterly level balance sheets for all state-chartered commercial banks and trust companies in New York State. This information was published in the *Annual Report of the Superintendent of Banks*. We computerized this data for the years relevant for our study, and our working to computerize the data series for all years from 1913 through 1938.

Newly constructed balance sheet information possesses many advantages. It is accurate, since it comes from legal submissions whose veracity checked by independent auditors and bank examiners. Incorrect submissions exposed corporate officers to civil and criminal liability. This information was also widely disseminated, since state law required banks to publish these balance sheets in local newspapers. The bank superintendent published all of this information in monthly bulletins and in an annual report published early in the following year (i.e. 1912 data appeared in print in early 1913). The report presented this data in a consistent format for several decades.

The data also present certain challenges. One challenge comes from the evolving categorization of liabilities and assets across the years that we study. In some years, for example, the source reports liabilities tabulated by class of depositor and type of deposit. In other years, the source does not contain this cross tabulation. We overcome this challenge by computing consistent categories across all years at the finest possible categorization. Another challenge comes from 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.[5] We overcome

[5] In the spring of 1932, the Legislature of the State of the New York established the Banking Board to improve banking businesses during the Great Depression. In March 1933, when the Banking Act was passed to end banking

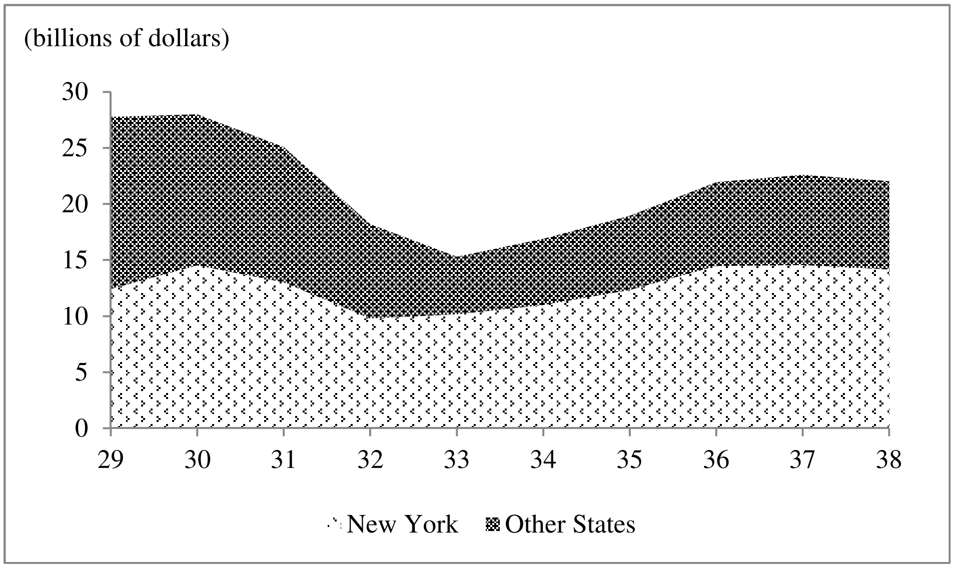
this challenge by comparing the impact of the permanent program of the FDIC, established in the summer of 1935, to the state of affairs that prevailed in the state of New York prior to the introduction of emergency measures during March 1933. We do not analyze the impact of the temporary insurance regimes established during the banking emergency and evolving prior to the solidification of the FDIC.

The structure of New York's banking system provides a unique analytic opportunity. It also illuminates a salient and central case. Deposits at banks in New York comprised a large share of total deposits in the U.S. Figure 2.1 presents total deposits in New York and the United States. At the onset of the Great Depression, U.S. deposits amounted to $27 billion. In the early 1930s, deposits fell sharply due to the banking panics that deepened the depression. From 1933 to 1935, deposits rebounded, but did not return to the pre-depression peak until after the end of our study. These aggregate changes coincided with an increase in the share of deposits held in banks in the state of New York. At the beginning of 1929, banks in New York held 42 percent of all deposits. At the end of 1932, banks in New York held nearly 70 percent of all deposits. This is because deposits contracted sharply in the other states, while deposits declined mildly in New York.

Our data on state-chartered banks represents a large share of all deposits in the state of New York. Figure 2.2 presents the share of deposits in the national and state-chartered banking systems in New York. State-charted banks were important financial intermediaries in New York during this period; they represented 60 percent of total deposits.

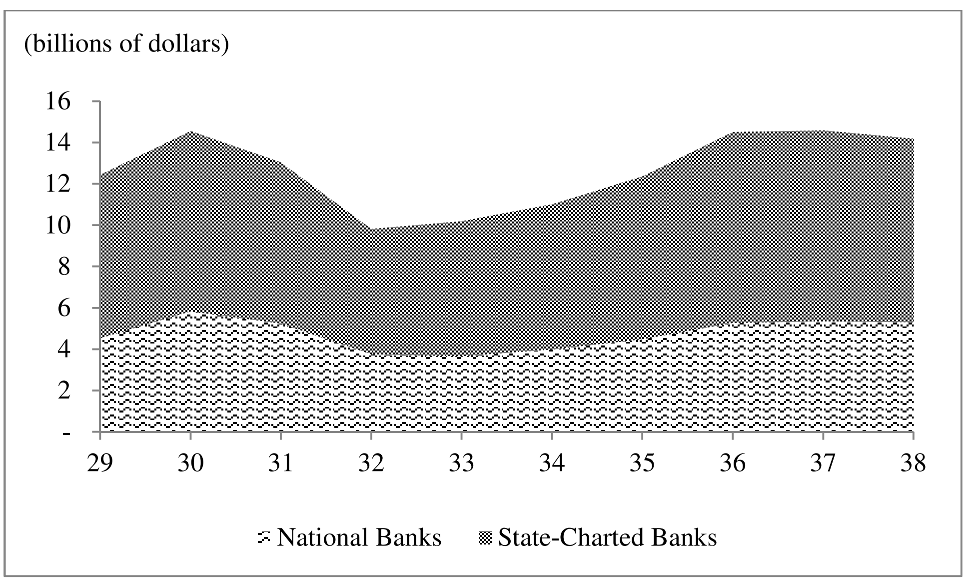
panics, the Legislature gave the Banking Board the emergency powers to enact rules and regulations which have the effect of law. During the years 1933 and 1934, the Banking Board suspended Banking Laws requiring the rendering of reports or the examinations of banking institutions subject to the supervision of the Banking Department.

Figure 2.1. Deposits in New York and United States



Source: All Bank Statistics, 1896-1955.

Figure 2.2: Deposits in National and State Banking Systems in New York



Source: All Bank Statistics, 1896-1955.

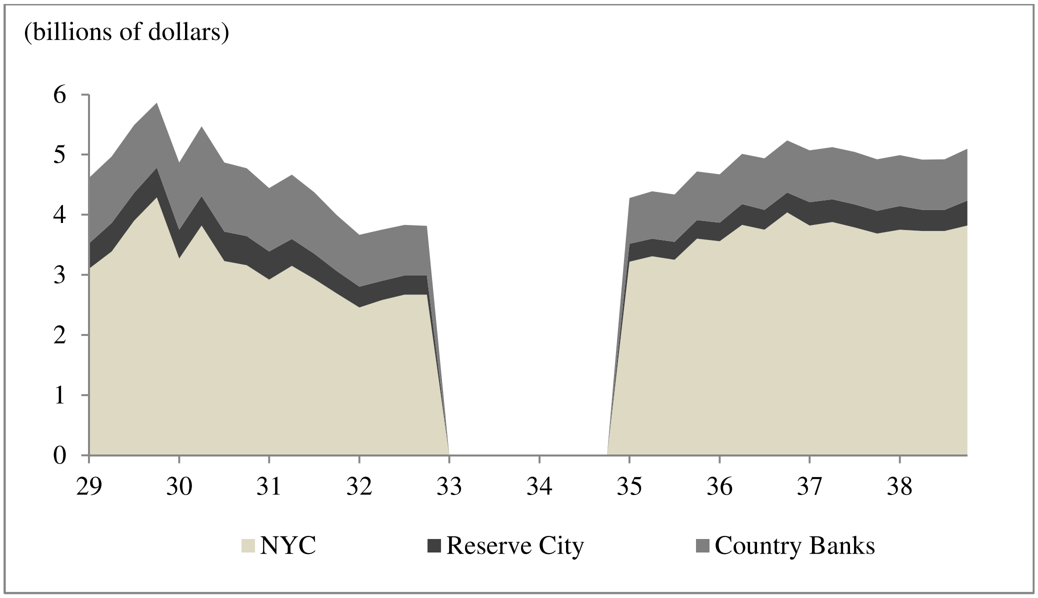
Tables A-1 and A-2 show balance sheets published in the *annual report* between 1929 and 1938. After the state department began reporting of balance sheets, it made several changes to the reporting framework over time.[6] In 1930, there was a major change in the reporting framework because the state department began to report the amount of demand and time deposits separately.

Our micro-sample consists of data on 377 state-chartered banks and trust companies, 72 of which are New York City banks, 8 are reserve city banks, and 297 are country banks. While just over 19 percent of the sample consists of New York City banks, those banks are much larger than the country banks, averaging over 10 million in assets versus just over 4 million in assets for country banks.

Most of these deposits were concentrated in New York City. Figure 2.3 presents the share of deposits in New York's state-charted banking system by reserve city status. New York City banks represented only 19 percent of banks, but 70 percent of deposits. Reserve city and country banks represent 10 and 20 percent of deposits, respectively. Throughout our analysis, we will provide separate estimation results for New York City bank and for country banks since we find important differences in depositor monitoring of these two categories of banks.

[6] The major change occurred in 1911 when the state banking department began to publish quarterly balance sheets for trust companies in an attempt to intensify regulatory scrutiny in response to the banking panic of 1907. Other changes occurred in various years as the state banking department made changes to the reporting of balance sheet items.

Figure 2.3: Deposits in State-Charted Banking System by Reserve City Status



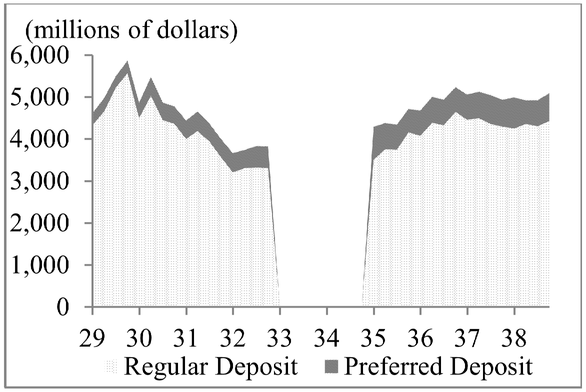
Source: Annual Reports.

In order to identify causality between deposit insurance and depositor monitoring, we use deposit insurance as a natural experiment that reduced the risk of holding regular deposits after 1935. We begin our analysis by plotting the movement of regular and preferred deposits before and after deposit insurance. Figure 2.4, Panel A, shows that regular deposits constituted most of total deposits. Regular and preferred deposits represented 90 percent and 10 percent of total deposits, respectively. Figure 2.4, Panel B illustrates deposit indices for regular and preferred deposits. While regular deposits declined and preferred deposits increased before deposit insurance, it is unclear that both types of deposits followed different trajectories after deposit insurance.

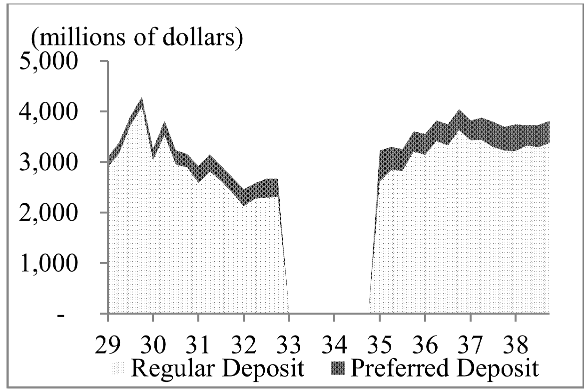
Figure 2.4: Share of Deposits held by Preferred and Regular Depositors in New York

Panel A. Deposits Held By Preferred and Regular Depositors

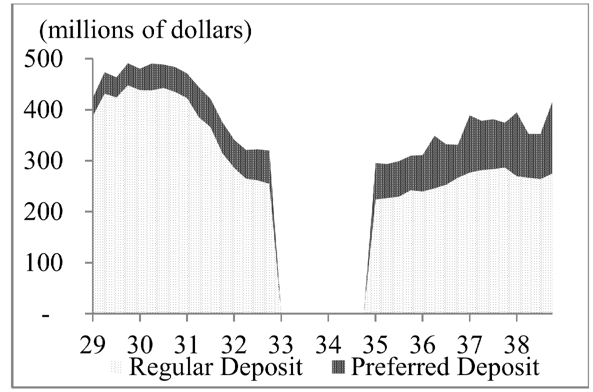
All Banks



New York City Banks

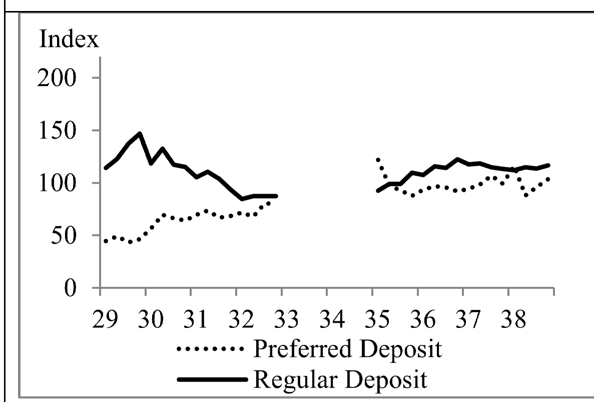


Country Banks

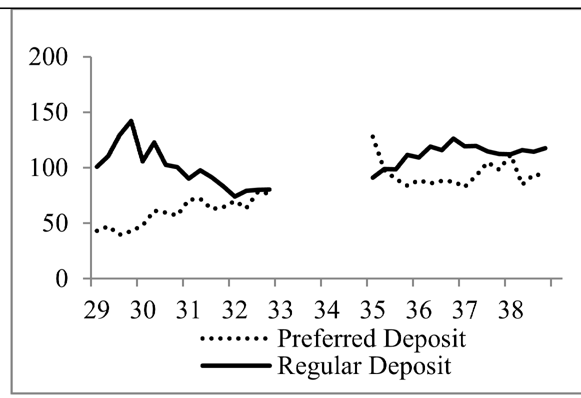


Panel B. Deposit Indices

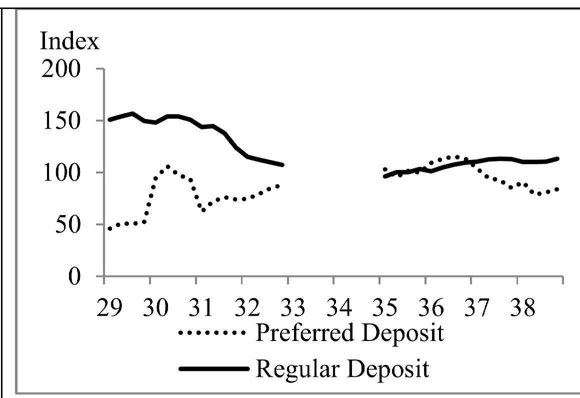
All Banks



New York City Banks



Country Banks



Source: Annual Reports.

Notes: Indices are based on the 1935 yearly average value for preferred and regular deposits.

We present the mean values and standard deviation for all variables used in the analysis in Table 2.1. The descriptive statistics are calculated separately for the periods before and after the introduction of deposit insurance. We observe that while regular deposits contracted, preferred deposits expanded before the introduction of deposit insurance. In comparison, while regular deposits expanded, preferred deposits contracted after the introduction of deposit insurance. As a result, a share of preferred deposits increased from 0.7 to 0.11. The cash-deposit ratio rose from 0.13 to 0.21 as banks accumulated large cash reserves after 1935. In comparison, the capital-deposit ratio remained constant.

Table 2.1: Summary Statistics

	1929Q1-1932Q4			1935Q1-1938Q4		
	N	Mean	SD	N	Mean	SD
Preferred deposit growth	5100	0.04	0.28	4071	-0.01	0.27
Regular deposit growth	5095	-0.02	0.12	4071	0.02	0.10
Preferred deposits/total deposits	5100	0.07	0.09	4071	0.11	0.12
Cash-deposit ratio	5100	0.13	0.10	4071	0.21	0.12
Capital-deposit ratio	5100	0.22	0.12	4071	0.21	0.10
Collateralized loan/total loans	5100	0.25	0.15	4071	0.35	0.20
ln(total assets)	5100	14.98	1.65	4071	14.99	1.73

Source: Authors' calculations.

The remainder of our data indicates information about the state of the economy. Data on Dow Jones Industrial Average comes from *Federal Reserve Economic Data* operated through the Federal Reserve Bank of St. Louis. Data on retail trade indices is constructed by combining data published in the *Federal Reserve Bulletin* and a monthly internal memorandum produced by the Federal Reserve Board, as described in Park and Richardson (2010). Data on construction contracts awarded and the number of business failures comes from the *Federal Reserve Bulletin*.

These latter two series originally appeared in the business periodicals of R.G. Dun and Bradstreets, and after their merger at the depths of the depression, the publications by Dun and Bradstreets.

2.4 Model

Our empirical approach begins with a model of why economic agents deposited funds in commercial banks during the era which we investigate. Depositors' primary motivation was acquiring transaction services. The principal service was the ability to use checks as a means of payment. Secondary services included safekeeping of cash, wire transfers, letters of credit, certified checks, access to seasonal lines of credit, and convenient foreign exchange. Interest was paid on demand deposits, which were the majority of deposits held by commercial banks. Savings accounts paid slightly higher rates of interest, and could be used for transaction services by transferring funds between savings and demand accounts. At the time, commercial banks were the only financial institutions that offered these services – the legal, contractual, and technological innovations that enabled other institutions to compete on this dimension did not occur until after World War 2, and largely during the 1970s and 1980s. Thus, the principal alternative to using commercial banks for transactions services was to hold large quantities of cash.

Given these institutions, we represent depositors' decision concerning what fraction of their transaction funds to hold as deposits in commercial banks and what fraction to hold as cash with the following formula:[7]

[7] A function of this form arises from the maximization of an expected utility function (for consumers) or expected profit function (for firms) where the economic agent chooses the fraction of their transaction funds to hold as cash, d, to maximize an expected utility (or profit) function of the form EU(pX(df), (1-p)Y(df),(1-d)f), where p is the

(1) $d_{ijt} = f_{ijt} * d(B,L)$

Where d_{ijt} indicates the funds deposited by the i^{th} depositor in the j^{th} bank at time t. The number of banks runs from j = 1, ….., J. The number of depositors in each bank runs from i = 1, …., I. The subscript t indicates the time period. Time periods runs from t = 1912.1, …., 1938.4, where 1912.1 indicates the first quarter of 1912 and 1938.4 indicates the fourth quarter of 1938. f_{ijt} indicates the transaction funds available to the i^{th} depositor of the j^{th} bank in quarter t.

The function, $d(B,L)$, indicates the fraction of a depositor's transaction funds that they deposited in their bank. The function possesses two arguments, B and L. The first argument, B, indicates the expected benefits of holding demand deposits. It is the product of two terms, $B = b(r_{jt},s_{jt})*p_{jt}$. The first term, $b(r_{jt},s_{jt})$, indicates the benefits from holding demand deposits, given the services, s_{jt}, and interest, r_{jt}, offered by bank j at time t. The second term, p_{jt}, indicates the probability that the bank remained in operation and that depositors received these benefits. The second argument, L, indicates the expected liquidation value of a bank deposit. It is also the product of two terms, $L = l_{jt} * (1-p_{jt})$. The first term, l_{jt}, indicates the liquidation value of a deposit in bank j at time t, if the bank should cease operations, which occurred with probability $(1-p_{jt})$.[8] Substituting for B and L in (1), we see that depositors determined the fraction of their funds to deposit in their bank by weighing the expected benefits of two states of the world: one state in which the bank remained in operation and provided transaction services; the other in

probability of the bank yielding deposit services X(df), 1-p is the probability of the bank yielding liquidation value Y(df), and 1-d is the fraction of transaction funds held as cash.

[8] Note that since we are focusing on demand deposits, which individuals can withdraw at any time, individuals based their decisions on the interest rate they earn in the current period. Since we are focusing on transaction accounts, the alternative investment is holding currency (or a close substitute for currency, such as gold coins or perhaps postal-savings deposits, a safe forming of savings that pays minimal interest and provides few services). For these reasons, our model abstracts from the term structure of interest rates and returns on alternative forms of invest. Later, we'll discuss how these could be added to the model, but why they would not change our results. Throughout our analysis, we normalize the costs and benefits of holding cash, which was depositors principal alternative, to zero.

which the bank ceased operations and the depositor received the liquidation value of their deposit.[9]

(2) $$d_{ijt} = f_{ijt} * d\big(b(r_{jt}, s_{jt})p_{jt}, l(1 - p_{jt})\big)$$

To determine total deposits in each bank, we need to sum the balances of the depositors. Then, we can write total deposits in a bank, D_{jt}, as follows.

(3) $$D_{jt} = \sum_1^I d_{ijt} = \sum_1^I f_{ijt} \ * \ d(B, L) = F_{jt} \ * \ d(B, L)$$

Here, F_{jt} indicates total transaction funds available to all depositors in bank j at time t. If we assume that all depositors are identical, then we can write (3) as follows.

(4) $$D_{jt} = \sum_1^I d_{ijt} = \sum_1^I f_{ijt} \ * \ d(B, L) = F_{jt} \ * \ d(B, L) = \ I * f_{ijt} \ * \ d(B, L)$$

Our empirical estimates focus on deposits aggregated at the bank level, because we observe total deposits in each bank, not the balances of particular depositors.

We also observe banks' allocation of assets. Depositors observed this information, and in many cases, considered it when deciding the fraction of their transaction balances to place in their banks. For this section, we represent a bank's choice with a single variable, x, which indicates the fraction of a bank's assets placed into lucrative but risky asset, such as a loan to a local business. The variable x_{jt} lies between zero and one. Assume a bank holds all resources other than loans in a safe, liquid, low-return asset, such as cash in its vault. A bank's portfolio decisions influence the interest that it pays to depositors, its probability of failure, and the liquidation value of its deposits. Taking this information into account allows us to rewrite our depositor-decision equation as follows.[10]

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[9] Note that we'll assume depositors in failed banks have access to the liquidation value of their deposits during the quarter in which the bank failed.

[10] The concept of depositor monitoring means that depositors react to banks' choices – particularly about how to invest the funds with which they are entrusted – which influence the costs and benefits of deposits. Our model incorporates this concept by adding a variable, *x*, which represents the banks' choice (or choices). For now, think of *x* as a single decision, a banks' choice of what percentage of its balance sheet to invest in a safe, liquid asset (e.g.

(5) $D_{jt} = F_{jt} * d\big(b\big(r(x_{jt}), s_{jt}\big)p(x_{jt}), l(x_{jt})(1 - p(x_{jt}))\big)$

To determine how aggregate deposits responded to banks' portfolio choices, we take the derivative of both sides of (4) with respect to x_{jt}.

(6) $\partial D_{jt}/\partial x_{jt} = \frac{\partial F_{jt} * d\left(b\left(r(x_{jt}), s_{jt}\right)p(x_{jt}), l(x_{jt})(1-p(x_{jt}))\right)}{\partial x_{jt}}$

Simplifying and collecting terms yields an equation with a clear interpretation.

(7) $\frac{\partial D_{jt}}{\partial x_{jt}} = F_{jt} * \left[p(x_{tj})\frac{\partial d}{\partial B}\frac{\partial b}{\partial r}\frac{\partial r}{\partial x} + \left(\frac{\partial d}{\partial B}b\big(r(x_{tj}), s\big) - \frac{\partial d}{\partial L}l(x_{tj})\right)\frac{\partial p}{\partial x} + \big(1 - p(x_{tj})\big)\frac{\partial d}{\partial L}\frac{\partial l}{\partial x}\right]$

The derivative on the right-hand side contains three terms. The first term, $\frac{\partial d}{\partial B}\frac{\partial b}{\partial r}\frac{\partial r}{\partial x}p(x_{tj})$, refers to the change in benefits that a depositor receives when a bank changes interest rates on demand deposits (multiplied by the probability of receiving interest payments). The second term, $\left(\frac{\partial d}{\partial B}b\big(r(x_{tj}), s\big) - \frac{\partial d}{\partial L}l(x_{tj})\right)\frac{\partial p}{\partial x}$, refers to the net benefit of depositing in a healthy bank rather than receiving the liquidation value of one's deposits multiplied by the change in the likelihood of the banks' survival (due to the changing riskiness of the bank's portfolio). The third term, $\big(1 - p(x_{tj})\big)\frac{\partial d}{\partial L}\frac{\partial l}{\partial x}$, refers to the change in liquidation value of the bank's portfolio (due to the changing riskiness of the bank's portfolio) multiplied by the probability of the bank failing.

Economic factors determine the endpoints of the *r(x)* and *p(x)* functions. If a bank holds all of its assets as cash, then it earns no returns, cannot pay interest to depositors, cannot recoup its costs, and eventually fails. If a bank holds no liquid assets, then it may be able to pay high interest for a while, but eventually the illiquid institution faces a credit crunch, when depositors wish to withdraw funds and the bank lacks the ability to repay, and the bank goes out of

cash in its vault or deposits at the Federal Reserve) versus what percentage to invest in riskier higher-return assets (e.g. mortgage loans). Therefore, *x* is a fraction whose domain lies between zero and one (later, we generalize *x* to a vector of variables that can lie either between zero and one or along the real line). A bank's choice may influence the probability of default or the interest paid to depositors. Therefore, both *r*, *p,* and *D* are functions of *x*.

business. So, the optimal level of x lies in the interior of the (0,1) interval. Between those endpoints, the shapes of the functions are unknown.

The functions' optimal points and even their shapes may vary over time, as the state of the economy and attitudes of individuals vary. For example, during a long period of prosperity, banks with above average *x* may earn larger profits, pay higher dividends, and have lower rates of failure. Following a financial panic, however, banks with above average *x* may suffer substantial investment losses, which could force them into insolvency.0 The shapes of the *r(x)* and *p(x)* functions may also depend upon strategic interactions in financial markets. The probability of failure, *p(x)*, for example, depends upon depositors' perceptions of mindset of short-term creditors (such as other depositors or correspondent bankers), who could withdraw funds en masse, forcing an illiquid institution out of business.

Equation (2) highlights a key issue in empirical studies of depositors' behavior. We observe deposits, *D*, at the aggregate but not the individual level. We observe few of the variables or functions on the right-hand side of the equation. At times, ex-post returns, *r*, can be estimated by dividing total interest paid during a period by average daily deposits during that same interval, but this information is available infrequently, and estimated average yields may be far from the marginal returns earned by particular depositors. The ex-post probability of default can be estimated from the failure rate of commercial banks, but depositors' ex-ante expectations of the probability of default cannot be unobserved.

Depositors' reactions to banks' choices are represented by the derivative of (2) with respect to x_{jt}. Economic theory places little or no restrictions on the shapes or slopes of these relationships. Not surprisingly, empirical estimates of these coefficients (or of the aggregate relationship between x and D) recover coefficients with various signs, magnitudes, and significance levels. The coefficients often vary over time. The coefficients usually seem consistent with sensible interpretations of the situation – like during booms depositors shift towards higher-risk higher-return institutions, so that D/dx is positive, while following financial crises, depositors shift their funds towards institutions with less exposure and more liquidity, so that D/dx is negative.

For the model, we assume that the depositors do not change banks before and after the creation of deposit insurance. However it is certainly possible that the depositor may choose to change banks after deposit insurance. In this case it will lead to the standard error of the model to be higher, making it harder to find significant results.

Our estimates recover similar patterns, from which we construct a strong statistical test of the impact of deposit insurance on depositor monitoring. Our test stems from the structure of New York's commercial banking system, which divided depositors into two classes, regular and preferred. Equation (3) above summarizes the behavior of regular depositors. Equation (4) summarizes the behavior of preferred depositors, and compares their reactions to regular depositors. We know that preferred depositors should react less to changes in a bank's portfolio position, because state law set interest rates for preferred depositors. For them, therefore, dr/dx was zero. State law ensured that preferred depositors received complete repayment before regular depositors received any repayment. Historically, preferred depositors in New York state banks experienced no legal losses, although bank failures occasionally caused them economic inconvenience, because it trapped their deposits in institutions undergoing liquidation, and prevented them from accessing their cash until the liquidating agent, either the Superintendent of Banks or court-authorized receiver, collected sufficient funds to pay of preferred claims, which probably took some time. In the instances which the authors' examined, liquidators typically began paying preferred depositors within a few months and finished the payouts within one year. Payouts to regular depositors began after preferred depositors and extended for several years. Therefore, $\frac{dC^{preferred}}{dp} < \frac{dC^{regular}}{dp}$.

(8) $$\frac{D_{it}^{preferred}}{dx} = 0 + \frac{\delta F}{\delta C}\frac{dC^{preferred}}{dp}\frac{dp}{dx}$$

Similar restrictions help us to interpret the change in coefficients that occurred at the time of the adoption of deposit insurance. The Banking Act of 1935 established the FDIC, reducing the risk of deposit losses near to zero, fixed the interest rate on checking deposits at zero, and capped the interest rate on savings accounts at a low level. Thus, our model predicts changes that we should observe. Before the FDIC, preferred depositors react less than regular depositors. After the FDIC, the behavior of the two types of depositors converges, and regular depositors shift towards zero.

(9) $$\frac{D_{it}^{preferred}}{dx} = 0 + \frac{\delta F}{\delta C}\frac{dC^{preferred}}{dp}\frac{dp}{dx} < \frac{\delta F}{\delta B}\frac{\delta B}{\delta r}\frac{dr}{dx} + \frac{\delta F}{\delta C}\frac{dC}{dp}\frac{dp}{dx} = \frac{D_{it}^{regular}}{dx}$$

2.5 Empirical Methods and Results

Our empirical analysis asks two related questions. First, how did preferred and regular depositors' reactions to information about the state of the economy change after the introduction of deposit insurance? Second, did depositors' reactions to information about banks' balance sheets change after the introduction of deposit insurance? These questions cannot be answered simultaneously, because answering each question involves overcoming a problem of endogeneity. The solution to endogeneity in the first case prevents us from answering the second question; while the solution to endogeneity in the latter case prevents us from answering the former. So, we must answer the questions in sequence.

For the first question, our key explanatory variable is the Dow Jones Industrial Average (DJIA). At the time (and even today), the Dow was one of the most prominent statistics in the United States. Depositors received information about it daily. Media outlets displayed the information prominently. The Dow, however, was not exogenous information for banks in New York City. These banks invested substantial sums – at times up to a fifth of their assets – in call money markets. Call loans were invested in equity, derivative, and commodity markets, particularly the New York Stock Exchange. The quantity of call loans influenced, therefore, the prices of stocks, and the Dow Jones average. As a result, we cannot establish causality between deposits and Dow Jones indices for banks operating in New York City. By contrast, banks outside New York City could not invest in call loans. For those banks, deposits did not drive the Dow.

Our baseline panel specification is as follows,

$$(10)\ D_{j,k,t} = \beta_1 \mathrm{A_t} + \beta_2 \mathrm{A_t} R + \beta_3 \mathrm{A_t} I + \beta_4 \mathrm{A_t} RI + \beta_5' \mathrm{X_t} + \beta_6' \mathrm{X_t} R + \beta_7' \mathrm{X_t} I$$

$$+\beta_8' \mathrm{X_t} RI + \beta_9' F_{i,t-1} + \beta_{10}' F_{i,t-1} R + \beta_{11}' F_{i,t-1} I + \beta_{12}' F_{i,t-1} RI + \mu_{j,k} + \varepsilon_{j,k,t}$$

D stands for the depositor reaction, captured by the log of deposits of type *k* (preferred or regular) for bank *j* during period *t*. *A* stands for the log of the Dow Jones Industrial Average. The dummy variable, *R*, takes on the value of one if the observation is for regular deposits. The other dummy variable, *I*, takes on the value of one if the observation is recorded after the introduction of deposit insurance. The interaction term *RI* is one if both the variable *R* and the variable *I* amount to one, and zero otherwise. The corresponding coefficient β_4 is our main interest. It captures the how the reaction of regulators to information changed relative to the reaction of preferred depositors after the introduction of deposit insurance.

X stands for macroeconomic indicators and is a matrix that includes variables that control for the fluctuations in deposits caused by changes in general economic conditions. In particular, we include a leading economic indicator (construction contracts awarded), a coincident indicator (retail trade indices), and a lagging indicator (number of business failures). We use the logged value of these variables. We know that these controls represent economic reality, rather than information that depositors possess today about the market's expectations of the future, because these data were constructed with a lag of several months and were not disseminated to ordinary individuals.

F stands for bank fundamentals. Since we are interested in the effects of information about the state of the economy on market discipline, we control for bank fundamentals by adding a matrix of bank level ratios that are intended to capture banks' asset quality, liquidity, and capitalization levels. In particular, we include the ratio of unsecured loans to total loans, the ratio of excess reserves to total deposits, the ratio of capital to total assets, and the log of total assets.[11] These bank fundamentals are lagged in order to reflect the fact that balance sheet information was released to the public by bank regulators with a delay and to reduce potential endogeneity problems. μ_{ij} is a bank fixed effect to control for unobserved heterogeneity ($j=1 \ldots N$); note we include separate fixed effects for each class of depositor in a bank. To account for heterogeneity at the bank level, we use clustered standard errors at the bank level. ε_{jkt} is random error terms.

Table 2.4 indicates the results of these regressions for the sample of banks outside the city of New York. Column (1) does not include controls for general economic conditions while columns (2)-(4) do. Columns (3) and (4) control for balance sheet characteristics by dividing the

[11] We do not use the ratio of cash reserves over total deposits because required reserves varied depending on the city in which a bank was located and membership in the Federal Reserve System. Excess reserves are calculated by subtracting required reserves from total reserves, giving a clear indication of banks' liquidity.

sample into different groups based on the total asset distribution.[12] Before the introduction of deposit insurance, preferred depositors were less sensitive to the fluctuations of DJIA whereas regular depositors exhibited greater sensitivity. The value of β_2, however, is smaller than the value of β_1. This suggests that regular depositors were sensitive to DJIA in an absolute sense, and not just relative to preferred depositors. In all regressions, the key coefficient, *A*R*I*, which measures the impact of deposit insurance, is negative and statistically significant. These results imply that depositor's reaction to information about the state of the economy was reduced after the introduction of deposit insurance. Moreover, the value of β_4 is greater than the value of β_3. This suggests that after the introduction of deposit insurance, regular depositors' sensitivity to DJIA declined both to that of regular depositors and in an absolute sense.

Table 2.2: Depositors' Reaction to Information about the State of the Economy

	(1)	(2)	(3)
Dow Jones Average	-0.32***	-0.32***	-0.35***
	(0.029)	(0.043)	(0.043)
Dow Jones Average * R	0.49***	0.31***	0.31***
	(0.029)	(0.044)	(0.044)
Dow Jones Average * I	0.09***	0.93***	1.04***
	(0.009)	(0.094)	(0.093)
Dow Jones Average * R * I	-0.12***	-1.14***	-1.14***
	(0.010)	(0.097)	(0.097)
Bank Fixed Effects	Yes	Yes	Yes
Economic Conditions	No	Yes	Yes
Bank Fundamentals	No	No	Yes
Observations	16,016	16,016	16,010
R-squared	0.190	0.214	0.228

Notes: Regressions include observations for all banks outside New York City for each call report for the years 1929 to 1932 and 1935 through 1938. R is an indicator variable indicating regular deposits. I is an indicator variable indicating deposit insurance exists in that time period. Standard errors in parentheses. Asterisks indicate level of statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Controls for economic conditions include construction contracts awarded, retail sales, and business failures. See text for details.

[12] Large banks are those with total assets above the 95th percentile of the total asset distribution in 1929Q1. Small banks are those with total assets below the 90th percentile of the total asset distribution in 1929Q1each quarter. Regressions with the sample based on total assets in each quarter yield similar results.

In the next set of analyses, we directly measure how depositors reacted to information about banks' balance sheets. We look for market discipline through quantities.[13] Our baseline panel specification is as follows,

$$(11)\quad \Delta \ln\left(D_{j,k,t}\right) = \beta_1 X_{j,t-1} + \beta_2 X_{j,t-1} R + \beta_3 X_{j,t-1} I + \beta_4 X_{j,t-1} RI + \lambda_t + \mu_{j,k} + \varepsilon_{j,k,t}$$

In this regression framework, the dependent variable is the first differenced log of deposits of type *k* (preferred or regular) for bank *j* during period *t*. Much like the previous regression framework, the corresponding coefficient β_4 is our main interest. It captures the average effect of deposit insurance on the growth of regular deposits. A vector of bank-level balance-sheet characteristics, $X_{i,t-1}$, varies over time and across banks. The vector of balance sheet characteristics is included with a lag, to account for the fact that balance sheet information is available to the public with a delay. These bank level risk factors include liquidity, capital adequacy, and asset quality. Liquidity is measured by the ratio of cash items, cash on hand, and due from banks to assets. Capital adequacy is measured by the capital-asset ratio. Lastly, asset quality is measured by a ratio of secured loans to total loans.

A time-specific dummy variable, λ_t, controls for time-varying macroeconomic effects that may have a uniform impact across depositors. Note that this time-fixed effect replaces the time-varying variables, such as the Dow Jones Industrial Average, that we analyzed previously. We cannot use the Dow, because our regressions now include banks in New York City. We cannot

[13] Earlier studies look for market discipline through quantities (depositors withdrawing funds from risky banks) and prices (depositors demanding an interest rate premium from risky banks). This is because deposit outflows by themselves could be caused by a contraction in a bank's demand for deposits, which leads banks to lower interest rates to induce deposit outflows. Due to the lack of data on bank-level interest rates, we cannot study market discipline through prices. However, during the period of our study, it is unlikely that banks faced a low demand for deposits and wanted to induce deposit outflows. As described earlier, banks used deposits as their major funding source; hence they had an incentive to induce deposit inflows rather than outflows.

use the rest of the variables, because our functional form assumption focuses on lagged effects. The time fixed effect stands in for those, and all other potential, time varying factors.

The results from the treatment-control estimations are laid out in Table 2.5. Columns (1)-(3) estimate the equation with bank-fixed effects; columns (4)-(6) include bank-fixed effects. We observe that prior to the introduction of deposit insurance, preferred depositors were generally not sensitive to liquidity, but they were sensitive to capitalization and asset quality. In order to investigate whether regular depositors were more or less sensitive bank fundamentals before the introduction of deposit insurance, we examine the β_2 coefficient. The regression results suggest that regular depositors were less sensitive (or insensitive) to liquidity and asset quality.

The coefficient of our interest, β_4, is positive and significant for bank liquidity. In comparison, the coefficient of our interest, β_4, is negative and significant for bank capitalization. These findings suggest that the sensitivity of regular depositors to bank liquidity, relative to that of preferred depositors, increased after the introduction of deposit insurance while the sensitivity of regular depositors to bank capitalization, relative to that of preferred depositors, diminished after the introduction of deposit insurance.

As to whether the values of β_4 represent a decline in the sensitivity of regular depositors to bank liquidity and capitalization in an absolute as well as a relative sense, we examine the coefficients β_3 and β_4 jointly. The coefficients β_3 and β_4 capture the effect of deposit insurance on depositor monitoring. The coefficient β_3 represents the relationship between bank fundamentals and deposit flows for preferred and regular depositors, whereas the coefficient β_4 captures the differential effect of deposit insurance on regular depositors.

Table 2.3: Depositors' Reactions to Bank Balance Sheet Characteristics, 1929 to 1938

	(1) All Banks	(2) NYC Banks	(3) Country Banks	(4) All Banks	(5) NYC Banks	(6) Country Banks
Excess Reserve Ratio	0.05	0.08	-0.08	-0.06	0.13	-0.10
	(0.044)	(0.085)	(0.082)	(0.072)	(0.147)	(0.108)
Excess Reserve Ratio *R	-0.15***	-0.14	-0.10	-0.20**	-0.29	-0.20*
	(0.055)	(0.119)	(0.090)	(0.088)	(0.184)	(0.116)
Excess Reserve Ratio * I	-0.07	-0.19	-0.00	-0.01	-0.25	0.03
	(0.054)	(0.117)	(0.094)	(0.066)	(0.160)	(0.115)
Excess Reserve Ratio *R*I	0.14**	0.19	0.11	0.14*	0.34**	0.14
	(0.060)	(0.122)	(0.099)	(0.072)	(0.154)	(0.120)
Capital Ratio	-0.10	-0.15	-0.10	0.11	0.54	0.09
	(0.069)	(0.183)	(0.068)	(0.129)	(0.403)	(0.128)
Capital Ratio*R	0.22***	0.23	0.21***	0.17	-0.09	0.12
	(0.073)	(0.197)	(0.071)	(0.119)	(0.356)	(0.124)
Capital Ratio*I	0.30***	0.44	0.28***	0.42***	0.73*	0.38***
	(0.093)	(0.269)	(0.091)	(0.129)	(0.389)	(0.130)
Capital Ratio*R*I	-0.35***	-0.49*	-0.29***	-0.43***	-0.71*	-0.32**
	(0.099)	(0.275)	(0.096)	(0.133)	(0.410)	(0.133)
Unsecured Loan Ratio	0.00	0.01	0.01	0.10**	0.11	0.09**
	(0.020)	(0.063)	(0.020)	(0.041)	(0.159)	(0.041)
Unsecured Loan Ratio*R	-0.01	-0.05	-0.00	-0.07*	-0.20	-0.05
	(0.020)	(0.062)	(0.020)	(0.042)	(0.159)	(0.041)
Unsecured Loan Ratio*I	-0.01	0.02	-0.02	-0.01	0.15	-0.05
	(0.029)	(0.088)	(0.028)	(0.034)	(0.126)	(0.035)
Unsecured Loan Ratio*R*I	0.01	0.06	0.00	0.00	-0.02	0.00
	(0.030)	(0.088)	(0.029)	(0.035)	(0.119)	(0.036)
Bank Fixed Effects	No	No	No	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,571	2,285	15,286	17,571	2,285	15,286
R-squared	0.074	0.118	0.078	0.075	0.121	0.079

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

The coefficient on bank liquidity also tells us that deposit insurance did not diminish depositor monitoring. As noted earlier, prior to the introduction of deposit insurance, preferred depositors were insensitive to bank liquidity whereas regular depositors were less sensitive to bank liquidity. After the introduction of deposit insurance, however, regular depositors became more sensitive to bank liquidity, but there is no evidence that preferred depositors' behavior changed. That is, when we observe the coefficient for the treatment-and-control panel estimation, β_4 is consistently positive and statistically significant, whereas β_3 is never statistically different from zero. In other words, even after the introduction of deposit insurance, regular depositors' sensitivity to bank liquidity increased both relative to that of preferred depositors and in an absolute sense. These results are consistent with the wake-up call effect that regular depositors may experience in the aftermath of a banking crisis.

The significant positive value of β_3 for bank capitalization suggests that preferred depositors became more sensitive to bank risk even after the introduction of deposit insurance, a result consistent with the wake-up call effect that depositors may experience in the aftermath of a banking crisis. The coefficient β_4 is negative and statistically significant. However, the decrease in regular deposit sensitivity is only relative. The absolute values of β_3 and β_4 are very close to identical and their difference is not significant, suggesting that while preferred depositors got a wake-up call from the banking crisis in the early 1930s, regular depositors remained equally sensitive to bank capitalization. In other words, both types of depositors were woken up by the effect of the banking crisis.[14]

A threat to this inference is the substitution of depositors between regular and preferred accounts, which might make our estimates biased and inconsistent. We do not believe that this

[14] Karas, Pyle, and Schoors also report that the numbing effect of deposit insurance and the wake-up call effect of a crisis cancel each other in the longer run.

occurred in substantial amounts, because when we can determine the identities of preferred depositors, the preponderance appear to be those required by law to deposit in preferred accounts. In addition, the substitution would make preferred depositors appear to react more to balance sheet information during the pre-insurance period, but we detect no statistically significant reaction of preferred depositors in that time period. So, there is no obvious statistical evidence of substitution. To further explore the issue, we performed a series of statistical robustness checks, which involved estimating the reactions of preferred and regular depositors in separate regression (i.e. not a panel). The signs and significance levels of those regressions matched the signs and significance levels of our treatment-and-control panel regressions, suggesting that substitution did not contaminate our results.

2.6 Conclusions

This essay examines the impact of the world's first and largest nationwide deposit-insurance system. In 1935, after two years of tinkering with emergency expedients, the United States finalized the structure for the Federal Deposit Insurance Corporation. After this date, depositors' reactions to information about the aggregate economy diminished. Reactions to information about banks' balance sheets disappeared. Deposit insurance, in sum, reduced but did not entirely eliminate depositor monitoring.

This result raises several questions. First, was this the outcome what the advocates of the system intended? The answer is a qualified yes. Advocates certainly wanted to reduce the reactions of small depositors, and they appear to have done so. But, advocates also desired to retain market discipline, and hoped that large investors and corporate depositors, who lacked insured but possessed the ability to monitor banks' performance, would continue to reward banks that behaved well and punish banks that performed poorly. On this front, they appear to have been partially successful. Depositors continued to react, to some extent, to information about aggregate economic risks. Bad news resulted in fewer deposits in risky banks; good news resulted in the opposite. But these reactions were much smaller than they had been in the past, and reactions to information about banks' balance sheets disappeared.

The difference between these two types of information may be due to the regulatory regime imposed along with deposit insurance. With the creation of the FDIC, commercial banks faced at least three regulatory agencies – the FDIC, Fed, and either OCC or state bank superintendent. These agencies enforced a tighter regulatory regime. So, differences among banks' balance sheets diminished. This convergence may prevent us from observing what would have happened had banks acted in ways that they had prior to the panics of the early 1930s.

A second question concerns comparability: do studies of other nations at other times reach similar results? Some studies do, but other studies don't. A clear contrast arises with the work of Martinez-Peria and Schmukler (2001), who employ similar methods to examine how depositors reacted to the creation of deposit insurance schemes in Latin American nations in recent decades. They find that the crises which preceded the creation of deposit insurance 'woke up' depositors, increasing their awareness of risk and reaction to information about the safety and soundness of banks. These heightened reactions continued after the creation of deposit insurance, probably because depositors did not believe these schemes would protect them against plausible contingencies, because the governments of those nations lacked the financial resources to back up their systems if things went wrong.

In the United States, however, the promises of the Federal Deposit Insurance System seem to have been credible, after 1935. From the spring of 1933 through the summer of 1935, few banks in New York volunteered to join the temporary insurance scheme, probably because it required healthy commercial banks to pay assessments to cover losses at insolvent institutions that exceeded the reserves of the insurance fund. The Banking Act of 1935 changed that provision, by increasing fees paid by insured institutions and assigning losses that those fees did not cover to the Federal Government. The Banking Act of 1935 also provided the FDIC with a permanent, rather than temporary, charter. The Banking Act of 1935 also reformed the corporate governance of commercial banks, for example by making the CEO and CFO personally liable for the veracity of financial statements, and reformed procedures for the resolution of failed banks. These modern procedures kept banks in operation, to maximize the firms' value, while trying to merge or sell the valuable operations of the insolvent institution to new business partners. These modern resolution procedures dramatically reduced depositors' risk, because depositors no longer had to wait for courts to decide who would receive what fraction of their deposits in a failed institution. Since then, depositors at FDIC institutions have incurred no losses. The FDIC that arose from the Banking Act of 1935 appears to have been popular among depositors and bankers. Every state-chartered commercial bank in New York State joined the FDIC during 1935, and as this paper shows, depositors in general ceased worrying about the safety of their deposits.

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Appendix: Assets and Liabilities Reported Items

Table A-1: Assets and Liabilities Reported, 1929

Assets	Liabilities
Specie	Capital
Other currency authorized by the United States government	Surplus, including all undivided profits
Cash Items	Preferred deposits, viz:
Due from NY Federal Reserve Bank, less offsets	Due New York State savings banks
Due from other approved reserve depositories, less offsets	Due New York State savings and loan associations, credit unions, and land bank
Due from other banks, bankers, and trust companies	Deposits by the State of New York
Stocks and bond investments	Other deposits secured by the pledge of assets
Loans and discounts secured by bond, mortgage, deed, or other real estate collateral	Deposits otherwise preferred
Loans and discounts secured by other collateral	Due depositors, not preferred
Loans, discounts, and bills purchased but not secured by collateral	Due trust companies, banks, and bankers
Own acceptances purchased	Bills payable
Overdrafts	Rediscounts
Bonds and mortgages owned	Acceptances of drafts payable at a future date or authorized by commercial lines of credit
Real estate	Other liabilities
Customers' liability on acceptances (per contra, see liabilities)	
Other Assets	

Source: New York State Banking Department (1929).

Table A-2: Assets and Liabilities Reported, 1930-1932 and 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 (1930-1932, 1935-1938).