Leverage, Liability, and Commercial Banks: Evidence from the Booms Before the Great Depression and Great Recession

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– PRELIMINARY DRAFT –

Abstract

The regulatory framework for commercial banks evolved over the 20th century. During the boom before the Great Depression, capital requirements for commercial banks were low and fixed. Bankers faced double liability. Failing banks were not bailed out. During the boom before the Great Recession, capital requirements were proportional to risk-weighted assets. Bankers faced limited liability. Banks deemed too big to fail received bailouts. Across these regimes, we compare banks' capital choices using balance-sheet data. We document how the largest institutions' choices changed over the business cycle. During the Roaring 20s, the largest banks increased capital holdings as asset prices rose to unprecedented levels. During the boom from 2002 to 2007, the largest institutions kept capital levels near regulatory minimums. Our results suggest that more market discipline would have induced the largest U.S. banks to hold greater capital buffers prior to the financial crisis of 2008.

Keywords: Leverage, Limited Liability, Commercial Banks, Capital Ratios, Macro- and Microprudential Regulation, Great Depression, Great Recession

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1. Introduction

Leverage, capital, risk-taking, and regulation play prominent roles in accounts of the Great Recession (Blinder 2013, Bernanke 2013).[1] Prior to the contraction, regulators worried about risk-taking by commercial banks and tried to control it with rules regarding capital, such as those stemming from the Basel Committee on Banking Supervision. Yet during the financial crisis in 2008, the largest U.S. commercial banks required unprecedented assistance to prevent the banking system's collapse.

The crisis reinvigorated research into the structure of financial markets and the institutions underlying banks' behavior. A recent example is Kashyap, Tsomocos, and Vardoulakis (2014). They modify a classic model of bank intermediation by assuming the probability of runs depends upon banks' leverage and lending choices. Markets are incomplete. Liability is limited. Potential for runs reduces incentives to lend, while limited liability induces excessive risk taking. Regulations that reduce the risk of runs, including capital requirements and deposit insurance, generate Pareto improvements, but also distort incentives for investment, generating inefficient allocations and shifting risks from bankers to governments.

The current research builds on earlier theoretical foundations. Rochet (2008 pp. 227-9) shows that limited liability alters bankers' behavior towards risk. Bankers invest in more and riskier assets than they would if they were fully liable. Regulations requiring banks to reduce the riskiness of their portfolios can control such risk taking. Yet this might induce inefficient asset allocation thus reducing economic growth and increasing the failure probability for some banks,

[1] Blinder writes that "leverage was everywhere … leverage was piled on top of leverage – as when companies with highly levered balance sheets bought derivatives with high synthetic leverage (Blinder 2013 p. 55)

even when the capital-ratios risk weights are optimal. Imposing additional regulations, such as binding minimum capital levels, is necessary to alleviate these inefficiencies. Kim and Santomero (1988), Furlong and Keeley (1990), Gennotte and Pyle (1991), Thakor (1996), Blum (1999), and many essays building on Diamond and Dybvig (1983) also show that both limited liability and the mispricing of deposit insurance distort bankers' incentives and induce excessive risk-taking. Capital requirements could be used to correct these distortions, although regulations' effects vary among models and empirical applications.

Limited liability also plays a key role in models of the leverage cycle. Commercial-bank leverage is high during booms and low during busts, because bankers receive the upside when risky assets yield high returns, while depositors or the government bear the cost when risky assets yield less substantially less than their book value (Nuno and Thomas 2013, Geanakoplos 2010). Brunnermeier and Pedersen (2009), Adrian and Shin (2009), and Nuno and Thomas (2013) document leverage patterns both for the purchase of assets and balance sheets of financial institutions during recent decades.

The key insight of this literature – that modern institutions distort banks' behavior towards risk – has not yet been tested. An ideal test would examine a panel of banks operating in an environment without regulations that distort incentives, and then, randomly change the incentives of some banks relative to others. The result of this ideal experiment would reveal the impact of the imposition of these institutions. This ideal experiment did not occur in the real world. Our contribution is to examine events that approximate this ideal.

We compare the behavior of banks in the United States before and after the creation of institutions on which theorists focus and during economic episodes when individual banks' choices could and should have had aggregate consequences: the boom from 1921 to 1929 which

preceded the Great Depression and the boom from 2002 to 2007 preceding the Great Recession. In the first era, banks operated in an environment without deposit insurance, without limited liability, without implicit bailouts, and without resolution procedures that favored large versus small institutions. At that time, stockholders of commercial banks faced double liability. Directors and most senior executives typically held substantial equity shares in their institutions. Failed banks' directors and senior executives often faced civil suits and criminal prosecution. Courts liquidated failed banks. Large firms received no special treatment.

We create a data set containing balance-sheets of banks that operated in the state of New York during the earlier era and that operated throughout the United States in the current period. The data contain institutions operating in both periods, such as National City Bank of New York (in the 1930s) and its descendant Citibank. We standardize balance sheets between the two periods and compare capital choices of commercial banks in the two environments.

We find important differences among the behavior of the largest institutions in the run-up prior to the Great Depression and the Great Recession. Large commercial banks held more capital, and adjusted their capital holdings pro-cyclically -- accumulating capital during the 1920s boom. In contrast, in the decade before the Great Recession, the largest commercial banks in the United States typically held little capital in excess of the regulatory minimum. These differences appear starker when we compare the behavior of large to small commercial banks in each period.

The rest of this paper is organized as follows. Section 2 describes the institutional structure of commercial banking in the two eras that we examine. Section 3 describes the data that we analyze with a focus on describing how we standardize balance sheets over time. Section 4 describes our methods and results. Section 5 discusses the implications of our analysis.

2. Institutional History

Institutions shape banks' choices concerning capital and leverage. In the United States over the last two centuries, the relevant regulations evolved through periodic, punctuated equilibria. Institutions remained stable for periods, and then changed substantially, often in response to financial crises, before settling into new periods of stability.

The institutional foundations for the first period that we examine, the Roaring 20s and Great Depression, formed in response to financial crises in 1893 and 1907 and functioned as a stable system from the 1920s through the mid-1930s.[2] In this system, bank owners and managers faced substantial liability for the fates of their firms. Bank stock possessed double liability. This meant that when banks failed, regulators assessed stockholders the par value of each share (typically $100), which went into a fund used to repay depositors, reimburse liquidators, and cover losses. Laws required bank directors to own a minimum quantity of stock, ensuring that all had skin in the game. Bank officers also typically owned stock in their institutions, and often faced civil suits and criminal prosecutions after their banks suspended operations.

Banks had to possess minimum levels of capital. Capital requirements varied by the jurisdiction of the charter and population of the town in which a bank operated. The state of New York required state banks in towns with populations less than 2,000 to have $25,000 in capital; in towns of 2,000 to 30,000 to have $50,000 in capital; and in towns over 30,000 to have $100,000. Federal law required national banks operating in towns of population under 3000 to have $25,000; in towns of 3,000 to 6,000 to have $50,000; in towns from 6,000 to 50,000 to have

[2] This section discusses institutions relevant to state and nationally chartered banks operating in the state of New York during the 1920s and 30s. When specify when rules differed for state and nationally chartered institutions or for Fed member and non-member banks. This section does not detail laws and regulations for state-chartered banks operating in other jurisdictions. For that information, see sources such as Rand McNally Bankers Directory, the Report of the Committee on Branch, Group, and Chain Banking, White (1983), or Komai and Richardson (2013).

$100,000; and in towns above 50,000 to have $200,000 (OCC Annual Report, 1900 through 1932; White 1983).

Lenders of last resort existed. The plural is appropriate. For member banks in the 2nd Federal Reserve District, the Federal Reserve Bank of New York served as the lender of last resort. Laws permitted the Reserve Bank to discount only "eligible paper," which consisted of standardized, short-term loans issued for industrial, commercial, and agricultural purposes and originated by member banks. Should the New York Fed lack resources sufficient to satisfy the demands of its member banks, New York could rediscount eligible assets with other Reserve Banks. These Reserve Banks could, but did not always, accommodate New York's requests. The Federal Reserve Board had the authority to compel one Reserve Bank to rediscount for another, but on some occasions when the Board tried to compel compliance, some Reserve Banks refused to acquiesce. The Federal Reserve Board could also authorize Reserve Banks to accept as collateral for discount loans assets originated by non-member banks, but for most of the period under examination, the Board did not permit member banks from discounting assets originated by non-members. This policy prevented member banks – particularly the money-center institutions in New York and Chicago – from passing Fed liquidity through to their country clients. These bankers' banks had to use their own resources to serve their clients' liquidity needs. Non-member banks – particularly small banks operating outside reserve cities (known as country banks) – relied New York City's largest banks for liquidity during periods of pressure. The largest banks in New York City – such as Chase and National City – did a large correspondent banking business, a fact that we exploit in our analysis. These banks held deposits of country banks, which served as part of the rural institutions' legal reserves; cleared checks for their country clients; extended lines of credit; and provided an array of other financial services.

New York's money center banks stood at the top of a reserve pyramid, which stretched across the United States (Mitchener and Richardson 2012, 2013, 2014).

Commercial banks in distress – both members and non-members – could expect authorities to scrutinize their institutions. Regulators could recommend that troubled institutions seek merger partners, and on some occasions, encourage negotiations, but on no occasion did they facilitate mergers with financial assistance. Regulators could intervene more forcefully, and when they believed depositors likely to suffer losses, either because the bank experienced asset losses or heavy withdrawals, regulators tended to act swiftly, closing institutions, commencing liquidation, and repaying creditors with proceeds from the receivership. Illiquid banks had the option to suspend payments. But, regulators typically seized institutions that could not reopen within a few days. Deposit insurance did not exist. The preponderance of bank liquidations involved losses to depositors.[3] Bailouts also did not exist. Neither the state nor the Federal government helped banks cover losses or raise new capital. Liquidation procedures did not distinguish between institutions of different sizes, and regulators had little leeway when shutting down commercial banks, since liquidation occurred under court supervision.

An example from Manhattan involves the fourth largest bank in New York and eighth largest bank in nation, the Bank of United States. Difficulties arose about a year into the contraction. As investment losses rose, the bank sought to merge with a stronger institution. Negotiations dragged on. Depositors became wary, and withdrawals accelerated. The bank belonged to the Federal Reserve System, and the New York Fed facilitated merger negotiations, but when talks stalled and runs began, the Fed ended its assistance, and the state bank

[3] In the 2nd (NY) Federal Reserve District between the Stock Market Crash in 1929 and the Banking Holiday in 1933, for example, the Federal Reserve reported 166 commercial banks in distress. Of those institutions, 50 merged with another bank, 96 liquidated at a loss to depositors, 8 liquidated after repaying all creditors, and 12 temporarily suspended payments but later resumed unrestricted operations (See Richardson REH 2008 and Richardson and Van Horn JEH).

superintendent seized the institution, liquidated its assets, repaid depositors, and imposed assessments on stockholders (Richardson and Van Horn 2011).

The institutional foundations for the second period, the boom of the early 21st century and Great Recession which followed, formed in response to the Great Depression of the 1930s, the Savings and Loan Crisis of the 1970s/80s, and the international movement towards deregulation and competition during the 1980s/90s.[4] Banker owners' and managers' liability was dramatically reduced by the Banking Act of 1935, which eliminated double liability for nationally-chartered banks and which inspired states to eliminate double liability for state chartered institutions. Banks bailouts became possible after the Banking Act of 1932, which broadened collateral acceptable at the discount window and the lending authority of Reserve Banks; the Emergency Relief and Construction Act of 1932, which added Section 13.3 to the Federal Reserve Act; and the Emergency Banking Act of 1933, which authorized the Reconstruction Finance Corporation to inject capital into commercial banks. The Federal Deposit Insurance Corporation was established by the Banking Act of 1933. The FDIC received the authority to resolve or liquidate troubled institutions in the Banking Act of 1935.

In the 1970s and 1980s, after decades with few bank failures, the impact of these changes on the behavior of large relative to small banks became apparent. When small banks became distressed, the FDIC typically closed the institution and paid off insured depositors. The banks' stockholders and uninsured depositors (i.e. those holding funds above the insurance threshold) suffered losses. When large banks became distressed, the FDIC typically resolved their affairs by arranging for a healthy institution to purchase the troubled bank and assume all of its liabilities, including uninsured deposits. When very large and interconnected banks suffered distress, such

[4] Komai and Richardson (2013) provide a concise history of financial legislation in the twentieth century. Descriptions of many of the major acts can be found at www.federalreservehistory.org.

as Franklin in 1974, Penn Square in 1982, and Continental Illinois in 1984, the FDIC along with the Fed (and at times other regulators) bailed out the institution, providing loans at below-market rates and other assistance to enable these institutions to reorganize and remain in operation. The differential treatment of small, large, and extremely large and connected banks engenders incentives of a type commonly called too big to fail.

Regulatory reform accelerated in the decades that followed. In 1980, the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) eliminated restrictions on interests that bank's paid to depositors (the infamous Reg-Q), applied the Fed's reserve requirements to institutions that accepted deposits, and also opened the discount window and the Fed's payments services to those institutions. In 1982, the Garn-St. Germain Depository Institutions Act accelerated the deregulation of deposit interest rates and expanded the FDIC's powers to aid troubled institutions. The later enabled supervisors to delay closing failing firms, which allowed those firms to gamble for recovery, typically leading to larger losses. In reaction, the FDIC Improvement Act of 1991 (FDICIA) required the FDIC to take prompt corrective action, close institutions before they became book-value insolvent, and use the least costly method of resolution. FDICIA also weakened restrictions on bank branching. In 1994, the Riegle-Neal Interstate Banking Act authorized interstate branch banking. In 1999, The Financial Services Modernization Act (commonly called Gramm-Leach-Bliley) expanded the integration of financial services, by authorizing the creation of financial holding companies, which could own subsidiaries involved in different financial activities, including commercial banking, investment banking, and insurance underwriting and sales.

Congress passed a series of acts that required banks to fulfill capital-ratio requirements.[5] Like commercial banks in all countries adhering to the guidelines of the Basel Committee on Capital Supervision, U.S. regulators required commercial banks to keep their ratio of capital to risk-weighted assets above a threshold, at which they would be deemed adequately capitalized. Banks falling below that threshold faced additional oversight, corrective action, and regulatory intervention that could include the seizure and liquidation of the institution (the next section of this essay describes these ratios, weights, and calculations in greater detail).

The Federal Reserve System served as the lender of last resort for all commercial banks (and much of the rest of the financial system). Banks could access the Fed's discount window directly, via their reserve accounts, and indirectly, via correspondent institutions. Banks could use a wide array of collateral at the discount window, including government bonds, not just the 'real bills' acceptable before the Great Depression.

After these reforms, banks and bankers faced substantially less liability if their institutions failed than their predecessors had in the decade before the Great Depression. In the run up to the Great Recession, commercial banks were limited liability corporations. Stockholders had no liability for institutions' losses above the price they paid for their stock. Owners, directors, and managers seldom faced civil lawsuits or criminal prosecutions following the failure of their institutions. The nation's largest commercial banks in terms of asset size and

[5] The Financial Institutions Regulatory and Interest Rate Control Act of 1978 created the Federal Financial Institutions Examination Council (FFIEC). This organization was tasked with establishing uniform standards across U.S. regulatory agencies such as the Fed, OCC, and FDIC. It standardized capital ratios required for U.S. commercial banks. In 1988, the US adopted policies established by the Basel Committee on Bank Supervision known as Basel 1. In 1991, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) authorized regulators to establish capital to asset ratios above which commercial banks would be deemed adequately capitalized and below which banks would face additional oversight, corrective action, or regulatory intervention. In 2004, the Basel Committee released its initial recommendations for Basel II, which updated procedures for calculating capital requirements for the largest commercial banks. After several rounds of revisions, US regulators implemented Basel II in 2008. The Basel Committees initial recommendations for Basel III came out in 2010 with implementation schedule for 2013-5, although amendments and revisions have pushed implementation to the 2016-8 time frame. For details about current regulations, see http://www.federalreserve.gov/bankinforeg/basel/.

connections with other institutions received preferential treatment when distressed. Regulators and central bankers had the ability and authority to bail-out banks and the motivation and mindset to treat systemically-important institutions specially. Their tools include the ability 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.

3. Data

Data for this study come from several sources. This section describes those sources and information necessary for understanding its application in our analysis.

3.1 Historical Bank Data Sources: 1920 to 1940

During the era of the 1920s and 1930s, commercial banks receive charters from either the national or a state government. For national banks, balance-sheet information comes from the Office of the Comptroller of the Currency (OCC). The OCC published bank-level data for one call each year during the period of our study. For New York state bank and trust companies, balance-sheet information comes from the state Superintendent of Banks. The Superintendent published bank-level data for all calls (typically four) each year during the period of our study except for the years 1933 and 1934, when the state legislature suspended the collection and publication of this information.

In the 1920s and 30s, New York banks played a key role in the national financial system and were representative of the range of institutions operating throughout the United States at that time. During the 1920s, New York possessed about 375 state-chartered banks and 400 nationally-chartered banks. The number varied from year to year with frequent entries, exits, and

mergers, particularly among smaller institutions. These banks included the full spectrum of institutions that operated at that time in the United States, ranging from small country banks serving local clientele in rural communities; to larger institutions financing industry and trade; to money-center banks operating in Manhattan, serving as correspondents for thousands of banks in the U.S. and hundreds overseas, and operating networks of foreign branches In 1930, New York banks held about 30% percent of all bank assets in the United States, 30% of all deposits, and 45% of interbank deposits.[6] This fraction increased during the economic downturn, since bank balances in New York contracted less than in the rest of the nation (Richardson and Van Horn 2010).

Figure 3.1A and 3.1B portray basic patterns in the historical data. Both panels plot banks' size, measured as the base 10 log of total assets, to banks' leverage, measured as ratio of capital to total assets. Capital is the book value of owners' equity, calculated by adding together the reported value of banks' paid-up capital, surplus, and retained earnings. Panel A examines data from 1921 quarter 3, the date closest to the start of our study for which we have data for both state and national banks. In 1921, capital ratios for larger instituted tended to be lower than for smaller institutions. Panel B examines data from 1929 quarter 4, the date nearest to the peak of the boom for which we have data for both types of banks. By 1929, capital ratios for many banks had risen, with larger banks tending to have larger increases.

Table 3.1A presents summary statistics that illuminate additional patterns. In 1921, smaller banks tended to hold more capital relative to assets than larger banks. Cross-sectional variation was larger for the smaller segments of the size distribution. While larger banks tended to exhibit more uniform behavior. This is true both for state and national banks. Comparing the largest ten entities to the remainder highlights this patter. The largest banks all held capital equal

[6] The data for these calculations come from *All-Bank Statistics*

to about 9 percent of assets, with little variation around that ratio. Banks outside that top group held on average capital equal to 14 percent of assets, with substantial variation in their behavior. In 1929, the top ten banks, on average, held capital equal to 14 percent of their assets, a ratio statistically indistinguishable from that held by all other banks before the boom in 1921 and after the boom in 1929.

3.2 Modern Bank Data Sources

The modern bank data comes from the Federal Reserve, Federal Deposit Insurance Corporation (FDIC), and Federal Financial Institutions Examination Council (FFIEC).[7] The principal information that we analyze appears on FFIEC reporting forms 031 (Consolidated Reports of Condition and Income for a Bank with Domestic and Foreign Offices) and 041 (Consolidated Reports of Condition and Income for a Bank with Domestic Offices Only). We measure bank size as nominal total assets using call code RCFD2170 and we examine the tier 1 capital ratio using call code RCFD7206. We compute gross interconnectedness as the absolute sum of call variables RCONB551, RCONB552, RCONB531, and RCON0082. We restrict our analysis to commercial banks (RSSD9331=1, CALL8786=1 or 2, RSSD9048=250, RSSD9424=1,2,6, or 7) and we limit ourselves to banks physically located in the United States (RSSD9210<57).

[7] FFIEC forms and instructions can be found at its web site, http://www.ffiec.gov/. Federal Reserve information on commercial banks, including call report codes and item descriptions, can be found at the Micro Data Reference Manual, http://www.federalreserve.gov/apps/mdrm/. Reporting forms may be found at http://www.federalreserve.gov/apps/reportforms/. Links to agency data appears at http://www.federalreserve.gov/apps/mdrm/series/list/reportform. The FDIC's publicly available data can be found at https://www.fdic.gov/bank/statistical/.

3.3 Calculating Risk-Weighted Assets for Historical Banks

Modern regulation of commercial banks' capital relies on measuring the ratio of capital to risk-weighted assets. The Basel Capital Accords separate assets into four categories. The first, considered risk-free and perfectly liquid, includes cash and home-country national debt. It receives a weight of 0%. The second category receives a weight of 20%. It includes assets deemed safe and liquid, such as securities with the highest rating, AAA. The third category receives a weight of 50%. It consists of secured and relatively safe assets such as municipal debt and mortgage loans. The last category receives a weight of 100%. This includes most other loans and assets without ratings or deemed unrateable.

We create analogs to this measure by risk-weighing assets at historical commercial banks using criteria equivalent to the Basel criteria. Complications arise from the insufficient granularity of the historical balance sheets. We make assumptions about the appropriate risk weights of the equivalent less granular balance sheets. Details appear in Table 3.3A. State bank balance sheets, for example, aggregate all bonds into a single category, "securities." This category includes U.S. government bonds, whose risk weight is zero; securitization, whose risk weight is 20%; and municipal and corporate bonds, whose risk weight is 50% in the modern data. To these composition categories, we assign a value which is the average of the weights of its subcomponents weighted by the fraction of this category held by the average bank in the state in the year 1928 (which is reported by state authorities) rounded to the nearest ten percent. Another complication arises from items considered assets in the past, but not classified as assets today. An example is cash items. The principle component of cash items is drafts in the process of collection. Today and in the past, the Federal Reserve counts these items neither as assets nor liabilities of the bank until they clear or until the passage of days sufficient to enable them to

clear in normal circumstances. Yet, state authorizes did consider them an asset in the 1920s and 30s. Since cash items are both risky and illiquid particularly during financial crises, we assign them a risk-weight of 100% (Richardson 2009).

3.4 Business Cycle Dating

In order to compare the cyclical capital choices across the bank size distribution, we construct a coherent concept of a cyclical upswing prior to the Great Depression and Great Recession. Macroeconomic data for the modern era come from standard sources. Business cycle peaks and troughs are from the NBER. GNP and other data about the cycle come from the Federal Reserve's Economic Data System (FRED).

In the 1920s, business cycles occurred more frequently in the United States than in modern times. Cyclical peaks occurred in January 1920, May 1923, October 1926, and August 1929. Cyclical troughs occurred in March 1919, July 1921, July 1924, November 1927, and March 1933. The three contractions in the decade averaged 15 months. The three expansions averaged 23 months. In this era, however, we only examine data from banks in the state of New York. The state's economy exhibited few cycles in that decade, which historians label the Roaring 20s, in part for the asset and consumption booms in America's financial and fashion capital.

The Federal Reserve's consumption index for the Second District, essentially the state of New York, illustrates the trend in the Big Apple and its hinterland. The data exhibits two peaks (May 1920 and 1930) and two troughs (September 1921 and March 1933), with a 104-month-long expansion in between. We use this consumption index to date the cycle, but note that this pattern appears in other data series from the Second District, such as asset prices on the New York Stock Exchange as encapsulated in the Dow Jones Industrial Average (DJIA). The DJIA

has a trough in August 1921 and then expands continuously until it peaks in September 1929 (. 97 months of expansion). The length and amplitude of the cycle in New York in the 1920s exceeds the expansion from November 2001 to December 2007, which lasted 73 months.

4. Method and Results

The summary statistics in the previous section portray clear patterns. In the 1920s the largest banks accumulated capital during the boom relative to smaller banks. In the 2000s, the capital position of the largest banks changed little during the boom or possibly diminished. This section analyzes these patterns smoothly over the cycle using polynomial regressions. We first consider polynomial regressions across the different size deciles in the run-up of the Great Depression and the Great Recession. The length of expansions differed prior to the Great Depression and the Great Recession. Therefore, we normalize both time periods to a unit interval. This transformation allows us to directly compare bank behavior across the two periods and to account for idiosyncrasies in the frequency and timing of bank-balance sheet reporting. Finally, we use this normalization to statistically test for differences in capital choices by banks of different sizes under different institutional arrangements.

4.1 Polynomial Time Regressions Across Bank Size

We investigate differences in the choice of capitalization across bank size by dividing banks into within-period size deciles. $R_{i,t}$ is the capital ratio that we analyze. *i* denotes the *ith* commercial bank. *t* is the time index, which is based on call report dates. Calls occurred roughly quarterly for the commercial banks in the modern era and state banks in the historical era. We can only observe a single call each year for national banks on the date that the Comptroller of the Currency chose to publish (for additional details, see Mason, 1998). The reporting intervals are mostly annual, but some were longer and others were shorter (see Appendix for actual call dates). When we analyze state or national bank data separately, we include information from all extant dates and assume the state banks calls occurred quarterly and the national bank calls occurred annually. When we pool all data from the historical era, we only examine

data from the observed national bank call dates. α is a constant intercept term. $\varepsilon_{i,t}$ is an *iid* error term. The index $I(ass)_{i,t}^{d}$ indicates the size decile of the respective sample (state, national, and pooled). *d* indicates the size decile (1,2,…,10). ρ indicates the degree of the polynomial. ρ equals $(1,2,\dots,P)$, with 1 being the linear case.

We estimate the following specifications:

$$R_{i,t} = \alpha + \sum_{d=1}^{10} \sum_{\rho=1}^{P} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_{t}^{\rho} + \varepsilon_{i,t} \quad (1)$$

Figure 4.1A displays the conditional mean for each decile over time for the historical state bank for a time polynomial of degree seven for New York state banks and trusts for the period from 1921 Q1 to 1932 Q4. Figure 4.1B shows time paths for all commercial banks in the United States for the modern period from 2002 Q1 to 2007 Q4. For both the historical and the modern eras, other higher-order time polynomials yield similar visualizations.

We find marked patterns in capital-ratio choices. In both sample periods, small banks, those in lower size deciles, on average had higher capital ratio than large banks. In contrast, the dispersion in capital ratios is significantly larger at the beginning of the historical period than in the modern period. In 1921, for example, the smallest ten percent of banks held capital equal to 16.7 percent of assets, while the largest ten percent of banks held capital equal to 12.8 percent of assets. In 2002 Q1, the smallest ten percent of banks held capital equal to 12.0 percent of assets and the largest ten percent of banks held capital equal to 8.5 percent of assets.

We find marked differences in capital-ratio dynamics over the business cycle. First, note the differences in capital choices over the cycle above and below the size median (between the fifth and sixth decile). In both eras, all banks below the size median behave similarly and display pro-cyclical capitalization ratios. That is, as the cyclical expansion continues smaller banks tend to raise their capital buffers with the ensuing boom. In contrast, banks above the size median, in particular large banks, differ

in their cyclical behavior between the two eras. During the Roaring Twenties, a long economic boom in which asset values soared, the largest commercial banks increased the amount of capital they held relative to their assets. The capital to assets ratio rose from approximately 12.1 percent at the beginning of the boom to 14.7 percent at the peak – a twenty percent increase in the capital ratio. Figure 4.1A illustrates the rapid rise in capital ratios by the largest banks. At the beginning of the boom, their capital ratios are substantially lower than most other banks. By the peak of the business cycle, in 1929 Q3, their capital ratios exceeded that of median bank and approached that of the smallest decile. During the equity and real estate booms at the start of the twenty-first century, the largest commercial banks allow their capital ratios to fall as their assets grew. Figure 4.1B illustrates the gradual depletion of capital ratios for large banks and the rigidity of the rank orderings of the capital ratios across bank size deciles.

The contrasting capital-ratio dynamics illustrated in Figures 4.1A and 4.1B for the large banks speak to the theoretical literature regarding bank leverage and too big to fail. Today for the large banks in the United States, the risks of financial distress during systemic events are believed to be borne by regulators and the central banks and ultimately the tax-paying public. Whereas in the past, people believed that if large banks failed they would not be bailed out. Consequently, in the past the large banks accumulated capital buffers during booms to protect themselves from the inevitable downturn. Today, large banks appear to be leveraging as much as possible during the boom. The main restriction on their capital holding is the regulatory requirement. However, the similarities in capital-ratio dynamics for the smallest banks in both time periods are consistent with the predictions of theory because they benefit less from the regulatory system that seldom offers liquidity in busts and imposes losses on debt and equity-holders.

4.2 Polynomial Regressions On Normalized Unit Time Interval

The previous section presented results based on the assumption that call reports were collected quarterly with an equal amount of calendar time between each call, with the exception of national banks

in the historical period for which only annual data survived, which we assumed was collected on the same date each year. Comparing coefficients between the historic and modern periods implicitly assumed the calendar dates in the two periods had the same relation to the phases of the economic expansion. Here, we eliminate these assumptions by normalizing the dates to a unit interval enabling us to systematically compare capital choices over the two business expansions. We formulate statistical hypothesis tests on differences in capital choices induced by the two different institutional settings.

In order to transform our samples to enable a simple and meaningful comparison between the two eras, we tag all dates relative to an appropriately normalized economic expansion. We consider the trough of the cycle as day 0 and the peak of the cycle as the end of the unit interval. The time of each data point indicates the fraction of days that it occurred within the expansion. For example, if a call occurred at the midpoint of the expansion, our method would assign it the time of 0.5. If a call occurred on the last day of the expansion, we would assign it a time of 1.0.

Having defined time in this manner, we estimate the following specification. All of the variables in equation 2 have the same definitions as in equation 1, except for the time variable that we have redefined over the (0,1) interval.

$$R_{i,t} = \alpha + \sum_{d=1}^{10} \sum_{\rho=1}^{P} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_{t}^{\rho} + \varepsilon_{i,t} \quad (2)$$

Figure 4.2A plots the results for historical state banks and all modern banks. The most interconnected banks clearly behave differently before the Great Depression and Great Recession. In the recent boom, the capital ratios for the most interconnected banks remained constant from trough to peak and hovered slightly above 8 percent, which is the minimum level at which regulators would consider them adequately capitalized. The capital ratios for the largest banks varied around 10 percent with little discernable trend from trough to peak. During the 1920s the largest and most interconnected banks increase leverage slightly during the early stage of the boom, but after the midpoint of the expansion begin deleveraging and raising capital. By the end of the expansion, the largest banks' capital ratios approach those below the

size median. In fact, the average capital ratios of the ten largest banks converges on the capital ratio of banks in the smallest decile. In both periods, banks below the median size held substantially more capital than the largest banks and their average capital ratios changed little over the cycle.

Figure 4.2B plots the results for historical national banks and all modern banks. Prior to the Great Depression, the most connected national banks began increasing their capital ratios one-third into the expansion. The largest national banks began increasing their capital in the latter third of the contraction. It is possible that the interconnected banks faced more risk from the upswing because they possessed foreign branch networks and substantial exposure to international economic shocks which their large but not connected counterparts did not face.

Our polynomial regressions on the unit time interval emphasize the different behavior of banks in the Manhattan money center in the booms before the Great Depression and Great Recession. Almost all of the most interconnected modern banks are descendants of the most interconnected banks during the 1920s.

4.3 Comparative Linear Regression on Unit Interval

Differences in patterns presented in the higher order polynomials in the previous figures are difficult to test. Straightforward tests of differences in behavior arise directly from linear regressions on the unit interval. These regressions have the form:

$$R_{i,t} = \alpha + \sum_{d=1}^{10} \sum_{\rho=1}^{1} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_{t}^{\rho} + \varepsilon_{i,t} \quad (3)$$

Equation 3 is equal to:

$$R_{i,t} = \alpha + \sum_{d=1}^{10} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_{t}^{\rho} + \varepsilon_{i,t} \quad (4)$$

To pool the historical and modern data, we introduce an indicator variable that identifies banks in the modern period, $\mathbb{I}_{i,t}^{modern}$, which equals 1 if the observation contains information after the year 2000 and

zero otherwise. Then we test whether the behavior of historical and modern banks in corresponding deciles differ during the expansion by estimating the following regression:

$$R_{i,t} = \alpha + \sum_{d=1}^{10} \iota_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{modern} + \sum_{d=1}^{10} \delta_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{modern} \cdot time_t + \sum_{d=1}^{10} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_t + \varepsilon_{i,t} \quad (5)$$

Now, τ represents the common component of the slope of the capital ratio rise over the expansion for historic and modern banks. ι indicates the average difference in capital ratios between the historic and modern deciles. δ indicates the difference between the historical and modern response of capital ratios to the economic expansion.

Table 4.3A presents estimates of δ, the key coefficient from equation 5. For modern banks, the table presents estimates for three versions of the modern regulatory capital ratio. All of these estimates are relative to the historic equity ratio. δ indicates the amount by which the change in the modern equity ratio over the expansion exceeded the change in the historical equity ratio for banks in the same size decile. For example, a coefficient of 3.0 would indicate that the capital ratio of *modern* banks in that size decile increased on average by 3 percentage points over the cycle relative to similar sized historic banks. A coefficient of -1.5 would indicate that the capital ratio of *historic* banks in that size decile increased on average by 1.5 percentage points over the cycle relative to similar sized modern banks. The results for the size deciles indicate that large historical banks increased their capital ratios relative to their modern counterparts over the economic expansion. The pattern was reversed for smaller bank. Capital ratios for the median bank in both periods behaved similarly. This finding is consistent with the patterns depicted in Figures 4.1 and 4.2. These regressions add statistical verification to those visualizations. They quantify the differences in the depictions and demonstrate their statistical significance.

The linear regressions above may not capture changes in behavior over the cycle suggested by the curvature of many of the curves in Figures 4.1 and 4.2. To analyze changes in the behavior of banks in

different deciles, we introduce another indicator variable that identifies the midpoint of the economic expansion, $\mathbb{I}_{i,t}^{midpoint}$, which equals 1 if $time_t \geq 0.5$ and zero otherwise. This indicator variable allows us to test whether banks behavior changed during the economic expansion, as depicted in Figure 4.2A, and to compare the changes for the historical relative to the modern banks.

$$\begin{aligned} R_{i,t} = \alpha &+ \sum_{d=1}^{10} \iota_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{modern} \\ &+ \sum_{d=1}^{10} \delta_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{modern} \cdot time_t \\ &+ \sum_{d=1}^{10} \delta_{d,\rho}^{mid} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{modern} \cdot \mathbb{I}_{i,t}^{midpoint} \cdot time_t \\ &+ \sum_{d=1}^{10} \tau_{d,\rho} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot time_t \\ &+ \sum_{d=1}^{10} \tau_{d,\rho}^{mid} \cdot \mathbb{I}(ass)_{i,t}^{d} \cdot \mathbb{I}_{i,t}^{midpoint} \cdot time_t + \varepsilon_{i,t} \end{aligned} \qquad (6)$$

Now, τ^{mid} represents the common component of changes in the slope of the capital ratio rise over the expansion for historic and modern banks during the latter half of the expansion. δ^{mid} indicates the difference between the changes in historical and modern banks in response of capital ratios during the latter half of the expansion.

Table 4.3 presents estimates of δ and δ^{mid}. The estimates reinforce the conclusions from Table 4.3A, but demonstrate that the larger historical banks increase their capital ratios relative to their modern counterparts largely during the latter half of the expansion. During the initial phase of the expansion, the behavior of the two groups of banks differed to a lesser degree.

5. Conclusion

This paper examines the capital choices of commercial banks in the booms preceding the Great Depression and the Great Recession. In the earlier period, banks capital choices were

constrained mainly by market discipline, bankers faced substantial liability if their institutions failed, even the largest institutions had little hope of a government bailout. In the modern period, banks had limited liability, and the largest banks had the expectation as being treated as too big to fail. The modern theories of corporate finance predict that banks should behave differently under these different regulatory regimes.

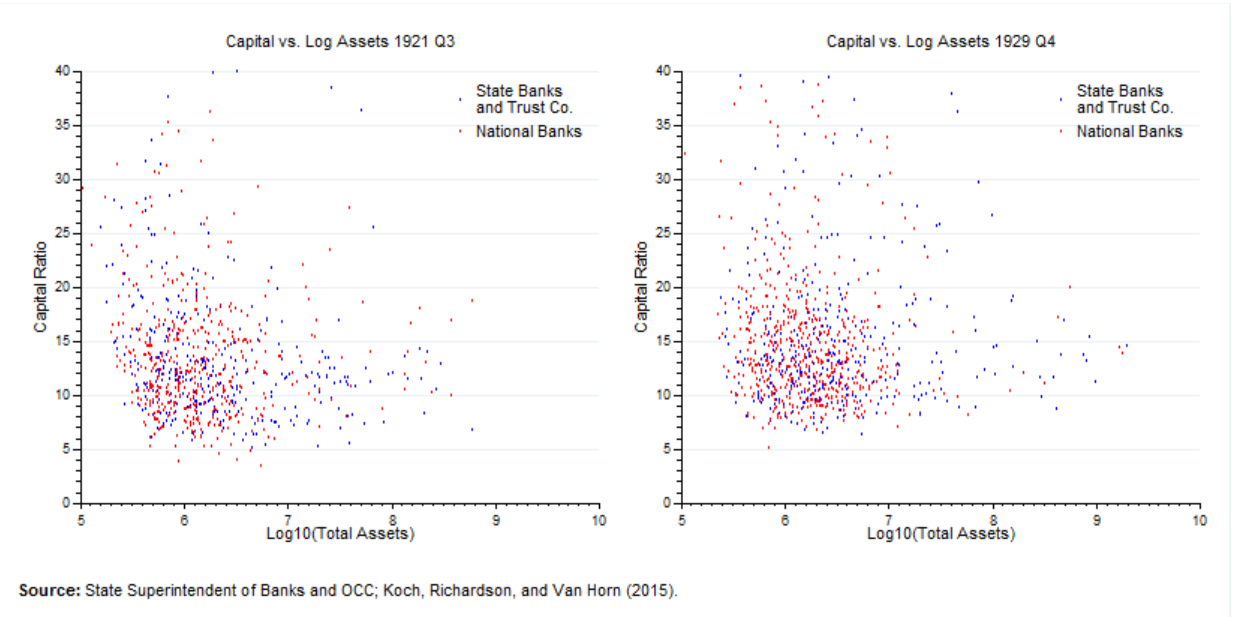
We find that banks did, in fact, make different capital choices in the historic and modern periods. In the historic period all banks held more capital than their modern counterparts. The behavior of large banks was particularly striking. As the Roaring Twenties progressed the largest banks in New York, particularly the money center banks in Manhattan, with their numerous connections with numerous financial institutions throughout the United States and overseas increased capital to levels held by the smallest commercial banks. Their procyclical capital accumulation is one reason that all money center banks survived the Great Depression and most paid dividends throughout the downturn. During the boom preceding the Great Recession the largest commercial banks in the United States maintained capital levels near those required by law. As the boom progressed, they did not accumulate capital; instead their capital ratios slowly sank. The change in behavior of the largest banks, whose incentives were changed the most by the rise of too big to fail institutions, conforms to the predictions of the theoretical literature. Our findings substantiate suppositions that institutions which insulate commercial bank owners and managers from downside investment risks, such as limited liability, deposit insurance, and government bailouts, generate incentives that lead to excessive risk taking at commercial banks.

Institutions, of course, are not exogenous to the economic environment, but we know they have changed over the seventy years between our two sample periods. What shapes the institutions is beyond the scope of this paper. What we can compare is the response in capital

choices to different sets of institutions across the bank-size distribution. Lack of observable exogenous variation in institutions has thus far prevented empiricists from employing the standard research design of comparing similar institutions operating in both environments. We have examined the historical experiments that come closest to the ideal case.

Figures

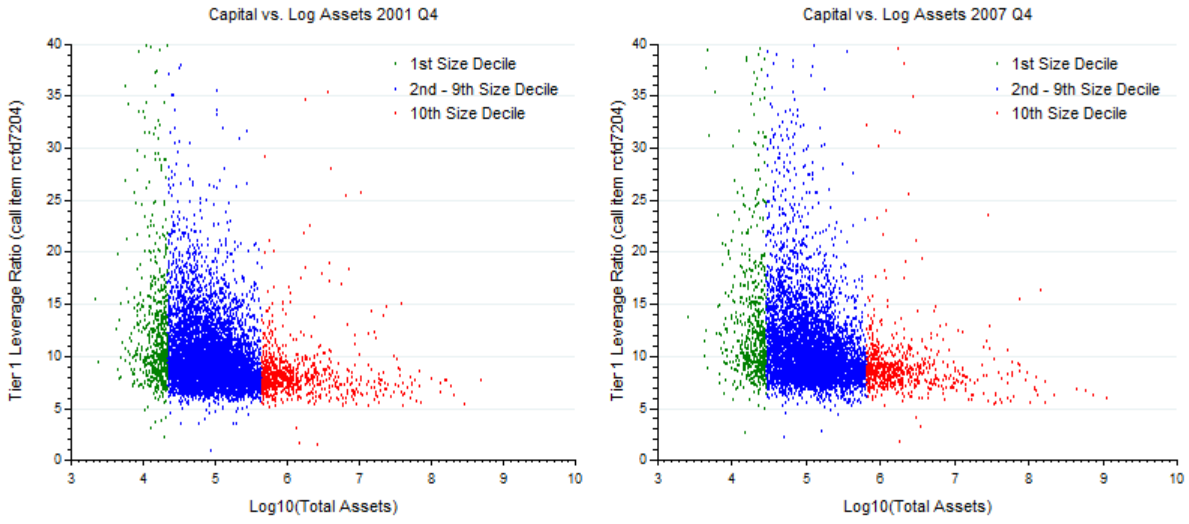
Figure 3.1 A: Capital and Assets of Banks in New York State, 1921 q3 and 1929 q4.



Source: See text. Notes: State chartered banks in blue. State-chartered banks and trust companies in blue. Nationally chartered banks in red.

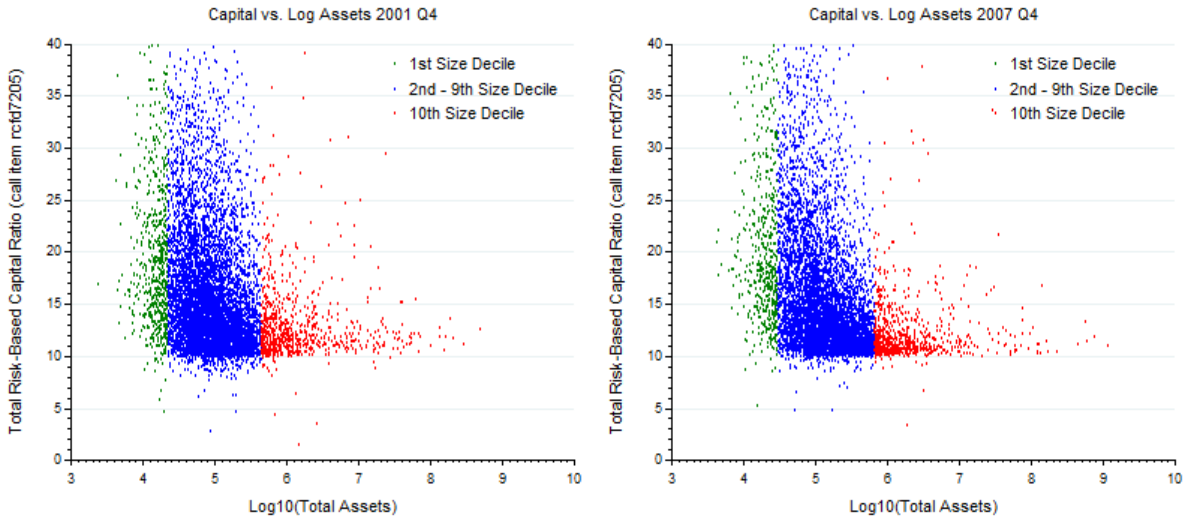
Figure 3.1 B: Capital and Assets of Modern Banks, 2001 q3 and 2007 q4.

Panel 1: Tier 1 Leverage Ratio and Assets



Source: FFIEC; Koch, Richardson, and Van Horn (2015).

Panel 2: Total Risk-Based Capital and Assets

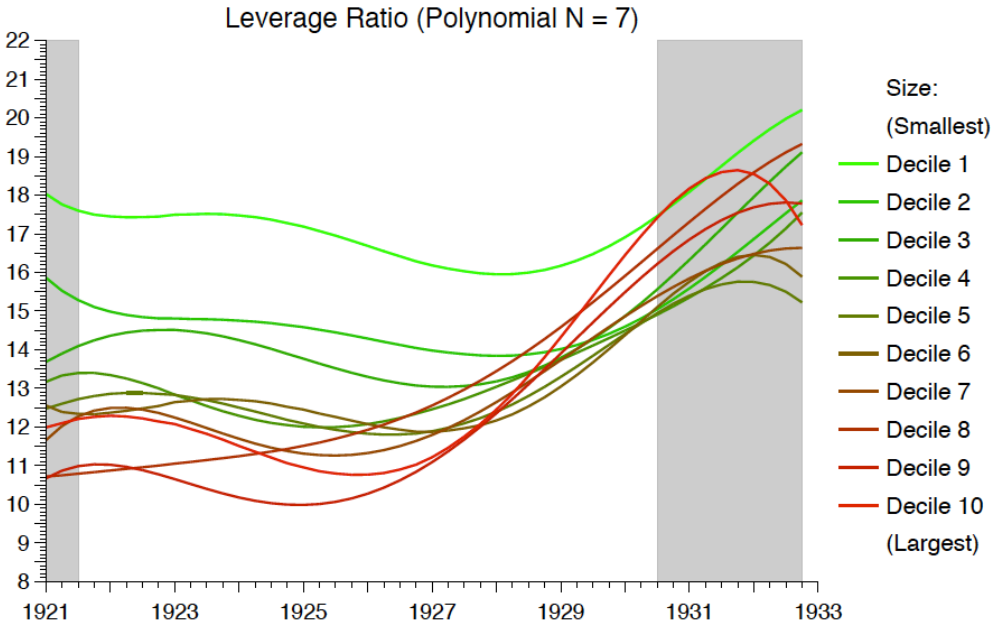


Source: FFIEC; Koch, Richardson, and Van Horn (2015).

Panel 3: Tier 1 Risk-Based Capital and Assets

Source: FFIEC; Koch, Richardson, and Van Horn (2015).

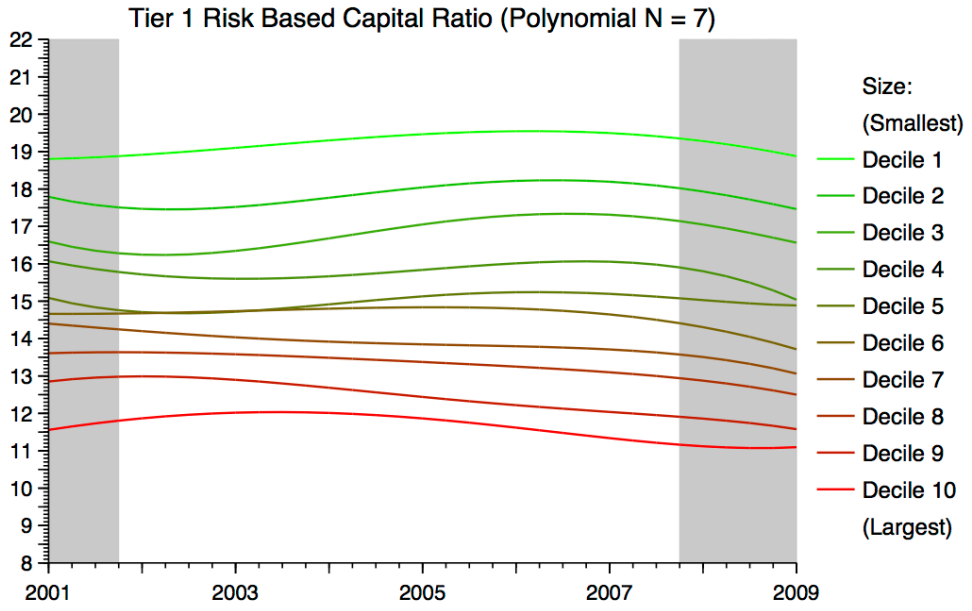
Figure 4.1A



Notes: Grey bars denote NBER recessions.

Source: FFIEC; Koch, Richardson and Van Horn (2015).

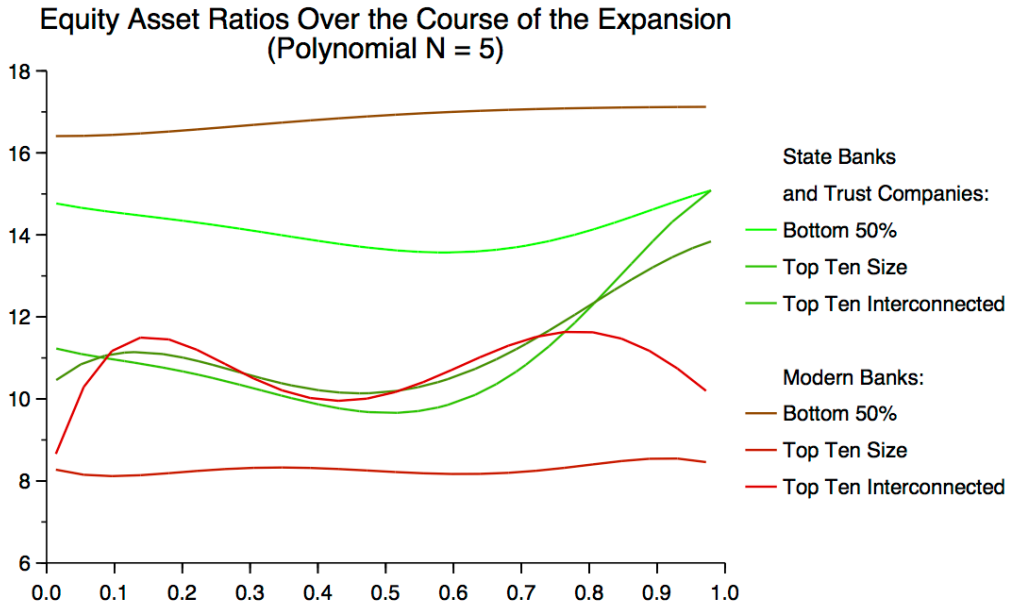
Figure 4.1B



Notes: Grey bars denote NBER recessions.

Source: FFIEC; Koch, Richardson and Van Horn (2015).

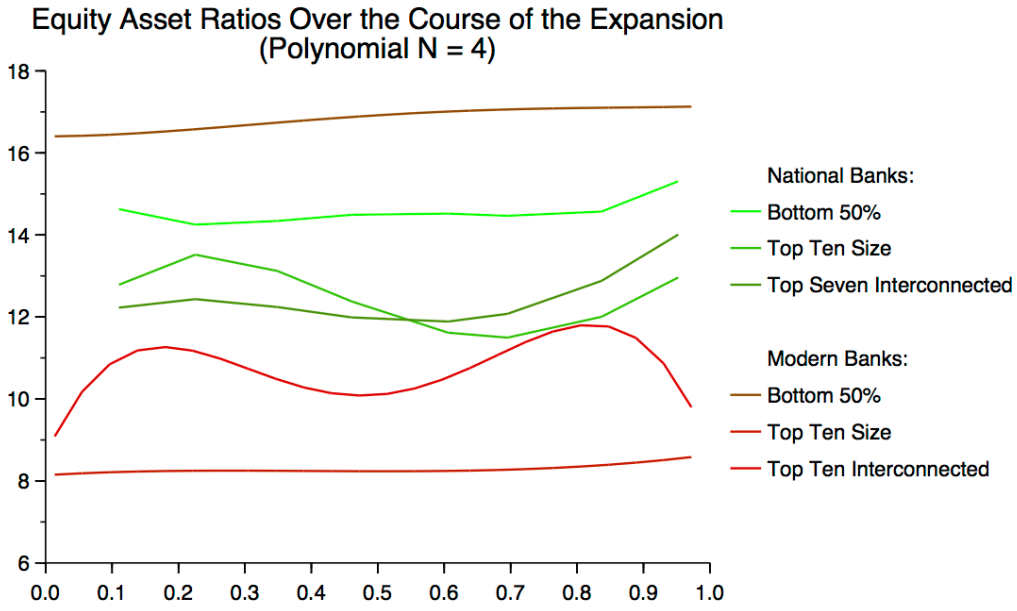
Figure 4.2A



Notes: Modern Equity Asset Ratio Measured with Tier 1 Risk-Based Capital Ratio

Source: FFIEC; Koch, Richardson and Van Horn (2015).

Figure 4.2B



Notes: Modern Equity Asset Ratio Measured with Tier 1 Risk-Based Capital Ratio

Source: FFIEC; Koch, Richardson and Van Horn (2015).

Tables

Table 3.1Z

20 Largest National Banks	Assets in 1929 Q4
1. NYC, National City	$ 1,802,000,000
2. NYC, Chase	$ 1,705,000,000
3. NYC, First	$ 568,400,000
4. NYC, Bank of America N A	$ 438,100,000
5. NYC, Chatham & Phenix	$ 328,800,000
6. NYC, Public	$ 205,700,000
7. NYC, Commercial	$ 152,500,000
8. NYC, Harriman	$ 60,122,891
9. Albany, New York State	$ 47,896,945
10. Albany, National	$ 42,758,323
11. Troy, Manufacturers	$ 34,617,789
12. NYC, Grace	$ 32,270,042
13. Yonkers, First	$ 27,683,800
14. NYC, Liberty	$ 24,057,455
15. NYC, Straus	$ 18,989,319
16. NYC, Central	$ 18,057,321
17. NYC, Lefcourt	$ 17,964,566
18. Elmira, First	$ 16,636,676
19. New Rochelle, National City	$ 16,445,753
20. NYC, Sterling	$ 15,011,558

20 Largest State Banks and Trusts	Assets in 1929 Q4
1. Guaranty Trust Company of New York	$ 2,012,000,000
2. Equitable Trust Company of New York	$ 1,014,000,000
3. Irving Trust Company	$ 866,000,000
4. Bankers Trust Company	$ 818,000,000
5. Central Hanover Bank and Trust Company	$ 769,300,000
6. Manufacturers Trust Company	$ 508,200,000
7. Bank of Manhattan Trust company	$ 474,800,000
8. Chemical Bank and Trust Company	$ 423,200,000
9. New York Trust Company	$ 401,900,000
10. Marine Trust Company of Buffalo	$ 306,100,000
11. Corn Exchange Bank and Trust Company	$ 298,500,000
12. Bank of United States	$ 276,600,000
13. Bank Of New York And Trust Company	$ 161,600,000
14. Brooklyn Trust Company	$ 159,100,000
15. M & T Trust Company	$ 154,600,000
16. Liberty Bank Of Buffalo	$ 112,400,000
17. First Trust and Deposit Company	$ 110,000,000
18. Empire Trust Company	$ 105,600,000
19. United States Trust Company of New York	$ 100,400,000
20. Interstate Trust Company	$ 85,183,447

Table 3.1A: Capital to Asset Ratio for Banks in New York State, 1921 to 1929

	1921	State Banks and Trusts in 1921 Q3 Mean	Std. Dev.	National Banks in 1921 Q3 Mean	Std. Dev.	Pooled in 1921 Q3 Mean	Std. Dev.
	Banks with Highest Interconnectedness	10.5	3.0	13.5	5.3	11.7	3.7
	Other Banks	13.3	6.0	13.4	5.7	13.4	5.8
	Size Top 10 Banks	11.5	2.4	14.0	3.4	12.1	3.7
	Size All But Top 10 Banks	13.3	6.0	13.4	5.7	13.3	5.8
Largest	10. Size Decile	12.8	7.3	13.7	4.6	13.0	5.7
	9. Size Decile	11.2	2.7	12.3	5.2	11.6	4.5
	8. Size Decile	10.8	4.4	12.2	4.5	12.6	5.4
	7. Size Decile	12.7	6.2	14.0	7.3	12.9	6.5
	6. Size Decile	13.0	6.3	11.5	3.8	12.9	4.9
	5. Size Decile	12.6	5.0	13.8	5.9	12.3	4.6
	4. Size Decile	12.5	3.6	14.2	6.1	13.5	5.6
	3. Size Decile	14.8	6.9	12.3	6.0	13.5	6.4
	2. Size Decile	15.9	7.5	13.3	5.1	14.5	6.6
Smallest	1. Size Decile	16.7	5.3	16.9	5.8	16.8	5.6
	Observations	328		471		799	

	1929	State Banks and Trusts in 1929 Q4 Mean	Std. Dev.	National Banks in 1929 Q4 Mean	Std. Dev.	Pooled in 1929 Q4 Mean	Std. Dev.
	Banks with Highest Interconnectedness	12.5	2.2	14.1	3.5	14.5	2.6
	Other Banks	15.1	6.4	14.8	5.9	14.9	6.1
	Size Top 10 Banks	12.9	2.5	13.3	3.7	14.7	2.4
	Size All But Top 10 Banks	15.1	6.4	14.8	5.9	14.9	6.1
Largest	10. Size Decile	16.1	7.2	15.3	6.7	15.2	6.3
	9. Size Decile	15.1	5.8	12.9	3.9	14.9	6.7
	8. Size Decile	15.3	7.7	13.4	4.9	13.9	5.2
	7. Size Decile	14.6	5.6	14.9	7.4	13.8	5.9
	6. Size Decile	14.6	6.6	14.5	5.4	14.7	6.7
	5. Size Decile	13.8	4.6	14.0	4.1	14.5	5.4
	4. Size Decile	15.8	7.5	14.8	4.6	14.3	5.0
	3. Size Decile	14.1	5.7	15.4	7.0	15.0	6.1
	2. Size Decile	14.9	5.7	15.8	6.3	15.8	6.5
Smallest	1. Size Decile	16.2	6.5	16.8	6.8	16.5	6.5
	Observations	367		546		913	

Table 3.1B: Capital to Asset Ratio for Modern Banks, 2001-2007

	2001	Modern Tier 1 Leverage Ratio in 2001 Q4 Mean	Std. Dev.	Modern Tier 1 Risk Based Leverage Ratio in 2001 Q4 Mean	Std. Dev.	Modern Total Risk Based Capital Ratio in 2001 Q4 Mean	Std. Dev.
	Interconnectedness Top 10 Entities	9.4	9.1	8.5	1.0	12.0	0.8
	Interconnectedness All But Top 10 Entities	10.0	7.2	14.6	13.7	15.7	13.6
	Size Top 10 Entities	6.9	0.9	8.1	0.7	11.9	0.9
	Size All But Top 10	10.0	7.2	14.6	13.7	15.7	13.6
Largest	10. Size Decile	8.5	2.9	11.7	4.0	13.1	3.8
	9. Size Decile	9.0	2.7	12.8	4.4	13.9	4.4
	8. Size Decile	9.2	2.8	13.6	5.1	14.7	5.1
	7. Size Decile	9.6	3.0	14.0	5.3	15.1	5.3
	6. Size Decile	9.8	3.2	14.7	5.7	15.7	5.5
	5. Size Decile	9.7	2.8	14.7	5.3	15.7	5.2
	4. Size Decile	10.3	3.3	15.6	6.0	16.8	6.0
	3. Size Decile	10.7	3.6	16.1	6.0	17.1	5.8
	2. Size Decile	11.6	6.2	17.1	8.1	18.1	8.0
Smallest	1. Size Decile	12.0	21.7	16.7	44.7	17.7	44.9
	Observations	7,961		7,791		7,774	

	2007	Modern Tier 1 Leverage Ratio in 2007 Q4 Mean	Std. Dev.	Modern Tier 1 Risk Based Leverage Ratio in 2007 Q4 Mean	Std. Dev.	Modern total Risk Based Capital Ratio in 2007 Q4 Mean	Std. Dev.
	Interconnectedness Top 10 Entities	9.0	3.9	9.3	2.5	12.6	2.0
	Interconnectedness All But Top 10 Entities	10.9	4.4	14.7	6.0	15.8	5.8
	Size Top 10 Entities	7.4	3.2	8.2	2.3	11.8	2.0
	Size All But Top 10	10.9	4.4	14.8	6.0	15.8	5.8
Largest	10. Size Decile	9.1	3.4	11.2	3.7	12.4	3.3
	9. Size Decile	9.3	2.5	11.9	3.6	13.0	3.4
	8. Size Decile	9.6	2.5	12.9	4.3	14.0	4.3
	7. Size Decile	10.1	3.2	13.4	4.7	14.4	4.8
	6. Size Decile	10.5	3.5	14.3	5.0	15.3	5.0
	5. Size Decile	11.0	3.8	15.1	5.6	16.2	5.6
	4. Size Decile	11.6	4.8	16.0	6.3	16.9	6.1
	3. Size Decile	11.9	4.8	16.8	6.4	17.8	6.2
	2. Size Decile	12.7	5.5	18.1	7.0	19.1	6.8
Smallest	1. Size Decile	13.6	6.6	19.4	7.3	20.3	7.1
	Observations	7,103		6,950		6,934	

Table 3.3: Risk Weights for Bank Assets in Historical Data

State Charter		National Charter	
Asset	**Weight %**	**Asset**	**Weight %**
a. Cash on Hand	0	Cash and Exchange	0
b. Due from Banks	0		
c. Cash Items	100		
d. Loans and Discounts	75	Loans and Discounts	75
e. Mortgages Owned	50		
f. Loans Secured, Other	50		
g. Loans Unsecured	100		
h. Overdrafts	100		
i. Securities	25	US Govt. Securities	0
j. Real Estate Owned	100	Other Bonds and Real Estate	50
k. Other Assets	100	Other Assets	100

Table 4.3A: Capitalization Slope Differences in the Booms Across the Size Dimension

	Pooled (State and National)	Tier 1 Leverage Ratio		Tier 1 Risk-Based Capital Ratio		Total Risk-Based Capital Ratio	
		coeff.	(s.e)	coeff.	(s.e)	coeff.	(s.e)
	Banks with Highest Interconnectedness	-0.8	1.1	-0.9	1.1	-1.0	1.1
	Other Banks	-0.1	0.1	-1.0***	0.2	-1.1***	0.2
	Size Top 10 Banks	-0.6	0.9	-2.1*	1.1	-2.1**	1.0
	Size All But Top 10 Banks	-0.1	0.1	-1.0***	0.2	-1.1***	0.2
Largest	10. Size Decile	-1.5***	0.3	-2.8***	0.4	-2.9***	0.4
	9. Size Decile	-2.2***	0.3	-3.8***	0.4	-3.9***	0.4
	8. Size Decile	-2.0***	0.3	-3.3***	0.5	-3.3***	0.5
	7. Size Decile	-1.0***	0.3	-2.2***	0.5	-2.3***	0.5
	6. Size Decile	0.7**	0.3	-0.4	0.5	-0.4	0.5
	5. Size Decile	0.6*	0.3	-0.1	0.5	-0.2	0.5
	4. Size Decile	1.3***	0.4	0.5	0.6	0.5	0.6
	3. Size Decile	2.1***	0.4	1.6***	0.6	1.5**	0.6
	2. Size Decile	2.1***	0.5	1.7**	0.7	1.7**	0.7
Smallest	1. Size Decile	3.0***	0.7	2.8**	1.1	2.7**	1.1

Table 4.3B: Slope Changes and Half-Way Slope Changes

	Pooled (State and National)	Tier 1 Leverage Ratio				Tier 1 Risk-Based Capital Ratio				Total Risk-Based Capital Ratio			
				Slope Change				Slope Change				Slope Change	
		(coeff)	(s.e.)	(coeff)	(s.e.)	(coeff)	(s.e.)	(coeff)	(s.e.)	(coeff)	(s.e.)	(coeff)	(s.e.)
	Banks with Highest Interconnectedness	1.5	2.9	-1.8	2.2	1.8	3.0	-2.0	2.3	-1.7	2.2	1.2	2.9
	Other Banks	1.0***	0.3	-0.8***	0.2	0.8	0.5	-1.4***	0.4	-1.5***	0.4	0.8*	0.5
	Size Top 10 Banks	2.3	2.4	-2.3	1.8	2.4	3.0	-3.6*	2.2	-3.0	2.0	1.7	2.7
	Size All But Top 10 Banks	1.0***	0.3	-0.9***	0.2	0.8*	0.5	-1.5***	0.4	-1.5***	0.4	0.8*	0.5
Largest	10. Size Decile	1.8**	0.9	-2.6***	0.6	1.3	1.1	-3.2***	0.8	-3.2***	0.7	1.2	1.0
	9. Size Decile	-0.4	0.7	-1.4***	0.5	-1.2	1.0	-2.0***	0.7	-2.2***	0.7	-1.1	1.0
	8. Size Decile	-0.6	0.7	-1.1**	0.5	-1.6	1.2	-1.3	0.8	-1.5*	0.8	-1.5	1.2
	7. Size Decile	1.0	0.8	-1.5***	0.6	0.2	1.3	-1.8**	0.9	-1.8**	0.9	0.1	1.3
	6. Size Decile	2.3***	0.9	-1.3**	0.6	2.2	1.4	-2.0**	1.0	-2.0**	1.0	2.2	1.4
	5. Size Decile	0.5	0.8	0.1	0.6	0.2	1.4	-0.3	1.0	-0.4	1.0	0.3	1.3
	4. Size Decile	2.6***	0.9	-0.9	0.7	1.8	1.4	-0.9	1.0	-1.0	1.0	1.8	1.4
	3. Size Decile	2.2**	1.1	-0.1	0.8	2.7*	1.6	-0.8	1.2	-1.0	1.1	2.8*	1.6
	2. Size Decile	2.4*	1.3	-0.2	0.9	3.2*	1.7	-1.2	1.2	-1.3	1.2	3.3**	1.7
Smallest	1. Size Decile	2.1	1.8	0.7	1.3	3.9	2.9	-0.9	2.1	-0.8	2.0	3.6	2.9

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