A Bank-Level Analysis of Regulation Q and Commercial Bank Portfolio Risks

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Abstract

The impact of financial regulation on commercial bank competition and portfolio risks has been a focus of academic debate over the past three decades. This topic is increasingly relevant since the 2007-2008 financial crisis ushered in significant changes to financial regulation laws. I use bank-level data on all U.S. commercial banks from 1976-1991 to investigate the impact of financial deregulation, in the form of the phase-out of Regulation Q, on bank portfolio risks. The results suggest that this phase-out was associated with a decrease in commercial banks' credit and insolvency risks, as well as a slight increase in liquidity risk. An additional microeconomic analysis of individual bank characteristics suggests that the effect of financial deregulation did not vary significantly across banks of different sizes; both large and small banks assumed similar changes in portfolio risks when faced with the regulation's phase-out. The results thus show that the deregulation of Regulation Q is associated with less risky commercial bank portfolios.

Keywords: Interest Rates, Commercial Banks, Portfolio Risk, Bank Regulation
JEL Codes: E43, G18, G21, G28

1. Introduction

The impact of financial deregulation, bank competition, and bank portfolio risk has been a focus of academic and policy debates over the past three decades (Lam & Chen, 1985; Allen & Wilhelm, 1988; Bundt, 1992; Boyd & Nicolo, 2005; Berger, Klapper, & Turk-Ariss, Bank Competition and Financial Stability, 2009). In 1980, The Depository Institutions Deregulation and Monetary Control Act (DIDMCA) mandated the phase-out of the federal Regulation Q (Reg. Q) on individual and non-profit deposits. Established in the Glass-Steagall Act of 1933, Reg. Q was a nationally implemented regulation that established interest rate ceilings on individual, non-profit, and commercial deposits at all commercial banking institutions. Regarding prior policies, Reg. Q was initially implemented to reduce commercial bank portfolio risks. Additionally, a recent policy contained within the Dodd-Frank Act of 2011 completely eliminates Reg. Q by terminating the regulation on commercial deposits (Federal Reserve Board, 2011). To date, no empirical work has evaluated the impact of DIDMCA's phase-out of Reg. Q on commercial banks' portfolio risks. This paper provides both an aggregate and bank-level analysis of the impact of Reg. Q on commercial bank portfolio risks.

Prior research conducted on Reg. Q focuses on five main topics. First, multiple studies examine the relationship between interest rate ceilings on deposits, changes in bank portfolio risks, and bank failure rates during the 1920s and 1930s. The results of these studies are mixed. Benston (1964) and Cox (1966) find that the introduction of Reg. Q neither increased nor decreased portfolio risks; Rolnick (1986) suggests that the imposition of Reg. Q reduced the probability of bank failure. Second, Lam and Chen (1985) construct a mathematical model to predict the relationship between the phase-out of Reg. Q and bank portfolio risks; the model concludes that the phase-out of Reg. Q will increase portfolio risks, particularly among smaller institutions. Third, Allen and Wilhelm (1988) and Bundt, Cosimano and Halloran (1992) use capital market methodology to analyze market measures of commercial bank risk after the phase-out of Reg. Q. These papers suggest that movements in capital markets reflect little to no change in the probabilities of commercial bank failures. Fourth, McKelvey (1978), Gilbert and Lovati (1979) and Spellman (1980) study the relationship between Reg. Q and financial disintermediation during the 1960s and 1970s. This research body concludes that Reg. Q is associated with increased levels of disintermediation during this period. Finally, Duca (1995), Mertens (2008) and Koch (2014) assess the impact of Reg. Q's phase-out on commercial banks' balance sheets; all three papers find that the implementation of Reg. Q is significantly associated with changes in commercial bank balance sheets.

Duca (1995) and Koch (2014) both evaluate the effect of Reg. Q on the compositions of commercial banks' balance sheets. Using a Reg. Q bindingness measure that adjusts as a dual function of the Reg. Q phase-out and market interest rates, these studies determine that the phase out of Reg. Q is significantly associated with financial disintermediation and shifts in the monetary policy transmission mechanisms of monetary policy.

In this paper, I conduct a bank-level analysis to evaluate the relationship between the phase-out of Reg. Q and commercial banks' portfolio risks. I use quarterly balance sheet reports of more than 10,000 U.S. commercial banks from 1976 to 1991. Using an approach similar to Koch (2014), I then analyze the response of four bank-level portfolio risk measures to changes in the bindingness of Reg. Q, controlling for monetary policy and macroeconomic conditions. The four portfolio risk measures are: (1) risk-weighted assets ratio, (2) capital adequacy ratio, (3) asset liquidity ratio, and (4) liquidity mismatch index (LMI). In addition to examining aggregate changes in portfolio risks, I also study how the impact of interest rate deregulation varies across banks of different sizes. Previous research by Koch (2014) suggests that larger banks had higher lending levels than smaller banks during the imposition of Reg. Q. Mathematical modeling by Lam and Chen (1985) suggests that the impact of Reg. Q's phase-out should vary across commercial banks of different sizes, with smaller banks assuming greater risks. Using a microeconomic analysis of bank-level data, I contribute to the literature by empirically testing this theory.

My aggregate level results suggest that the phase-out of Reg. Q is broadly associated with decreases in commercial banks' portfolio risks. Specifically, the phase-out of Reg. Q is, on average, associated with a: decrease in the risk-weighted assets ratio, increase in the capital adequacy ratio, decrease in asset liquidity, and indeterminate changes in the LMI. The first two measures suggest that the phase-out of Reg. Q reduced commercial banks' portfolio risks. While the latter two measures suggest little to some increase in risks, these changes may reflect simultaneous changes in credit growth due to reduced disintermediation (Koch, 2014). Overall, my findings lend support to the works of Benston (1964) and Cox (1966), which find that the imposition of Reg. Q does not reduce commercial banks' portfolio risks. The microeconomic analysis of bank-level data shows that the impact of Reg. Q's phase-out on portfolio risks generally did not vary by bank size. The effect of Reg. Q's phase out on the risk-weighted assets ratio, the capital adequacy ratio, and LMI was uniform across bank sizes. However, the impact of Reg. Q on liquidity risk varies slightly by bank size. Generally, larger banks have higher asset liquidity ratios in response to the phase-out of Reg. Q. These results, which show the effect of relaxed disintermediation on smaller banks, support previous research by Koch (2014). Overall, the empirical evidence shows that banks uniformly decreased portfolio risks in response to the phase-out of Reg. Q. These bank-level results contradict the conclusions of the theoretical model proposed by Lam & Chen (1985).

2. History of Regulation Q

As a component of the Glass-Steagall Act of 1933, Reg. Q was passed in the wake of the Great Depression during which nearly half of the commercial banks in the United States failed. Reg. Q's initial purpose was to i) reduce competition among banks for deposits and ii) reduce banks' investments in higher-yield, higher-risk assets. The regulation is in line with the profit target theory, which hypothesizes that banks compete to offer higher interest on demand deposits in order to attract more deposits and maintain pre-determined profit levels. To pay higher rates, banks simultaneously invest in higher-yield, higher-risk assets. These assets increase banks' portfolio risks, thereby increasing the probability of failures (Benston, 1964). Reg. Q was intended to reduce such competition and ensure that the interest rates paid on deposits were prudent in terms of overall financial stability (Benston, 1964; Friedman, 1970; Roos, 1979; Gilbert, 1986).

The original Reg. Q legislation contains two main provisions. First, it prohibits the payment of interest on demand deposits. Second, it gives the Federal Reserve (the Fed) the authority to regulate interest rate ceilings on all savings and time deposits. During Reg. Q's first three decades, the Fed kept interest rate ceilings above market rates. Thus, while interest rate competition amongst banks was constrained, interest rates on deposits remained competitive with broader market rates. Beginning in the late 1950s, market interest rates began to increase at an accelerated rate (see Figure 1). Fed officials perceived growing competition for credit as the primary reason for increasing rates. Specifically, due to greater demand by both businesses and households for credit, financial institutions were able to charger higher rates. In order to end the competitive credit cycle thought to be responsible for overall increases in market rates, the Fed amended its strategy in 1966 and committed to keeping interest rates on deposits artificially low (Higgins, 1977; Roos, 1979; Gilbert, 1986).

The change in the Fed's Reg. Q strategy had several unexpected consequences, the most serious of which was the diversion of funds away from financial intermediaries and towards securities markets. Disintermediation increased as the difference between short-term market interest rates and interest rate ceilings on deposits grew larger. Starting in the early 1970s, higher short-term market interest rates incentivized savers to move funds out of commercial bank deposit accounts and into higher-yielding market investment products. Disintermediation had several significant effects. Research by Koch (2014) finds that disintermediation caused by Reg. Q resulted in contractions in the growth rates of both deposits and credit at commercial banks. Additionally, due to reduced funding sources, commercial banks increased the cost of credit. Thus, the Fed's strategy of artificially low rates on deposits was unintentionally associated with even greater increases in the market rates for credit (Gilbert, 1986).

Recognizing the undesirable association between Reg. Q and disintermediation, Congress passed DIDMCA in 1980 and mandated the phase-out of Reg. Q over the next six years. The legislative objectives of DIDMCA were two-fold. First, the act sought to increase the authority of the Fed so that it could better manage the money supply. Second, it aimed to dismantle specific financial regulations so that commercial banks could better compete with other financial institutions for funds (Federal Reserve Bank of Boston, 1980; Gilbert, 1986).

DIDMCA's nine titles address different aspects of the financial sector. For this paper's focus on commercial banking and Reg. Q, Title II is most relevant.[1] Title II created the

[1]Other relevant DIDMCA titles include Titles I, III and V. Title I is the *Monetary Control Act of 1980*, which extended the Fed's authority to a greater variety of depository institutions, including banks, savings banks, savings and loans (S&Ls) and credit unions. By applying reserve requirements to a greater number of institutions, among other actions, the Monetary Control Act gave the Fed greater control over the money supply (Robinson, 1980; Gilbert, 1986). Title III, called the *Consumer Checking Account Equity Act of 1980*, allowed for the creation of NOW accounts at all depository institutions. Further, the title increased federal deposit insurance from $40,000 to $100,000. Both actions were intended to halt disintermediation by making commercial banks and thrifts more competitive with money market funds, which had been attracting deposits away since the late 1960s. Finally, Title V addresses state usury laws. Specifically, the title eliminated state mortgage usury ceilings and restrictions on

Depository Institutions Deregulation Committee (DIDC), which oversaw the phase-out of Reg. Q. The DIDC's mandate involved three guiding policies. First, it oversaw a gradual increase in interest rate ceilings on all savings and time deposits. Second, it managed the complete elimination of interest rate ceilings on all individual and non-profit deposits, excluding demand deposits, by 1986. Third, the committee created new categories of deposits, such as super negotiable orders of withdrawal (NOW) accounts, which were either not subject to interest rate ceilings or given flexible ceilings set at market rates.[2] The DIDC's mandate lasted for six years (until March 1986), after which the committee was disbanded (Gilbert, 1986).

The dates associated with the relaxation and official phase-out of Reg. Q are catalogued in Table 1. Of the many steps, a few are particularly significant. The relaxation of interest rate ceilings on deposits began in the late 1970s, just prior to the passing of DIDMCA. In June 1978, money market certificates (MMCs) were authorized; these accounts had minimum denominations of $10,000 and interest rates that floated with the 6-month Treasury bill. In July 1979, small saver certificates (SSCs) were created. With no minimum deposit, a maturity of 30 months or more, and floating ceiling rates based on the 2.5 year Treasury bill yield, these accounts were comparable to traditional savings and time deposits. As a substitute for other short-term, still-regulated savings deposits, SSCs marked a significant step in the relaxation of Reg. Q because they provided interest rates that floated with market rates.

The passing of DIDMCA in 1980 marked the beginning of the official phase-out of Reg. Q. Beyond the legislative mandate to repeal Reg. Q as "rapidly as economic conditions warrant", the DIDC was given full authority to determine the timeline of Reg. Q's phase-out (Federal

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discount points, finance charges and other charges with respect to residential mortgage loans. The purpose of this title was to further reduce interest rate regulations on the state level. Like the repeal of Reg. Q, Title V was intended to reduce disintermediation and increase competition between financial institutions, this time at the state level.

[2] NOW accounts are similar to demand deposits in that funds may be withdrawn an unlimited amount of times from both accounts. However, NOW accounts, unlike deposit accounts, may earn interest.

Reserve Bank of Boston, 1980: 5). [3] On May 1982, the DIDC removed interest rate ceilings on all time deposits with minimum maturities of at least 3.5 years. This date is the most significant in the phase-out of Reg. Q because it marks the introduction of time deposits with interest rates that are competitive with other investment products. The significance of this date is reflected in the annualized growth rate of core deposits, which was four times greater during 1982 than any other year in the phase-out (Koch, 2014).[4]

Between December 14, 1982 and January 1, 1983, the DIDC introduced money market demand accounts (MMDAs) and Super NOW accounts. MMDAs were authorized with a minimum balance of $2,500, accounts with no interest ceiling, no minimum maturity, and unlimited withdrawals by mail or in person; Super NOWs were similar, but also allowed unlimited numbers of fund transfers. While the December 1982 and January 1983 events are less significant than May 1982 in terms of changes in core deposits, Gilbert (1986) identifies the period as a significant milestone in the phase-out of Reg. Q. Finally, on March 31, 1986, the DIDC eliminated all remaining interest rate ceilings on saving and time deposits. This date marks the official end of Reg. Q on all non-commercial deposits, as well as the termination of the DIDC committee (Gilbert, 1986).

3. Methodology

My baseline specification follows empirical work by Koch (2014), which measures the relationship between the bindingness of Reg. Q and changes in bank-level balance sheet compositions and monetary policy transmission mechanisms. In my models, measures of

[3] The DIDC initially proposed an ambitious timeline that would phase-out the majority of Reg. Q by 1983. This timeline was derailed, however, by significant lobbying pushback from small commercial banks, as well as the S&L industry (Noble, 1983). Both groups were concerned about being competitive in a less-regulated financial environment. The lobbying efforts were successful in delaying the DIDC's phase-out timeline by three years.

[4] Summary statistics produced by Koch (2014) show that the annualized growth in core deposits was greater than 45% during 1982. The second most significant year, by core deposit growth, was 1986 when the DIDC fully terminated Reg. Q on all individual and non-profit savings and time deposits; the annualized growth rate in 1986 was just over 15%.

portfolio risk are a function of: (1) the bindingness of Reg. Q, (2) bank size, (3) macroeconomic controls, and (4) bank fixed effects. I use a fixed effects model to control for variations within individual bank entities.[5] I also include a bank size control to account for differences across banks of varying sizes. Bank size is calculated as the log of total assets.

3.1 Measures of Portfolio Risk

A substantial body of empirical literature is devoted to employing various risk measures to capture important components of bank portfolio risk. This paper utilizes four: (1) a risk-weighted assets (RWA) ratio, (2) a capital adequacy ratio, (3) an inverse asset liquidity ratio and (4) liquidity mismatch index (LMI). These measures evaluate multiple aspects of portfolio risks. RWA ratio is a measure of credit risk (Avery and Berger, 1991). Capital adequacy measures bank capitalization and insolvency risk (Berger et al., 1995; Derviz and Podpiera, 2008). The inverse asset liquidity ratio measures asset insolvency risk (Henebry, 1997); the LMI measures structural liquidity risks (Brunnermeier et al., 2009).

Empirical research suggests that policy makers, bankers, and investors interpret higher RWA ratios, cetris paribus, as indicative of greater institutional risk (Lesle & Avramova, 2012). RWA is constructed through the assignation of risk-weights, between 0 and 100 percent, to asset categories according to perceived credit risks. Higher values are given to assets with greater perceived credit risks. Research on capital ratios employs a variety of weighting methods. Avery and Berger (1991) assigns weights to on- and off-balance sheet assets according to U.S. federal regulations passed in December 1989; Gordy (2003) evaluates credit risks according to the 1988 Basel I framework. To calculate risk-weighted assets (RWA), I use the standard Basel I risk weights, as listed in Table 3. The final the RWA ratio (RWARAT) risk measure is calculated as:

$$RWARAT = RWA \,/\, Total\ Assets$$

[5] The Hausman test supports the fixed effects specification. Further, with more than 600,000 observations, the model's power is not compromised by including the fixed effect controls.

Capital adequacy, the ratio of a bank's capital holdings against its asset holdings, is a measure of risk that evaluates a bank's level of capitalization. Bank capital is generally composed of equity and retained earnings and represents the net difference between assets and liabilities.[6] In instances of economic and financial distress, greater capital holdings promote institutional solvency; thus, well-capitalized banks are less risky than similar, but less-capitalized, institutions (Berger, Herring, & Szego, 1995). While Henebry (1997) and others have used a simple capital-to-assets ratio to measure the capital adequacy of commercial banks, Berger (1995) and Derviz and Podpiera (2008) consider RWA in their measures of capital adequacy in order to express capital as a percentage of a bank's risk-weighted asset credit exposures. I use the RWA method employed by Basel I and calculate the capital adequacy measure as:

$$Capital\ Adequacy = Total\ Equity\ Capital\ /\ RWA$$

Bank liquidity risk reflects a bank's ability to liquidate its asset positions in a timely manner without significant losses (Basel Committee, 2008). Henebry (1997) uses a simple inverse asset liquidity ratio, calculated as:

$$Inverse\ Liquidity = Total\ Loans\ /\ Total\ Assets$$

Following the recent financial crisis, policymakers and academics have developed more comprehensive measures of liquidity risk. Berger and Bouwman (2009) weight categories of both assets and liabilities based on their liquidity profile, as seen in Table 4. Brunnermeier et al. (2013) use a more complex liquidity weighting scheme to construct a liquidity mismatch index (LMI). The LMI measures changes in bank liquidity through the liquidity-weighted index:

$$LMI = Asset\ Liquidity\ Index - Liability\ Liquidity\ Index$$

[6] In the RCI reports, total capital equity is calculated as the sum of: perpetual preferred stock, common stock, surplus, undivided profits and capital reserves, foreign currency adjustments, and unrealized losses on equity securities. This entry necessarily equals the difference between assets and liabilities.

Unlike inverse liquidity, LMI evaluates the overall liquidity structure of a commercial bank's portfolio, such that a lower LMI value reflects reduced portfolio liquidity.

3.2 Bindingness of Regulation Q

Two Reg. Q measures were defined and tested. The first, noRegQ, is a dummy variable that takes a value of "0" before the first quarter of 1983 and "1" thereafter. This measure reflects the introduction of MMDAs in December 1982 and SuperNOWs in January 1983, two steps in the phase-out that Gilbert (1986) identifies as particularly significant. The second, called RegQ_bind, is a measure of the bindingness of Reg. Q that accounts for the gradual relaxation of Reg. Q that occurred between 1979 and 1982. Specifically, the bindingness variable measures the difference between market interest rates and interest rate ceilings on SSCs; larger differences are measured as greater bindingness, while smaller differences as less. As seen in Figure 2, between the period 1976 and 1983, there is a general relaxation in the difference between market and SSCs rates. Thus, RegQ_bind is a continuous measure of the gradual phase-out of Reg. Q.

Following the method in Duca (1995) and Koch (2014), I calculate RegQ_bind across three distinct phases of Reg. Q from 1976Q1 – 1982Q2. In the first phase, 1976Q1 - 1979Q2, RegQ_bind is calculated as the difference between interest rate ceilings on time deposits and the yield on the three-year Treasury bill. During the second phase, 1980Q3 – 1982Q2, RegQ_bind is either a) the legislated spread between market interest rates and SSCs, between 0 and 50 basis points or b) the difference between the yield on the 2.5 year treasury bill and the rate ceilings on SSCs.[7] Finally, in the third phase, 1982Q3 – 1991Q4, RegQ_bind is reduced to 0 to reflect the complete lifting of interest rate ceilings on time deposits.

[7]See Duca (1995) for an explicit explanation of the legislated interest rates in the period between 1980Q1 and 1981Q3.

Both measures of Reg. Q are significant in explaining changes in bank portfolio risks. The advantage of the RegQ_bind over the simpler noRegQ dummy is that it reflects the gradual relaxation in the bindingness of Reg. Q during the period of the regulation's phase-out. Going forward, all future references to measures of Reg. Q refer to the RegQ_bind measure.[8]

4. Data

The source for all bank-level balance sheet variables is the Federal Reserve Bank of Chicago's Commercial Bank Database, which contains the quarterly Reports of Condition and Income (RCI) for all insured domestic commercial banks from 1976 through 2010. The sample data used in this research includes all commercial banks in the United States and spans from the first quarter of 1976 through the fourth quarter of 1991. This sample period encompasses the phase-out period of Reg. Q (1980 - 1986), as well as five years before and after the phase-out. The start date is restricted to March 1976 because earlier periods are not electronically available. The end date is restricted to before the national implementation of the first Basel Accord in 1992, which may confound changes in portfolio risks. The total number of quarterly observations is 642,650 RCIs, or 10,805 individual commercial banks.

To ensure consistent bank-level data across time, I account for significant changes in RCI report forms during the sample period through the consistent time series method developed by Kayshap, Stein and Wilcox (1993). Furthermore, I account for inconsistencies and outliers. I eliminate all banks with missing RCI observations during the phase-out of Reg. Q, from the first quarter of 1980 to the fourth quarter of 1986. I exclude all banks with i) implausible zero or negative entries or ii) unequal asset and liability totals. I also eliminate all banks involved in mergers and acquisitions during the sample period.

[8]The noRegQ dummy regression results produce the same directional relationships between the phase-out of Reg. Q and portfolio risks as the RegQ_bind regression results. Specifically, the noRegQ dummy is associated with a: (1) decrease in RWARAT (2) increase in the capital adequacy ratio, (3) increase in the inverse asset liquidity ratio and (4) insignificant changes in the LMI.

The St. Louis Federal Reserve's FRED database and FRASER research archive are the sources for all macroeconomic data. To control for changes in the macroeconomic environment and monetary policy, I follow Koch's (2014) method and include three macroeconomic controls: the real annual GDP growth, the change in the last month of the quarter core Personal Consumption Expenditure Chain Price Index, and the end-of-quarter difference in fed funds rate. I also include a Great Moderation dummy variable that takes a "1" after Q1 1984 to control for a break in macroeconomic conditions as identified by McConnell and Perez-Quiros (2000) and Koch (2014).

Table 4 provides summary statistics of bank size, the four risk measures, and Reg. Q during the data sample period. Histograms show that the bank size and LMI data are skewed to the right. To normalize the distributions, both measures are logged. While the RWARAT, capital adequacy ratio and inverse liquidity ratio remain relatively constant over the sample period, both the total assets and LMI measures increase significantly over the sample period. These changes may be a consequence of reduced disintermediation produced by the phase-out of Reg. Q (Koch, 2014). The Reg. Q statistics show that the measure is skewed to the right; occasionally very binding, ceilings on SSCs were typically less than 50 basis points below market rates.

5. Model Specifications

Following the model developed by Koch (2014), my baseline empirical model is:

$$\Delta Risk = \alpha + \delta RegQ_{t-l} + \sum_{j=1}^{3} \beta_j * M_t + \sum_{j=0}^{1} \delta^{inter} * M_j * RegQ_{t-l} + \gamma_1 GM_t + U_i + \epsilon_{i,t} \qquad (\mathbf{1})$$

Model (1) is the simplest specification through which the effect of Reg. Q on bank-level portfolio risks may be identified while still including all important macroeconomic controls. $\Delta Risk$ is one of the four measures of portfolio risk. GM_t is the great moderation dummy and U_i

represents a vector of bank fixed effects. M_j is a vector consisting of real GDP, core PCE and federal funds rate, as defined in the methodology section. I also include interactions between Reg. Q and the macroeconomic variables in order to control for Reg. Q's influence on the macroeconomic environment and the monetary policy transmission mechanism.

The measure of Reg. Q bindingness is exogenous to each individual bank in the sample. When interest rate ceilings move closer to market rates, the bindingness of Reg. Q falls and bank deposits become more competitive with other market investments. The profit target theory suggests that banks respond to this increased competitiveness by increasing both the interest paid on deposits and their holdings of higher-yield, higher-risk assets. The null-hypothesis regarding the relationship between Reg. Q and commercial bank portfolio risk is therefore:

$$H_0 : \delta RegQ_{t-l} = 0 \qquad \text{(Reg. Q Portfolio Risk Shifter)}$$

A rejection of the null hypothesis suggests a significant association between the bindingness of Reg. Q and changes in commercial bank portfolio risks.

I am also interested in how the bindingness of Reg. Q differentially affects banks of various sizes. Building on the first model, I add bank size to create model (2):

$$(1) + \delta_l BankSize_{t-1} + \delta^{inter} * RegQ_{t-1} * BankSize_{t-1} + \sum_{j=0}^{1} \delta^{inter} * M_j * BankSize_{t-1} \qquad (\mathbf{2})$$

To identify the effect of Reg. Q across banks of different sizes, I include an interaction between Reg. Q and bank size. I also include interactions between bank size and the macroeconomic controls to account for variances in bank responses to changes in macroeconomic conditions.

The impact of the bindingness of Reg. Q on portfolio risks is expected to vary across banks of different sizes. The null hypothesis of the relationship between Reg. Q and bank size is:

$$H_0 : \delta^{inter} * RegQ_{t-1} * BankSize = 0 \qquad \text{(Heterogeneity in Reg. Q Impact)}$$

A rejection of the null suggests that the effect of Reg. Q on bank portfolio risks varies across banks of different sizes. The results of this parameter will empirically test the conclusions of Lam and Chen (1985)'s mathematical model.

Model (3) closely resembles the first specification, but is a distributed lag model. The following variables are lagged: risk control, Reg. Q and the macroeconomic variables, such that (3):

$$\Delta Risk = \alpha + \sum_{l=1}^{4} \rho l * \Delta Risk_{i,t-l} + \sum_{l=0}^{4} \delta_l^{level} * RegQ_{t-l} + \sum_{j=1}^{3}\sum_{l=0}^{4} \beta_{j,l} * M_{j,t-l}$$

$$+ \sum_{j=0}^{3}\sum_{l=0}^{4} \delta_l^{inter} * M_{i,j,t-l} * RegQ_{t-l} + \gamma_1 GM_t + U_i + \epsilon_{i,t} \qquad (\mathbf{3})$$

A distributed lag model is used to predict the relationship between the risk measure and both current and past values of the explanatory variables. The inclusion of finite distributed lagged variables into the times series model will improve it by making it more dynamic. For these reasons, model (4) is a distributed lag form of model (2), such that:

$$(3) + \delta_l BankSize_{t-1} + \sum_{j=1}^{3}\sum_{l=0}^{4} \delta_{j,l}^{inter} * BankSize_{t-1} * M_{j,t-l}$$

$$+ \sum_{k=0}^{3}\sum_{l=0}^{4} \delta_l^{inter} * BankSize_{t-1} * RegQ_{t-l} \qquad (\mathbf{4})$$

Both the simple and the controlled models are used to test the relationship between Reg. Q and changes in portfolio risks. While models (1) and (2) are simpler and avoid autocorrelation and integration issues, models (3) and (4) are more specified and have the advantage of controlling for the lagged impact of macroeconomic variables and Reg. Q.

7. Empirical Results

The empirical results are reported in Tables 5-8. For each table, there are two panels; the first panel is measured in units while the second represents percent changes. For each table, the column labels match the number of the model estimated, with the empirical results for the basic model listed under (1) and the three more expansive models (2), (3), and (4) listed afterwards.

There are two coefficient parameters of particular interest: Reg. Q and Reg.Q*BankSize. Regarding the first, a one unit increase in Reg. Q is equivalent to a 100 basis point increase in the difference between market and ceiling rates. As seen in Table 4, the bindingness of Reg. Q varies by 400 basis points during the sample period; a 100 basis point unit change is a relatively typical change in bindingness across periods. An increase in this measure indicates greater bindingness, which reflects more restrictive regulation. The impact of the phase-out is interpreted as an inverse of this coefficient. Regarding the second, Reg.Q*BankSize evaluates the impact of Reg. Q across larger institutions. The parameter coefficient reflects the effect of an increase in the bindingness of Reg. Q on larger intuitions' portfolio risks.

Table 5 shows that the phase-out of Reg. Q is associated with a decrease in the risk-weighted assets ratio. The first level column shows that a 100 basis point decrease in the bindingness of Reg. Q is associated with a .003 decrease in the RWARAT. The first percent change column shows that this decrease in bindingness is associated with a 0.2 percent decrease in the RWARAT. Across the level panel, the coefficient estimates for model (2) are slightly larger than (1), while the estimates for (3) and (4) are slightly smaller. However, across all four models the relationship between the phase-out of Reg. Q and less risk generally holds. Regarding the bank-level interaction, the magnitude of the Reg.Q*BankSize, while statistically significant, is essentially zero across all four models. These coefficients suggest that the impact of Reg. Q on risk-weighted assets is not different across banks of varying sizes.

As seen in Table 6, the empirical models for capital adequacy are slightly different than the empirical models for the three other measures of risk. In 1988, federal regulators introduced national risk-weighted capital adequacy ratios (CARs). The CARs established a minimum risk-weighted capital ratio of eight percent across all commercial banks (FDIC, 2003). To control for this regulation, I include a dummy variable Capital Regulation in each regression. This dummy takes a value of "1" at and after 1988Q1. The results in Table 6 show that the phase-out of Reg. Q is, on average, associated with an increase in commercial banks' capital adequacy ratios. The first column shows that a 100 basis point decrease in Reg. Q bindinginess is associated with a 0.008 unit increase in the capital adequacy ratio. This pattern holds across the first four columns, though it is not statistically significant in the fourth. The coefficient on the interaction term between Reg.Q*BankSize is effectively zero in all models across both panels. This suggests that the impact of Reg. Q on commercial banks' capital adequacy did not vary amongst institutions of different sizes.

The empirical results evaluating the relationship between Reg. Q and inverse liquidity, as reported in Table 7, are mixed. The results in the first two models generally suggest that the phase-out of Reg. Q is associated with an increase in commercial banks' asset liquidity ratios. However, contradictory results are reported across models (3) and (4). Given the latter models' greater explanatory power (as measured using r-squared), I expect them to better capture the relationship between Reg. Q and inverse asset liquidity. The results of Table 7 show that the phase-out of Reg. Q is associated with a decrease in commercial banks' asset liquidity. Like the Reg. Q control, the coefficients on the Reg.Q*BankSize parameter are also mixed. Following the same logic as above, I expect that model (4) best captures the impact of Reg. Q across institutions of varying sizes. This model suggests that a 100 basis point decrease in the bindingness of Reg. Q is associated with a 0.015% decrease in the asset liquidity of larger banks as compared to smaller ones.

As reported in Table 8, the relationship between LMI and a) Reg. Q and b) Reg.Q*BankSize is insignificant in terms of both magnitude and p-value. This insignificance may be due to limitations in the RCI reporting data. Specifically, the RCI reports during the period of 1976-1991 contain limited categorization of liabilities. While modern measures of LMI distinguish between savings deposits, transaction deposits and time deposits, the RCI reports available during the sample period do not provide these distinctions. This limitation may be responsible for the insignificant LMI results. The insignificance may also arise from the LMI's derivation from both the assets and liabilities sides of the balance sheet. LMI, by incorporating both sides of the balance sheet, evaluates the capacity of a bank's overall liquidity structure to respond to a shock event (Brunnermeier et al., 2013). Other standard measures of liquidity do not take this broad approach. For example, the inverse liquidity measure used above does not consider liabilities. Thus, while Reg. Q may be significantly associated with changes in asset liquidity, such a relationship may not exist between Reg. Q and liability liquidity. Alternatively, Reg. Q may have an equal relationship with the liquidity of both assets and liabilities, such that the regulation's association with the final LMI measure is made neutral and insignificant.

8. Discussion of Results

Portfolio Risks and Regulation Q

The estimation results for the relationship between the phase-out of Reg. Q and risk-weighted assets, capital adequacy, and inverse liquidity are significant. The first two measures suggest that the phase-out of Reg. Q reduced commercial bank portfolio risks. Conversely, the inverse asset liquidity ratio results indicate that the phase-out of Reg. Q is associated with an increase in liquidity risk.

Potential explanations for the risk-weighted assets and capital adequacy results include i) a fundamental contradiction of the 'profit target' theory and ii) increased investments in market securities that, while higher risk, are not reported on the RCIs. Regarding the first, the results show that, in response to the phase-out of Reg. Q, commercial banks reduced their holdings of risk-weighted assets as a proportion of total assets. They also increased their holdings of capital as a proportion of risk-weighted assets. These outcomes both contradict the profit target theory, which suggests that, when faced with interest rate competition for deposits, banks will increase their holdings of higher-yield, higher-risk assets. My findings support those of Benston (1964) and Cox (1966), whose results also contradict the profit target hypothesis. Yet, while their research finds that the imposition of Reg. Q neither increased nor decreased banking stability during the 1920s and 1930s, I find that the phase-out of Reg. Q may have increased stability in the 1980s by reducing both credit and insolvency risks.

A second explanation for these results is that, while banks may have invested in higher-risk assets in response to the phase-out of Reg. Q, these risks are not reflected in the RWA measure. Roussakis (1997) finds rapid growth during the 1980s in commercial banks' investments in "off-balance-sheet items"; the most common of these include loan commitments, commercial letters of credit, standby letters of credit, investment-related commitments and commitments to buy and sell foreign exchange. Under the Basel I risk-weighting guidelines, these off-balance sheet activities are assigned higher risk-weights. Unfortunately, the RCI reports do not begin recording off-balance sheet assets data until 1994. Thus, the data in my sample do not include these banking activities. It is therefore likely that the RWA measure used to calculate both the risk-weighted assets ratio and the capital adequacy ratio does not reflect commercial banking activities that became riskier in response to the phase-out of Reg. Q. The capital adequacy summary statistics, reported in Table 4a, further suggest that the RWA may be underweighted. Whereas the federal CARs passed in 1988 require a minimum capital adequacy ratio of 0.08, the mean ratio in my data sample across all periods is just below 0.50. This large difference indicates an RWA measure that is underweight.

The decrease in asset liquidity associated with the phase-out of Reg. Q may be attributed to improvements in financial disintermediation. Under the disintermediation imposed by a highly binding Reg. Q, commercial banks drastically constricted credit. Research by Koch (2014) finds that, as the phase-out of Reg. Q reduced disintermediation, the rate of commercial bank credit growth significantly increased. This aggregate growth in lending may explain the decline in asset liquidity. Since inverse asset liquidity is calculated as the ratio of total loans over total assets, an expansion in lending activity will produce a decline in the asset liquidity measure.

Bank Size, Portfolio Risks, and Regulation Q

The bank size parameter suggests significant relationships between bank size and portfolio risks. Larger banks have higher risk-weighted asset ratios and lower capital adequacy ratios. This suggests that, on average, larger banks invest in riskier assets and hold less capital against these higher risk assets. My results support previous empirical research, which finds that the portfolios of larger banks are relatively more diversified and can support higher levels of risky assets and lower levels of capital. Demsetz and Strahan (1997), find that, because larger banks have better portfolio diversification, they also have lower capital ratios and higher risky asset holdings as a proportion of total assets. Further, McAllister and McManus (1993) and Liang and Rhoades (1991), show that large banks generally operate with lower capital ratios than small institutions.

Larger banks also have lower asset liquidity ratios and larger LMIs. The asset liquidity results lend support to previous research, which finds that larger banks have a greater capacity for lending growth. Koch (2014) finds higher credit growth rate among larger institutions. The larger banks' higher LMI measure contradicts previous research by Brunnermeier et al. (2014), which finds that larger banks are generally less liquid than smaller institutions. This difference in results may lie in Burnnermeier et al.'s inclusion of off-balance sheet activities, which are considerably less liquid than those available in the RCIs.

While larger commercial banks have different portfolio risk profiles than smaller ones, the impact of the phase-out of Reg. Q on portfolio risks generally does not vary across institutional size. Specifically, there is no significant difference in Reg. Q's effect on risk-weighted assets, capital adequacy ratio, or LMI by bank size. These results contradict Lam and Chen's (1985) mathematical model, which predicted that portfolio risks at small commercial bank risks would increase relatively more than larger institutions in response to the phase-out of Reg. Q. This also suggests that, despite small commercial banks' strong opposition to the phase-out of Reg. Q, their portfolio risks were not disproportionately affected (Noble, 1983).

The phase-out of Reg. Q is associated with an increase in the asset liquidity of large banks as compared to smaller ones. As Reg. Q reduced financial disintermediation, smaller banks increased loans as a proportion of assets relatively more than larger banks. These results suggest that, by reducing financial disintermediation, Reg. Q restored small banks' funding sources and enabled them to generate relatively more credit. Research by Bernanke and Blinder (1988) suggests that smaller banks cannot easily replace savings deposits with alternative sources of funds. Thus, under disintermediation, smaller banks constrain lending activity significantly more than larger ones. Upon the phase-out of Reg. Q, which reduced disintermediation, small banks attracted savings deposits and generated relatively higher rates of credit growth. Small institutions' relatively lower asset liquidity ratios reflect their higher rates of loan growth during the phase-out of Reg. Q, as compared to larger banks .

9. Conclusion

I use bank-level data to examine how the phase-out of Reg. Q affected changes in commercial bank portfolio risks. My examination of Reg. Q, portfolio risks, and bank size produces two contributions to the Reg. Q literature. First, my results contribute to empirical research that examines the impact of Reg. Q on commercial bank portfolio risks. My analysis shows that the regulation's phase-out was significant in reducing both credit and insolvency risks. Further, while the phase-out was associated with increased asset liquidity risk, this relationship may be attributed to increased credit growth stemming from reduced financial disintermediation. My results therefore show that the phase-out of Reg. Q is broadly associated with a decrease in commercial bank portfolio risks. Second, my research contributes a unique study of the relationship between Reg. Q and bank-level portfolio risks. This analysis suggests that the impact of Reg. Q on portfolio risks did not vary across bank size. The relationships between Reg. Q and the risk-weighted assets ratio, the capital adequacy ratio, and LMI are uniform across institution size. And, while smaller banks had a relatively greater decline in asset liquidity than larger ones during the phase-out, this difference likely stems from patterns of increased credit growth, rather than behaviors of greater risk.

This paper has important implications on financial regulatory policies. Most significantly, it suggests that interest rate ceiling policies do not reduce commercial bank portfolio risks. These results provide empirical support for the final phase-out of Reg. Q on commercial deposits, which was enacted in the Dodd-Frank Act of 2011. If the phase-out of Reg. Q is, in fact, associated with decreases in commercial bank portfolio risks, then the deregulation introduced by Dodd-Frank should have a similar risk-reducing effect.

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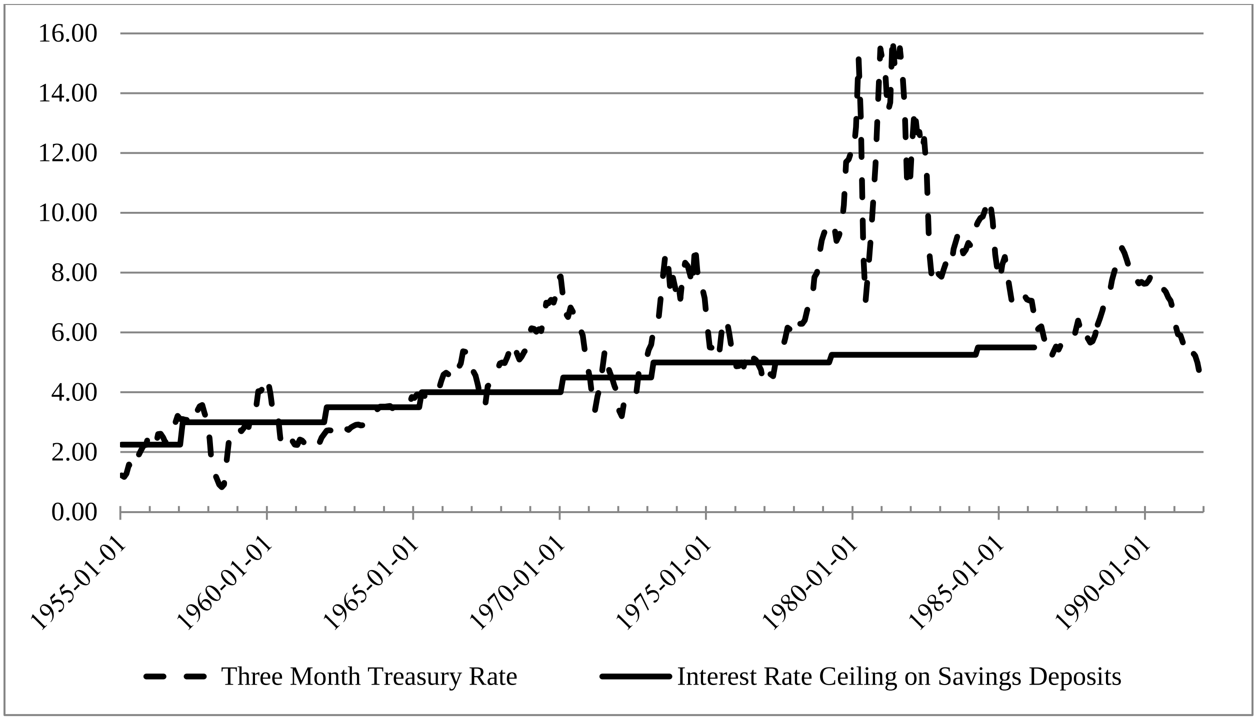
Appendix

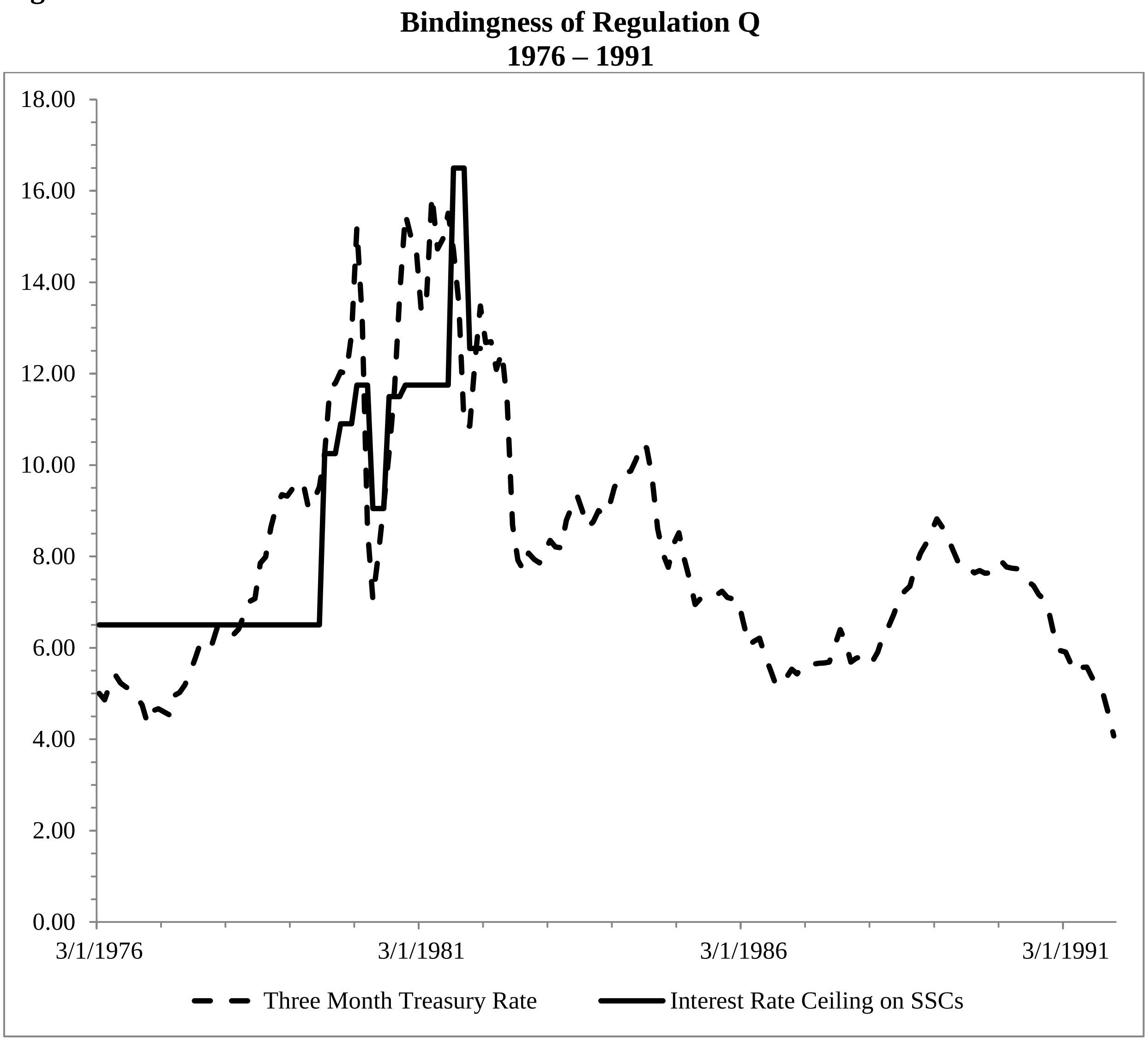
Figure 1:

Market Interest Rates and Interest Rate Ceilings on Savings Deposits 1955 – 1991



Source: FRED, 2015. Figure 1 shows the relationship between market interest rates and interest rate ceilings on deposits from 1955 through 1991.

Figure 2:



Source: FRED, 2015. Figure 2 shows the relationship between market interest rates and interest rate ceilings on SSCs from 1976 through 1991.

Table 1:	Steps in the Phase-Out of Regulation Q
Effective Date of Change	**Nature of Change**
Jun. 1, 1978	MMCs established, with minimum denomination of $10,000 and maturities of 26 weeks. The floating ceiling rates for each week were set at discount yield on 6-month Treasury bills at S&Ls and MSBs, 25 basis points less at CBs.
Nov. 1, 1978	CBs authorized to offer ATS accounts, allowing funds to be transferred automatically from savings to checking accounts as needed to avoid overdrafts. The ceiling rate on ATS accounts was set at 5.25%.
Jul. 1, 1979	SSCs established with no minimum denomination, maturity of 30 months or more and floating ceiling rates based on the yield on 2.5-year Treasury securities. Maximums of 11.75% at CBs and 12% at S&Ls and MSBs.
Jun. 2, 1980	The floating ceiling rates on SSCs raised 50 basis points relative to the yield on 2.5-year Treasury securities at S&Ls and MSBs and at CBs. The maximum ceiling rates set in June 1979 were retained.
Jun. 5, 1980	New floating ceiling rates on MMCs. All depository institutions may pay the discount yield on 6-month Treasury bills plus 25 basis points when the bill rate is 8.75 percent or higher. The ceiling rate will be no lower than 7.75 percent and 8.75 percent.
Dec. 31, 1980	NOW accounts permitted nationwide at all depository institutions. Ceiling rates on NOW and ATS accounts set at 5.25%.
Aug. 1, 1981	Caps on SSCs of 11.75% at CBs and 12% at S&Ls. MSBs eliminated. Ceiling rates float with the yield on 2.5-year Treasury bill.
Oct. 1, 1981	Adopted rules for the All Savers Certificates specified in the Economic Recovery Act of 1981
Nov. 1, 1981	Floating ceiling rates on MMCs each week changed to the higher of the 6-month Treasury bill rate in the previous week or the average over the previous four weeks
Dec. 1, 1981	New category of IRA/Keogh accounts created with minimum maturity of 1.5-years, no regulated interest rate ceiling and no minimum denomination.
May 1, 1982	New time deposit created with no interest rate ceiling, no minimum denomination and an initial minimum maturity of 3.5 years. New short-term deposit instrument crated with $7,500 minimum denomination and 91-day maturity. The floating ceiling rate is equal to the discount yield on 91-day Treasury bills for S&Ls and MSBs, 25 basis points less for CBs. Maturity range of SSCs adjusted to 30-42 months
Sep. 1, 1982	New deposit account created with minimum denomination of $20,000 and maturity of 7 to 31 days. The floating ceiling rate is equal to the discount yield on 91-day Treasury bills for S&Ls and MSBs, 25 basis points less for CBs.
Dec. 14, 1982	MMDAs authorized with minimum balance of not less than $2,500, no interest ceiling, no minimum maturity, up to 6 transfers per month (no more than three by draft) and unlimited withdrawals by mail, messenger or in person.
Jan. 5, 1983	Super NOW accounts authorized with same features as the MMDAs, except that unlimited transfers are permitted
Oct. 1, 1983	All interest rate ceilings eliminated except those on passbook savings and regular NOW accounts. Minimum denomination of $2,500 established for time deposits with maturities of 31 days or less (below this minimum, passbook savings rates apply)
Jan. 1, 1984	Rate differential between commercial banks and thrifts on passbook savings accounts and 7- to 31-day time deposits of less than $2,500 eliminated. All depository institutions may pay a maximum of 5.50%.
Jan. 1, 1985	Minimum denomination on MMDAs, Super NOWS and 7- to 31-day ceiling-free time deposits reduced to $1,000
Jan. 1, 1986	Minimum denominations on MMDAs, Super NOWs and 7- to 31-day ceiling-free time deposits eliminated.
Mar. 31, 1986	All interest rate ceilings eliminated, except for the requirement that no interest be paid on demand deposits

Source: Gilbert, 1986.

Table 2:	**Basel I Standardized Asset Risk Weights**	
Risk Category	**Asset Category**	**Risk Weight**
No Risk	Cash	0%
	Coin & Currency	0%
	Securities	0%
Semi Risk	U.S. Public Sector Entity Exposures	20%
	Gov't Sponsored Entity Exposures	20%
	Consumer Loans	20%
	U.S. Commercial Bank Exposures	20%
	Foreign Gov't Exposures	50%
	Foreign Bank Exposures	50%
	Residential Mortgage Loans	50%
High Risk	Commercial and Industrial Loans	100%
	Commercial Real Estate Exposures	100%
	Corporate Exposures	100%

Source: Davis Polk & Wardwell LLP, 2014. The Basel I framework includes several other risk-weighted asset categories. The categories listed above include only those available in the RCI report. Additionally, in the Basel I framework foreign government and bank risk weights vary based on if the country of origin is OECD (20%) or non-OECD (50%). Country of asset origin is not reported in the RCIs, so a higher risk-weighting of 50% was assigned to all foreign assets.

Table 3:	Liquidity Classification of Bank Assets and Liabilities		
Rank	**Assets Category**	**Rank**	**Liabilities Category**
Liquid weight = 1/2	Cash Coin & Currency Securities	**Liquid** weight = -1/2	Total Deposits Overnight Fed Funds Purchased
Semiliquid weight = 0	U.S. Public Sector Entity Loans Secured Real Estate Loans	**Semiliquid** weight = 0	Other Borrowed Money
Illiquid weight = -1/2	Commercial and Industrial Loans Commercial Real Estate Loans Other Real Estate Loans Investments in Uncons. Subsidiaries Intangible Assets Customer's Liabilities Acceptances Premises and Fixed Assets Other Assets	**Illiquid** weight = 1/2	Bank's Liabilities Outstanding Acceptances Subordinated Debt Other Liabilities Equity

Source: Berger and Bouwman, 2009. The weighting methodology includes many other liquidity-weighted asset and liability categories. The categories listed above include only those available in the RCI report. Additionally, while Berger and Bouwman distinguish between the liquidity of savings, transaction and time deposits, the RCI includes only total deposits. Finally, to reflect more typical LMI measures, I have inversed Berger and Bouwman's asset weights, such that liquid categories receive a positive weighting.

Table 4a:	Commercial Bank Portfolio Risks Summary Statistics 1976 – 1991				
Date	Total Assets (1000s)	Risk-Weighted Assets Ratio	Capital Adequacy Ratio	Inverse Liquidity Ratio	Liquidity Mismatch Index (1000s)
March 1976	36,018	0.255	0.484	0.511	27,401
	(138,357)	(0.096)	(1.790)	(0.280)	(97,414)
March 1981	59,697	0.272	0.449	0.527	46,292
	(240,854)	(0.098)	(1.760)	(0.115)	(178,294)
March 1986	97,333	0.264	0.488	0.517	69,870
	(402,369)	(0.111)	(0.853)	(0.141)	(306,402)
March 1991	138,671	0.265	0.491	0.522	104,854
	(582,034)	(0.107)	(1.080)	(0.150)	(465,490)

Table 4b:	Bindingness of Regulation Q Summary Statistics 1976 – June 1982			
	Mean	Std. Deviation	Min.	Max.
Reg. Q	0.427	0.952	-0.50	3.50

Sources: FRED, 2015; Chicago Federal Reserve Commercial Banking Data, 2015.

Table 4a reports the summary statistics for bank size and the four measures of portfolio risk at four discrete points during the sample period 1976-1991. The fours measures of portfolio risk are: risk-weighted assets ratio, capital adequacy ratio, inverse liquidity ratio, and liquidity mismatch index. Table 4b reports the summary statistics for the bindingness of Reg. Q across the periods of its phase-out, from 1976 until its effective phase-out in 1982.

Table 5: Estimates of the Effect of Bindingness of Reg. Q on Credit Risks
Dependent Variable: Risk-Weighted Assets Ratio, 1976-1991

	Level				Percent Change			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\sum RWARAT_{t-\ell}$			0.913*	0.907*			-12.490%*	-1.204%*
			(0.000)	(0.001)			(0.001)	(0.001)
Bank Size		0.021*		0.007*		-0.414%*		0.929%*
		(0.000)		(0.000)		(0.000)		(0.000)
$\sum RegQ_{t-\ell}$	0.003*	0.021*	0.001*	0.001*	0.191%*	0.852%*	0.240%*	-0.158%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$\sum RegQ_{t-\ell}$ * Bank Size		0.000*		0.000		0.001*		0.000*
		(0.000)		(0.000)		(0.000)		(0.000)
Great Moderation	-0.003*	-0.013*	0.009*	0.006*	0.070%*	0.303%*	0.000%*	1.806%*
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
R-square (within)	0.008	0.024	0.803	0.805	0.002	0.002	0.025	0.028
R-square (between)	0.006	0.203	0.999	0.991	0.002	0.024	0.383	0.026
R-square (overall)	0.002	0.162	0.953	0.948	0.011	0.002	0.024	0.008
N	641845	641845	598556	598556	641798	641798	598499	598499

Robust standard errors are in parentheses.

* Indicate significance at the 1% levels.

This table reports the regression results of estimating the relationship between the bindingness of Reg. Q and the risk-weighted assets ratio as a measure of portfolio risk. Explanatory variables in model (1) also include: three macroeconomic controls (real GDP, core PCE, and federal funds rate), and interactions between the macroeconomic controls and the Reg. Q measure. Model (2) includes the same as (1), as well as interactions between the macroeconomic controls and bank size. Explanatory variables in model (3) also include: lagged risk-weighted assets ratio measures, three lagged macroeconomic controls, and interactions between the lagged macroeconomic controls and the lagged Reg. Q measure. Model (4) includes the same as (3), as well as interactions between the lagged macroeconomic controls and bank size. Regressions (3) and (4) have fewer observations because the lagged variables drop the first period observation.

Table 6: Estimates of the Effect of Bindingness of Reg. Q on Insolvency Risks

Dependent Variable: Capital Adequacy Ratio, 1976-1991

	Level				Percent Change			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\sum$Capital Adequacy$_{t-\ell}$			0.901*	0.901*			-0.031%*	-0.031%*
			(0.001)	(0.001)			(0.000)	(0.000)
Bank Size		-0.142*		-0.034*		0.019%*		0.003%
		(0.005)		(0.002)		(0.000)		(0.000)
$\sum$RegQ$_{t-\ell}$	-0.008*	-0.007*	-0.007*	-0.009	0.000%	-0.001%*	-0.005%	-0.008%
	(0.000)	(0.002)	(0.002)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)
$\sum$RegQ$_{t-\ell}$ * Bank Size		-0.001*		-0.001		0.000%*		0.000%
		(0.000)		(0.001)		(0.000)		(0.000)
Great Moderation	0.054*	0.114*	-0.038*	-0.032*	-0.011%*	-0.018%*	-0.041%*	-0.041%*
	(0.004)	(0.005)	(0.004)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
Capital Regulation	-0.018*	0.010*	0.006*	0.011*	0.003%*	-0.001%	0.013%*	0.013%*
	(0.004)	(0.004)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
R-square (within)	0.009	0.002	0.769	0.769	0.000	0.000	0.005	0.001
R-square (between)	0.002	0.056	0.998	0.995	0.000	0.000	0.547	0.282
R-square (overall)	0.007	0.002	0.883	0.882	0.000	0.000	0.000	0.000
N	641556	641556	598277	598277	641546	641546	598259	598259

Robust standard errors are in parentheses.

* Indicates significance at the <1% level.

This table reports the regression results of estimating the relationship between the bindingness of Reg. Q and the capital adequacy ratio measure of portfolio risk. Explanatory variables in model (1) also include: three macroeconomic controls (real GDP, core PCE, and federal funds rate), and interactions between the macroeconomic controls and the Reg. Q measure. Model (2) includes the same as (1), as well as interactions between the macroeconomic controls and bank size. Explanatory variables in model (3) also include: lagged capital adequacy ratio measures, three lagged macroeconomic controls, and interactions between the lagged macroeconomic controls and the lagged Reg. Q measure. Model (4) includes the same as (3), as well as interactions between the lagged macroeconomic controls and bank size. Regressions (3) and (4) have fewer observations because the lagged variables drop the first period observation.

Table 7:	Estimates of the Effect of Bindingness of Reg. Q on Asset Liquidity Risks Dependent Variable: Inverse Asset Liquidity Ratio, 1976-1991							
	Level				Percent Change			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\sum$Inverse Liquidity$_{t-\ell}$			0.923*	0.913*			-0.008%*	-0.009%*
			(0.001)	(0.001)			(0.000)	(0.000)
Bank Size		0.275*		0.016*		0.000*		0.011*
		(0.001)		(0.000)		(0.000)		(0.000)
$\sum$RegQ$_{t-\ell}$	0.009*	0.004*	-0.004*	0.000	0.001%*	-0.055%*	-0.318%*	-0.137%
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
$\sum$RegQ$_{t-\ell}$ * Bank Size		0.001*		0.001*		0.015%*		-0.038%*
		(0.000)		(0.001)		(0.000)		(0.000)
Great Moderation	-0.003*	-0.015*	0.008*	0.002*	-0.167%*	0.211%*	0.908%*	0.470%*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-square (within)	0.026	0.040	0.824	0.826	0.005	0.008	0.027	0.032
R-square (between)	0.002	0.032	0.999	0.975	0.037	0.004	0.039	0.001
R-square (overall)	0.011	0.036	0.934	0.921	0.005	0.003	0.027	0.008
N	641649	641649	598376	598376	641536	641536	598248	598248

Robust standard errors are in parentheses.

* Indicate significance at the 1% levels.

This table reports the regression results of estimating the relationship between the bindingness of Reg. Q and the inverse asset liquidity ratio as a measure of portfolio risk. Explanatory variables in model (1) also include: three macroeconomic controls (real GDP, core PCE, and federal funds rate), and interactions between the macroeconomic controls and the Reg. Q measure. Model (2) includes the same as (1), as well as interactions between the macroeconomic controls and bank size. Explanatory variables in model (3) also include: lagged inverse asset liquidity ratio measures, three lagged macroeconomic controls, and interactions between the lagged macroeconomic controls and the lagged Reg. Q measure. Model (4) includes the same as (3), as well as interactions between the lagged macroeconomic controls and bank size. Regressions (3) and (4) have fewer observations because the lagged variables drop the first period observation.

Table 8: Estimates of the Effect of Bindingness of Reg. Q on Liquidity Mismatch Risks
Dependent Variable: Liquidity Mismatch Index, 1976-1991

	Level				Percent Change			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
$\sum LMI_{t-\ell}$			0.990*	0.979*			-0.002%*	-0.002%*
			(0.000)	(0.000)			(0.000)	(0.000)
Bank Size		0.063*		0.003*		0.003%*		-0.002%*
		0.000		0.000		(0.000)		(0.000)
$\sum RegQ_{t-\ell}$	-0.001*	0.004*	0.000*	-0.022	-0.004%*	-0.002%	0.004%*	0.001%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\sum RegQ_{t-\ell}$ * Bank Size		0.000 *		-0.001*		0.000%*		0.000%
		(0.000)		(0.000)		(0.000)		(0.000)
Great Moderation	0.036*	-0.168*	0.001*	0.005*	0.002%	-0.005%	0.002%*	0.002%*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-square (within)	0.102	0.286	0.949	0.950	0.000	0.000	0.001	0.001
R-square (between)	0.002	0.564	1.000	1.000	0.000	0.000	0.739	0.226
R-square (overall)	0.013	0.524	0.993	0.993	0.000	0.000	0.000	0.000
N	641599	641599	598326	598326	641592	641592	598303	598303

Robust standard errors are in parentheses.
* Indicate significance at the 1% levels.
This table reports the regression results of estimating the relationship between the bindingness of Reg. Q and the LMI as a measure of portfolio risk. Explanatory variables in model (1) also include: three macroeconomic controls (real GDP, core PCE, and federal funds rate), and interactions between the macroeconomic controls and the Reg. Q measure. Model (2) includes the same as (1), as well as interactions between the macroeconomic controls and bank size. Explanatory variables in model (3) also include: lagged LMI measures, three lagged macroeconomic controls, and interactions between the lagged macroeconomic controls and the lagged Reg. Q measure. Model (4) includes the same as (3), as well as interactions between the lagged macroeconomic controls and bank size. Regressions (3) and (4) have fewer observations because the lagged variables drop the first period observation.