POST-2008-CRISIS BANK REFORMS: STUDIES ON THE REAL EFFECTS OF LOAN LOSS ACCOUNTING AND THE ROLE OF BANKS AS INFORMATION INTERMEDIARIES

by

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Abstract

This thesis examines the consequences of two post-2008 financial crisis bank reforms in two studies. The first study explores the consequences of a new accounting rule for recognizing loan losses, the current expected credit loss model (CECL). CECL requires banks to expense their expected credit losses when a loan is issued, rather than when an event occurs that could make the loan uncollectable, as required by CECL's predecessor accounting standard. Requiring earlier recognition of loan losses is likely to require banks to prepare more regulatory capital, decreasing their willingness to lend. Empirically, I find that following the approval of CECL, more capital-constrained banks reduce their loan growth rates. The reduced loan growth is stronger for real estate loans, which typically have a longer term to maturity, and for banks operating under a more lenient regulator. Using county-level loan origination data, I also find that more capital-constrained banks originate fewer small business loans. One key takeaway of this study is that when evaluating the effects of a new accounting change, policymakers should also consider the changes in economic behaviors that occur *before* the effective date of the change, rather than only focusing on the time *after* it becomes effective.

In the second study, we examine the consequences of the Volcker Rule, which prohibits banks from conducting proprietary trading. The Volcker Rule aims to reduce the likelihood of future financial crises by discouraging banks from taking on too much risk. However, prior research finds that corporate bond liquidity (i.e., the ease of trading public bonds) has decreased after the Volcker Rule. This study utilizes the Volcker Rule as a bond liquidity shock to investigate whether the loss of bond liquidity motivates bond issuing firms to increase their voluntary disclosures. Using a difference-in-difference design, we find that bond issuers are more likely to increase their management guidance after the Volcker Rule was implemented.

Further, the increased management guidance is more pronounced for firms with credit ratings close to the investment-grade cutoff, rather than those with very high or very low ratings, where firms have less ability to change market perceptions by their disclosures.

Lay Summary

This thesis examines the consequences of two post-2008 financial crisis bank reforms. The first study finds evidence consistent with a new accounting rule reform (the current expected credit loss model, known as CECL) reducing a bank's willingness to lend. After CECL, banks are required to recognize the expected loan losses at the time of loan issuance rather than when borrowers are unable to repay the loan. This requirement forces banks to prepare for higher regulatory capital for each loan they issue, increasing their lending cost.

The second study finds that after banks are prohibited from trading corporate bonds due to the Volcker Rule, bond issuers increase their voluntary disclosures. This finding is consistent with the notion that banks' bond trading activities can provide information to bond traders. Once banks are no longer allowed to trade bonds, bond issuers are encouraged to increase their disclosures to compensate for this information vacuum.

Preface

Chapter 2 is an original and independent work by the author, Hsiang-Chieh Yang. Chapter 3 is co-authored with Professor Joy Begley and Professor Ira Yeung from the University of British Columbia. I initiated this project as my third-year paper. Since coauthors joined this project, I have been responsible mainly for data analysis, and I have contributed to research design decisions and editing. My coauthors are mainly responsible for the formal writing of the manuscript. All authors contributed equally to the conceptual foundation, idea development, and empirical analysis.

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I am also grateful for the support of our divisional assistant, Debra Harris, and Ph.D. program administrator, Elaine Cho. My Ph.D. life would not have been as smooth without them.

Last but not least, this thesis is dedicated to my wife Linda Luo, who is my great companion and supports me through all of the most challenging moments in my Ph.D. life.

Dedication

To my parents.

Chapter 1: Introduction

The 2008 financial crisis stimulated many reforms in the U.S. banking sector. This thesis consists of two studies that examine the economic consequences of two of the post-crisis reforms. The first study focuses on the economic consequences of an accounting rule reform, the current expected credit loss model (ASU 2016-13, also known as CECL). CECL was approved on November 18, 2015, and it requires banks to disclose more information on the credit risk of their loan portfolios. Specifically, CECL requires banks to expense a loan's lifetime expected credit losses whenever a new loan is issued, reducing the size of their equity capital. In contrast, CECL’s predecessor accounting rule (the incurred loss model) does not require banks to recognize the expected credit losses of a loan until an event occurs that could make the loan uncollectable. If banks effectively and efficiently apply CECL, CECL is expected to benefit the financial sector by promoting bank transparency. However, recognizing credit losses at the inception of loans can hurt a bank’s regulatory capital by reducing their retained earnings, increasing a bank’s cost of issuing new loans.

In the first study, I explore the possibility that CECL might hurt the availability of bank lending even before the new standard takes effect in 2020 and beyond. I find that following the approval of CECL, more capital-constrained banks reduce their loan growth. In addition, the reduced loan growth is more pronounced for real estate loans. These loans are expected to become costlier after CECL because they typically have a longer maturity than other loan products. The above findings are shown to be stronger for banks operating under a more lenient regulator, suggesting that these types of banks expect to experience increased regulatory enforcement after CECL. I also find that relative to privately-held banks, publicly-listed banks are more likely to reduce their growth in long-term loans during the CECL transition period. This finding is consistent with the notion that public banks acted more quickly to mitigate CECL's impact because they must adopt CECL at an earlier date. Using the Community Reinvestment Act (CRA) data to sharpen the identification, I also find that more capital-constrained banks originate fewer small business loans as they prepare for CECL. These loans are essential to the local economy but riskier for banks. This study has two important policy implications. First, policymakers should consider CECL's impact on the availability of loans to individuals and small businesses. Second, when evaluating the effects of a new accounting change, policymakers should consider changes in economic behaviors that occur both before and after the effective date of the accounting change.

In the second study, I examine the consequences of the Volcker Rule, which prohibits banks from doing proprietary trading. This rule aims to reduce the likelihood of future financial crises by preventing banks from trading financial assets that could increase their asset risk. However, studies have found that following the Volcker Rule, corporate bond liquidity (i.e., the ease of trading public bonds) has decreased. In this study, I use the Volcker Rule as a bond liquidity shock to investigate whether the loss of bond liquidity encourages bond issuing firms to increase their management disclosures to replace the loss of information flowing from banks. Using a difference-in-difference design, I find that bond issuing firms are more likely to increase their management guidance after the Volcker Rule. Further, the increased management guidance is more pronounced for firms with credit ratings close to the investment-grade cutoff rather than those with very high or very low ratings. Firms with very high credit ratings are likely to have good bond liquidity, even without banks trading and holding their bonds, while banks with low ratings face inherent uncertainties that are unlikely to be resolved by increasing their management disclosures.

Although the topics of the two studies focus on two different economic decisions (i.e., bank loan originations and firms' voluntary disclosures), both studies touch on the consequences of post-crisis reforms in the banking sector. The first one investigates banks as a source of lending in the economy to see whether banks contract their lending in anticipation of CECL requiring them to prepare more regulatory capital for each loan they issue. The second one explores the information role banks have played in the corporate bond market. The study finds that bond issuers increase their voluntary disclosures after banks are prohibited from trading their bonds, consistent with banks no longer impounding their private information through their bond trading activities. Because each study examines a different topic, chapters are designed to be self-contained. I thus leave a more thorough discussion of the research question and contribution to the introduction sections of each chapter.

Chapter 2: How does accounting for loan losses influence bank lending? Evidence from the Current Expected Credit Loss Model (CECL)

2.1 Introduction

CECL, the current expected credit loss model, is considered by the American Bankers Association to be *the most sweeping change to bank accounting ever*.[1] CECL requires the life of loan estimates of expected future losses to be recorded for unimpaired loans, posing significant compliance and operational challenges for banks.[2] While practitioners, lawmakers, and scholars worry about CECL's consequences for bank loan availability, there is no direct empirical evidence on how the transition to CECL has affected bank lending. To fill this gap, I investigate how banks adjusted their lending in response to the announcement of CECL. This research question is important because bank lending plays a crucial role in a well-functioning economy, and loans make up the largest portion of a bank's assets. The relevance of loan loss accounting is also highlighted by the post-crisis debate over whether to include loan loss allowances in calculating regulatory capital, negating its charge to retained earnings.[3]

Prior to the adoption of CECL in 2020, loan loss accounting in the U.S. was governed by the incurred loss model (ILM) for over four decades. ILM requires banks to recognize loan losses only when it becomes *probable* that a loss has occurred as of the balance sheet date. If no event has occurred that would make a loss probable, then no provision can be recognized. Critics of ILM and the *probable* threshold have argued that the ILM model delays loan loss recognition

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[1] The full official name of CECL is Accounting Standard Update (ASU) 2016-13, Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments.
[2] See the article written by American Banks Association, available at https://www.aba.com/advocacy/our-issues/cecl-implementation-challenges
[3] See Ng and Roychowdhury (2014) for a detailed discussion on this debate.

and makes loan loss allowance *too little, too late* (e.g., Laeven and Majnoni 2003; FSF 2009). Many bank stakeholders contend that the absence of adequate loan loss provisions due to having to meet the *probable* condition was one of the major causes of the 2008 financial crisis (Beatty and Liao 2011; Kim 2021).

Responding to the criticism of ILM, the Financial Accounting Standards Board (FASB) developed a new accounting standard on loan loss provisioning, announcing the current expected credit loss (CECL) model on November 18, 2015. CECL significantly changes how banks determine their loan loss provisions from 2020 onwards[4]. Unlike ILM's backward-looking incurred-loss approach, CECL is forward-looking. It requires banks to maintain a loan loss allowance for all expected future credit losses throughout a loan's contractual life from the day the loan is made.

Although CECL requires banks to disclose more information about their loan quality, practitioners are worried that CECL can distort banks' incentives to make new loans by mismatching expenses and revenues. When a loan is made, CECL requires banks to recognize expected losses due to the loan's expected probability of default over its entire contractual life. However, CECL does not correspondingly allow banks to recognize the loan's lifetime revenues that compensate for its default risk. While there is much ongoing debate, we have little evidence on the impact of CECL on bank lending policies. As a result, in June 2019, a group of lawmakers

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[4] CECL was originally set to be effective for all publicly traded banks in 2020 and for all other banks in 2021 and onwards. However, on July 17, 2019, the FASB proposed an extension to CECL's effective date (https://www.fasb.org/jsp/FASB/FASBContent_C/ActionAlertPage&cid=1176172970471&rss=1). This proposal extended the beginning effective dates from 2020 to 2023 for small public banks and from 2021 to 2023 for non-public banks. FASB approved this proposal on November 15, 2019. Subsequently, due to the COVID-19 pandemic, in March 2020 President Donald Trump signed into the law the CAREs Act, which grants banks the option to postpone their adoption of CECL until the pandemic is over. However, these changes do not influence the analyses in this study because the sample period ends in the fourth quarter of 2018. See appendix A.1 for the history on the changes in CECL adoption dates for different types of banks.

proposed a bill that delays CECL until the government performs a quantitative study to investigate CECL's impact on bank loan availability.[5]

CECL is likely to influence bank lending policy not only after its effective date but also when banks are preparing for it during the transition period. Many of the loans made during the CECL transition period[6] will remain on bank balance sheets and be measured by CECL once CECL is adopted. The anticipated change in how these loans will be accounted for under CECL is likely to induce banks to revise their lending strategy during the CECL transition period. On day-1 of CECL adoption, bank balance sheets are expected to shrink as additional expected credit losses are subtracted from loans, reducing retained earnings, a major component of regulatory capital[7]. Consistent with this expectation of additional loan losses, the loan loss allowance for the 200 largest U.S. banks (which adopted CECL in the first quarter of 2020) increased by nearly 60% due to their day-1 CECL adjustment.[8] In this study, I predict that banks with greater *capital adequacy concerns* during the CECL transition period are more likely to reduce their supply of loans to reduce their risk of violating minimum regulatory capital requirements upon CECL adoption.[9]

To examine CECL's anticipatory impact on bank lending, I use a sample of bank holding companies filing the FR Y-9C regulatory reports. Using the four quarters of bank data before

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[5] To see the section 3 of the proposed bill on the following website: https://www.congress.gov/bill/116th-congress/house-bill/3182/text?r=1571&s=5.
[6] The full CECL transition period starts from when CECL is approved by the FASB and ends when CECL becomes effective. For publicly listed banks, this was from 2016 to 2020. And for other types of banks, it was from 2016 to 2023.
[7] In the sample used in this study, banks' retained earnings make up about 58% of their Tier 1 regulatory capital.
[8] The figure is obtained from an article by the American Banker Association, which is available on https://bankingjournal.aba.com/2020/06/bipartisan-group-of-senators-call-for-fsoc-study-on-cecl/.
[9] For the more capital constrained banks examined in this study, a 60% increase in their loan loss allowance equates to a 4.2% decline in their equity to asset ratio – from 9.60% to 9.20%.

CECL was approved (i.e., 2015Q1–2015Q4), I classify banks as more or less likely to be impacted by CECL based on their regulatory capital ratios. Banks with capital ratios closer to their capital adequacy constraints are considered to be more affected by CECL, while those with healthier capital ratios are assumed to be less affected. For the first hypothesis, I predict and find that higher closeness to capital adequacy constraints is associated with a lower loan growth rate during the CECL transition period (2016Q1–2018Q4).

In this study, I also examine which types of lending these banks are more likely to reduce in anticipation of adopting CECL. Longer-term loans have higher and more volatile CECL expected lifetime loss rates than shorter-term loans when the default risk is held constant. As mentioned earlier, CECL requires banks to recognize expected lifetime credit losses when a loan is made, reducing the bank's equity capital. Thus, CECL is expected to increase a bank's marginal cost on offering one unit of loan maturity and decrease a bank's willingness to hold longer-term loans relative to other assets. Although I do not find a general result on the relation between the issuance of long-term loans and the capital adequacy concern during the CECL transition, I do find support for this hypothesis in two subsets of banks, which will be described more fully later in this section.

A follow-up question is how banks reduce their holding of longer-term loans to mitigate CECL's impact. Do banks lower all their existing loan products' loan maturity but hold constant the mixture of different loan types (i.e., intensive margin)? Or do banks increase (decrease) their holdings of loan types with shorter (longer) terms (i.e., extensive margin)? To answer this question, I examine how the loan growth rates of different loan types change during the CECL transition period. I find that banks that are closer to their capital adequacy constraints decrease their lending of total real estate loans during the CECL transition period. However, these banks do not have significant changes in the growth rates for other loan types (i.e., consumer and non-real estate commercial loans). When I divide real estate loans into residential real estate and commercial real estate loans, only the growth in residential real estate loans declines in the CECL transition period. The reduced growth rate only for the residential loans is consistent with banks decreasing these relatively longer-term loans to reduce their loan remaining life and mitigate CECL's impact.

To further investigate CECL's impact on banks, I conduct two sets of cross-sectional analyses. First, I analyze whether CECL's impact on bank lending through regulatory capital becomes stronger when banks are monitored by a more lenient regulator. I rely on the index developed by Agarwal et al. (2014) to measure regulatory leniency. I find that capital-constrained banks monitored by a more lenient regulator are more likely to contract their total loans, long-term loans, and total real estate loans during the CECL transition period. This finding suggests that these banks change their lending policy to mitigate CECL's negative impact on their regulatory capital. This is consistent with Agarwal et al.'s finding that banks monitored by a more lenient regulator are financially weaker.

Second, I also perform a cross-sectional analysis looking at public and private banks separately. Public banks could be more affected because they have to adopt CECL sooner than private banks. However, it is also possible that the private banks could be more affected by CECL if it is more costly for them to raise new equity to mitigate the reduction in regulatory capital caused by CECL. I find both public and private capital-constrained banks experience an overall reduction in loan growth rates during the CECL transition period. In addition, I find that CECL's negative impact on long-term loans through regulatory capital is concentrated in publicly traded banks but not in their privately-held banks. This finding is consistent with public banks, which must adopt CECL earlier than private banks, responding to CECL's anticipatory negative impact on capital by reducing their issuance of long-term loans.

To corroborate my interpretation with sharper empirical identification, I perform several additional analyses. In particular, I use the Community Reinvestment Act (CRA) small business lending data at the bank-county level[10] to control for local economic conditions. Consistent with the main results, I find that during the CECL transition period, banks that are closer to their capital adequacy constraints are more likely to reduce their small business lending. I also find that CECL's impact on small business lending through the regulatory capital channel is more concentrated in more-leniently-regulated banks and in public banks, consistent with the results obtained from the bank-level data.

This study contributes to the policy debates on CECL by responding to the lawmakers' call for quantitative studies on CECL. Notably, it suggests that banks with weaker capital adequacy when CECL was announced are more likely to contract their supply of loans, especially the longer-term loans, real estate loans, and small business loans. These findings help inform regulators and lawmakers about which sectors of the economy are likely to be impacted by CECL.

This study also contributes to the accounting literature in two ways. First, it contributes to the research on CECL's impact on banks. Wheeler (2021) develops a measure of lifetime expected credit losses using a method intended to mimic one approach acceptable under CECL. He finds that recorded allowances during the pre-CECL period were, on average, less than this estimate of lifetime expected credit losses, consistent with concerns that implementing the

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[10] See section 7 for more details on the CRA data.

expected loss model will adversely impact regulatory capital adequacy. My study also speaks to this concern by showing evidence consistent with CECL negatively affecting banks' willingness to lend when their regulatory capital constraints are more severe.

In a recent working paper related to CECL's impact, Lu and Nikolaev (2020) suggest that under-recognition of expected losses (which amounts to overstating real capital) gives banks incentives and opportunities to take more risks. The findings in my paper are consistent with Lu and Nikolaev (2020). Because CECL exposes the information about under-recognition of expected losses, banks reduce riskier long-term loans and small business loans. However, the approach in this paper is different from Lu and Nikolaev. While Lu and Nikolaev create their proxy for under-recognition of expected losses to gauge CECL's impact, I examine how banks change their lending strategy during the transition period of CECL.

This study also contributes to the literature on the real effects of accounting changes. The findings in this paper are related to a fundamental question in accounting – whether and to what extent financial reporting influences firms' investment behavior.[11] This study documents the real effects of CECL on bank lending and shows that the real effects can occur even before the standard's effective date. The results are consistent with affected firms altering their investment decisions during a new standard's transition period (i.e., the period between the standard's approval date and its effective date) in preparation for implementing the new standard. The results also provide an important message to policymakers that in order to estimate the standard's full impact on the economy, they should consider a new accounting standard's anticipatory effects as well as its effect after implementation.

[11] Roychowdhury, Shroff, and Verdi (2019) provide a comprehensive review on this literature.

The remainder of the study is organized as follows: Section 2 discusses the institutional background and literature related to this study. Section 3 develops hypotheses. Section 4 describes the research design. Section 5 describes the sample construction process and descriptive statistics. Section 6 discusses the main results. Section 7 discusses the additional analyses. Section 8 concludes.

2.2 Background and related literature

This study investigates CECL's anticipatory impact on bank lending. To provide the institutional background relevant to the research question, I begin section 2 by providing a simple theoretical description of the role of banks in the economy as aggregators and distributors of capital (section 2.1). In section 2.2, I discuss the role that regulatory capital plays in bank supervision. In section 2.3, I discuss the evolution of U.S. bank capital regulations. Finally, I discuss loan loss accounting for banks and the recent move in bank financial reporting toward timelier accounting for expected credit losses, CECL (section 2.4).

2.2.1 Banks' role in the economy

Banks serve as financial intermediaries: collecting capital from bank depositors, debt holders, and equity holders and distributing it to various types of borrowers in the form of residential mortgages, commercial loans, consumer loans, etc. While getting access to these loans is critical to a well-functioning economy, loans are not all equal. Some loans have a lower risk and pay relatively lower interest rates because they are unlikely to default. Other loans have higher risk and pay higher interest rates to compensate for their higher risk of default. The greater the risk, the larger the risk premium that a borrower can expect to pay for getting access to funds. As risk increases, at some point the bank will decide the loan is too risky and will reject the loan. In this instance, the borrower may have to rely on some other form of risky borrowing (e.g., convertible debt or high yield bonds), equity financing, or they may have to cancel the investment project.

Banks do not always make lending decisions in the best interests of their stakeholders (equity holders, depositors, debt holders, banking regulators, etc.) because information asymmetry exists between bank managers and their outside stakeholders. Moreover, the banks' high leverage and the default risk protection provided to depositors by deposit insurance offer bank managers an opportunity to take on additional risk for a higher upside profit but at the expense of debt holders. To prevent banks from taking on excessive risk, bank regulators monitor the risk exposure of banks by conducting on-site visits and by setting minimum capital ratio requirements that banks must adhere to.

2.2.2 Regulators' role in bank supervision

2.2.2.1 Types of banking entities in the U.S. and their regulators

In the U.S., most banks operate as subsidiaries, governed by a bank holding company (BHC). [12] BHCs are defined as parent companies that control one or more bank subsidiaries. The Federal Reserve is the regulator of BHCs, but much of their work is shared with state and other regulators, who monitor the bank subsidiaries.

Each bank subsidiary's bank charter type determines its banking regulators (no matter whether a BHC controls them or not). See Figure 2.1. *Nationally chartered* banks are supervised by the Office of the Comptroller of the Currency (OCC). *State-chartered* banks are supervised

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[12] In my sample period, 79.93% of banks in the Call Report data are governed by a BHC, and 81% of BHC have only one bank subsidiary.

simultaneously by their state banking department and a federal banking regulator. The structure of the U.S. bank charter system is summarized in Figure 2.1 as below.

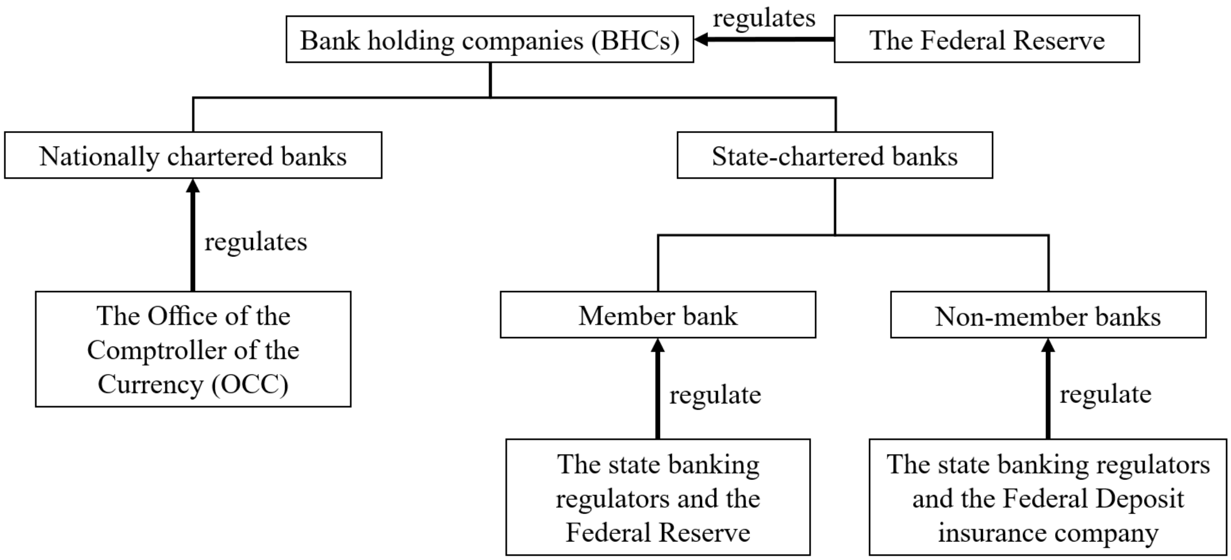

Figure 2.1 The structure of the U.S. bank charter system

Which federal regulator regulates *state-chartered* banks depends on their membership in the Federal Reserve System. The Federal Reserve regulates banks that are members of the Federal Reserve System. The Federal Deposit Insurance Corporation (FDIC) regulates non-member banks. *State-member* banks and *state-non-member banks* are examined on an alternating annual basis by their state regulators and their respective federal regulators.[13] Despite being supervised by different regulators with different strictness on regulatory enforcement, state and national banks face the same bank capital regulations (including regulatory capital requirements) and have similar banking business models (Blair and Kushmeider 2006; Nicoletti 2018).

[13] This statement is based on the Riegle Community Development and Regulatory Improvement Act of 1994.

2.2.2.2 On-site and off-site examinations

Banking regulators in the U.S. supervise the financial condition of each bank through both on-site and off-site examinations. The periodic on-site examinations typically occur on an annual basis[14]. During such examinations, bank examiners review various aspects of a bank's operations to assess the bank's overall safety and soundness. After their examinations, a written report is prepared, and a CAMELS rating is assigned to the bank. The report and the CAMELS rating are confidential and are only disclosed to the bank management. The CAMELS rating is a comprehensive assessment of a bank's capital adequacy (C), asset quality (A), management (M), earnings (E), liquidity (L), and sensitivity to market risk (S). Each rating component is assessed on a scale of from one to five, with one representing the highest quality and five the lowest. Banking regulators provide individual ratings for each of the six CAMELS components and a composite CAMELS rating for the bank as a whole.

Banking regulators also conduct off-site examinations during the time between two consecutive on-site examinations. Specifically, banking regulators analyze the periodic reports filed by banks[15] to remotely monitor bank financial health. Federal Reserve Bank of New York (2020) specifies that their off-site examinations aim to help banking regulators understand the strategic business developments and changes in risk profiles of the banks they monitor. They adjust the scope of their off-site examinations based on specific events, such as (a) significant changes in a bank's inherent risk, control processes, or key personnel; (b) increased concerns

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[14] As an exception to this rule, banks can be examined once every 18 months if they meet certain criteria: (1) assets below $3 billion, (2) well-capitalized, (3) CAMELS ratings of 1 or 2, (4) well-managed, (5) not operating under a formal enforcement action and (6) has not experienced a change in control in the previous 12 months.

[15] Banks file quarterly Call Reports with their regulators. These are discussed further in section 2.2.3.

about the adequacy of internal controls; (c) the absence of sufficiently recent exams; or (d) market events.

2.2.2.3 Inconsistency between banking regulators

As previously mentioned, state-chartered banks are examined alternatively by their federal and state banking regulators. Using these alternating visits and private data on the CAMELS ratings from the Federal Reserve Board, Agarwal et al. (2014) find that federal and state banking regulators differ in how they implement the same supervisory rules. In particular, Agarwal et al. (2014) find that the federal regulators systematically operate to a higher standard, downgrading CAMELS ratings almost twice as frequently as their state counterparts. State regulators are also more likely to upgrade a bank's CAMEL rating, implying that state regulators are more lenient. The implication of this leniency is manifest in their finding that the leniency of state regulators is related to costly outcomes, such as higher bank failure rates and lower repayment rates of government assistance funds amongst state-regulated banks. Agarwal et al. also find that the leniency of state banking regulators varies in different states, and they develop a state-level index to measure this leniency. I utilize the Agarwal et al. regulatory leniency index in some of my hypothesis tests.

In this study, I use the level of a bank's regulatory capital as an indicator of when a bank is likely to be more affected by a new accounting rule that reduces shareholders' equity. Two accounting studies apply the Agarwal et al. (2014) leniency index. Their findings imply that regulatory leniency is likely to lead to an overstatement of a bank's net income, retained earnings, and regulatory capital. First, Costello et al. (2019) find that banks that are more leniently regulated are less likely to restate their net income downward. Second, Nicoletti (2019) finds that higher regulatory leniency is associated with greater delays in loan loss recognition, which overstates retained earnings and equity capital.

2.2.2.4 The regulatory reporting system of banks

In the U.S., all bank subsidiaries (regardless of their chartered status) and BHCs must file financial statement-based reports to banking regulators each quarter. Bank subsidiaries file Call Reports and BHCs file FR Y-9C reports.[16] The details that must be disclosed in Call Reports are set by the Federal Financial Institutions Examination Council (FFIEC), which primarily consists of high-ranking representatives from the three federal banking regulators (i.e., the Federal Reserve, FDIC, and OCC). The details disclosed in FR Y-9C reports are set by the Federal Reserve, the designated regulator of BHCs. However, in practice, the Call Report and the FR Y-9C contain very similar reporting items, reported on almost identical schedules. The Call Report and the FR Y-9C include an income statement and a balance sheet prepared using U.S. GAAP. The two filings also include various supporting schedules that show the breakdowns of particular income statement items and balance sheet items.

One area of key concern for regulators is the adequacy of a bank's regulatory capital levels in relation to assets. Regulatory capital ratios are expressed as a capital amount over an asset amount. These will be explained more in the next section. Regulatory capital ratios are reported for bank subsidiaries in their Call Reports and for BHCs in their FR Y-9C reports.

[16] This study relies on data from Y-9C reports. Therefore, this study examines banks at the BHC level, rather than at the bank subsidiary level.

2.2.3 Bank capital regulation history

2.2.3.1 Pre-Basel period (before 1992)

Before the 1980s, banking regulators in the U.S. did not impose specific numerical capital ratio standards. Instead, banking regulators applied informal and subjective measures tailored to the circumstances of individual institutions.

In 1981, triggered by the convergence of macroeconomic weakness, bank failures, and diminishing bank capital, the three primary U.S. banking regulators (i.e., the Federal Reserve, OCC, and FDIC) implemented explicit numerical capital requirements for all but the largest multinational banks. However, the numerical requirements differed by bank size, and the three regulators did not use the same definition of capital adequacy.

In 1985, the International Lending Supervision Act was passed. The act introduced a common definition of regulatory capital across all three regulators and set a uniform capital requirement that all banks must adhere to. Capital adequacy was mainly evaluated using the ratio of primary capital[17] to total assets. Intuitively, the capital ratio measures how much equity capital a bank has on hand to support each dollar of its assets. A higher capital ratio demonstrates a bank has a better ability to absorb a decrease in the value of its assets. A higher capital ratio, therefore, reflects a healthier bank. These requirements remained in place in the U.S. until the first Basel Accord (referred to as Basel I) was implemented in 1992.[18]

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[17] The primary capital components include (1) common equity, (2) perpetual preferred stock (i.e., preferred stock that does not have a maturity), (3) minority interests, (4) mandatory convertible instruments, and (5) the loan loss allowance.

[18] This history is obtained from FDIC (2003).

2.2.3.2 First Basel period – Basel I (1992 – 2008)

In 1992, the U.S. implemented Basel I. The most significant change introduced by Basel I was to replace total assets in the denominator of the capital adequacy ratio with risk-weighted assets. Risk-weighted assets assign higher weights to riskier assets. The intuition behind risk-weighting is that banks must hold more regulatory capital to support the riskier assets they hold. Assets considered risk-free (e.g., U.S. Treasury Securities) are assigned a zero weight and therefore do not require any capital. Assets assumed not to be risk-free but considered relatively safe (e.g., short-term claims guaranteed by other U.S. banks) are assigned a 20% weight. Assets that are risky where the loss of default is limited by collateral (e.g., residential mortgages) are assigned a 50% weight. The remaining assets are assigned a 100% weight (Beatty and Liao 2011).

The numerator of the capital adequacy ratio is regulatory capital. Basel I defines two measures of regulatory capital, Tier 1 capital and total capital. Tier 1 capital is a narrower definition of capital, and it only includes the following equity accounts: common stock, retained earnings, noncumulative perpetual preferred stock[19], and minority interests. Total capital includes Tier 1 capital plus other accounts (referred to as Tier 2 capital) that can absorb losses, providing additional protection for depositors. Tier 2 capital accounts include some portion of the loan loss allowance[20], cumulative perpetual preferred stock, limited-life preferred stock, and subordinated debt[21]. Under Basel I, banking regulators used *the Tier 1 capital ratio* (i.e., Tier 1

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[19] Noncumulative perpetual preferred stock is a type of preferred stock that (1) has no fixed date on which invested capital will be returned to the shareholder and (2) does not accumulate a fixed dividend to the investor in the future if the dividend is not currently paid.

[20] The maximum amount of loan loss allowance that banks can include in Tier 2 capital is equal to 1.25% of the risk-weighted assets.

[21] Subordinated debt is any type of debt that will not be paid until all other senior debt is paid in full.

capital divided by risk-weighted assets) and *the total risk-based capital ratio* (i.e., the sum of Tier 1 and Tier 2 capital divided by risk-weighted assets) to monitor the financial conditions of banks.

In addition to the Tier 1 capital ratio and the total risk-based capital ratio, U.S. banking regulators also monitor a bank's *Tier 1 leverage ratio*, which is defined as Tier 1 capital over total assets (i.e., not risk-weighted). By limiting the Tier 1 leverage ratio, regulators aim to (1) protect against risks beyond credit risk and (2) discourage banks from becoming highly leveraged by concentrating on assets with lower risk weightings (Haubrich 2020).

2.2.3.3 Second Basel period – Basel II (2008 – 2013)

One of the problems with Basel I regulatory capital was the divergence between the Basel risk weights and economic risks, such as securitizations and credit derivatives that increase risk exposure but lower the Basel I risk weights (Beatty and Liao 2014). To alleviate this problem, the 2008 Basel II included more granular risk-weighted asset measures and off-balance sheet exposures in risk-weighted assets. The numerators of the capital ratios (i.e., Tier 1 capital and Tier 2 capital) were left unchanged from Basel I.

Due to the concerns about Basel II's high implementation cost, U.S. banking regulators only required Basel II for large, internationally active banks (i.e., banks with assets over $250 billion or foreign exposures greater than $10 billion). These larger banks had to apply a new formula to calculate the risk-weighted assets, referred to as the *advanced approaches*. The advanced approach involves calculating a complicated formula based on expected asset losses produced by a bank's own internal risk model. However, smaller banks could continue to adhere to the Basel I rules for calculating risk-weighted assets, referred to as the *standardized approaches*.

2.2.3.4 Third Basel period – Basel III (2013 – the current period)

The 2008 financial crisis revealed weaknesses in Basel II as a bank monitoring mechanism. Basel II's inability to prevent bank failures and the resultant taxpayer bailouts led global banking regulators to reform Basel II. Basel III was released in November 2010. Basel III strengthened the capital requirements by (1) tightening the elements that count as capital (the numerator of capital ratios), (2) improving the ways that bank risks are measured (the denominator of capital ratios), and (3) requiring that higher minimum ratios be met (Walter 2019). In July 2013, US supervisors established the capital requirements in conformance with Basel III. Banks with assets over $250 billion or foreign exposures greater than $10 billion (a.k.a. *advance approaches banks*) were required to comply with the Basel III requirements by January 2014. *Non-advanced approaches banks* were required to comply with those requirements by January 2015. Figure 2.2 below summarizes the timeline of the Basel III implementation for U.S. banks. These requirements are still in effect.

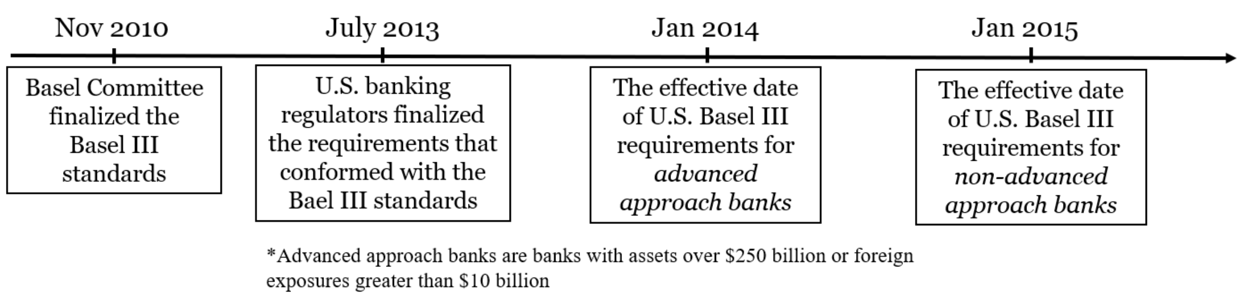

Figure 2.2 Timeline of the Basel III implementation

Under Basel III, U.S. banking regulators monitor two additional bank capital ratios: (1) the *common equity Tier 1 capital ratio* and (2) the *supplementary leverage ratio*. The *common equity Tier 1 capital ratio* is similar to the Tier 1 common equity capital ratio. The only difference is that the numerator of the ratio (the common equity Tier 1 capital) only contains a subset of what is included in Tier 1 capital. The common equity Tier 1 capital is designed to be the highest quality of regulatory capital, as it absorbs losses immediately when they occur. It includes only the items that are directly related to common shareholders' equity, such as common stock, retained earnings, accumulated other comprehensive income, and certain minority interests[22].

The *supplementary leverage ratio* is similar to the Tier 1 leverage ratio discussed previously. However, it only applies to the *advanced approaches banks*. It equals the Tier 1 capital divided by total leverage exposure, which is a comprehensive measure of asset risks, reflecting both on- and off-balance sheet risk exposures.

2.2.3.5 Consequences of violating capital requirements – FDICIA prompt corrective action requirement

The Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) is an essential part of the U.S. capital regulation system. FDICIA specifies the consequences of violating bank capital requirements by establishing tripwires below which supervisors must take *prompt corrective actions*. These tripwires specify the minimum regulatory capital requirements that all banks must adhere to.

Minimum regulatory capital requirements of the five regulatory capital measures are as follows: (1) 4.5 percent for the common equity Tier 1 capital ratio, (2) 6 percent for the Tier 1 capital ratio, (3) 8 percent for the total risk-based capital ratio, (4) 4 percent for the Tier 1 leverage ratio, and (5) 3 percent for the supplementary leverage ratio, with the last ratio only applying to *the advanced approaches banks*.

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[22] Certain minority interests are defined as the minority interests held by consolidated depository institutions or foreign bank subsidiaries.

The FDICIA-mandated *prompt corrective actions* include (1) heightened supervisory monitoring, (2) requiring the bank to submit a capital restoration plan, (3) restrictions on executive pay, and (4) requiring prior supervisory approval on any acquisitions or new branch formations. Figure 2.3 below summarizes the definitions of the five regulatory capital ratios and their corresponding thresholds for *adequate capitalization*.

Capital ratio	**Numerator**	**Denominator**	**The minimum threshold for adequate capitalization**
Common equity Tier 1 capital ratio	**Common equity Tier 1 capital** = common stock + retained earnings + accumulated other comprehensive income + certain minority interests**	Risk-weighted assets	4.5%
Tier 1 capital ratio	**Tier 1 capital** = **Common equity Tier 1 capital** + noncumulative perpetual preferred stock + non-qualifying minority interests	Risk-weighted assets	6%
Total risk-based capital ratio	Total capital = **Tier 1 capital** + **Tier 2 capital** where, Tier 2 capital = cumulative perpetual preferred stock + limited life preferred stock + subordinated debt + loan loss allowance*	Risk-weighted assets	8%
Tier 1 leverage ratio	**Tier 1 capital**	Total assets	4%
Supplementary leverage ratio	**Tier 1 capital**	Total leverage exposure***	3%

* The loan loss allowance that banks can include in Tier 2 capital is limited to a maximum of 1.25% of risk-weighted assets.
** Minority interests held by consolidated depository institutions or foreign bank subsidiaries.
*** A comprehensive risk exposure measure, reflecting both on- and off-balance sheet exposures.

Figure 2.3 A summary of FDICIA bank regulatory capital requirements

2.2.4 Loan loss accounting

The accrual accounting principle requires banks to record loan losses using the *allowance method*. Theoretically, banks record the loan loss allowance for the *expected* future losses that will occur if a borrower does not repay according to the loan contract. The word *expected* is ambiguous in the sense that it can be defined in two ways. First, *expected* can be defined as *the expected value of* future losses, i.e., the sum of loss given default in different states of the world multiplied by the corresponding probability. Alternatively, the *expected* can be defined as *the losses that are expected to happen*. The expected-to-happen losses are recognized in the period in which the loss events occur, and the events are very likely to make the loans uncollectible. For example, suppose that a car factory, the primary employer in a rural town, closed on December 1, 2018. Even though on December 31, 2018, no loans made by a bank in that town have defaulted, the bank knows that a major portion of the loans will not be repaid due to the factory closure. Under the incurred loss approach, the bank must recognize the loan loss allowance and bad debt expenses connected to the factory closure for the year 2018.

The ambiguity in defining *expected* future loan losses reflects the notion that different financial statement users have different demands for loan loss-related information. Thus, there is no perfect, one-size-fits-all loan loss accounting standard. Investors of bank stocks likely prefer the loan loss accounting that generates *expected values of* future loan losses, which are more value-relevant. However, auditors and banking regulators likely prefer the loan loss accounting that generates the *incurred losses*, which are more reliable, objective, and easier to monitor. After discussing the theoretical aspects of loan loss accounting, the following subsections discuss loan loss accounting practices in the U.S.

2.2.4.1 The incurred loss model (ILM)

Before the introduction of CECL, the incurred loss model (ILM) governed accounting for loan losses. Under ILM, there are two types of loans: loans that are impaired and loans that are not. For impaired loans[23], banks use ASC 310-10-35 (formerly known as FAS 114) and analyze the loans individually using observable market value or the discounted cash flow method. Even though impaired loans are individually large and heterogeneous, they account for only around 1.5% of a median bank's loan portfolio (Table 1, Wheeler 2017). For nonimpaired loans, banks use ASC 450-20 (formerly known as FAS 5) to analyze their nonimpaired loans in aggregate. Nonimpaired loans cover most loans, including pools of homogeneous loans (e.g., credit card loans, residential real estate loans). ASC 450-20 is also called the *incurred loss model* (ILM) because it requires banks to recognize credit losses only when (1) the credit losses are *estimable* and (2) it is *probable*[24] that the credit losses have been incurred on the balance sheet date. Grant Thornton, a large international accounting firm, explains the *probable* condition[25]:

> *"A loss, for it to be accruable, must have already occurred by the date of the financial statements. In other words, expected future losses are not accruable, no matter how likely. This is what is meant by references to the incurred loss model. For example, consider a hurricane bearing down on the Gulf Coast and a property-casualty insurance company with policies outstanding in the soon-to-be-affected area. No accrual for losses can be made until the hurricane hits because, until then, no losses have been incurred by the insurer."*

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[23] According to ASC 310-10-35, a loan is classified as *impaired* when, based on current information and events, it is probable that the company will be unable to collect all amounts due according to the terms of the contractual loan agreement.

[24] ASC 450-20-20 defines *probable* as *likely to occur*. While the assessment of these terms is subject to an entity's judgment, *likely* under U.S. GAAP typically is considered a much higher threshold (i.e., approximately 80 percent) than *more likely than not* under IFRS (i.e., greater than 50 percent). See an article written by Deloitte (one of the biggest U.S. accounting firms): https://web.archive.org/web/20190921021222/www.iasplus.com/en-us/standards/ifrs-usgaap/contingencies).

[25]See https://www.grantthornton.com/~/media/content-page-files/financial-services/pdfs/2016/Allowance-for-loan-and-lease-lossess-ALLL.ashx

2.2.4.2 The current expected credit loss model (CECL)

Regulators, scholars, and investors have at least two major concerns with using ILM to account for a bank's loan losses. First, they blame the delays in loan loss recognition under ILM for exacerbating the severity of economic downturns. Their argument runs as follows. ILM's probable threshold delays loan loss recognition during good times and results in excessive loan loss recognition during bad times. In turn, the excessive loan losses recorded during bad times lead to a depletion of retained earnings, increasing the risk that banks will have insufficient regulatory capital to support their risky assets during periods of economic distress. The risk of being undercapitalized forces affected banks to decrease their risky assets and/or increase their equity capital. However, since raising equity capital is costlier during downturns, banks are more likely to downsize their risky assets by reducing loan supply (Acharya and Ryan 2016; Beatty and Liao 2011; Laeven and Majnoni 2003).

Second, regulators, scholars, and investors argue that the probable threshold results in an allowance estimate that does not provide investors with enough information about the full extent of expected credit losses over the entire contractual life of a bank's loans. Ultimately, this leads to financial reports that are not transparent enough for making informed investment decisions.[26]

Responding to the two criticisms of ILM, the FASB replaced ILM with the current expected credit loss model (CECL) in Accounting Standards Update No. 2016-13.[27] CECL

[26] See the article by American Banker Association on the following website: https://www.aba.com/archive/Issue_Sites/Pages/issues_CreditImpairmentModel.aspx
[27] The official name of the new CECL standard is "Financial Instruments – Credit Losses (ASC 326-20): Measurement of Credit Losses on Financial Instruments."

became effective in 2020 for large public banks and in 2023 for all other banks.[28] The American Bankers Association calls CECL *the biggest change in bank accounting over the past 40 years*.

To provide a complete view of expected future credit losses, CECL removes the *probable* loss threshold and requires a *lifetime* loan loss allowance to be established whenever a loan is originated. Under CECL, banks must estimate their loan loss allowance based on (1) historical credit loss experience on financial assets with similar risk characteristics, (2) current conditions, and (3) reasonable and supportable forecasts that affect the collectability of the remaining cash flows over the contractual term of the financial assets (Federal Reserve System 2020). While CECL does not affect the aggregate lifetime amount of loan charge-offs, it significantly shifts the timing of recognizing loan losses by requiring banks to recognize all expected losses at loan origination.

When CECL is first adopted (referred to as day-1), banks must estimate the lifetime expected credit losses of all the loans on their balance sheets. To adjust the ILM loan loss allowance to the CECL allowance, banks must post the following journal entry:

	Dr.	**Cr.**
Retained earnings	Y = X − Z	
Deferred tax assets	Z = X*effective tax rate	
Loan loss allowance		X

Figure 2.4 The journal entry when CECL is first adopted (day-1)

[28] CECL was originally set to be effective for *all* public banks in 2020 and for all other banks in 2021 and onwards. However, on July 17, 2019, the FASB proposed an extension to CECL's effective date (https://www.fasb.org/jsp/FASB/FASBContent_C/ActionAlertPage&cid=1176172970471&rss=1). This proposal extends the beginning effective dates from 2021 to 2023 for small public banks and from 2022 to 2023 for non-public companies. Small public banks are defined as the public banks with a public float of less than $250 million, or annual revenue of less than $100 million. This proposal was approved by the FASB on November 15, 2019. Subsequently, due to the COVID-19 pandemic, in March 2020 President Donald Trump signed into the law the CAREs Act, which grants banks the option to postpone their adoption of CECL until the pandemic is over. However, the change due to COVID-19 does not influence the analyses in this paper because the sample period ends in the fourth quarter of 2018. See appendix A.1 for the history on the changes in CECL adoption dates for different types of banks.

In the above journal entry, the loan loss allowance is credited because the broader definition of the loan loss allowance means that, on average, banks will adjust their allowance for loan losses upward.[29] The above adjustment reflects the fact that the deferred tax asset account is debited for the effective tax rate portion of the allowance adjustment. The income tax regulations require loan losses to be excluded from expenses until the loan becomes wholly worthless. The retained earnings account is debited for the after-tax portion of the allowance adjustment.

On day-2 of CECL adoption and beyond, banks must adjust their loan loss allowance by recording a debit or credit to the loan loss provision at the end of each quarter. The day-2 journal entry for CECL is similar to the entry under ILM, involving the loan loss provision account and the loan loss allowance account[30]. Theoretically, the adjustment consists of three components. First, banks recognize additional expected credit losses for any new loans issued during the quarter. This component of loan loss reserve adjustment is unique for CECL because ILM does not allow banks to recognize future expected credit losses when loans are issued. This component depends on the current and forecasted future economic conditions, so the same type of loans originated at different times can have different amounts of initial loan losses.

Second, banks adjust upward or downward their previous estimates of loan losses on loans that have been outstanding throughout the quarter because CECL requires the loan loss allowance to reflect changes in current and expected future economic conditions. Although ILM

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[29] The prediction of an upward adjustment is consistent with the actual CECL adjustment recorded by the large public banks that adopted CECL in 2020Q1. According to the 2020Q1 financial reports, the large public banks increased their loan loss allowance by between 31% and 52% on day 1 CECL. See https://www.moodysanalytics.com/-/media/article/2020/cecl-adoption-and-q1-results-amid-covid-19.pdf for more details.

[30] If banks need to adjust upward (downward) their loan loss allowance, then they debit (credit) the loan loss provision and credit (debit) the loan loss allowance.

has a similar component, ILM does not allow banks to incorporate any forecasted economic conditions in their loan loss estimate. As you will recall, ILM allows banks to recognize loan losses only when the losses become probable and estimable.

Third, banks adjust the loan loss allowance when a loan reaches the end of its life (i.e., either being repaid or charged-off). For example, if a loan is fully repaid with no default but had been estimated to have 100 dollars of loan loss allowance, then on the repayment date, the bank adjusts downward the loan allowance by 100 dollars. This component exists in the ILM regime as well. In the long run, if bank managers estimate loan losses without manipulation, this component is expected to have a time-series mean of zero.

2.2.4.3 Criticism of CECL

CECL seems to increase bank disclosures by requiring banks to provide a longer horizon of credit loss information for all loans with a positive probability of default. However, CECL has also sparked concerns regarding its unintended negative impacts.

The most relevant concern to this paper is that CECL can distort banks' incentives to lend. CECL requires that when banks originate a loan, they must recognize all loan losses expected to occur over the loan's entire contractual life when banks originate a loan. However, CECL does not correspondingly allow banks to immediately recognize the higher expected future interest revenue banks receive in compensation for taking on higher default risk. This asymmetric treatment creates a mismatch between expenses and revenues, distorting banks' incentive to originate new loans and grow their loan portfolios (PwC 2016; U.S. Congress 2018; Ryan 2019).

Relatedly, FASB member Lawrence Smith also brought up this mismatching concern. At the AICPA's National Conference on Banks and Savings Institutions, he stated that, while he supported disclosure of expected losses, he would vote against the proposal because it requires banks to recognize a loss on the day that a bank originates a loan (Wheeler 2021).

As mentioned in section 1, the widespread debate about the merits of CECL has led banks to lobby regulators and the FASB to delay CECL's implementation. In 2019, the U.S. Senate and House of Representatives proposed bills to delay CECL until the government could evaluate CECL's impact on bank lending.[31] Responding to this call, this study takes an initial step to investigate how banks change their lending strategy after CECL was approved in 2015.

2.2.4.4 Loan loss accounting, regulatory capital, and bank lending

The Financial Stability Forum (FSF) Report (2009) identified ILM as one potential cause of procyclical bank lending[32] during the 2007 financial crisis. ILM's probable threshold for loss recognition requires banks to delay loss recognition in good times, creating an overhang of loan losses that carry forward and must be recognized in bad times. Due to such loss overhang, banks must record capital-decreasing provisions during economic downturns, increasing the pressure on them to add new capital or reduce lending in order to maintain their capital ratios above the capital adequacy constraints.

While a bank can raise equity to maintain its capital when recognizing larger loan losses, this may prove to be too costly during downturns. Wall and Koch (2000) argue that banks experiencing losses and falling capital during bad times are likely to have relatively low stock

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[31] See the proposed bills on:
(1) https://www.congress.gov/bill/116th-congress/senate-bill/1564/text?r=77&s=4 for the U.S. Senate
(2) https://www.congress.gov/bill/116th-congress/house-bill/3182/text?r=1571&s=5 for The U.S. House of Representatives.

[32] Procyclical lending refers to supply-driven changes in lending that amplify the business cycle. That is, procyclical changes in lending are systematic, cyclical changes in lending not explained by changes in the demand for loans (Wheeler 2019).

prices. Their managers may be unable or unwilling to issue new stock at what they perceive as a distressed price. Thus, rather than raising new shares to maintain their capital ratio, banks are more likely to downsize their risky assets by reducing their loan issuances.

The argument that the accounting for loan losses influences bank lending through regulatory capital is consistent with the well-developed capital crunch theory in the economics literature (e.g., Bernanke and Lown 1991; Berger and Udell 1994; Peek and Rosengren 1995; Peek and Rosengren 1997; Furfine 2001). The capital crunch theory states that when banks need to raise their equity-to-asset ratio, they usually choose to cut the issuance of new loans (i.e., decrease risky assets) to avoid the high costs of raising new equity.

Under CECL, the requirement to add new capital to compensate for a growing loan loss allowance is expected to occur in two circumstances. First, it likely occurs when there is an increase in expected defaults during an economic downturn[33]. Second, it likely occurs when loan balances are growing. In the first instance, the capital crunch theory is expected to apply. In the second case, growth in loans can occur both during economic downturns and when the economy is expanding. Even in strong economic times, banks will likely prefer to minimize new equity issuances to avoid diluting the claim of their existing equity holders and maintain the multiplier effect that leverage has on their return on equity.

Banks that do not want to add common equity could issue preferred stock or subordinated debt to boost their regulatory capital. Adding noncumulative perpetual preferred stock would help increase Tier 1 capital, and adding preferred stock and subordinated debt would help

[33] This is similar to what would occur under ILM. However, the magnitude of the shock to the allowance, and to regulatory capital, is likely to be less than under ILM as some allowance for expected future losses will already have been accrued under CECL.

increase total capital. However, they do not change a bank's Common Equity Tier 1 capital (CET1). The CET1 capital ratio is considered particularly important under Basel III.

2.2.4.5 Prior research on how the accounting for loan losses influences bank lending through capital ratio requirements

Three recent empirical studies in accounting examine loan loss accounting's impact on lending through the capital ratio requirements. First, Beatty and Liao (2011) examine a sample of U.S. publicly listed banks and find a positive association between delays in loan loss recognition[34] and lending contraction during economic downturns. They also find that banks with a greater delay in their loan loss recognition have a stronger association between low regulatory capital and lending contraction. Their finding is consistent with delaying loan loss recognition exacerbating the procyclical lending through the capital ratio channel.

Second, Kim (2021) also finds that banks with a greater delay in their loan loss recognition experience a greater reduction in their lending during the financial crisis. Unlike Beatty and Liao (2011), Kim uses mortgage loan data at the contract level to control for geographical demand-side factors. The reduction in mortgage lending Kim finds in his study is stronger for less-well-capitalized banks and for mortgage loans with a higher capital burden. His finding is also consistent with loan loss accounting influencing banks' willingness to lend being driven by concerns over meeting capital ratio requirements.

Third, Jayaraman et al. (2019) use the late 1990s emerging market crisis to capture an adverse supply shock to the capital of U.S. banks. They show that the reduction in lending due to

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[34] Beatty and Liao (2011) consider banks that delay accruing a loan loss provision to be more exposed to capital losses during downturns.

the emerging market capital shock is lower for the banks that appear to smooth their loan loss provisions than other banks. Banks are considered smoothing their loan loss provisions if they book larger (smaller) provisions when pre-provision earnings are high (low).

In sum, the first two studies (Beatty and Liao 2011; Kim 2021) find that delaying the recognition of loan loss provisions influences bank lending by depleting their regulatory capital during downturns. The third study by Jayaraman et al. finds that loan loss smoothing is likely to mitigate a negative shock on regulatory capital. However, what is still underexplored is how *future changes in the measurement of loan losses brought about by CECL* influence banks' current lending strategy through the capital ratio channel.

2.3 Hypothesis development

As the CECL transition period is crucial to understanding this study's hypotheses, I begin by defining this period before developing my hypotheses. The rules governing when banks must adopt CECL and include the CECL loan loss allowance in calculating their regulatory capital had changed many times since November 2015, when CECL was first announced. Also, adoption dates differ for different types of banks (e.g., SEC filers versus non-SEC filers and public banks versus private banks).[35]

Initially, when CECL was first announced by the FASB in November 2015, it was scheduled to become effective for financial reporting and calculating regulatory capital in 2019Q1 for all SEC filing public entities. However, when the final draft of the standard was released seven months later in June 2016, the first effective date by which SEC-filing public

[35] Appendix A.1 lays out the various timelines, set by the FASB and by bank regulators, for when CECL would become effective for financial reporting and for calculating regulatory capital.

entities must adopt CECL was extended by one year to 2020Q1. This schedule continued to apply for financial reporting and calculating regulatory capital until December 21, 2018, when bank regulators offered banks relief by delaying when the financial reporting day-1 adjustment would be incorporated into the calculation of regulatory capital. Regulators approved a new rule giving all banks the option to phase in their day-1 financial reporting adjustment to their regulatory capital over three years on a quarterly basis.

For this study, I treat the implementation schedule announced in June 2016 as the primary implementation schedule. I examine how the prospect of CECL impacts bank lending during the transition period from 2016Q1 to 2018Q4. By stopping in 2018Q4, I avoid the impact of changing expectations due to the regulatory capital phase-in. I also avoid two further financial reporting extensions to CECL adoption dates, one announced in November 2019 and one in March 2020. Unfortunately, by stopping at the end of 2018, before the adoption date has been reached, I will miss some of the transitional adjustments that banks make, particularly for shorter-term loans.

2.3.1 CECL and bank lending (H1)

CECL has one of the longest transition periods, from announcement to the adoption date, of any new accounting standard. In part, this is due to the significance of its impact on the banks that must adopt it. This transition period allows us to observe CECL's impact on bank lending practices even before it comes into effect.

Longer-term loans issued during the transition period are likely to be still outstanding when CECL must be adopted. In addition, some shorter-term loans are likely to roll over and be renewed for a period that extends into the CECL adoption period. For example, a credit card loan may be repaid by the cardholder before CECL's adoption date, but the cardholder will continue to hold the credit card and is unlikely to have their credit limit reduced before CECL's adoption date. Therefore, the bank issuing the card can expect to remain exposed to the borrower for longer than the term of the initial loan.

As mentioned previously, in section 2.4.2, CECL requires banks to expand how they estimate their allowance for expected future credit losses. Whereas under ILM, banks were only able to look at past events in determining what losses had been incurred and should be accrued as a reduction in the carrying value of their loans, under CECL, current economic conditions and future forecasts must also be considered. Since CECL requires the loan loss allowance to also reflect expected future losses that have not yet been incurred, it is expected to substantially increase the size of bank loan loss allowances. The increase in loan loss allowance will reduce their retained earnings, a primary component of regulatory capital[36].

A bank's sensitivity to this expected capital decline and whether they alter their lending policies to limit the degree of expected capital adjustment to CECL is likely to depend on the current level of their capital ratios and how close they are to regulatory capital minimums. When capital-constrained banks experience a negative shock to their regulatory capital, the capital crunch theory (see section 2.4.4) argues that they will tend to alleviate the situation by originating fewer loans rather than by issuing new equity. By issuing fewer loans during the CECL transition period, banks can build a larger capital buffer to absorb the day-1 capital shock. This is because fewer loans mean lower risk-weighted assets, the denominator in three of the five

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[36] In the sample used in this study, banks' retained earnings make up about 58% of their Tier 1 regulatory capital. Moreover, as mentioned in footnote 26, the prediction of an upward adjustment is consistent with the actual CECL adjustment recorded by the large public banks that adopted CECL in 2020Q1. According to the 2020Q1 financial reports, the large public banks increased their loan loss allowance by between 31% and 52% due to their day-1 adjustments. See https://www.moodysanalytics.com/-/media/article/2020/cecl-adoption-and-q1-results-amid-covid-19.pdf.

regulatory capital ratios. In addition, issuing fewer loans during the transition period also means a smaller day-1 capital adjustment when CECL becomes effective, reducing the severity of the negative shock to the numerator of their regulatory capital ratios.[37] This leads to the following hypothesis:

H1: Banks with lower capital adequacy ratios originate fewer loans following the approval of CECL, compared to other banks that are not as capital constrained.

Banks have four years to prepare for CECL implementation. Therefore, it could be argued that this event is not a *shock*, and they have sufficient time to adopt other approaches (such as raising new equity) to replenish their capital levels. However, adding new capital is not without a cost (section 2.2.4.4). Banks are able to enhance their return on equity (ROE) profitability ratio through the use of leverage, which acts as a multiplier of their return on assets (ROA). Therefore, banks have an incentive to keep their asset to equity ratio high, so their ROE can be higher for the same ROA. The choice between raising new equity, or cutting back lending will depend on the relative cost of each. If raising new equity capital increases their after tax cost of capital, then banks may be unwilling to do so to counteract the impact of CECL on their regulatory capital.[38] On the other hand, to the extent that adding new loans is profitable, banks may add equity to help maintain their loan market share and profitability. Thus, we may not observe a decline in new lending by capital constrained banks if it is less costly for them to raise new equity than the cost of cutting back their lending.

[37] The anticipation effect of CECL's day-1 adjustment should happen only during the transition period. After CECL is adopted, if lending levels remain relatively constant then things are in the steady state. So, if there is no additional shock then CECL is not expected to have any additional effects after the adoption date.
[38] In section 7.3, I investigate whether capital constrained banks that increase their equity to asset after CECL is announced are less likely to adjust their policies.

2.3.2 CECL and long-term loans (H2)

Intuitively, if a loan is issued for a longer-term, there is more time for the loan to default. Therefore, *ceteris paribus*, the longer the loan term, the larger the loan loss allowance adjustment that will be required when CECL takes effect. This higher implicit cost of longer-term loans reported under CECL leads us to expect that, during the CECL transition period, banks will adjust their holdings of longer-term loans downward in anticipation of their larger allowance for expected loan losses once CECL is adopted.

As discussed previously, more capital-constrained banks are expected to be more concerned about CECL's impact on their capital status. Since longer-term loans are associated with higher expected credit losses, capital-constrained banks will find them costlier to hold. Therefore, capital-constrained banks are likely to issue fewer long-term loans to decrease the size of the adjustment to their loan loss allowance and regulatory capital when CECL is adopted. This will help such banks reduce their risk of being undercapitalized and subject to regulatory intervention both at the time of adoption and in the future.

Issuing fewer long-term loans also helps banks to lower the volatility of their loan loss allowance. With a shorter loan remaining life, banks can predict their future loan losses more accurately because the horizon that banks must forecast is shorter. Whether banks can predict loan losses reliably is important to bank stakeholders. As shown in the comment letters on CECL submitted to the FASB and the SEC, bank investors expect to use the new CECL disclosures to evaluate management's ability to forecast expected credit losses reliably.[39] The reliability of a

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[39] See the following website for a summary of comment letters received by the FASB: www.fasb.org/jsp/FASB/Document_C/DocumentPage&cid=1176162917634

bank's loan loss estimate is also important to banking regulators. As shorter loan terms improve the accuracy with which banks can estimate their future loan losses, they help minimize the chance that such banks will have inadequate loan loss reserves. Wheeler (2019) finds that banks with inadequate loan loss allowances are more likely to be placed under enforcement actions by banking regulators, restricting their lending activities. Therefore, more capital-constrained banks have a greater incentive to hold fewer long-term loans during the CECL transition period. This leads to the following hypothesis:

H2: Banks with lower capital adequacy ratios issue fewer long-term loans following the approval of CECL, compared to other banks that are not as capital constrained.

While this prediction is expected to hold, ceteris paribus, all loans are not equal in their default risk per unit of time. Therefore, banks may change the mix of their loan portfolios and the duration of their loans in anticipation of CECL. This possibility is explored in the next hypothesis.

2.3.3 CECL and loan types (H3)

CECL's impact on bank lending policy during the CECL transition period is likely to vary between loan types. One reason to expect this is because the probability a new loan issued during this period will remain on a bank's balance sheet when CECL is adopted depends on its term-to-maturity, which varies by loan type.

Any loans that are issued during this CECL transition period (starting in 2016Q1 and ending in 2018Q4) that are expected to be repaid before CECL is scheduled to take effect (in 2020Q1 for SEC filing public banks, in 2021Q1 for non-SEC filing public banks and in 2021Q4 for all other banks), will be accounted for over their entire life using the ILM and the issuer's regulatory capital will not be impacted by CECL. On the other hand, new loans issued during this period, with a maturity date beyond the expected CECL adoption date, can be expected to impact bank regulatory capital upon adoption.[40] Therefore, longer-term loans issued during the transition period will be more costly for banks to issue, both because they result in a larger CECL adjustment (as discussed in section 3.2) and because they have a higher likelihood of being on bank balance sheets when CECL is finally adopted. This higher cost likely will impact initial loan terms, especially for capital-constrained banks, pushing up the interest rate they will require to issue such loans. The higher costs of borrowing for these types of loans will drive down demand, resulting in lower loan growth rates.

This study predicts that the growth rates for residential loans and commercial real estate loans are likely to decrease during the CECL transition period. This is because new residential first mortgages (which account for the majority of all residential loans) are most often issued for 30 years.[41] Also, the typical term for new commercial real estate loans ranges from five to 25 years, depending on the type of commercial property used for security.[42] Therefore, most of the principals of residential and commercial real estate new loans, issued during the CECL transition period, are likely to remain on bank balance sheets after CECL is adopted.

In contrast, during the CECL transition period, banks are more likely to continue with their existing (pre-CECL) loan contracting policies for consumer and commercial non-real estate loans, which are typically issued for a shorter term. New loans of these types are less likely to

[40] To the extent that some loans issued during the CECL transition period are likely to roll-over and become new loans with maturities that extended into the post CECL adoption period they may also be a concern to bank management. However, such roll-overs typically allow the bank to adjust the contract terms and/or the interest rate on the loan, making their CECL adoption impact less of a concern for management.
[41] See an article from Forbes, which is available at https://www.forbes.com/advisor/loans/what-are-loan-terms/.
[42] See an article from ValuePenguin (a publicly listed lending research firm), which is available at https://www.valuepenguin.com/small-business/commercial-real-estate-loan.

remain on bank balance sheets when CECL becomes effective due to their typically shorter maturities. Most consumer loans are made up of auto loans (normally issued for either four or five years), personal loans (frequently issued for terms of between two and five years)[43], and credit card debt. While credit card loans have no stated term to maturity, and some credit cardholders carry this debt for many years, the majority of cardholders pay off their credit card debt in under one year.[44] We do not have access to information on the term-to-maturity of commercial non-real estate loans on their grant date. However, their average remaining life would be a lower bound for the typical loan term. S&P Global (2018) and Killian and Ding (2020) report that U.S banks hold commercial non-real estate loan portfolios with an average remaining life of 1.5 years. The Federal Reserve also shows that at the end of 2015Q4, the average loan remaining life of commercial non-real estate loans held by U.S. banks was 790 days, which equals 2.16 years. These statistics on loan terms demonstrate that compared to residential and commercial real estate loans, consumer and non-real estate commercial loans issued during the CECL transition period are more likely to be repaid before banks adopt CECL. While some shorter-term loans, issued later in the transition period, can be expected to be on bank balance sheets after CECL is adopted, a larger proportion of their principal is likely to have been repaid. Even though consumer loans and non-real estate commercial loans have higher net charge-off rates than the typical residential and commercial real estate loans, their shorter loan terms help offset their higher default rates. Therefore, I expect bank management to be more

[43] These loan statistics are from the Federal Reserve statistics are available at https://www.federalreserve.gov/releases/e2/201512/default.htm.
[44] Killian and Ding (2020) report that on average, credit card loans have a remaining life of 0.75 years.

concerned about residential and commercial real estate loans during the CECL transition period examined in this study.

Thus, during the CECL transition period, capital-constrained banks are more likely to change the loan contract terms of residential real estate and commercial real estate loans, making them less attractive to borrowers while leaving their consumer loans and commercial non-real estate loans relatively unchanged. As a result, the cost of these two types of real estate loans, for capital-constrained banks, is predicted to increase, and we are more likely to observe a decrease in their growth rates. This leads to the following hypothesis:

H3: Banks with lower capital adequacy ratios issue fewer residential loans and commercial real estate loans (but not fewer commercial non-real estate loans and consumer loans) following the approval of CECL, compared to other banks that are not as capital constrained.

2.3.4 Cross-sectional Analysis (H4 and H5)

2.3.4.1 Regulatory leniency (H4)

CECL's impact on bank lending is likely to vary depending upon the degree to which a bank's regulator is strict versus lenient in enforcing the regulatory capital requirements. Banks that are monitored by a stricter regulator are likely to already be operating with a more conservative capital structure and risk exposure. For example, banks that are subject to stress testing are likely to be closely monitored by their regulators even before CECL was approved.[45]

[45] Stress-tested banks account for only 16% of the BHCs in my sample because the Fed only requires stress testing for very large BHCs. In 2012, the Fed introduced stress testing for BHCs with total assets greater than $50 billion, and in 2014, as part of the Dodd-Frank Act, this was expanded to include banks with assets between $10 billion and $50 billion (Cortés et al 2020). These large banks are likely to have a different business model from other smaller banks. Therefore, I do not use bank size as a proxy for regulatory leniency.

There are at least two possible reasons why some regulators might be more lenient than others. First, some regulators may lack adequate resources, including highly skilled staff, to sufficiently monitor all the banks under their jurisdictions. If this is the case, there will be greater information asymmetry between these leniently regulated banks and their regulators. CECL requires all banks to disclose more information about their expected loan losses. Therefore, banks with a more lenient regulator are likely to be concerned that their CECL-required disclosures will reveal new information about their capital status and asset risk that will trigger costly regulatory intervention. In order to mitigate the risk of such actions, leniently regulated banks are more likely to rein in their lending during the CECL transition period than their more strictly regulated counterparts. Thus, after CECL was approved, capital-constrained banks with a more lenient regulator are more likely to be impacted by CECL.

However, it's also possible that regulatory leniency observed in prior research is due to regulatory forbearance rather than due to the ineffectiveness of regulatory monitoring.[46] If this is the case, lenient regulators may already be aware of the real capital status and riskiness of the banks they regulate, and they will not learn new information and change their bank monitoring level after CECL. If state regulators are more lenient by choice, then regulatory leniency is unlikely to be a determinant of banks' lending strategy during the CECL transition period. In addition, banks that are regulated by the more lenient state-level regulators are also regulated by federal regulators every other year (or regulator rotation). So, the prospect of being subject to a more rigorous federal regulator may mean all banks are affected equally. Ultimately, whether

[46] For example, state regulators can be expected to practice greater forbearance in enforcing regulatory capital requirements than their federal counterparts because they are afraid stricter enforcement would trigger a reduction in lending and hurt the local economy (Agarwal et al. 2014).

CECL’s impact through the capital channel is stronger for banks with lenient regulators is an empirical question. This leads to the following hypotheses:

H4a: CECL’s negative impact on loan growth is stronger when banking regulators are more lenient.

H4b: CECL’s negative impact on growth in long-term loans is stronger when banking regulators are more lenient.

H4c: CECL’s negative impact on growth in real estate loans is stronger when banking regulators are more lenient.

2.3.4.2 Public banks versus private banks (H5)

CECL’s impact on lending can also vary with a bank’s ownership structure. In particular, it can depend on whether a bank’s common equity is publicly listed or not.

Publicly-listed banks differ from privately-held banks on two dimensions (Nichols et al., 2009). First, public banks, on average, have greater separation between owners and managers, leading to more severe agency problems. Public banks have more dispersed equity ownership because they sell their shares to outside equity investors who are not actively involved in management. Because the outside investors do not have enough incentives to closely monitor the actions of managers, managers of public banks are more able to exploit information asymmetry to shirk and consume excessive compensation. In addition, managers of public banks are likely to own a smaller fraction of the banks commone equity. Their smaller shareholdings lead public bank managers to bear a smaller proportion of the costs if they take excessive risk. Therefore, public banks are expected to engage in more extensive contracting and monitoring mechanisms to align the incentives of owners and managers.

The second difference between public and private banks is their access to capital. The shares of a public bank are traded in public capital markets, so it's easier for investors to find counterparties to trade with at a lower transaction cost. Therefore, public banks are likely to enjoy a lower cost of raising capital, avoiding the liquidity premium paid by private banks.

Ex-ante, it is not clear whether public banks or private banks are expected to be *more* affected by CECL when their regulatory capital is closer to its regulatory minimum. On the one hand, public banks may be *less* affected by CECL when they are capital constrained because they have better access to capital markets. Thus, public banks are likely to be more willing to raise new capital than reduce lending to maintain their capital ratio. In this sense, it is less costly for public banks to raise new equity than private banks because they don't have to pay the liquidity premium that a private bank would have to pay. In contrast, private banks must undergo a fundamental and costly change in ownership structure in order to raise new equity (Nichols et al., 2009). For example, a private bank could become publicly listed in order to have access to the public capital market to raise new equity. However, such change would be extremely costly and require additional disclosures that public companies must adhere to. Another option would be to remain private and conduct a private placement of new equity. However, this would mean giving up a significant portion of their existing control rights.

On the other hand, public banks may be *more* affected by CECL during the transition period examined by this study. Public banks were scheduled to adopt CECL two years earlier than private banks[47], so it is more urgent for them to prepare for CECL's adoption sooner.

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[47] CECL's adoption dates for different types of banks have changed several times since CECL was approved by the FASB in 2015. When CECL was officially announced in June 2016, public banks were scheduled to adopt CECL in 2020Q1 and private banks were scheduled to adopt CECL in 2021Q4. Please refer to Appendix A.1 for more details on the evolvement of CECL adoption timeline.

Private banks can first observe how public banks adopt CECL and then decide what to do to mitigate the negative impact of CECL. Since it is unclear whether public or private banks will respond more strongly during the 2016-2018 transition period examined in this study, I state the hypotheses in a non-directional form:

H5a: CECL's negative impact on loan growth varies between public and private banks.

H5b: CECL's negative impact on growth in longer-term loans varies between public and private banks.

H5c: CECL's negative impact on growth in real estate loans varies between public and private banks.

It's also hard to say whether the more severe agency problems of public banks lead them to be more impacted by CECL. At first glance, compared with private banks, public banks may be more affected by CECL because they have worse agency problems, leading to a higher cost of raising new capital when they are capital constrained. However, to mitigate the these agency problems, public banks often utilize stricter monitoring mechanisms. Public banks are subject to SEC's monitoring on their financial reports and must comply with stricter regulations (e.g., SOX). Consistent with public banks engaging in stricter monitoring, Nichols et al. (2019) find that public banks recognize larger and more timely loan losses.

2.4 Research design

2.4.1 Timeline of the difference-in-differences design

Conceptually, this study examines whether banks that are closer to their capital adequacy constraints are more likely to change their lending strategy after CECL was approved. To test my hypotheses, I adopt a difference-in-differences design. For the research design timeline, I use two

12-quarter windows surrounding the time when CECL was approved on November 18, 2015.[48] Since this is close to the end of 2015Q4 and banks are unlikely to change their lending strategy this quarter, I set 2013Q1−2015Q4 as the benchmark period and 2016Q1−2018Q4 as the post-treatment period (i.e., the CECL transition period).

The implementation of Basel III's new capital adequacy rules in the U.S. is a contaminating event that overlaps with the first two years of my benchmark period. Recall that Basel III was agreed upon by the country members of the Basel Committee in November 2010.[49] While Basel III bank capital regulations were finalized in 2013 in the U.S., the rules did not become effective until January 2014 for larger banks and in January 2015 for smaller banks (see section 2.3.4). I assume that U.S. banks would have begun their Basel III preparation in 2010 and would have fully responded to the new rules by 2014Q4 before CECL was approved.

The banking industry's transition, during 2013 and 2014, toward full adoption of the U.S. Basel III rules is expected to bias against my findings. The rules introduced stricter capital ratio requirements, encouraging banks to both increase their level of regulatory capital and decrease their holding of risk-weighted assets. As a result, banks would become less willing to grow their loan assets during my benchmark period. In turn, this lowers the benchmark used for measuring the extent of reduction in loan growth during the CECL transition period, reducing the chance that I find statistically significant results.

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[48] See https://www.fasb.org/jsp/FASB/Document_C/DocumentPage&cid=1176167627008 for the meeting minutes of the FASB's approval on November 18, 2015 in page 3.

[49] Basel III introduced two new regulatory capital ratios (i.e., the Common Equity Tier 1 capital ratio and the supplementary leverage ratio), and it also specified minimum levels of capital adequacy for each of the five regulatory capital ratios.

In order to avoid overlapping with the Basel III implementation period and the CECL transition period, I measure each bank's degree of capital adequacy constraint based on their regulatory capital ratios during 2015. This measure will be discussed more fully in the next section.

The CECL transition period stops at 2018Q4 because, on December 21, 2018, the banking regulators changed the CECL implementation date for regulatory capital. They approved a rule giving banks an option to take three years to phase in CECL's day-1 adverse effects on regulatory capital.[50] A limitation of this study is that I cannot include the period right before CECL was required to be adopted. For a complete history of how the adoption of CECL has evolved since FASB approved it in November 2015, please refer to Appendix A.1. The timeline of my research design is summarized in the figure below:

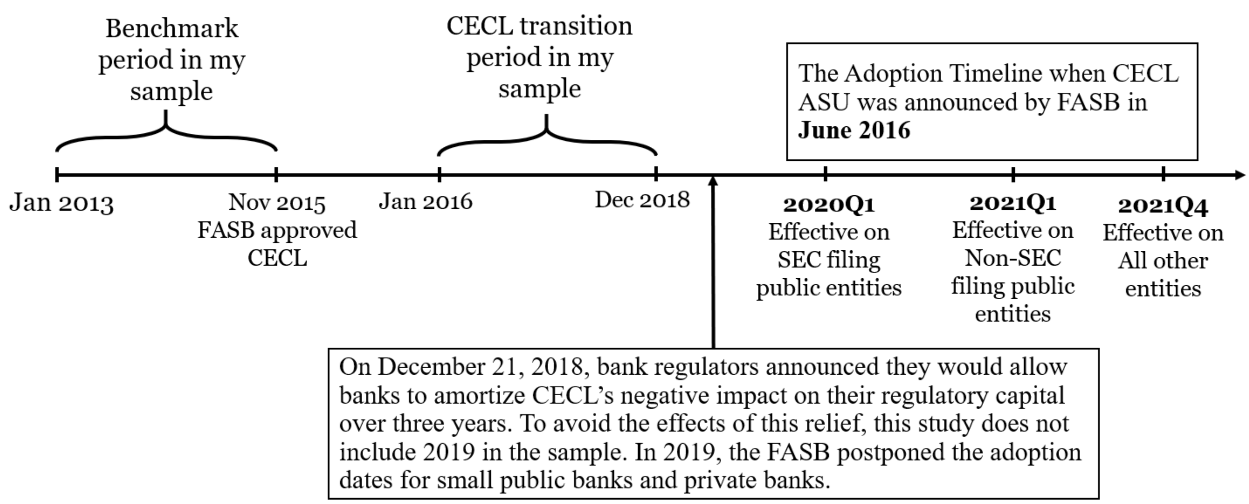

Figure 2.5 Timeline of my research design

[50] See the OCC website on https://www.occ.treas.gov/news-issuances/news-releases/2018/nr-ia-2018-142.html for more details on CECL and regulatory capital.

2.4.2 CECL's impact on bank lending (H1, H2, and H3)

Hypotheses H1, H2, and H3 examine CECL's effect on bank lending through regulatory capital from three perspectives. H1 focuses on the growth rate of total loans; H2 focuses on the growth rate of longer-term loans; H3 focuses on the growth rate of three main loan types, i.e., residential loans, commercial loans, and consumer loans. I use the following model to test these three hypotheses:

$$\mathrm{Y}_{\mathrm{i,t}}^{\mathrm{k}} = \beta^{\mathrm{k}}\ \mathrm{CLOSE\_TO\_CONS\_ALL}_{\mathrm{i}} \times \mathrm{POST}_{\mathrm{t}} + \mathrm{CONTROLS}_{\mathrm{i,t-1}} + \text{Bank Fixed Effects} + \text{Year-quarter Fixed Effects} \qquad (1)$$

where the subscripts i and t denote the bank and quarter, respectively.[51] The superscript k ∈ {H1, H2, H3} and denotes which hypothesis the equation refers to. $\mathrm{Y}_{\mathrm{i,t}}^{\mathrm{H1}}$ equals $\Delta\mathrm{LOANS}_{i,t}$, which indicates the change in total loans during the quarter scaled by total loans at the start of the quarter. $\mathrm{Y}_{\mathrm{i,t}}^{\mathrm{H2}}$ equals $\Delta\mathrm{LONG\_TERM\_LOANS}_{i,t}$, which denotes the change in long-term loans during the quarter scaled by long-term loans at the beginning of the quarter. Long-term loans are defined as loans with a remaining life greater than five years.

$\mathrm{Y}_{\mathrm{i,t}}^{\mathrm{H3}}$ denotes changes in different types of loans, scaled by their beginning of the quarter balance. The two types of real estate loans are combined into a single variable, total real estate loans ($\Delta\mathrm{TOT\_RE\_LOANS}_{i,t}$), which includes residential and commercial real estate loans[52]. Regressions are also estimated for the change in residential real estate loans ($\Delta\mathrm{RES\_RE\_LOANS}_{i,t}$) and commercial real estate loans ($\Delta\mathrm{COM\_RE\_LOANS}_{i,t}$) separately, along with the change in commercial non-real estate loans ($\Delta\mathrm{COM\_NRE\_LOANS}_{i,t}$), and

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[51] All of the analysis in this study is performed at the bank holding company level.

[52] Total real estate loans include all bank real estate loans except for land development and construction loans. These loans are not analyzed in this study.

consumer loans (ΔCONSUMER_LOANS$_{i,t}$). These four types of loans make up approximately 85% of the total loans of the banks in my sample. The ending balances of different loan types are obtained from the Schedule HC-C in the FR Y-9C reports. Commercial non-real estate loans include commercial and industrial loans to both U.S. addressees and non-U.S. addressees. Consumer loans consist of non-real-estate loans to individuals, including credit cards, other revolving credit plans, automobile loans, other loans to individuals, and leases to individuals.

2.4.2.1 Main independent variable

The main independent variable CLOSE_TO_CONS_ALL$_{i}$ measures how constrained a bank's regulatory capital is in the benchmark period, i.e., before CECL was announced in 2015Q4.[53] As mentioned in section 2.3.5, under U.S. Basel III, banks must at all times comply with the five different minimum regulatory capital requirements. CLOSE_TO_CONS_ALL$_{i}$ measures the most restrictive of four of these regulatory capital requirements: the common equity Tier 1 capital ratio, the Tier 1 capital ratio, the total risk-based capital ratio, and the leverage ratio. The fifth regulatory capital ratio (the supplementary leverage ratio) is only reported by large, internationally active banks (see section 2.3).

To calculate CLOSE_TO_CONS_ALL$_{i,t}$ for each quarter during 2015, I first incorporate the four different regulatory capital ratios into a single metric that measures the status of a bank's most restrictive regulatory capital ratio. CLOSE_TO_CONS_ALL$_{i,t}$ is calculated as:

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[53] I only use data from before CECL's approval in 2015Q4 because the status of bank regulatory capital can be influenced by the changes in bank lending strategy during the CECL transition period. I use 2015 quarters only because Basel III regulatory capital minimums were not required for all U.S. banks until January 2015.

$$\text{CLOSE\_TO\_CONS\_ALL}_{i,t}$$

$$= \text{Max}\left\{\frac{4.5\%}{\text{Common equity Tier 1 capital ratio}_{i,t}}, \frac{6\%}{\text{Tier 1 capital ratio}_{i,t}}, \frac{8\%}{\text{Total risk-based capital ratio}_{i,t}}, \frac{4\%}{\text{leverage ratio}_{i,t}}\right\}$$

where the restrictiveness of each regulatory capital ratio is measured by the ratio of its minimum acceptable level under U.S. Basel III divided by the bank's actual regulatory capital level. This ratio is equal to one when the bank's capital ratio is exactly equal to the minimum set by Basel III. If the ratio is less than one, this implies that the bank has excess regulatory capital. A bank that is in breach of the restriction will have a ratio that is greater than one[54]. By finding the maximum of the four ratios, $\text{CLOSE\_TO\_CONS\_ALL}_{i,t}$ considers the type of capital ratio with the greatest closeness to the regulatory minimum and uses it to measure a bank's overall risk of breaching its regulatory capital requirements. The total risk-based capital ratio is by far the most restrictive of the four capital adequacy ratios examined by this study. It is the most restrictive of the four ratios 93.3% of the time. The leverage ratio is most restrictive 3.2% of the time, while the common equity Tier 1 and Tier 1 capital ratios are most restrictive only 1.4% and 2.1% of the time.

I calculate $\text{CLOSE\_TO\_CONS\_ALL}_{i}$ for each bank by taking the average of $\text{CLOSE\_TO\_CONS\_ALL}_{i,t}$ over the four quarters from 2015Q1 to 2015Q4. I use the average

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[54] Another way to interpret the ratio of the minimum constraint over the actual regulatory capital ratio is to consider its inverse. Suppose $\frac{6\%}{\text{Tier 1 capital ratio}} = 0.8$. Its inverse, $\frac{\text{Tier 1 capital ratio}}{6\%}$, can be viewed as the distance to default in terms of the constraint 6%. The 0.8's inverse 1/0.8 = 1.25, meaning that the bank's current Tier 1 capital ratio 1.25 times of the regulatory minimum. As this inverse gets closer to one from above, the probability of violating the capital *covenant* becomes greater. I don't use the inverse in this study because I want to the main variable of interest to capture the level of closeness to capital adequacy constraints, which is more suitable to my research question.

during 2015 rather than measuring closeness at the end of 2015Q4 in order to avoid picking up the temporary seasonal fluctuations of capital status.

For robustness, I also consider just one capital constraint, the ratio of 6% to the bank's Tier 1 capital ratio ($CLOSE\_TO\_CONS\_T1_i$), as an alternative measure of closeness to the capital adequacy constraint. I examine this measure for two reasons. First, $CLOSE\_TO\_CONS\_ALL_i$ is almost always based on the restrictiveness of the total risk-based capital ratio, and that ratio allows banks to add their loan loss allowance back to the capital, up to a maximum of 1.25% of risk-weighted assets. Therefore, CECL's impact on capital constraints is likely to be nullified muted in the case of the total risk-based capital ratio. Thus, it is important to repeat the analysis using the Tier 1 capital ratio to see whether the results still hold. The second reason for using the Tier 1 capital ratio is for comparability with other studies, which most often rely on this measure of the regulatory capital ratio. In addition to measuring the capital constraints in a continuous fashion, I also measure banks' closeness to their regulatory capital constraints using two dichotomous variables. Specifically, I create $MORE\_CONSTRAIN\_ALL_i$, which is a dummy variable set equal to one when $CLOSE\_TO\_CONS\_ALL_i$ is above its median, and I create $MORE\_CONSTRAIN\_T1_i$ as a dummy variable set equal to one when $CLOSE\_TO\_CONS\_T1_i$ is above its median.

$POST_t$ is an indicator variable set to one for the CECL transition period (between 2016Q1 and 2018Q4). The coefficient on $CLOSE\_TO\_CONS\_ALL_i \times POST_t$ (β^k) endeavors to capture the effect of CECL on bank lending during the transition period. If the β^k is significantly *less* than zero, then the empirical finding is consistent with H1, H2, or H3. $CLOSE\_TO\_CONS\_ALL_i$ and $POST_t$ are excluded in Eq. (1) because their coefficients are subsumed by bank fixed effects and year-quarter fixed effects, respectively.

2.4.2.2 Control variables and fixed effects

Following prior literature (e.g., Beatty and Liao 2011; Wheeler 2019), Eq. (1) includes a battery of bank-quarter level control variables ($\mathrm{CONTROLS}_{i,t-1}$). All control variables are measured for bank i at the end of quarter t-1 (or, equivalently, at the beginning of quarter t). In particular, I control for (1) bank size ($\mathrm{SIZE}_{i,t-1}$ measured as log value of total assets), (2) portfolio composition of assets ($\mathrm{RES\_RE\_LOANS}_{i,t-1}$, $\mathrm{COM\_RE\_LOANS}_{i,t-1}$, $\mathrm{COM\_NRE\_LOANS}_{i,t-1}$, $\mathrm{CONSUMER\_LOANS}_{i,t-1}$, $\mathrm{LONG\_TERM\_LOANS}_{i,t-1}$, $\mathrm{TRADING\_ASSETS}_{i,t-1}$; all six variables are scaled by total assets), (3) funding structure ($\mathrm{DEPOSITS}_{i.t-1}$, scaled by total liabilities), (4) liquidity ($\mathrm{CASH\&MKTSEC}_{i,t-1}$, scaled by total assets), (5) loan quality ($\mathrm{NPL}_{i,t-1}$, calculated as non-performing loans scaled by total assets), and (6) profitability ($\mathrm{ROA}_{i,t-1}$, calculated as net income before discontinued operations scaled by average total assets). See Appendix A.2 for detailed definitions of all the variables included in Eq. (1).

Eq. (1) also controls for bank fixed effects, so the identification of the main parameter β^k comes from comparing the bank lending strategies for the same bank before and after CECL's approval date. In other words, Eq. (1) uses each bank as its own control to adjust for all determinants of the lending strategies that tend to be stable over the entire sample period, including business complexities, operating cost structures, the strictness of different banking regulators, and corporate governance structures. Eq. (1) also controls for year-quarter fixed effects, so the identification of the main parameters excludes the factors that affect all sample banks equally in each year-quarter. Such factors would include changes in Federal funds rates, monetary policy, national GDP growth, the national unemployment rate in each quarter, etc. All standard errors are two-way clustered at the bank and year-quarter levels.

2.4.3 Cross-sectional analysis (H4 and H5)

2.4.3.1 Regulatory leniency (H4)

H4a, H4b, and H4c predict that CECL's impact on bank lending through the capital channel is stronger when the banking regulators are more lenient. To test these hypotheses, I rely on the regulator leniency index developed by Agarwal et al. (2014) [55] to identify banks with a more lenient state regulator. As discussed earlier, Agarwal et al. (2014)'s measure of regulator leniency utilizes a data set from 1996 to 2010 containing the results of all on-site examinations conducted by U.S. banking regulators. They measure state-level regulatory leniency by calculating the average difference in the supervisory rating given to the bank by its state regulator versus the one given to the same bank by its federal regulator. Given that state regulators are found to be more lenient than federal regulators on average, I interpret banks in states with larger rating differences between state and federal regulators as subject to lower regulatory scrutiny relative to states with smaller differences between the two.

Agarwal et al. (2014)'s regulatory leniency index is assigned to each bank depending on the leniency of the state regulator where the bank is located. This variable is denoted by REG_LEN_i. Since the leniency index is only defined for state-chartered banks, I follow Costello et al. (2019) by assigning a nonzero value when bank i is regulated by a state authority and a value of zero when bank i is solely regulated by federal regulators. The banks that are solely regulated by federal regulators (i.e., federally chartered banks) are included in the analysis in an effort to benchmark the average strategic response to CECL of the state-chartered banks with similar characteristics.

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[55] The regulatory leniency index is available at Amit Seru's website, https://aseru.people.stanford.edu/.

For H4, I conduct two sets of analyses. For the first set, I split the sample at the median, based on REG_LEN_i, into two equal-sized groups. Banks with a more lenient regulator are denoted by $HIGH\_REG\_LEN_i = 1$, and those with a less lenient regulator are denoted by $HIGH\_REG\_LEN_i = 0$. Then I estimate the coefficients of Eq. (1) using the two subsamples. If the coefficient on $CLOSE\_TO\_CONS\_ALL_i \times POST_t$ is significantly smaller for the more lenient subsample than for the less lenient subsample, then the results would be consistent with H4a, H4b, H4c. Such a result would be consistent with regulatory leniency strengthening CECL's anticipatory impact on bank lending through the capital channel.

The second set of analyses directly relies on REG_LEN_i as a continuous measure of regulatory leniency to test H4a, H4b, and H4c. I estimate the following regression:

$$\mathrm{Y}_{i,t}^{k} = \beta^{k}\mathrm{CLOSE\_TO\_CONS\_ALL}_i \times \mathrm{POST}_t \times \mathrm{REG\_LEN}_i + \gamma\, \mathrm{CLOSE\_TO\_CONS\_ALL}_i \times \mathrm{POST}_t + \delta\, \mathrm{REG\_LEN}_i \times \mathrm{POST}_t + \mathrm{CONTROLS}_{i,t-1} + \text{Bank Fixed Effects} + \text{Year-quarter Fixed Effects} \qquad (2)$$

where the subscripts i and t denote the bank and quarter, respectively. The superscript k ∈ {H4a, H4b, H4c} and denotes which hypothesis the equation refers to. $Y_{i,t}^{H4a}$ equals $\Delta LOANS_{i,t}$. $Y_{i,t}^{H4b}$ equals $\Delta LONG\_TERM\_LOANS_{i,t}$. $Y_{i,t}^{H4c}$ equals $\Delta TOT\_RE\_LOANS_{i,t}$. Other variables are defined previously. See Appendix A.2 for detailed definitions of all the other variables included in Eq. (2).

2.4.3.2 Public banks versus private banks (H5)

As discussed previously, H5a, H5b, and H5c state the hypotheses in a non-directional form. These three hypotheses examine whether CECL's impact on bank lending through the capital channel varies between public and private banks. To test these hypotheses, I split the sample into two subsamples: publicly listed banks and privately held banks. Then I estimate the coefficients of Eq. (1) using the two subsamples. If the coefficients on $CLOSE\_TO\_CONS\_ALL_i \times POST_t$ estimated using the two subsamples are significantly different, then the empirical finding is consistent with bank ownership structure being an important factor in determining CECL's impact on bank lending through the capital channel.

2.5 Sample selection process and univariate analysis

2.5.1 Sample selection process

The sample selection begins with all U.S. bank holding companies (BHCs) that file the FR Y-9C quarterly regulatory reports between 2013Q1 and 2018Q4. As already mentioned, the sample period stops at 2018Q4 because, in December 2018, the banking regulators approved a rule that gives banks an option to phase in CECL's day-1 adverse effects on regulatory capital over three years (see section 4.1). I obtain the FR Y-9C data from the Federal Reserve Bank of Chicago website[56]. Since each Y-9C report is at the BHC level, it contains the consolidated financial report of a parent BHC and all bank subsidiaries under the BHC's control. The FR Y-9C reports include detailed information on income statement items, balance sheet items, and off-balance sheet activities.

$LONG\_TERM\_LOANS_{i,t-1}$ (defined as the percentage of a bank's assets made up of loans with five years or greater remaining life) is not available in the FR Y-9C reports, so I collect them from the Call Report data[57] at the bank-subsidiary level. If a BHC has only one bank subsidiary, I merge this variable directly with the FR Y-9C data. However, if a BHC has

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[56] The FR Y9C data is available at https://www.chicagofed.org/banking/financial-institution-reports/bhc-data.
[57] The Call Report data is available at https://www.fdic.gov/foia/ris/.

two or more bank subsidiaries, I aggregate the long-term loan amounts and merge the aggregate with the FR Y-9C data. Then I use the aggregate amount of long-term loans at the end of each year-quarter to derive the change in long-term loans (ΔLONG_TERM_LOANS$_{i,t}$).

The regulatory leniency index developed by Agarwal et al. (2014) is collected from Amit Seru's website.[58] When a BHC has two or more bank subsidiaries in different states, I merge the state-level regulatory index (REG_LEN$_i$) into BHC level data using a weighted average of the subsidiary level regulatory leniency index. The weights are based upon the total assets of each bank subsidiary. Following Costello et al. (2019), I assign the federal-chartered banks a zero value as they are solely regulated by the federal regulator, and so their difference is zero.

The final step of the sample selection process is to exclude all BHCs with at least one of the following characteristics: (1) they do not own an FDIC-insured bank subsidiary, (2) their loans-to-assets ratio is below 10 percent (inactive in the loan market), (3) they have zero or negative total deposits, (4) they have asset growth greater than 25% (this could indicate they have been involved in a merger), (5) they have less than ten quarters of observations either before or after 2015Q4, which was the time when CECL was approved (to ensure a balanced panel), or (6) they have one or more missing regression variables. To reduce the influence of outliers, I winsorize all continuous variables at the 1% and the 99% levels. Variable definitions are provided in Appendix A.2.

Table 2.1 Panel A summarizes the sample selection process for the FR Y-9C sample, resulting in a final sample of 7,073 bank-quarter observations by 313 unique banks. Table 2.1 Panel B shows the number of banks in each quarter. Table 2.1 Panel B shows that during the

[58] Amit Seru's website is available at https://aseru.people.stanford.edu/.

period from 2013Q1 to 2018Q2, the number of unique banks is around 305 per quarter. However, starting from 2018Q3, the number of banks drops by 42% from 306 to 178 because the Federal Reserve increased the asset-size threshold for filing the Y-9C from $1 billion to $3 billion, effective in September 2018.

Table 2.1 Panel C shows the numbers of the large, medium, and small banks in my sample. Small banks with assets less than $10 Billion make up 85% of my sample (5,978 out of 7,073 bank-quarters). Medium banks with assets between $10 and $50 Billion make up 9% of my sample, and large banks with assets greater than $50 Billion make up 6% of my sample.

To identify the public banks in my sample (for H5), I use the CRSP-FRB link file from the Federal Reserve Bank of New York's website59. Table 2.1 Panel D shows the numbers of public and private banks in my sample. Just over fifty percent of my sample are publicly traded banks, and the rest are privately held banks.

In my sample, leniently regulated banks are not all privately held. Neither all strictly regulated banks are publicly listed. Table 2.1 Panel E shows that in my sample, there are 3,471 leniently regulated banks (i.e., banks with REG_LENi higher than the sample median) and 3,602 strictly regulated banks (i.e., banks with REG_LENi lower than the sample median). Among the 3,471 leniently regulated banks, 1,749 (i.e., 50.4%) of them are privately held. Moreover, only 2,004 of the 3,602 (i.e., 55.6%) strictly regulated banks are publicly listed.

[59] The CRSP-FRB link file is available at https://newyorkfed.org/research/banking research/datasets.html.

2.5.2 Descriptive statistics

Table 2.2 Panel A reports the descriptive statistics of key variables used in my analysis. On average, loans[60] account for 66% of the total assets of the banks in my sample. Loans consist of residential real estate loans (accounting for 20% of assets); commercial real estate loans (accounting for 20% of assets); commercial non-real estate loans (accounting for 13% of assets); and consumer loans (accounting for 2.9% of assets). Other loans account for the remaining 9.7% of assets[61]. Across the entire sample period, the average quarter-to-quarter growth rate in loans ($\Delta LOANS_{i,t}$) is 2.0%, consistent with prior studies (e.g., Beatty and Liao 2014; Wheeler 2020). The quarter-to-quarter growth rate of loans with a remaining life greater than five years ($\Delta LONG\_TERM\_LOANS_{i,t}$) has a mean of 2.7%.

Commercial non-real estate loans grew at a faster rate than total real estate loans and consumer loans during the period of my study. The average quarter-to-quarter growth in commercial non-real estate loans ($\Delta COM\_NRE\_LOANS_{i,t}$) is 2.6%; the quarter-to-quarter growth rates in residential and commercial real estate loans ($\Delta RES\_RE\_LOANS_{i,t-1}$, and $\Delta COM\_RE\_LOANS_{i,t-1}$) are 1.6% and 2.1%, respectively, on average. The average growth rate in consumer loans ($\Delta CONSUMER\_LOANS_{i,t}$) is 1.4% during the sample period.

For the main independent variables, banks' closeness to their Tier 1 capital adequacy constraints ($CLOSE\_TO\_CONS\_T1_i$) has a mean (median) of 0.462(0.469)[62]. A greater closeness measure represents a higher risk of violating the Tier 1 capital ratio requirement.

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[60] Total loans include both loans and lease financing receivables.

[61] Other loans include construction, land development, and other land loans; loans to depository institutions and acceptances of other banks; loans to non-depository financial institutions; and loans to foreign governments, and official institutions (including foreign central banks) in the Y9C report.

[62] As previously mentioned, I winsorize $CLOSE\_TO\_CONS\_T1_i$ at 1% and 99% levels. Before being winsorized, $CLOSE\_TO\_CONS\_T1_i$ has a maximum of 0.942 (untabulated).

Alternatively, one minus the closeness can be viewed as the distance to default on the Tier 1 ratio *covenant*. Because $1 - \frac{6\%}{\text{Tier 1 capital ratio}} = \frac{\text{Tier 1 capital ratio} - 6\%}{\text{Tier 1 capital ratio}}$, the numerator can be thought of as the difference between the bank's Tier 1 ratio and the minimum requirement. Thus, $1 - \frac{6\%}{\text{Tier 1 capital ratio}}$ can be interpreted as *the margin of safety* or the % by which the current Tier 1 capital ratio can decrease before reaching its minimum regulatory requirement. The 0.462 mean of $\text{CLOSE\_TO\_CONS\_T1}_i$ shows that an average bank can afford a 53.8% (i.e., 1 – 46.2%) decline in its current Tier 1 capital ratio before violating the Tier 1 ratio covenant.

As discussed in section 4.2, $\text{CLOSE\_TO\_CONS\_ALL}_i$[63] incorporates the four capital ratio types (i.e., the common equity Tier 1 capital ratio, the Tier 1 capital ratio, the total risk-based capital ratio, and the leverage ratio) into one metric that measures how close a bank is to its most restrictive capital adequacy constraints, where it would be subject to prompt corrective action by its regulators. $\text{CLOSE\_TO\_CONS\_ALL}_i$ has a mean (median) of 0.559 (0.564). As in the last paragraph, a mean 0.559 for CLOSE_TO_CONS_ALL indicates that the most restrictive capital ratio can afford a 44.1% (i.e., 1 – 55.9%) decline before reaching its regulatory minimum.

Table 2.2 panel B presents the sample descriptive statistics during the periods before and after FASB approved CECL in 2015Q4. On average, banks hold a larger portion of their assets as loans after CECL was approved than during the benchmark period. The average percentage of loans over total assets increases from 64.5% to 68.0% during the CECL transition period. Another interesting aspect of changes during the CECL transition period is the changes in the

[63] As previously mentioned, I winsorize $\text{CLOSE\_TO\_CONS\_ALL}_i$ at 1% and 99% levels. Before being winsorized, $\text{CLOSE\_TO\_CONS\_ALL}_i$ has a maximum of 1.186 (untabulated), indicating that there are some banks that violated their capital ratio requirement during 2015Q1 and 2015Q4. I further check my sample and discover that greater-than-one maximum is due to one bank (i.e., CIB MARINE BANCSHARES, INC.). Excluding this bank from the sample does not change the inferences from my analysis.

capital ratios. The average of total equity over assets ($EQUITY\_TOTAL\_ASSETS_{i,t}$) increases from 10.5% to 10.8%. However, the three risk-based regulatory capital ratios decrease. The average Tier 1 capital ratio ($T1\_CAP\_RATIO_{i,t}$) decreases from 14.0% to 13.5%; the average total risk-based capital ratio ($TOTAL\_CAPITAL\_RATIO_{i,t}$) decreases from 15.4% to 14.9%; and the average common equity Tier 1 capital ratio ($CET1\_CAP\_RATIO_{i,t}$)[64] decreases from 12.6% to 12.5%. The average bank does not appear to add new regulatory capital in anticipation of CECL.

2.5.3 Correlations

Table 2.2 panel C reports the correlation matrix of the regression variables for descriptive purposes. The pair-wise correlations among the regression variables do not validate or reject the hypotheses because the identification in my regression models relies on difference-in-differences and fixed effects.

Not surprisingly, the two measures of regulatory capital constraints, $CLOSE\_TO\_CONS\_T1_i$ and $CLOSE\_TO\_CONS\_ALL_i$, are significantly and highly correlated, implying that these two variables capture similar economic phenomena. However, their high correlation does not necessarily imply that the two variables will produce qualitatively similar results in the regression analysis because the correlation is just univariate. $CLOSE\_TO\_CONS\_T1_i$ and $CLOSE\_TO\_CONS\_ALL_i$ can have different economic implications after controlling for bank characteristics, bank fixed effects, and year-quarter fixed effects.

[64] The number of observations for $CET1\_CAP\_RATIO_{i,t}$ is less than the numbers for other variables because it is only available for all banks after U.S. Basel III rules becomes effective in 2015Q1.

For the main dependent variables, $\Delta LOANS_{i,t}$ is positively correlated with $CLOSE\_TO\_CONS\_ALL_{i,t}$, implying that banks that are closer to their capital adequacy constraints tend to have higher total loan growth across the entire sample period. $\Delta TOT\_RE\_LOANS_{i,t}$ and $\Delta COM\_NRE\_LOANS_{i,t}$ are positively correlated with $CLOSE\_TO\_CONS\_ALL_{i}$, suggesting that more constrained banks had higher growth in their long-term real estate and commercial loans during the entire sample period.

2.5.4 Difference-in-differences univariate analysis

Table 2.3 reports the difference-in-difference univariate analysis for the FR Y-9C sample. Panel A reports the descriptive statistics for banks that are more versus less capital-constrained separately for the benchmark period and the CECL transition period. Capital-constrained is determined based on a bank's average CLOSE_TO_CONS_ALL during the four quarters of 2015.[65] More (less) capital-constrained banks are the banks with average $CLOSE\_TO\_CONS\_ALL_{i}$ in 2015 above (below) the median for all banks.

In Panel A, during the benchmark period, the average growth in total loans ($\Delta LOANS_{i,t}$) is 2.45% (see column A1) for more capital-constrained banks and 1.66% (see column B1) for less capital-constrained banks, and the difference in these means is significant. It's consistent with the notion that more capital-constrained banks are more aggressive in their lending policy. During the CECL transition period, the average $\Delta LOANS_{i,t}$ difference between the two bank groups narrows to only 0.02% (specifically, 1.98% for more capital-constrained banks in column C1, and 1.96% for other banks), and it's no longer significantly different. The trend we observed

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[65] Note that the capital-constrained is measured for each bank before CECL was announced, but after Basel III became effective for all banks. Recall that the final set of banks were required to adopt Basel III by January 1, 2015.

is consistent with CECL negatively affecting more capital-constrained banks to a greater extent. If the change to CECL is expected to result in a more precise measure of regulatory capital this prospect may be motivating the more capital-constrained banks to be less aggressive in lending. However, it could also reflect mean reversion in loan growth rates.

The average growth in loans secured by real estate (i.e., total real estate loans, residential real estate loans, and commercial real estate loans) also show a similar trend to the growth of total loans. In the benchmark period, the more capital-constrained banks were growing their real estate loans at a significantly faster rate, but in the CECL transition period, the two groups of banks came closer together in their real estate loan growth rates. Interestingly, the growth rate for long-term loans ($\Delta LONG\_TERM\_LOANS_{i,t}$) declined from the benchmark period to the CECL transition period for both the more and less capital-constrained banks. If this is due to changes in interest rates during the transition period, the year-quarter fixed effects in the regressions should help to control for this.

To analyze the differences in covariate balances between more capital-constrained banks and other banks, I follow Imbens and Wooldridge (2009), who compute the normalized differences for each variable separately in the pre- and post-periods. Normalized differences greater than 0.25 can result in specification sensitivity in the linear regression model.[66] The normalized difference column is calculated as $(\overline{X}_{MORE} - \overline{X}_{LESS})/\sqrt{S^2_{MORE} - S^2_{LESS}}$ where $\overline{X}_{MORE}$ and S^2_{MORE} ($\overline{X}_{LESS}$ and S^2_{LESS}) are the sample means and sample variances for more (less) capital-constrained banks. Among all the required variables in the regression, only the two normalized

[66] This method is also used in other published accounting papers (e.g., Nicoletti 2018; Iselin and Nicoletti 2017).

differences of $LOANS_{i,t-1}$ and $COM\_NRE\_LOANS_{i,t-1}$ are above the recommended 0.25 threshold, suggesting that more and less capital-constrained banks are comparable.

Table 2.3 Panel B reports the difference-in-differences of the regression variables. The loan growth rate ($\Delta LOANS_{i,t}$) for the more capital-constrained banks decreases more than for the less capital-constrained banks after the FASB approved CECL, consistent with more capital-constrained banks, during the CECL transition period, issuing fewer loans as a response to the anticipated CECL capital shock. The change in the growth rate of total real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$) is significantly less for the more capital-constrained banks than the less constrained banks, consistent with banks that are closer to their capital adequacy constraints originating fewer real estate loans during the CECL transition period. However, these findings are only at the univariate level, and controlling for other determinants of lending is required for further inferences.

2.6 Main results

2.6.1 CECL and bank lending (H1)

H1 predicts that banks that are closer to their capital adequacy constraints originate fewer loans after CECL was approved, compared to other banks that are not as close to their capital adequacy constraints. Table 2.4 presents the results of estimating Eq. (1) for H1. The dependent variable is the quarterly loan growth rate ($\Delta LOANS_{i,t}$). Columns [1] and [2] show the results when closeness to the capital adequacy constraints is measured using the most restrictive of the four types of regulatory capital ratios. Columns [3] and [4] show the results when closeness is measured using only the Tier 1 capital ratio. In columns [1] and [3], I use the continuous specifications of closeness to constraints, while in columns [2] and [4], I use the binary specifications (i.e., whether the corresponding version of closeness is greater than its median).

The main coefficient of interest is $POST_t$ interacted with one of the capital adequacy constraint measures ($CLOSE\_TO\_CONS\_ALL_i$, $MORE\_CONSTRAIN\_ALL_i$, $CLOSE\_TO\_CONS\_T1_i$, and $MORE\_CONSTRAIN\_T1_i$). All coefficients on the four interaction terms are negative and significant, consistent with H1. The main coefficients of interest are also economically significant. For example, in column [2], the coefficient on $MORE\_CONSTRAIN\_ALL_i \times POST_t$ (i.e., -0.421 percentage points) is equivalent to 20.93% of average total loan growth.[67]

For the control variables in Table 2.4, the coefficients on the log value of total assets ($SIZE_{i,t-1}$) are significant and negative, suggesting that larger banks experienced less loan growth. The coefficients on $RES\_RE\_LOANS_{i,t-1}$ (residential real estate loans), $COM\_RE\_LOANS_{i,t-1}$ (commercial real estate loans), and $COM\_NRE\_LOANS_{i,t-1}$, are also significant and negative. This finding suggests that banks that held a larger fraction of their assets in these three types of loans at the beginning of a quarter were less likely to grow their loan portfolio. The coefficients on non-performing loans ($NPL_{i,t-1}$) are significant and negative. This finding suggests that banks experiencing greater difficulty collecting their loans grew their loan portfolios more slowly, consistent with the capital crunch theory.

2.6.2 CECL and long-term loans (H2)

H2 predicts that banks that are closer to their capital adequacy constraints hold fewer long-term loans after CECL was approved, compared to other banks that are not as close to their capital adequacy constraints. Table 2.5 presents the results of estimating Eq. (1) for H2. The dependent variable is the quarter-to-quarter growth rate of loans with five years or more of

[67] The 20.93% decrease is calculated by dividing the coefficient estimate (-0.421%) by the average loan growth rate in the sample which is 2.011%.

remaining life (ΔLONG_TERM_LOANS$_{i,t}$). As in the previous table, Columns [1] and [2] show the results when closeness to the capital adequacy constraints is measured using the most restrictive of the four types of regulatory capital ratios. Columns [3] and [4] show the results when closeness is measured using only the Tier 1 capital ratio. Both continuous and binary specifications of the closeness to constraints measures are used.

All the interaction terms between closeness to capital adequacy constraints and the dummy variable for the post period in the four columns are insignificant. These results fail to support H2 that more capital-constrained banks reduce their holding of longer-term loans during the CECL transition period.[68]

For the control variables in Table 2.5, the coefficients on residential real estate loans (RES_RE_LOANS$_{i,t-1}$) and commercial real estate loans (COM_RE_LOANS$_{i,t-1}$) are significant and positive, consistent with these loans, on average, having the highest loan maturity. The coefficients on TRADING_ASSETS$_{i,t-1}$ are also significant and negative, suggesting that banks that issue more longer-term loans hold fewer trading assets.

2.6.3 CECL and loan types (H3)

H3 predicts that banks that are closer to their capital adequacy constraints issue fewer total real estate loans after CECL was approved, compared to other banks that are not as close to their capital adequacy constraints. Table 2.6 presents the results of estimating Eq. (1) for H3. The dependent variables are (a) the growth rate of total real estate loans (ΔTOT_RE_LOANS$_{i,t}$), (b) the growth rate of commercial non-real estate loans (ΔCOM_NRE_LOANS), and (c) the growth

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[68] I have repeated this analysis using alternative definitions of long-term loans (such as loans with remaining life greater than 15 years), and the interaction coefficients are never significant. These results imply that during the CECL transition period, more capital constrained banks were not likely to reduce the amount of longer-term loans that they held.

rate of consumer loans (ΔCONSUMER_LOANS) in columns [1], [2], and [3], respectively. Columns [4] and [5] show the results when I set the dependent variables as the growth rate of the two components of total real estate loans, *residential* real estate loans (ΔRES_RE_LOANS$_{i,t}$) and *commercial* real estate loans (ΔCOM_RE_LOANS$_{i,t}$). For brevity, I only present the results when the closeness to the capital adequacy constraints is measured by the most restrictive of the four regulatory capital ratio types, transformed into a dummy variable indicating whether the closeness is greater than its median. The results are qualitatively similar when I use the other three specifications of closeness.

In column [1], the coefficient on the interaction term, MORE_CONSTRAIN_ALL$_i$ × POST$_t$, is negative and significant, while in columns [2] and [3], the interaction term coefficients are insignificantly different from zero. This empirical finding supports H3. Specifically, banks that are closer to their capital constraints are more likely to reduce their real estate loan supply in anticipation of CECL's negative shock to regulatory capital. The finding is also economically significant. In column [1], the coefficient on MORE_CONSTRAIN_ALL$_i$ × POST$_t$ (i.e., -0.428 percentage points) is equivalent to a 23.75% decrease in the average growth rate of total real estate loans.[69]

Total real estate loans consist of loans secured by residential properties and loans secured by commercial properties. These two types of loans might exhibit different risk profiles. Therefore, banks may reformulate their lending strategies differently on these two different types of loans in anticipation of CECL. Thus, I further check whether the growth rates of these two

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[69] The 23.75% decrease is obtained from dividing the coefficient estimate (0.428%) by the average growth rate of long-term real estate loans, 1.802%.

loan types are affected differently during the CECL transition period. Columns [4] and [5] show the results when I set the dependent variables as the growth in residential real estate loans ($\Delta RES\_RE\_LOANS_{i,t}$) and commercial real estate loans ($\Delta COM\_RE\_LOANS_{i,t}$). The results show that more capital-constrained banks reduce their growth only in the real estate loans secured by residential properties.

For the control variables in Table 2.6, the coefficients on bank size ($SIZE_{i,t-1}$) are significant and negative in all regressions, consistent with larger banks being less likely to expand the supply of each type of loan. The coefficients on residential real estate loans ($RES\_RE\_LOANS_{i,t-1}$) and commercial real estate loans ($COM\_RE\_LOANS_{i,t-1}$) are significant and negative in columns [1], [4], and [5], consistent with the mean reversion of loan portfolio allocation. The coefficients on non-performing loans ($NPL_{i,t-1}$) are significant and negative in all regressions, consistent with banks with higher non-performing loans experiencing slower growth in their loan portfolios.

2.6.4 Cross-sectional analyses (H4 and H5)

2.6.4.1 Regulatory leniency (H4)

H4 predicts that CECL's impact on bank lending through the regulatory capital constraints is stronger when the banking regulators are more lenient. As discussed previously, I rely on the Agarwal et al. (2014) index to identify the degree of regulatory leniency. Table 2.7 Panel A presents the results of estimating Eq. (1) on the two subsamples: banks with higher-than-median regulatory leniency and banks with lower-than-median regulatory leniency. Table 2.7 Panel B reports a test of whether the coefficient on the variable of interest is significantly different between the two subsamples.

The first two columns of Table 2.7 estimate Eq. (1) separately for the more leniently and less leniently regulated subsamples with loan growth rate ($\Delta LOANS_{i,t}$) as the dependent variable. Only the more leniently regulated subsample shows a significantly lower loan growth for more capital-constrained banks during the CECL transition period. Panel B shows that the interaction term ($MORE\_CONSTRAIN\_ALL_i \times POST_t$) in Column [1] is marginally significantly smaller than the one in column [2] (coef. diff. = -0.508, one-tailed p-value = 0.06), consistent with more leniently regulated banks reducing their loan growth rates (H4a).

Table 2.7 Columns [3] and [4] report the subsample results for H2 when the dependent variable is loans with remaining life greater than five years ($\Delta LONG\_TERM\_LOANS_{i,t}$). The more and the less leniently regulated subsamples both show an insignificantly lower growth rate of longer-term loans for the more capital-constrained banks during the CECL transition period. Panel B shows that the interaction term ($MORE\_CONSTRAIN\_ALL_i \times POST_t$) in Column [3] is significantly smaller than the one in column [4] (coef diff = -1.954 one-tailed p-value = 0.04), consistent with H4b.

The final two columns of Table 2.7 present the results when the dependent variable is the growth rate of total real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$) for the two subsamples. The interaction term ($MORE\_CONSTRAIN\_ALL_i \times POST_t$) is only significantly negative for the more leniently regulated banks, and the term for the more leniently regulated banks is significantly smaller than the term for the less leniently regulated banks (coef diff = -0.929, one-tailed p-value = 0.01), consistent with H4c.

For robustness, I check whether the above findings still hold if I use the continuous measure of Agarwal et al. regulatory leniency rather than a binary measure created using the median of the leniency index. Table 2.8 presents the H4 results of estimating Eq. (2), which includes the leniency index on the right-hand side of the regression model. Columns [1], [2], and [3] show the coefficient estimates for Eq. (2). The dependent variables are loan growth rate ($\Delta LOANS_{i,t}$), long-term loan growth ($\Delta LONG\_TERM\_LOANS_{i,t}$), and the growth rate of total real estate loans (ΔTOT_RE_LOANS). The coefficients of interest ($MORE\_CONSTRAIN\_ALL_i \times REG\_LEN_i \times POST_t$) in columns [1], [2], and [3] are significantly negative, consistent with H4a, H4b, and H4c.

2.6.4.2 Public banks versus private banks (H5)

H5 recognizes that CECL's impact on bank lending through regulatory capital can vary between public and private banks. Table 2.9 Panel A presents the results of estimating Eq. (1) separately for the two subsamples: public banks and private banks. Table 2.9 Panel B tests whether the coefficient on the variable of interest ($MORE\_CONSTRAIN\_ALL_i \times POST_t$) is significantly different between public and private banks.

The first two columns of Table 2.9 present the public and private subsample results for H1 when the dependent variable is loan growth rate ($\Delta LOANS_{i,t}$). Both public and private capital-constrained banks reduce their loan growth in the CECL transition period. Panel B shows the reduction in loan growth by capital-constrained public banks is not significantly different from that of private banks in column [2].

Table 2.9 Columns [3] and [4] report the public and private subsample results for H2 when the dependent variable is growth in loans with a remaining life of greater than five years ($\Delta LONG\_TERM\_LOANS_{i,t}$). The interaction term ($MORE\_CONSTRAIN\_ALL_i \times POST_t$) is only significantly negative for public banks, and it is significantly smaller for public banks relative to private banks (coef diff = -2.969, two-tailed p-value = 0.01), consistent with H5b.

The last two columns of Table 2.9 present the results when the dependent variable is the growth rate of total real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$) for the two subsamples. In Panel A, when I estimate the regression separately for public and private banks, the reductions in real estate loan growth during the CECL transition period are not significantly different from zero for either public or private capital-constrained banks.[70] Panel B shows that the reductions in real estate loan growth for the two bank groups are not significantly different from each other.

2.7 Additional analysis

2.7.1 CECL and small business lending

2.7.1.1 Motivation

The main analysis in this study uses bank-level data from the FR Y-9C reports. One caveat of using bank-level data is that we cannot control for the different economic conditions banks face in their branch locations. The results may be biased if the main variable (i.e., the closeness to the capital adequacy constraints) in the regression is correlated with the changes in local economic conditions. Another caveat is that the loan origination amount is not available from the Y-9C bank-level data, so I estimate the loan origination using loan growth rate (i.e., the change in loan balances during the quarter scaled by the start of quarter balances). However, the loan growth rate is also determined by loan repayments, charge-offs, and the sale of loans.
To mitigate the two caveats of using bank-level data, I conduct a set of analyses using the Community Reinvestment Act (CRA) small business lending data. The CRA data provides the annual amount of small business loan origination by each bank in each county where it operates

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[70] In untabulated results, the reductions in both residential and commercial real estate loan growth during the CECL transition period are not significantly different from zero for either public or private capital-constrained banks

in the U.S. This enables me to keep local credit demand constant, by comparing the new small business loans originated within the same county-years, across banks affected differently by CECL.

Small business loans are important because of the role small businesses play in the U.S. economy. Small businesses account for over 43% of U.S. private, nonfarm gross domestic product (see, e.g., Kobe 2018), and they are responsible for 47.3% of all U.S. employment.[71] Bank loans are the primary source of external financing for small businesses (Dou 2020; Granja et al. 2020; Cortés et al. 2020). A reduction in the credit supply to this sector would be detrimental to the growth of small businesses and the role they play in the broader economy. Even though in section 6.3, I find that CECL does not significantly impact the quarterly commercial loan growth rate, I can't generalize this finding to commercial loans issued to different types of commercial borrowers. Compared to large firms, small firms are riskier and informationally opaque. Prior research emphasizes that small firms lack quantitative data, audited financial statements, and other types of *hard* and easily transmitted information (see, e.g., Petersen and Rajan 1994, 1995; Berger and Udell 1995; Agarwal, Chang, and Yavas 2012). Consequently, lending to small firms relies more on *soft* information, such as the lender's subjective assessment of the borrower's character and the community's economic prospects (Levine et al. 2020). As Stein (2002) argues, *soft* information (such as the firmness of a borrower's handshake, the cleanliness of her premises, or her punctuality in meetings) can reveal valuable information about the likelihood of repayment.

[71] See the U.S. official small business statistics in 2019, which is available at https://cdn.advocacy.sba.gov/wp-content/uploads/2019/04/23142719/2019-Small-Business-Profiles-US.pdf.

2.7.1.2 Data and research design

The small business lending CRA data is collected from the Federal Financial Institutions Examination Council.[72] Small business loans are defined as commercial loans with a principal amount of less than or equal to $1 million. The CRA data reports the annual volume of small business loans originated by banks that have total assets greater than $1 billion. Each bank's small business loans are stratified by the county of the loan recipient. As the small business loan volume amounts in the CRA data are reported at the bank subsidiary level, I aggregate this data to the BHC-county-year level.

Table 2.10 reports the sample selection process and composition. The sample used for the small business lending analysis includes 256,849 bank-county-year observations with 256 unique banks and 3,084 unique counties for the years 2013 to 2018. Table 2.11 reports the descriptive statistics for the small business lending sample. The average annual amount of small business loans originated per bank-county ($SBL_{i,c,t}$) is $2.517 million at the bank-county-year level, which is comparable to prior studies (e.g., Dou 2020). I use the following model to examine whether the anticipation of CECL had a negative impact on small business lending between 2016Q1 and 2018Q4:

$$\mathrm{LOG}_{\mathrm{SBL}_{i,c,t}} = \delta\ \mathrm{CLOSE\_TO\_CONS\_ALL}_i \times \mathrm{POST}_t + \mathrm{CONTROLS}_{i,t-1} + \text{Bank Fixed Effects} + \text{County-year Fixed Effects} \quad (3)$$

where $LOG\_SBL_{i,c,t}$ denotes the log value of small business loan origination for bank i in county c during year t. As I do not observe the total amount of small business loans outstanding at the

[72] The CRA data is available at https://www.ffiec.gov/cra/default.htm. Also see, e.g., Bord et al. (2018) for a more comprehensive description of the CRA data.

bank-county level, I do not measure the small business loan growth rate. Instead, I use the log of loan originations. $CLOSE\_TO\_CONS\_ALL_i$ indicates banks' closeness to their capital adequacy constraints. $CONTROLS_{i,t-1}$ includes the same set of variables as the one in Eq. (1), except that they are at bank-year level. See Appendix A.2 for detailed definitions. Eq. (3) includes bank fixed effects to control for time-invariant bank-level factors that influence a bank's supply of small business loans. Eq. (3) also includes county-year fixed effects to control each county's local economic condition during a particular sample year. To reduce the influence of outliers, I winsorize all continuous variables at the 1% and the 99% levels. All standard errors are two-way clustered at the bank and year-county levels.[73]

2.7.1.3 Results

Table 2.12 presents the results of estimating Eq. (3). Columns [1], [2], [3], and [4] show the results when the closeness to the capital adequacy constraints is measured using the four different regulatory capital ratios used to test H1. In all four regressions, more capital-constrained banks in the post-period reduce the growth rate of their small business lending, consistent with H1.

Table 2.13 columns [1] and [2], and Table 2.14 present the tests on whether CECL's negative impact on small business lending through the capital ratio channel is stronger when banking regulators are more lenient. In Table 2.13 columns [1] and [2], I find that the interaction terms, $MORE\_CONSTRAIN\_ALL_i \times POST_t$ in Column [1] is significantly more negative than the one in column [2] (coef diff = -0.235, one-tailed p-value = 0.05), consistent with CECL's

[73] Although I include bank and county-year fixed effects, clustering by bank and county-year is still crucial, as the fixed effects do not fully capture serial correlation in residuals (e.g., they cannot fully capture autoregressive shocks to banks). Since small business lending is a highly localized banking activity, local shocks likely yield correlated residuals across banks within each county-year (Dou 2020).

impact on small business lending, through capital constraints, being more pronounced for banks with lenient regulators. In Table 2.14, I check whether the coefficient on $MORE\_CONSTRAIN\_ALL_i \times POST_t$ is smaller when the continuous version of the Agarwal et al. regulatory leniency index (REG_LEN_i) is higher. This analysis uses the same methodology applied in Table 2.8. I find that the three-way interaction term, $MORE\_CONSTRAIN\_ALL_i \times REG\_LEN_i \times POST_t$, is not significantly negative. However, the coefficient on $MORE\_CONSTRAIN\_ALL_i \times POST_t$ is still significantly negative, consistent with H1.

Table 2.13 columns [3] and [4] present the test of whether CELC's negative impact on small business lending through the regulatory capital channel varies between public and private banks. I find that the coefficient on $MORE\_CONSTRAIN\_ALL_i \times POST_t$ is significantly smaller for public banks than for private banks (coef diff = -0.447, one-tailed p-value = 0.00), consistent with CECL's impact through capital constraints on small business lending being more pronounced for public banks.

2.7.2 Placebo tests

The findings in this study may not be driven by CECL but by the inherent relationship between capital adequacy constraints and lending. Other studies find that when banks experience a negative shock to their capital adequacy ratios, they tend to cut back on their lending (e.g., Beatty and Liao 2011). If this is driving my results, then I should find similar results by using different treatment dates. To explore this possibility, I repeat all of my analyses using four different placebo treatment dates for the announcement of CECL. Specifically, I use (1) 2011Q4,

(2) 2012Q4, (3) 2013Q4, and (4) 2014Q4 as the placebo CECL approval dates.[74] Then I test my hypotheses using the placebo announcement dates.[75]

The placebo results are, in general, qualitatively weaker than the tests using the actual CECL announcement date (2015Q4). Table 2.15 reports the number of significant test results for each hypothesis using the actual announcement date and placebo announcement dates. Using the true announcement date, I find 19 out of the possible 27 test results that support my hypotheses. The test results using 2014Q4 as the placebo CECL approval date only retains 37%[76] of coefficients of interest that are statistically significant at conventional levels. For 2013Q4, 2012Q4, and 2011Q4, the retention rates are 32%, 32%, and 26%, respectively. The degree to which my original results can be replicated using the placebo dates declines as the assumed treatment dates move further from the actual treatment date.[77] The much stronger results that I find using the true CECL approval date imply that something different happened after 2015Q4 during the CECL transition period.

2.7.3 Are banks that increase their equity less affected by CECL?

As mentioned in section 2.4.4, banks can improve their regulatory capital status by raising new equity or retaining a profit. Thus, banks can alleviate CECL's negative impact on their regulatory capital ratio by using a combination of decreasing new lending and raising

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[74] One limitation of this placebo period is that it begins during the global financial crisis and ends during the implementation of the Basel III regulatory capital requirements.
[75] Since the common equity ratio is only available for all banks after 2015Q1, I calculate the capital constraint measure ($CLOSE\_TO\_CONS\_ALL_i$) using only the three regulatory capital ratios (Tier 1 capital ratio, total risk-based capital ratio, and leverage ratio).
[76] The 36.84% is calculated using the following procedures. The 2014Q4 placebo test results in seven statistical tests of my hypotheses that are significant in the predicted direction. The seven significant coefficients tests retain 36.84% of the 19 significant tests that I get by using the actual CECL approval dates (7/19 = 36.84%).
[77] For brevity, this paper does not tabulate the full regression results for all the placebo tests. All untabulated results are available upon request.

equity. The extent to which a bank uses one *versus* the other is likely to depend on their relative costs. The decrease in lending is expected to be smaller if a capital-constrained bank grows its equity after CECL is approved. To explore this possibility, I test whether CECL's impact on bank lending through capital constraints is lower if banks increase their equity to asset ratio during the CECL transition period. Tables 2.16, 2.17, and 2.18 present the test results.

In Table 2.16, I check whether CECL's negative impact on growth in *total loans* is lower when banks increase their equity during the CECL transition period. Specifically, I extend the original H1 regression model by adding the bank's change in total equity to asset ratio during the CECL transition period (dEQ_i)[78] as a proxy for increasing in its equity[79]. I interact this new variable with closeness to capital constraints and the dummy variable for the post period. In columns [1] and [3], when an increase in equity (dEQ_i) is interacted with $POST_t$ and one of the continuous measures of capital constraints (either $CLOSE\_TO\_CONS\_ALL_i$ or $CLOSE\_TO\_CONS\_T1_i$), the coefficient estimates on both of these triple interaction terms are positive and significant. This finding implies that increasing equity capital helps banks that were capital-constrained to continue their lending. After controlling for equity increases, I continue to find that more capital-constrained banks tend to reduce their lending in the post CECL announcement period. In columns [2] and [4], when the dichotomous measure of capital constraints is interacted with $POST_t$ and increase in equity, the coefficients are insignificant,

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[78] dEQ_i equals the change in bank i's equity to asset ratio from the beginning of 2016Q1 to the end of 2018Q2. I use 2018Q2 as the end the CECL transition period to avoid losing observations due to a change in reporting requirements. In 2018Q3 smaller banks with assets below $3 Billion became exempt from filing Y-9C reports. See section 5.1 for more details.

[79] In using this measure of equity raised over almost the entire post-CECL announcement period I am assuming that during the earlier quarters of the post-CECL period bank decision makers fully anticipated their equity raising strategy.

suggesting that raising equity moderates the lending reduction only when capital constraints are extremely high.

In Table 2.17, I check whether CECL's impact on the growth of *long-term loans* is lower when banks increase their equity during the CECL transition period. Similarly, I add the change in the total equity to asset ratio to the original H2 regression model. As we can see, the coefficient estimates on all the triple interaction terms are not significantly different from zero, as was the case in the original H2 test.

In Table 2.18, I check whether CECL's negative impact on the growth in *various types of loans* reduces when banks increase their equity during the CECL transition period. To investigate this question, I add the new three-way interacted variable $CLOSE\_TO\_CONS\_ALL_i \times POST_t \times dEQ_i$ to each regression model used to test H3.[80] In Table 2.18, the coefficient estimates on the new equity term interacted with post and capital constraints positively load for the growth of total real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$) and growth in commercial loans ($\Delta COM\_RE\_LOANS_{i,t}$) regressions in Columns [1] and [5], respectively. This finding implies that previously capital-constrained banks that increase their equity during the CECL transition period are able to issue more longer-term real estate loans during the post-period. After controlling for an increase in equity during the CECL transition period, I continue to find that banks that were more capital-constrained when CECL was approved experienced less growth in both their residential and commercial real estate lending after the announcement. While the results in this section are somewhat mixed, overall they tend to suggest that during the CECL

[80] For brevity, I do not report results for the dichotomous capital constraint variables which are never significant. I also do not report results for the second continuous capital constraint variable ($CLOSE\_TO\_CONS\_T1_i$) that uses only the Tier 1 capital ratio constraint. The results for this measure are qualitatively similar to what I report in the Table 18 when I measure the capital constraint using all four regulatory capital ratios ($CLOSE\_TO\_CONS\_ALL_i$).

transition period, banks that were able to alleviate their capital constraints by increasing their equity experienced less reduction in their lending.

The analysis in this section does not estimate a full structural model for the increase in equity capital and adjustments to lending by banks experiencing constraints on their regulatory capital. Therefore, the results here could be subject to a collider bias. Collider bias appears when we include an independent variable that is both an outcome of our treatment variable and an outcome of our dependent variable (i.e., a collider). Research shows that a collider is likely to bias the true treatment effect we are interested in.[81] In the context here, raising equity during the CECL transition period is likely a collider because both increasing total loans (i.e., the dependent variable) and being capital constrained (i.e., a treatment variable) can cause banks to want to increase their equity capital (i.e., a new independent variable added). Therefore, the finding in this section should not be viewed as conclusive evidence that banks that raised new equity were able to avoid the impact of CECL on their lending practices.

2.8 Conclusion

This study documents evidence consistent with the hypothesis that CECL influences bank loan supply through its anticipatory negative impact on bank regulatory capital. Specifically, I find that during the first three years of the CECL transition period (2016 - 2018), banks that were closer to their capital adequacy constraints (1) reduced their total loan growth, (2) reduced their growth rate of real estate loans, and (3) reduced their small business lending relative to less capital-constrained banks. In cross-sectional analyses, I find that the above findings are

[81] See Gow et al. (2016) for a discussion of the potential for collider bias in accounting research. Also see the following video for an excellent explanation on collider bias: https://youtu.be/vKeBD6JLexY.

concentrated in banks operating under a more lenient regulator, consistent with financially weaker banks being more sensitive to the anticipated capital shock induced by CECL.

Loan growth rates for total loans and real estate loans were higher on average for the more capital-constrained banks than for the less constrained banks during the benchmark period (before CECL was approved). During the CECL transition period, the two groups of banks become much more similar in their lending growth rates. This may reflect the fact that CECL led the capital-constrained banks to cut back on their more aggressive lending policies, and the less constrained banks took advantage of the opportunity by increasing their lending rates. Alternatively, it could be an indication of mean reversion in lending growth rates over time. It is not possible to say whether the new lending policies that I observe as the adoption of CECL approaches are a better or worse societal outcome than what occurred before CECL was approved.

Bank regulatory capital is also likely to be more negatively impacted by CECL when loans have a longer maturity. I do not find that capital-constrained banks, on average, reduce their issuance of long-term loans (i.e., loans with a remaining life of five years or more). However, I do find that two groups of capital-constrained banks reduce the growth rate of their long-term loans during the CECL transition period in this study, consistent with an effort to mitigate CECL's negative impact. Capital-constrained banks are found to reduce their long-term loan growth when they are regulated by a lenient regulator or when they are publicly traded banks, which must adopt CECL earlier than their privately-held counterparts.

The findings in this paper are consistent with many banks' concerns that CECL is expected to reduce their regulatory capital and, as a result, will impact their lending policies. This paper provides evidence supporting CECL's *potentially disparate effects on certain types of* *lending* (e.g., longer-term loans), which has been mentioned as a key area of debate in a policy assessment report written by the U.S. Department of Treasury.[82] Policymakers should be interested to learn this study's finding that it is not only growth in long-term loans that is being reduced by CECL impacted banks. Capital-constrained banks have also reduced the growth rate of their residential loans and originated fewer small business loans. Thus, banking regulators should also consider CECL's potential effects on banks' willingness to originate home mortgages and its potential impact on the availability of small business loans in the economy. This study also has a key takeaway for standard setters interested in evaluating the economic impact of a new accounting change. The finding that CECL appears to influence bank lending decisions during the CECL transition period implies that only conducting an *ex-post* analysis after a new standard's effective date is likely to miss a large part of a new rule's economic impact. By ignoring the transition period, it is even possible that researchers could miss a new standard's entire impact if all of the responses were to happen in anticipation of the new standard. Expanding the potential response period to include the pre-adoption period is crucial as we see many other new accounting standards with long transition periods in recent times (e.g., two years for the new U.S. lease accounting standard, ASC 842; and three years for the new U.S. revenue recognition accounting standard, ASC 606).

The transition period examined in this study ends in the fourth quarter of 2018 because additional changes to the CECL transition timeline were announced in 2019 and 2020. Therefore, I am unable to observe changes to lending policies governing shorter-term loans, such as consumer loans, that may happen closer to the CECL adoption date. Finally, a further

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[82] The report is available at https://www.nafcu.org/sites/default/files/Treasury%20Study%20CECL.pdf.

limitation of this study is the fact that all banks must adopt CECL, making it more difficult to use the difference-in-difference approach to identify the impact of CECL on bank lending. I rely on a bank's regulatory capital adequacy in 2015 to indicate those banks that are likely to be more impacted by CECL. As mentioned in section 7.2, one has to keep in mind that the reduction in the loan growth of capital-constrained banks might be a general outcome due to deteriorating capital status rather than a specific one due to the anticipation of CECL. To explore this concern, I conduct a placebo test using a different sample period, and I find far fewer significant results. The difference-in-difference approach could also lead to results that appear to support my hypotheses even if CECL was not the influencing factor. If there was another event that happened around the same time of CECL approval and the impact of that event also relates to a bank's capital status, it could influence the results I observe. This is always a potential problem with a difference-in-difference approach.

Table 2.1 Composition of the FR Y-9C sample
Panel A - Sample selection process

	Number of bank-quarters
Bank holding companies (BHCs) filing Y9C during 2013Q1 and 2018Q4	19,148
Less:	
BHCs with no commercial bank subsidiary	(1,787)
BHCs with a loans-to-assets ratio < 10% (inactive in loan market)	(125)
BHCs with lower than zero or missing total deposits	(3,752)
BHCs with asset growth > 20% (likely involve in a merger)	(256)
BHCs with less than ten quarters before and after CECL approval in 2015Q4	(5,664)
BHCs with missing variables	(491)
Total	7,073
Number of unique banks	313

Panel B - Number of observations in each time period

	Number of banks in:				
Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
2013	305	305	306	299	1,215
2014	306	306	309	305	1,226
2015	304	301	305	306	1,216
2016	308	304	304	310	1,226
2017	305	303	307	304	1,219
2018	307	*306*	*178*	180	971
					7,073

Note:

Panel A summarizes the sample selection process. The bank data is collected from the FR Y-9C database, which is available on https://www.chicagofed.org/banking/financial-institution-reports/bhc-data. **Panel B** illustrates the breakdown of the FR Y-9C Sample, including the number of banks in each quarter. The number of banks significantly drops from 306 in 2018Q2 to 178 in 2018Q3 because Federal Reserves increased the asset-size threshold for filing the FR Y-9C from $1 billion to $3 billion effective in 2018Q3. See https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDal8cbqnRxZRg== for more details.

Panel C - Number of large, medium, and small banks

		Bank-quarters		Unique banks
Assets ≥ $50 billions	(Large)	443	6%	21
$10b ≤ Assets < $50b	(Medium)	652	9%	43
Assets < $10 billions	(Small)	5,978	85%	274
	Total	7,073		

Panel D - Number of public banks

	Bank-quarters		Unique banks
Public	3,726	53%	165
Private	3,347	47%	148
Total	7,073		

Panel E - Leniently regulated and public banks

	Leniently regulated banks (HIGH_REG_LENi = 1)	Strictly regulated banks (HIGH_REG_LENi = 0)	
Public banks	1,723	2,004	3,726
Private banks	1,748	1,598	3,347
Total # of bank-quarters	3,471	3,602	

Note:

Panel C shows the number of large, medium, and small banks in the sample used in the analysis. **Panel D** shows the number of public banks in the sample used in the analysis. Public banks are defined as the banks that are publicly traded in a stock exchange or over the counter. The list of public banks is obtained from the Federal Reserve. See https://www.newyorkfed.org/research/banking research/datasets.html for more details.

Table 2.2 Descriptive Statistics and Correlations - Y9C Sample (bank-quarter)
Panel A: Descriptive Statistics

Variables	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
$LOANS_{i,t-1}$ (%)	7,073	66.152	13.319	22.120	58.488	67.926	76.097	88.424
$TOT\_RE\_LOANS_{i,t-1}$ (%)	7,073	40.939	15.480	5.468	30.937	40.560	51.469	77.627
$RES\_RE\_LOANS_{i,t-1}$ (%)	7,073	20.781	11.770	2.509	12.444	18.973	26.212	60.738
$COM\_RE\_LOANS_{i,t-1}$ (%)	7,073	20.058	9.692	0.449	13.398	19.798	25.448	53.248
$COM\_NRE\_LOANS_{i,t-1}$ (%)	7,073	12.679	8.434	0.392	6.178	10.589	17.937	39.249
$CONSUMER\_LOANS_{i,t-1}$ (%)	7,073	2.882	4.132	0.006	0.518	1.232	3.059	21.572
$LONG\_TERM\_LOANS_{i,t-1}$ (%)	7,073	18.626	11.456	1.478	10.113	16.068	24.969	53.886
$\Delta LOANS_{i,t}$ (%)	7,073	2.011	3.126	-5.193	0.209	1.644	3.335	15.348
$\Delta TOT\_RE\_LOANS_{i,t-1}$ (%)	7,073	1.802	3.505	-6.300	-0.207	1.319	3.224	16.231
$\Delta RES\_RE\_LOANS_{i,t-1}$ (%)	7,073	1.615	4.519	-10.494	-0.821	1.043	3.368	20.229
$\Delta COM\_RE\_LOANS_{i,t-1}$ (%)	7,073	2.069	4.646	-8.043	-0.650	1.398	3.977	21.752
ΔCOM_NRE_LOANSi,t (%)	7,073	2.619	7.489	-15.542	-1.506	1.842	5.678	35.017
$\Delta CONSUMER\_LOANS_{i,t}$ (%)	7,073	1.401	11.660	-32.431	-3.398	0.344	4.181	62.221
$\Delta LONG\_TERM\_LOANS_{i,t}$ (%)	7,073	2.697	9.000	-25.095	-1.284	1.807	5.604	43.718
$CLOSE\_TO\_CONS\_T1_{i}$	7,073	0.462	0.096	0.225	0.400	0.469	0.520	0.708
$CLOSE\_TO\_CONS\_ALL_{i}$	7,073	0.559	0.109	0.289	0.495	0.564	0.623	0.941
$EQUITY\_TO\_ASSETS_{i,t}$ (%)	7,073	10.643	2.579	5.529	8.941	10.329	12.011	21.286

dEQ_i (%)	7,073	0.391	1.416	-3.240	-0.431	0.337	0.956	4.999
$CET1\_CAP\_RATIO_{i,t}$ (%)	4,632	12.553	3.509	5.486	10.307	11.828	14.170	25.882
$T1\_CAP\_RATIO_{i,t}$ (%)	6,950	13.730	3.324	8.112	11.595	12.989	15.195	26.663
$TOTAL\_CAPITAL\_RATIO_{i,t}$ (%)	6,950	15.172	3.189	10.273	13.085	14.427	16.448	27.918
$LEV\_RATIO_{i,t}$ (%)	6,950	10.139	2.088	5.648	8.875	9.834	10.967	18.943
$TOTAL\_ASSETS_{i,t-1}$ ($ Bill)	7,073	37.766	213.747	0.638	1.199	1.933	5.064	1849.182
$SIZE_{i,t-1}$	7,073	14.986	1.490	13.366	13.997	14.475	15.438	21.338
$NPL_{i,t-1}$ (%)	7,073	1.219	1.157	0.031	0.479	0.867	1.564	6.640
$DEPOSITS_{i,t-1}$ (%)	7,073	89.692	7.458	59.148	86.495	91.259	94.847	99.552
$CASH\&MKTSEC_{i,t-1}$ (%)	7,073	6.014	5.613	0.835	2.439	4.187	7.354	31.891
$TRADING\_ASSETS_{i,t-1}$ (%)	7,073	0.282	1.348	0.000	0.000	0.000	0.000	11.000
$ROA_{i,t-1}$ (%)	7,073	0.257	0.139	-0.186	0.187	0.247	0.313	0.904
REG_LEN_i	7,073	0.069	0.058	-0.006	0.000	0.073	0.107	0.266

Note:
Panel A reports the descriptive statistics for the FR Y-9C sample, which is at the bank-quarter level. The number of observations for common equity Tier 1 capital ratio ($CET1\_RATIO_{i,t}$) is equal to 4,632, which is lower than the number of most other variables because $CET1\_RATIO_{i,t}$ is only available after 2015Q1. The other three regulatory capital ratios ($T1\_CAP\_RATIO_{i,t}$, $TOTAL\_CAPITAL\_RATIO_{i,t}$, $LEV\_RATIO_{i,t}$) also have fewer observations than others because my sample selection process does not require these three capital ratios to be non-missing in my whole sample period, 2013Q1-2018Q4. Instead, I only require them to be non-missing in 2015Q1-2015Q4. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Panel B: Descriptive Statistics before and after CECL approval

Variables	Benchmark period - Before CECL approval (2013Q1-2015Q4)				CECL transition period - After CECL approval (2016Q1-2018Q4)			
	N	Mean	Median	St. Dev.	N	Mean	Median	St. Dev.
$LOANS_{i,t-1}$ (%)	3,657	64.466	65.949	13.347	3,416	67.956	69.913	13.052
$TOT\_RE\_LOANS_{i,t-1}$ (%)	3,657	40.324	39.690	15.468	3,416	41.597	41.405	15.469
$RES\_RE\_LOANS_{i,t-1}$ (%)	3,657	20.597	18.774	11.792	3,416	20.979	19.163	11.745
$COM\_RE\_LOANS_{i,t-1}$ (%)	3,657	19.636	19.148	9.626	3,416	20.509	20.431	9.743
$COM\_NRE\_LOANS_{i,t-1}$ (%)	3,657	12.444	10.225	8.590	3,416	12.930	11.074	8.258
$CONSUMER\_LOANS_{i,t-1}$ (%)	3,657	2.805	1.264	3.932	3,416	2.965	1.198	4.335
$LONG\_TERM\_LOANS_{i,t-1}$ (%)	3,657	17.925	15.457	11.168	3,416	19.376	16.815	11.710
$\Delta LOANS_{i,t}$ (%)	3,657	2.049	1.667	3.299	3,416	1.970	1.636	2.930
$\Delta TOT\_RE\_LOANS_{i,t-1}$ (%)	3,657	3.007	2.170	7.916	3,416	2.205	1.499	6.981
$\Delta RES\_RE\_LOANS_{i,t-1}$ (%)	3,657	1.684	1.090	4.729	3,416	1.542	0.960	4.282
$\Delta COM\_RE\_LOANS_{i,t-1}$ (%)	3,657	1.888	1.125	4.822	3,416	2.263	1.617	4.442
$\Delta COM\_NRE\_LOANS_{i,t}$ (%)	3,657	1.723	1.194	3.694	3,416	1.886	1.441	3.289
$\Delta CONSUMER\_LOANS_{i,t}$ (%)	3,657	1.377	0.184	11.416	3,416	1.426	0.507	11.918
$\Delta LONG\_TERM\_LOANS_{i,t}$ (%)	3,657	3.567	2.361	9.475	3,416	1.766	1.207	8.362

$CLOSE\_TO\_CONS\_T1_{i}$	3,657	0.461	0.469	0.096	3,416	0.462	0.469	0.096
$CLOSE\_TO\_CONS\_ALL_{i}$	3,657	0.559	0.564	0.109	3,416	0.560	0.564	0.108
$EQUITY\_TOTAL\_ASSETS_{i,t}$ (%)	3,657	10.521	10.196	2.704	3,416	10.774	10.464	2.431
$CET1\_CAP\_RATIO_{i,t}$ (%)	1,216	12.591	11.784	3.770	3,416	12.539	11.835	3.413
$T1\_CAP\_RATIO_{i,t}$ (%)	3,534	13.994	13.282	3.430	3,416	13.457	12.689	3.189
$TOTAL\_CAPITAL\_RATIO_{i,t}$ (%)	3,534	15.446	14.744	3.316	3,416	14.888	14.120	3.026
$LEV\_RATIO_{i,t}$ (%)	3,534	10.085	9.785	2.156	3,416	10.194	9.865	2.014
$TOTAL\_ASSETS_{i,t-1}$ ($ Bill)	3,657	35.048	1.674	206.726	3,416	40.677	2.375	221.009
$SIZE_{i,t-1}$	3,657	14.839	14.330	1.464	3,416	15.143	14.680	1.501
$NPL_{i,t-1}$ (%)	3,657	1.519	1.107	1.321	3,416	0.899	0.668	0.840
$DEPOSITS_{i,t-1}$ (%)	3,657	89.842	91.509	7.569	3,416	89.531	91.061	7.334
$CASH\&MKTSEC_{i,t-1}$ (%)	3,657	6.490	4.557	5.913	3,416	5.504	3.764	5.225
$TRADING\_ASSETS_{i,t-1}$ (%)	3,657	0.282	0.000	1.372	3,416	0.281	0.000	1.322
$ROA_{i,t-1}$ (%)	3,657	0.253	0.239	0.146	3,416	0.261	0.256	0.133
REG_LEN_{i}	3,657	0.069	0.073	0.058	3,416	0.069	0.073	0.058

Note:

Panel B reports the descriptive statistics for the FR Y-9C sample in periods before and after the approval of CECL. The number of observations for common equity Tier 1 capital ratio ($CET1\_RATIO_{i,t}$) in the benchmark period is equal to 1,216, which is lower than the number of observations for most other variables because $CET1\_RATIO_{i,t}$ is only available after 2015Q1. The other three regulatory capital ratios ($T1\_CAP\_RATIO_{i,t}$, $TOTAL\_CAPITAL\_RATIO_{i,t}$, $LEV\_RATIO_{i,t}$) also have fewer observations than others because my sample selection process does not require these three capital ratios to be non-missing in my whole sample period, 2013Q1-2018Q4. Instead, I only require them to be non-missing in 2015Q1-2015Q4. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Panel C: Pearson (top) and Spearman (bottom) correlation coefficients

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1]	LOANS$_{i,t-1}$		**0.63**	**0.43**	**0.48**	**0.29**	**-0.04**	**0.35**	**0.06**	**0.06**	**0.06**	**0.03**
[2]	TOT_RE_LOANS$_{i,t-1}$	**0.59**		**0.78**	**0.64**	**-0.41**	**-0.32**	**0.58**	**0.05**	**0.03**	**0.04**	0.01
[3]	RES_RE_LOANS$_{i,t-1}$	**0.38**	**0.77**		0.01	**-0.42**	**-0.14**	**0.58**	0.01	-0.02	-0.01	0.01
[4]	COM_RE_LOANS$_{i,t-1}$	**0.45**	**0.63**	**0.12**		**-0.14**	**-0.33**	**0.22**	**0.07**	**0.06**	**0.08**	0.01
[5]	COM_NRE_LOANS$_{i,t-1}$	**0.25**	**-0.41**	**-0.40**	**-0.07**		0.00	**-0.34**	-0.01	0.01	0.02	-0.01
[6]	CONSUMER_LOANS$_{i,t-1}$	**-0.16**	**-0.40**	**-0.14**	**-0.37**	**0.11**		**-0.09**	**-0.03**	**-0.07**	**-0.08**	**-0.03**
[7]	LONG_TERM_LOANS$_{i,t-1}$	**0.28**	**0.55**	**0.56**	**0.23**	**-0.30**	**-0.08**		**0.08**	**0.07**	**0.05**	**0.07**
[8]	ΔLOANS$_{i,t}$	**0.11**	**0.08**	0.00	**0.10**	0.02	**-0.08**	**0.10**		**0.77**	**0.60**	**0.56**
[9]	ΔTOT_RE_LOANS$_{i,t}$	**0.11**	**0.09**	0.00	**0.11**	0.02	**-0.11**	**0.11**	**0.71**		**0.71**	**0.76**
[10]	ΔRES_RE_LOANS$_{i,t}$	**0.08**	**0.08**	0.02	**0.08**	0.02	**-0.10**	**0.09**	**0.55**	**0.69**		**0.22**
[11]	ΔCOM_RE_LOANS$_{i,t}$	**0.09**	**0.07**	0.01	**0.08**	0.01	**-0.05**	**0.09**	**0.50**	**0.74**	**0.17**	
[12]	ΔCOM_NRE_LOANS$_{i,t}$	**0.05**	**0.08**	**0.06**	**0.06**	**-0.03**	-0.02	**0.04**	**0.50**	**0.12**	**0.12**	**0.09**
[13]	ΔCONSUMER_LOANS$_{i,t}$	-0.01	**-0.06**	-0.02	**-0.07**	**0.03**	**0.15**	0.00	**0.21**	**0.09**	**0.10**	**0.06**
[14]	ΔLONG_TERM_LOANS$_{i,t}$	**-0.03**	0.02	-0.02	**0.04**	**-0.04**	-0.02	0.00	**0.39**	**0.37**	**0.35**	**0.20**
[15]	CLOSE_TO_CONS_T1$_{i}$	**0.36**	-0.01	**-0.06**	**0.18**	**0.48**	0.01	**-0.05**	**0.08**	**0.08**	**0.06**	**0.07**
[16]	CLOSE_TO_CONS_ALL$_{i}$	**0.35**	**0.03**	**-0.06**	**0.22**	**0.42**	**-0.03**	**-0.03**	**0.09**	**0.11**	**0.07**	**0.08**
[17]	SIZE$_{i,t-1}$	-0.02	**-0.13**	-0.02	**-0.20**	**0.08**	**0.14**	**-0.05**	-0.01	**-0.05**	**-0.04**	-0.02
[18]	NPL$_{i,t-1}$	**-0.20**	**-0.06**	**0.04**	**-0.09**	**-0.08**	**0.10**	**-0.10**	**-0.22**	**-0.25**	**-0.19**	**-0.17**
[19]	DEPOSITS$_{i,t-1}$	**-0.06**	**-0.09**	**-0.25**	**0.17**	**0.07**	**0.04**	**-0.13**	0.00	**0.05**	**0.03**	0.01
[20]	CASH&MKTSEC$_{i,t-1}$	**-0.20**	**-0.25**	**-0.29**	**-0.09**	0.00	**0.05**	**-0.31**	**-0.09**	**-0.07**	**-0.06**	**-0.05**
[21]	TRADING_ASSETS$_{i,t-1}$	**-0.13**	**-0.24**	**-0.05**	**-0.30**	**0.14**	**0.14**	**-0.18**	**-0.06**	**-0.10**	**-0.07**	**-0.05**

[22]	ROA$_{i,t-1}$	0.00	**-0.19**	**-0.20**	**-0.08**	**0.13**	**0.08**	**-0.11**	**0.06**	**0.05**	**0.06**	**0.03**

		[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]
[1]	LOANS$_{i,t-1}$	**0.03**	0.01	**-0.04**	**0.35**	**0.30**	**-0.17**	**-0.16**	**0.06**	**-0.41**	**-0.30**	0.00
[2]	TOT_RE_LOANS$_{i,t-1}$	**0.08**	-0.01	0.00	0.01	**0.04**	**-0.27**	**-0.03**	-0.01	**-0.34**	**-0.29**	**-0.18**
[3]	RES_RE_LOANS$_{i,t-1}$	**0.07**	0.00	**-0.03**	**-0.11**	**-0.10**	**-0.08**	0.01	**-0.22**	**-0.28**	**-0.12**	**-0.17**
[4]	COM_RE_LOANS$_{i,t-1}$	**0.04**	-0.02	**0.04**	**0.17**	**0.18**	**-0.34**	**-0.06**	**0.25**	**-0.21**	**-0.32**	**-0.09**
[5]	COM_NRE_LOANS$_{i,t-1}$	**-0.09**	0.02	**-0.03**	**0.43**	**0.35**	**0.08**	**-0.12**	**0.11**	**-0.08**	-0.02	**0.10**
[6]	CONSUMER_LOANS$_{i,t-1}$	-0.02	**0.03**	-0.02	0.00	**-0.05**	**0.29**	**0.05**	**-0.08**	0.01	**0.15**	**0.09**
[7]	LONG_TERM_LOANS$_{i,t-1}$	**0.06**	0.01	**-0.06**	**-0.09**	**-0.08**	**-0.13**	**-0.12**	**-0.10**	**-0.29**	**-0.18**	**-0.11**
[8]	ΔLOANS$_{i,t}$	**0.50**	**0.21**	**0.36**	**0.06**	**0.05**	**-0.06**	**-0.21**	0.00	**-0.06**	**-0.03**	**0.05**
[9]	ΔTOT_RE_LOANS$_{i,t}$	**0.18**	**0.12**	**0.33**	**0.07**	**0.08**	**-0.09**	**-0.22**	**0.03**	**-0.04**	**-0.06**	**0.04**
[10]	ΔRES_RE_LOANS$_{i,t}$	**0.15**	**0.11**	**0.30**	**0.06**	**0.06**	**-0.07**	**-0.16**	0.01	**-0.05**	**-0.05**	**0.04**
[11]	ΔCOM_RE_LOANS$_{i,t}$	**0.15**	**0.09**	**0.21**	**0.04**	**0.04**	**-0.04**	**-0.17**	-0.01	-0.02	0.00	**0.03**
[12]	ΔCOM_NRE_LOANS$_{i,t}$		**0.09**	**0.14**	0.01	0.01	**-0.03**	**-0.03**	**-0.04**	**-0.04**	-0.01	-0.02
[13]	ΔCONSUMER_LOANS$_{i,t}$	**0.10**		**0.06**	0.02	0.00	0.01	**-0.03**	-0.01	-0.02	0.01	0.01
[14]	ΔLONG_TERM_LOANS$_{i,t}$	**0.13**	**0.09**		0.00	0.01	**-0.07**	0.01	0.01	0.00	-0.02	**-0.03**
[15]	CLOSE_TO_CONS_T1$_{i}$	**0.05**	0.02	0.00		**0.91**	**0.13**	**-0.12**	**0.04**	**-0.13**	**-0.04**	**-0.08**
[16]	CLOSE_TO_CONS_ALL$_{i}$	**0.05**	0.00	0.01	**0.94**		**0.03**	**-0.11**	**0.07**	**-0.13**	**-0.08**	**-0.11**
[17]	SIZE$_{i,t-1}$	0.01	**0.07**	**-0.07**	**0.15**	**0.08**		**0.05**	**-0.46**	**0.23**	**0.56**	**0.06**
[18]	NPL$_{i,t-1}$	**-0.06**	**-0.03**	0.00	**-0.11**	**-0.14**	**-0.03**		-0.01	**0.14**	**0.11**	**-0.19**
[19]	DEPOSITS$_{i,t-1}$	**-0.04**	0.00	**0.03**	**-0.04**	-0.01	**-0.30**	**-0.03**		0.00	**-0.49**	**0.03**
[20]	CASH&MKTSEC$_{i,t-1}$	**-0.05**	-0.01	-0.01	**-0.10**	**-0.14**	-0.02	**0.11**	**0.31**		**0.42**	0.02

[21]	$TRADING\_ASSETS_{i,t-1}$	0.00	**0.08**	**-0.06**	**0.12**	**0.07**	**0.54**	**0.07**	**-0.30**	**0.06**		0.00
[22]	$ROA_{i,t-1}$	0.01	**0.04**	-0.01	0.00	**-0.03**	**0.14**	**-0.21**	**0.06**	-0.02	**0.02**	

Note:
Panel C reports the Pearson correlation above the diagonal and the Spearman correlation below the diagonal for the variables included in the regression models. Correlation coefficients in bold are significantly different from zero at the 0.05 level. The sample selection process and its composition are presented in Table 2.1. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.3 Difference-in-difference descriptive statistics

Panel A: Banks that are closer to their capital adequacy constraints versus other banks

	Benchmark period - Before CECL approval (2013Q1-2015Q4)						
	More capital-constrained banks		Less capital-constrained banks		Normalized Diff [(A1-B1)/ √(A2^2+B2^2)]	t statistics	P-value
	(A1) MEAN	**(A2) STD**	**(B1) MEAN**	**(B2) STD**			
$LOANS_{i,t-1}$ (%)	67.98	12.15	61.05	13.57	0.381	16.285	0.000
$TOT\_RE\_LOANS_{i,t-1}$ (%)	39.70	14.67	40.93	16.19	-0.057	-2.424	0.021
$RES\_RE\_LOANS_{i,t-1}$ (%)	18.94	10.10	22.20	13.04	-0.198	-8.474	0.000
$COM\_RE\_LOANS_{i,t-1}$ (%)	20.73	9.13	18.58	9.97	0.159	6.804	0.000
$COM\_NRE\_LOANS_{i,t-1}$ (%)	15.59	8.95	9.39	6.98	0.546	23.323	0.000
$CONSUMER\_LOANS_{i,t-1}$ (%)	2.74	3.82	2.86	4.04	-0.021	-0.907	0.264
$LONG\_TERM\_LOANS_{i,t-1}$ (%)	17.30	10.16	18.53	12.04	-0.078	-3.323	0.002
$\Delta LOANS_{i,t}$ (%)	2.45	3.53	1.66	3.01	0.172	7.360	0.000
$\Delta TOT\_RE\_LOANS_{i,t}$ (%)	2.22	4.02	1.24	3.28	0.191	8.149	0.000
$\Delta RES\_RE\_LOANS_{i,t}$ (%)	2.21	5.10	1.18	4.28	0.155	6.613	0.000
$\Delta COM\_RE\_LOANS_{i,t}$ (%)	2.34	5.09	1.44	4.51	0.133	5.662	0.000
$\Delta COM\_NRE\_LOANS_{i,t}$ (%)	3.26	7.57	2.76	8.23	0.045	1.919	0.063
$\Delta CONSUMER\_LOANS_{i,t}$ (%)	1.50	11.49	1.25	11.35	0.015	0.657	0.322
$\Delta LONG\_TERM\_LOANS_{i,t}$ (%)	3.71	9.76	3.42	9.19	0.022	0.925	0.260
$SIZE_{i,t-1}$	14.88	1.33	14.80	1.59	0.038	1.612	0.109
$NPL_{i,t-1}$ (%)	1.29	1.21	1.75	1.38	-0.250	-10.714	0.000

$DEPOSITS_{i,t-1}$ (%)	90.27	6.39	89.42	8.54	0.080	3.423	0.001
$CASH\&MKTSEC_{i,t-1}$ (%)	5.89	5.37	7.08	6.34	-0.143	-6.139	0.000
$TRADING\_ASSETS_{i,t-1}$ (%)	0.17	0.68	0.39	1.80	-0.115	-4.948	0.000
$ROA_{i,t-1}$ (%)	0.25	0.14	0.26	0.15	-0.030	-1.278	0.176
N of obs (See note)	**1,802**		**1,855**				

	CECL transition period - After CECL approval (2016Q1-2018Q4)						
	More capital-constrained banks		Less capital-constrained banks		Normalized Diff [(C1-D1)/ √(C2^2+D2^2)]	t statistics	P-value
	(C1) MEAN	**(C2) STD**	**(D1) MEAN**	**(D2) STD**			
$LOANS_{i,t-1}$ (%)	71.07	11.75	64.90	13.53	0.344	-1.103	0.217
$TOT\_RE\_LOANS_{i,t-1}$ (%)	41.14	14.52	42.05	16.34	-0.041	-1.693	0.095
$RES\_RE\_LOANS_{i,t-1}$ (%)	19.31	9.86	22.62	13.14	-0.201	-5.049	0.000
$COM\_RE\_LOANS_{i,t-1}$ (%)	21.81	9.31	19.23	9.99	0.189	-1.163	0.203
$COM\_NRE\_LOANS_{i,t-1}$ (%)	15.84	8.50	10.07	6.90	0.528	3.794	0.000
$CONSUMER\_LOANS_{i,t-1}$ (%)	2.75	4.11	3.18	4.54	-0.069	-1.221	0.189
$LONG\_TERM\_LOANS_{i,t-1}$ (%)	18.24	10.54	20.50	12.66	-0.137	-3.502	0.001
$\Delta LOANS_{i,t}$ (%)	1.98	3.00	1.96	2.86	0.003	0.398	0.369
$\Delta TOT\_RE\_LOANS_{i,t}$ (%)	1.96	3.33	1.82	3.25	0.030	0.241	0.387
$\Delta RES\_RE\_LOANS_{i,t}$ (%)	1.52	4.42	1.56	4.14	-0.007	0.819	0.285
$\Delta COM\_RE\_LOANS_{i,t}$ (%)	2.27	4.27	2.26	4.61	0.002	-0.973	0.249

ΔCOM_NRE_LOANS$_{i,t}$ (%)	2.11	6.67	2.30	7.27	-0.019	-1.733	0.089
ΔCONSUMER_LOANS$_{i,t}$ (%)	1.32	11.37	1.53	12.43	-0.012	-3.057	0.004
ΔLONG_TERM_LOANS$_{i,t}$ (%)	1.78	8.82	1.76	7.89	0.002	2.695	0.011
SIZE$_{i,t-1}$	15.22	1.36	15.07	1.62	0.072	-0.525	0.348
NPL$_{i,t-1}$ (%)	0.84	0.75	0.96	0.91	-0.101	-0.461	0.359
DEPOSITS$_{i,t-1}$ (%)	89.78	6.14	89.29	8.34	0.048	-0.999	0.242
CASH&MKTSEC$_{i,t-1}$ (%)	4.79	4.61	6.20	5.68	-0.193	-2.849	0.007
TRADING_ASSETS$_{i,t-1}$ (%)	0.17	0.60	0.39	1.76	-0.122	-3.347	0.001
ROA$_{i,t-1}$ (%)	0.26	0.13	0.26	0.13	-0.021	-0.003	0.399
N of obs (See note)	**1,693**		**1,723**				

Panel B: Difference-in-Difference statistics				
	DiD [(C1-D1) - (A1-B1)]	**P-value**	**t-stat**	
LOANS$_{i,t-1}$ (%)	-0.76	0.21	-1.25	
TOT_RE_LOANS$_{i,t-1}$ (%)	0.33	0.65	0.45	
RES_RE_LOANS$_{i,t-1}$ (%)	-0.04	0.94	-0.07	
COM_RE_LOANS$_{i,t-1}$ (%)	0.43	0.35	0.93	
COM_NRE_LOANS$_{i,t-1}$ (%)	-0.42	0.26	-1.13	
CONSUMER_LOANS$_{i,t-1}$ (%)	-0.31	0.12	-1.56	
LONG_TERM_LOANS$_{i,t-1}$ (%)	-1.04	0.06	-1.92	*
ΔLOANS$_{i,t}$ (%)	-0.79	0.00	-5.32	***
ΔTOT_RE_LOANS$_{i,t}$ (%)	-0.85	0.00	-5.13	***

$\Delta RES\_RE\_LOANS_{i,t}$ (%)	-1.07	0.00	-5.02	***
$\Delta COM\_RE\_LOANS_{i,t}$ (%)	-0.89	0.00	-4.03	***
$\Delta COM\_NRE\_LOANS_{i,t}$ (%)	-0.69	0.05	-1.96	*
$\Delta CONSUMER\_LOANS_{i,t}$ (%)	-0.46	0.41	-0.82	
$\Delta LONG\_TERM\_LOANS_{i,t}$ (%)	-0.27	0.52	-0.64	
$SIZE_{i,t-1}$	0.08	0.28	1.07	
$NPL_{i,t-1}$ (%)	0.34	0.00	6.59	***
$DEPOSITS_{i,t-1}$ (%)	-0.36	0.31	-1.02	
$CASH\&MKTSEC_{i,t-1}$ (%)	-0.22	0.41	-0.83	
$TRADING\_ASSETS_{i,t-1}$ (%)	-0.01	0.93	-0.09	
$ROA_{i,t-1}$ (%)	0.00	0.75	0.32	

Note:
This table reports the difference-in-difference descriptive statistics of the FR Y-9C Sample (bank-quarter level). **Panel A** reports the descriptive statistics for banks that are more versus less capital constrained separately for the pre-period and post-period. More (less) capital-constrained banks are the banks with a $CLOSE\_TO\_CONS\_ALL_i$ above (below) than the median during 2015Q1 and 2015Q4 after Basel III came into effect at the beginning of 2015. The benchmark period is the period during 2013Q1 and 2015Q4, which is *before* CECL was approved. The CECL transition period is defined as the period during 2016Q1 and 2018Q4 *after* CECL is approved. The normalized difference column is calculated as $(\bar{X}_{MORE} - \bar{X}_{LESS})/\sqrt{S^2_{MORE} - S^2_{LESS}}$ where $\bar{X}_{MORE}$ and S^2_{MORE} ($\bar{X}_{LESS}$ and S^2_{LESS}) are the sample mean and sample variance for more (less) capital-constrained banks. The numbers of observations for less capital-constrained banks are the numbers for all variables *except* residential and commercial real estate loan growth rates ($\Delta RES\_RE\_LOANS_{i,t-1}$, and $\Delta COM\_RE\_LOANS_{i,t-1}$). **Panel B** reports the difference in difference of the descriptive statistics. ***, **, * in the two panels denote a statistically significant t-statistics of the mean differences at the 0.01, 0.05, and 0.1 levels, respectively. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.4 CECL and bank lending (H1)

Independent Variables	Dependent Variable = $\Delta LOANS_{i,t}$ [1]	[2]	[3]	[4]
$CLOSE\_TO\_CONS\_ALL_i \times POST_t$	**-2.029**			
	t = -2.238**			
$MORE\_CONSTRAIN\_ALL_i \times POST_t$		**-0.421**		
		t = -2.628**		
$CLOSE\_TO\_CONS\_T1_i \times POST_t$			**-2.897**	
			t = -2.740**	
$MORE\_CONSTRAIN\_T1_i \times POST_t$				**-0.407**
				t = -2.303**
<u>Controls</u>				
$SIZE_{i,t-1}$	-2.282	-2.277	-2.206	-2.266
	t = -4.418***	t = -4.413***	t = -4.276***	t = -4.459***
$RES\_RE\_LOANS_{i,t-1}$	-0.151	-0.152	-0.151	-0.154
	t = -8.942***	t = -8.862***	t = -8.882***	t = -9.030***
$COM\_RE\_LOANS_{i,t-1}$	-0.14	-0.139	-0.141	-0.141
	t = -4.851***	t = -4.803***	t = -4.885***	t = -4.876***
$COM\_NRE\_LOANS_{i,t-1}$	-0.123	-0.122	-0.122	-0.123
	t = -3.426***	t = -3.418***	t = -3.377***	t = -3.405***
$CONSUMER\_LOANS_{i,t-1}$	-0.091	-0.093	-0.09	-0.094
	t = -1.641	t = -1.706	t = -1.669	t = -1.697
$LONG\_TERM\_LOANS_{i,t-1}$	0.026	0.025	0.024	0.026
	t = 1.376	t = 1.364	t = 1.329	t = 1.380
$NPL_{i,t-1}$	-0.457	-0.449	-0.45	-0.455

	[1]	[2]	[3]	[4]
	t = -5.337***	t = -5.336***	t = -5.335***	t = -5.338***
$DEPOSITS_{i,t-1}$	-0.005	-0.004	-0.003	-0.003
	t = -0.231	t = -0.176	t = -0.162	t = -0.141
$CASH\&MKTSEC_{i,t-1}$	-0.002	-0.001	-0.002	-0.0003
	t = -0.077	t = -0.058	t = -0.070	t = -0.015
$TRADING\_ASSETS_{i,t-1}$	0.31	0.267	0.327	0.265
	t = 1.358	t = 1.141	t = 1.439	t = 1.131
$ROA_{i,t-1}$	-0.373	-0.403	-0.371	-0.407
	t = -0.792	t = -0.859	t = -0.787	t = -0.862
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.276	0.276	0.277	0.276
Number of bank-quarters	7,073	7,073	7,073	7,073

Note:
This table reports the results from examining whether banks that are closer to their capital adequacy constraints are more likely to contract lending during the CECL transition period. The dependent variable is the loan growth rate ($\Delta LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints (measured by $CLOSE\_TO\_CONS\_ALL_i$ and $CLOSE\_TO\_CONS\_T1_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1] and [2] report the results obtained from using the three types of capital ratio to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_ALL_i$ and whether $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_ALL_i$). Regressions [3] and [4] report the results obtained from using only the Tier 1 capital ratio to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_T1_i$ and whether $CLOSE\_TO\_CONS\_T1_i$ is greater than its median, $MORE\_CONSTRAIN\_T1_i$). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.5 CECL and long-term loans (H2)

Independent Variables	[1]	[2]	[3]	[4]
	Dependent Variable = ΔLONG_TERM_LOANS$_{i,t}$			
CLOSE_TO_CONS_ALL$_i$ × POST$_t$	**0.931**			
	t = 0.336			
MORE_CONSTRAIN_ALL$_i$ × POST$_t$		**-0.275**		
		t = -0.438		
CLOSE_TO_CONS_T1$_i$ × POST$_t$			**-0.857**	
			t = -0.262	
MORE_CONSTRAIN_T1$_i$ × POST$_t$				**0.003**
				t = 0.004
Controls				
SIZE$_{i,t-1}$	-2.041	-1.904	-1.928	-1.987
	t = -1.757*	t = -1.648	t = -1.673	t = -1.709
RES_RE_LOANS$_{i,t-1}$	-0.137	-0.136	-0.136	-0.136
	t = -2.118**	t = -2.096**	t = -2.105**	t = -2.103**
COM_RE_LOANS$_{i,t-1}$	-0.222	-0.221	-0.222	-0.222
	t = -3.447***	t = -3.431***	t = -3.446***	t = -3.414***
COM_NRE_LOANS$_{i,t-1}$	-0.036	-0.038	-0.037	-0.037
	t = -0.369	t = -0.388	t = -0.382	t = -0.375
CONSUMER_LOANS$_{i,t-1}$	-0.249	-0.255	-0.252	-0.251
	t = -1.399	t = -1.428	t = -1.407	t = -1.395
LONG_TERM_LOANS$_{i,t-1}$	-0.437	-0.439	-0.439	-0.438
	t = -6.452***	t = -6.460***	t = -6.489***	t = -6.373***
NPL$_{i,t-1}$	-0.3	-0.282	-0.289	-0.295

	t = -1.326	t = -1.222	t = -1.284	t = -1.306
$DEPOSITS_{i,t-1}$	0.022	0.02	0.021	0.021
	t = 0.455	t = 0.408	t = 0.422	t = 0.422
$CASH\&MKTSEC_{i,t-1}$	0.006	0.003	0.004	0.004
	t = 0.106	t = 0.051	t = 0.067	t = 0.075
$TRADING\_ASSETS_{i,t-1}$	-1.094	-1.069	-1.053	-1.072
	t = -1.822*	t = -1.825*	t = -1.850*	t = -1.799*
$ROA_{i,t-1}$	-3.552	-3.5	-3.503	-3.523
	t = -2.267**	t = -2.230**	t = -2.250**	t = -2.245**
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.132	0.132	0.132	0.132
Number of bank-quarters	7,073	7,073	7,073	7,073

Note:

This table reports the results from examining whether banks that are closer to their capital adequacy constraints are more likely to reduce their holding of long-term loans during the CECL transition period. The dependent variable is the growth rate of long-term loans ($\Delta LONG\_TERM\_LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints (measured by $CLOSE\_TO\_CONS\_ALL_i$ and $CLOSE\_TO\_CONS\_T1_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1] and [2] report the results obtained from using the three types of capital ratios to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_ALL_i$ and whether $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_ALL_i$). Regressions [3] and [4] report the results obtained from using only the Tier 1 capital ratio to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_T1_i$ and whether $CLOSE\_TO\_CONS\_T1_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_T1_i$). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.6 CECL and loan growth of different loan types (H3)

	Dependent Variable =				
	ΔTOT_RE_LOANS$_{i,t}$	ΔCOM_NRE_LOANS$_{i,t}$	ΔCONSUMER_LOANS$_{i,t}$	ΔRES_RE_LOANS$_{i,t}$	ΔCOM_RE_LOANS$_{i,t}$
Independent Variables	[1]	[2]	[3]	[4]	[5]
MORE_CONSTRAIN_ALL$_i$ × POST$_t$	**-0.428**	**-0.436**	**0.111**	**-0.789**	**-0.243**
	t = -2.222**	**t = -1.162**	**t = 0.163**	**t = -2.833*****	**t = -1.054**
Controls					
SIZE$_{i,t-1}$	-2.095	-3.913	-4.36	-1.564	-2.775
	t = -4.012***	t = -5.433***	t = -3.338***	t = -2.379**	t = -4.593***
RES_RE_LOANS$_{i,t-1}$	-0.19	-0.065	-0.07	-0.302	-0.059
	t = -9.693***	t = -1.133	t = -0.660	t = -8.698***	t = -2.143**
COM_RE_LOANS$_{i,t-1}$	-0.231	-0.057	-0.185	-0.091	-0.385
	t = -7.045***	t = -0.846	t = -1.527	t = -2.346**	t = -8.338***
COM_NRE_LOANS$_{i,t-1}$	0.023	-0.735	0.215	0.034	0.011
	t = 0.580	t = -8.218***	t = 2.706**	t = 0.720	t = 0.238
CONSUMER_LOANS$_{i,t-1}$	0.013	0.028	-1.174	-0.129	0.091
	t = 0.226	t = 0.197	t = -4.221***	t = -2.160**	t = 1.201
LONG_TERM_LOANS$_{i,t-1}$	0.014	0.043	0.148	0.002	0.03
	t = 0.776	t = 1.298	t = 2.827***	t = 0.098	t = 1.260
NPL$_{i,t-1}$	-0.338	-0.495	-0.668	-0.258	-0.428
	t = -5.109***	t = -2.376**	t = -2.214**	t = -3.016***	t = -4.696***
DEPOSITS$_{i,t-1}$	0.015	-0.021	-0.137	0.042	0.001
	t = 0.846	t = -0.415	t = -2.475**	t = 1.905*	t = 0.018
CASH&MKTSEC$_{i,t-1}$	-0.009	-0.053	-0.046	-0.021	-0.015
	t = -0.506	t = -0.856	t = -0.552	t = -0.877	t = -0.566

$TRADING\_ASSETS_{i,t-1}$	-0.269	-0.006	0.908	-0.291	-0.168
	t = -0.765	t = -0.009	t = 2.143**	t = -0.695	t = -0.572
$ROA_{i,t-1}$	-0.833	-1.246	-0.197	-0.661	-0.393
	t = -1.483	t = -1.313	t = -0.128	t = -1.157	t = -0.698
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
R^2	0.255	0.158	0.120	0.223	0.191
Number of bank-quarters	7,073	7,073	7,073	7,073	7,073

Note:
This table reports the results from examining whether banks that are closer to their capital adequacy constraints are more likely to reduce the origination of real estate loans during the CECL transition period. The dependent variable is the loan growth rate for real estate loans, residential real estate loans, commercial real estate loans, commercial loans, and consumer loans ($\Delta TOT\_RE\_LOANS_{i,t-1}$; $\Delta RES\_RE\_LOANS_{i,t-1}$; $\Delta COM\_RE\_LOANS_{i,t-1}$; $\Delta COM\_NRE\_LOANS_{i,t}$; and $\Delta CONSUMER\_LOANS_{i,t}$). The key independent variables include the capital inadequacy risk (measured by $MORE\_CONSTRAIN\_ALL_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1], [2], [3], [4], and [5] report the results from using the loan growth rate for real estate loans, residential real estate loans, commercial real estate loans, commercial loans, and consumer loans, respectively, as the dependent variables. The number of observations in column [5] is equal to 7,512, which is lower than the number of observations in other columns. This is because commercial real estate loans occasionally have a zero beginning of the quarter balance, leading to a missing value for their growth rates. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.7 CECL's impact on lending and regulatory leniency - using subsample tests (H4)

Panel A: Regression estimation

Dependent Variable =	$\Delta LOANS_{i,t}$		$\Delta LONG\_TERM\_LOANS_{i,t}$		$\Delta TOT\_RE\_LOANS_{i,t-1}$	
Subsample =	**High regulatory leniency ($HIGH\_REG\_LEN_i = 1$)**	**Low regulatory leniency ($HIGH\_REG\_LEN_i = 0$)**	**High regulatory leniency**	**Low regulatory leniency**	**High regulatory leniency**	**Low regulatory leniency**
Hypotheses =	**H4a**		**H4b**		**H4c**	
Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]
$MORE\_CONSTRAIN\_ALL_i \times POST_t$	**-0.662**	**-0.154**	**-1.329**	**0.625**	**-0.885**	**0.044**
	t = -2.985* **	**t = -0.648**	**t = -1.521**	**t = 0.853**	**t = -3.173*** **	**t = 0.159**
Controls						
$SIZE_{i,t-1}$	-2.742	-2.040	-1.357	-2.770	-2.718	-1.561
	t = -5.797***	t = -2.968***	t = -0.950	t = -1.573	t = -4.769***	t = -2.081**
$RES\_RE\_LOANS_{i,t-1}$	-0.192	-0.125	-0.148	-0.112	-0.207	-0.181
	t = -5.837***	t = -8.960***	t = -1.487	t = -1.275	t = -5.876***	t = -7.856***
$COM\_RE\_LOANS_{i,t-1}$	-0.174	-0.112	-0.317	-0.158	-0.256	-0.228
	t = -3.979***	t = -2.797**	t = -2.728**	t = -1.805*	t = -5.766***	t = -4.861***
$COM\_NRE\_LOANS_{i,t-1}$	-0.132	-0.132	-0.032	-0.051	-0.008	0.049
	t = -2.940***	t = -2.476**	t = -0.259	t = -0.383	t = -0.138	t = 1.232
$CONSUMER\_LOANS_{i,t-1}$	-0.123	-0.078	0.076	-0.437	0.007	0.029
	t = -1.277	t = -1.258	t = 0.329	t = -1.706	t = 0.079	t = 0.405

$LONG\_TERM\_LOANS_{i,t-1}$	0.032	0.017	-0.515	-0.400	0.005	0.024
	t = 1.869*	t = 0.581	t = -6.004***	t = -4.598***	t = 0.282	t = 0.868
$NPL_{i,t-1}$	-0.451	-0.455	-0.333	-0.215	-0.362	-0.319
	t = -4.403***	t = -3.860***	t = -1.112	t = -0.548	t = -3.833***	t = -2.771**
$DEPOSITS_{i,t-1}$	-0.001	-0.008	0.066	-0.041	0.009	0.021
	t = -0.049	t = -0.270	t = 0.938	t = -0.580	t = 0.387	t = 0.769
$CASH\&MKTSEC_{i,t-1}$	-0.044	0.055	-0.045	0.066	-0.040	0.031
	t = -1.396	t = 1.054	t = -0.560	t = 0.627	t = -1.389	t = 0.996
$TRADING\_ASSETS_{i,t-1}$	1.008	-0.072	-0.022	-1.600	0.186	-0.467
	t = 2.142**	t = -0.800	t = -0.039	t = -1.429	t = 1.260	t = -1.019
$ROA_{i,t-1}$	-1.043	0.368	-4.646	-2.247	-1.598	0.001
	t = -1.426	t = 0.935	t = -1.733*	t = -1.203	t = -1.794*	t = 0.002
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.274	0.291	0.145	0.132	0.248	0.272
Number of bank-quarters	3,471	3,602	3,471	3,602	3,471	3,602

Panel B: Tests of difference in coefficients across subsamples

Hypothesis	H4a	H4b	H4c
Regression columns	[1] − [2] < 0?	[3] − [4] < 0?	[3] − [4] < 0?
$MORE\_CONSTRAIN\_ALL_i \times POST_t$ coef diff	-0.508	-1.954	-0.929
z-statistics	-1.562	-1.714	-2.364
One-tailed p-value	0.06	0.04	0.01

Note:

Panel A reports the findings from examining whether the negative impact of CECL on bank lending through the capital channel is stronger when banks face a more lenient regulator. The dependent variables are the growth rate of total loans (ΔLOANSi,t), the growth rate of long-term loans ($LONG\_TERM\_LOANS_{i,t}$), and the growth rate of real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints ($MORE\_CONSTRAIN\_ALL_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1], [3], and [5] reports the results obtained from estimating the regression model using banks with regulatory leniency greater than the median. Regressions [2], [4], and [6] reports the results obtained from estimating the regression model using banks with regulatory leniency lower than the median. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. **Panel B** presents z-tests of differences in coefficients across the different subsample regressions in Panel A. Specifically, the first two rows of Panel B indicate which regression columns are compared and the relevant hypothesis. The third and fourth rows provide the calculated difference of the $MORE\_CONSTRAIN\_ALL_i \times POST_t$ coefficients and the associated z-statistics for the indicated regression columns. The last row provides the associated p-value for the significance of difference in the MORE_CONSTRAIN_ALLi × $POST_t$ coefficients. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.8 CECL's impact on lending and regulatory leniency - using continuous measure (H4)

	Dependent Variable =		
	$\Delta LOANS_{i,t}$	$\Delta LONG\_TERM\_LOANS_{i,t}$	$\Delta TOT\_RE\_LOANS_{i,t}$
Hypotheses =	**H4a**	**H4b**	**H4c**
Independent Variables	[1]	[2]	[3]
$MORE\_CONSTRAIN\_ALL_i \times REG\_LEN_i \times POST_t$	**-5.347**	**-18.802**	**-7.872**
	t = -2.297**	**t = -2.249****	**t = -2.493****
<u>**Controls**</u>			
$MORE\_CONSTRAIN\_ALL_i \times POST_t$	-0.055	1.032	0.118
	t = -0.236	t = 1.490	t = 0.413
$REG\_LEN_i \times POST_t$	4.822	11.225	5.318
	t = 2.607**	t = 2.290**	t = 2.104**
$SIZE_{i,t-1}$	-2.314	-1.967	-2.129
	t = -4.431***	t = -1.723*	t = -3.992***
$RES\_RE\_LOANS_{i,t-1}$	-0.153	-0.14	-0.192
	t = -8.980***	t = -2.161**	t = -9.840***
$COM\_RE\_LOANS_{i,t-1}$	-0.141	-0.231	-0.235
	t = -4.855***	t = -3.621***	t = -7.056***
$COM\_NRE\_LOANS_{i,t-1}$	-0.124	-0.039	0.022
	t = -3.454***	t = -0.410	t = 0.551
$CONSUMER\_LOANS_{i,t-1}$	-0.095	-0.253	0.013
	t = -1.726*	t = -1.418	t = 0.221
$LONG\_TERM\_LOANS_{i,t-1}$	0.025	-0.439	0.014
	t = 1.366	t = -6.415***	t = 0.788

$NPL_{i,t-1}$	-0.447	-0.287	-0.339
	t = -5.281***	t = -1.243	t = -5.096***
$DEPOSITS_{i,t-1}$	-0.005	0.018	0.014
	t = -0.215	t = 0.364	t = 0.802
$CASH\&MKTSEC_{i,t-1}$	-0.001	0.003	-0.009
	t = -0.060	t = 0.048	t = -0.519
$TRADING\_ASSETS_{i,t-1}$	0.258	-1.102	-0.283
	t = 1.084	t = -1.863*	t = -0.800
$ROA_{i,t-1}$	-0.424	-3.518	-0.847
	t = -0.900	t = -2.211**	t = -1.506
Year-quarter Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
R^2	0.277	0.133	0.256
Number of bank-quarters	7,073	7,073	7,073

Note:
This table reports the findings from examining whether the negative impact of CECL on bank lending through the capital channel is stronger when the banks face a more lenient regulator. The dependent variables are the loan growth rate ($\Delta LOANS_{i,t}$), the long-term loan growth rate ($\Delta LONG\_TERM\_LOANS_{i,t}$), and the growth rate of residential loans ($\Delta TOT\_RE\_LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints ($MORE\_CONSTRAIN\_ALL_i$), the proxy for regulatory leniency index (REG_LEN_i) obtained from Agarwal et al. (2014), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.9 CECL's impact on lending and bank share listing status (H5)

Panel A: Regression estimation

Dependent Variable =	$\Delta LOANS_{i,t}$		$\Delta LONG\_TERM\_LOANS_{i,t}$		$\Delta TOT\_RE\_LOANS_{i,t}$	
Subsample =	**Public Bank ($PUBLIC_i$ = 1)**	**Private Bank ($PUBLIC_i$ = 0)**	**Public Bank**	**Private Bank**	**Public Bank**	**Private Bank**
Hypotheses =	**H5a**		**H5b**		**H5c**	
Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]
$MORE\_CONSTRAIN\_ALL_i \times POST_t$	**-0.369**	**-0.464**	**-1.571**	**1.398**	**-0.359**	**-0.462**
	t = -1.803*	**t = -2.196****	**t = -1.751***	**t = 1.794***	**t = -1.457**	**t = -1.622**
<u>Controls</u>						
$SIZE_{i,t-1}$	-2.292	-4.207	-1.346	-7.174	-1.9	-4.351
	t = -3.626***	t = -4.868***	t = -0.996	t = -2.337**	t = -3.193***	t = -3.836***
$RES\_RE\_LOANS_{i,t-1}$	-0.131	-0.187	-0.11	-0.229	-0.17	-0.231
	t = -6.354***	t = -4.601***	t = -1.391	t = -1.571	t = -6.899***	t = -5.246***
$COM\_RE\_LOANS_{i,t-1}$	-0.112	-0.171	-0.102	-0.362	-0.202	-0.28
	t = -2.636**	t = -5.107***	t = -1.155	t = -3.664***	t = -4.489***	t = -6.750***
$COM\_NRE\_LOANS_{i,t-1}$	-0.102	-0.135	0.041	-0.094	0.024	0.04
	t = -2.102**	t = -3.308***	t = 0.362	t = -0.740	t = 0.426	t = 0.774
$CONSUMER\_LOANS_{i,t-1}$	-0.06	-0.159	-0.352	0.083	0.049	-0.07
	t = -1.356	t = -1.312	t = -2.085**	t = 0.326	t = 0.720	t = -0.911
$LONG\_TERM\_LOANS_{i,t-1}$	0.032	0.015	-0.393	-0.571	0.013	0.015
	t = 1.224	t = 0.742	t = -4.926***	t = -6.491***	t = 0.531	t = 0.639
$NPL_{i,t-1}$	-0.391	-0.439	-0.382	-0.073	-0.225	-0.416
	t = -2.905***	t = -3.781***	t = -1.096	t = -0.208	t = -1.888*	t = -4.965***
$DEPOSITS_{i,t-1}$	-0.03	0.036	0.017	0.031	-0.019	0.071
	t = -1.136	t = 1.321	t = 0.234	t = 0.438	t = -0.855	t = 2.645**

	[1]	[2]	[3]	[4]	[5]	[6]
$CASH\&MKTSEC_{i,t-1}$	0.004	-0.002	-0.082	0.071	-0.031	0.018
	t = 0.100	t = -0.083	t = -1.021	t = 1.115	t = -0.975	t = 0.595
$TRADING\_ASSETS_{i,t-1}$	0.423	-1.151	-0.735	-2.742	-0.183	-1.16
	t = 1.586	t = -3.294***	t = -1.106	t = -2.161**	t = -0.487	t = -4.695***
$ROA_{i,t-1}$	0.242	-1.031	-4.206	-2.875	-0.296	-1.415
	t = 0.353	t = -1.976*	t = -1.940*	t = -1.520	t = -0.370	t = -2.136**
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.298	0.262	0.123	0.158	0.298	0.211
Number of bank-quarters	3,726	3,347	3,726	3,347	3,726	3,347

Panel B: Tests of difference in coefficients across subsamples

Hypothesis	**H5a**	**H5b**	**H5c**
Regression columns:	[1] − [2] ≠ 0?	[3] − [4] ≠ 0?	[3] − [4] ≠ 0?
$MORE\_CONSTRAIN\_ALL_i \times POST_t$ coef diff	0.095	-2.969	0.103
z-statistics	0.323	-2.498	0.273
Two-tailed p-value	1.00	0.01	1.00

Note:

Panel A reports the findings from examining whether the negative impact of CECL on bank lending through the capital channel is stronger when banks are publicly listed in a stock exchange. The dependent variables are the growth rate of total loans ($\Delta LOANS_{i,t}$), the growth rate of long-term loans ($\Delta LONG\_TERM\_LOANS_{i,t}$), and the growth rate of real estate loans ($\Delta TOT\_RE\_LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints ($MORE\_CONSTRAIN\_ALL_{i}$), a dummy indicating observations that are during the CECL transition period ($POST_{t}$), and various control variables. Regressions [1], [3], and [5] ([2], [4], and [6]) report the results obtained from estimating the regression model using publicly traded (privately held) banks. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. **Panel B** presents z-tests of differences in coefficients across the different subsample regressions in Panel A. Specifically, the first two rows of Panel B indicate which regression columns are compared and the relevant hypothesis. The third and fourth rows provide the calculated difference of the $MORE\_CONSTRAIN\_ALL_{i} \times POST_{t}$ coefficients and the associated z-statistics for the indicated regression columns. The last row provides the associated p-value for the significance of difference in the $MORE\_CONSTRAIN\_ALL_{i} \times POST_{t}$ coefficients. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.10 Composition of the Small Business Loan Sample

Panel A - Sample selection process

		Number of bank-county-years
BHC main sample merged with the CRA small business lending data		
Number of banks in the main Y9C sample		313
Less: number of banks with no small business loan origination available	-	57
Number of unique banks in the SBL sample		256
SBL Sample of year-bank-county observations (2013-2018)		256,849
Number of unique counties		3,084

Note:

This panel summarizes the sample selection process. The SBL Sample is the inner joint of the FR Y-9C data and the CRA small business lending data. The bank data is collected from the FR Y-9C database, which is available on https://www.chicagofed.org/banking/financial-institution-reports/bhc-data. The small business lending data is collected from the CRA database, which is available on https://www.ffiec.gov/cra/default.htm. See, e.g., Bord et al. (2018) for a more comprehensive description of the CRA data.

Panel B - Sample composition by year

SBL Sample (Bank-county-year level)

Year	Number of observations	Number of banks	Number of counties
2013	35,726	187	3,080
2014	37,623	214	3,079
2015	41,691	225	3,081
2016	46,135	236	3,084
2017	48,105	*238*	3,082
2018	47,569	*165*	3,082
Total	256,849		

Note:

This panel illustrates the breakdown of the SBL Sample, including the number of bank-county pairs, the number of unique banks, and the number of unique counties in each sample year. The number of unique banks significantly drops from 238 in 2017 to 165 in 2018 because Federal Reserves increased the asset-size threshold for filing the Y-9C from $1 billion to $3 billion effective in 2018Q3. See https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDal8cbqnRxZRg== for more details.

Table 2.11 Descriptive Statistics - Small business lending (SBL) sample

Variables	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
$SBL_{i,c,t}$ (thousand)	2,517	7,839	3	58	250	1,073	56,436
$LOG\_SBL_{i,c,t}$	5.610	2.138	1.099	4.060	5.521	6.978	10.941
$CLOSE\_TO\_CONS\_T1_i$	0.487	0.061	0.299	0.460	0.485	0.535	0.624
$CLOSE\_TO\_CONS\_ALL_i$	0.559	0.066	0.381	0.521	0.561	0.607	0.715
$SIZE_{i,t-1}$	18.491	2.433	13.930	16.400	19.030	21.246	21.668
$TOTAL\_ASSETS_{i,t-1}$ (%)	650.281	881.166	1.122	13.254	183.872	1687.155	2572.773
TOT_RE_LOANSi,t-1 (%)	27.463	13.332	3.091	16.833	26.669	35.685	63.372
$RES\_RE\_LOANS_{i,t-1}$ (%)	16.910	7.460	0.565	11.858	16.729	21.208	43.611
$COM\_RE\_LOANS_{i,t-1}$ (%)	10.450	8.693	0.299	3.773	7.098	16.964	35.493
$COM\_NRE\_LOANS_{i,t-1}$ (%)	14.277	8.094	3.392	8.265	11.389	19.277	39.969
$CONSUMER\_LOANS_{i,t-1}$ (%)	9.297	9.471	0.002	2.879	7.932	10.579	44.076
$LONG\_TERM\_LOANS_{i,t-1}$ (%)	13.443	7.196	2.154	8.539	12.712	17.492	38.170
$NPL_{i,t-1}$ (%)	1.767	1.301	0.184	0.849	1.510	2.216	7.216
$DEPOSITS_{i,t-1}$ (%)	79.374	13.052	40.833	75.042	81.664	90.323	97.667
$CASH\&MKTSEC_{i,t-1}$ (%)	9.688	9.088	1.353	2.850	4.943	16.404	35.523
$TRADING\_ASSETS_{i,t-1}$ (%)	3.537	5.695	0.000	0.010	0.400	4.300	19.000
$ROA_{i,t-1}$ (%)	1.013	0.419	-0.365	0.816	1.016	1.264	2.271
REG_LEN_i	0.040	0.055	-0.055	0.000	0.000	0.085	0.315
# of obs =	**256,849**						

Note:

This table reports the descriptive statistics for the SBL Sample. Bank-county-year level data is aggregated at the bank holding company-county level. The selection process of these two samples and their composition are presented in Table 2.10. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.12 CECL and small business lending

Independent Variables	Dependent Variable = $LOG\_SBL_{i,c,t}$ [1]	[2]	[3]	[4]
$CLOSE\_TO\_CONS\_ALL_i \times POST_t$	**-2.011**			
	t = -3.949* **			
$MORE\_CONSTRAIN\_ALL_i \times POST_t$		**-0.239**		
		t = -3.154* **		
$CLOSE\_TO\_CONS\_T1_i \times POST_t$			**-1.706**	
			t = -3.269* **	
$MORE\_CONSTRAIN\_T1_i \times POST_t$				**-0.233**
				t = -3.764* **
<u>Controls</u>				
$SIZE_{i,t-1}$	0.055	0.024	-0.023	-0.024
	t = 0.245	t = 0.109	t = -0.092	t = -0.097
$RES\_RE\_LOANS_{i,t-1}$	-0.008	-0.009	-0.012	-0.016
	t = -0.720	t = -0.872	t = -1.087	t = -1.523
$COM\_RE\_LOANS_{i,t-1}$	0.03	0.028	0.026	0.022
	t = 1.813*	t = 1.739*	t = 1.513	t = 1.321
$COM\_NRE\_LOANS_{i,t-1}$	-0.023	-0.024	-0.026	-0.025
	t = -1.421	t = -1.517	t = -1.526	t = -1.463
$CONSUMER\_LOANS_{i,t-1}$	-0.025	-0.031	-0.028	-0.035
	t = -1.289	t = -1.602	t = -1.438	t = -1.847*
$LONG\_TERM\_LOANS_{i,t-1}$	-0.006	-0.005	-0.007	-0.008
	t = -0.705	t = -0.592	t = -0.731	t = -0.866
$NPL_{i,t-1}$	0.086	0.095	0.075	0.054

	[1]	[2]	[3]	[4]
	t = 2.060**	t = 2.185**	t = 1.695*	t = 1.218
$DEPOSITS_{i,t-1}$	0.02	0.023	0.02	0.02
	t = 2.949***	t = 3.009***	t = 2.813***	t = 2.665***
$CASH\&MKTSEC_{i,t-1}$	-0.017	-0.02	-0.018	-0.02
	t = -1.648	t = -1.917*	t = -1.868*	t = -1.969**
$TRADING\_ASSETS_{i,t-1}$	-0.017	-0.028	-0.029	-0.024
	t = -0.510	t = -0.764	t = -0.855	t = -0.669
$ROA_{i,t-1}$	-0.003	-0.014	-0.007	-0.004
	t = -0.047	t = -0.228	t = -0.110	t = -0.066
Bank Fixed Effects	Yes	Yes	Yes	Yes
County-year Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.448	0.448	0.448	0.448
Number of bank-county-years	256,849	256,849	256,849	256,849

Note:
This table reports the results from examining whether banks that are closer to their capital adequacy constraints are more likely to reduce small business lending during the CECL transition period. The dependent variable is the log value of small business lending ($LOG\_SBL_{i,c,t}$). The key independent variables include the closeness to capital adequacy constraints(measured by $CLOSE\_TO\_CONS\_ALL_i$ and $CLOSE\_TO\_CONS\_T1_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1] and [2] report the results obtained from using the three types of capital ratio to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_ALL_i$ and whether $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_ALL_i$). Regressions [3] and [4] report the results obtained from using only the Tier 1 capital ratio to measure the closeness to capital adequacy constraints($CLOSE\_TO\_CONS\_T1_i$ and whether $CLOSE\_TO\_CONS\_T1_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_T1_i$). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-county-years with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and county-year. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.13 Cross-sectional analysis of CECL's impact on small business lending

Panel A: Regression estimation

Dependent Variable =	$LOG\_SBL_{i,c,t}$		$LOG\_SBL_{i,c,t}$	
Subsample =	**High regulatory leniency ($HIGH\_REG\_LEN_i$ = 1)**	**Low regulatory leniency ($HIGH\_REG\_LEN_i$ = 0)**	**Public Bank ($PUBLIC_i$ = 1)**	**Private Bank ($PUBLIC_i$ = 0)**
Independent Variables	[1]	[2]	[3]	[4]
$MORE\_CONSTRAIN\_ALL_i \times POST_t$	**-0.272** **t = -2.892*** **	**-0.037** **t = -0.335**	**-0.297** **t = -3.481*** **	**0.150** **t = 2.195***
<u>Controls</u>				
$SIZE_{i,t-1}$	0.098 t = 0.521	-0.448 t = -1.261	0.088 t = 0.381	-0.145 t = -0.574
$RES\_RE\_LOANS_{i,t-1}$	-0.014 t = -1.212	-0.011 t = -0.602	-0.012 t = -1.018	-0.002 t = -0.121
$COM\_RE\_LOANS_{i,t-1}$	0.034 t = 2.060**	0.008 t = 0.315	0.033 t = 1.743*	-0.002 t = -0.217
$COM\_NRE\_LOANS_{i,t-1}$	-0.029 t = -1.935*	-0.047 t = -1.859*	-0.023 t = -1.294	-0.009 t = -0.786
$CONSUMER\_LOANS_{i,t-1}$	-0.032 t = -1.966*	-0.028 t = -1.021	-0.038 t = -1.916*	0.028 t = 1.479
$NPL_{i,t-1}$	-0.008 t = -0.976	0.016 t = 0.852	-0.004 t = -0.396	-0.003 t = -0.306
$LONG\_TERM\_LOANS_{i,t-1}$	-0.038 t = -0.961	0.186 t = 3.273***	0.12 t = 2.665***	0.006 t = 0.186
$DEPOSITS_{i,t-1}$	0.027 t = 2.127**	0.016 t = 2.055**	0.025 t = 2.992***	-0.006 t = -0.687
$CASH\&MKTSEC_{i,t-1}$	-0.006	-0.051	-0.023	-0.011

	t = -0.632	t = -3.573***	t = -1.834*	t = -1.309
$TRADING\_ASSETS_{i,t-1}$	-0.09	-0.059	-0.022	0.298
	t = -2.182**	t = -1.443	t = -0.630	t = 1.240
$ROA_{i,t-1}$	-0.032	0.111	-0.004	-0.053
	t = -0.561	t = 1.517	t = -0.066	t = -0.841
Bank Fixed Effects	Yes	Yes	Yes	Yes
County-year Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.430	0.588	0.499	0.498
Number of bank-county-years	143,039	113,810	232,260	24,589

Panel B: Tests of difference in coefficients across subsamples

Regression columns:	[1] − [2] < 0?		[3] − [4] ≠ 0?
$MORE\_CONSTRAIN\_ALL_i \times POST_t$ coef diff	-0.235		-0.447
z-statistics	-1.620		-4.085
One-tailed p-value	0.05	Two-tailed p-value	0.00

Note:

Panel A reports the findings from examining whether the negative impact of CECL on bank lending through the capital channel is stronger when banks are publicly listed in a stock exchange. The dependent variable is the log value of small business lending ($LOG\_SBL_{i,c,t}$). The key independent variables include the closeness to capital adequacy constraints ($MORE\_CONSTRAIN\_ALL_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Regressions [1] ([2]) reports the results obtained from estimating the regression model using banks with regulatory leniency greater (smaller) than the median, respectively. Regressions [3] ([4]) reports the results obtained from estimating the regression model using publicly traded (privately held banks). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and county-year. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. **Panel B** presents z-tests of differences in coefficients across the different subsample regressions in Panel A. Specifically, the first two rows of Panel B indicate which regression columns are compared and the relevant hypothesis. The third and fourth rows provide the calculated difference of the $MORE\_CONSTRAIN\_ALL_i \times POST_t$ coefficients and the associated z-statistics for the indicated regression columns. The last row provides the associated p-value for the significance of difference in the $MORE\_CONSTRAIN\_ALL_i \times POST_t$ coefficients. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.14 CECL's impact on small business lending and regulatory leniency - using a continuous measure

Independent Variables	Dependent Variable = $LOG\_SBL_{i,c,t}$ [1]
$MORE\_CONSTRAIN\_ALL_i \times REG\_LEN_i \times POST_t$	**-0.242**
	t = -0.195
$MORE\_CONSTRAIN\_T1_i \times REG\_LEN_i \times POST_t$	
Controls	
$MORE\_CONSTRAIN\_ALL_i \times POST_t$	-0.216
	t = -2.125**
$REG\_LEN_i \times POST_t$	0.084
	t = 0.411
$SIZE_{i,t-1}$	-0.006
	t = -0.596
$RES\_RE\_LOANS_{i,t-1}$	0.027
	t = 1.760*
$COM\_RE\_LOANS_{i,t-1}$	-0.023
	t = -1.438
$COM\_NRE\_LOANS_{i,t-1}$	-0.029
	t = -1.637
$CONSUMER\_LOANS_{i,t-1}$	-0.009
	t = -0.973
$LONG\_TERM\_LOANS_{i,t-1}$	0.103
	t = 2.573**
$NPL_{i,t-1}$	0.02

	t = 2.626***
$DEPOSITS_{i,t-1}$	-0.02
	t = -1.898*
$CASH\&MKTSEC_{i,t-1}$	-0.022
	t = -0.582
$TRADING\_ASSETS_{i,t-1}$	0.011
	t = 0.180
$ROA_{i,t-1}$	-0.022
	t = -0.582
Bank Fixed Effects	Yes
County-year Fixed Effects	Yes
R^2	0.449
Number of bank-county-years	256,849

Note:
This table reports the findings from examining whether the negative impact of CECL on bank lending through the capital channel is stronger when banks are state-chartered. The dependent variable is the log value of small business lending ($LOG\_SBL_{i,c,t}$). The key independent variables include the closeness to capital adequacy constraints ($MORE\_CONSTRAIN\_ALL_i$), the proxy for regulatory leniency (REG_LEN_i) obtained from Agarwal et al. (2014), a dummy indicating observations that are during the CECL transition period ($POST_t$), and various control variables. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and county-year. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.15 **Summary of placebo test results**

Assumed treatment dates	**How much significance does a placebo test retain?**	**Total (A)**	**How many statistical tests on the coefficients of interests are statistically significant?**														
			Table 2.4	**Table 2.5**	**Table 2.6**	**Table 2.7**			**Table 2.8**			**Table 2.9**			**Table 2.12**	**Table 2.13**	**Table 2.14**
			H1	**H2**	**H3**	**H4a**	**H4b**	**H4c**	**H4a**	**H4b**	**H4c**	**H5a**	**H5b**	**H5c**	**Add1**	**Add2**	**Add3**
<u>Main analysis</u>	**(A divided by 19)**																
2015Q4	NA	19	4	0	2	1	1	1	1	1	1	0	1	0	4	2	0
<u>Placebo Test</u>																	
2014Q4	36.84%	7	4	0	0	1	0	0	0	0	0	0	0	0	1	1	0
2013Q4	31.58%	6	4	0	0	0	0	1	0	0	0	0	0	0	0	1	0
2012Q4	31.58%	6	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0
2011Q4	26.32%	5	0	0	2	0	0	0	0	0	0	0	0	0	2	1	0

Note:
This table summarizes the results obtained from the placebo test. For the placebo test, the pre-period is 12 quarters before the assumed treatment dates, and the post-period is 12 quarters after the assumed treatment dates. Specifically, I check how many statistical tests on the coefficients of interest are still statistically significant if I replace the 2015Q4 actual approval date of CECL with four different placebo dates. For example, the 2014Q4 placebo test results in a 36.84% retention rate, which is calculated using the following procedures. The 2014Q4 placebo test shows seven coefficients tests that are significant in the same direction as predicted. The seven significant coefficient tests retain 36.84% of the 19 significant tests that I obtain from using the actual CECL approval dates (7/19 = 36.84%).

Table 2.16 Does increasing equity mitigate the impact of CECL on lending?

Independent Variables	Dependent Variable = $\Delta LOANS_{i,t}$ [1]	[2]	[3]	[4]
$CLOSE\_TO\_CONS\_ALL_i \times POST_t \times dEQ_i$	**1.028** **t = 2.424****			
$MORE\_CONSTRAIN\_ALL_i \times POST_t \times dEQ_i$		**0.154** **t = 0.977**		
$CLOSE\_TO\_CONS\_T1_i \times POST_t \times dEQ_i$			**1.194** **t = 2.248****	
$MORE\_CONSTRAIN\_T1_i \times POST_t \times dEQ_i$				**0.114** **t = 0.754**
$CLOSE\_TO\_CONS\_ALL_i \times POST_t$	-2.826 t = -3.275***			
$MORE\_CONSTRAIN\_ALL_i \times POST_t$		-0.459 t = -2.950***		
$CLOSE\_TO\_CONS\_T1_i \times POST_t$			-3.46 t = -3.450***	
$MORE\_CONSTRAIN\_T1_i \times POST_t$				-0.428 t = -2.511**
$dEQ_i \times POST_t$	-0.574 t = -2.462**	-0.105 t = -1.037	-0.55 t = -2.239**	-0.089 t = -0.690
<u>Controls</u>				
$SIZE_{i,t-1}$	-2.33 t = -4.561***	-2.321 t = -4.564***	-2.313 t = -4.635***	-2.302 t = -4.671***
$RES\_RE\_LOANS_{i,t-1}$	-0.152	-0.152	-0.154	-0.155

	t = -8.843***	t = -9.062***	t = -8.950***	t = -9.130***
$COM\_RE\_LOANS_{i,t-1}$	-0.138	-0.138	-0.141	-0.141
	t = -4.689***	t = -4.824***	t = -4.854***	t = -4.848***
$COM\_NRE\_LOANS_{i,t-1}$	-0.122	-0.123	-0.122	-0.123
	t = -3.333***	t = -3.425***	t = -3.361***	t = -3.372***
$CONSUMER\_LOANS_{i,t-1}$	-0.089	-0.095	-0.089	-0.092
	t = -1.624	t = -1.736*	t = -1.650	t = -1.658
$LONG\_TERM\_LOANS_{i,t-1}$	0.028	0.027	0.028	0.027
	t = 1.559	t = 1.435	t = 1.579	t = 1.443
$NPL_{i,t-1}$	-0.427	-0.441	-0.426	-0.45
	t = -4.987***	t = -5.074***	t = -5.047***	t = -5.356***
$DEPOSITS_{i,t-1}$	-0.005	-0.003	-0.005	-0.004
	t = -0.234	t = -0.145	t = -0.215	t = -0.171
$CASH\&MKTSEC_{i,t-1}$	0.002	0.0001	0.002	-0.0004
	t = 0.101	t = 0.003	t = 0.086	t = -0.018
$TRADING\_ASSETS_{i,t-1}$	0.345	0.292	0.356	0.285
	t = 1.664	t = 1.273	t = 1.699	t = 1.217
$ROA_{i,t-1}$	-0.361	-0.389	-0.348	-0.373
	t = -0.736	t = -0.799	t = -0.717	t = -0.770
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.277	0.276	0.278	0.276
Number of bank-quarters	7,073	7,073	7,073	7,073

Note:

This table reports the results from examining whether increasing equity mitigates CECL's impact on loan growth during the CECL transition period. The dependent variable is the loan growth rate ($\Delta LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints (measured by $CLOSE\_TO\_CONS\_ALL_i$ and $CLOSE\_TO\_CONS\_T1_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), the change in total equity to asset ratio during the CECL transition period (dEQ_i), and various control variables. Regressions [1] and [2] report the results obtained from using the three types of capital ratio to measure the closeness to capital adequacy constraints($CLOSE\_TO\_CONS\_ALL_i$ and whether $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_ALL_i$). Regressions [3] and [4] report the results obtained from using only the Tier 1 capital ratio to measure the closeness to capital adequacy constraints ($CLOSE\_TO\_CONS\_T1_i$ and whether $CLOSE\_TO\_CONS\_T1_i$ is greater than its median, $MORE\_CONSTRAIN\_T1_i$). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.17 Does increasing equity mitigate the impact of CECL on long-term lending?

Independent Variables	Dependent Variable = $\Delta LONG\_TERM\_LOANS_{i,t}$ [1]	[2]	[3]	[4]
$CLOSE\_TO\_CONS\_ALL_i \times POST_t \times dEQ_i$	**0.47**			
	t = 0.365			
$MORE\_CONSTRAIN\_ALL_i \times POST_t \times dEQ_i$		**-0.317**		
		t = -0.715		
$CLOSE\_TO\_CONS\_T1_i \times POST_t \times dEQ_i$			**0.424**	
			t = 0.234	
$MORE\_CONSTRAIN\_T1_i \times POST_t \times dEQ_i$				**-0.321**
				t = -0.750
$CLOSE\_TO\_CONS\_ALL_i \times POST_t$	**1.72**			
	t = 0.642			
$MORE\_CONSTRAIN\_ALL_i \times POST_t$		**0.058**		
		t = 0.105		
$CLOSE\_TO\_CONS\_T1_i \times POST_t$			**-0.17**	
			t = -0.055	
$MORE\_CONSTRAIN\_T1_i \times POST_t$				**0.301**
				t = 0.537
$dEQ_i \times POST_t$	-0.599	-0.138	-0.493	-0.164
	t = -0.825	t = -0.421	t = -0.594	t = -0.440
Controls				
$SIZE_{i,t-1}$	-1.916	-1.662	-1.835	-1.702
	t = -1.735*	t = -1.484	t = -1.624	t = -1.462
$RES\_RE\_LOANS_{i,t-1}$	-0.145	-0.142	-0.143	-0.141

	t = -2.162**	t = -2.113**	t = -2.111**	t = -2.112**
$COM\_RE\_LOANS_{i,t-1}$	-0.221	-0.224	-0.221	-0.221
	t = -2.970***	t = -3.318***	t = -3.173***	t = -2.965***
$COM\_NRE\_LOANS_{i,t-1}$	-0.037	-0.039	-0.039	-0.039
	t = -0.372	t = -0.395	t = -0.400	t = -0.401
$CONSUMER\_LOANS_{i,t-1}$	-0.261	-0.264	-0.263	-0.27
	t = -1.201	t = -1.455	t = -1.369	t = -1.421
$LONG\_TERM\_LOANS_{i,t-1}$	-0.435	-0.44	-0.437	-0.439
	t = -5.988***	t = -6.401***	t = -5.749***	t = -5.995***
$NPL_{i,t-1}$	-0.295	-0.31	-0.287	-0.318
	t = -1.316	t = -1.373	t = -1.303	t = -1.402
$DEPOSITS_{i,t-1}$	0.029	0.025	0.025	0.029
	t = 0.563	t = 0.479	t = 0.489	t = 0.558
$CASH\&MKTSEC_{i,t-1}$	0.003	-0.005	-0.00003	-0.002
	t = 0.043	t = -0.092	t = -0.0004	t = -0.037
$TRADING\_ASSETS_{i,t-1}$	-0.995	-1.009	-0.965	-0.994
	t = -1.962*	t = -1.826*	t = -1.982*	t = -1.779*
$ROA_{i,t-1}$	-3.37	-3.325	-3.327	-3.372
	t = -2.084**	t = -2.056*	t = -2.071**	t = -2.074**
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.132	0.132	0.132	0.132
Number of bank-quarters	7,073	7,073	7,073	7,073

Note:

This table reports the results from examining whether increasing equity mitigates CECL's impact on long-term loan growth during the CECL transition period. The dependent variable is the growth rate of long-term loans ($\Delta LONG\_TERM\_LOANS_{i,t}$). The key independent variables include the closeness to capital adequacy constraints(measured by $CLOSE\_TO\_CONS\_ALL_i$ and $CLOSE\_TO\_CONS\_T1_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), the change in total equity to asset ratio during the CECL transition period ($dEQ_{i,2015Q4-2018Q2}$), and various control variables. Regressions [1] and [2] report the results obtained from using the three types of capital ratios to measure the closeness to capital adequacy constraints($CLOSE\_TO\_CONS\_ALL_i$ and whether $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_ALL_i$). Regressions [3] and [4] report the results obtained from using only the Tier 1 capital ratio to measure the closeness to capital adequacy constraints($CLOSE\_TO\_CONS\_T1_i$ and whether $CLOSE\_TO\_CONS\_T1_i$ is greater than its median, i.e., $MORE\_CONSTRAIN\_T1_i$). Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Table 2.18 Does increasing equity mitigate the impact of CECL on different types of lending?

Independent Variables	Dependent Variable = $\Delta TOT\_RE\_LOANS_{i,t}$ [1]	$\Delta COM\_NRE\_LOANS_{i,t}$ [2]	$\Delta CONSUMER\_LOANS_{i,t}$ [3]	$\Delta RES\_RE\_LOANS_{i,t}$ [4]	$\Delta COM\_RE\_LOANS_{i,t}$ [5]
$CLOSE\_TO\_CONS\_ALL_i \times POST_t \times dEQ_i$	**1.071**	**0.037**	**2.093**	**0.732**	**1.167**
	t = 1.867*	**t = 0.023**	**t = 1.340**	**t = 1.006**	**t = 2.061***
$CLOSE\_TO\_CONS\_ALL_i \times POST_t$	-3.059	-1.029	1.279	-3.351	-2.872
	t = -2.549**	t = -0.393	t = 0.382	t = -2.088**	t = -2.084**
$dEQ_i \times POST_t$	-0.61	0.134	-1.17	-0.61	-0.554
	t = -1.941*	t = 0.148	t = -1.387	t = -1.496	t = -1.580
Controls					
$SIZE_{i,t-1}$	-2.132	-4.084	-4.595	-1.539	-2.847
	t = -4.303***	t = -5.283***	t = -3.556***	t = -2.455**	t = -4.965***
$RES\_RE\_LOANS_{i,t-1}$	-0.19	-0.063	-0.075	-0.306	-0.058
	t = -9.479***	t = -1.111	t = -0.741	t = -8.679***	t = -1.863*
$COM\_RE\_LOANS_{i,t-1}$	-0.23	-0.058	-0.181	-0.091	-0.383
	t = -6.947***	t = -0.874	t = -1.518	t = -2.358**	t = -8.319***
$COM\_NRE\_LOANS_{i,t-1}$	0.024	-0.733	0.22	0.033	0.011
	t = 0.574	t = -8.204***	t = 2.729**	t = 0.689	t = 0.253
$CONSUMER\_LOANS_{i,t-1}$	0.017	0.04	-1.167	-0.13	0.097
	t = 0.293	t = 0.280	t = -4.179***	t = -2.163**	t = 1.311
$LONG\_TERM\_LOANS_{i,t-1}$	0.017	0.044	0.155	0.005	0.033
	t = 0.970	t = 1.418	t = 2.769**	t = 0.234	t = 1.228
$NPL_{i,t-1}$	-0.314	-0.509	-0.619	-0.258	-0.393

	t = -4.248***	t = -2.271**	t = -2.078**	t = -2.690**	t = -3.964***
$DEPOSITS_{i,t-1}$	0.014	-0.023	-0.134	0.044	-0.003
	t = 0.753	t = -0.452	t = -2.424**	t = 1.898*	t = -0.088
$CASH\&MKTSEC_{i,t-1}$	-0.005	-0.049	-0.034	-0.022	-0.01
	t = -0.304	t = -0.861	t = -0.393	t = -0.845	t = -0.325
$TRADING\_ASSETS_{i,t-1}$	-0.181	-0.037	0.914	-0.143	-0.116
	t = -0.679	t = -0.050	t = 1.948*	t = -0.436	t = -0.460
$ROA_{i,t-1}$	-0.777	-1.346	-0.255	-0.5	-0.399
	t = -1.339	t = -1.378	t = -0.167	t = -0.833	t = -0.685
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
R^2	0.256	0.158	0.121	0.225	0.192
Number of bank-quarters	7,073	7,073	7,073	7,073	7,073

Note:
This table reports the results from examining whether increasing equity mitigates CECL's impact on the growth of different types of loans during the CECL transition period. The dependent variable is the loan growth rate for real estate loans, residential real estate loans, commercial real estate loans, commercial loans, and consumer loans ($\Delta TOT\_RE\_LOANS_{i,t-1}$; $\Delta RES\_RE\_LOANS_{i,t-1}$; $\Delta COM\_RE\_LOANS_{i,t-1}$; $\Delta COM\_NRE\_LOANS_{i,t}$; and $\Delta CONSUMER\_LOANS_{i,t}$). The key independent variables include the capital inadequacy risk (measured by $MORE\_CONSTRAIN\_ALL_i$), a dummy indicating observations that are during the CECL transition period ($POST_t$), the change in total equity to asset ratio during the CECL transition period (dEQ_i), and various control variables. Regressions [1], [2], [3], [4], and [5] report the results from using the loan growth rate for real estate loans, residential real estate loans, commercial real estate loans, commercial loans, and consumer loans, respectively, as the dependent variables. The number of observations in column [5] is equal to 7,512, which is lower than the number of observations in other columns. This is because commercial real estate loans occasionally have a zero beginning of the quarter balance, leading to a missing value for their growth rates. Variable definitions are presented in Appendix A.2. The regressions are based on the bank-quarters with required data in the period of 2013Q1–2018Q4. t-statistics are reported below the coefficients and based on standard errors clustered by bank and year-quarter. ***, **, and * denote statistical significance at the two-tailed 0.01, 0.05, and 0.1 levels, respectively. The boldface font indicates the estimates for the variable of interest. All continuous variables are winsorized at the 1% and 99% levels. Variable definitions are presented in Appendix A.2.

Chapter 3: Bond Liquidity and Voluntary Disclosures: Evidence from the Volcker Rule

3.1 Introduction

Well-functioning capital markets are an important hallmark of a strong and healthy economy, giving firms access to capital at best possible price. One required element for capital markets to be well functioning is a rich information environment that facilitates price efficiency. Banks have an important role in this process, gathering funds from depositors and facilitating its distribution to worthy borrowers. However, before the financial crisis, banks were doing more than lending to their customers. They were also engaged in proprietary trading[83] on their own account, exposing them to additional risk backstopped by the FDIC deposit insurance program.

After the financial crisis, regulators introduced several regulatory reforms to make the banking system more transparent and to reduce the likelihood of future financial crises. Among the many regulatory changes introduced following the crisis, few are more controversial than the Volcker Rule. Enacted as part of the Dodd-Frank Act in April 2014, the Volcker Rule prohibits proprietary trading in an effort to limit bank risk-taking. The rule reduces the ability of banks to hold inventories of securities, lowering their incentives to gather information and convey that information to the markets through their trades. In addition, as banks can no longer hold inventories of securities, the Volcker Rule reduces the ability of banks to provide liquidity in corporate bond markets by taking the other side of trades that their customers request. A recent commentary by market participants indicates that liquidity has indeed deteriorated since the

[83] Proprietary trading occurs when a bank invests for its own direct gain instead of buying and selling on behalf of its clients to earn commissions.

Volcker Rule, with a 2016 Wall Street Journal article[84] noting that "*Three-quarters of institutional bond investors say that liquidity provided by bond dealers has declined in the past year.*"

This paper aims to investigate whether the loss of liquidity caused by the Volcker Rule impacts the actions of firms that issue bonds. After the rule change, affected bond dealers (i.e., bond dealers affiliated with government-insured banks) have reduced their market-making services, and they hold fewer bond inventories (see Schultz 2017; Bessembinder, Jacobsen, Maxwell, and Venkataraman 2018), reducing their incentive to gather information on bond issuers. In turn, bond trading prices are expected to become less informative, increasing the potential for information asymmetry between investors. Also, since the ability of these dealers to provide immediacy has decreased, bond investors need more time to find counterparties to trade with. These increased trading frictions in bond markets discourage investors from lending, increasing a firm's cost of borrowing. As a result, firms are likely to increase their voluntary disclosures to fill this information vacuum and mitigate Volcker Rule's negative impact on their debt financing. Theoretical models such as Diamond (1985) and Diamond and Verrecchia (1991) show that when there is information asymmetry between investors, firms are likely to commit to disclosing more information than mandated to reduce the information asymmetry. Viewing the loss of bond liquidity following the Volcker Rule as an information problem that significantly increases the frictions in public debt markets, we predict that after the Volcker Rule is implemented, firms that rely on bond financing are more likely to increase their voluntary disclosures.

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[84] Wall Street Journal (2016/3/31), "Big Bond Investors Say Liquidity Has Declined in Past Year".

It is also possible that firms relying on bond financing increased their voluntary disclosures following the Volcker Rule to encourage non-Volcker-affected dealers (dealers not affiliated with government-insured banks) to engage in market-making. Relative to dealers affected by the Volcker Rule (such as J.P. Morgan, Goldman Sachs), unaffected dealers are on average smaller in size (Bao, O'Hara, and Zhou 2018), so they have less ability to take bond inventory risk. Also, these unaffected dealers are unlikely to be affiliated with a commercial bank, which has private information channels (e.g., through a syndicated loan network) that can be used to assess a bond issuer's default risk. The unaffected dealers will become willing to participate in market making for a particular corporate bond only when the information environment of the bond is transparent enough to reduce the dealers' inventory risk to an acceptable level. Thus, if bond issuers aim at encouraging more non-affected dealers to replace the liquidity previously provided by the Volcker Rule affected dealers, bond issuers are likely to disclose more forward-looking information to create a more transparent information environment.

We use a difference-in-difference design to test our prediction that firms affected by the Volcker Rule will increase their voluntary disclosures. The treatment sample consists of firms that issue public bonds, while the control sample consists of firms that do not. The treatment time is the implementation year of the Volcker Rule. The full sample contains 30,365 firm-quarters (for 1,971 unique firms) from eight quarters before to eight quarters after the year when Volcker Rule was enacted. The Volcker Rule came into effect in April 2014. Therefore, we exclude all firm-quarters in 2014. The difference-in-difference test is implemented as follows. First, we examine how all firms change their tendency to provide forecasts from before versus after the implementation of the Volcker Rule. Then we compare these changes in willingness to provide forecasts across firms with and those without public bonds. The results show a differential increase in willingness to forecast for firms with public bonds, consistent with the liquidity shock caused by the Volcker Rule inducing firms to increase their disclosures.

Several additional sources of evidence strengthen our inferences. First, the theory leads to a differential prediction regarding which bond issuing firms are more likely to increase their voluntary disclosures after the Volcker Rule. Firms with very high credit ratings (i.e., AAA and AA) are much less likely to be affected by the decreased bond liquidity caused by the Volcker Rule. These firms have a rich information environment and low uncertainty. It is relatively straightforward to find counterparties that are willing to trade these high-quality securities. Thus, the bank-dealer liquidity of these high-rated bonds does not play a significant role in their bond pricing (see Dick-Nielsen, Feldhutter, and Lando 2012; Bao, Pan, and Wang 2011 for empirical evidence). It is also unlikely that firms with low credit ratings (i.e., firms with high yield bonds) will increase their voluntary disclosures in response to the Volcker Rule, as explained below. Even if commencing voluntary disclosures can lower the yield to maturity of bonds issued by these firms, the high uncertainty they face makes it too costly for them to disclose. The high uncertainty can render their disclosures inaccurate, damage the managers' reputations, and lead to lawsuits when the disclosures are incorrect (see Kim, Pandit, and Wasley 2015). In this situation, the disclosure cost is likely to be greater than the benefit, discouraging these firms from increasing their disclosures. Thus, we predict that the increased forecast tendency, due to the Volcker Rule, is likely to originate from firms with intermediate credit ratings rather than from firms with very high or very low ratings. The results are consistent with this prediction.

Furthermore, firms that issue public debt are likely to be systematically different from firms that do not use public debt. It's possible that other confounding factors (e.g., future growth opportunities) simultaneously influence both disclosure policy and capital structure. To mitigate endogeneity concerns, we follow prior studies (e.g., Faulkender and Petersen 2005 and 2012; Harford and Uysal 2014) and use three predictors of whether a firm issues corporate bonds as instruments[85] for our main test. Our results still hold, consistent with the notion that when facing the bond liquidity shock caused by the Volcker Rule, firms that rely on public bonds increased their disclosures more than firms not using public bonds.

This paper contributes to the existing literature on how firms change their disclosure policy when facing an exogenous change in market structure. For example, Li and Yang (2015) find that firms increase their voluntary disclosures after the mandatory adoption of International Financial Reporting Standards (IFRS). Balakrishnan, Billings, Kelly, and Ljungqvist (2014) show that firms respond to an exogenous loss of analyst coverage by providing timelier and more informative earnings guidance. Lo (2014) documents that borrowers whose banking relationships are threatened by declining bank health increase their public disclosures of forward-looking information. We extend these studies by examining how firms adjust their disclosure policies in response to the bond liquidity shock caused by the Volcker Rule. The results are among the first to show the importance of considering the impact of a trading mechanism change on a firm's public disclosure policy.

This paper also contributes to studies on the association between voluntary disclosures and debt markets, such as studies on how management guidance impacts CDS[86] pricing

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[85] These instruments include whether the firm is included in the Standard & Poor's (S&P) 500 index, whether it is listed on the NYSE, and the percentage of firms with ratings in the firm's industry grouping.

[86] A credit default swap (CDS) is a financial swap agreement that the seller of the CDS will compensate the buyer (usually the creditor of the reference loan) in the event of a loan default (by the debtor) or other credit event. CDS prices are higher when the reference debt has a greater default risk.

(Shivakumar, Urcan, and Zhang 2011) and credit ratings (Lin 2015). While prior studies focus on the market consequence of management forecasts, our paper investigates the determinants of issuing management forecasts.

3.2 Background and hypothesis development

This paper examines whether firms adjust their disclosure strategy in response to an exogenous loss of bond liquidity caused by the Volcker Rule. Affected firms will increase their voluntary disclosures only if the benefits of doing so (such as a lower cost of debt) are greater than the potential costs (e.g., reputation damage due to forecast errors and proprietary costs due to releasing information to competitors). To understand the benefits and costs of voluntary disclosures, we begin by discussing the reasons why firms issue bonds and the role of dealers in corporate bond markets. Then we discuss how the Volcker Rule reduces the options for trading corporate bonds and potentially increases the cost of borrowing in public debt markets. Finally, we develop hypotheses on why the negative shock to bond liquidity caused by the Volcker Rule is expected to force firms to change their disclosure policies.

3.2.1 Reasons why firms issue bonds

When firms raise capital to finance their projects, they have three options – equity, private debt, and public debt. Young firms, or start-ups, are more likely to rely on equity financing because their high uncertainty and default risk prohibit them from issuing debt at a cost that maximizes the returns to existing equity holders. In contrast, more mature firms that generate steady cash flows can obtain lower-cost bank loans and issue bonds to optimize their weighted average cost of capital. These firms can raise debt at a lower cost because their future cash flows are more predictable based on the existing set of information available for these firms.

Firms that issue debt must choose between issuing private debt, such as bank loans, or issuing corporate bonds in public markets.

When choosing between alternative forms of borrowing, firms are likely to rely more on bank loans and other forms of private debt if their borrowing requirements are modest or when they cannot overcome the information asymmetry in public markets. If the amount of new financing a firm requires is small, the fixed costs of going to public debt markets, including legal costs and SEC filing costs, tend to make it unattractive to issue public bonds. Private loans often enjoy an informational advantage for two reasons. If the loan is issued by the borrower's bank, then the bank will already have information about the customer's creditworthiness. In addition, borrowing from a single lender (or small group of lenders) means that the borrower can disclose proprietary information to the lender without revealing it to the public (Krishnaswami, Spindt, and Subramaniam 1999). But for larger loan issues, public debt can be more cost-effective than private debt if the interest rate in public debt markets is below the interest rate on private borrowing by enough to offset the fixed costs and disclosure costs of issuing public debt. The interest rate paid on private loans includes a liquidity premium that is typically larger than the liquidity premium on public debt.[87] If information asymmetry is not a major concern, the marginal cost of an additional dollar of public debt is typically less than that of private debt. So as the scale of a firm's demand for debt increases, the lower interest rate on public debt can more than compensate for the fixed costs of issuing public debt.

Other positive factors make bonds less costly than bank loans. Rajan (1992) models a possible scenario. A bank can monitor a firm and control its investment decisions. However, in

[87] The liquidity premium on various types of public debt is discussed further in section 2.5.

doing this, the bank alters the division of surpluses between itself and the firm. This distorts the firm's incentives, creating frictions that can lead the firm to prefer public debt. Diamond (1991) analytically explores this scenario, finding that if the information asymmetry between managers and outside capital markets is sufficiently severe, new borrowers will begin to build their reputation by borrowing from banks. Once they have demonstrated their creditworthiness, the firm will switch to issuing public debt. Thus, once the firm builds its reputation, bonds become a less costly source of financing than bank loans. Furthermore, Diamond (1996) argues that although bank loans are easier to restructure than corporate bonds, banks themselves must bear intermediation costs (e.g., the costs of monitoring and complying with regulatory capital requirements), which ultimately must be borne by borrowers. Thus, when the financial intermediation costs are too high, firms will prefer bond financing.

In sum, most of the tradeoffs between public and private debt center around the idea of information asymmetry between firms and their bond investors. Corporate bonds are likely to be a cheaper source of capital than bank debt if firms can effectively communicate important information to outside investors, alleviating concerns about default. To do this, firms must maintain an information environment that limits information asymmetry with outsiders. A firm's public information environment comes from two sources – public disclosures made by the firm and information collected and disseminated by intermediaries. Public disclosures consist of mandatory disclosures, such as audited financial statements, and voluntary disclosures, such as management forecasts. Financial information intermediaries include a firm's underwriters in primary markets, bond dealers in secondary markets, and credit rating agencies.[88] Our research question is how firms adjusted their disclosure policies in response to the Volcker Rule, which substantially altered bank bond dealers' ability to provide bond liquidity and, in doing so, convey information. To understand why this rule change is likely to induce firms to change their disclosure strategies, we first discuss the role of dealers in bond markets.

3.2.2 The role of dealers in corporate bond markets

The secondary market for corporate bonds works very differently from equity markets. While equity markets are made up of multiple exchanges that consolidate quotes and orders of market participants, corporate bonds are traded in decentralized over-the-counter (OTC) markets. Investors in these markets trade their corporate bonds via a network of dealers.

A customer, who intends to buy or sell her bonds, contacts a dealer, who either acts as an agent and seeks another customer (or another dealer) who is willing to sell or buy the bonds or trades as a counterparty with the customer. In these markets, pre-trade price quotes are only available upon request. As a result, bond dealers are better informed about order flows than their customers. Moreover, since dealers also profit from holding bond inventories and trading with their customers, they have an incentive to gather information about the firms whose bonds they hold. Hence, bond dealers not only provide counterparty-search services, but they also convey their private information about a bond's value and order flow to the market through their trades. Immediately following the financial crisis, dealers affiliated with government-insured banks

[88] For brevity, we will not discuss the information roles of bond underwriters and credit rating agencies in bond markets because our research question is related the liquidity functions of bond dealers.

were responsible for more than 90% of all bond trading volume (see Bessembinder et al. 2018, P.1643).

3.2.3 How the Volcker Rule affects corporate bond markets

The Volcker Rule was implemented on April 1, 2014, as part of the Dodd-Frank Act, prohibiting government-insured banks and their affiliates from engaging in risky proprietary trading. After the Volcker Rule, insured banks were no longer allowed to use their own funds to buy, sell, and hold securities to increase their profits. The purpose of the Volcker Rule is to prevent a repeat of the 2008 financial crisis by discouraging banks from taking on too much risk. Regulators recognize that insured banks are the primary market makers for many fixed-income securities (e.g., corporate bonds), and they play a critical role in providing liquidity to these markets. Thus, the Volcker Rule permits market-making by banks but prohibits banks from trading securities to earn a profit. However, because both activities require banks to hold inventories, the distinction between market-making and proprietary trading is blurred. In practice, Volcker compliance requirements still affect a bank dealer's inventory management and thus their ability to take the other side of the trades they are orchestrating.

Under the Volcker Rule, insured banks must report several quantitative measures that regulators use to determine whether they engage in proprietary trading. Banks are expected to conduct their transaction behaviors to minimize the appearance of proprietary trading implied by these metrics. One measure banks must report is the standard deviation of daily trading profits and losses. This discourages them from holding large positions that could generate significant variation in daily trading profits. They are also required to report inventory turnover calculated over 30, 60, and 90 days. Faster inventory turnover is an indication that the dealer is making markets rather than engaging in proprietary trading. Another metric that dealers must report is the customer-facing trade ratio, defined as the ratio of trades with customers to trades with other dealers. This ratio is calculated using both the number of trades and the trading volume. A high ratio of customer trading volume to interdealer trading volume suggests that the dealer is making markets rather than engaging in proprietary trading. So, the Volcker Rule mandates strict inventory control but limits a vital tool for dealers to manage their inventory – their interdealer trades. In sum, bank-affiliated dealers are expected to provide less liquidity in bond markets after the Volcker Rule. They worry that holding extensive bond inventories (or trading high volumes with other dealers) for market-making distorts these reporting metrics in a way that raises the concern of regulators and brings additional scrutiny.

Prior studies find evidence consistent with the Volcker Rule affecting bank dealers' ability to provide bond liquidity. Schultz (2017) shows that since the implementation of the Volcker Rule, bond dealers have become more reluctant to take bonds into their inventory, more likely to offset trades within a day, and they unwind their inventory positions more quickly. Bao et al. (2018) show that corporate bond liquidity has decreased after the Volcker Rule, and dealers regulated by the rule have reduced their market-making activities. These affected dealers exhibit an economically and statistically significant increase in agency trades, that is, trades in which the dealer prearranged an offsetting trade to avoid the inventory risk. They also have committed significantly less inventory capital to market-making.

3.2.4 How firms that issue bonds respond to the Volcker Rule

Given the importance of bank-affiliated dealers in corporate bond markets, the Volcker Rule is expected to have a major negative impact on bond market liquidity. After the rule change, bond investors are expected to find it harder to trade their corporate bonds. They take more time to search for a counterparty to trade with[89] because affected dealers are now less willing to take the other side of their trade. If bond investors are subject to uncertainty and cannot transact quickly, they can incur significant losses while hunting for a counterparty.

Moreover, Volcker Rule restrictions also bar bank-affiliated dealers from trading in corporate bonds to make a profit. As a result, these dealers are now less likely to gather information about bond issuers and convey this information to the markets through their trading activities. Therefore, information asymmetry among investors is expected to be higher after the Volcker Rule, reducing bond prices and increasing yields. If these increases in trading frictions raise required returns, this will cause firms' cost debt to increase, thus, changing the allocation of resources in the economy. Prior studies on corporate bond markets find evidence consistent with this argument. Dick-Nielsen, Feldhutter, and Lando (2012), and Bao, Pan, and Wang (2011) find that bond liquidity (or the ease of trading bonds) is associated with bond returns. More liquid bonds have lower yield spreads, implying a lower cost of debt. Qi and Wang (2017) document that firms with higher liquidity of their existing corporate bonds enjoy contract terms that are more favorable when issuing new bonds. Thus, when firms issuing bonds want to mitigate the Volcker Rule's negative impact on their financing, they are likely to increase their voluntary disclosures in order to reduce information asymmetry and increase the liquidity of their bonds. The increased disclosures help the bond issuers to fill the information vacuum created by the decreased participation of bank-affiliated dealers in the secondary bond markets.

As mentioned previously, increased voluntary disclosures can also make non-Volcker-affected dealers more willing to hold bonds and expand their dealer activities. Thus, if bond

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[89] See Wall Street Journal (2016/3/31), "Big Bond Investors Say Liquidity Has Declined in Past Year".

issuers aim to encourage more non-affected dealers to replace the affected dealers as liquidity providers, bond issuers are likely to disclose more forward-looking information to create a more transparent information environment.

Lastly, Lo (2014) finds that when a firm's banking relationship is threatened due to its bank's declining ability to provide loans, the borrower must turn to other funding sources. To reduce the information asymmetry with other potential capital providers, such firms increase their voluntary disclosures. He also argues that those firms are likely to voluntarily disclose more to satisfy current investors (e.g., current shareholders). The reasoning is that since current investors do not know a firm's ability to find alternative funding, banking shocks can lead investors to demand more information about the firms' prospects due to concerns about disruptions in the firm's operating performance. The same logic can be applied to the bond market. When facing a bond liquidity shock and an increasing cost of debt, firms are likely to consider turning to new funding sources. Thus, to reduce the information concerns of alternative capital providers, firms will voluntarily disclose more. Moreover, to minimize the worries of current capital providers about the firms' ability to obtain new funding, firms are likely to reveal more forward-looking information. The first hypothesis is summarized below:

H1: When facing bond liquidity shocks caused by the Volcker Rule, bond issuing firms increase their voluntary disclosures.

3.2.5 Do firms react to the Volcker Rule differently?

This section discusses how firms with different credit ratings are likely to respond to the Volker Rule differently. Firms with excellent credit ratings (i.e., AAA and AA) are unlikely to be affected by the decreased bond liquidity caused by the Volcker Rule. These firms have a rich information environment and low uncertainty. The liquidity of bonds issued by these firms does not rely heavily on the ability of government-insured bank dealers to hold their bonds in inventory for market making. Instead, it's relatively straightforward for bond investors to find counterparties willing to trade, so dealers are likely to act as brokers between buyers and sellers to facilitate the trade. Even though after the Volcker Rule, the bond dealers are less able to hold bond inventories, high-rated firms are not affected due to their rich information environment and low uncertainty.

Firms with poor credit ratings (i.e., firms with high yield bonds) face greater uncertainty and are subject to more information asymmetry. Bonds issued by these firms rely heavily on bond dealer market-making. When a seller of these bonds needs to sell a security quickly, their high degree of information asymmetry makes it difficult to find a counterparty willing to trade. As a result, the seller needs to sell their bonds to a dealer who buys in anticipation of being able to unwind the position later. Thus, a dealer's ability to hold bond inventories is a critical factor that helps to facilitate the trade of bonds issued by firms with poor credit ratings. After the Volcker Rule, bank dealers are less able to hold bond inventories and provide liquidity for these bonds, so the rule change is expected to impact firms with poor credit ratings negatively.

According to the finance literature on the structure of bond yields, the higher an issuer's default risk, the higher the liquidity component of its bond yield. This is because higher information asymmetry and uncertainty generate greater dispersion of beliefs about bond prices. Thus, investors who invest in bonds in a highly uncertain environment tend to put a high valuation weight on the ease with which they can trade their bonds. Consistent with this theory, Dick-Nielsen et al. (2012, P480) find that 3 percent of the total yield spreads of AAA bonds is due to the liquidity component, but for A and BBB bonds, the liquidity contribution to yield increases to 11 and 8 percent, respectively. For the high yield bonds (BB and below), the liquidity component accounts for 24 percent of their yields. In sum, since the Volcker Rule lowers bond liquidity as previously discussed, and the pricing of bonds with lower credit ratings is more sensitive to liquidity concerns, the Volcker Rule is likely to affect firms with poorer credit ratings more seriously.

As we can see, the impact of the Volcker Rule on firms that issue bonds is likely to be negatively associated with their credit ratings. The lower their credit ratings, the greater the Volcker Rule's impact on the liquidity of their corporate bonds. However, unlike the Volcker Rule's negative effect on bond liquidity, the disclosure response to this rule change is expected to be nonlinear with ratings. Firms with excellent credit ratings are not affected by Volcker Rule, so they are unlikely to respond by changing their disclosure policies. On the other hand, for firms with poor credit ratings, increasing voluntary disclosures is likely to have very little impact on their bond yield spreads. The greater uncertainty that they face is likely to render their disclosures inaccurate, damaging their managers' reputations and even prompting lawsuits (e.g., Kim et al. 2015). In this situation, the disclosure cost is likely to be greater than the benefit, discouraging these firms from increasing disclosure. Therefore, since the increased willingness to increase voluntary disclosures after the Volcker Rule is unlikely to originate from firms with excellent or poor credit ratings, we predict that the increased disclosures will come from the firms in the middle rating classes. The hypothesis is formalized as follow:

H2: The tendency of bond issuing firms to increase voluntary disclosures following the Volcker Rule originates from firms with intermediate credit ratings rather than from firms with either high or low ratings.

3.3 Research design

3.3.1 Identifying treatment firms and post-treatment period

To test the relation between the Volcker Rule and voluntary disclosures, we apply a difference-in-difference design around the time of the rule's implementation in April 2014. Accordingly, we include quarters that ended in 2012 and 2013 as the pre-treatment period and those that ended in 2015 and 2016 as the post-treatment period. The quarters that ended in 2014 (the transition year) are excluded because we are unsure when firms affected by the Volcker Rule changed their voluntary disclosure policies during this year.

Conceptually, the treatment sample consists of firms that rely on bond financing, and the control sample consists of firms that do not. We use whether a firm has an issuer credit rating reported on COMPUSTAT to indicate whether the firm uses bond financing. Prior studies find that the correspondence between having a credit rating and having public debt is high.[90] By combining COMPUSTAT and the FISD[91] database, we find that during our sample quarters (2012Q1-2013Q4 and 2015Q1-2016Q4), 86 percent of firm-quarters with credit ratings have outstanding public debt. In contrast, 91 percent of firms without ratings *do not* issue any bonds. Although a firm has a credit rating that does not perfectly identify firms with outstanding public bonds, any misclassification is expected to bias against our hypothesis. For example, suppose the treatment firms (those who rely on bond financing) are misclassified as control firms. In that

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[90] For example, Cantillo and Wright (2000) examine a sample of COMPUSTAT firms and find that 97.6% of firms with public debt have a credit rating and 99.7% of firms with a reported credit rating also have public debt outstanding.

[91] The Mergent Fixed Income Securities Database (FISD) for academia is a comprehensive database of publicly offered U.S. bonds. FISD contains issue details on over 140,000 corporate bonds, corporate MTN (medium term note), supranational, U.S. Agency, and U.S. Treasury debt securities. FISD provides details on debt issues and the issuers, as well as transactions by insurance companies.

case, such misclassification will drive the control group disclosure probability toward the treatment group, lowering the results we can find in the *difference-in-difference* setting. The same logic can also be applied if the control firms are misclassified as the treatment firms.

3.3.2 Regression models

3.3.2.1 The regression model for H1

To test the Volcker Rule's impact on the likelihood of firms' voluntary disclosures, we estimate the following specification:

$$VDISC_{i,t} = \beta_0 + \beta_1 Post_t * Have\_rat_i + \Sigma\, \beta_j\, Controls_{i,t} + Firm\_FE_i + Time\_FE_t + \varepsilon_{i,t}, \quad (1)$$

where the dependent variable $VDISC_{i,t}$ represents a proxy for voluntary disclosures. We use two variables, $MF\_all\_dum_{i,t}$, and $MF\_all_{i,t}$, to measure the level of voluntary disclosures. $MF\_all\_dum_{i,t}$ is a dummy variable set to 1 if a firm issues at least one management guidance regarding its quarterly performances (e.g., EPS, sales, earnings before interest and tax, etc.) during the quarter, and zero if they do not. $MF\_all_{i,t}$ is a count variable measuring the total number of management guidance items issued during the quarter.[92] $Post_t$ is an indicator set to one for the quarters after the implementation of the Volcker Rule (i.e., quarters 2015Q1 to 2016Q4). $Have\_rat_i$ is an indicator that equals one if firm *i* has an S&P issuer credit rating at the end of the year 2013. The coefficient on $Post_t * Have\_rat_i$ captures the effect of the Volcker Rule bond liquidity shock on a firm's voluntary disclosures. Hypothesis H1 predicts that β_1 will be positive. $Controls_{i,t}$ is a set of firm-specific time-varying control variables found in the literature to explain disclosure choices (e.g., Lo 2014; Li and Yang 2017). Each variable is defined in

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[92] See appendix B.2 for a list of the possible types of quarterly management forecasts issued by firms in the sample.

appendix B.1. We include firm fixed effects to control for time-invariant unobserved correlated variables and time fixed effects (including the year and fiscal-quarter fixed effects) to capture the influence of aggregate time-series trends. Since the firm and time fixed effects are included, $Have\_rat_i$ and $Post_t$ are subsumed in the regression model. The standard errors are clustered across firms in a quarter to account for the common macroeconomic factors at each time point.

We use management forecasts as our proxy for voluntary disclosures because they are considered to be an effective disclosure tool. Prior researchers report that price reactions to forecasts are significant in both debt (Shivakumar et al. 2011; De Franco, Vasvari, and Wittenberg-Moerman 2009) and equity (Balakrishnan et al. 2014; Pownall, Wasley, and Waymire 1993) markets. The significant price reactions suggest that investors use the information in forecasts to update their beliefs on a firm's default risk and prospects. Prior studies also show that a firm's management guidance increases stock liquidity (Balakrishnan et al. 2014), the precision of investors' information about future earnings (Baginski, Conrad, and Hassell 1993), and consensus of analyst earnings forecasts (Clement, Frankel, and Miller 2003). These findings indicate that firms facing increased uncertainty can issue forecasts to lower information asymmetry. In addition, Lin (2015) finds that management forecasts are associated with the likelihood of rating changes. All of these things combined make it clear that management forecasts are important means of voluntary disclosure.

Rather than using a nonlinear model for our non-continuous dependent variable, we estimate equation (1) using a linear probability model. The reasons are twofold. Nonlinear models tend to produce biased estimates in panel data sets with a short time series and many fixed effects, leading to an incidental parameters problem and inconsistent estimates (Naughton, Rusticus, Wang, and Yeung 2019). Also, nonlinear fixed effects models generate biased estimates for interaction terms[93], which are the main coefficients of interest in this study. To ensure that the main result is not sensitive to this research design choice, we repeat our primary analysis using both logit and probit specifications and obtain the same conclusions.

Following the prior literature (e.g., Lo 2014; Li and Yang 2015), we control for firm-specific disclosure determinants. These include firm size, measured by the log value of a firm's market value of equity (*LnMV*); firm growth, measured by the market-to-book ratio (*MTB*); firm performance, captured by return on assets (*ROA*), the occurrence of losses (*LOSSDUM*), and buy-and-hold size-adjusted returns (*BHAR*); and firm risk, captured by equity beta (*BETA*), operating cash flow volatility (*CFVOL*), and return volatility (*RETVOL*). In addition, we include additional controls for institutional ownership (*INST*), analyst following (*LnAF*), proprietary costs (*HERFIN*), and leverage (*LEV*). All control variables are measured in the quarter before the choice of disclosure. Appendix B.1 provides variable definitions.

3.3.2.2 The regression model for H2

Hypothesis H2 predicts that the increased voluntary disclosures due to the Volcker Rule originate from firms with intermediate credit ratings rather than from firms with either high or low ratings. To test the impact of the Volcker Rule on firms with different credit ratings, we use the following specification:

$$VDISC_{i,t} = \beta_0 + \beta\, Post_t * Rating\_indicator_i + \gamma\, Controls_{i,t} + Firm\_FE_i + Time\_FE_t + \varepsilon_{i,t}, \text{ (2).}$$

[93] See Ai and Norton (2003), and Duchin and Sosyura (2014).

Rating_indicator$_i$ is a *vector* for the indicators of different credit ratings at the end of the year 2013. For example, the credit rating variable *AAA* is the first element of this *vector*, and *AA* is the second element. Thus, the variable *AA* equals one if a firm has an AA+, AA, or AA- credit rating at the end of 2013. And the same logic applies to other credit rating classes such as A, BBB, BB, etc. As in equation (1), the control group includes firms without credit ratings. Each element in the β vector is intended to measure the impact of the bond liquidity shock on voluntary disclosures of firms in each credit rating class. The control variables are the same as for equation (1).

3.4 Sample, Descriptive Statistics and Main Result

3.4.1 Data Source and Sample

We collect the data for our main analysis from the intersection of the COMPUSTAT, CRSP, IBES, Capital IQ, and Thomson-Reuters Institutional Holdings databases. We begin by obtaining the firm characteristics (including S&P issuer credit rating and financial statement variables) in each of our sample quarters (2012Q1-2013Q4 and 2015Q1-2016Q4)[94] from COMPUSTAT. Next, we merge this data with data from CRSP to obtain the return-related variables such as beta and return volatility. Next, the COMPUSTAT/CRSP data is combined with data from the IBES dataset to obtain analyst following, with Capital IQ data to get management guidance variables, and with Thomson-Reuters Institutional Holdings data to get institutional ownership. We exclude all firms in the financial and utility industries and firm-quarters with missing values for any of the regression variables. To remain in the sample, firms

[94] As discussed previously in section 3.1, we exclude quarters in 2014, the year that the Volcker Rule was implemented.

must have at least five quarters of data in both the pre-treatment period and the post-treatment period. This is done to ensure enough time-series observations of each firm to estimate the firm fixed effects regression. Finally, we winsorize all continuous variables at the 1st and 99th percent levels to limit the impact of outliers. The final sample includes 30,377 firm-quarters with 1,973 unique firms.

3.4.2 Summary Statistics

Table 3.1 Panel A reports summary statistics of regression variables in the pre-Volcker Rule and post-Volcker Rule eras for all firms with credit ratings, while Panel B reports summary statistics for those without credit ratings. The differences in means between pre- and post-Volcker Rule eras are also reported. Firms with credit ratings (treated firms) are presumed to rely on bond financing, so they are expected to be influenced by the Volcker Rule. As Table 3.1 shows, 30.7 (32.4) percent of rated firms issue at least one management forecast (*MF_all_dum*) during the pre- (post-) Volcker Rule era, while 25.9% (25.7%) of non-rated firms issue at least one management forecast during the pre- (post-) Volcker Rule era. Panel C reports the difference-in-difference value (i.e., the difference between pre-Volcker Rule disclosure and post-Volcker Rule disclosure for rated versus non-rated firms), and it is positive and significant. This univariate result provides preliminary evidence that firms with public bonds increased their voluntary disclosures after the Volcker Rule's bond liquidity shock.

We also observe that relative to non-rated firms, rated firms also experience greater increases in market-to-book ratios (*MTB*), return volatility (*RETVOL*), and leverage (*LEV*), a smaller increase in analyst following (*LnAF*), and a larger decrease in institutional ownership (*INST*). Changes in these control variables could be associated with differences in the probability of issuing management forecasts, necessitating multivariate regression models that control for the forecast determinants.

3.4.3 Results on Testing H1

Table 3.2 reports the results from estimating equation (1). The standard errors in the brackets are clustered by year-quarter. In Columns (1) and (2), the dependent variables are a dummy variable set to 1 if the firm issues at least one management guidance regarding its quarterly performances during the quarter, and zero otherwise ($MF\_all\_dum_{i,t}$). Column (1) reports the OLS regression estimates, and Column (2) the logistic regression estimates. In Columns (3) and (4), the dependent variables are a count variable measuring the total number of management guidance items issued during the quarter ($MF\_all_{i,t}$). Column (3) uses OLS, and Column (4) uses a Poisson regression.

In Column (1), the coefficient on the interaction term, $Post_t*Have\_rat_i$, is 0.019 and significant at 1% level. Because we use a linear probability model, we can directly interpret the coefficients as the marginal effects on the probability of issuing management guidance. Thus, the 0.019 coefficient estimate implies that firms relying on public debt financing increased their forecast tendency by 1.9 percentage points (relative to firms not using public debt) after the bond liquidity shock induced by the Volcker Rule. This effect is also economically significant. Given that 30.7% of firms with bond ratings issued at least one forecast during the sample quarters before the Volcker Rule, relatively speaking, these firms increased their forecast probability by 6.2% (1.9/30.7).

In Column (1), the coefficients on control variables are generally consistent with prior studies. Forecast likelihood is positively associated with firm size (*LnMV*), *BETA*, cash flow volatility (*CFVOL*), analyst following (*LnAF*), and leverage (*LEV*) (consistent with Li and Yang 2016; Ajinkya, Bhojraj, and Sengupta 2005; Feng and Koch 2010). These results suggest that large, highly levered, volatile, high systematic-risk firms issue more forecasts. Moreover, positive coefficients on analyst following are consistent with management disclosing more to meet the information demands of analysts. Forecast probability is negatively associated with market-to-book ratio (*MTB*) and institutional ownership (*INST*) (consistent with Lennox and Park 2006; Bergman and Roychowdhury 2008). These results suggest that that firms with high growth opportunities and institutional holdings tend to forecast less. Column (2) reports the results from estimating equation (1) using a logistic model. The results are consistent with the OLS regression.

We also examine whether firms that rely on public debt increase the number of items they forecast following the Volcker Rule. The number of disclosures is used as a proxy for the information content of voluntary disclosures each quarter. Column (3) shows the OLS regression results when we regress the number of forecast items on the same set of independent variables as in column 1. In Column (3), the coefficient on the interaction term, $Post_t*Have\_rat_i$, is 0.063 and significant at 1% level, suggesting that firms relying (relative to the ones not relying) on public debt financing increase their number of forecast items by 0.063 times after the Volcker Rule. This effect is also economically significant. Given that the average number of forecast items reported by firms with ratings is 0.785 before the Volcker Rule, firms that relied on public debt financing experienced an additional 8% (0.063/0.785) increase in the number of forecast items they disclosed. Column (4) reports the results from estimating the same regression for the number of forecast items using a Poisson model. The results are consistent with the OLS regression results in Column (3).[95]

3.4.4 Results on Testing H2

Table 3.3 reports the results of estimating equation (2), where the change in disclosure tendency is measured separately for each rating category. The regression is estimated using OLS, and standard errors, reported in the brackets, are clustered by year-quarter. In Column (1), the dependent variable is a dummy variable set to 1 if the firm issues at least one management guidance regarding its quarterly performances during the quarter, and zero otherwise ($MF\_all\_dum_{i,t}$). In Column (2), the dependent variable is the total number of management guidance items issued during the quarter ($MF\_all_{i,t}$).

Column (1) shows that, among the post-rating interaction terms, only the coefficients for *Post*Rating_A* (0.05) and *Post*Rating_BBB* (0.021) are positive and significant at the 1 and 5 percent levels, respectively. This indicates that the increased disclosure tendency of rated firms following the Volcker Rule is being driven by firms in the two credit rating categories immediately above the investment-grade cutoff. Moreover, in terms of economic significance, the firms with A (BBB) ratings increase their disclosure tendency by 13% (7%) relative to their average disclosure probability of 38% (32%) before the Volcker Rule.[96] In sum, this result is consistent with our predictions that the increased forecast tendency after the Volcker Rule is due to the firms with intermediate credit ratings.

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[95] To check the robustness, we also analyze the COMPUSTAT-FISD combined data to test two additional specifications. First, we use a continuous variable to indicate the degree to which a firm uses public debt. This is measured by bond issue proceeds from FISD scaled by total capital (long-term debt plus book value of shareholder's equity). Second, we use a dummy variable, which is based on whether the bond issue proceeds are greater than zero to identify treated firms. The results are similar.

[96] Appendix B.3 presents summary statistics of management forecasts for firms in each rating category.

Table 3.3 Column (2) shows the results when we use OLS to regress the number of forecast items on the public debt rating categories interacted with an indicator variable for the post period. The coefficients for *Post*Rating_BBB* (0.045), *Post*Rating_BB* (0.083), and *Post*Rating_B* (0.117) are all positive and significant. In terms of economic significance, the firms with BBB (BB; B) ratings increase their disclosure tendency by 5% (10%; 27%) relative to their average disclosure items of 0.83 (0.87; 0.43) before the Volcker Rule.

When the results in Column (1) and Column (2) of Table 3.3 are combined, they show that the rating categories experiencing an increase in the number of forecast items being disclosed are not the same as the rating categories that increased their tendency to disclose forecasts. Firms with BBB ratings increase both their propensity to disclose and the information content of their guidance. However, firms with BB and B ratings increase the number of forecast items they disclose, but they do not change their tendency to start issuing management forecasts. This finding implies that the increased number of forecast items disclosed by firms with public debt rated in the BB and B rating categories is likely to be by firms that were already disclosing forecasts rather than by firms that are new to forecasting. This finding is consistent with managers being concerned about setting disclosure precedents that can be difficult to maintain (e.g., Graham, Harvey, and Rajgopal 2005). Therefore, the existing disclosing firms, who have already established a practice of issuing management guidance, are the ones that are likely to increase the information content of their management guidance by increasing the number of forecast items they disclose. The firms that have not disclosed in the past are not willing to start a guidance practice. Interestingly, the coefficient on *Post*Rating_AA* (0.143) is negative and significant at the 10% level. This finding implies that although firms with AA ratings do not change their forecast tendency, as shown in Table 3.3 column 1, they decrease the average number of forecast items they report following the Volcker Rule.

3.5 Additional Tests: Instrumental variables for whether a firm issues public debt

It's possible that whether a firm issues public debt ($have\_rat_i$) is endogenous to a firm's forecast tendency. The main concern is firm characteristics simultaneously determine whether a firm issues public debt and whether it issues management forecasts. Thus, we re-estimate the equation (1) using an instrumental variable approach that is analogous to the one in Faulkender and Petersen (2006; 2011) and Harford and Uysal (2014). The first stage in the instrumental variable estimation is to estimate the endogenous variable (whether a firm issues public debt) as a function of instruments and the control variables from the second stage. The two stages of the specification are as follows:

<u>Stage 1</u>

$$have\_rat_i = \beta_0 + \beta_1 SP500_{i,t} + \beta_2 NYSE_{i,t} + \beta_2 Ratio\_of\_Rated\_Firms_{i,t} + \Sigma\, \beta_j Controls_{i,t} + Time\_FE_t + \varepsilon_{i,t}, \quad (3)$$

Stage 2

$VDISC_{i,t} = \beta_0 + \beta_1\, have\_rat\ (hat)_{i,t} + \beta_2\, Post_t{*}have\_rat\ (hat)_{i,t} + \Sigma\, \beta_j\, Controls_{i,t} + Time\_FE_t + Firm\_FE_i + \varepsilon_{i,t},$ (4)

where $SP500_{i,t}$ and $NYSE_{i,t}$ are indicator variables equal to one if firm i is included in the S&P 500 index and listed on the New York Stock Exchange in quarter t, respectively. $Ratio\_of\_Rated\_Firms_{i,t}$ is the percentage of firms in the same three-digit SIC industry with a credit rating. The fitted variable $have\_rat(hat)_{i,t}$ is the estimated probability that firm i uses public debt in quarter t. For the interaction term in equation (4) ($Post_t{*}have\_rat(hat)$), we follow the method in Prilmeier (2017), interacting the predicted value of $have\_rat_t$ with the post-Volcker Rule indicator. The controls in equation (4) include the same set of variables as used in the regression model for our main test. The first stage equation (3) is estimated by a probit model[97] to ensure the predicted likelihood of having a credit rating is in the right range. The second stage equation (4) is estimated by OLS to analyze the marginal effects as discussed previously.

Table 3.4 column 1 reports the results from estimating the stage 1 (equation 3) regression. The instruments ($SP500_{i,t}$, $NYSE_{i,t}$, and $Ratio\_of\_Rated\_Firms_{i,t}$) are significantly associated with the likelihood that a firm has a credit rating, consistent with the results in Faulkender and Petersen (2006; 2011) and Harford and Uysal (2014). Table 3.4 column 2 reports the results from estimating the stage 2 (equation 4) regression. The coefficient on $Post_t{*}have\_rat(hat)_{it}$ is positive and significant at the one percent level, suggesting that firms with a higher predicted likelihood

[97] Our conclusions remain unchanged if we use a logit model.

of using public bond issues increase their voluntary disclosure after the Volcker Rule. Again, the result is consistent with our hypothesis.

Table 3.4 Column (3) reports the results on whether firms that are more likely to use public bond issues increased their number of forecast items following the Volcker Rule. The coefficient on $Post_t*have\_rat(hat)_{it}$ is positive and significant at the one percent level, consistent with the notion that, on average, firms using public bonds issued management forecasts covering more items after the Volcker Rule.

3.6 Conclusion

We examine the relation between the negative impact of the Volcker Rule on bond liquidity and voluntary disclosures. The Volcker Rule prohibits banks and their affiliates from using their funds to buy, sell, and hold securities to make profits. Its purpose is to prevent a repeat of the 2008 financial crisis by discouraging banks from taking on too much risk. However, the rule's compliance requirements also affect the ability and incentive of banks to act as market-makers for corporate bonds. Prior studies (e.g., Bao et al. 2018) find that after the Volcker Rule, corporate bond liquidity decreased, and dealers regulated by the rule decreased their market-making activities. Using a difference-in-difference approach, we find that, compared with firms that don't use public debt, firms with outstanding bonds increase their tendency to provide management guidance after the Volcker Rule. This result is consistent with the notion that firms that experienced a negative shock to the trading mechanism for their debt securities increased voluntary disclosure to compensate for the loss of liquidity.

Two additional tests support our main finding. First, we find that the increased management guidance is more pronounced for firms with credit ratings close to the investment-grade cutoff, rather than those with very high or very low ratings, where firms have less ability to change market perceptions by their disclosures. Firms with very high credit ratings (i.e., AAA and AA) are less likely to be affected by the decreased bond liquidity caused by the Volcker Rule. These firms have a rich information environment and low uncertainty. It is relatively straightforward to find counterparties to trade these high-quality securities. Firms with very low credit ratings (i.e., BB and below) have less incentive to increase their voluntary disclosures in response to the Volcker Rule. The uncertainty they face makes it costlier for these firms to disclose and more difficult for them to resolve the uncertainty investors are concerned about. Firms that issue public debt are likely to be systematically different from firms that do not use public debt. To mitigate endogeneity concerns, we follow prior studies (e.g., Harford and Uysal 2014) and use three predictors of whether a firm issues corporate bonds as instruments for our main test. Our results continue to hold when we control for endogeneity.

Table 3.1 **Summary Statistics**

Panel A: Firms With Credit Rating

Period	**Pre-Volcker 2012Q1-2013Q4**					**Post-Volcker 2015Q1-2016Q4**								
	(A) MEAN	**MEDIAN**	**Min**	**Max**	**STD**	**(B) MEAN**	**MEDIAN**	**Min**	**Max**	**STD**	**Mean DIFF**	**P-value**	**t-test**	
MF_all_dum	0.307	0.000	0	1	0.461	0.324	0.000	0	1	0.468	0.017	0.009	2.626	***
MF_all	0.785	0.000	0	12	1.499	0.873	0.000	0	13	1.614	0.088	0.000	4.045	***
LnMV	8.468	8.404	4.134	12.260	1.527	8.644	8.673	3.633	12.136	1.654	0.176	0.000	7.897	***
MTB	2.964	2.158	0.261	24.450	2.952	3.750	2.499	0.151	32.035	4.443	0.786	0.000	14.861	***
ROA	0.012	0.013	-0.217	0.160	0.021	0.007	0.010	-0.300	0.139	0.028	-0.005	0.000	-14.598	***
LOSSDUM	0.153	0.000	0	1	0.360	0.222	0.000	0	1	0.416	0.070	0.000	12.777	***
BHAR	0.012	0.007	-0.465	0.750	0.131	-0.001	-0.003	-0.567	0.859	0.160	-0.013	0.000	-6.285	***
BETA	1.412	1.291	0.009	3.694	0.731	1.329	1.283	-0.278	3.152	0.612	-0.083	0.000	-8.791	***
CFVOL	0.020	0.015	0.002	0.162	0.017	0.020	0.015	0.003	0.156	0.016	-0.001	0.034	-2.117	**
RETVOL	0.018	0.016	0.007	0.081	0.008	0.022	0.019	0.008	0.114	0.013	0.004	0.000	28.800	***
LnAF	2.472	2.639	0.000	3.584	0.697	2.476	2.639	0.000	3.555	0.727	0.004	0.674	0.421	
HERFIN	0.097	0.068	0.030	0.708	0.083	0.090	0.069	0.029	0.543	0.070	-0.008	0.000	-7.186	***
LEV	0.267	0.252	0.000	0.663	0.150	0.312	0.297	0.000	0.816	0.149	0.045	0.000	21.721	***
INST	63.973	74.266	0	100	30.079	53.958	64.756	0.000	96.345	29.336	-10.015	0.000	-24.055	***
N of obs	**5,011**					**4,985**								

Panel B: Firms Without Credit Rating

Period	Pre-Volcker 2012Q1-2013Q4					Post-Volcker 2015Q1-2016Q4								
	(C) MEAN	**MEDIAN**	**Min**	**Max**	**STD**	**(D) MEAN**	**MEDIAN**	**Min**	**Max**	**STD**	**Mean DIFF**	**P-value**	**t-test**	
MF_all_dum	0.259	0.000	0	1	0.438	0.256	0.000	0	1	0.437	-0.003	0.648	-0.457	
MF_all	0.732	0.000	0	11	1.511	0.754	0.000	0	11	1.587	0.022	0.307	1.022	
LnMV	5.737	5.780	1.850	11.639	1.755	5.936	6.020	1.740	11.719	1.848	0.200	0.000	7.899	***
MTB	2.864	1.900	0.223	24.450	2.955	3.216	2.079	0.151	32.035	3.825	0.352	0.000	7.344	***
ROA	-0.006	0.009	-0.300	0.160	0.061	-0.010	0.006	-0.303	0.139	0.058	-0.004	0.000	-4.455	***
LOSSDUM	0.334	0.000	0	1	0.472	0.388	0.000	0	1	0.487	0.054	0.000	8.094	***
BHAR	0.005	-0.010	-0.525	1.646	0.200	-0.002	-0.012	-0.567	0.859	0.206	-0.008	0.008	-2.634	***
BETA	1.289	1.223	-0.073	3.694	0.633	1.204	1.175	-0.278	3.152	0.622	-0.084	0.000	-9.595	***
CFVOL	0.038	0.027	0.002	0.228	0.036	0.037	0.026	0.003	0.221	0.035	-0.001	0.046	-1.999	**
RETVOL	0.027	0.024	0.007	0.110	0.015	0.030	0.025	0.008	0.114	0.016	0.002	0.000	10.280	***
LnAF	1.340	1.386	0.000	3.584	0.999	1.379	1.386	0.000	3.555	0.980	0.039	0.005	2.813	***
HERFIN	0.093	0.064	0.030	0.708	0.083	0.088	0.072	0.029	0.830	0.066	-0.005	0.000	-4.764	***
LEV	0.097	0.017	0.000	0.663	0.140	0.130	0.060	0.000	0.697	0.161	0.033	0.000	15.689	***
INST	45.058	46.900	0	100	34.354	40.165	43.508	0	96.345	31.083	-4.893	0.000	-10.659	***
N of obs	**10,218**					**10,151**								

(1) *, **, *** indicate significance at 10, 5, 1 percent levels, respectively, in a two-tailed test.

(2) Please refer to Appendix B.1 for variable definitions.

Panel C: Difference in Difference

	DiD [(B-A) - (D-C)]	P-value	t-stat	
MF_all_dum	0.020	0.074	1.787	*
MF_all	0.066	0.082	1.740	*
LnMV	-0.023	0.567	-0.573	
MTB	0.434	0.000	4.855	***
ROA	-0.001	0.148	-1.445	
LOSSDUM	0.015	0.139	1.479	
BHAR	-0.005	0.186	-1.322	
BETA	0.001	0.931	0.087	
CFVOL	0.001	0.407	0.829	
RETVOL	0.002	0.000	7.201	***
LnAF	-0.035	0.080	-1.750	*
HERFIN	-0.003	0.146	-1.455	
LEV	0.012	0.001	3.366	***
INST	-5.122	0.000	-6.821	***

(1) *, **, *** indicate significance at 10, 5, 1 percent levels, respectively, in a two-tailed test.

(2) Please refer to Appendix B.1 for variable definitions.

Table 3.2 The effect of Volcker Rule on management guidance

	(1)	(2)	(3)	(4)
Dep. Var =	***MF_all_dum***		***MF_all***	
Estimation Method =	OLS	Logit	OLS	Poisson
Post*Have_rat	0.019***	0.316***	0.063***	0.084***
	[0.006]	[0.094]	[0.020]	[0.022]
<u>Firm Controls</u>				
LnMV	0.018***	0.293***	0.042***	0.060**
	[0.005]	[0.089]	[0.014]	[0.024]
MTB	-0.002**	-0.026**	-0.006**	-0.012***
	[0.001]	[0.013]	[0.002]	[0.005]
ROA	0.002	0.229	-0.129	-0.365
	[0.055]	[1.096]	[0.167]	[0.333]
LOSSDUM	-0.004	-0.047	-0.018	-0.024
	[0.005]	[0.075]	[0.011]	[0.015]
BHAR	0	-0.044	-0.008	-0.02
	[0.006]	[0.099]	[0.023]	[0.040]
BETA	0.016***	0.327***	0.013	0.021
	[0.004]	[0.079]	[0.011]	[0.020]
CFVOL	0.229***	7.082***	0.552***	1.722***
	[0.068]	[1.983]	[0.204]	[0.653]
REVOL	-0.16	-4.042	-0.699*	-1.649*
	[0.146]	[2.804]	[0.408]	[0.930]
LnAF	0.025***	0.457***	0.071***	0.140***
	[0.006]	[0.092]	[0.020]	[0.029]
HERFIN	-0.009	0.318	-0.052	-0.043
	[0.049]	[0.834]	[0.138]	[0.288]

LEV	0.055**	0.782**	0.254***	0.222**
	[0.027]	[0.364]	[0.086]	[0.103]
INST	-0.000***	-0.004***	-0.001*	-0.001
	[0.000]	[0.001]	[0.001]	[0.001]
Qtr FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
N	30,365	30,365	30,365	30,365
R-squared/Psuedo R-squared	0.688	0.308	0.766	0.58

(1) ***MF_all_dum*** is an indicator variable set to one for firms that issue at least one management guidance regarding its quarterly performances during each quarter, and zero otherwise. ***MF_All*** is a count variable measuring the total number of management guidance items issued during each quarter.

(2) *, **, *** indicate significance at 10, 5, 1 percent levels, respectively, in a two-tailed test.

(3) Number in brackets [ ] are standard errors clustered by the year-quarter end.

(4) Please refer to Appendix B.1 for the definitions of independent variables.

Table 3.3 Examining the Volcker Rule's impact on disclosures of firms with different credit ratings

	(1)	(2)
Dep. Var =	***MF_all_dum***	***MF_all***
Estimation Method =	OLS	OLS
Post*Rating_AAA	0.07	0.028
	[0.063]	[0.063]
Post*Rating_AA	-0.04	-0.143*
	[0.026]	[0.078]
Post*Rating_A	0.050***	0.053
	[0.017]	[0.042]
Post*Rating_BBB	0.021**	0.045**
	[0.009]	[0.021]
Post*Rating_BB	0.017	0.083**
	[0.011]	[0.035]
Post*Rating_B	0.002	0.117**
	[0.014]	[0.053]
Post*Rating_CCC	0.046	-1.158
	[0.260]	[1.098]
Controls	YES	YES
Qtr FE	YES	YES
Year FE	YES	YES
Firm FE	YES	YES
N	30,365	30,365
R-squared	0.689	0.767

(1) ***MF_all_dum*** is an indicator variable set to one for firms that issue at least one management guidance regarding its quarterly performances during each quarter, and zero otherwise. ***MF_All*** is a count variable measuring the total number of management guidance items issued during each quarter.

(2) *, **, *** indicate significance at 10, 5, 1 percent levels, respectively, in a two-tailed test.
(3) Number in brackets [ ] are standard errors clustered by the year-quarter end.
(4) Please refer to Appendix B.1 for the definitions of independent variables.

Table 3.4 The effect of Volcker Rule on management guidance: Instrumental Variable Approach

	(1)	(2)	(3)
Dep. Var =	***Have_rat***	***MF_all_dum***	***MF_all***
Estimation Method =	Probit	OLS	OLS
SP500	0.527***		
	[0.036]		
NYSE	0.556***		
	[0.023]		
Ratio_of_Rated_Firms	0.744***		
	[0.062]		
Have_rat (hat)		0.078*	0.187*
		[0.042]	[0.102]
Post*Have_rat (hat)		0.029***	0.072***
		[0.010]	[0.021]
Controls	YES	YES	YES
Qtr FE	YES	YES	YES
Year FE	YES	YES	YES
Firm FE	NO	YES	YES
N	29,679	29,679	29,679
R-squared/Psuedo R-squared	0.537	0.689	0.767

(1) ***MF_all_dum*** is an indicator variable set to one for firms that issue at least one management guidance regarding its quarterly performances during each quarter, and zero otherwise. ***MF_All*** is a count variable measuring the total number of management guidance items issued during each quarter. ***Have_rat*** is an indicator variable set to 1 if a firm has S&P credit rating, and zero otherwise.

(2) *, **, *** indicate significance at 10, 5, 1 percent levels, respectively, in a two-tailed test.

(3) Number in brackets [ ] are standard errors clustered by the year-quarter end.

(4) Please refer to Appendix B.1 for the definitions of independent variables.

Chapter 4: Conclusion

This thesis is a collection of two studies that seek to broaden our understanding of banks' role in the economy. These two studies are both related to the banking sector reforms in the post-financial crisis era. The first study focuses on how the reform in loan loss accounting influences banks' role in the loan markets. The second study examines how the reform in bond trading regulation influences banks' information provision role in the bond market. Because these two studies are presented in two self-contained chapters, I provide an exhaustive discussion of the contribution and position of each study in the broader accounting literature in conclusion specific to each chapter. In this chapter, I briefly summarize the takeaways from these two studies.

The first study examines the economic consequences of an accounting rule reform, the current expected credit loss model (also known as CECL). CECL revolutionizes the concept of loan loss accounting. While CECL's predecessor standard requires banks to not recognize expected loan losses until an event occurs that could make the loan uncollectible, CECL requires banks to expense the expected value of credit losses when loans are issued. As a result, when a loan is issued banks must consider whether they have enough capital in place to absorb the immediate charge for the new loan's expected future losses. This implies CECL is likely to increase the amount of capital that banks need in order to maintain their capital adequacy, tightening their regulatory capital requirement.

The first study is interested in whether the tightened capital requirement due to CECL would influence bank lending. Following the approval of CECL, I find that during the first three years of the CECL transition period (2016 - 2018), banks that were closer to their capital adequacy constraints (1) reduced their total loan growth, (2) reduced their growth rate of real estate loans, and (3) reduced their small business lending relative to less capital-constrained banks. In cross-sectional analyses, I find that the above findings are concentrated in banks operating under a more lenient regulator, consistent with financially weaker banks being more sensitive to the anticipated capital shock induced by CECL.

Bank regulatory capital is also predicted to be more negatively impacted by CECL when loans have a longer maturity. I do not find that capital-constrained banks, on average, reduce their issuance of long-term loans (i.e., loans with a remaining life of five years or more). However, I do find that two groups of capital-constrained banks reduce the growth rate of their long-term loans during the CECL transition period in this study, consistent with an effort to mitigate CECL's negative impact. Capital-constrained banks are found to reduce their long-term loan growth when they are regulated by a lenient regulator or when they are publicly traded banks, which must adopt CECL earlier than their privately-held counterparts.

The second study examines the consequences of the Volcker Rule, which prohibits banks from conducting proprietary trading. Proprietary trading occurs when banks trade financial assets for profits using their own funds. The goal of the Volcker Rule is to prevent future financial crises by discouraging banks from taking on too much risk. However, prior research finds that corporate bond liquidity (i.e., the ease of trading public bonds) has decreased after the Volcker Rule. Utilizing the Volcker Rule as a bond liquidity shock, this study examines whether the decreased bond liquidity encourages bond issuing firms to voluntarily disclose more information. Using a difference-in-difference design, this study finds that bond issuers are more likely to issue management guidance after the Volcker Rule was implemented, consistent with an effort to improve liquidity by replacing the information flow that previously came from banks. Further, the increased management guidance is more pronounced for firms with credit ratings close to the investment-grade cutoff, rather than those with very high or very low ratings, where firms have less ability to change market perceptions by their disclosures.

Bibliography

Acharya, V.V. and Ryan, S.G., 2016. Banks' financial reporting and financial system stability. *Journal of Accounting Research*, *54*(2), pp.277-340.

Agarwal, S., Y. Chang, and A. Yavas. 2012. Adverse selection in mortgage securitization. Journal of Financial Economics 105:640–60.

Amihud, Y., Mendelson, H. and Pedersen, L.H., 2006. *Liquidity and asset prices*. Now Publishers Inc.

Agarwal, S., Lucca, D., Seru, A. and Trebbi, F., 2014. Inconsistent regulators: Evidence from banking. *The Quarterly Journal of Economics*, *129*(2), pp.889-938.

Balakrishnan, K., Billings, M.B., Kelly, B. and Ljungqvist, A., 2014. Shaping liquidity: On the causal effects of voluntary disclosure. *the Journal of Finance*, *69*(5), pp.2237-2278.

Bank Policy Institute, July 2018. The current expected loss (CECL) accounting standard will make the next recession worse. Available at https://bpi.com/analysis-demonstrates-that-the-current-expected-credit-loss-cecl-accounting-standard-would-be-procyclical-if-used-for-regulatory-capital-purposes/

Bao, J., O'Hara, M. and Zhou, X.A., 2018. The Volcker Rule and corporate bond market making in times of stress. *Journal of Financial Economics*, *130*(1), pp.95-113.

Bao, J., Pan, J. and Wang, J., 2011. The illiquidity of corporate bonds. *The Journal of Finance*, *66*(3), pp.911-946.

Beatty, A., 1995. The effects of fair value accounting on investment portfolio. *Review-Federal Reserve Bank of St. Louis*, *77*(1), p.25.

Beatty, A. and Liao, S., 2011. Do delays in expected loss recognition affect banks' willingness to lend?. *Journal of accounting and economics*, *52*(1), pp.1-20.

Beatty, A. and Liao, S., 2014. Financial accounting in the banking industry: A review of the empirical literature. *Journal of Accounting and Economics*, *58*(2-3), pp.339-383.

Bernanke, B.S., Lown, C.S. and Friedman, B.M., 1991. The credit crunch. *Brookings papers on economic activity*, *1991*(2), pp.205-247.

Berger, A.N. and Udell, G.F., 1994. Did risk-based capital allocate bank credit and cause a "credit crunch" in the United States?. *Journal of Money, credit, and Banking*, *26*(3), pp.585-628.

Berger, A. N., and G. F. Udell. 1995. Relationship lending and lines of credit in small firm finance. Journal of Business 68:351–81.

Bessembinder, H., Jacobsen, S., Maxwell, W. and Venkataraman, K., 2018. Capital commitment and illiquidity in corporate bonds. *The Journal of Finance*, *73*(4), pp.1615-1661.

Bhat, G., Ryan, S.G. and Vyas, D., 2019. The implications of credit risk modeling for banks' loan loss provisions and loan-origination procyclicality. *Management Science*, *65*(5), pp.2116-2141.

Blackwell, D.W. and Kidwell, D.S., 1988. An investigation of cost differences between public sales and private placements of debt. *Journal of Financial Economics*, *22*(2), pp.253-278.

Blair, C.E. and Kushmeider, R.M., 2006. Challenges to the dual banking system: The funding of bank supervision. *FDIC Banking Rev.*, *18*, p.1.

Bord, V.M., Ivashina, V. and Taliaferro, R.D., 2018. *Large banks and small firm lending* (No. w25184). National Bureau of Economic Research.

Chen, L., Lesmond, D.A. and Wei, J., 2007. Corporate yield spreads and bond liquidity. *The Journal of Finance*, *62*(1), pp.119-149.

Cheynel, E., 2013. A theory of voluntary disclosure and cost of capital. *Review of Accounting Studies*, *18*(4), pp.987-1020.

Chowdhury, S. and deRitis, C., 2018*, Mean Reversion in CECL: The What and the How*, Moody's Analytics. Available at https://www.moodysanalytics.com/articles/2018/Mean-Reversion-in-CECL

Costello, A.M., Granja, J. and Weber, J., 2019. Do Strict Regulators Increase the Transparency of Banks?. *Journal of accounting research*, *57*(3), pp.603-637.

Cortés, K.R., Demyanyk, Y., Li, L., Loutskina, E. and Strahan, P.E., 2020. Stress tests and small business lending. *Journal of Financial Economics*, *136*(1), pp.260-279.

Davis Polk. 2015. U.S. *Basel III Final Rule: Visual Memorandum*. Available at https://www.davispolk.com/sites/default/files/u.s.basel_.iii_.final_.rule_.visual.memo_.pdf

Davis, R.L., Maslar, D.A. and Roseman, B.S., 2017. Secondary market trading and the cost of new debt issuance. *Unpublished working paper*.

Diamond, D.W., 1985. Optimal release of information by firms. *The Journal of Finance*, *40*(4), pp.1071-1094.

Diamond, D.W. and Verrecchia, R.E., 1991. Disclosure, liquidity, and the cost of capital. *The*

Journal of Finance, *46*(4), pp.1325-1359.

Diamond, D.W., 1991. Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy*, *99*(4), pp.689-721.

Diamond, D.W., 1996. Financial intermediation as delegated monitoring: A simple example. *FRB Richmond Economic Quarterly*, *82*(3), pp.51-66.

Dick-Nielsen, J., Feldhütter, P. and Lando, D., 2012. Corporate bond liquidity before and after the onset of the subprime crisis. *Journal of Financial Economics*, *103*(3), pp.471-492.

Duffie, D., 2012. Market making under the proposed Volcker Rule. *Rock Center for Corporate Governance at Stanford University Working Paper*, (106).

Eisenbach, T.M., Haughwout, A., Hirtle, B., Kovner, A., Lucca, D.O. and Plosser, M.C., 2017. Supervising large, complex financial institutions: What do supervisors do?. *Economic Policy Review*, (23-1), pp.57-77.

Faulkender, M. and Petersen, M.A., 2006. Does the source of capital affect capital structure?. *The Review of Financial Studies*, *19*(1), pp.45-79.

Faulkender, M. and Petersen, M., 2012. Investment and capital constraints: repatriations under the American Jobs Creation Act. *The Review of Financial Studies*, *25*(11), pp.3351-3388.

FDIC, 2003. *Basel and the Evolution of Capital Regulation: Moving Forward, Looking Back*. Available at https://www.fdic.gov/bank/analytical/fyi/011403fyi.pdf

Federal Reserve System, 2020. *Frequently Asked Questions on the New Accounting Standard on Financial Instruments--Credit Losses*. Available at https://www.federalreserve.gov/supervisionreg/topics/faq-new-accounting-standards-on-financial-instruments-credit-losses.htm

Federal Reserve Bank of New York, 2020. About the New York Fed – Supervision. Available at https://www.newyorkfed.org/aboutthefed/org_banksup.html

Financial Stability Forum (FSF), 2009. Report of the financial stability forum on addressing procyclicality in the financial system. Available at http://www.financialstabilityboard.org/publications/r_0904a.pdf

Foucault, T., Pagano, M., Roell, A. and Röell, A., 2013. *Market liquidity: theory, evidence, and policy*. Oxford University Press.

Friewald, N., Jankowitsch, R. and Subrahmanyam, M.G., 2013. Illiquidity or credit deterioration: A study of liquidity in the US corporate bond market during financial crises. In *Managing and Measuring Risk: Emerging Global Standards and Regulations After the Financial*

Crisis (pp. 159-200).

Furfine, C., 2001. Bank portfolio allocation: The impact of capital requirements, regulatory monitoring, and economic conditions. *Journal of Financial Services Research*, *20*(1), pp.33-56.

Gow, I.D., Larcker, D.F. and Reiss, P.C., 2016. Causal inference in accounting research. *Journal of Accounting Research*, *54*(2), pp.477-523.

Graham, J.R., Harvey, C.R. and Rajgopal, S., 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, *40*(1-3), pp.3-73.

Hall, C.M., 2016. Does ownership structure affect labor decisions?. *The Accounting Review*, *91*(6), pp.1671-1696.

Harford, J. and Uysal, V.B., 2014. Bond market access and investment. *Journal of Financial Economics*, *112*(2), pp.147-163.

Haubrich, J.G., 2020. A Brief History of Bank Capital Requirements in the United States. *Economic Commentary*, (2020-05). Available at https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/2020-economic-commentaries/ec-202005-evolution-bank-capital-requirements.aspx

Hodder, L., Kohlbeck, M. and McAnally, M.L., 2002. Accounting choices and risk management: SFAS No. 115 and U.S. bank holding companies. *Contemporary Accounting Research*, *19*(2), pp.225-270.

Imbens, G.W. and Wooldridge, J.M., 2009. Recent developments in the econometrics of program evaluation. *Journal of economic literature*, *47*(1), pp.5-86.

Iselin, M. and Nicoletti, A., 2017. The effects of SFAS 157 disclosures on investment decisions. *Journal of accounting and economics*, *63*(2-3), pp.404-427.

Jayaraman, S., Schonberger, B. and Wu, J.S., 2019. Good buffer, bad buffer: Smoothing in banks' loan loss provisions and the response to credit supply shocks. *Journal of Law, Finance, and Accounting, Forthcoming*.

Killian, T.W. and Ding, W., 2020. *CECL – Ready or Not Here it Comes*. Piper Sandler. Available at http://www.pipersandler.com/private/pdf/CECL_ready_or_not.pdf

Kim, K., Pandit, S. and Wasley, C.E., 2016. Macroeconomic uncertainty and management earnings forecasts. *Accounting Horizons*, *30*(1), pp.157-172.

Kim, Sehwa, 2021. *Do Delays in Banks' Loan Loss Provisioning Affect Economic Downturns? Evidence from the U.S. Housing Market*. Available at SSRN: https://ssrn.com/abstract=3395911

Kobe, K. 2018. Small Business GDP: Update 1998-2014 Report, Small Business Administration, Washington, DC. Available at https://cdn.advocacy.sba.gov/wp-content/uploads/2018/12/21060437/Small-Business-GDP-1998-2014.pdf

Krishnaswami, S., Spindt, P.A. and Subramaniam, V., 1999. Information asymmetry, monitoring, and the placement structure of corporate debt. *Journal of Financial Economics*, *51*(3), pp.407-434.

Laeven, L. and Majnoni, G., 2003. Loan loss provisioning and economic slowdowns: too much, too late?. *Journal of financial intermediation*, *12*(2), pp.178-197.

Levine, R., Lin, C., Peng, Q. and Xie, W., 2020. Communication within banking organizations and small business lending. *The Review of Financial Studies*, *33*(12), pp.5750-5783.

Li, OZ and Zhuang, Z., 2012. Management guidance and the underpricing of seasoned equity offerings. *Contemporary Accounting Research*, *29*(3).

Li, X. and Yang, H.I., 2016. Mandatory financial reporting and voluntary disclosure: The effect of mandatory IFRS adoption on management forecasts. *The Accounting Review*, *91*(3), pp.933-953.

Lin, A.P., 2015. *Management Earnings Guidance and Future Credit Rating Agency Actions*. Arizona State University.

Lo, A.K., 2014. Do declines in bank health affect borrowers' voluntary disclosures? Evidence from international propagation of banking shocks. *Journal of Accounting Research*, *52*(2), pp.541-581.

Lu, Yao and Nikolaev, Valeri V., Expected Loan Loss Provisioning: An Empirical Model (April 30, 2020). Chicago Booth Research Paper No. 19-11, Available at SSRN: https://ssrn.com/abstract=3344657

Murray, S. and Nikolova, SS, 2020, April. The bond pricing implications of rating-based capital requirements. In *14th Annual Mid-Atlantic Research Conference in Finance (MARC)*.

Nakamura, L.I., 1991. *Commercial bank information: Implications for the structure of banking* (No. 92-1). Federal Reserve Bank of Philadelphia.

Naughton, J.P., Rusticus, T.O., Wang, C. and Yeung, I., 2019. Private litigation costs and voluntary disclosure: Evidence from the Morrison ruling. *The Accounting Review*, *94*(3), pp.303-327.

Nichols, D.C., Wahlen, J.M. and Wieland, M.M., 2009. Publicly traded versus privately held: implications for conditional conservatism in bank accounting. *Review of accounting studies*, *14*(1), pp.88-122.

Nicoletti, A., 2018. The effects of bank regulators and external auditors on loan loss provisions. *Journal of Accounting and Economics*, *66*(1), pp.244-265.

Ng, J. and Roychowdhury, S., 2014. Do loan loss reserves behave like capital? Evidence from recent bank failures. *Review of Accounting Studies*, *19*(3), pp.1234-1279.

Peek, J. and Rosengren, E., 1995. Bank regulation and the credit crunch. *Journal of Banking & Finance*, *19*(3-4), pp.679-692.

Peek, J. and Rosengren, E.S., 1997. The international transmission of financial shocks: The case of Japan. *The American Economic Review*, pp.495-505.

Petersen, M. A., and R. G. Rajan. 1994. The benefits of lending relationships: Evidence from small business data. Journal of Finance 49:3–37.

———. 1995. The effect of credit market competition on lending relationships. Quarterly Journal of Economics 110:407–43.

PwC, The FASB's new financial instruments impairment model, July 11, 2016. Available at https://www.pwc.com/il/he/bankim/assets/fasb-financial-instruments-credit-losses-impairment.pdf

Qi, Y. and Wang, Y., 2016. Does expected bond liquidity affect financial contracts?. *Available at SSRN 2881063*.

Rajan, R.G., 1992. Insiders and outsiders: The choice between informed and arm's-length debt. *The Journal of Finance*, *47*(4), pp.1367-1400.

Roychowdhury, S., Shroff, N. and Verdi, R.S., 2019. The effects of financial reporting and disclosure on corporate investment: A review. *Journal of Accounting and Economics*, *68*(2-3), p.101246.

Ryan, S., Quarter 1, 2019. The CECL Approach, Banking Perspectives. Available at https://www.bankingperspectives.com/the-CECL-approach/

Schoenfeld, J., 2017. The effect of voluntary disclosure on stock liquidity: New evidence from index funds. *Journal of Accounting and Economics*, *63*(1), pp.51-74.

Schultz, P., 2017. Inventory management by corporate bond dealers. *Available at SSRN*

2966919.

Schwarcz, S.L., 2016. Rethinking Corporate Governance for a Bondholder Financed, Systematically Risky World. *Wm. & Mary L. Rev.*, *58*, p.1335.

Shivakumar, L., Urcan, O., Vasvari, F.P. and Zhang, L., 2011. The debt market relevance of management earnings forecasts: Evidence from before and during the credit crisis. *Review of Accounting Studies*, *16*(3), pp.464-486.

Stein, J.C., 2002. Information production and capital allocation: Decentralized versus hierarchical firms. *The journal of finance*, *57*(5), pp.1891-1921.

Stovall, N. and Vanderpool, C., 2018. *CECL Will Create Large Capital Hit, Earnings Volatility For US Banks*, S&P Global Market Intelligence. Available at https://www.spglobal.com/marketintelligence/en/news-insights/research/cecl-will-create-large-capital-hit-earnings-volatility-for-us-banks

Thakor, AV, 2012. The economic consequences of the Volcker rule. *Report by the US chamber's center for capital market competitiveness*, *20120*.

U.S. Congress, 2018. Assessing the impact of the FASB's current expected credit loss (CECL) accounting standard on financial institutions and the economy. Hearing before the subcommittee on financial institutions and consumer credit of the committee on financial services. 115th Congress. Available at https://www.govinfo.gov/app/details/CHRG-115hhrg33798/CHRG-115hhrg33798/summary

U.S. Department of the Treasury, 2020. The Current Expected Credit Loss Accounting Standard and Financial Institution Regulatory Capital. Available at https://www.nafcu.org/sites/default/files/Treasury%20Study%20CECL.pdf

Walter, John. 2019. U.S. Bank Capital Regulation: History and Changes since the Financial Crisis. Federal Reserve Bank of Richmond, *Economic Quarterly*, 105(1): 1–40.

Weygandt, J.J., Kimmel, P.D. and Kieso, D.E., 2018. *Financial and managerial accounting*. John Wiley & Sons.

Wheeler, P.B., 2017. Do Investors Impound Information About Unrecognized Expected Credit Losses into Bank Stock Prices? (Ph.D. Dissertation). Indiana University, United States -- Indiana.

Wheeler, P.B., 2019. Loan loss accounting and procyclical bank lending: The role of direct regulatory actions. *Journal of Accounting and Economics*, *67*(2-3), pp.463-495.

Wheeler, P.B., 2021. Unrecognized Expected Credit Losses and Bank Share Prices. Journal of Accounting Research (forthcoming). https://doi.org/10.1111/1475-679X.12353

Appendices

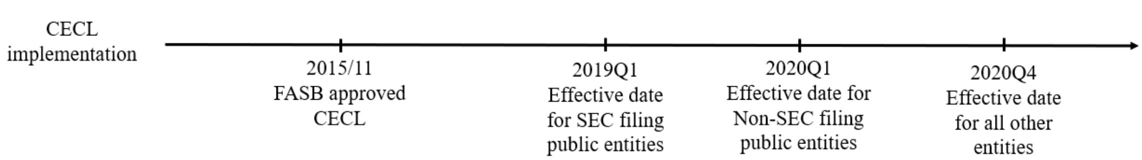
Appendix A Appendix for Chapter 2

A.1 History of changes in CECL effective dates

This appendix describes the history of changes in CECL's effective dates. There are two aspects of CECL adoption. The first aspect is related to financial reporting: when are banks required to report their CECL accounting numbers in their financial statements? The second aspect is related to their regulatory capital calculations: when and how are banks required to include the impact of CECL into their regulatory capital calculations?

The financial reporting aspect: when are banks required to report their CECL accounting numbers in their financial statements?

There are four versions of CECL effective dates for financial reporting. The first one was the version announced when the FASB approved CECL in November 2015[98]. The original timeline is shown below:



As we can see, under the original rules, public entities who are SEC filers must adopt CECL in 2019Q1, and public entities that *are not* SEC filers must adopt CECL one year later in 2020Q1. The definition of public entities is documented in ASU 2013-12[99]. Banks are considered to be public entities when they meet one of the following criteria at the beginning of the fiscal year:

[98] See https://www.fasb.org/jsp/FASB/Document_C/DocumentPage&cid=1176167627008 for the meeting minutes of the FASB's approval on November 18, 2015 in page 3.
[99] See page 5 in https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1176163702930&acceptedDisclaimer=true

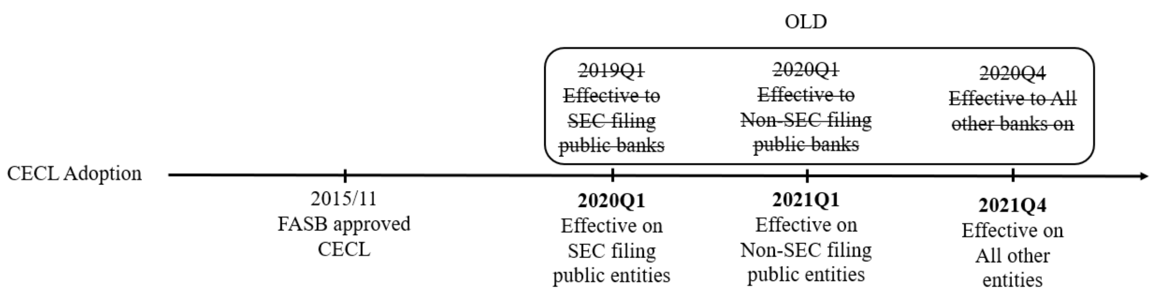
(1) they are an SEC filer, or

(2) they have stock traded on the OTC market, or

(3) they have total assets greater than $500 million[100].

Non-public entities, those banks that do not meet one of these three criteria, must adopt CECL in 2020Q4.

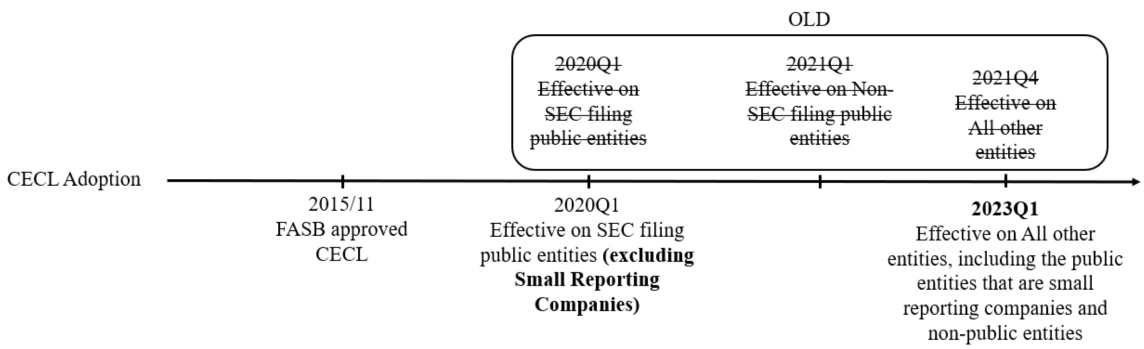
The second version of CECL effective dates was made public in June 2016 when the FASB officially announced the details of the CECL standard in Accounting Standard Update (ASU 2016-13) in June 2016. The timeline is shown below:



The second version postpones all three effective dates for different entities by one additional year.

The third version of the timeline was made public when the FASB modified the CECL effective dates in November 2019[101]. The new timeline is shown below:

[100] See https://www.eidebailly.com/insights/articles/2019/11/the-impact-of-fasb-delays-on-financial-institutions.
[101] See https://www.fasb.org/jsp/FASB/FASBContent_C/ActionAlertPage&cid=1176172970471&rss=1 for the source.



This new timeline extends the effective dates by three years for SEC filers that fall under the definition of Small Reporting Companies. Small Reporting Companies are those SEC filers, at the beginning of the fiscal year, either have:

(1) a public float of less than $250 million, or

(2) annual revenue of less than $100 million and

(a) no public float, or

(b) a public float of less than $700 million[102].

Moreover, this new timeline also extends the effective dates for all other entities to 2023Q1.

The fourth version of the timeline arises from The Coronavirus Aid, Relief, and Economic Security Act (CARES), signed into law on March 27, 2020. Section 4014 of the Act offers banks the option to delay their CECL adoption date until the earlier of, when the COVID-19 national emergency ends, or December 31, 2020. Section 4014 affects only the entities that were scheduled to adopt CECL in 2020Q1 (i.e., the SEC filers that are not small reporting companies).

[102] See the SEC website on https://www.sec.gov/smallbusiness/goingpublic/SRC for the more details on the small reporting companies.

The regulatory capital calculation aspect: when and how are banks required to include the impact of CECL into their regulatory capital calculations?

Originally, banks were expected to incorporate the day-1 CECL adjustments into their regulatory capital calculations at the same time as they would adopt CECL for financial reporting purposes [103]. However, on December 21st, 2018, bank regulators announced that banks would be given an option to phase in their day-1 adjustment to regulatory capital over three years. Specifically, when banks adopt CECL, they have an option to amortize CECL's initial adjustment to their retained earnings for calculating their tier one regulatory capital.

Further relaxation of CECL for regulatory capital purposes was issued in response to the COVID-19 outbreak. In March 2020, the banking regulators approved a new rule that gives large public banks several options to further delay when CECL adoption impacts their regulatory capital[104]. Under this new rule, the SEC filers who have adopted CECL in 2020Q1 can delay the initial CECL retained earnings adjustment to their regulatory capital for two years. After the two years, these SEC filers must either recognize the full adjustment immediately or amortize the adjustment over up to three years.

There were some additional regulatory capital relaxations introduced for these 2020Q1 adopters under the CARES Act. These adjustments give the adopting banks the option to delay the recognition of a portion of loan loss provisions in calculating regulatory capital. Please see

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[103] See the OCC website on https://www.occ.treas.gov/news-issuances/news-releases/2018/nr-ia-2018-142.html for more details on CECL and regulatory capital.

[104] See OCC website https://www.occ.treas.gov/news-issuances/bulletins/2020/bulletin-2020-30.html for more details on COVID-19 regulatory capital relief.

the Federal Register website for further details on the COVID-19-related relaxation of CECL for regulatory capital purposes.[105]

[105] The Federal Register website is available at https://www.federalregister.gov/documents/2020/09/30/2020-19782/regulatory-capital-rule-revised-transition-of-the-current-expected-credit-losses-methodology-for.

A.2 Variable Definitions

Variables	Definitions	Source
$CET1\_CAP\_RATIO_{i,t}$	Common equity Tier 1 capital ratio for bank i at the end of quarter t = $$\frac{\text{Common equity Tier 1 regulatory capital}_{i,t}}{\text{Risk-weighted assets}_{i,t}}$$ Y-9C items: bhcap859/bhcaa223	FR Y-9C[106]
$T1\_CAP\_RATIO_{i,t}$	Tier 1 capital ratio for bank i at the end of quarter t = $$\frac{\text{Tier 1 regulatory capital}_{i,t}}{\text{Risk-weighted assets}_{i,t}}$$ Y-9C items: bhck8274/bhcka223	
$TOTAL\_CAPITAL\_RATIO_{i,t}$	Total risk-based capital ratio for bank i at the end of quarter t = $$\frac{\text{Total regulatory capital}_{i,t}}{\text{Risk-weighted assets}_{i,t}}$$ Y-9C items: sbhck3792/bhcka223	
$LEV\_RATIO_{i,t}$	Tier 1 leverage ratio for bank i at the end of quarter t = $$\frac{\text{Tier 1 regulatory capital}_{i,t}}{\text{Total assets}_{i,t}}$$ Y-9C items: bhck8274/bhcka224	

[106]See https://www.chicagofed.org/banking/financial-institution-reports/bhc-data.

Variables	Definitions	Source
$CLOSE\_TO\_CONS\_ALL_i$	$\text{Max}\left\{\frac{4.5\%}{CET1\_CAP\_RATIO_{i,t}}, \frac{6\%}{T1\_CAP\_RATIO_{i,t}}, \frac{8\%}{TOTAL\_CAPITAL\_RATIO_{i,t}}, \frac{4\%}{LEV\_RATIO_{i,t}}\right\}$, averaged over the four quarters: 2015Q1–2015Q4, for bank i.	
$CLOSE\_TO\_CONS\_T1_i$	$\frac{6\%}{T1\_CAP\_RATIO}$, averaged over the four quarters: 2015Q1–2015Q4, for bank i.	
$MORE\_CONSTRAIN\_ALL_i$	Indicator variable equal to 1 if $CLOSE\_TO\_CONS\_ALL_i$ is greater than its median and equal to 0 otherwise.	
$MORE\_CONSTRAIN\_T1_i$	Indicator variable equal to 1 if $CLOSE\_TO\_CONS\_T1_i$ is greater than its median and equal to 0 otherwise.	
$EQUITY\_TO\_ASSETS_{i,t}$	$\frac{\text{Total equity}_{i,t}}{\text{Total assets}_{i,t}}$ for bank i at the end of quarter t. Y-9C items: bhck3210/bhck2170	
dEQ_i	$\frac{\text{Total equity}_{i,2018Q2}}{\text{Total assets}_{i,2018Q2}} - \frac{\text{Total equity}_{i,2015Q4}}{\text{Total assets}_{i,2015Q4}}$, for bank i. Y-9C items: bhck3210/bhck2170	
$CASH\&MKTSEC_{i,t-1}$	$\frac{\text{Cash}_{i,t-1} + \text{Marketable securities}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ for bank i at the end of quarter t-1. Y-9C items: (bhck0081+bhck0395+bhck0397+bhck3545)/bhck2170	
$TOT\_RE\_LOANS_{i,t-1}$	Long-term real estate loans, which is equal to the sum of residential real estate loans ($RES\_RE\_LOANS_{i,t-1}$) and commercial real estate loans ($COM\_RE\_LOANS_{i,t-1}$)	

Variables	Definitions	Source
$\Delta TOT\_RE\_LOANS_{i,t}$	$\frac{TOT\_RE\_LOANS_{i,t} - TOT\_RE\_LOANS_{i,t-1}}{TOT\_RE\_LOANS_{i,t-1}}$ for bank i during quarter t.	
$RES\_RE\_LOANS_{i,t-1}$	Residential real estate loans for bank i at the end of quarter t-1 = $\frac{\text{Loans secured by residential properties}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ Y-9C items: (bhdm1797+bhdm5367+bhdm5368+bhdm1460)/bhck2170	
$\Delta RES\_RE\_LOANS_{i,t}$	$\frac{RES\_RE\_LOANS_{i,t} - RES\_RE\_LOANS_{i,t-1}}{RES\_RE\_LOANS_{i,t-1}}$ for bank i during quarter t.	
$COM\_RE\_LOANS_{i,t-1}$	Commercial **real estate** loans for bank i at the end of quarter t-1 = $\frac{\text{Loans secured by nonfarm nonresidential properties}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ Y-9C items: (bhckf160+bhckf161)/bhck2170	
$\Delta COM\_RE\_LOANS_{i,t}$	$\frac{COM\_RE\_LOANS_{i,t} - COM\_RE\_LOANS_{i,t-1}}{COM\_RE\_LOANS_{i,t-1}}$ for bank i during quarter t.	
$COM\_NRE\_LOANS_{i,t-1}$	Commercial **non-real estate** loans for bank i at the end of quarter t-1 = $\frac{\text{Commercial and industrial loans}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ Y-9C items: (bhck1763+bhck1764+bhck1590)/bhck2170	
$\Delta COM\_NRE\_LOANS_{i,t}$	$\frac{COM\_NRE\_LOANS_{i,t} - COM\_NRE\_LOANS_{i,t-1}}{COM\_NRE\_LOANS_{i,t-1}}$ for bank i during quarter t.	

Variables	Definitions	Source
$CONSUMER\_LOANS_{i,t-1}$	Loans and leases to individuals (including credit cards, other revolving credit plans, automobile loans, other consumer loans, and leases to individuals) for bank i at the end of quarter t-1 = $\frac{\text{Loans and leases to individuals}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ Y-9C items: (bhckb538+bhckb539+bhckk137+bhckk207+bhckf162)/bhck2170	
$\Delta CONSUMER\_LOANS_{i,t}$	$\frac{\text{Consumer loans}_{i,t} - \text{Consumer loans}_{i,t-1}}{\text{Consumer loans}_{i,t-1}}$ for bank i during quarter t.	
$DEPOSITS_{i,t-1}$	$\frac{\text{Deposits}_{i,t-1}}{\text{Total liabilities}_{i,t-1}}$ for bank i at the end of quarter t-1. Y-9C items: (bhdm6631+bhdm6636+bhfn6631+bhfn6636)/bhck2948	
$TOT\_LOANS_{i,t-1}$	$\frac{\text{Total loans}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ for bank i at the end of quarter t-1. Y-9C items: bhck2122/bhck2170	
$\Delta LOANS_{i,t}$	$\frac{\text{Total loans}_{i,t} - \text{Total loans}_{i,t-1}}{\text{Total loans}_{i,t-1}}$ for bank i during quarter t.	
$TOTAL\_ASSETS_{i,t-1}$ ($ Bill)	Total assets in $ billion for bank i at the end of quarter t-1. Y-9C items: bhck2170	
$SIZE_{i,t-1}$	Log value of $TOTAL\_ASSETS_{i,t-1}$.	

Variables	Definitions	Source
$NPL_{i,t-1}$	$\frac{\text{Non-performing loans}_{i,t-1}}{\text{Total loans}_{i,t-1}}$ for bank i at the end of quarter t-1. Y-9C items: (bhck1407+bhck1403+bhck3506+bhck3507)/bhck2122	
$ROA_{i,t-1}$	$\frac{\text{Income before discontinued operations}_{i,t-1}}{\text{Average total assets}_{i,t-1}}$ for bank i during quarter t-1. Y-9C items: (1) bhck4300/(bhck2170+lag(bhck2170)/2) for the first quarter in each sample year, or (2) (bhck4300 − lag(bhck4300))/(bhck2170+lag(bhck2170)/2) for the second, third, and fourth quarter in each sample year.	
$TRADING\_ASSETS_{i,t-1}$	$\frac{\text{Trading assets}_{i,t-1}}{\text{Total assets}_{i,t-1}}$ for bank i at quarter t-1. Y-9C items: bhck3545/bhck2170	
$PUBLIC_i$	Indicator variable equal to 1 if bank i has equity traded on a stock exchange and equal to 0 otherwise. This variable is time-invariant at the bank level because banks that change their public listing status during my sample period are dropped from the sample.	New York Fed[107]
$SBL_{i,c,t}$	Amount of new small business loans in $ thousand originated by bank i in county c during year t.	FFIEC website[108]

[107] See https://newyorkfed.org/research/banking_research/datasets.html.
[108] FFIEC stands for Federal Financial Institutions Examination Council. The website is available at https://www.ffiec.gov/cra/default.htm.

Variables	Definitions	Source
$LOG\_SBL_{i,c,t}$	Log value of $SBL_{i,c,t}$.	
$LONG\_TERM\_LOANS_{i,t-1}$	Amount of loans with five years or greater of remaining life scaled by total assets for bank i at the end of quarter t-1. If bank i owns multiple bank subsidiaries, then this variable is measured at the bank i level by taking a weighted average according to each subsidiary's total assets. Call Report data variable names: LNOT5T15+LNRS5T15+LNRSOV15+LNOTOV15	Call Reports data[109]
$\Delta LONG\_TERM\_LOANS_{i,t}$	$\frac{LONG\_TERM\_LOANS_{i,t} - LONG\_TERM\_LOANS_{i,t-1}}{LONG\_TERM\_LOANS_{i,t-1}}$ for bank i during quarter t.	
REG_LEN_i	Index of regulatory leniency, calculated as follows: (1) If a bank is state-chartered, I use the regulatory leniency index constructed by Agarwal et al. (2014). The index is measured as the average difference between the federal regulator and each state regulator in the bank regulatory ratings assigned to the same bank. (2) If a bank is federally chartered, I follow Costello et al. (2019) and set bank i's regulatory leniency index to zero as these banks are only monitored by federal regulators.	Amit Seru's website[110]

[109] See https://www.fdic.gov/foia/ris/.
[110] See https://aseru.people.stanford.edu/data-and-discussions.

Variables	Definitions	Source
	If bank i owns multiple bank subsidiaries, then this variable is measured to the bank i level by taking the weighted average of each subsidiary's regulatory leniency index. The weights are equal to each subsidiary's total assets.	
$HIGH\_REG\_LEN_i$	Indicator variable equal to 1 if REG_LEN_i is greater than its median and equal to 0 otherwise.	

Appendix B Appendix for Chapter 3

B.1 Variable definitions

All continuous variables are winsorized at 1% and 99%.

Main variables	(alphabetically ordered)
have_rat	An indicator variable set to 1 if a firm has an S&P credit rating, and zero otherwise
have_rat (hat)	Estimated probability that a firm has a credit rating
MF_all_dum	An indicator variable set to one for firms that issue at least one management guidance regarding its quarterly performances (e.g., EPS, sales, earnings before interest and tax, etc.) during each quarter, and zero otherwise
MF_all	A count variable measuring the total number of management guidance items issued during each quarter
NYSE	An indicator set to one if a firm i is listed on the New York Stock Exchange, and zero otherwise
Post	An indicator variable set to one if a firm-quarter is after the implementation of Volcker Rule in 2014, and zero before 2014
Ratio_of_Rated_Firms	The percentage of firms in the same three-digit SIC industry that have a credit rating.
Rating_indicator	A vector for the indicators of different credit ratings at the end of the year 2013. For example, credit rating variable A is one of the elements in this vector. The variable A equals one if a firm has a credit rating A+, A, or A- at the end of the year 2013. And the same logic applies to other credit rating classes.
SP500	An indicator set to one if a firm i is included in the S&P 500 index, and zero otherwise
Controls	(ordered as the sequence they appear in regression tables.)
LnMV	Natural logarithm of beginning of the quarter market value of firm equity (in millions).
MTB	Beginning of quarter market-to-book ratio.
ROA	Current quarter's return on assets, computed as the ratio of earnings before extraordinary items to total assets at the beginning of the fiscal quarter.
LOSSDUM	An indicator variable set to one for firms that report losses in the previous quarter
BHAR	Buy-and-hold size-adjusted return measured over the three months prior to the beginning of the fiscal quarter. The size adjustment is based on the return on a portfolio of NYSE/AMEX/NASDAQ stocks in the same size-decile (market capitalization) as the sample firm.
BETA	Equity beta for the previous fiscal quarter.

CFVOL	Cash flow volatility, computed as the standard deviation of quarterly operating cash flows over the prior two years.
RETVOL	Stock return volatility, computed as the standard deviation of daily gross stock returns over the three months prior to the beginning of the quarter.
LnAF	Natural logarithm of one plus the number of analysts at the beginning of the quarter. (Data on the number of analysts following are obtained from I/B/E/S. If a firm is not covered by I/B/E/S, the number of analysts variable is coded as zero.)
HERFIN	Beginning of the quarter Herfindahl index estimated based on firm sales in an industry defined by the Fama–French classification. It is calculated by squaring each firm's share of industry revenues.
LEV	Beginning of the quarter long-term debt divided by total assets.
INST	Percentage of shares owned by institutional investors in the previous quarter. (Data on institutional ownership are obtained from Thomson-Reuters Institutional Holdings (13F) Database. If a firm is not covered by the database, the institutional ownership variable is coded as zero.)

B.2 Disclosure frequency of different quarterly management forecast items for treatment and control firms in pre-Volcker and post-Volcker eras

				Treatment: Firms With Credit Rating		Control: Firms W/O Credit Rating	
	Capital IQ Item name	**Description**	**Overall**	**Pre-Volcker 2012Q1-2013Q4 (n = 5,011)**	**Post-Volcker 2015Q1-2016Q4 (n = 4,985)**	**Pre-Volcker 2012Q1-2013Q4 (n = 10,218)**	**Post-Volcker 2015Q1-2016Q4 (n = 10,151)**
All types			27.7%	30.7%	32.4%	25.9%	25.6%
EPS	EPS_EXCL	EPS with some adjustments (e.g., excluding Amortization of Intangible Assets)	17.4%	20.2%	21.0%	15.9%	15.8%
	EPS_GAAP	Regular EPS					
	EPS_GROWTH	EPS growth					
Sales	REVENUE	Sales	18.8%	14.0%	16.7%	20.2%	20.7%
Earnings related	EBITDA	Earnings before interest, tax, depreciation, and amortization	6.8%	5.1%	6.8%	6.5%	7.9%
	EBIT	Earnings before interest and tax					
	NI	Net income excluded executive compensation					
	NI_GAAP	Net income by GAAP					

	Capital IQ Item name	Description	Overall	Treatment: Firms With Credit Rating Pre-Volcker 2012Q1-2013Q4 (n = 5,011)	Treatment: Firms With Credit Rating Post-Volcker 2015Q1-2016Q4 (n = 4,985)	Control: Firms W/O Credit Rating Pre-Volcker 2012Q1-2013Q4 (n = 10,218)	Control: Firms W/O Credit Rating Post-Volcker 2015Q1-2016Q4 (n = 10,151)
Gross Margin%	GROSS_MARGIN	Gross Margin%	5.7%	3.9%	4.6%	6.0%	6.7%
Effective Tax Rate %	EFFECTIVE_TAX	Effective Tax Rate %	6.7%	8.6%	9.8%	5.8%	5.2%
Others	DPS	Dividends per share	6.9%	9.9%	9.6%	5.3%	5.7%
	INTEREST_EXP	interest expenses					
	DISTRIBUTABLE_CASH	distributable cash					
	DA	Depreciation & Amortization					
	CASH_OPER	Cash From Operations					
	CAPEX	Capital Expenditure					
	MAINT_CAPEX	Maintenance Capital Expenditure					
	FCF	free cash flow					
	SAME_STORE	Same-Store Sales Growth %					

B.3 Summary Statistics of disclosure variables for firms in each rating category

Credit ratings	Post-Volcker	N Obs	Variable	Mean
AAA	**No**	**40**	***MF_all_dum***	0.075
			MF_all	0.075
	Yes	**36**	***MF_all_dum***	0.139
			MF_all	0.139
AA	**No**	**139**	***MF_all_dum***	0.396
			MF_all	1.050
	Yes	**138**	***MF_all_dum***	0.362
			MF_all	0.906
A	**No**	**713**	***MF_all_dum***	0.383
			MF_all	0.865
	Yes	**703**	***MF_all_dum***	0.437
			MF_all	0.977
BBB	**No**	**1699**	***MF_all_dum***	0.323
			MF_all	0.834
	Yes	**1688**	***MF_all_dum***	0.341
			MF_all	0.900
BB	**No**	**1586**	***MF_all_dum***	0.303
			MF_all	0.867
	Yes	**1574**	***MF_all_dum***	0.314
			MF_all	0.966
B	**No**	**827**	***MF_all_dum***	0.210
			MF_all	0.430
	Yes	**838**	***MF_all_dum***	0.211
			MF_all	0.575
CCC	**No**	**7**	***MF_all_dum***	0.571
			MF_all	2.571
	Yes	**8**	***MF_all_dum***	0.625
			MF_all	1.500
Firms without a credit rating	**No**	**10218**	***MF_all_dum***	0.259
			MF_all	0.732
	Yes	**10151**	***MF_all_dum***	0.256
			MF_all	0.754

MF_all_dum denotes an indicator variable set to one for firms that issue at least one management forecast in the current quarter, and zero otherwise. ***MF_all*** denotes a count variable measuring the total number of management forecasts issued in each quarter.