Size-Based Regulation and Bank Fragility: Evidence from the Wells Fargo Asset Cap *

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Abstract

We argue that heightened regulation on large banks contributed to the rise in fragility of smaller banks revealed by the 2023 regional bank crisis. In 2018, regulators restricted Wells Fargo from growing beyond $1.95 trillion in assets. This asset cap forced Wells Fargo to give up large uninsured deposits. We find that smaller, less regulated banks more geographically proximate to Wells Fargo experienced an influx of flighty uninsured deposits, particularly during the COVID-19 period. In turn, these banks experienced higher deposit outflows once monetary tightening commenced, and saw stock prices plummeted during the 2023 banking stress.

JEL Codes: G01, G21, G28, G32, E44, E58.

Keywords: Too-Big-to-Fail, Banking Fragility, Wells Fargo, Asset Cap, Regional Bank Crisis, COVID-19, Monetary Tightening

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1 Introduction

Following the 2007–09 Global Financial Crisis (GFC), the regulatory framework governing banks was overhauled to emphasize the role of size. Large banks were subject to more stringent regulation due to too-big-to-fail (TBTF) and systemic risk concerns.[1] While such regulations have been successful in reducing the TBTF subsidy enjoyed by large banks (Berndt et al., 2019), an enduring concern is that these restrictions have unintended consequences for other parts of the banking system. An important question is whether size-based regulation leads to a reallocation of banking activity to smaller, less-regulated banks and the associated implications for financial stability.[2]

We study the financial stability implications of a unique regulatory action that constrained the growth of one of the largest U.S. banks, Wells Fargo and Company. Following the cross-selling scandal involving fraudulent account openings (Tayan, 2019), the Federal Reserve restricted Wells Fargo from growing beyond $1.95 trillion in assets. We find that this hard asset cap, effective since February 2018, has led to a reallocation of flighty uninsured deposits from Wells Fargo to other banks. This asset cap contributed to the rise in fragility in regional banks revealed by the 2023 regional bank crisis, the most significant U.S. banking stress since the GFC.

The crisis, precipitated by the collapse of Silicon Valley Bank (SVB), saw a run by uninsured depositors,[3] concerned by an increase in banks' unrealized asset losses due to a rise in interest rates (Jiang et al., 2023; Drechsler et al., 2023). Banks differ substantially in the share of funding obtained from uninsured deposit funding (Jiang et al., 2023). *Why* were some banks more dependent on flighty uninsured deposits than others? We argue a con-

[1] Examples include provisions on stress testing and capital and liquidity requirements in the Dodd-Frank Act of 2010.

[2] Several papers document that banking regulation leads to a reallocation of risky activity to non-bank intermediaries, aka shadow banks (e.g., Acharya et al. (2013); Buchak et al. (2018); Irani et al. (2021); Begenau and Landvoigt (2022)). Begley and Srinivasan (2022) find that post-GFC regulatory burden on large banks leads to increased lending by small banks.

[3] The deposit insurance limit is $250,000 per depositor per bank. Uninsured depositors are, thus, those with more than $250,000 in a single bank.

tributing factor was their geographic proximity to Wells Fargo, which led them to absorb uninsured deposits Wells Fargo could not due to the asset cap. We document that banks more proximate to Wells Fargo experienced higher growth in uninsured deposits prior to monetary tightening *and* higher stress during the regional bank crisis. The reallocation of flighty uninsured deposits is driven by smaller and less regulated banks, representing the spillover effects of tighter regulation on largest banks.

The asset cap on Wells Fargo, still in place, is a direct and unprecedented act limiting the growth of a large bank. To the best of our knowledge, we are the first to comprehensively analyze the effects of the asset cap both on Wells Fargo and its competitors.[4] We begin by showing that the asset cap substantially affected Wells Fargo's operations, particularly during the COVID-19 period when the aggregate banking sector saw significant growth owing to an inflow of deposits. While the other three of the Big-4 American banks–Bank of America, JP Morgan, and Citigroup–have seen cumulative growth between 30%-50% since 2017, Wells Fargo has been forced to stay at the same size. We estimate that if Wells Fargo had grown at the same rate as the overall U.S. commercial banking sector, it would have had $414.19 billion in additional deposits by the time the Fed commenced monetary tightening in early 2022. This gap alone is larger than the asset size of all but the nine largest bank holding companies in the U.S.

The deposit gap is concentrated among uninsured deposits. As insured deposits are stickier than uninsured deposits, i.e., they are less responsive to market conditions such as interest rates (Drechsler et al., 2023), we expect Wells Fargo to prioritize maintaining insured deposits relative to uninsured deposits. In its public disclosures, Wells Fargo indicates that it gave up large corporate deposits, likely uninsured, to stay under the asset cap.

We verify this in the data by using two complementary approaches to overcome the

[4]In their study of Paycheck Protection Program (PPP) lending, Granja et al. (2022) use Wells Fargo's limited participation, due to the asset cap, as an instrument for the distribution of PPP loans. Yang (2023) uses the Wells Fargo scandal itself as a negative shock to borrowers' trust in banks.

data challenge of measuring retail and business deposits. First, we use Wells Fargo's reported decomposition of demand deposits into business and retail demand deposits. We show that Wells Fargo gave up business demand deposits during the pandemic while experiencing growth in retail demand deposits till the start of monetary tightening in early 2022. Secondly, we use a novel proxy for retail and business deposits at a granular level. Specifically, we geo-code central business districts (CBDs) (Holian and Kahn, 2012) and take deposits in branches located in CBDs and main offices as a proxy for business deposits. Again, we find that Wells Fargo gave up large business deposits till 2022.

We next turn to the spillover effects on other banks. Since bank competition has a strong local component (e.g., Petersen and Rajan (1994); Berger and Udell (1995); Drechsler et al. (2017, 2021)), we expect banks geographically proximate to Wells Fargo to be more active in filling the gap left by Wells Fargo than distant banks. To operationalize this idea, we measure Wells Fargo's branch presence at the local market level (in our case, a zip code) in early February 2018, just before the asset cap came into effect. We then compute the proximity of other banks to Wells Fargo as the fraction of their deposits in the same zip codes as Wells Fargo branches prior to the asset cap. We find that for higher (lower)-proximity banks, business deposits grow faster (slower) than retail deposits following the imposition of the asset cap.

Motivated by this descriptive evidence, we examine the relationship between proximity to Wells Fargo and uninsured deposit growth in a difference-in-differences (DID) design. In bank-level panel regressions, we control for time-varying bank characteristics, bank fixed effects, as well as bank size-group-specific time fixed effects. We find that the growth of uninsured deposits does not differ significantly between higher- and lower-proximity banks in the period before the asset cap, validating the parallel trends assumption. After the asset cap was put in place, higher-proximity banks grew their uninsured deposits significantly faster than lower-proximity banks, especially during the COVID-19 pandemic. On deposit pricing, we find that banks more proximate to Wells Fargo paid

lower interest on deposits, or equivalently, charged higher spreads (relative to the market rate), after the imposition of the asset cap.

The preceding results of prices (deposit spreads) and quantities (uninsured deposit growth) moving in the same direction at proximate banks indicate shifts in the demand for deposits rather than shifts in banks' supply of deposits. By contrast, supply shifts would cause quantities and prices to move in opposite directions. As Wells Fargo actively reduced uninsured deposits after the asset cap, the demand for proximate banks' uninsured deposits went up, leading to uninsured deposit growth and higher deposit spreads. Supply-based factors such as improvement in bank investment opportunities or the deposits channel of monetary policy (Drechsler et al., 2017) are inconsistent with our findings.

To address other demand-based explanations such as local economic growth, we conduct tests of deposit flows at the local deposit market level which allows us to control for local economic conditions. In our empirical model, we can compare outcomes for two branches belonging to the same bank in the same county in the same year but in different zip codes. We find that branches in the same zip codes as Wells Fargo branches saw higher deposit growth than other branches of the same bank in the same county in the same year after the asset cap was imposed on Wells Fargo. These effects are driven by community and regional banks. Furthermore, our finding of higher deposit growth for branches in the same zip code as Wells Fargo is concentrated in counties with a CBD, corroborating that the effect of the asset cap is stronger for uninsured deposits.

Proximate banks' increased reliance on uninsured deposit funding makes them vulnerable to potentially substantial deposit outflow once monetary tightening commences. The funding fragility started to materialize when the Fed started the rate hike in March 2022 and culminated in the regional bank crisis: Banks with higher pre-asset cap proximity to Wells Fargo experienced higher stress, as reflected in more negative cumulative stock returns, during the failures of SVB and First Republic Bank.

Extending the analysis of bank deposit funding to the monetary tightening period, we find that banks proximate to Wells Fargo experienced a pronounced deposit inflow-outflow cycle. After the asset cap was put in place, higher-proximity banks grew their uninsured deposits significantly faster than lower-proximity banks, especially during the COVID-19 pandemic. As the Fed started to tighten monetary policy in 2022, higher-proximity banks saw larger uninsured deposit outflows than lower-proximity banks. The outflow was exacerbated during the first quarter of 2023, when the failure of SVB triggered a wider bank run (Cipriani et al., 2024; Caglio et al., 2024).

On deposit pricing, we find that banks more proximate to Wells Fargo charged higher deposit spreads particularly during the COVID-19 pandemic. As the Fed started to tighten monetary policy in 2022, higher-proximity banks experienced a decrease in deposit spreads relative to lower-proximity banks. Such differential pricing further widened during the regional bank crisis of 2023. The simultaneous decreases in deposit prices and quantities at proximate banks during monetary tightening imply a reduction in the demand for their deposits, reversing the excess demand they enjoyed prior. Once monetary policy tightening commenced, the demand for proximate banks' uninsured deposits subsided, leading to uninsured deposit outflows and lower deposit spreads.

Our results are robust to alternate definitions of uninsured deposit quantities and prices. They cannot be explained by general proximity to large banks as we construct falsification tests wherein we imagine other large banks as being (fictitiously) treated. We find that the branches close to other large banks do not experience higher deposit growths than other branches in the post-2018 period. This provides reassurance that the deposit growth response of branches close to Wells Fargo is unlikely to be driven by proximity to large banks in general.

Finally, we perform back-of-the-envelope calculations to quantify the magnitude of uninsured deposits that Wells Fargo lost to other banks due to the asset cap. We estimate that if Wells Fargo had grown at the same rate as the overall U.S. commercial banking

sector, it would have had $231.25 billion in additional uninsured deposits by the time the Fed started the monetary tightening in early 2022. Over the same period, banks proximate to Wells Fargo jointly enjoyed an excess of $235.99 billion in uninsured deposits.

Relation to the Literature

We contribute to several strands of literature. First, the causes of the 2023 regional banking crisis. During the COVID-19 pandemic, there was significant growth in commercial bank deposits due to fiscal stimulus and quantitative easing (Castro et al., 2022; Acharya et al., 2023). As monetary policy tightened through 2022 and early 2023, banks saw large unrealized losses on their asset portfolios (Jiang et al., 2023). At the same time, uninsured deposits flowed out as bank deposit rates did not keep pace with interest rates (Koont et al., 2023). Drechsler et al. (2023) highlight that heavy reliance on uninsured deposits can lead to a bank run during periods of rising rates. This is compounded by banks not hedging their interest rate risk exposure (McPhail et al., 2023), reclassifying securities as held-to-maturity to avoid loss recognition (Granja et al., 2024), and through concentrated depositor networks (Cookson et al., 2023). A natural question is why some banks came to rely more heavily on flighty uninsured deposits than other banks. Gelman et al. (2023) and Benmelech et al. (2023) show that these banks experienced high deposit inflows during the COVID-19 pandemic period. Our paper provides evidence for one novel explanation – a redistribution of uninsured deposits induced by the Wells Fargo asset cap.

We also contribute to the burgeoning literature on size-based regulation in banking. Following the GFC, there was renewed recognition that TBTF guarantees create distortion (Iyer et al., 2019) and the social costs of bank failures were increasing in bank size. This prompted an approach of tiered regulation, best encapsulated in the Dodd-Frank Act, where the degree of oversight increases with bank size. Bouwman et al. (2018) and Alvero et al. (2022) study how bank behavior changes as they approach the $10 billion asset size threshold for tighter regulation. In comparison to the size threshold studied by

these papers, the asset cap we analyze is binding and targets one of the largest banks in the world. We analyze the effects of this unique regulatory experiment on other banks that are proximate to Wells Fargo. The substantial spillover effects we document support the notion that idiosyncratic shocks to large firms can lead to nontrivial aggregate impacts (Gabaix, 2011; Gabaix and Koijen, 2024). Our findings also shed light on the design of policy to solve the too-big-to-fail conundrum (Philippon and Wang, 2023) by documenting that asset caps have spillover effects that need to be accounted for.

More broadly, our results speak to a fundamental tension in financial regulation. Banks alter their structure and risk profile in response to regulation (Acharya et al., 2013; Begley et al., 2017; Behn et al., 2022). Constraints on traditional depository institutions may lead to a reallocation of risky activities to less-regulated entities rather than to their suppression. Prior work has focused on how regulatory arbitrage has spurred the rise of shadow banking (e.g., Buchak et al. (2018); Irani et al. (2021); Begenau and Landvoigt (2022)). We show that the migration of risks exists even within the confines of the traditional banking system. Increased regulation on Wells Fargo in the form of the asset cap led to the reallocation of risky uninsured deposits to smaller banks that faced lower regulation and supervision. A potential "too-many-to-fail" risk arises as the TBTF risk recedes (Gandhi and Purnanandam, 2023).

Finally, we contribute to the literature on the value of the bank deposit franchise (Egan et al., 2021). While deposits form a cheap source of financing, they are exposed to run risk if they are uninsured. Deposits can also be costly in the presence of other constraints. Another concern raised recently, is that banks cannot control their deposit inflows. Bolton et al. (2020) argue, theoretically, that if customer demand for deposits is excessive, the firm faces leverage constraints and has to issue costly equity. Through the lens of Wells Fargo, we show how a constrained bank manages its deposit base and prioritizes insured over uninsured deposits.

2 Institutional Background

2.A The Wells Fargo Cross-Selling Scandal and the Asset Cap

In the second half of 2016, Wells Fargo became embroiled in what came to be known as the "cross-selling scandal" (Tayan, 2019). For several years, employees in the company's community banking division had been fraudulently creating additional accounts for existing customers without their knowledge. In response to the scandal, the courts and regulators imposed significant monetary and operational penalties on the bank.

On February 2, 2018, the Federal Reserve entered into a Consent Order with Wells Fargo (available here). As part of the regulatory action, Wells Fargo agreed to limit the total asset size of its holding company to the value at the end of the fourth quarter of 2017. This asset cap of $1.952 trillion would stay in place until the Federal Reserve determined the bank had made significant improvements to its corporate governance and risk management practices. In the words of the Wall Street Journal, the Federal Reserve had "..never before imposed such a broad restriction as part of an enforcement action" (Wall Street Journal, 2018). Market reaction to the news of the Consent Order was sharp and swift as Wells Fargo stock fell 9.2%, its worst day since April 2009. At the time of the asset cap, Wells Fargo was the third largest bank in the U.S. and accounted for 10.5% of total banking assets.

As of this writing, the asset cap remains in place. Figure 1 shows how the asset cap has affected Wells Fargo's growth compared to Bank of America, JP Morgan, and Citigroup - the other three of the "Big 4" of American banking. While the other three banks have seen growth between 30%-50%, Wells Fargo has been forced to stay at the same size.

2.B Commercial Banking from 2018–2023Q1

The asset cap on Wells Fargo has been in place since early 2018. Over this period, there have been several distinct phases of banking sector evolution. Figure 2 presents the

weekly Fed Funds rate and the aggregate deposits in the U.S. banking sector for the period from 2013 to the first quarter of 2023. In the first two years of the asset cap, the overall banking sector grew modestly at a rate similar to that in the preceding years. During the COVID-19 period, the aggregate banking sector saw significant growth owing to an inflow of deposits. Castro et al. (2022) show that the rise in aggregate deposits in 2020 and 2021 is outsized compared to any period in the past 30 years. They document four factors explaining this historic growth in aggregate deposits: (1) the initial spike in commercial and industrial (C&I) credit line drawdowns at the onset of the pandemic; (2) asset purchases by the Federal Reserve; (3) large fiscal transfers to households more likely to hold savings in the form of deposits; and (4) a higher personal savings rate.

The growth in deposits reversed as monetary policy tightened starting in March 2022. The high-frequency dynamics in Figure 2 indicate that aggregate deposit growth started reversing precisely when the Fed started increasing the target Fed Funds rate, consistent with the deposits channel of monetary policy (Drechsler et al., 2017). The deposit outflow was exacerbated in March 2023, when the failure of SVB triggered a wider run on the banking sector.

Decomposing total deposits into insured and uninsured deposits reveals substantial differences during this period. Using bank-level data[5], we calculate insured and uninsured deposits based on the deposit insurance limits and then sum across all banks to obtain the aggregate insured and uninsured deposits for the overall banking sector. Figure 3 shows the quarterly dynamics of Fed Funds rate and cumulative growth of insured and uninsured deposits in the U.S. banking sector. It shows that the growth of uninsured deposits during the COVID-19 pandemic is more pronounced than the corresponding growth of insured deposits. Relatedly, Acharya et al. (2023) document that banks increase uninsured demand deposits during quantitative easing. Once the Fed started tightening

[5]Fed Board Release H.8 reports deposit breakdown by product type (e.g., checking, saving, time) and hence does not allow a decomposition into insured and uninsured deposits as deposit insurance limit is based on total balance across deposit products per depositor per bank.

monetary policy and in particular during the regional bank crisis, there was substantial outflow of uninsured deposits from the banking sector. In contrast, insured deposits were relatively stable. This comparison suggests that, in aggregate, the deposit outflow during the monetary policy cycle is driven by the outflow of uninsured deposits.

2.C Data Sources

To study the effect of the asset cap on Wells Fargo and its banking competitors, we combine a variety of data sets from public or standard sources:

Bank Financials: Quarterly data on the financial position of individual banks comes from the Reports of Condition and Income (aka 'Call Reports'). The Call Reports have income statement and balance sheet data on all U.S. depository institutions. For analyses at the holding company level, we use data from Form FR Y-9C. Both sets of data are available from the website of the Federal Financial Institutions Examination Council.

Local Deposits: Data on deposits at the branch level is obtained from the FDIC Summary of Deposits (SOD). The SOD covers the universe of U.S. bank branches at an annual frequency, and data is as of June 30 each year. The data includes the dollar amount of deposits at each branch, the physical location, and the identity of the bank that owns the branch.

Branch Changes: Data on bank branch openings, closings, and relocations is obtained from the FDIC BankFind Suite. The data includes the effective date for branch change events and thus allows us to construct branch location information for any point in time between the annual SOD reporting time.

Stock Returns: We get stock return data from CRSP. To obtain a comprehensive list of publicly traded banks, we start with the CRSP-FRB link available from the Federal Re-

serve Bank of New York.[6] We merge this set with the list of banks obtained using the methodology of Gandhi and Lustig (2015). We include all banks that appear on both lists. For banks appearing on only one of the lists, we manually confirm that it is a commercial bank or bank holding company during our sample period.

2.D Variable Definitions

The first measure of funding fragility we use in our analysis is the fraction of uninsured deposits. We calculate insured and uninsured deposits based on the deposit insurance limits. Last changed in 2008, the deposit insurance limits of $250,000 per depositor per bank are constant throughout our sample period. Schedule RC-O "Other Data for Deposit Insurance and FICO Assessments" of the Call Reports reports the total amount and number of deposit accounts for those above and below the FDIC limits in its Memoranda item 1. Following Bai et al. (2018), we calculate insured deposits as the combination of (i) all deposits lower than the FDIC limit of $250,000 and (ii) the first $250,000 dollar amount in the accounts above the limit multiplied by the number of such deposit accounts. Uninsured deposits are calculated as all deposits greater than the FDIC limit of $250,000 minus the insured portion of these large deposit accounts. We also examine the total number and average size of deposit accounts.

We use uninsured leverage as another measure for funding fragility. Following Jiang et al. (2020, 2023), uninsured leverage is defined as the ratio of uninsured debt funding to assets, where uninsured debt consists of uninsured deposits, foreign deposits, repos, other borrowed money, and subordinated debt.

To measure deposit pricing, we use the information on the deposit interest expense from the Call Reports. We calculate the deposit interest expense as the quarterly interest expense on deposits divided by the quarterly average of deposits, multiplied by 4 to obtain an annual deposit rate. This measure reflects the average deposit rate a bank pays

[6] Available at https://www.newyorkfed.org/research/banking_research/datasets.html.

on its deposits including both insured and uninsured deposits. The Call Reports also contain a decomposition of deposit interest expense by type (e.g., checking, savings, and time deposits) but do not contain any breakdown corresponding to insured and uninsured deposits. As uninsured deposits can be any of these types[7], we believe that the overall deposit interest expense is best suited for the analysis of the pricing of uninsured deposits. An alternative data source that has been used in the empirical literature to measure deposit pricing is RateWatch, which reports the weekly branch-level deposit rates on new accounts by product. Although the RateWatch data offers higher frequency and more granular rates, its coverage is largely limited to retail deposit products (e.g., Drechsler et al., 2017, 2021). Also, it only covers new accounts. As such, it is not useful to reflect the pricing of uninsured deposits that mostly consist of large, business deposits.

We calculate the deposit spread as the difference between the effective Fed funds rate (a competitive market rate) and the deposit interest expense rate. The deposit spread represents the opportunity cost of holding deposits (Drechsler et al., 2017). The Call Reports also have information on the fee income from service charges on domestic deposits, which allows us to measure the full spread a bank charges on these deposits inclusive of fees.

During our sample period, the severity of U.S. bank regulation relies on nominal size thresholds and the exact regulation imposed on banks in a size group can change over time (Alvero et al., 2022).[8] Following Alvero et al. (2022), we use quarter-end nominal assets of the regulatory high holders to construct bank size groups.

For other variables, we follow Drechsler et al. (2017, 2021) to form consistent time-series data. Internet Appendix B contains a detailed description of variable definitions.

[7]Other than the large-denomination time deposits, large corporate checking and savings accounts may constitute the bulk of uninsured deposits for some banks, such as in the case of Silicon Valley Bank.

[8]For instance, in the original formulation of the Dodd-Frank Act, banks with more than $10 billion in assets are subject to stress tests. In 2018, the U.S. Congress passed the Economic Growth, Regulatory Relief, and Consumer Protection Act, partially reversing some regulations of the Dodd-Frank Act. As a result, banks with more than $10 billion in assets are no longer required to conduct stress tests except for those whose assets are greater than $250 billion.

3 Effects of the Asset Cap on Wells Fargo

The asset cap has had a substantial impact on Wells Fargo's operations, particularly during the COVID-19 period when the aggregate banking sector saw significant growth owing to an inflow of deposits. Figure 4 shows that the deposit growth of Wells Fargo slowed down relative to the other three largest BHCs since 2020. If Wells Fargo had grown at the same speed as the overall U.S. commercial banking sector, it would have had $414.19 billion additional deposits by the time the Fed started monetary tightening in early 2022.

A close examination of the behavior of Wells Fargo reveals that the deposit gap it left mostly takes the form of *uninsured* deposits. Insured deposits are more stable than uninsured deposits due to deposit insurance[9] and they typically have a lower interest rate. Conceptually, it makes sense for Wells Fargo to cut uninsured deposit funding when facing a constraint on asset growth. In addition, turning away a few large depositors may be operationally easier than turning away many small deposits to manage under a nominal asset cap. In essence, there is a pecking order of depositors.

Narrative evidence points to Wells Fargo decreasing large business deposits to manage under the asset cap. For instance, in its 2020 and 2021 annual reports, the bank talks about giving up business deposits and prioritizing household deposits. Such actions continued till early 2022. Levers for Wells Fargo to decrease unwanted deposits include reducing interest rates and imposing fees.[10] In Internet Appendix A, we use Wells Fargo's public disclosures and relevant media coverage to provide an in-depth narrative of how the asset cap affected the bank, complementing our ensuing quantitative analysis.

[9] Recognizing this, the liquidity regulation framework in Basel III allows a lower outflow factor for insured retail deposits than uninsured retail deposits (Basel Committee on Banking Supervision, 2013).

[10] These are among the common strategies adopted by banks wanting to reduce deposits. See, for example, the March and November 2021 waves of the Federal Reserve's Senior Financial Officer Survey, available at `https://www.federalreserve.gov/data/sfos/sfos-release-dates.htm`. Some banks are reported to charge corporate depositors fees for large deposit balances in 2011 and 2014 (Wall Street Journal, 2011, 2014; Heider et al., 2019).

3.A Insured v. Uninsured Deposits

The distinction between retail and business depositors maps naturally to that between insured and uninsured depositors given the existing deposit insurance limit of $250,000 per depositor per bank. Retail depositors are mostly "sleepy" insured deposits due to their size and limited financial sophistication (Drechsler et al., 2017). On the other hand, business deposits are more likely to be uninsured due to their size, and more volatile due to firms' risk-taking & reaching for yield (e.g., Duchin et al. (2017)).

Bank data do not contain information on the decomposition of the entire deposit base into retail and business deposits. Given this data challenge, we adopt two complementary approaches to verify in the data that Wells Fargo gave up large uninsured deposits to stay under the asset cap. First, we use Wells Fargo's reported decomposition of demand deposits (i.e., checking and savings deposits) into business and retail demand deposits. We measure retail demand deposits as checking and savings deposit accounts "intended primarily for individuals for personal, household, or family use" from the Call Reports.[11] We measure business demand deposits as the difference between total demand deposits and retail demand deposits. We sum these demand deposit quantities across banks whose top-tier bank holding company is Wells Fargo & Company (WFC). Figure 5 shows the cumulative growth rate of Wells Fargo's demand deposits and its decomposition into business and retail demand deposits for the period from 2014 to the first quarter of 2023. Wells Fargo gave up business demand deposits during the pandemic while experiencing growth in retail demand deposits till the start of monetary tightening in early 2022.

Our second approach involves introducing a novel proxy for business deposits at the local level. Drawing on the urban economics literature, we define the central business district (CBD) for each metropolitan statistical area (MSA). Following the literature (e.g. Holian and Kahn (2012)), we collect the latitude and longitude output by Google's

[11] Such information is reported by selected large banks in their quarterly call reports since 2014 in Schedule RC-E Part I Memoranda items 6 & 7 of FFIEC 031 (or Schedule RC-E Memoranda items 6 & 7 of FFIEC 041).

Geocoding API when just the name of an MSA's primary city is input. The MSA's CBD is then defined as the area within a 1 kilometer radius of this central point (Conwell et al., 2023). As branches located in CBDs are most likely to cater to business clients, we can use deposits in these branches to proxy for business deposits.

We validate the measurement of business branches using CBD branches in several ways. Firstly, CBD branches are large branches – they account for 3% of branches but 20% of deposit amount. Main offices, where large corporate deposits are likely to be registered in the SOD data are likely to be CBD branches. Secondly, CBD branches are roughly twice as likely as average branches to report business deposit products in the RateWatch data. In what follows, we refer to the CBD branches and main offices collectively as "business branches" and the other branches as "retail branches".

Figure 6 shows that Wells Fargo gives up deposits in business branches since 2020 but keeps experiencing deposit growth in retail branches. The two approaches based on different information both paint a consistent picture to corroborate the notion that Wells Fargo gave up large uninsured deposits to stay under the asset cap when the overall banking sector experienced rapid growth.

3.B Asset-side Effects

As for the asset side of the balance sheet, we compare the growth of loans and securities, two major types of assets, of Wells Fargo versus the other three large banks in Figure 7. As can be seen from this figure, although Wells Fargo experienced lower growth for both types of assets, it is the growth of securities that is significantly slower compared to the other three large banks.

We also examine the evolution of Wells Fargo's geographic presence over this period in three key functions: deposit taking, small business lending, and mortgage lending. Data sources are the Community Reinvestment Act (CRA) data for small business lending, the Home Mortgage Disclosure Act (HMDA) data for mortgage lending, and the

FDIC Summary of Deposits (SOD) data for deposit-taking. For each function, we count the number of counties that Wells Fargo was present in each year and scale the number of counties to the level in 2017. Figure 8 shows how Wells Fargo's geographic presence evolved over time. We find that the geographic presence contracted for deposit-taking but stayed relatively constant for both small business and mortgage lending. Despite being constrained from asset growth, Wells Fargo was not forced to lend to fewer counties in either small business or mortgage lending, as high degrees of securitization and government support implies little balance sheet capacity is needed to make these loans (Buchak et al., 2024). Such a pattern is consistent with our previous analyses showing that Wells Fargo appeared to be more constrained in taking deposits than in making loans. Therefore, in subsequent analyses on the spillover effects to other banks, we focus on deposit funding as opposed to lending.

4 Reallocation of Uninsured Deposits due to the Asset Cap

Since Wells Fargo is forbidden from growing its balance sheet beyond a certain level, it is forced to reduce its provision of banking services relative to what it would have been without the asset cap. The results in the previous section point to the asset cap constraining the provision of uninsured deposits. In essence, the asset cap served as a *de facto* deposit cap.

We expect other banks to step in to fill the gap left by Wells Fargo. Motivated by prior literature that shows bank competition, including deposit competition, has a strong local component (e.g., Petersen and Rajan (1994); Berger and Udell (1995); Drechsler et al. (2017, 2021)), we expect banks more geographically proximate to Wells Fargo at the time of the regulation to be more active in filling the deposit gap than distant banks.

Given the gap left by Wells Fargo was concentrated among uninsured deposits, we expect that banks that are more geographically proximate to Wells Fargo grow their uninsured deposits faster than more distant banks following the asset cap.

As Wells Fargo gave up large, uninsured deposits, other banks face a stronger demand for their deposits, particularly from uninsured depositors. Consistent with this demand shift, we also expect banks that are more geographically proximate to Wells Fargo to pay lower interest on deposits than more distant banks following the asset cap. In the ensuing analysis, we test these predictions in the data.

4.A Measuring Pre-Asset Cap Proximity to Wells Fargo

We measure proximity to Wells Fargo using the geographic distribution of bank branches across granular local deposit markets. In each zip code, we check if Wells Fargo had a bank branch on February 1, 2018, the day before the asset cap came into effect. To do this, we start with Wells Fargo branches as of June 30, 2017 from the 2017 SOD data, and adjust for all branch openings, closings, and relocations between July 2017 and February 1, 2018 recorded in the FDIC branch change data.[12] We create a zip-code level indicator that equals 1 if the zip code contains a Wells Fargo branch in early February 2018 and 0 if the zip code has bank branches but not those of Wells Fargo. Figure 9 shows the distribution of this indicator across the United States. The map shows that Wells Fargo has a national presence, with particular strength in the Western and Southeastern United States.

Armed with this granular measure of pre-asset cap Wells Fargo presence, we compute the pre-asset cap bank-level proximity to Wells Fargo based on the following formula:

$$\text{Proximity}_b = \frac{\sum_z \text{Deposits}_{b,z} \times \text{WFC}_z}{\sum_z \text{Deposits}_{b,z}} \tag{1}$$

The proximity of bank b is the fraction of its deposits in 2017 ($\text{Deposits}_{b,z}$) that are in zip codes that also have a Wells Fargo branch in early February 2018 (WFC_z). In computing *Proximity* using (1), we exclude the deposits in the bank's main office in the calculation. This is because banks are allowed to allocate to the main office deposits that they

[12] All of our subsequent results stay virtually unchanged if we only rely on SOD data and use Wells Fargo presence as of June 30, 2017.

cannot categorize geographically. Hence, deposits in the main branch may not reflect the true deposits in that location.

4.B Sample and Summary Statistics

The asset cap on Wells Fargo is effective at the top-tier holding company level. In what follows, our sample of banks includes all banks whose regulatory high holder is not Wells Fargo & Company (collectively referred to as "non-Wells Fargo banks").

We report the summary statistics for bank size, pre-asset cap proximity to Wells Fargo, and deposit composition and pricing in the bank-quarter sample in Table 1. Size groups of banks are defined using nominal size thresholds following the regulatory practices of the Dodd-Frank Act: Community banks are banks with regulatory high holders' quarter-end assets not exceeding $10 billion; regional banks are defined as the banks with regulatory high holders' quarter-end assets above $10 billion but not exceeding $250 billion; and national banks are defined as banks with regulatory high holders' quarter-end assets above $250 billion.

Consistent with the skew in U.S. bank sizes, over 96% of banks are categorized as community banks while only 0.3% are national. The mean of the proximity measure is 0.247 but the median bank has a proximity measure of 0, indicating that none of its branches shared a zip code with a Wells Fargo branch just before the asset cap.

As a prelude to our difference-in-differences regression analysis, we first present descriptive evidence of the impact of the asset cap on banks geographically proximate to Wells Fargo. We divide non-Wells Fargo banks into two groups based on whether their pre-asset cap proximity to Wells Fargo is above or below the median. As median proximity is 0, the two groups correspond to banks with positive proximity (higher-proximity banks) and banks with zero proximity (lower-proximity banks) prior to the imposition of the asset cap.

Figure 10 compares the composition of deposit growth by retail and business branches,

based on the annual FDIC SOD data, for the two groups side by side. Overall, higher-proximity banks experience a more substantial cumulative deposit growth than lower-proximity banks, consistent with a larger role in filling the Wells Fargo gap. The composition of deposit growth also shows higher-proximity banks' active role in filling the gap in uninsured deposits: For higher-proximity banks, deposits in business branches grow faster than deposits in retail branches. The opposite is true for lower-proximity banks.

4.C Difference-in-Differences Analysis

To more formally test the relationship between proximity to Wells Fargo and bank outcomes, we conduct a quarterly analysis using the Call Reports. Our sample period starts from the first quarter of 2013 and runs through the first quarter of 2022. This period covers 20 quarters before the asset cap became effective (2013Q1 to 2017Q4) and 17 quarters after (2018Q1 to 2022Q1); thus, the analysis sample covers the period of substantial expansion experienced by US banks from 2020 to early 2022 (Figures 2 and 3). For this quarterly sample of non-Wells Fargo banks, we estimate the following model via OLS:

$$y_{b,t} = \mu_b + \pi_{s,t} + X'_{b,t-1}\Gamma + \beta_{post} \cdot (Proximity_b \times \mathbb{1}(Post)_t) + \varepsilon_{b,t} \tag{2}$$

The outcome variable is a characteristic of bank b at year-quarter t. $Proximity_b$ is bank b's overall proximity to Wells Fargo, calculated as the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. $\mathbb{1}(Post)_t$ is an indicator variable equal to 1 for the quarters since 2018Q1, the quarter when the asset cap was imposed on Wells Fargo.

In this specification, the independent variable of interest is the interaction term of $Proximity_b$ and $\mathbb{1}(Post)_t$. The omitted baseline period is the period of 2013 to 2017, the period prior to the imposition of the asset cap on Wells Fargo. β_{post} captures the response in the behaviors in the period after the imposition of the asset cap compared to the base-

line period.

$X_{b,t-1}$ is a vector of lagged bank-level characteristics serving as time-varying bank-level control variables. Bank fixed effects μ_b control for time-invariant bank-specific factors. Time fixed effects $\pi_{s,t}$ neutralize the impact of aggregate dynamics and all other time-series fluctuations.

Acharya et al. (2023) show that banks of different size groups experience different uninsured deposit growth, potentially due to the liquidity coverage ratio (LCR), applicable to large banks but not the rest. To fully control for this and other time-varying bank regulation based on nominal size thresholds (Alvero et al., 2022), we include a separate set of time fixed effects for each nominal size group (hence the subscript s).

By comparing changes in the behaviors across banks with varying degrees of pre-determined proximity to Wells Fargo, our empirical approach can be described as a difference-in-differences (DID) design with continuous treatment intensity. We cluster standard errors by bank.

Identification relies on the assumption that banks with varying degrees of pre-determined geographic proximity to Wells Fargo were not differentially exposed to unobserved shocks that are correlated with proximity to Wells Fargo and coincided with the asset cap, conditional on the fixed effects and control variables. This identifying assumption does not require random assignment for proximity to Wells Fargo, nor does it require that banks have similar characteristics in levels. Rather, what we rely on is the "parallel trends assumption", i.e., outcomes for banks with different proximity to Wells Fargo would have trended similarly absent the asset cap. An example of a potential threat to identification would be that local demand for banking services in markets served by Wells Fargo was different during the pandemic than in markets not served by Wells Fargo for reasons unrelated to the asset cap. In later analysis, we validate the plausibility of this assumption in several ways.

We first show the results from our difference-in-differences model in Table Table 2.

In Column (1), the outcome variable is the growth rate of the fraction of uninsured deposits in total deposits, multiplied by 100 to yield a percentage point interpretation. After the asset cap was imposed on Wells Fargo, higher-proximity banks grew their uninsured deposits significantly faster than lower-proximity banks. The coefficient of 0.164 implies that a one standard deviation increase in proximity is associated with a 0.059 percentage point, or 2% of the sample standard deviation, additional growth in uninsured deposits. In Column (2), we examine the impact on the growth rate of uninsured leverage (Jiang et al., 2020, 2023), multiplied by 100 to yield a percentage point interpretation. The estimates show that the growth of uninsured leverage exhibits a similar pattern as that of the fraction of uninsured deposits in total deposits in Column (1).

In Columns (3) and (4), we examine the impact of the asset cap on deposit pricing. We use the deposit spread, i.e., the difference between the Fed funds rate and the deposit interest expense rate, as it comprehensively reflects the opportunity cost of holding deposits for both insured and uninsured depositors. In Column (3), the outcome variable is the change in overall deposit spread in basis points. We find that higher-proximity banks are able to charge higher deposit spreads than lower-proximity banks after the enactment of the asset cap on Wells Fargo. The coefficient estimate on the interaction between proximity and the post indicator suggests that a one standard deviation increase in proximity is associated with a 0.11 basis point additional increase in deposit spread. In Column (4), the outcome variable is the change in domestic deposit spread in basis points. We obtain similar coefficient estimates as in Column (3).

Our estimates suggest that the asset cap on Wells Fargo appears to shift the demand for uninsured deposits for banks geographically proximate to Wells Fargo rather than their supply of uninsured deposits. This follows from the fact that prices (deposit spreads) and quantities (uninsured deposit growth) move in the same direction. By contrast, a shift in supply would lead prices and quantities to move in opposite directions. As Wells Fargo actively reduced its uninsured deposits after being subject to the asset cap, the demand for

proximate banks' uninsured deposits went up, leading to uninsured deposit growth and higher deposit spreads. Supply-based factors such as improvement in bank investment opportunities or the deposits channel of monetary policy (Drechsler et al., 2017) do not explain our findings.

4.D Branch-level Analyses to Address Threats to Identification

To address the concern that our estimates may be driven by unobserved factors local to the banking markets that Wells Fargo serves, we utilize branch deposit data from the FDIC Summary of Deposits (SOD). The SOD data is at an annual frequency, and data is as of June 30 each year. In this analysis using the SOD data, our sample period covers the 10 years from 2013 to 2022, with 5 years before the asset cap (2013 to 2017) and 5 years after (2018 to 2022). Hence, it closely aligns with the sample period of our quarterly call report sample and covers the period of substantial expansion experienced by US banks from 2020 to early 2022 (Figures 2 and 3).

We undertake a standard difference-in-differences analysis at the level of the bank branch to test if bank branches proximate to Wells Fargo branches experience higher deposit growth following the imposition of the asset cap. We use OLS to estimate the following linear model at the branch-year level:

$$y_{i,b,z,t} = \mu_{bz} + \pi_{bct} + \beta \cdot (Treat_z \times Post_t) + \varepsilon_{i,z,b,t} \tag{3}$$

The outcome variable is the growth rate of deposits at branch i owned by bank b located in zip code z from year $t-1$ to year t. The independent variable of interest, $Treat_z \times Post_t$, is the interaction of two indicator variables. $Treat_z$ takes the value 1 if zip code z has a Wells Fargo branch in early February 2018, and 0 otherwise. $Post_t$ takes the value 1 if year t is 2018 or later. Bank$\times$Zip fixed effects account for any time-invariant local economic factor that is correlated with the presence of bank b in zip code z. In our

tightest specification, we include Bank×County×Year fixed effects. This specification not only accounts for any time-varying local economic factors at the county level, it also accounts for time-varying bank activity at the county level. Our empirical model compares outcomes for two branches belonging to the *same* bank operating in the *same* county in the *same* year. We cluster standard errors by zip code since our treatment is at that level.

Table 3 Panel (A) reports the estimates from equation (3) in Column (1). It shows that branches directly competing with Wells Fargo saw higher deposit growth than other branches of the same bank. In Column (2), we additionally control for time-varying zip-code level economic indicators and obtain similar results. The coefficient implies a higher deposit growth of about 0.4%, which is substantial given the sample mean deposit growth of 10% and the sample standard deviation of 22%. In Columns (3) to (6), we repeat the analysis for subsamples based on bank size. As before, we distinguish community and regional banks (banks with total assets below $250 billion) from national banks (banks with total assets at least $250 billion). Similar to the previous bank-level results, we find that the deposit reallocation effects are driven by smaller banks.

If the effect of the Wells Fargo asset cap is stronger for uninsured deposits, we expect the results to be stronger for those regions encompassing central business districts. We split our sample into CBD and non-CBD counties where the former includes all counties that have part or whole of a CBD within them. Table 3 Panel (B) reports the estimates for these two sub-samples. In CBD counties, the deposit growth for other banks, when they overlap with Wells Fargo, is stronger than in the baseline. In non-CBD counties, the effect is substantially smaller in magnitude, and statistically insignificant.

Table 3 Panel (C) reports the estimates when we exclude certain areas from our analyses. In Columns (1) and (2), we repeat the analyses by excluding bank branches located in the Silicon Valley area.[13] The estimates remain virtually unchanged, implying that our

[13]Specifically, we exclude bank branches in the two MSAs containing San Francisco and San Jose–the San Francisco-Oakland-Berkeley, CA or the San Francisco-Oakland-Hayward, CA MSA, and the San Jose-Sunnyvale-Santa Clara, CA MSA–from the analyses.

results are not merely driven by the tech sector or the idiosyncratic features of Silicon Valley Bank. In Columns (3) and (4), we exclude bank branches located in New York City and find that the estimates become stronger. This could be due to the fact that large banks are over-represented in bank branches in New York City than elsewhere. As we show in Table 3, the observed higher deposit growth among bank branches proximate to Wells Fargo branches is primarily driven by smaller banks.

5 Funding Fragility due to the Asset Cap

So far, we document that geographic proximity to Wells Fargo led some banks to absorb uninsured deposits Wells Fargo could not due to the asset cap. The increased reliance on uninsured deposit funding makes the proximate banks vulnerable to potentially substantial deposit outflow once monetary tightening commences. In this section, we examine the rising fragility due to the asset cap stemming from the deposit reallocation.

5.A Evidence from Stock Returns

We examine the relationship between pre-asset cap proximity to Wells Fargo and stock returns during the bank stress of 2023 for publicly traded banks and bank holding companies. Following Benmelech et al. (2023), we consider two distinct phases: (i) March 8 to March 14, corresponding to the Silicon Valley Bank (SVB) failure; and (ii) April 28 to May 2, corresponding to the First Republic (FRC) failure.

Figure 11 presents visual evidence of the relationship between proximity and cumulative returns during the week of SVB failure in panel (A) and during the week of FRC failure in panel (B). In both phases, banks more proximate to Wells Fargo had more negative cumulative returns, reflecting higher stress.

Table 4 reports regression results. The dependent variable is cumulative log returns during the SVB and FRC failures. The independent variable of interest is pre-asset cap proximity to Wells Fargo as defined in 1. In columns (1) and (3), we report results from

specifications without any control variables. In columns (2) and (4), we include controls for bank size (*log assets*), deposit funding ratio (*deposits/assets*), the fraction of uninsured deposits in total deposits. These control variables are measured as of end-2022. We also control for bank branch density, defined as number of branches per deposits in billions of $, as Benmelech et al. (2023) find that banks with low branch density had lower returns during the stress periods we study. This variable is defined as of June 30, 2022. In all specifications, we add a fixed effect for the size quintile of publicly traded banks that each bank belongs to.

Across specifications, we find evidence of a statistically significant negative relationship between cumulative stock returns. The economic magnitude is also substantial. The coefficient in column (2) implies that a one standard deviation increase in pre-asset cap proximity would have led a bank to have a 1.12% lower cumulative return over the week surrounding the SVB failure. For the FRC failure, the corresponding magnitude is lower at 0.66%. In sum, these results indicate that banks more proximate to Wells Fargo experienced heightened stress during the regional bank crisis of 2023. We next turn our attention to explaining these lower stock returns for proximate banks.

5.B Unconditional Deposit Inflow-Outflow Cycle

What explains the worse stock returns experienced by banks geographically proximate to Wells Fargo during the regional bank crisis? One possibility is that as these banks absorb uninsured deposits Wells Fargo could not due to the asset cap, they are vulnerable to potentially substantial deposit outflows once monetary tightening commences. We extend the quarterly call report sample to 2023Q1 to examine the deposit inflow-outflow cycle.

Figure 12 compares the cumulative growth of the fraction of uninsured deposits in total deposits among higher- versus lower-proximity banks. For each bank, we normalize the fraction of uninsured deposits to the 2017:Q4 level and then average the normal-

ized fraction across banks in the groups of higher- and lower-proximity banks separately. The figure shows that the share of uninsured deposits increased for both groups till the Fed started monetary tightening in early 2022. The effect is particularly stark during the COVID-19 pandemic, consistent with the larger increase in aggregate uninsured deposits during the same period in Figure 3. The difference between the two groups, however, was minimal before the asset cap on Wells Fargo was enacted, suggesting they were on parallel trends. After the asset cap was imposed on Wells Fargo, the two groups still behaved similarly in the unconditional comparison for approximately two years. Once the COVID-19 pandemic started in 2020:Q1, the two groups started to diverge – higher-proximity banks experienced a faster increase in the share of uninsured deposits than lower-proximity banks. Such a pattern is consistent with our earlier findings using business branches to proxy for large corporate deposits. Since the Fed's monetary tightening in early 2022, the growth in uninsured deposits appeared to come to a stop, before turning negative during the regional bank crisis in March 2023. During the run, higher-proximity banks experienced a greater outflow of uninsured deposits than lower-proximity banks.

5.C Dynamic Difference-in-Differences Analysis

To more formally test for the subsequent outflow of flighty uninsured deposits among banks geographically proximate to Wells Fargo during monetary tightening, we augment equation (2) to study both the expansion and contraction phases in the quarterly call report sample extended to 2023Q1:

$$y_{b,t} = \mu_b + \pi_{s,t} + X'_{b,t-1}\Gamma + \beta_{pre} \cdot (Proximity_b \times \mathbb{1}(Pre)_t) + \sum_T \beta_{post,T} \cdot (Proximity_b \times \mathbb{1}_{t,T}) + \varepsilon_{b,t} \tag{4}$$

In this augmented specification, $\mathbb{1}(Pre)_t$ is an indicator variable equal to 1 for the four quarters in 2017, the year before the asset cap was imposed on Wells Fargo. The sub-period indicators $\mathbb{1}_{t,T}$ for $g \in \{1, 2, \ldots, 4\}$ indicate the four sub-periods since the asset

cap was imposed in the first quarter of 2018: the first sub-period is the first two years of the asset cap and includes a total of 8 quarters in 2018 and 2019; the second sub-period corresponds to the COVID-19 pandemic and includes a total of 9 quarters from 2020 to the first quarter of 2022; the third sub-period denotes the monetary tightening in 2022 and includes the 3 quarters from 2022Q2 to 2022Q4; and the fourth and last sub-period contains 2023Q1 and corresponds to the regional bank crisis in 2023.

In this dynamic specification, the independent variables of interest are the interaction terms of $Proximity_b$ and the time-period indicators. The omitted baseline period is the period of 2013 to 2016, up to two years prior to the imposition of the asset cap on Wells Fargo. $\beta_{post,T}$ captures the response in the behaviors in the sub-period T after the imposition of the asset cap compared to the baseline period. β_{pre} measures the response in the behaviors in the year before the imposition of the asset cap relative to the baseline period.

Table 5 shows the relationship between the proximity to Wells Fargo and deposit composition and pricing in the extended bank-quarter sample. Column (1) shows that the growth of uninsured deposits did not differ significantly between higher- and lower-proximity banks in the four quarters before the asset cap, validating the parallel trends assumption. The parallel pre-trends suggest that any reputation damage that Wells Fargo may have experienced as a result of the cross-selling scandal in 2016 did not materially lead to a reallocation of deposits before the asset cap was imposed in 2018. In the first two years after the asset cap was put in place, higher-proximity banks started to grow their uninsured deposits significantly faster than lower-proximity banks. A one standard deviation increase in proximity is associated with a 0.051 percentage point, or 2% of the sample standard deviation, additional growth in uninsured deposits. The difference in uninsured deposit growth widened during the COVID-19 pandemic to a 0.083 percentage point (3% of the sample standard deviation) additional growth in uninsured deposits for a one standard deviation increase in proximity. As the Fed started to tighten monetary policy in 2022, higher-proximity banks saw a larger uninsured deposit outflow than

lower-proximity banks. The coefficient estimate implies that a one standard deviation increase in proximity is associated with a 0.055 percentage point (2% of the sample standard deviation) additional decrease in uninsured deposits during the first three quarters of the monetary tightening. The outflow was exacerbated during the first quarter of 2023, when the failure of SVB triggered a wider run in the banking sector. During the turmoil, a one standard deviation increase in proximity is associated with a 0.484 percentage point (17% of the sample standard deviation) additional outflow of uninsured deposits. In Column (2), the estimates show that the growth of uninsured leverage exhibits a similar pattern as that of the fraction of uninsured deposits in total deposits in Column (1).

In Column (3), we find that higher-proximity banks are able to charge higher overall deposit spreads than lower-proximity banks after the enactment of the asset cap on Wells Fargo, particularly during the COVID-19 pandemic when the overall banking sector experienced a large inflow of deposits. The coefficient estimate on the interaction between proximity and the pandemic suggests that a one standard deviation increase in proximity is associated with a 0.619 basis point (2% of the sample standard deviation) additional increase in deposit spread during the pandemic period. As the Fed started to tighten monetary policy in 2022, higher-proximity banks experienced a more rapid decrease in the deposit spread they charged for their deposits than lower-proximity banks. A standard deviation increase in proximity is associated with a 1.58 basis point (5% of the sample standard deviation) additional decrease in the deposit spread during the first three quarters of the monetary tightening. This pricing gap further widened during the regional bank crisis of 2023 to a 2.19 basis point (6% of the sample standard deviation) additional decrease in the deposit spread for a one standard deviation increase in proximity. We obtain similar coefficient estimates for the change in domestic deposit spread in Column (4) as in Column (3). In summary, the augmented analysis implies that once monetary policy tightening commenced, the demand for proximate banks' uninsured deposits subsided as aggregate deposits contracted, leading to uninsured deposit outflows

and lower deposit spreads.

Table 6 shows the relationship between proximity to Wells Fargo and the deposit inflow-outflow cycle by bank size. Columns (1) to (3) report the relationship the proximity to Wells Fargo and the growth rate of the fraction of uninsured deposits in total deposits in three sub-samples: community banks, defined as the banks with quarter-end assets not exceeding $10 billion; regional banks, defined as the banks with quarter-end assets above $10 billion but not exceeding $250 billion; and national banks, defined as banks with quarter-end assets above $250 billion.

Column (1) indicates that, among the sample of community banks, high-proximity banks see a significant increase in uninsured deposit funding during the first two years of the asset cap as well as the pandemic relative to low-proximity banks. During the monetary tightening, the difference is insignificant but during the first quarter of 2023, high-proximity community banks did experience higher outflows. Column (2) shows that, among regional banks, the effect of proximity only becomes significant during the pandemic period. However, the magnitude of the effect is larger than among community banks. During the monetary tightening and run period, high-proximity banks experience significantly larger outflows. For the small sample of national banks (Column (3)), the results are only significant during the run period.

Columns (4) to (6) show the analysis of deposit pricing for the respective samples of community, regional, and national banks. Effect magnitudes are largest for regional banks. Among community banks, the results have strong statistical significance.

6 Additional Robustness Results

6.A Other Bank Outcomes

Table 7 reports the estimates for alternative measures of deposit composition and pricing. In Columns (1) and (2), we examine the impact on the growth rate of insured deposits and uninsured deposits. These estimates show that the dynamic shifts in the funding mix

documented in the previous table are indeed driven by the substantial increase since the asset cap and the subsequent reversal in uninsured deposits at higher-proximity banks, as opposed to mere composition changes. In Columns (3) and (4), we further examine the impact on the number and size of deposit accounts. Banks proximate to Wells Fargo started to gain depositors after the asset cap on Wells Fargo. The average balance per depositor in these banks did not respond significantly during the first two years of the asset cap, but increased during the pandemic. Since the monetary tightening in 2022, the average balance per depositor reversed its trend and started to decrease in these banks. Such a decrease was more pronounced during the regional bank crisis of 2023.

For deposit pricing, we consider two additional measures in Columns (5) and (6) The call report also contains information on the fee income from service charges on domestic deposits, which allows us to measure the full spread a bank charges on these deposits inclusive of fees. Column (5) reports the estimates for this fuller measure of deposit spread. The estimates remain consistent after we take into account the service charges in our measure of deposit spread. Lastly, in Column (6), we examine the change in foreign deposit spread as the outcome variable in the smaller sample of banks with foreign deposits. The evolution of foreign deposit pricing does not seem to be correlated with the proximity to Wells Fargo.

Did banks proximate to Wells Fargo change the asset side of their balance sheets as they experienced demand shifts of deposits? Table 8 shows the relationship between asset composition and the proximity to Wells Fargo in the sample of all non-Wells Fargo banks.

6.B Falsification Tests

Using the SOD data, we perform two falsification tests to further address concerns about spurious correlations between proximity to Wells Fargo branches and other covariates of deposit growth.

In the first test, we test for whether proximity to large banks in general can qualify as an explanation for our findings. Specifically, we assume each of the 25 largest bank holding companies was treated[14], i.e., subject to the "asset cap" and examine whether other banks' branches close to the fictitiously treated large bank grows deposits faster than other branches of the same banks in the same county in the same year using equation (3). By construction, branches close to these fictitiously treated large banks are similarly proximate to large banks as branches close to Wells Fargo, and their deposit growth provide a useful reference for the impact of being proximate to large banks in general. The results from this falsification test are presented in Figure 13: The coefficient on the DID variable is plotted on the x-axis, and the corresponding t-statistic is plotted on the y-axis. The size of the bubble indicates the relative size of the treated bank. In the figure, we also mark the four large bank holding companies–JP Morgan ("JPM"), Bank of America ("BAC"), Wells Fargo ("WFC"), and Citigroup ("C"). The graph shows that only when Wells Fargo is the treated bank is the t-statistic above 1.96 (5% significance). In particular, Wells Fargo's estimated spill-over effect is substantially different from those of other three of the Big-4 of American banking. This falsification test rules out the proximity to large banks in general as the alternative explanation for our findings.

In the second test, treatment is randomly assigned to zip codes with the total number of treated zip codes being 4,319 (the number of zip codes with Wells Fargo presence in early February 2018). 500 such random permutations of treated zip codes are created and the baseline analysis is conducted on each of these permutations. A histogram of the resulting DID coefficent is plotted in Figure 14. The dashed red line indicates the coefficient with the actual Wells Fargo-treated zip codes. The estimated increase in deposit growth in Wells Fargo zip codes, 0.4214 percentage points (Column 1, Table 3) is larger than all but one of the bootstrapped coefficients in the 500 iterations. In other words, this boot-

[14]For this test, we set a condition that each bank exists for the entirety of the sample period. This restriction leads to the exclusion of Suntrust, which merged with BB&T in 2019. The resulting bank, Truist, took BB&T's bank identifiers.

strap test rejects the hypothesis that the observed deposit growth response could simply be random.

7 Discussion

7.A Aggregate Implications of the Asset Cap

To quantify the aggregate implications of the asset cap, we perform simple back-of-the-envelope calculations to estimate the total deposit gap left by Wells Fargo and how much was absorbed by proximate banks.

In Table 9, we compare the magnitude of deposits that Wells Fargo could not acquire due to the asset cap with that of the additional deposits that banks with positive proximity to Wells Fargo took. We use the growth rate of the entire commercial banking sector as a counterfactual growth rate. Building on our earlier findings, we trace through four distinct periods: first 2 years of the asset cap (2018–2019), COVID-19 pandemic (2020–2022Q1), monetary tightening in 2022 (2022Q2–2022Q4), and the crisis period (2023Q1). For Wells Fargo, the deposit gap equals the counterfactual deposit amount minus the actual deposit amount in each period. For banks with positive proximity to Wells Fargo, the deposit excess equals the actual deposit amount minus the counterfactual deposit amount in each period. We also calculate the cumulative gap and excess over the periods. Based on this stylized calculation, Wells Fargo's deposit growth rate fell behind the overall banking sector in the first 2 years of the asset cap and the difference widened during the COVID-19 pandemic. During the same periods, the deposit growth rate of banks with positive proximity to Wells Fargo outpaced the sector-wide growth rate. By 2022Q1, Wells Fargo's deposit gap amounted to 414.19 billion, while positive-proximity banks jointly enjoyed a deposit excess of 477.30 billion. During the monetary tightening in 2022, Wells Fargo experienced faster deposit outflow than the banking sector as a whole, resulting in its deposit gap widening to 448.21 billion by the end of 2022 (relative to a deposit excess of 465.49 billion for positive-proximity banks). During the run period in

2023Q1, Wells Fargo experienced a slower deposit outflow than the overall banking sector, while positive-proximity banks experienced faster deposit outflows than the banking sector.

Table 10 repeats the analysis for uninsured deposits. By 2022Q1, Wells Fargo's uninsured deposit gap amounted to 231.25 billion, while banks with positive proximity to Wells Fargo jointly enjoyed an uninsured deposit excess of 235.99 billion. Despite the simplicity of this aggregate analysis, the magnitudes line up well, indicating that the deposits that could not find a home at Wells Fargo stayed withing the commercial banking sector rather than migrating outside.

7.B Policy Implications

The asset cap is a regulation targeting an institution rather than an activity (Farhi and Tirole, 2020). But because it binds, it *de facto* regulates an activity; in this case, the provision of uninsured deposits. The policy is akin to imposing different marginal tax rates on the same activity across different institutions (Greenwood et al., 2017), creating a distortion. It may be ex-ante unclear *which* activity will suffer the distortion. However, given the key role of deposits on the bank's balance sheet and the relative ease of adjusting uninsured deposits, this was perhaps not that difficult to guess ex-ante.

Our results also have implications for the oversight of smaller banks. The failure of SVB presents an example of overlooked fragility due to more relaxed regulation faced by non-systemically important banks (non-SIBs). Despite being the 16^{th} largest bank in the US prior to its abrupt failure in March 2023, SVB was not subject to the Liquidity Coverage Ratio (LCR) rule (Davies, 2023). Feldberg (2023) analyzes SVB's public financial information and concludes that its LCR would have been 75% in 2022 if it were subject to the rule, substantially below the minimum threshold of 100%. Our results show that flighty uninsured deposits accumulate at smaller banks due to the gap left by Wells Fargo.

More broadly, size-based bank regulation has the capacity to create constraints on

large banks, particularly during periods of growth. This, in turn, leads to a reallocation to smaller banks who grow faster and take on risks that later metastasize (Gelman et al., 2023). This tension at the heart of size-based bank regulations only promises to grow more relevant as policymakers contemplate actions similar to the Wells Fargo asset cap in the future.[15]

8 Conclusion

The Wells Fargo asset cap is a unique regulatory experiment – a hard constraint on the size of a TBTF institution. In this paper, we provide the first systematic analysis of the cap's impact on Wells Fargo and its competitors. Following the cap's imposition, Wells Fargo contracted geographically, and experienced sluggish deposit growth relative to its peers. Deposits, particularly uninsured deposits, were redistributed to banks geographically proximate to Wells Fargo. In turn, these banks experienced higher deposit outflows once monetary tightening commenced, and had lower equity returns during the regional bank crisis of 2023.

While we do not undertake a complete welfare analysis of the asset cap, our results point to several dimensions along which the asset cap's influence can be measured. On the one hand, our aggregate results indicate that the Wells Fargo deposit "gap" was filled within the banking system itself. This is, perhaps, the reason we do not uncover much impact on the lending side. On the other hand, the banks that filled the gap were not Wells Fargo's peers but smaller, less regulated banks. Given that the deposit mix was weighted towards uninsured deposits, this allowed fragility to accumulate in places with potentially less oversight. With asset caps having the potential to be part of the regulatory toolkit going forward, our results point to the key role that bank geographic structure still plays in the transmission of the effects of regulatory action.

As for the current tale, the Wells Fargo asset cap remains in place as of this writing.

[15] A recent example is the OCC forbidding Citigroup from undertaking acquisitions starting in October 2020.

An interesting avenue for future research would be the reaction of Wells Fargo and its competitors once the cap is lifted. Will there be a sharp increase in Wells Fargo's growth, at the expense of its proximate banks, or is the business it lost gone for good? The answer to this question will provide the epilogue to this tale.

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Figure 1: **Asset Growth of Top 4 Bank Holding Companies**

This figure compares the asset growth of the top 4 U.S. bank holding companies– JP Morgan, Bank of America, Citigroup, and Wells Fargo. We normalized the total assets of the 4 bank holding companies to their respective levels in 2017:Q4. The vertical line indicates 2017:Q4.

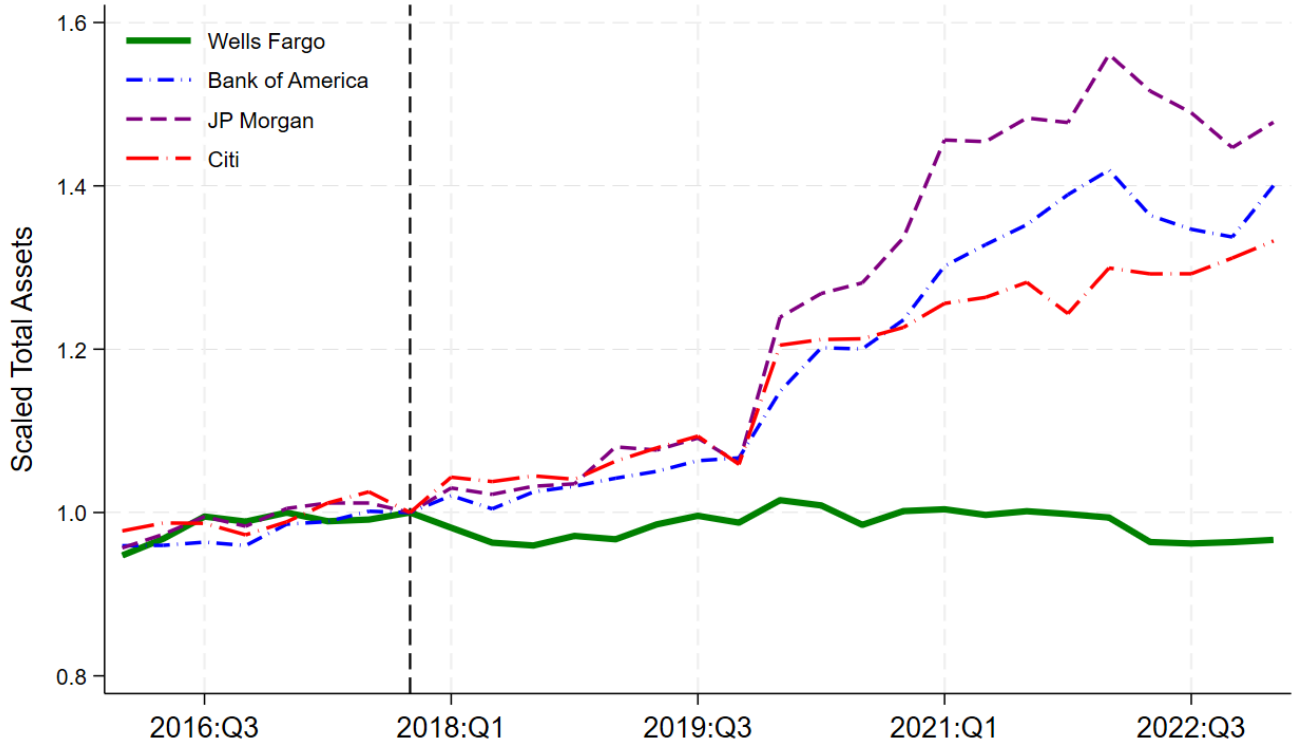


Figure 2: **Weekly Evolution of Federal Funds Rate and Aggregate Deposits in 2013–2023:Q1**

This figure shows the weekly evolution of the federal funds effective rate (left axis) and aggregate deposits of the commercial bank sector (in billions of USD, right axis). The weekly data for the federal funds effective rate is from Fed Board Release H.15 "Selected Interest Rates" and downloaded from FRED (series name: FF). The weekly data for aggregate deposits of the commercial bank sector is from Fed Board Release H.8 "Assets and Liabilities of Commercial Banks in the United States" and downloaded from FRED (series name: DPSACBW027SBOG). The three vertical lines indicate the time when the Fed lowered the interest rate at the onset of the COVID-19 pandemic in mid March 2020, when the Fed started raising interest rate in March 2022, and when the regional bank crisis unfolded in March 2023.

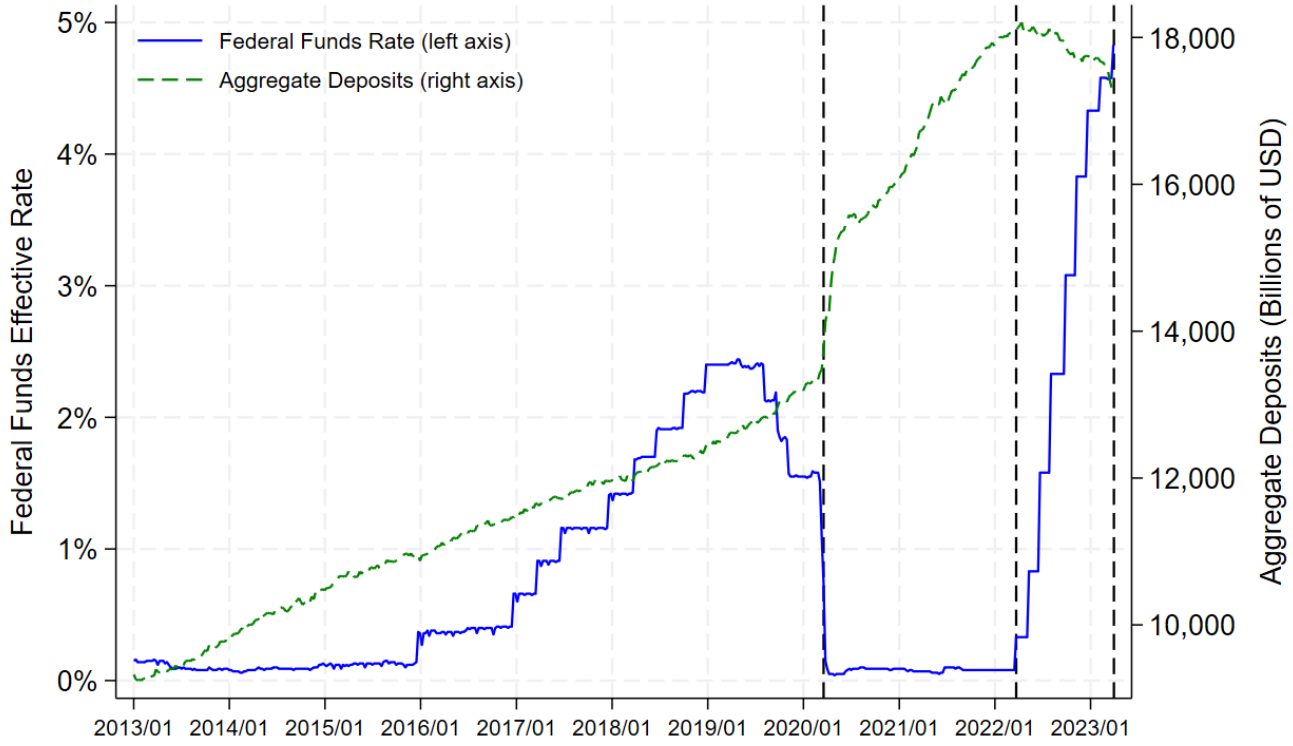


Figure 3: **Quarterly Evolution of Federal Funds Rate and Aggregate Insured versus Uninsured Deposits in 2013–2023:Q1**

This figure shows the quarterly evolution of the federal funds effective rate (left axis) and aggregate insured and uninsured deposits of the commercial bank sector (normalized to their respective levels in 2017:Q4, right axis). For the federal funds effective rate, we download the daily federal funds effective rate from Fed Board Release H.15 "Selected Interest Rates" (FRED series name: DFF) and take its average within a quarter to be the quarterly federal funds effective rate. We calculate insured and uninsured deposits based on the deposit insurance limits using the call report data (details in Section 2.D) and sum across all filing banks to obtain the aggregate insured and uninsured deposits for the overall banking sector. We normalized the aggregate insured and uninsured deposits to their respective levels in 2017:Q4. The three vertical lines indicate 2020:Q1 (when the Fed lowered the interest rate at the onset of the COVID-19 pandemic), 2022:Q1 (when the Fed started raising interest rate), and 2023:Q1 (when the regional bank crisis unfolded).

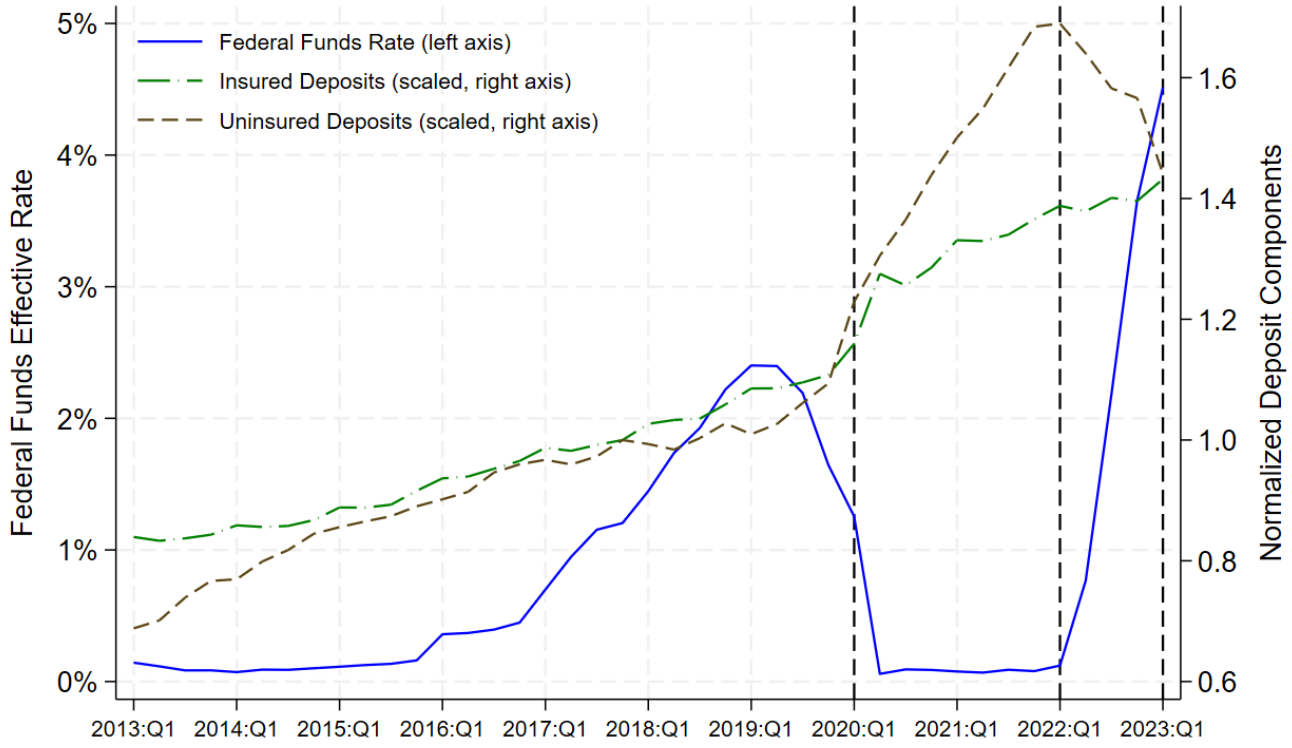


Figure 4: **Deposit Growth of Top 4 Bank Holding Companies**

This figure compares the deposit growth of the top 4 U.S. bank holding companies– JP Morgan, Bank of America, Citigroup, and Wells Fargo. We normalized the total deposits of the 4 bank holding companies to their respective levels in 2017:Q4. The vertical line indicates 2017:Q4.

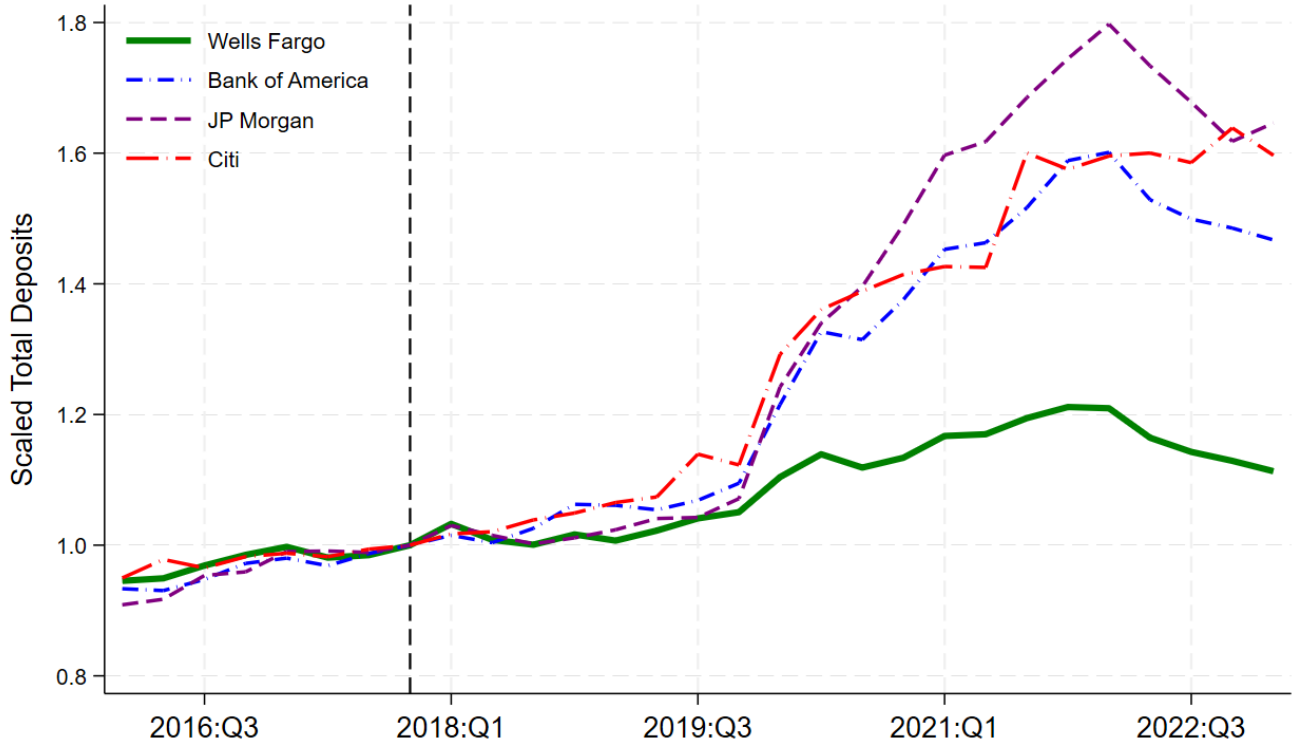


Figure 5: **Deposit Growth of Wells Fargo by Business and Retail Demand Deposits**

This figure shows the average growth of Wells Fargo's demand deposits and its decomposition into business and retail depositors. The decomposition is obtained from Schedule RC-E Part I Memoranda items 6 & 7, available since 2014, in quarterly call reports. As the asset cap is imposed on the top-tier holding company level, we sum the demand deposit quantities across banks whose top-tier bank holding company is Wells Fargo & Company (WFC). We normalized total demand deposits, retail demand deposits, and business demand deposits to their respective levels in 2017:Q4. The vertical line indicates 2017:Q4.

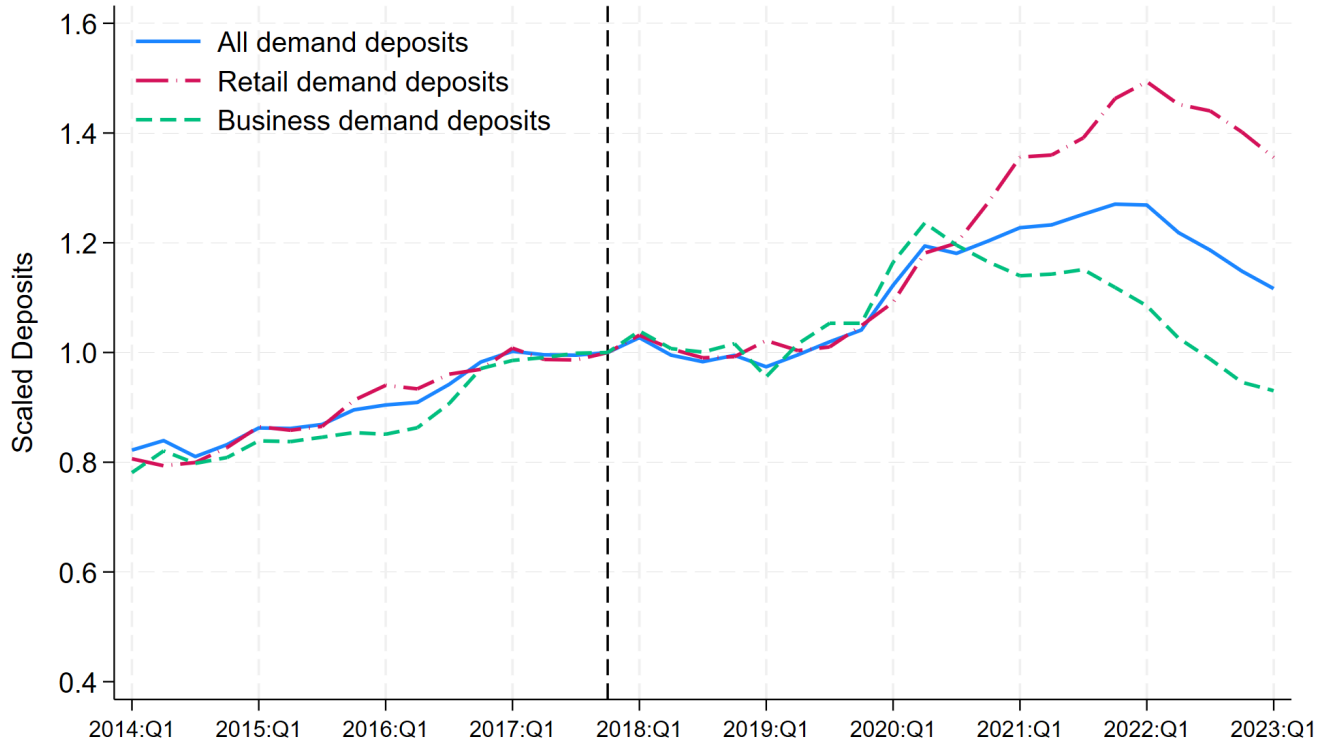


Figure 6: **Deposit Growth of Wells Fargo by Business and Retail Branches**

This figure shows the average deposit growth of Wells Fargo branches by location. We consider branches located in central business districts (CBDs) and the main office collectively as business branches, and branches located in other places collectively as retail branches. Following Holian and Kahn (2012), we define CBD centers as the pairs of latitude and longitude coordinates corresponding to MSA primary cities from Google's Geocoding API. We define CBD branches as those branches located within 1km distance from the nearest CBD centers (Conwell et al., 2023).

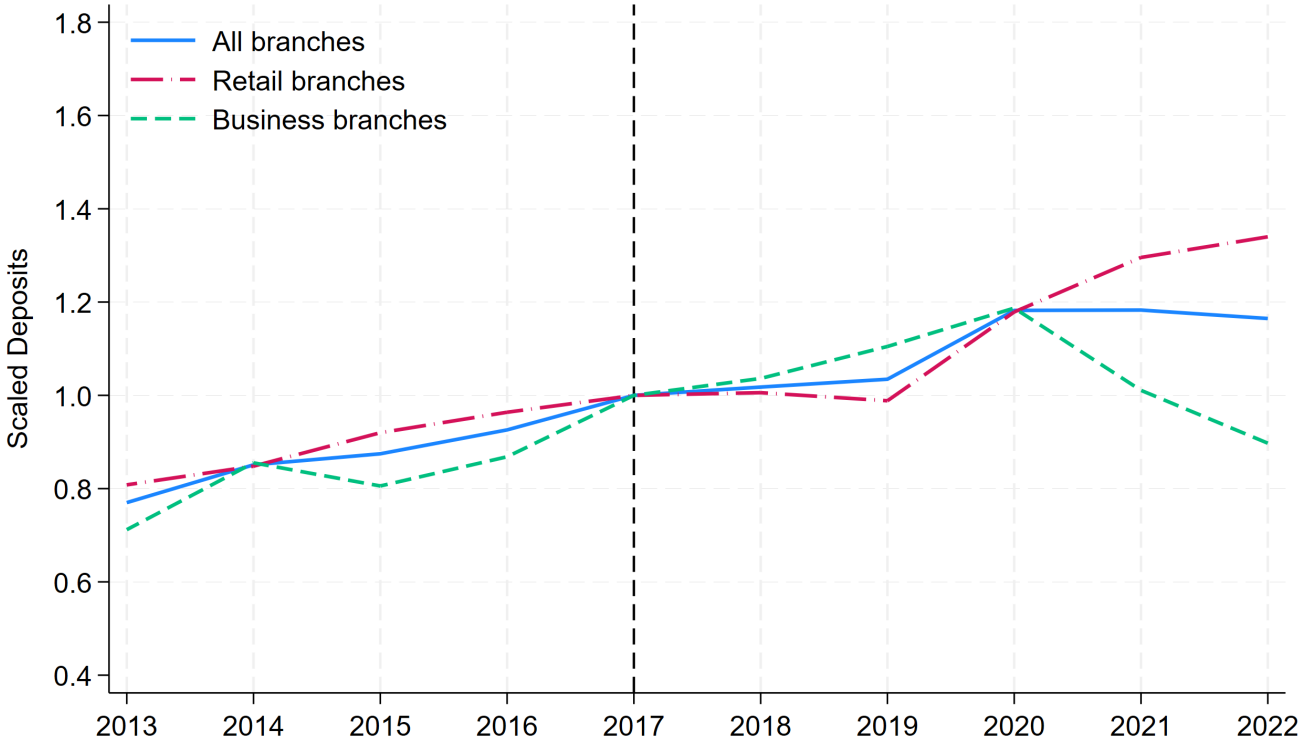
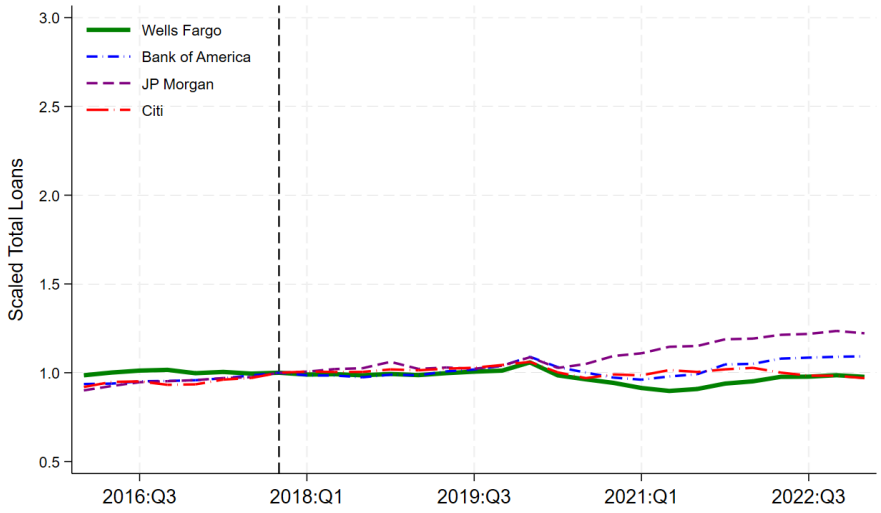


Figure 7: **Growth of Loans versus Securities of Top 4 Bank Holding Companies**

This figure compares the loan growth of the top 4 U.S. bank holding companies– JP Morgan, Bank of America, Citigroup, and Wells Fargo in Panel (A) and the growth of securities holding in Panel (B). We normalize the total loans and total securities holding of the 4 bank holding companies to their respective levels in 2017:Q4. The vertical line indicates 2017:Q4.

(A) Total loans



(B) Total securities

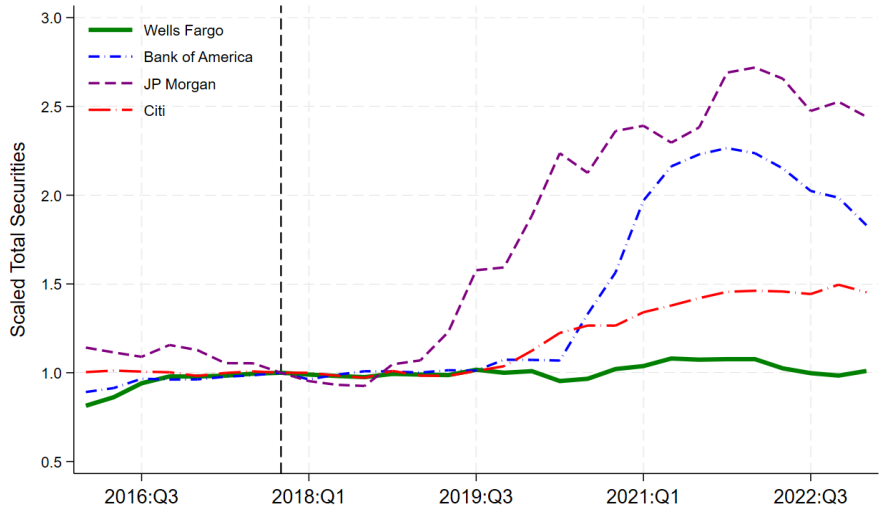


Figure 8: **Wells Fargo's Geographic Presence in Key Functions**

This figure shows the evolution of Wells Fargo's geographic presence in three key functions: deposit taking, small business lending, and mortgage lending. Data sources are the Community Reinvestment Act (CRA) data for small business lending, the Home Mortgage Disclosure Act (HMDA) data for mortgage lending, and the FDIC Summary of Deposits (SOD) data for deposit taking. For each function, we count the number of counties that Wells Fargo was present in each year and scale the number of counties to the level in 2017. The vertical line indicates 2017.

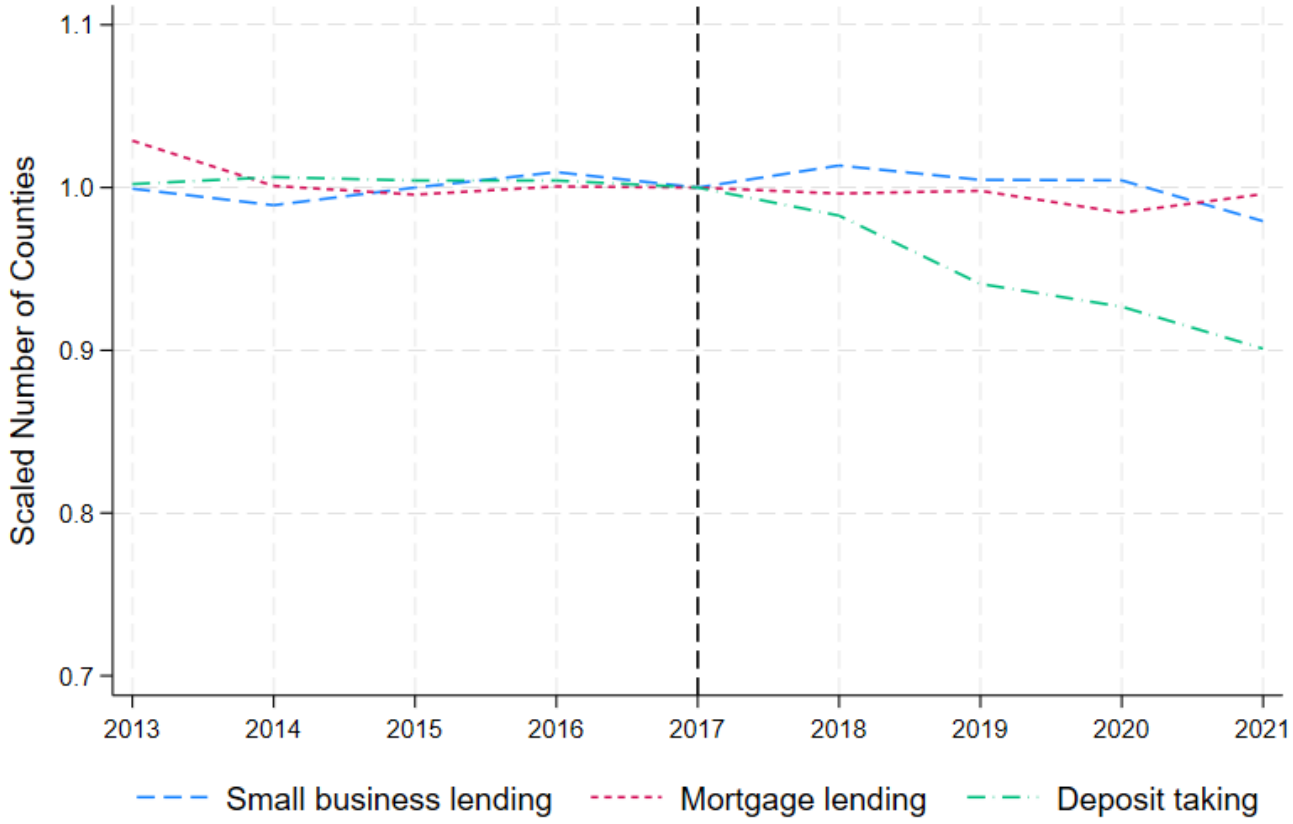


Figure 9: **Distribution of Zip Codes with Wells Fargo Presence prior to the Asset Cap**

This map shows the distribution of Wells Fargo and Company (WFC) bank branches across U.S. zip codes on February 2, 2018. We categorize zip codes as those with (i) at least one WFC branch ('treated'); (ii) zero WFC branches but with branches of other banks ('control'); and (iii) zero bank branches.

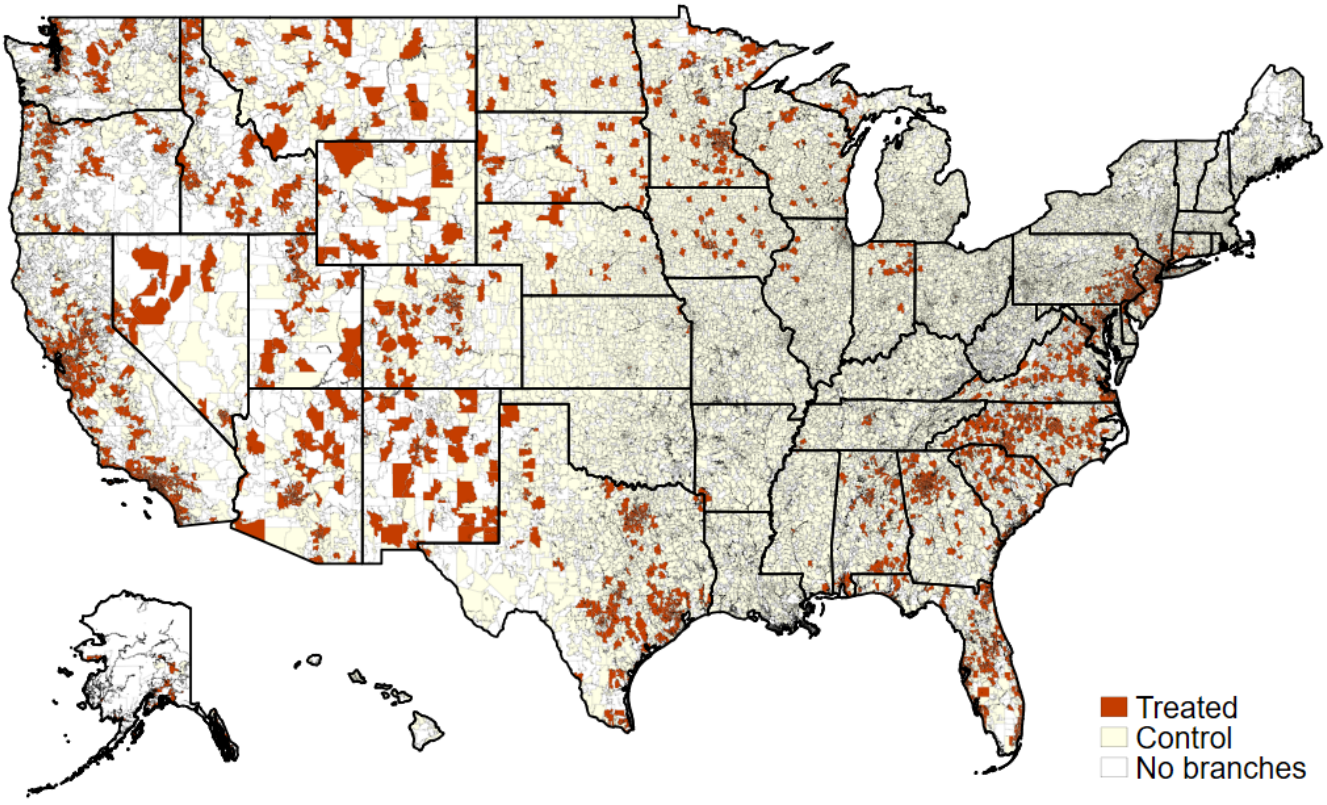
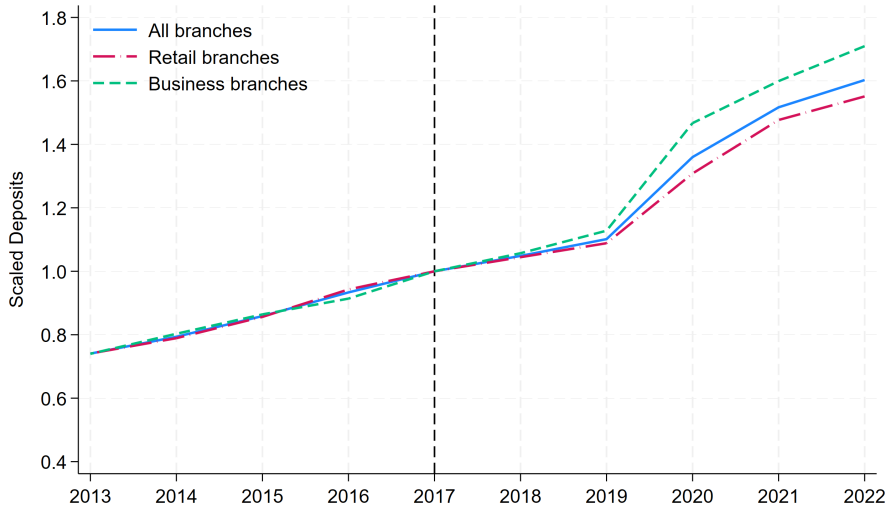


Figure 10: **Deposit Growth of non-Wells Fargo Banks by Business and Retail Branches**

This figure shows the average deposit growth of non-Wells Fargo bank branches by location. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. We separately analyze the deposit growth for higher-proximity banks in Panel (A) and lower-proximity banks in Panel (B). We consider branches located in central business districts (CBDs) and the main office collectively as business branches, and branches located in other places collectively as retail branches. Following Holian and Kahn (2012), we define CBD centers as the pairs of latitude and longitude coordinates corresponding to MSA primary cities from Google's Geocoding API. We define CBD branches as those branches located within 1km distance from the nearest CBD centers (Conwell et al., 2023).

(A) Higher-proximity banks



(B) Lower-proximity banks

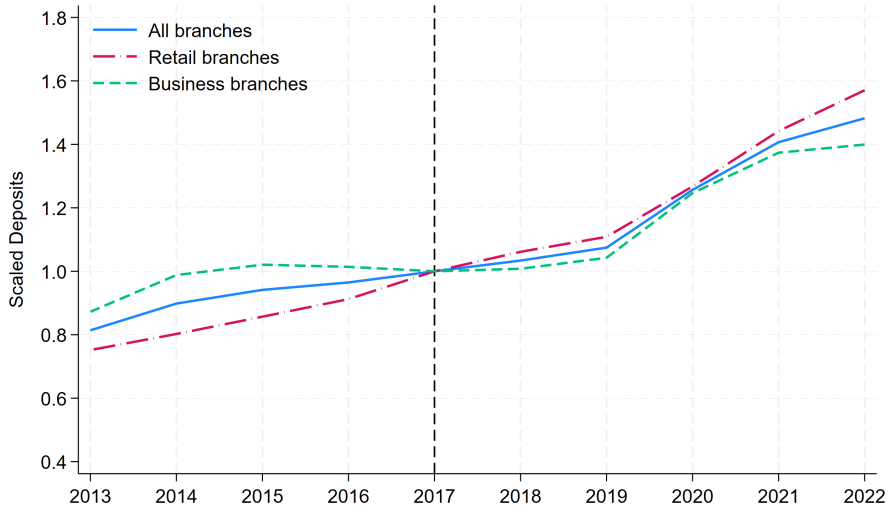
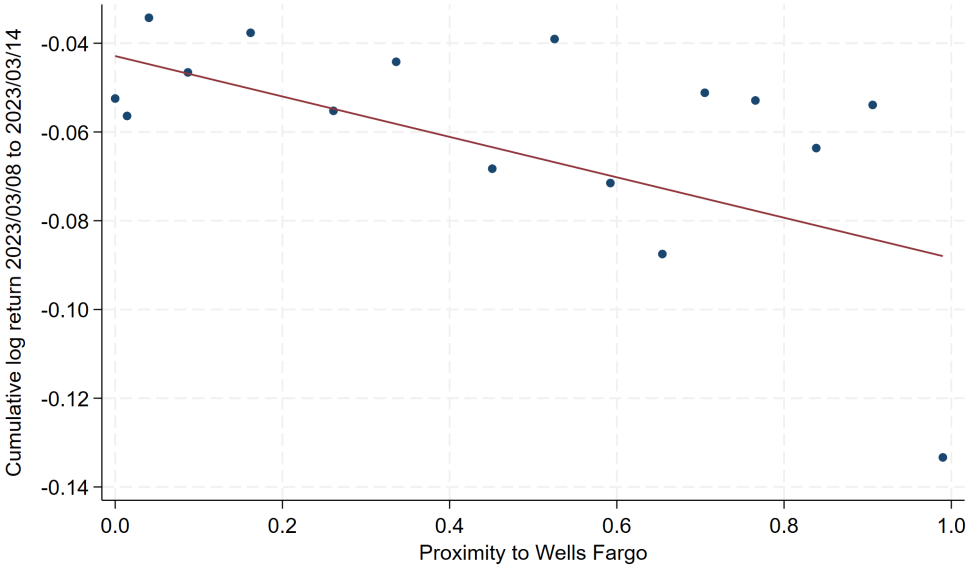


Figure 11: **Proximity to Wells Fargo and Stock Returns during Runs**

This figure uses a binscatter plot to depict the relationship between pre-asset cap proximity to Wells Fargo and the stock returns during the 2023 regional bank crisis. Following Benmelech et al. (2023), we consider two distinct phases: (A) March 8 to March 14, corresponding to the Silicon Valley Bank (SVB) failure; and (B) April 28 to May 2, corresponding to the First Republic (FRC) failure. Data on returns is from CRSP. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. To obtain a comprehensive list of publicly traded bank holding companies and banks, we start with the CRSP-FRB link available from the Federal Reserve Bank of New York. We merge this set with the list of banks obtained using the methodology of Gandhi and Lustig (2015). We include all banks that appear on both lists. For banks appearing on only one of the lists, we manually confirm that it is a commercial bank or bank holding company.

(A) Silicon Valley Bank (SVB) Failure



(B) First Republic Bank (FRC) Failure

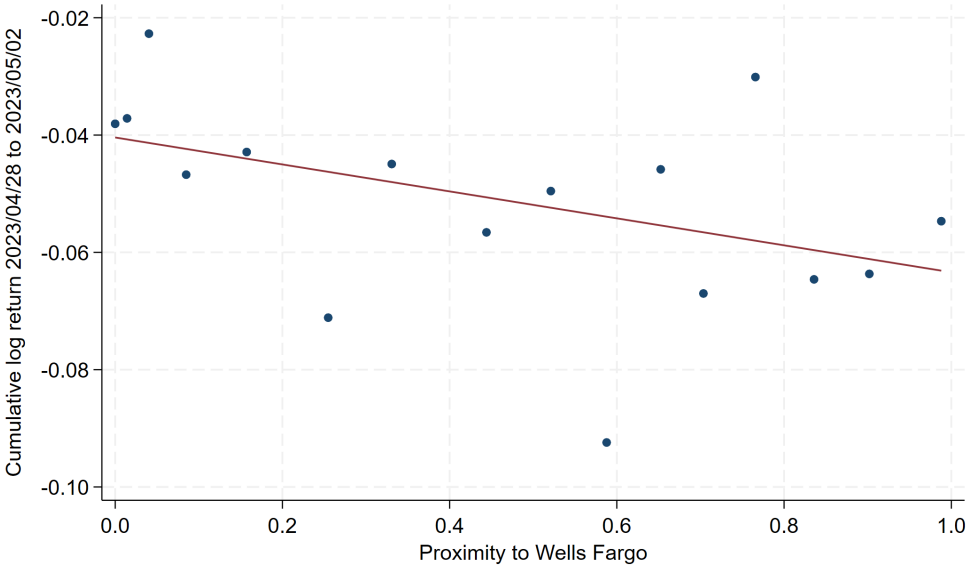


Figure 12: **Cumulative Uninsured Deposit Growth by Proximity to Wells Fargo**

This figure compares the quarterly evolution of the fraction of uninsured deposits in total deposits among higher- versus lower-proximity banks. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. We calculate insured and uninsured deposits based on the deposit insurance limits using the call report data (details in Section 2.D). For each bank, we normalize the fraction of uninsured deposits in total deposits to the level in 2017:Q4 to show cumulative growth. We average the normalized fraction across banks in the groups of higher- and lower-proximity banks separately.

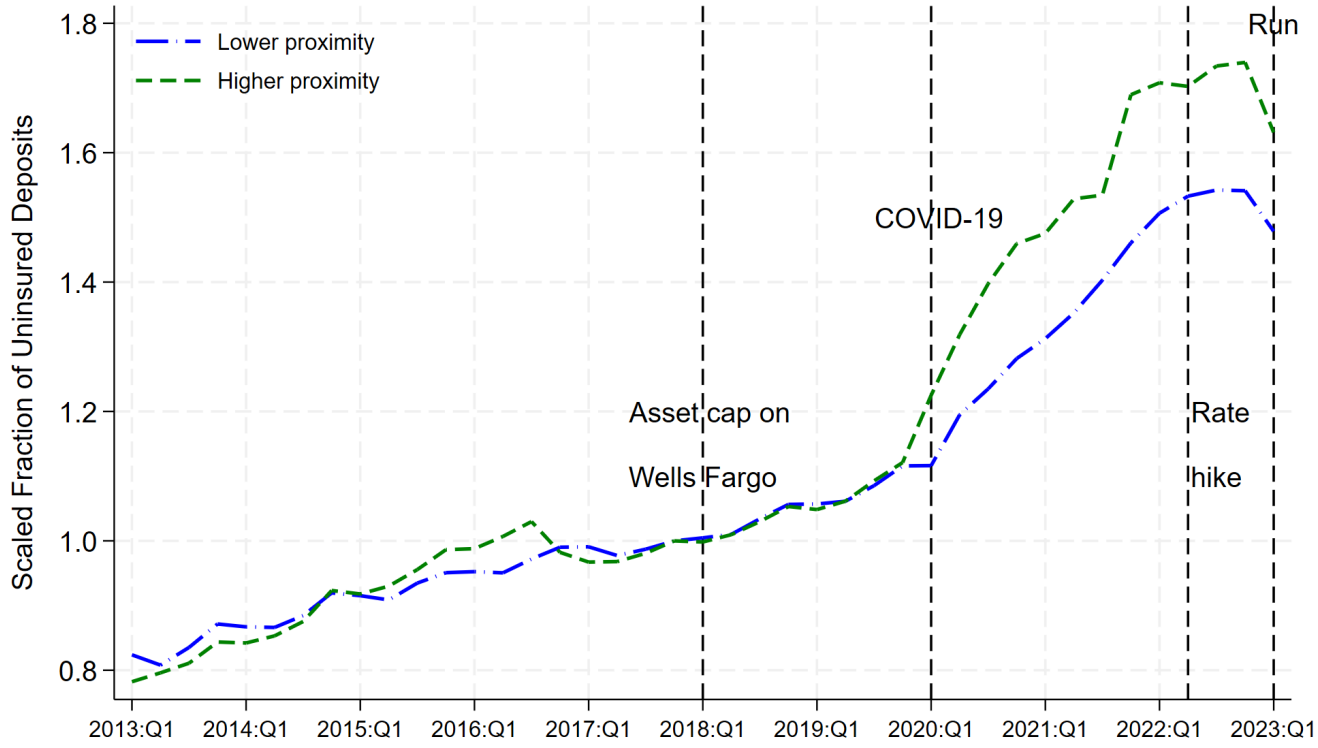


Figure 13: **Falsification Test for Proximity to Large Banks**

This figure shows the results from the falsification test for proximity to large banks in general. We repeat the baseline zip-code level deposits analysis with each of the 25 largest bank holding companies being separately treated as the bank subject to the "asset cap". The coefficient on the DID variable is plotted on the x-axis, and the corresponding t-statistic is plotted on the y-axis. The size of the bubble indicates the relative size of the treated bank. The graph shows that only when Wells Fargo is the treated bank is the t-statistic above 1.96 (5% significance).

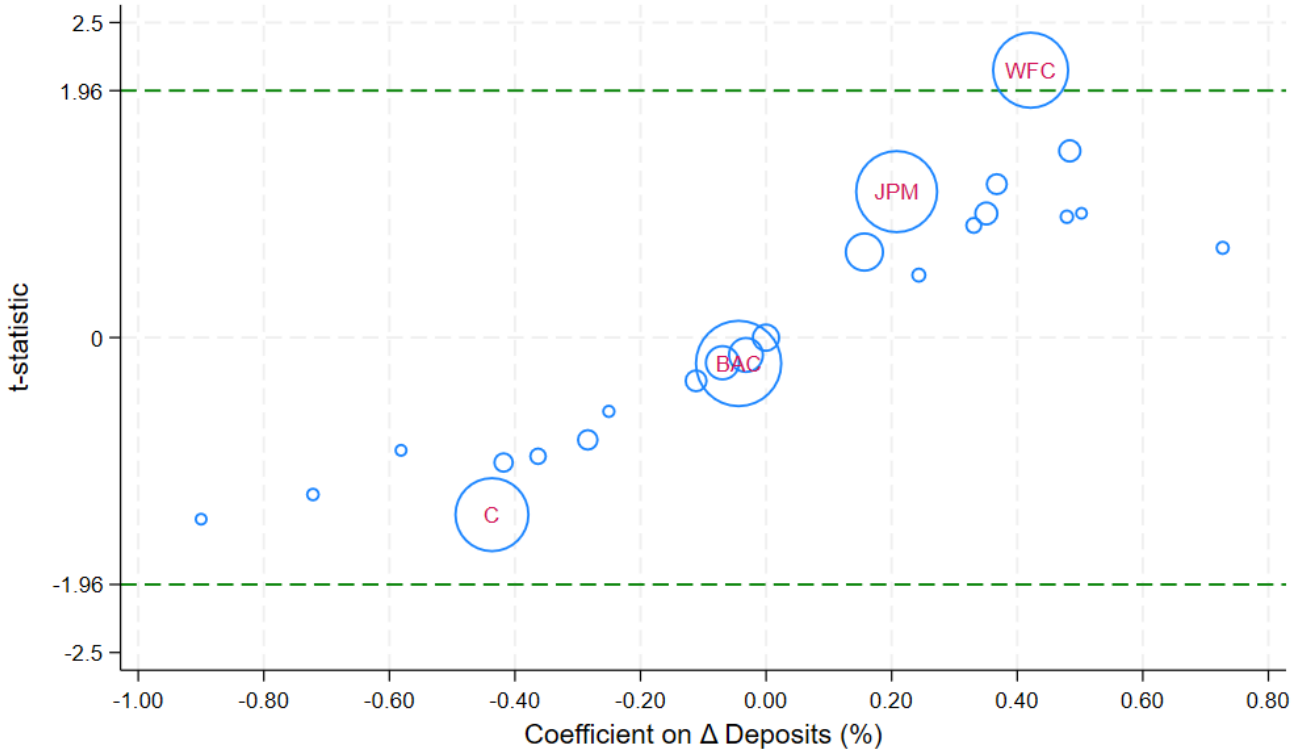


Figure 14: **Falsification Test for Random Assignment of Treatment**

This figure shows the results from the falsification test for random assignment of treatment. In the second test, treatment is randomly assigned to zip codes with the total number of treated zip codes being 4,319 (the number of treated zip codes in the baseline result). 500 such random permutations of treated zip codes are created and the baseline analysis is conducted on each of these permutations. A histogram of the resulting DID coefficient is plotted here. The dashed red line indicates the coefficient with the Wells Fargo-treated zip codes.

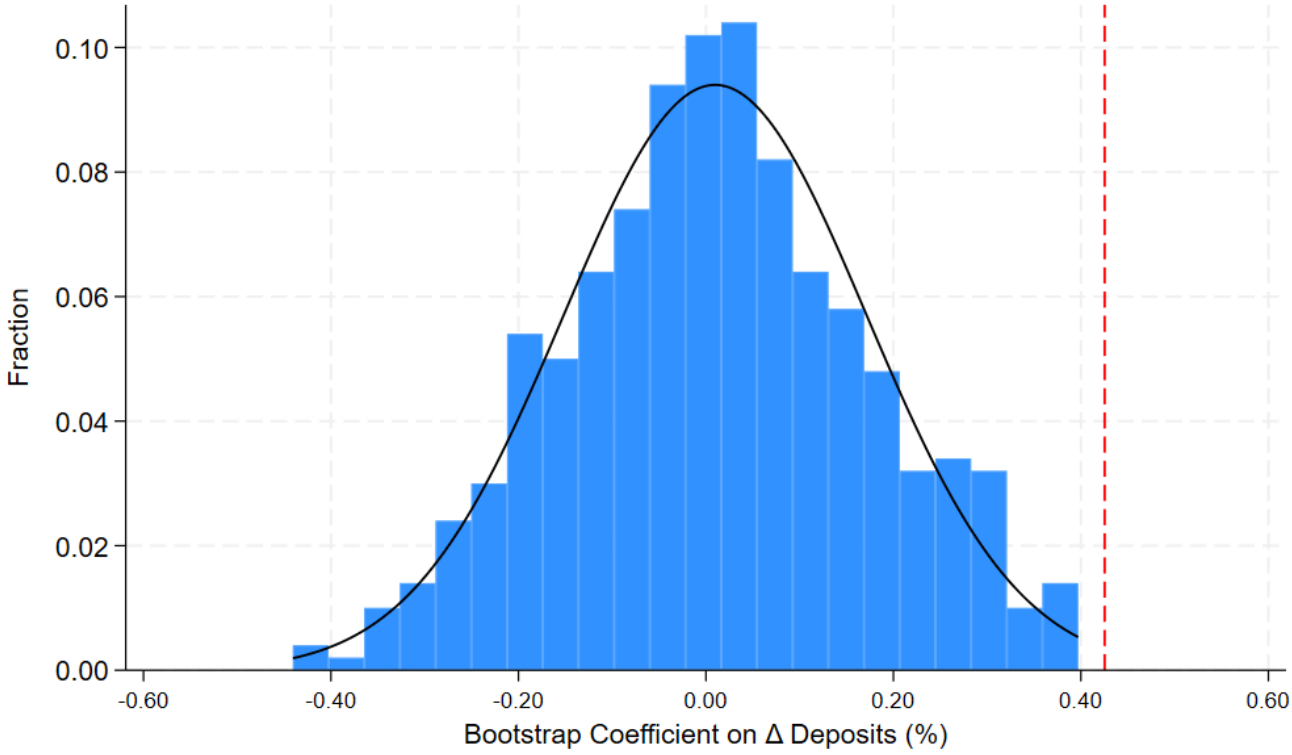


Table 1: **Summary Statistics**

This table reports the summary statistics for bank size, treatment intensity, and deposit composition and pricing. The sample includes all non-Wells Fargo banks in the call report data for the period from 2013 to 2023:Q1. Size groups of banks are defined using nominal size thresholds following the regulatory practices of the Dodd-Frank Act: Community banks are banks with quarter-end assets not exceeding $10 billion; regional banks are defined as the banks with quarter-end assets above $10 billion but not exceeding $250 billion; and national banks are defined as banks with quarter-end assets above $250 billion.

(A) Characteristics of non-Wells Fargo banks prior to the Asset Cap

	Mean	Std. Dev.	25%	50%	75%
Size distribution:					
Total Assets (millions of USD)	3,199.271	49,148.392	141.629	278.058	626.252
Size group:					
$\mathbb{1}$(community bank)	0.965	0.183	1.000	1.000	1.000
$\mathbb{1}$(regional bank)	0.033	0.177	0.000	0.000	0.000
$\mathbb{1}$(national bank)	0.002	0.048	0.000	0.000	0.000
Treatment intensity:					
Proximity to Wells Fargo	0.250	0.364	0.000	0.000	0.506
Deposit composition and pricing:					
Uninsured deposit fraction	0.213	0.122	0.129	0.189	0.274
Uninsured leverage	0.222	0.112	0.142	0.204	0.282
Insured deposits (millions of USD)	1,287.817	16,019.208	98.878	183.466	394.749
Uninsured deposits (millions of USD)	989.004	16,276.581	17.286	43.944	122.828
Number of depositors (millions)	98.676	1,525.038	5.497	10.413	22.317
Average balance per depositor (thousands of USD)	29.800	57.389	15.903	20.202	28.170
Overall deposit spread (b.p.)	60.980	29.863	43.310	65.293	82.568
Domestic deposit spread (b.p.)	60.984	29.877	43.307	65.409	82.568
Domestic deposit spread incl. fees (b.p.)	85.621	52.262	60.608	87.013	110.398
Foreign deposit spread (b.p.)	56.995	64.196	24.792	75.893	92.467
Number of banks	4,367				

(B) Characteristics of bank-quarter observations (2013–2022Q1)

	Mean	Std. Dev.	25%	50%	75%
Deposit composition and pricing (changes):					
Δ Uninsured deposit fraction (%)	0.294	2.802	-0.920	0.204	1.441
Δ Uninsured leverage (%)	0.228	2.674	-0.959	0.165	1.378
Δ Insured deposits (%)	1.585	6.371	-0.816	0.773	2.686
Δ Uninsured deposits (%)	5.128	20.625	-5.359	2.744	12.338
Δ Number of depositors (%)	0.620	7.626	-0.683	0.018	0.867
Δ Average balance per depositor (%)	1.616	7.348	-1.122	1.063	3.667
Δ Overall deposit spread (b.p.)	1.363	23.435	-0.186	3.326	11.949
Δ Domestic deposit spread (b.p.)	1.363	23.118	-0.186	3.326	11.952
Δ Domestic deposit spread incl. fees (b.p.)	0.912	24.819	-1.093	3.536	12.261
Δ Foreign deposit spread (b.p.)	1.154	29.830	-1.598	1.384	6.892
Number of bank $\times$ quarter obs. (2013–2022Q1)	154,629				

Table 2: **Proximity to Wells Fargo and Deposit Reallocation**

This table shows the relationship between the proximity to Wells Fargo and deposit composition and pricing in the sample of all non-Wells Fargo banks. The data are at the bank-quarterly level from 2013Q1 to 2022Q1. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. In the dynamic specification, we include a set of interactions of proximity and indicators that correspond to periods before and after the enactment of the asset cap on Wells Fargo. Bank fixed effects, size-group specific year-quarter fixed effects, and time-varying bank size control are included and denoted at the bottom. Standard errors are clustered at the bank level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Deposit quantity		Deposit pricing	
	(1) Δ Uninsured deposit fraction (%)	(2) Δ Uninsured leverage (%)	(3) Δ Overall deposit spread (b.p.)	(4) Δ Domestic deposit spread (b.p.)
Proximity to Wells Fargo × Post Asset Cap	0.164***	0.205***	0.310***	0.310***
	(0.033)	(0.033)	(0.113)	(0.113)
Bank chars.	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Size Group × Year-Quarter FE	Yes	Yes	Yes	Yes
R^2	0.0308	0.0361	0.850	0.874
Observations	154,629	154,629	154,606	154,603

Table 3: **Proximity to Wells Fargo and Branch-Level Deposit Growth**

This table shows the relationship between the proximity to Wells Fargo and branch-level deposit growth in the sample of all non-Wells Fargo bank branches. The data are at the annual frequency from 2013 to 2022. *Post* is an indicator variable equal to 1 for 2018 and all subsequent years. *Treat* is the zip-code level treatment indicator that equals to 1 if Wells Fargo operated at least one branch at the zip code in early February 2018 and 0 otherwise. The included fixed effects and control variables are denoted at the bottom. Standard errors are clustered at the zip-code level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

(A) Branch-Level Deposit Growth by Bank Size

	Δ Deposits (%)					
	All banks		Excluding national banks		National banks	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × Post	0.4253**	0.4215**	0.4177*	0.4232*	0.2405	0.2225
	(0.1980)	(0.1978)	(0.2513)	(0.2514)	(0.3135)	(0.3127)
Bank × Zip FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank × County × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Zip controls	No	Yes	No	Yes	No	Yes
R^2	0.425	0.426	0.454	0.454	0.345	0.344
Observations	652,083	651,882	490,107	489,925	161,976	161,957

(B) Branch-Level Deposit Growth in CBD and Non-CBD Counties

	Δ Deposits (%)			
	CBD Counties		Non-CBD Counties	
	(1)	(2)	(3)	(4)
Treat × Post	0.5248**	0.5237**	0.1751	0.1699
	(0.2366)	(0.2363)	(0.3498)	(0.3499)
Bank × Zip FE	Yes	Yes	Yes	Yes
Bank × County × Year FE	Yes	Yes	Yes	Yes
Zip controls	No	Yes	No	Yes
R^2	0.405	0.405	0.467	0.467
Observations	378,752	378,667	273,331	273,215

(C) Branch-Level Deposit Growth Excluding Certain Areas

	Δ Deposits (%)			
	Excluding Silicon Valley		Excluding New York City	
	(1)	(2)	(3)	(4)
Treat × Post	0.4099**	0.4058**	0.6488***	0.6459***
	(0.1998)	(0.1996)	(0.2105)	(0.2103)
Bank × Zip FE	Yes	Yes	Yes	Yes
Bank × County × Year FE	Yes	Yes	Yes	Yes
Zip controls	No	Yes	No	Yes
R^2	0.426	0.426	0.430	0.430
Observations	642,215	642,014	609,421	609,228

Table 4: **Proximity to Wells Fargo and Stock Returns during Runs**

This table shows the relationship between the pre-asset cap proximity to Wells Fargo and the stock returns during the 2023 regional bank crisis. Following Benmelech et al. (2023), we consider two distinct phases: (A) March 8 to March 14, corresponding to the Silicon Valley Bank (SVB) failure; and (B) April 28 to May 2, corresponding to the First Republic (FRC) failure. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. All specifications include fixed effects for the size quintile, among traded banks, the bank belongs to. In even-numbered columns, we have controls including the log of assets, the ratio of deposits to assets, the ratio of insured to uninsured deposits and bank branch density, defined as the ratio of bank branches to deposits (in billions). To obtain a comprehensive list of publicly traded bank holding companies and banks, we start with the CRSP-FRB link available from the Federal Reserve Bank of New York. We merge this set with the list of banks obtained using the methodology of Gandhi and Lustig (2015). We include all banks that appear on both lists. For banks appearing on only one of the lists, we manually confirm that it is a commercial bank or bank holding company. We report robust standard standard errors and use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Cumulative Log Returns			
	SVB Failure		FRC Failure	
	(1)	(2)	(3)	(4)
Proximity to Wells Fargo	-0.0421**	-0.0309**	-0.0243***	-0.0181**
	(0.0179)	(0.0137)	(0.0084)	(0.0084)
Deposits/Assets		0.0771		-0.0616
		(0.1614)		(0.0521)
% Uninsured Deposits		-0.0528		-0.0518*
		(0.0716)		(0.0304)
Bank Branch Density		0.0008		0.0002
		(0.0013)		(0.0006)
Log Assets		0.0078		0.0045
		(0.0100)		(0.0058)
Size Quintile FE	Yes	Yes	Yes	Yes
R^2	0.0926	0.108	0.0525	0.0733
Observations	316	314	314	312

Table 5: **Proximity to Wells Fargo and Deposit Inflow-Outflow Cycle**

This table shows the relationship between the proximity to Wells Fargo and deposit composition and pricing in the sample of all non-Wells Fargo banks. The data are at the bank-quarterly level from 2013Q1 to 2023Q1. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. In the dynamic specification, we include a set of interactions of proximity and indicators that correspond to periods before and after the enactment of the asset cap on Wells Fargo. Bank fixed effects, size-group specific year-quarter fixed effects, and time-varying bank size control are included and denoted at the bottom. Standard errors are clustered at the bank level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Deposit quantity		Deposit pricing	
	(1) Δ Uninsured deposit fraction (%)	(2) Δ Uninsured leverage (%)	(3) Δ Overall deposit spread (b.p.)	(4) Δ Domestic deposit spread (b.p.)
Proximity to Wells Fargo				
× 1 year before asset cap	0.053	0.066	0.212	0.216
	(0.049)	(0.051)	(0.156)	(0.155)
× First 2 years of asset cap	0.141***	0.150***	0.047	0.034
	(0.039)	(0.038)	(0.171)	(0.171)
× COVID-19 pandemic	0.230***	0.297***	1.715***	1.708***
	(0.049)	(0.049)	(0.279)	(0.275)
× Monetary tightening in 2022	-0.152*	-0.219***	-4.376***	-4.382***
	(0.084)	(0.083)	(0.823)	(0.825)
× Crisis in 2023Q1	-1.342***	-0.688***	-6.077***	-5.418***
	(0.222)	(0.199)	(1.519)	(1.315)
Bank chars.	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Size Group × Year-Quarter FE	Yes	Yes	Yes	Yes
R^2	0.0389	0.0393	0.910	0.921
Observations	169,002	169,002	168,976	168,973

Table 6: **Proximity to Wells Fargo and Deposit Inflow-Outflow Cycle by Bank Size**

This table shows the relationship between other measures of uninsured deposit growth and the proximity to Wells Fargo in the sample of all non-Wells Fargo banks. The data are at the bank-quarterly level from 2013Q1 to 2023Q1. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. In the dynamic specification, we include a set of interactions of proximity and indicators that correspond to periods before and after the enactment of the asset cap on Wells Fargo. The sample of banks used in each regression is also denoted at the bottom. Bank fixed effects, size-group specific year-quarter fixed effects, and time-varying bank size control are included and denoted at the bottom. Standard errors are clustered at the bank level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Δ Uninsured deposit fraction (%)			Δ Overall deposit spread (b.p.)		
	(1)	(2)	(3)	(4)	(5)	(6)
Proximity to Wells Fargo						
× 1 year before asset cap	0.065	-0.118	0.645	0.187	0.246	-1.978
	(0.050)	(0.287)	(1.414)	(0.155)	(1.162)	(6.404)
× First 2 years of asset cap	0.154***	-0.055	0.119	0.012	0.504	-0.153
	(0.040)	(0.255)	(0.333)	(0.173)	(1.111)	(3.016)
× COVID-19 pandemic	0.220***	0.611*	1.246	1.628***	3.737**	-5.245
	(0.050)	(0.321)	(0.791)	(0.279)	(1.807)	(11.811)
× Monetary tightening in 2022	-0.084	-1.140**	0.527	-4.271***	-8.241	31.421
	(0.083)	(0.506)	(2.132)	(0.818)	(5.636)	(24.064)
× Crisis in 2023Q1	-1.238***	-3.227**	-4.345**	-6.229***	-4.597	-0.794
	(0.224)	(1.422)	(1.880)	(1.586)	(4.877)	(33.192)
Bank chars.	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Size Group × Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample banks	Community	Regional	National	Community	Regional	National
R^2	0.0360	0.174	0.189	0.911	0.903	0.835
Observations	162,914	5,648	440	162,888	5,648	440

Table 7: **Proximity to Wells Fargo and Deposit Inflow-Outflow Cycle (Robustness)**

This table shows the relationship between the change in deposit spread and the proximity to Wells Fargo in the sample of all non-Wells Fargo banks. The data are at the bank-quarterly level from 2013Q1 to 2023Q1. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. In the dynamic specification, we include a set of interactions of proximity and indicators that correspond to periods before and after the enactment of the asset cap on Wells Fargo. Bank fixed effects, size-group specific year-quarter fixed effects, and time-varying bank size control are included and denoted at the bottom. Standard errors are clustered at the bank level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Deposit quantity				Deposit pricing	
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ Insured deposits (%)	Δ Uninsured deposits (%)	Δ Number of depositors (%)	Δ Average balance per depositor (%)	Δ Domestic deposit spread including fees (b.p.)	Δ Foreign deposit spread (b.p.)
Proximity to Wells Fargo						
× 1 year before asset cap	0.141	0.473	0.174	0.114	0.189	3.173
	(0.151)	(0.330)	(0.178)	(0.169)	(0.182)	(4.571)
× First 2 years of asset cap	0.165	1.217***	0.344**	0.019	-0.093	1.133
	(0.135)	(0.267)	(0.157)	(0.122)	(0.258)	(3.705)
× COVID-19 pandemic	0.422**	1.206***	0.491***	0.393**	1.793***	0.622
	(0.165)	(0.338)	(0.179)	(0.168)	(0.303)	(5.372)
× Monetary tightening in 2022	0.698***	0.414	0.732***	-0.313	-4.805***	-3.264
	(0.252)	(0.455)	(0.252)	(0.238)	(0.850)	(19.629)
× Crisis in 2023Q1	2.305***	-2.766***	2.218***	-2.257***	-4.995***	-1.498
	(0.519)	(0.820)	(0.618)	(0.587)	(1.344)	(25.059)
Bank chars.	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Size Group × Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.119	0.0548	0.0487	0.0729	0.897	0.578
Observations	169,002	168,929	169,002	169,002	168,973	1,441

Table 8: **Proximity to Wells Fargo and Asset Composition**

This table shows the relationship between asset composition and the proximity to Wells Fargo in the sample of all non-Wells Fargo banks. The data are at the bank-quarterly level from 2013Q1 to 2023Q1. The bank-level *Proximity to Wells Fargo* is the fraction of the bank's deposits in branches in the same zip codes as Wells Fargo branches prior to the asset cap. In the dynamic specification, we include a set of interactions of proximity and indicators that correspond to periods before and after the enactment of the asset cap on Wells Fargo. Bank fixed effects, size-group specific year-quarter fixed effects, and time-varying bank size control are included and denoted at the bottom. Standard errors are clustered at the bank level and reported in parentheses. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1) Δ Cash (%)	(2) Δ Loans (%)	(3) Δ Securities (%)	(4) Δ Other assets (%)
Proximity to Wells Fargo				
× 1 year before asset cap	0.110	0.192	-0.502	0.084
	(0.594)	(0.152)	(0.385)	(0.353)
× First 2 years of asset cap	1.256***	0.124	-0.363	0.359
	(0.446)	(0.144)	(0.335)	(0.291)
× COVID-19 pandemic	1.900***	0.893***	-0.566	1.026***
	(0.533)	(0.189)	(0.447)	(0.326)
× Monetary tightening in 2022	-0.271	0.063	1.365**	3.049***
	(0.995)	(0.231)	(0.626)	(0.622)
× Crisis in 2023Q1	2.664	0.497*	-0.838	-1.011
	(2.366)	(0.277)	(0.636)	(1.029)
Bank chars.	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Size Group × Year-Quarter FE	Yes	Yes	Yes	Yes
R^2	0.0684	0.145	0.0862	0.0325
Observations	169,001	168,943	166,246	169,002

Table 9: **Magnitude of Wells Fargo's Deposit Gap**

The table shows a back-of-the-envelope calculation to quantify the deposits Wells Fargo could not acquire due to the asset cap imposed in February 2018. The first column shows the quantum of deposits at the end of 2017. In columns 2–5, the change in deposits in billion dollars and % terms are shown for four distinct periods: first 2 years of the asset cap (2018–2019), COVID-19 pandemic (2020–2022Q1), monetary tightening in 2022 (2022Q2–2022Q4), and the crisis period (2023Q1). In the first panel, the numbers are for the entire commercial banking sector. In the second panel, we report what Wells Fargo actually saw, followed by a counterfactual where Wells Fargo grows at the same rate as the aggregate sector. For Wells Fargo, gap is the counterfactual amount minus the actual amount in each period. We also calculate the cumulative gap over the periods. In the third panel, we focus on the set of all banks with positive-proximity to Wells Fargo. We compare their actual growth with a counterfactual where they grow at the same rate as the aggregate sector. For these banks, excess is the actual amount minus the counterfactual amount in each period. We also calculate the cumulative excess over the periods.

	Deposits (bn)	Δ Deposits (bn)			
	2017	2018-19	2020-22Q1	22Q2-22Q4	22Q4-23Q1
All commercial banks	12,081.46	1,139.14	5,160.61	-655.85	-421.4
		9.43%	39.03%	-3.57%	-2.38%
Wells Fargo					
Actual	1,271.97	66.14	182.92	-103.06	-13.93
		5.20%	13.67%	-6.78%	-0.98%
Counterfactual	1,271.97	119.93	543.32	-69.05	-44.37
		9.43%	39.03%	-3.57%	-2.38%
Gap		53.79	360.40	34.01	-30.44
Cumulative gap		53.79	**414.19**	448.21	417.77
Banks with positive proximity to Wells Fargo					
Actual	8,710.72	889.48	4,129.93	-484.68	-401.55
		10.21%	43.02%	-3.53%	-3.03%
Counterfactual	8,710.72	821.32	3,720.79	-472.87	-303.83
		9.43%	39.03%	-3.57%	-2.38%
Excess		68.16	409.14	-11.81	-97.72
Cumulative excess		68.16	**477.30**	465.49	367.76

Table 10: **Magnitude of Wells Fargo's Uninsured Deposit Gap**

The table shows a back-of-the-envelope calculation to quantify the uninsured deposits Wells Fargo could not acquire due to the asset cap imposed in February 2018. The first column shows the quantum of deposits at the end of 2017. In columns 2–5, the change in uninsured deposits in billion dollars and % terms are shown for four distinct periods: first 2 years of the asset cap (2018-2019), COVID-19 pandemic (2020-2022Q1), monetary tightening in 2022 (2022Q2-2022Q4), and the crisis period (2023Q1). In the first panel, the numbers are for the entire commercial banking sector. In the second panel, we report what Wells Fargo actually saw, followed by a counterfactual where Wells Fargo grows at the same rate as the aggregate sector. For Wells Fargo, gap is the counterfactual amount minus the actual amount in each period. We also calculate the cumulative gap over the periods. In the third panel, we focus on the set of all banks with positive-proximity to Wells Fargo. We compare their actual growth with a counterfactual where they grow at the same rate as the aggregate sector. For these banks, excess is the actual amount minus the counterfactual amount in each period. We also calculate the cumulative excess over the periods.

	Uninsured (bn)	Δ Uninsured (bn)			
	2017	2018-19	2020-22Q1	22Q2-22Q4	22Q4-23Q1
All commercial banks	5,307.01	497.63	3,163.18	-655.762	-665.229
		9.38%	54.49%	-7.31%	-8.00%
Wells Fargo					
Actual	607.56	108.63	79.21	-47.07	-7.77
		17.88%	11.06%	-5.92%	-1.04%
Counterfactual	607.56	56.97	362.13	-75.07	-76.16
		9.38%	54.49%	-7.31%	-8.00%
Gap		-51.66	282.92	-28.01	-68.39
Cumulative gap		-51.66	**231.25**	203.25	134.85
Banks with positive proximity to Wells Fargo					
Actual	3,973.54	349.13	2,627.83	-476.67	-603.19
		8.79%	60.79%	-6.86%	-9.32%
Counterfactual	3,973.54	372.59	2,368.38	-490.99	-498.08
		9.38%	54.49%	-7.31%	-8.00%
Excess		-23.46	259.45	14.32	-105.11
Cumulative excess		-23.46	**235.99**	250.31	145.21

Internet Appendix

Size-Based Regulation and Bank Fragility: Evidence from the Wells Fargo Asset Cap

This Internet Appendix contains supplementary material.

A Narrative Evidence

In this appendix, we provide an in-depth narrative of how the asset cap affected Wells Fargo based on its public disclosures, earnings conference calls, and relevant media reports. We obtain Wells Fargo's annual reports,[1] quarterly earnings releases,[2] SEC filings (e.g., 10-Ks, 10-Qs),[3] and other regulatory disclosures (e.g., Liquidity Coverage Ratio disclosures).[4] We also obtain the transcripts of Wells Fargo's quarterly earnings conference calls from Seeking Alpha. This narrative evidence complements and corroborates our quantitative evidence; it shows that Wells Fargo's primary strategy to manage under the asset cap was to prioritize consumer deposits over larger corporate deposits, which the bank engaged actively in the first half of 2018 and for nine consecutive quarters from 2020 to the first quarter of 2022.

A.1 Major Impact on Deposit Taking

Almost immediately following the imposition of the asset cap in February 2018, Wells Fargo took steps to avoid breaching the threshold. Its 2018:Q1 and 2018:Q2 quarterly earnings releases showed that it decreased $15 billion and $13.5 billion of commercial deposits from financial institutions to comply with the asset cap in the two quarters respectively. In its 2018 annual report, the bank noted that this active decrease of commercial deposits was the main factor that the year-end balance in total deposits was down by 4% from 2017. In June 2018, Wells Fargo sold 52 branches in Indiana, Ohio, Michigan, and Wisconsin, giving up approximately $2 billion in deposits.[5] This geographic contraction was in the Midwest, a part of the country where Wells Fargo did not have a

[1] Available at https://www.wellsfargo.com/about/investor-relations/annual-reports/.

[2] Available at https://www.wellsfargo.com/about/investor-relations/quarterly-earnings/.

[3] Available at https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000072971&type=&dateb=&owner=include&count=40.

[4] Available at https://www.wellsfargo.com/about/investor-relations/disclosures/.

[5] Colin Kellaher in *The Wall Street Journal*, "Wells Fargo to Sell 52 Branches to Flagstar", June 5, 2018. Available at https://www.wsj.com/articles/wells-fargo-to-sell-52-branches-to-flagstar-1528203750.

significant presence to begin with (see Figure 9). It also sold smaller subsidiaries such as Wells Fargo Shareowner Services, Reliable Financial Services, Inc. and Reliable Finance Holding Company in 2018, and Institutional Retirement and Trust and Eastdil Secured in 2019.

As aggregate bank deposits started growing rapidly during the COVID-19 pandemic, the asset cap became more binding for Wells Fargo. The 2020 and 2021 annual reports both note that while total deposits grew on a year-on-year basis, an increase in consumer deposits was offset to an extent by "declines in commercial deposits, driven by our actions to remain under the asset cap...". For nine consecutive quarters from 2020 to the first quarter of 2022, Wells Fargo mentioned decreasing commercial deposits as its action to manage under the asset cap in its quarterly earnings releases. John Shrewsberry, Wells Fargo's then CFO, discussed charging fees and lowering deposit rates to dissuade commercial depositors in the 2020:Q1 earnings conference call. Specifically, he said "I think there are a range of deposit related activities that we have where we would begin to institute charging for holding cash. Given our – the existence of the asset cap, we can't overpay for deposits, because we were in the business of sending low liquidity value deposits back to bank customers and alike, so we would probably be pretty quick to be managing what we pay for deposits to – so that we didn't have an incremental influx that we that we didn't have an appetite for."

For commercial deposits, also known as "wholesale" deposits in the liquidity regulation framework, there are two segments: (1) operational commercial deposits that are closely associated with key operational services a bank provides to the commercial deposits such as payroll, clearing, custody, and cash management, and (2) non-operational commercial deposits for balances in excess of those operational deposits. Wells Fargo chose to actively reduce non-operational commercial deposits to manage under the asset cap. Based on the repeated discussions on this liability management strategy in the earnings conference calls such as the above quote from John Shrewsberry, the bank views these deposits as "low liquidity value deposits." These non-operational commercial deposits also tend to be higher cost and higher beta deposits for the bank, according to Timothy J. Sloan, Wells Fargo's then CEO and president, in the 2018:Q1 earnings conference call. The cost implications of the deposit segments are difficult to verify using available data as the delineation of commercial deposits into operational and non-operational is unique to Liquidity Coverage Ratio reporting, which does not include cost information. However, the results from recent waves of the Federal Reserve's Senior Financial Officer Survey (SFOS),[6] which periodically surveys roughly 80 banks across a range of sizes and busi-

[6] Available at https://www.federalreserve.gov/data/sfos/sfos.htm.

ness models about their funding, show that commercial non-operational deposits have higher costs and higher betas than commercial operational deposits, which in turn have higher costs and higher betas than retail deposits.

On the other hand, Wells Fargo maintained growth in consumer deposits. Charles Scharf, Wells Fargo's CEO, answered in 2021:Q3 earnings conference call "we have not limited the growth of deposits on the consumer side at all."

Contemporaneous press reports corroborate these actions. *The Wall Street Journal* reported that, during the pandemic, the bank reduced the excess deposits of other financial institutions and large corporations, which were "expected to reprice more quickly in response to rising rates". This meant Wells Fargo did not have to limit inflows in stickier deposit products like consumer checking accounts.[7] These media reports also recognized the cost of the asset cap to the bank. *Bloomberg* reported that, in spurning some deposits, the bank was potentially sending clients to competitors.[8]

A.2 Limited Impact on Lending

The impact of the asset cap on lending, a bank's other main economic function, was limited. Timothy J. Sloan, Wells Fargo's then CEO and president, stated the following in the 2018:Q1 earnings conference call "The asset cap really isn't impacting our ability to grow loans. I mean our folks are out there facing off with our customers every day across the entire platform. And so, I don't think we are going to have an impact from the asset cap on loan growth."

During the pandemic, Wells Fargo took several temporary measures to restrict certain types of lending, such as stopping correspondent non-conforming mortgage originations in 2020:Q1; reclassifying $10.4 billion of conforming first mortgage loans to held-for-sale status in 2020:Q2; stopping purchasing jumbo mortgage loans through the correspondent mortgage business in 2020:Q2, not accepting Home Equity and personal line of credit applications in 2020:Q2, decreasing trading assets in 2021:Q1 and 2021:Q2. In 2020, the *Wall Street Journal* reported that the bank raised the bars for mortgage refinancing and new commercial loans, and cut off auto lending through most of its independent car-dealership clients. The report also quoted the bank in saying that it would stop taking

[7] Telis Demos in *The Wall Street Journal*, "Wells Fargo Has Used Its Lockdown Time Well", April 23, 2021. Available at https://www.wsj.com/articles/wells-fargo-has-used-its-lockdown-time-well-11619175781.

[8] Hannah Levitt in *Bloomberg*, "Wells Fargo Asset Cap Is Now One of the Costliest Bank Penalties", August 25, 2020. Available at https://www.bloomberg.com/news/articles/2020-08-24/wells-fargo-asset-cap-is-now-one-of-the-costliest-bank-penalties.

new private student loan customers.[9]

Compared to the measures to reduce commercial deposits that continued for more than two years, measures to restrict lending were more temporary and smaller in scale. The reason is that Wells Fargo could flexibly replace liquid assets with loans. In the 2021:Q3 earnings conference call, Michael Santomassimo, Wells Fargo's CFO, answered, "I think we've got plenty of room to grow on the loan side and whether it comes initially from cash that's sitting at the FED or – that would be the first place. But if we needed to, we could reduce the securities portfolio as well if it grew much faster than what we expected, that would be a nice problem to have. But at this point, we have plenty of capacity to grow." In the subsequent quarter's earnings conference call, the company's executives once again emphasized that the asset cap constrained the deposit side but not the loan side.

B Variable Definitions

Proximity to Wells Fargo: defined as the fraction of a bank's deposits in 2017 (based on the 2017 SOD data) that are in zip codes that also have a Wells Fargo branch in early February 2018 (based on the 2017 SOD data). In computing the proximity measure, we exclude the deposits in the bank's main office in the calculation. This is because banks are allowed to allocate to the main office deposits that they cannot categorize geographically. Hence, deposits in the main branch may not reflect the true deposits in that location.

Insured deposits: constructed based on the deposit insurance limits of $250,000 per depositor per bank and calculated following the Bai et al. (2018). Schedule RC-O "Other Data for Deposit Insurance and FICO Assessments" of the Call Reports reports the total amount and number of deposit accounts for those above and below the FDIC limits in its Memoranda item 1. Specifically, insured deposits of a bank in a given quarter are the sum of (i) all deposits lower than the FDIC limit of $250,000 and (ii) the first $250,000 dollar amount in the accounts above the limit multiplied by the number of such deposit accounts.

Uninsured deposits: constructed based on the deposit insurance limits of $250,000 per depositor per bank and calculated following the Bai et al. (2018). Specifically, uninsured deposits of a bank in a given quarter are equal to all deposits greater than the FDIC limit of $250,000 minus the insured portion of these large deposit accounts.

[9] Ben Eisen in *The Wall Street Journal*, "Wells Fargo Tightens Purse Strings to Ride Out Coronavirus Pandemic", July 25, 2020. Available at https://www.wsj.com/articles/wells-fargo-tightens-purse-strings-to-ride-out-coronavirus-pandemic-11595669400.

Uninsured deposit fraction: defined as uninsured deposits to the sum of insured and uninsured deposits.

Number of depositors: defined as the sum of the number of deposit accounts above and below the FDIC limits.

Average balance per depositor: defined as the average balance per depositor across deposit accounts above and below the FDIC limits.

Uninsured leverage: defined as uninsured debt funding to assets, where uninsured debt consists of uninsured deposits, foreign deposits, repos, other borrowed money, and subordinated debt, following Jiang et al. (2020, 2023).

Federal funds effective rate in a quarter: average of the daily federal funds effective rate (from Fed Board Release H.15 "Selected Interest Rates", FRED series name: DFF) within the quarter.

Overall deposit spread: defined as the federal funds effective rate in the quarter minus the deposit interest expense rate on the bank's overall deposits (including both domestic and foreign deposits) in the quarter. The overall deposit interest expense rate is equal to the quarterly interest expense on overall deposits divided by the quarterly average of overall deposits, multiplied by 4 to obtain an annual deposit rate. The information on interest expense and quarterly average balance of deposits is obtained from Schedule RI and Schedule RC-K of the Call Reports, respectively.

Domestic deposit spread: defined as the federal funds effective rate in the quarter minus the deposit interest expense rate on the bank's domestic deposits in the quarter. The domestic deposit interest expense rate is equal to the quarterly interest expense on domestic deposits divided by the quarterly average of domestic deposits, multiplied by 4 to obtain an annual deposit rate. The information on interest expense and quarterly average balance of deposits is obtained from Schedule RI and Schedule RC-K of the Call Reports, respectively.

Domestic deposit spread including fees: defined as the domestic deposit spread plus the annualized rate of fee income from domestic deposits. The fee income is obtained from Schedule RI of the Call Reports.

Foreign deposit spread: defined as the federal funds effective rate in the quarter minus the deposit interest expense rate on the bank's foreign deposits in the quarter. The foreign deposit interest expense rate is equal to the quarterly interest expense on foreign deposits divided by the quarterly average of foreign deposits, multiplied by 4 to obtain an annual deposit rate. The information on interest expense and quarterly average balance of deposits is obtained from Schedule RI and Schedule RC-K of the Call Reports, respectively. This variable is only available for the smaller sample of banks with positive

foreign deposits.

Size group: constructed using the consolidated total assets of the regulatory high holder, as the Dodd-Frank Act applies to the highest holding entity. Specifically, for commercial banks that are not part of a bank holding company, we use the consolidated total assets of the banks; for banks that belong to a bank holding company, we use the consolidated total assets of their top-tier bank holding companies. We follow Alvero et al. (2022) to use the quarter-end assets to construct the size groups. Alvero et al. (2022) show that this simple measure of size is useful to analyze the impact of size-based bank regulation, although The Dodd-Frank Act does not provide a uniform methodology to determine bank size for regulatory purposes and separate rulemaking processes use slightly different methodologies to determine bank size. Community banks are banks with regulatory high holders' quarter-end assets not exceeding $10 billion; regional banks are defined as the banks with regulatory high holders' quarter-end assets above $10 billion but not exceeding $250 billion; and national banks are defined as banks with regulatory high holders' quarter-end assets above $250 billion.

For other variables, we follow Drechsler et al. (2017, 2021) to form consistent time-series data.