Open to All Comers: How Unsought Deposit Inflows Affect Banks

Michael Gelman Andrew MacKinlay*

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Abstract

Deposits are an important source of capital in the economy and the main form of bank financing. However, unlike other liabilities, not all deposit flows stem from a bank actively seeking them. In this paper, we show that banks that experience these inflows increase risk due to heightened leverage uncertainty and greater concerns about costly equity issuance. When the Fed funds rate rises, they face bigger losses and deposit outflows. This mechanism also plays a key role in understanding the 2022–2023 U.S. bank fragility episode, as the risk exposures of banks were amplified following deposit inflows in 2020–2021.

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*First draft: April 19, 2023. Michael Gelman: University of Delaware, Newark, DE 19716. Email: gelmanm@udel.edu. Andrew MacKinlay: Pamplin College of Business, Virginia Tech, Blacksburg, VA 24061. Email: acmackin@vt.edu. We are grateful for comments from Manuel Adelino, Linda Allen, Jack Bao, Indraneel Chakraborty, Sebastian Doerr, Itamar Drechsler, Mark Flannery, Itay Goldstein, Victoria Ivashina, Paul Laux, Elena Loutskina (discussant), Andres Schneider, Philip Strahan, Alexander Ufier (discussant), Jun Yang, and Gloria Yang Yu, as well as seminar and conference participants at the 2023 Community Banking Research Conference, SGF Conference 2024, 2024 OCC Bank Research Symposium: Depositor Behavior, Bank Liquidity, and Run Risk, Norges Bank, and the Bank of Israel.

I. Introduction

Deposits are an important source of capital in the economy and the main form of bank financing. Banks find it optimal to rely on deposits because they are a source of cheap funding. However, deposits introduce uncertainty regarding the bank's leverage, as they can be driven by depositor decisions—for example, changes in the liquidity of households and firms—rather than the bank actively managing them (Drechsler, Savov, and Schnabl, 2021; Jermann and Xiang, 2023; Bolton, Li, Wang, and Yang, forthcoming). We term these unsought deposits "supply-driven," and show their importance to the banking system.

In this paper, we empirically investigate the effect of the marginal supply-driven deposit inflow on bank risk-taking. Our hypothesis is that these inflows lead banks to reach for yield and increase risk. The premise behind this hypothesis is that because supply-driven deposits raise the bank's leverage uncertainty, the bank is more likely to issue additional equity. Such issuances are costly to current shareholders because of adverse selection concerns (Myers and Majluf, 1984).[1] To compensate shareholders, banks seek to generate higher returns. Exploring the universe of U.S. banks over the past two decades, we show that those that experience supply-driven deposit inflows achieve higher returns by increasing their interest rate risk and credit risk. We provide empirical evidence that equity issuance concerns drive the rise in risk.

We also study the resulting implications of the higher risk on bank performance and deposit outflows following monetary policy tightening. As rising interest rates typically lead to losses on existing security exposures and higher borrower default risk, riskier banks are expected to experience more negative outcomes. Indeed, we find that these banks face higher losses on securities and loans, as well as deposit outflows during periods of monetary tightening.

Supply-driven inflows play a key role in understanding the 2022-2023 U.S. bank fragility episode. Risk exposures of banks were amplified following significant COVID-related supply-driven deposit inflows in 2020–2021. This risk amplification led to larger losses and deposit outflows following

[1] Equity issuance costs are key ingredients in banking models which consider leverage (e.g., He and Krishnamurthy, 2012; Brunnermeier and Sannikov, 2014; Hugonnier and Morellec, 2017; Bolton, Li, Wang, and Yang, forthcoming).

the sharp rise in the Fed funds rate in 2022–2023. Our results point to an underlying mechanism that helps explain the observed results documented in recent papers and the media coverage of the recent fragility episode. More generally, high deposit inflows can serve as an early indicator for changes in bank risk and future deposit outflows in periods of monetary tightening.

Studying the effect of deposit inflows on bank risk, we face the hurdle of disentangling the effect of deposit inflows from the ex-ante decision of the bank to increase risk and collect deposits to achieve this goal. To address this issue, we use supply-driven deposits as our main measure. To determine if deposits are supply-driven, we employ an identification strategy used by Cohen, Diether, and Malloy (2007). The idea is that for deposits to increase without a concurrent rise in the interest rate paid on them, an outward shift in the supply of capital from depositors must have occurred. Thus, we construct our measure of supply-driven deposit inflows by only including bank-quarters in which the bank does not increase deposit rates in the current or previous quarter.[2] These deposits from households and firms are not under the full control of the bank—as they are driven by cyclical economic factors or idiosyncratic depositor circumstances—while periods when the bank raises deposit rates indicate that it actively seeks deposits to potentially achieve pre-determined goals. Hence, our measure of flows is external to the bank and less expected, making it more suitable to our identification strategy. To verify that the results are not driven by this specific construction, we show that the results hold using alternative measures. We also directly address alternative explanations, and employ Bartik-like instrumental variables and difference-in-differences strategies.

Changes in supply-driven deposit flows could stem from aggregate changes in the economy, as well from idiosyncratic household changes (e.g., inheritance) or firm-specific situations (e.g., higher revenues). To provide intuition for our measure, Figure 1 plots the aggregate supply-driven deposit flows for all banks in our sample (left axis) and aggregate personal and corporate savings growth (right axis). When households and firms have more savings, we expect some of this capital to be directed to banks as deposits, separate from the banks' demand for deposits. Supportive of this reasoning, the figure shows a positive correlation of supply-driven deposit flows and aggregate

[2]We include the previous quarter to be conservative and allow for a delayed response of households and firms to changes in deposit rates.

savings growth.

Analyzing the U.S. banking system from 2001–2022, we explore what banks do with the supply-driven deposit inflows. Banks can utilize the new deposits to expand credit supply, hold more long-term securities, or increase holdings of short-term assets. We find that the additional funds are used to expand credit supply and hold more securities. For our main measure, banks with one standard deviation higher supply-driven deposit inflows expand their loan and securities portfolios by 9% and 83% of the sample means (scaled by lagged assets), respectively.

The balance sheet changes are accompanied by reaching for yield behavior, and a rise in the riskiness of the bank. We find that banks with supply-driven deposit inflows improve their gross income and ROA while increasing their interest rate risk and credit risk. A one standard deviation higher supply-driven deposit inflow increases both of these income measures by magnitudes comparable to their sample means. Our primary measure of interest rate risk is the bank's maturity gap (following English, Van den Heuvel, and Zakrajšek, 2018).[3] A one standard deviation higher supply-driven deposit inflow is associated with a quarterly increase in the maturity gap equal to 13% of the mean quarterly change. We also employ an alternative measure based on changes in the interest rate sensitivities of interest income and interest expense for banks (following Drechsler, Savov, and Schnabl, 2021), and find a similar effect. The bank's response following supply-driven deposit inflows translates into interest rate risk, consistent with papers that show that banks may not fully hedge against changes in interest rates (Begenau, Piazzesi, and Schneider, 2015; Drechsler, Savov, Schnabl, and Wang, 2023; McPhail, Schnabl, and Tuckman, 2023).

Using the bank's risk-weighted assets to total assets as an overall measure of credit risk, we find that it increases following deposit inflows. A one standard deviation higher supply-driven deposit inflow is associated with a nearly nine-fold increase relative to the mean quarterly change in risk-weighted assets to total assets. We also find these banks hold more securities associated with higher credit risk (e.g., private-label mortgage-backed securities (MBS), asset-backed securities (ABS), non-government domestic securities, and foreign securities). The rise in interest rate risk and

[3]See also Flannery and James (1984) and Hutchison and Pennacchi (1996) for discussion of the maturity of assets, deposits, and the bank's interest rate risk.

credit risk following deposit inflows remains robust to using alternative measures of supply-driven inflows, focusing on a matched bank sample, and dropping particular time periods.

We argue that this increase in risk stems from banks seeking to compensate shareholders for costly future equity issuances by reaching for yield. We provide evidence that banks are indeed more likely to issue equity following higher supply-driven deposit inflows, indicating that the concern is a valid shareholder consideration. As further anecdotal evidence, in 2020 the banking system experienced large supply-driven deposit inflows, and Silicon Valley Bank, First Republic Bank, and Signature Bank in particular. These banks all raised substantial equity in 2021.[4] Next, we more formally show the key role of equity issuance concerns for risk-taking among banks that experience supply-driven deposit inflows. We provide multiple pieces of evidence for this mechanism. First, we focus on banks with lower equity ratios. These banks are closer to regulatory thresholds, thus any deposit-inflow-driven increase in their leverage raises the likelihood for costly equity issuance. Indeed, we find that the reaching for yield behavior and the rise in risk are more pronounced among this subsample of banks, with about 23% and 27% larger increases in their interest rate risk and credit risk (compared to well-capitalized banks), respectively.

Second, we utilize a 2019 regulatory change that created the Community Bank Leverage Ratio (CBLR) framework, which replaced four different capital requirements with a single tier 1 leverage ratio requirement. This change relaxed regulatory capital requirements for community banks with a high enough tier 1 leverage ratio. Using this regulatory change to perform a difference-in-differences analysis, we compare the affected community banks to the most similar banks just above the size cut-off for the regulation. In line with the previous results, we find that a decrease in the equity issuance concerns among the treated banks leads to smaller increases in reaching for yield behavior and risk following supply-driven inflows.

Third, we consider uninsured deposits. Over our sample, the volatility of uninsured deposits is about three times larger than insured deposits, as insured depositors have less incentive to move deposits (often thought of as "sleepy"). The higher volatility of uninsured deposits exacerbates the

[4] See `https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/us-banks-raise-1-33b-in-common-equity-in-the-first-2-months-of-2021-63133532`.

concern that the bank will cross the boundary where it needs to issue equity. Consequently, we expect banks with a higher share of uninsured deposits to engage more in reaching for yield behavior following supply-driven deposits inflows to compensate shareholders for the higher likelihood of costly equity issuances. Indeed, we find evidence of this. Further, splitting between insured and uninsured supply-driven deposit inflows, we find that the latter category drives the increase in bank risk more. The rise in interest rate and credit risk is about 1.3 times and seven times as large for the supply-driven uninsured inflows, respectively. This result holds whether we consider uninsured deposit growth rates or scale uninsured inflows by total deposits to capture their overall importance to the bank.

The notion that the marginal deposit inflow should cause banks to expand their balance sheets and increase risk is not obvious. One may find it more straightforward for banks that are concerned with their equity ratio to cut assets. Further, given the monitoring conducted by uninsured depositors (Diamond and Rajan, 2001; Martinez Peria and Schmukler, 2001), banks are expected to control risk in response to more uninsured deposits. In this paper, we do not claim that these effects do not exist. Our contribution is providing evidence of an opposing effect driven by equity issuance concerns, which dominates for the marginal supply-driven deposit.

While straightforward, our approach to classifying deposit flows may not adequately capture the distinction between supply- and demand-driven deposits in cases where non-price factors affect deposit flows to the bank. We address this issue in two ways. First, we further restrict the measure of supply-driven deposits by requiring that the bank does not increase advertising spending, which includes promotions related to deposits, in the current or previous quarter. Second, we verify that the results remain robust using an alternative measure of supply-driven deposits constructed from more granular data. Here, we use bank-county-level deposit flows and changes in rates. While this measure is only available annually, it captures if the bank seeks deposits in some markets but not others. It also allows us to rule out that the results are driven by differences in the market power of banks in collecting deposits (Drechsler, Savov, and Schnabl, 2017), or by deposit inflows stemming from newly acquired or established branches.

Our approach assumes that a bank's benchmark for the decision to attract additional deposits is making changes from its previous deposit rate. We believe the bank's own previous deposit rate most holistically encompasses the various factors the bank considers when determining its current deposit policy. We also include time fixed effects in all our specifications to capture any economy-wide changes. However, banks could use alternative reference points, such as the Fed funds rate, the deposit rates of other banks, other economic variables, or some combination of all of these factors. As a robustness test, we find consistent results when classifying supply-driven deposit inflows using changes in deposit spreads relative to the average bank deposit rate or the Fed funds rate.

Another challenge arises with regard to the depositors, who may increase deposits in some banks more than others due to specific changes in the bank's characteristics. We address this concern by including relevant bank controls in all specifications. In a separate analysis, we conduct nearest neighbor matching based on an extensive set of variables used in prior studies to explain deposit flows, such as bank size, growth and profitability, riskiness, capital, and asset and funding composition (Acharya and Mora, 2015; Egan, Hortaçsu, and Matvos, 2017; Chen, Goldstein, Huang, and Vashishtha, 2022, forthcoming). Matching allows us to consider the effect of deposit inflows in a setting with banks that are similar on a variety of observables. We also match banks based on the bank's physical footprint to help deal with the concern that areas with more supply-driven inflows may experience changing investment opportunities. This matching allows us to compare two similarly situated banks, but with only one experiencing significant supply-driven deposit inflows. We find that the results cannot be fully explained by differences in investment opportunities.

The rise in risk following supply-driven deposit inflows could be explained by factors unobserved in our setting. For example, it might be the case that the bank was planning to raise deposits in quarter *t+1* to expand risky assets, and the supply-driven deposits in quarter *t* just allowed it to increase risk earlier. To this end, we employ different Bartik-like instrumental variables (Bartik, 1991; Goldsmith-Pinkham, Sorkin, and Swift, 2020) for the supply-driven deposit inflows, and find results consistent with the baseline estimate. We also validate that the observed effects are not driven by changes in aggregate bank reserves stemming from quantitative easing periods (Acharya and Naqvi, 2012; Diamond, Jiang, and Ma, forthcoming; Acharya, Chauhan, Rajan, and Steffen, 2023), or low interest rate periods that might drive reaching for yield behavior. We confirm that the rise in deposits is not a mechanical outcome of credit line withdrawals (Li, Strahan, and Zhang, 2020), or other employed loan commitments. Additionally, we ensure that our findings hold when excluding the COVID period (i.e., 2020 onwards) from the sample, and that the results are not driven by the implementation of the Temporary Liquidity Guarantee Program (TLGP) following the global financial crisis.

Having established that supply-driven deposits lead to higher bank risk, we show that the increased risk negatively affects bank performance in periods of monetary policy tightening. We utilize these periods to analyze the implications of the bank's risk decisions following supply-driven deposit inflows, as rising interest rates typically lead to losses on banks' security exposures and hampers borrowers' ability to repay their debts. We show that the losses are concentrated in banks with the highest equity issuance concerns. For a one percentage point increase in the Fed funds rate, less capitalized banks with one standard deviation higher supply-driven deposit inflows exhibit increased losses on their securities portfolio equal to 31% of the sample mean. For credit losses, the increase in non-performing loans (NPLs) is equal to 74% of the sample mean.

The higher risk and the negative outcomes during monetary tightening increase bank solvency concerns, making them more prone to deposit outflows. Indeed, we find a positive relationship between the growth in supply-driven deposit inflows and the scale of deposit outflows in periods of monetary tightening among less solvent banks. Additionally, as uninsured deposit inflows lead to additional bank risk, we find higher outflows following these inflows. The heightened concerns among uninsured depositors regarding bank solvency lead them to pull their funds from these banks.

Our mechanism can also help explain the 2022–2023 U.S. bank fragility episode. Equity issuance concerns are expected to play an outsized role in periods with large deposit inflows, such as the COVID period in 2020–2021. We use the first two quarters of the COVID period (2020Q1–Q2), when deposit inflows increased sharply and unexpectedly (Levine, Lin, Tai, and Xie, 2021), and examine the effect of these inflows on bank risk, as well as outflows following the 2022 monetary tightening. These inflows stem from the rise in risk-aversion of firms and households with the onset of the COVID pandemic and subsequent government stimulus policies, making them less likely to be driven by bank decisions or depositors reacting to bank-specific characteristics. Nevertheless, to further rule out endogenous inflows, we match banks on observables and utilize our supply-driven deposit inflow estimate to perform a difference-in-differences analysis. We classify banks with high supply-driven deposit inflows in these two quarters as the treated group and the banks with low supply-driven deposit inflows as the control group.[5] We include the same controls as in the time-series analysis, and allow them to have their own independent effects in the post period. This helps us to control for other potential factors that affect inflows to specific banks. The analysis serves two purposes: it provides an additional identification strategy to understand the effect of supply-driven deposits, and it serves as a way to study how deposit inflows during this period contributed to the bank fragility of 2022–2023.

Similar to our full sample results, we find that the treated banks engaged more in reaching for yield behavior, and increased their interest rate risk and credit risk. Following the heightened deposit inflows in 2020Q1–Q2, the treated banks raise their gross income, maturity gap, and risk-weighted assets during 2020Q3–2021Q4 by 6.9%, 16.5%, and 34.9% of the sample standard deviation, respectively. Consistent with higher equity issuance concerns, the rise in reaching for yield and bank riskiness is more pronounced among less capitalized banks and ones with a higher share of uninsured deposits. Subsequently, treated banks experienced 2.5 percentage point higher deposit outflows in 2022, with bigger outflows among the less capitalized and less solvent banks.

Our results have important implications for depositors, bankers, stakeholders, and policymakers. While much of the current focus is on preventing bank runs, we introduce deposit inflows as a new early indicator for the potential of such events. It could also become a component for bank stress tests conducted by central banks.

Our paper contributes to a few different strands of the literature. Past work shows that banks find

[5] Both Silicon Valley Bank and Signature Bank, that failed in March 2023, are classified in the treatment group.

it optimal to rely on deposits due to mispriced deposit insurance, the existence of a liquidity premium on deposits, and the tax deductibility of debt payments (Gorton and Pennacchi, 1990; Allen, Carletti, and Marquez, 2015; DeAngelo and Stulz, 2015). Bank deposit rate setting policy determines to what extent banks exploit local market power, and consequent effects on local economic conditions and consumer welfare (Begenau and Stafford, 2023; Granja and Paixão, 2023; Dlugosz, Gam, Gopalan, and Skrastins, forthcoming). Banks collect deposits to expand risky assets (e.g., Kashyap, Rajan, and Stein, 2002; Gu, Mattesini, Monnet, and Wright, 2013), the deposit franchise allows them to produce stable net interest margins (Drechsler, Savov, and Schnabl, 2021), and the bank's productivity at collecting deposits and making loans is positively related to its market value (Egan, Lewellen, and Sunderam, 2022). We contribute by showing deposits that are supply-driven and not actively sought by banks affect their risk-taking, separate from the effect of endogenous risk-taking by banks.

Bolton, Li, Wang, and Yang (forthcoming) explore how uncertainty arising from deposit inflows affects bank behavior. We show empirically that deposit inflows lead banks to increase risk, which makes them more susceptible to losses and deposit outflows in periods of monetary tightening. This relates to the existing literature on how deposit reliance exposes the banking system to outflows and panic-based runs (Diamond and Dybvig, 1983; Kashyap, Rajan, and Stein, 2002; Goldstein and Pauzner, 2005; Martin, Puri, and Ufier, forthcoming). It also increases the capacity of banks to originate new loans, and enhances their lending resiliency during crisis periods (e.g., Berger and Bouwman, 2009; Ivashina and Scharfstein, 2010; Gilje, Loutskina, and Strahan, 2016). We further show the role of equity issuance concerns in the response of banks to supply-driven deposits.

Our study complements recent literature on the interactions between the monetary policy and the banking system (e.g., Drechsler, Savov, and Schnabl, 2017; Di Tella and Kurlat, 2021; Drechsler, Savov, and Schnabl, 2021; Supera, 2021; Haddad, Hartman-Glaser, and Muir, 2023). Banks that experienced higher supply-driven deposit inflows become more exposed to monetary policy tightening, which has broader implications for their ability to continue lending, the transmission of monetary policy to the economy, and the stability of the banking system. These banks might exhibit additional credit losses if high rates continue to put pressure on borrowers, similar to the evolution of the S&L crisis in the 1980s.[6]

We also contribute to recent studies that analyze U.S. banks' asset exposure to the 2022–2023 monetary tightening with implications for financial stability (Flannery and Sorescu, 2023; Jiang, Matvos, Piskorski, and Seru, 2023), banks experiencing uninsured deposit outflows (Drechsler, Savov, Schnabl, and Wang, 2023), unrealized losses on held-to-maturity (HTM) portfolios (Dursun-de Neef, Ongena, and Schandlbauer, 2023; Granja, 2023), and bank interest rate risk (Abdymomunov, Gerlach, and Sakurai, 2023).

II. Data and Variable Definitions

Our data cover the universe of U.S. banks from 2001 to 2022. We use the quarterly Report of Condition and Income (Call Reports), which contains data on the income statements, balance sheets, detailed supporting schedules, and off-balance sheet items for U.S. banks. The effective Fed funds rate is taken from the St. Louis Fed's Federal Reserve Economic Data (FRED). We use the rate at the end of each quarter to calculate the quarterly change.

II.A. Supply-Driven Deposits Variable

Our main measure of deposit inflows is supply-driven deposits, i.e., deposit inflows that do not stem from banks actively seeking them, but from depositor decisions, unrelated to the bank. To determine if deposits are supply-driven, we employ an identification strategy used by Cohen, Diether, and Malloy (2007) in the context of the stock lending market. For each bank, we observe the quarterly deposit flow and the change in the interest rate paid on these deposits. We classify as supply-driven any quarters in which deposits increase (decrease) but the deposit rate does not rise (fall) in the current or previous quarter. Thus, we exclude inflows when a bank increases deposit rates in quarter t or $t-1$. The supply-driven deposit inflows measure is the quarterly growth rate of *non-excluded*

[6] In the 1980s, higher rates exposed problems among borrowers which lead to a crisis within American thrifts. See `https://www.economist.com/finance-and-economics/2023/03/16/how-deep-is-the-rot-in-americas-banking-industry`.

bank-quarter deposits. The argument is that for deposits to increase without a concurrent increase in the interest rate paid on the deposits, an outward shift in the supply of capital from depositors must have occurred. Every quarter has some fraction of banks receiving supply-driven deposits.

The mean growth in total supply-driven deposits is 1% with a standard deviation of 3.6% (see summary statistics in Table I). These statistics compare to average total deposit growth of 1.5% and a standard deviation of 5.5%. Over the full sample, 41% of bank-quarters are classified as having supply-driven deposits.

Changes in supply-driven deposit flows could stem from aggregate changes in the economy, as well from idiosyncratic household changes or firm-specific situations. Figure 1 plots the aggregate supply-driven deposit flows for all banks in our sample (left axis) and aggregate personal and corporate savings growth (right axis). As households and firms have more savings, we expect some of this capital to be directed to banks as deposits, apart from the banks' demand for deposits. Supportive of this reasoning, the figure shows a positive correlation of supply-driven deposit flows and the growth in aggregate savings. As our analysis includes time fixed effects, we explore the cross-sectional differences in the supply-driven deposit inflows among banks within each year-quarter.

A concern is that this classification approach may not adequately capture non-price factors that could affect deposit flows to the bank. As a robustness exercise, we create a version of supply-driven deposits that also requires that the bank does not change advertising and marketing spending in the current or past quarter.[7] As a separate approach, we consider the change in total deposits for each bank using county-level data on the amount of deposits from the Summary of Deposits data, as well as county-level deposit rate data from RateWatch. Here we can classify deposit flows as supply-driven using a similar methodology, but this time at a bank-county-level rather than for the bank as a whole. The main limitation is that the deposit data is reported annually, so we can only compute this measure on an annual basis.[8] However, we can incorporate two additional refinements.

[7]The amount spent on advertising and marketing is provided at the bank level in Call Report Schedule RI-E. This expense includes costs of gifts or premiums provided to depositors when opening a new account or renewing an account. Alternatively, the bank can report these expenses separately, but in practice, very few banks do so.

[8]From RateWatch, we use the annual change (from June to June) in the twelve-month CD rate as it is the most

First, we exclude any deposit flows that coincide with the opening or acquisition of additional bank branches in the county. This captures if banks are actively seeking deposits through expanding their branch network (without changing the county-level deposit rates). Second, we exclude counties where the bank has limited competition (a county-level deposit HHI above the 90th percentile). This restriction recognizes that some banks have limited need to compete on rates (Drechsler, Savov, and Schnabl, 2017) and it is less clear that these deposit inflows are supply driven.

Our main measure assumes that a bank's benchmark for the decision to attract additional deposits is making changes from its previous deposit rate. However, banks could use alternative reference points, such as the Fed funds rate, the deposit rates of other banks, or other factors that we do not observe. Since we cannot clearly identify which of the reference points the bank uses, we use the bank's own previous deposit rate assuming that it most holistically encompasses the various factors the bank considers when determining its current deposit policy. Nevertheless, we create alternative versions of supply-driven deposits based on two potentially relevant benchmarks: changes in the spread of the bank's deposit rate relative to other banks' average rate, and the bank's deposit rate relative to the Fed funds rate.

II.B. Other Variables

For the analysis that separates deposits into insured and uninsured components, we use a similar classification scheme as for our main measure of supply-driven deposits. The only difference is that we use the rate paid on core deposits as the price measure for insured deposits, and the rate paid on uninsured time deposits as the price measure for uninsured deposits. In our analysis, we present these deposits both as growth rates and as changes scaled by lagged total deposits. Uninsured supply-driven deposit flows are more volatile than the base measure, with a standard deviation of 9.5%, but less variable than total uninsured deposit flows (17.3%).

The variables for bank activities include the quarterly growth in total loans and securities. We also use the quarterly change in total loans and securities scaled by lagged assets.[9] As measures of

frequently reported deposit rate across banks.

[9]For securities growth, we exclude from our definition government securities with less than three months to maturity,

bank earnings, we include the bank's gross income to assets and its ROA. For interest rate risk, we follow English, Van den Heuvel, and Zakrajšek (2018) and compute the quarterly change in the bank's maturity gap as the average difference between asset maturity and liability maturity in months. As an alternative measure of interest rate risk, we follow Drechsler, Savov, and Schnabl (2021) and estimate bank-specific sensitivities of interest income and interest expense to changes in the Fed funds rate.[10] We term the difference between the interest income and interest expense sensitivity as the bank's *Interest Rate Sensitivity Gap* and we use quarterly differences in *Interest Rate Sensitivity Gap* as a measure of changes in interest rate risk. For credit risk, we calculate the change in the risk-weighted assets and the quarterly growth in risky securities. Risky securities include non-agency MBS, ABS, non-government domestic securities, and foreign securities holdings.

As a measure of securities performance, we use the total losses on the bank's securities portfolio scaled by the prior's quarter total assets. Total losses include both the stated realized losses and any unrealized losses on both available-for-sale and held-to-maturity securities. For loan performance, we use the quarterly change in non-performing loans scaled by lagged assets. For deposit outflows, we use the quarterly growth rate in either total deposits or uninsured deposits.

The analysis uses lagged common bank-level variables such as the natural logarithm of total assets, equity to assets, and deposits to assets. We include the net interest margin (NIM) and ROA as measures of bank profitability. We also use the bank's average annual loan growth over the past three years.

The definitions of all of the variables are reported in Table A.1.

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as these are extremely liquid and cash-like. We find similar results if we include them.

[10]For each bank, we regress quarterly interest income or interest expense on the contemporaneous and three most recent quarterly changes in the Fed funds rate. Quarterly interest income and interest expense are scaled by average quarterly bank assets. These sensitivities are the sum of the coefficients on these four rate changes for each bank using a rolling 40-quarter (10-year) window. Because of the need for 40 quarters of prior bank data, this variable is not available for the entire sample.

III. Deposit Inflows and Bank Risk

III.A. The Effect of Supply-Driven Deposit Inflows on Bank Risk

We start the analysis by exploring what banks do with deposit inflows. To this end, we estimate different versions of the following baseline specification:

$$\text{Y}_{it} = \beta_1 \text{Supply-Driven Deposit Flow}_{it-1} + \beta_2 \text{Bank Controls}_{it-1} + \alpha_i + \gamma_t + \varepsilon_{it} \quad (1)$$

Here Y represents different balance sheet and risk variables of bank i in quarter t. We first analyze changes in lending and securities holdings. Then, we study the bank's reaching for yield behavior using measures of bank earnings and risk. For earnings, we use changes in gross income to assets and ROA as the outcome variables. For interest rate risk, we use the change in bank's maturity gap and its change in interest rate sensitivity gap. For credit risk, we use changes in the bank's risk-weighted assets and growth in risky securities holdings.

Our main measure of deposit inflows is *Supply-Driven Deposit Flow* as defined in Section II. We use this measure to address one of our main empirical challenges—disentangling the effect of deposit inflows from the ex-ante decision of the bank to engage in reaching for yield behavior and collect deposits to achieve this goal. The key idea is that these deposits are identified from an outward shift in the supply curve of depositor capital. These deposits from households and firms are not under the full control of the bank, as they are driven by cyclical economic factors or idiosyncratic depositor circumstances. Hence, this component of the flows is external to the bank and less expected, making it more suitable to our identification strategy.

Bank Controls include the bank's size, net interest margin (NIM), loan growth, ROA, and equity ratio. We also include the deposit ratio to account for the overall bank's reliance on deposits as a fraction of assets, separate of the effect of any inflows. We include bank fixed effects to account for any time-invariant bank characteristics and year-quarter fixed effects to control for macroeconomic factors that influence all banks and depositors in a given quarter. To ease interpretation, we standardize all continuous independent variables by their sample standard deviations. Standard errors are clustered by bank and the sample period is from 2001–2022.

Table II presents the results for the securities and loans portfolios. We find positive and statistically significant coefficients, meaning that banks utilize the additional funds to expand credit supply and hold more securities. The magnitudes are also meaningful. Banks with one standard deviation higher supply-driven deposit flows in the prior quarter expand their securities and loan portfolios in the current quarter by 83% and 9% of the sample mean, respectively (Columns 2 and 4).

The balance-sheet expansion is accompanied with reaching for yield behavior and increased bank risk. We find that banks that exhibit supply-driven deposit inflows improve their ROA and gross income but also increase their interest rate risk and credit risk. The fact that the marginal deposit inflow leads banks to take more risk is not obvious. In Section III.C, we provide evidence that banks are concerned with future equity issuance and respond by reaching for yield.

Table III presents the results. We estimate reaching for yield behavior using the change in the bank's gross income to assets ratio (Column 1) as it indicates the changes in the bank's income before netting the expenses (that might be affected by the deposit inflows). As an additional measure, we use the change in the bank's ROA (Column 2). We find positive and statistically significant coefficients, meaning that banks that experience deposit inflows engage more in reaching for yield behavior. A one standard deviation higher supply-driven deposit inflows is associated with a 0.0123 percentage point (pp) increase in the bank's gross income to assets ratio, and a 0.00825 pp increase in ROA. These effects are comparable in magnitude to the sample means of these variables.

Next, we show these inflows also coincide with more risk. We measure interest rate risk using the bank's maturity gap (Column 3) and the change in the interest rate sensitivity gap (Column 4). A one standard deviation higher supply-driven deposit inflow increases the maturity gap by 13% of the mean quarterly change. We choose to use changes in the maturity gap as our main measure of interest rate risk as it captures deviations in the maturity gap from the bank's ex-ante position, regardless if the bank was previously hedged against interest risk (Begenau, Piazzesi, and Schneider, 2015; Drechsler, Savov, and Schnabl, 2021; Drechsler, Savov, Schnabl, and Wang, 2023; McPhail, Schnabl, and Tuckman, 2023). This measure also allows us to capture immediate changes in interest rate risk, while interest rate sensitivities require a historical window to estimate. However, we show that the results also hold with this alternative measure. Using this measure, we find that a one standard deviation higher supply-driven deposit inflow increases the bank's interest rate sensitivity gap by 75% of the mean quarterly change.

Further, we find a positive effect of supply-driven deposit inflows on credit risk. Using the bank's risk-weighted assets to total assets as an overall measure of credit risk, we find that it increases following deposit inflows (Column 5). A one standard deviation higher supply-driven deposit inflow is associated with a 0.223 pp increase in risk-weighted assets to total assets.[11] In Column 6, we find these banks hold more securities associated with higher credit risk (e.g., private-label MBS, ABS, non-government domestic securities, and foreign securities).

The results in Table III show an increase in risk in the quarter following supply-driven deposit inflows. In Appendix Table A.2, we reproduce Table III but consider the income and risk measures over the subsequent four quarters. We find the estimates in the longer-run specification are similar to the main results. These results suggest that the bank's behavior does not revert shortly after receiving the deposit flows (in line with Bolton, Li, Wang, and Yang, forthcoming).

III.B. Variations on the Supply-Driven Measure

While our supply-driven measure is designed to address the reverse causality concern between the rise in risk and deposit inflows, in this section we introduce variations on the main measure to confirm the robustness of the results. These alternative measures address the possibility that the results are driven by non-price factors, heterogeneity in bank deposit collection across markets, depositors moving deposits for bank-specific factors, or differences in local market power of banks. We also show that the results are robust to alternative benchmarks for supply-driven deposits, not driven by periods of low interest rates or quantitative easing, and do not stem from credit line withdrawals, the COVID period, or the implementation of TLGP. Finally, to account for factors

[11] Plosser and Santos (2018) present the incentives for banks to bias their internally generated risk estimates. Despite this potential bias, we find a rise in risk-weighted assets, indicating that the our results may underestimate the full effect.

unobserved in our setting, we verify that the results hold after employing different Bartik-style instruments.

III.B.1. Alternative Measures of Supply-Driven Deposits

A concern regarding our results arises from depositors choosing to increase deposits in some banks more than others. Specifically, changes in the bank's characteristics might simultaneously affect deposit flows and the bank's risk-taking. We deal with this concern in our baseline specification in Equation (1) by including relevant bank controls, such as size, profitability, loan growth, and equity. Further, we perform a separate analysis to address this concern more directly: we conduct nearest neighbor matching based on an extensive set of variables used in prior studies to explain deposit flows (Acharya and Mora, 2015; Egan, Hortaçsu, and Matvos, 2017; Chen, Goldstein, Huang, and Vashishtha, 2022, forthcoming). Matching allows us to show the effect of deposit inflows in a setting with banks that are similar on a variety of observables. We match those banks that experience positive supply-driven inflows to other banks that do not using bank size, growth and profitability, riskiness, equity ratio, asset and funding composition.[12] The first row in Panel A of Table IV repeats the baseline specification in Equation (1) using the matched subsample for the change in gross income to assets (Column 1), change in maturity gap (Column 2), and change in risk-weighted assets (Column 3). Consistent to the results in Section III, we find that supply-driven deposits lead banks to engage more in reaching for yield and riskier activities. Comparing the magnitudes, we find similar effects in this restricted sample.

Banks can also collect deposits by providing monetary benefits to depositors other than more attractive deposit rates, such as promotions or other benefits. They can invest more in advertising the bank, without even offering any monetary benefits at all. To tackle this issue, we add an additional requirement to our supply-driven deposits inflows measure. This time we include only bank-quarters in which the bank does not increase advertising spending in the current or prior quarter (in addition

[12]The exact set of variables are lagged measures of ROA, ROE volatility, deposit rate, deposits to assets, equity to assets, bank size, real estate loans to assets, C&I loans to assets, NIM, loan growth, and two lags of quarterly changes in Fed funds rates and the CRSP value-weighted stock market return. The results of this initial matching regression are reported in Appendix Table A.3.

to the inclusion of only deposit inflows that do not occur with rate increases). This spending includes promotions for new or renewed deposit accounts. The second row in Panel A of Table IV presents the results with this alternative measure. We find the results remain and are statistically significant at the 1% level.

As mentioned, our measure excludes quarters in which the bank increases deposit rates. In other words, our assumption is that a bank's benchmark for the decision to attract additional deposits is making changes from its previous deposit rate. However, banks could use alternative reference points, such as the Fed funds rate, the deposit rates of other banks, or other factors that we do not observe. These alternative benchmarks assume that the bank seeks inflows relative to alternative assets for depositors, competition from other banks, or other economic drivers, respectively.

Since we cannot clearly identify which of the reference points the bank uses, we use the bank's own previous deposit rate assuming that it most holistically encompasses the various factors the bank considers when determining its current deposit policy. We also include time fixed effects in all our specifications to capture any economy-wide changes. Nevertheless, we focus on two relevant benchmarks in rows 3–4 of Panel A in Table IV. Specifically, we classify supply-driven deposit inflows using changes in the spread of the bank's deposit rate relative to other banks' average rate (row 3), and its deposit rate relative to the Fed funds rate (row 4). Using these alternative classification schemes, we find consistent results as in our main specification.

Alternatively, the results might be affected by heterogeneity in how banks seek deposits across different markets. This could affect the cleanness of the supply-driven deposit inflow measure, as the bank might raise deposit rates in one area and reduce them in others. These changes in deposit rates could be also affected by the local market power of the bank in collecting deposits. To this end, we construct a alternative measure of supply-driven deposits from more granular bank-county level deposit flows and changes in rates. This approach, using Summary of Deposits data for county-level bank deposits, allows us to identify supply-driven flows for each bank-county. The limitation is the data is only available annually. To determine supply-driven inflows, we identify flows that occur without a concurrent change in local deposit rates. In addition, we impose two further refinements. First, we exclude all deposit inflows in counties where the bank opens or acquires additional branches, as the bank chooses the timing and the location of opening new branches. Second, we exclude counties where the county-level deposit HHI is above the 90th percentile of the sample, as the deposit-collection behavior may differ in these less competitive counties (Drechsler, Savov, and Schnabl, 2017).

We aggregate the bank-county-level deposit flows classified as supply-driven to the bank level. As county-level deposits are reported each June, we perform the baseline specification in Equation (1) for the third quarter of each year. Row 5 in Panel A of Table IV presents the results, which are consistent with the main measure in Table III.

Another concern regarding the expansion of the bank's balance sheet following supply-driven deposit inflow is that differences in investment opportunities among some of the banks drive the observed effect. To this end, as a robustness test we match banks based on their physical footprint in the analysis of the recent U.S. banking turmoil episode in Section V. Thus, if there is a specific investment opportunity that coincides with supply-driven deposits in an area where only some banks operate, it would be accounted for in our setting. This allows us to compare two similarly situated banks, with only one experiencing significant supply-driven deposit inflows. Appendix Table A.5 presents the evidence that the results are not explained by differences in investment opportunities.

Besides the concerns addressed above, the results presented in Section III.A afford other alternative explanations. Low interest-rate environments may drive banks' reaching for yield behavior and correlate with supply-driven deposit flows. Other factors include the effect of QE on bank reserves (Acharya and Naqvi, 2012; Diamond, Jiang, and Ma, forthcoming; Acharya, Chauhan, Rajan, and Steffen, 2023), mechanical changes in deposits due to credit line withdrawals or utilizing loan commitments, the results being driven by the COVID period, or by the implementation of the Temporary Liquidity Guarantee Program (TLGP) following the global financial crisis.

In Panel B of Table IV, we perform different subsamples related to these concerns. First, we rerun the baseline specification in Equation (1) excluding all quarters in our sample that have effective Fed funds rates below 0.25%. Second, we exclude QE periods from the specifications.[13] Third, we exclude the TLGP period of 2008–2010, which is when the FDIC fully guaranteed noninterest-bearing transaction accounts held at participating banks and thrifts. Fourth, we exclude the COVID period (i.e., 2020 onwards) to confirm the results are not only driven by this period. Across these subsamples, the results remain similar in terms of economic magnitude and are all statistically significant at the 5% level or higher.

Finally, we verify that the rise in deposits is not a mechanical result of credit line withdrawals or utilizing established loan commitments (Li, Strahan, and Zhang, 2020). The demand for precautionary liquidity by households and firms might affect their usage of loans and credit lines. This usage translates into larger deposits in the bank, which raises the concern that the rise in deposits is not driven by new funds. We note that as we investigate the effect of the prior quarter's deposit flows on this quarter's bank behavior, it is less likely to be a purely mechanical result. Nevertheless, we add to the baseline specification in Equation (1) control variables for changes in credit lines: the lagged commitments to assets ratio and the contemporaneous change in commitments. We also add comparable variables for loans, i.e., the lagged loans to assets ratio and the contemporaneous change in loans. In Panel B of Table IV, we find results consistent with the main specification.

III.B.2. Bartik-Style Instruments

As an alternative approach to test the robustness of our main results, we employ three different Bartik-style instruments (Bartik, 1991). In the context of loans and deposits, similar instruments have been employed by Greenstone, Mas, and Nguyen (2020), Schiantarelli, Stacchini, and Strahan (2020), Diamond, Jiang, and Ma (forthcoming), and Stulz, Taboada, and van Dijk (2023). We construct these instruments in the following steps. First, we split the universe of banks into quintiles by size. For the first Bartik instrument, which uses bank-level Call Report data, we calculate each bank's share of deposits within its size quintile from five years prior. We calculate growth using aggregate quarterly deposit flows within each size quintile, excluding the bank's own flows from

[13]These periods are 2008Q4–2010Q2, 2010Q4–2011Q2, 2012Q3–2014Q4, and 2020Q1–2021Q4.

these calculations. The first Bartik instrument for each bank is the sum of its lagged market share multiplied by these aggregate deposit flows.

The identifying assumption of this instrument is that the bank deposit share from five years ago is exogenous to shocks to the bank's current risk-taking behavior (ε_{it} in Equation (1)), conditional on the other control variables and bank and year fixed effects (Goldsmith-Pinkham, Sorkin, and Swift, 2020). To avoid a finite sample bias, we exclude the bank's own deposit growth from the growth component of the instrument. The idea behind the instrument is to avoid unobserved bank policy changes that affect both the flow of supply-driven deposits and the bank's risk-taking. We note that as we already control for deposit rate increases, this policy would need to work through non-price channels.

The second and third Bartik instruments leverage the Summary of Deposits (SOD) data to introduce a geographical component. Here we use the bank's share of its total deposits in a given county (second instrument) or state (third instrument) from five years prior, and multiply these shares with the current annual deposit flows. For the deposit flows, we calculate the annual deposit growth within each size quintile, excluding any flows in that specific county (second instrument) or state (third instrument). We also exclude the bank's own deposit flows from the calculation. The instrument is aggregated to the bank level using the county deposit weights (second instrument) or state deposit weights (third instrument). Given the SOD data, the instruments are calculated on an annual basis through June of each year.

Table V presents the results for the main bank variables (gross income to assets, changes in maturity gap, and changes in risk-weighted assets) using these different instruments. Column 1 presents the first-stage estimate of the Bartik instrument on the supply-driven deposit flow variable. Here we find evidence that banks with a larger historical deposit share receive higher supply-driven deposit inflows. For the second and third instruments, based on annual county-level and state-level data, we switch to the annual version of supply-driven deposit flows that we derive from the SOD data. For these instruments, we also restrict the analysis on bank outcomes to the third quarter of each year, immediately after we measure the deposit flows at the end of June. Columns 2, 3, and

4 present the second stage results using these instruments. Across all three instruments, we find statistically significant effects of higher supply-driven deposits on bank outcomes. The instrumented estimates are more positive than the uninstrumented versions in Tables III and IV. This suggests that our baseline estimates might understate the effect of supply-driven deposits on bank risk-taking.

III.C. Equity Issuance Concerns

The result that supply-driven deposit inflows lead to banks taking additional risk is not obvious, as a marginal deposit inflow does not necessarily require banks to take more risk. However, consistent with a class of leverage-related banking models (e.g., Brunnermeier and Sannikov, 2014; Hugonnier and Morellec, 2017; Bolton, Li, Wang, and Yang, forthcoming), we argue that the bank's reaching for yield behavior is related to future equity issuance costs.

Generally, banks find it beneficial to finance themselves with deposits due to their unique characteristics compared to other liabilities. Reasons for this preference include mispriced deposit insurance, the existence of a liquidity premium on deposits, and the tax deductibility of debt payments (Gorton and Pennacchi, 1990; DeAngelo and Stulz, 2015; Hugonnier and Morellec, 2017). However, deposits levels are not under the full control of the bank, and the maturities of the deposits are not predetermined (Drechsler, Savov, and Schnabl, 2021; Bolton, Li, Wang, and Yang, forthcoming). This leads to uncertainty regarding its leverage and is particularly acute for supply-driven deposits, as the bank is not actively seeking these deposits and does not expect the change in leverage. We argue that these additional deposits raise the concern that the bank would need to raise additional equity. Such issuances are costly to the bank and current shareholders because of adverse selection concerns (Myers and Majluf, 1984), and current shareholders will demand additional return to compensate for this expected cost. To provide evidence that this friction is central to bank behavior, we conduct four analyses.

First, we provide evidence that equity issuance concerns are more likely to be realized following supply-driven deposit inflows. Figure 2 plots the percent of equity issued as a function of the prior quarter's supply-driven deposit flow. The figure shows that banks with higher supply-driven deposit inflows issue more common and preferred equity (net of retirements) in the following quarter. Since the figure provides univariate evidence, in Appendix Table A.4 we run regression specifications similar to Equation (1). We find even with additional controls and bank and year-quarter fixed effects, that an increase in supply-driven deposits is associated with a higher likelihood of issuing equity (Column 1) and a larger fraction of equity issued (Column 2). Both results are statistically significant at the 1% level.

As further anecdotal evidence, in 2020 the banking system experienced large deposit inflows, and banks like Silicon Valley Bank, First Republic Bank, and Signature Bank exhibited significant supply-driven inflows. These banks all raised equity in 2021.[14]

Next, we show more formally the key role of equity issuance concerns for banks that experience supply-driven deposit inflows. We use two approaches to capture a bank's equity issuance concerns: one based on equity (Section III.D), and one based on uninsured deposits (Section III.E).

III.D. Equity Issuance Concerns: Analysis by Equity Ratio

First, we split banks by their equity ratios. Banks that are closer to the regulatory threshold are more affected by any unexpected deposit inflows. We define the least capitalized banks as those in the bottom tercile of the lagged equity to assets distribution each quarter. We compare them to the most capitalized banks, which are in the top tercile of lagged equity to assets. In Panel A of Table VI, we reestimate our baseline specification for three measures of reaching for yield and bank risk, splitting the sample by equity. We find the effect of supply-driven deposit inflows are uniformly stronger for the low equity banks (Columns 1, 3, and 5) than for the high equity banks (Columns 2, 4, and 6).

To further show the effect of equity issuance concerns, we utilize a regulatory change in the equity issuance costs for community banks. Since 2013, all U.S. banks had to comply with four different capital requirements: Common Equity Tier 1 Capital Ratio, Tier 1 Capital Ratio, Total Capital Ratio, Tier 1 Leverage Ratio. In 2018, Congress passed the Economic Growth, Regulatory Relief, and Consumer Protection Act. Section 201 of the Act directed regulatory agencies to

[14]See `https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/us-banks-raise-1-33b-in-common-equity-in-the-first-2-months-of-2021-63133532`.

establish the Community Bank Leverage Ratio (CBLR) framework as a simple alternative to assess the capital adequacy of community banks. In 2019, the regulatory agencies published the final rule entitled "Regulatory Capital Rule: Capital Simplification for Qualifying Community Banking Organizations" that defined the CBLR framework, which replaced the four capital requirements of the generally applicable rule with a tier 1 leverage ratio requirement. The rule became effective on January 1, 2020.

Under the final rule, community banks were able to opt into the CBLR framework if their total consolidated assets are less than $10 billion, tier 1 leverage ratio exceeds 9 percent, average total off-balance sheet exposures are 25 percent or less of average total consolidated assets, trading assets and liabilities are 5 percent or less of average total consolidated assets, and the bank is not an advanced approaches institution.

This regulatory change relaxed regulatory capital requirements for community banks that had high enough tier 1 leverage ratio by eliminating the need to comply with four different measures simultaneously. This relaxation therefore reduces their equity issuance concerns when experiencing supply-driven deposit inflows. Thus, we use this regulatory change to perform the following difference-in-differences analysis:

$$
\begin{aligned}
\mathrm{Y}_{it} = {} & \delta_1 \text{Treated}_i \times \text{Post}_t \times \text{Supply-Driven Deposit Flow}_{it-1} + \delta_2 \text{Treated}_i \times \text{Post}_t \\
& + \delta_3 \text{Treated}_i \times \text{Supply-Driven Deposit Flow}_{it-1} + \delta_4 \text{Post}_i \times \text{Supply-Driven Deposit Flow}_{it-1} \\
& + \delta_5 \text{Supply-Driven Deposit Flow}_{it-1} + \delta_6 \text{Bank Controls}_{i,2019Q4} \times \text{Post}_t + \alpha_i + \gamma_t + \varepsilon_{it} \qquad (2)
\end{aligned}
$$

Here Y represents different reaching for yield and risk variables of bank i in quarter t, which were analyzed in Section III.B: changes in the bank's gross income to assets, maturity gap, and risk-weighted assets. *Treated* is equal to one for community banks that potentially qualify for the change given their total assets, off-balance sheet exposures, and trading assets and liabilities. The control group includes banks with $10–50 billion in total consolidated assets (the next asset-size group for banks, as classified by the Fed).[15] We also conduct nearest neighbor matching between treatment and control banks at the end of 2019 using the same set of bank characteristics as in Section III.B.1 (besides size). This enables us to verify that the results hold among a subset of the most similar banks that differ only if they were eligible for the regulatory relaxation. We use a tight four-year window around the implementation of the rule. *Post* equals one for 2020–2021, and zero for 2018–2019. The rest of variables are as defined in Equation (1). To avoid the "bad controls" problem (Angrist and Pischke, 2009), the control variables are fixed in 2019Q4, before the regulatory change. We interact these variables with the *Post* indicator, which allows these characteristics to have their own independent effects on the outcome variables of interest.[16]

Panel B of Table VI presents the results of this specification. We present only the coefficients of the main explanatory variable, *Treated* $\times$ *Post* $\times$ *Supply-Driven Deposit Flow*, but include all the interactions between these variables. In all the columns, the triple interaction term is negative and statistically significant. In line with the previous results, the reduction in the equity issuance concerns among the treated banks led them to reduce reaching for yield behavior and riskiness following supply-driven deposit flows.

III.E. Equity Issuance Concerns: Analysis by Uninsured Deposits

To provide further empirical evidence for equity issuance concerns, in this section we split banks by their use of uninsured deposits. In our sample, uninsured deposit flows are three times more volatile than the insured ones. The higher volatility of uninsured deposits exacerbates the concern that the bank will cross the boundary where it needs to issue equity. Consequently, we expect banks with a higher share of uninsured deposits to engage more in reaching for yield behavior following supply-driven deposits inflows to compensate shareholders for the higher likelihood of costly equity issuances. To this end, in Panel A of Table VII we perform a similar analysis to the one in Panel

[15] We choose to exclude the community banks that did not qualify for the regulatory change, as banks could adjust and change their assets and liabilities composition in response to the regulation. In unreported tests, we include these banks in the control group and find similar results.

[16] We find similar results if we allow these controls to enter with a lag rather than fixing them and interacting them with the *Post* indicator.

A of Table VI, splitting between banks with high and low shares of uninsured deposits (top and bottom terciles of lagged uninsured deposits to assets, respectively). Consistent with the higher equity issuance concerns, we find stronger effects in banks with more uninsured deposits (Columns 1, 3, and 5).

Additionally, we delve deeper into the uninsured deposits mechanism by splitting supply-driven deposit inflows into insured and uninsured components. Performing our baseline specification in Equation (1), we find that the latter category drives the rise in bank risk. Panel B in Table VII presents the results for our main measures of reaching for yield and riskiness. Columns 1–3 uses the quarterly growth rate in insured and uninsured supply-driven deposits. In Columns 4–6, we scale these changes by lagged total deposits to capture the importance of each type of deposit inflow to the funding structure of the bank. While both insured and uninsured supply-driven deposit inflows increase the bank's reaching for yield and risk measures, the uninsured deposits have a consistently stronger effect. For changes in gross income, the effects are 78% (Column 1) or 95% larger (Column 4). Maturity gap effects are 34% (Column 2) or 17% larger (Column 5). The differences in risk-weighted assets are the most pronounced: seven times larger (Column 3) or six times larger (Column 6). Although uninsured depositors are often considered monitors of bank risk-taking behavior, we provide evidence that the equity issuance concerns dominate the monitoring effect.

IV. Bank Performance and Deposit Outflows in Periods of Monetary Tightening

In this section, we show the consequences of the increased risk-taking presented in the previous section during monetary policy tightening. We utilize monetary tightening periods to analyze the implications of the bank's actions after receiving supply-driven deposit inflows, as rising interest rates typically lead to losses on existing security exposures, and higher default risk for existing borrowers. To this end, we perform a similar specification as in Equation (1), but interact our main explanatory variable *Supply-Driven Deposit Flow* with the quarterly change in the Fed funds rate, as follows:

$$
\begin{aligned}
\text{Y}_{it} = {} & \beta_1 \text{Supply-Driven Deposit Flow}_{it-1} + \beta_2 \text{Supply-Driven Deposit Flow}_{it-1} \times \Delta \text{ FF Rate}_{t-1} \\
& + \beta_3 \text{Bank Controls} + \beta_4 \text{Bank Controls} \times \Delta \text{ FF Rate}_{t-1} + \alpha_i + \gamma_t + \varepsilon_{it} \qquad (3)
\end{aligned}
$$

Here Y represents different performance measures of bank i in quarter t. We focus on total securities losses (realized and unrealized) out of lagged assets, and on the change in non-performing loans scaled by lagged assets (as the main proxy for credit losses). Bank controls are the same as in Equation (1), with a few additions. For the analysis of securities losses and non-performing loans, we include the lagged ratios of securities to assets and loans to assets. These inclusions allow us to determine whether increased supply-driven deposit inflows affect performance outcomes, separate from the amount of securities and loans the bank holds. All bank controls are interacted with the change in the Fed funds rate. This additional layer of robustness makes sure that the monetary tightening effect is operating through the recent supply-driven inflows, and not some other bank characteristic.[17]

Table VIII presents the results for the bank performance measures. Columns 1–3 show the results for securities losses. In Columns 4–6, we present the results for the change in non-performing loans. Columns 1 and 4 use the full sample. In the other columns, we split banks into low equity ratios (Columns 2 and 5) and high equity ratios (Columns 3 and 6). The securities losses and NPL measures are scaled by 100.

We find that the interaction terms are positive and statistically significant for the low equity banks, meaning that banks with higher supply-driven deposit flows in the prior quarter exhibit bigger losses in periods of monetary tightening. These banks face the highest equity issuance concerns, which leads them to increase risk the most (as shown in the previous section). For a one pp increase in the Fed funds rate, banks with a one standard deviation higher deposit inflow exhibit 31% and 74% higher securities and credit losses compared to their sample means, respectively. We do not

[17]All continuous control variables are standardized by their sample standard deviations with the exception of the change in the Fed funds rate, which is in percentage points.

find statistically significant effects for the high equity banks.

Banks that exhibit supply-driven deposit inflows seek to overcome equity issuance concerns by reaching for yield. However, the higher risk and the negative outcomes during monetary tightening lead to heightened concerns regarding the solvency of the banks, making them more prone to deposit outflows. To this end, we perform a similar specification as in Equation (3), but the outcome variable is the change in total deposits.[18] We also include the lagged deposit rate as an additional control variable. Table IX presents the results for this analysis. Column 1 uses the full sample of banks, Columns 2 and 3 split the sample between less capitalized (lowest tercile of equity to assets) and more capitalized banks (highest tercile of equity to assets). Columns 4 and 5 split between less and more solvent banks, as proxied by the lowest and highest Z-score terciles, respectively.

For all banks, we find that prior supply-driven deposit inflows negatively affects current deposit growth when the Fed funds rate changes. A bank with one standard deviation higher supply-driven deposit inflows exhibits 0.187 percentage point more negative deposit growth, following a one pp increase in the Fed funds rate (Column 1). The negative growth in deposits indicates that banks exhibit deposit outflows. In periods of monetary tightening, higher prior supply-driven inflows lead to higher current deposit outflows.

Splitting the sample, the effect is 21% larger for less capitalized banks than the more capitalized banks. This lines up with the results in Table VIII that banks with less equity take more risk and experience greater losses. When comparing banks by solvency risk, the banks in the lowest tercile by Z-score experience 80% more outflows for a one standard deviation increase in deposit inflows and a one pp increase in the Fed funds rate than the highest tercile banks by Z-score.

To further show that equity issuance concerns contribute to our results, we focus on the effect of prior supply-driven uninsured deposit inflows, and interact them with the change in the Fed funds rate. To be consistent, in this analysis the outcome variable is the growth in uninsured deposits. Table X presents the results of this specification. Consistent with the bigger rise in bank risk that stem from uninsured deposit inflows, we find that current uninsured deposit outflows increase with

[18]We do not include the additional securities and loan control variables, although we obtain similar results if we include them.

these prior inflows. The higher volatility of uninsured deposits leads the bank to take more risk. The heightened concerns among uninsured depositors regarding solvency lead them to pull more of their funds from these banks.

In sum, we establish that supply-driven deposit inflows raise equity issuance concerns, which lead to higher risk. In times of monetary tightening, the outcomes of these banks are more negative and they experience deposit outflows, which are mainly driven by uninsured depositors.

V. The Effect of COVID Deposit Inflows on the 2022–2023 U.S. Bank Fragility

In this section, we analyze the recent period of U.S. bank fragility and show that the mechanism presented in the previous sections plays a key role during this episode. We argue that the seeds for the 2022–2023 bank fragility were planted during the COVID period in 2020–2021. Significant and unexpected deposit inflows occurred in 2020–2021, following a rise in risk-aversion of firms and households with the onset of the COVID pandemic, and subsequent government stimulus policies (Levine, Lin, Tai, and Xie, 2021). These large inflows put significant strain on the banking system, particularly from the perspective of equity issuance concerns. Indeed, the issue was sufficiently acute that the Federal Reserve temporary relaxed the Supplementary Leverage Ratio rule in April 2020, which applies to banks over $250 billion in assets.[19] Our claim is that these inflows led banks to reach for yield and take on additional risk in 2020–2021, which exposed them to the subsequent bank fragility observed following monetary policy tightening in 2022–2023.

The unexpected nature of the initial deposit inflows in 2020–2021 provides an opportunity to further establish our mechanism, as the deposit inflows during this period are unlikely to be driven by bank decisions. However, unobserved factors can affect the heterogeneity of inflows across banks. To be conservative, we take the following steps. First, we focus only on deposit inflows during the first two quarters of the pandemic (2020Q1 and 2020Q2), when the rise in deposits was least anticipated. Second, we only use the subset of deposit inflows that we identify as supply driven and consider banks with some positive supply-driven inflows in this period. This is to avoid including

[19] See `https://www.federalreserve.gov/newsevents/pressreleases/bcreg20200401a.htm`. The relaxation was in effect until March 31, 2021.

banks that are not receiving inflows for potentially idiosyncratic reasons such as poor performance during this time. From these inflows, we categorize as treated those banks in the top tercile by supply-driven deposit flows, and as control those banks in the bottom tercile by supply-driven deposit flows. Again, both groups experience some positive supply-driven inflows, but differ in the magnitude of their inflows. Third, we conduct nearest neighbor matching between treatment and control banks at the end of 2019 using the same set of bank characteristics as in Section III.B.1 that have been identified in the literature to affect deposit flows to banks (Acharya and Mora, 2015; Egan, Hortaçsu, and Matvos, 2017; Chen, Goldstein, Huang, and Vashishtha, 2022, forthcoming). The motivation for these various steps is to make the treated and control banks as similar as possible, with the exception of the amount of supply-driven inflows they received in the first part of 2020.

Both Silicon Valley Bank and Signature Bank, two of the bank failures in 2023, are classified in the treatment group. It also includes other banks that experienced significant deposit outflows later in 2023, such as PacWest, Western Alliance, and Charles Schwab. The treated banks have a larger presence in California and other areas with relatively dominant high-tech industry that exhibited stronger economic performance during the COVID period. Banks classified in the control group include New York Community, Barclays, and BankUnited.

Using this sample, we perform the following difference-in-differences analysis to capture the risk effects following the deposit inflows:

$$\mathrm{Y}_{it} = \delta_1 \mathrm{Treat}_i \times \mathrm{Post}_t + \delta_2 \mathrm{Bank\ Controls}_{i,2019Q4} \times \mathrm{Post}_t + \alpha_i + \gamma_t + \varepsilon_{it} \qquad (4)$$

Here Y represents different variables for bank i in quarter t. These include the change in gross income to assets, maturity gap, and risk-weighted assets. *Post* is an indicator that equals one for 2020Q3–2021Q4, the period before the Fed started raising interest rates. *Bank Controls* include same set of controls as in the previous sections, such as the bank's size, equity to assets ratio, NIM, profitability, loan growth, and deposits ratio. To avoid the "bad controls" problem (Angrist and Pischke, 2009), we fix the control variables just before the shock in 2019Q4. We interact these variables with the *Post* indicator, which allows these characteristics to have their own independent effects on the outcome variables of interest. These interactions control for a host of alternative channels that are correlated with but not the exact mechanism in which we are interested. We also include bank and year-quarter fixed effects. For this analysis, our time window is 2019Q1–2021Q4.

Figure 3 presents the average supply-driven deposit flow for the treatment and control banks. The deposit inflow shock occurs in 2020Q1–2020Q2. The figure shows that prior to 2020, the treated and the control groups had a similar trends in supply-driven deposit inflows. This strongly suggests that the treated and control banks did not have systematic differences which lead to different levels of deposit inflows before the shock. In 2020Q1–2020Q2, the supply-driven inflows to the treated banks rise significantly relative to the control group. While the differences in the subsequent quarters become much smaller, there is no evidence that the inflows reverse. Overall, the treated banks experience a large shock of deposit flows in the first half of 2020 that are not undone in the rest of 2020 and 2021.

Panel A in Table XI presents the results for the change in gross income to assets (Columns 1 and 2), interest rate risk (Columns 3 and 4), and credit risk (Columns 5 and 6), both with and without other controls. Consistent with the earlier results, we find that the treated banks reach for more yield and increase their risk significantly more than the control group. Relative to the control group, the magnitudes are meaningful. The treated banks increased gross income, maturity gap, and risk-weighted assets by 0.01 pp (Column 2), 0.66 months (Column 4), and 1.18 pp (Column 6), respectively. All of these effects are much larger than the sample means and significant fractions of the sample standard deviations (7%, 16.5% and 34.9%, respectively).[20]

To show that the equity issuance concerns mechanism also plays a key role during this period, in Panel B of Table XI we reintroduce our sample splits by high and low equity ratios. Here we include all the bank controls and use the equity ratios as of 2019Q4 to divide the sample. Although changes in gross income are not significant when dividing the sample (Columns 1 and 2), we find statistically significant effects for changes in maturity gap and risk-weighted assets with larger magnitudes for the low equity subsample, i.e., the banks that experience higher equity issuance

[20]Appendix Table A.5 repeats this analysis but includes additional matching on geographic footprint, as discussed in Section III.B.1. Results are similar.

concerns (Columns 3, 5).

In Panel C of Table XI, we split the sample into high and low terciles by uninsured deposits to assets as of 2019Q4. Here we find similar evidence of differential risk-taking. The banks that rely most on uninsured deposits before the shock have the greatest increases in gross income, maturity gap, and risk weighted assets. Overall, we find that substantial supply-driven inflows lead these banks to increase risk, and the effects are stronger for banks with higher ex-ante concerns about future equity issuance.

Finally, we investigate if the same banks that increase risk in 2020–2021 experience deposit outflows when monetary policy tightens in 2022–2023. Figure 4 shows that banks with large deposit inflows during the COVID period are more likely to experience deposit outflows in 2022–2023, when the Fed funds rate increased from near zero to almost five percent. In Table XII, we consider the effect of the 2022 rate hikes on the outflows of total deposits. Here the difference-in-differences setup is very similar to Equation (4) with a few adjustments. First, the sample window runs from 2019–2022 to include the rate increase. Second, the *Post* indicator equals one in 2022Q1–Q4, when the Fed's interest rate hikes begin. Otherwise, the treatment and control definitions, bank control variables, and sample matching are the same.

Columns 1 and 2 consider the full sample of banks. We find that the treated banks have on average around 2.5 pp additional deposit outflows in 2022Q1–Q4 compared to the control banks, equivalent to 46% of the sample standard deviation. These results are similar with and without bank controls and are statistically significant at the 1% level. In Columns 3 and 4, we subsample banks into low and high equity groups, and find a stronger effect for the low equity banks. We find similar patterns when splitting the banks by Z-score (Columns 5 and 6).

VI. Conclusion

In this paper, we study the effect of supply-driven deposits, i.e., inflows that do not stem from a bank actively seeking them, but from depositors deciding to increase deposits, for reasons unrelated to the bank. We show that they lead banks to compensate shareholders for more frequent costly equity issuance concerns by reaching for yield and increasing risk. As a result, in periods of monetary tightening, banks that experienced supply-driven deposit inflows face higher losses and deposit outflows. Uninsured deposit inflows are the main driver of the rise in risk, as they represent the major source of deposit volatility, raising more equity issuance concerns. This mechanism also plays a key role in understanding the 2022–2023 U.S. bank fragility episode, as the risk exposures of banks were amplified following deposit inflows in 2020–2021. This in turn sparked larger losses and deposit outflows following the rise in the Fed funds rate in 2022–2023. Our results point to an underlying mechanism that helps explain the observed results documented in recent papers, and the media coverage of the recent fragility episode.

High deposit inflows can serve as an early indicator for understanding changes in bank risk and future deposit outflows—and even runs to the bank—assisting depositors, bankers, stakeholders, and policymakers.

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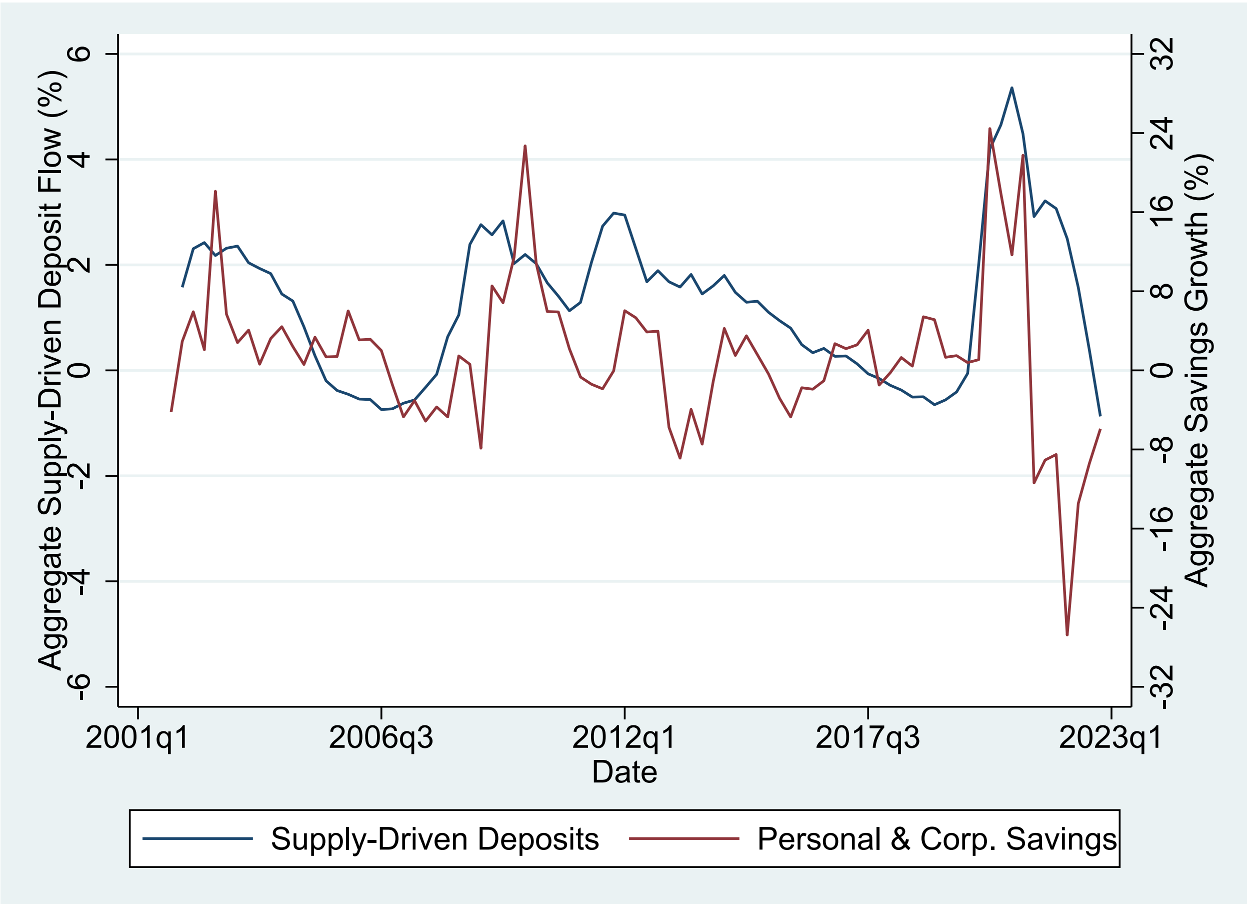

Figure 1: The figure plots the aggregate supply-driven deposit flow for all banks (left axis) and aggregate personal and corporate savings growth (right axis). Both growth rates are smoothed over the prior four quarters.

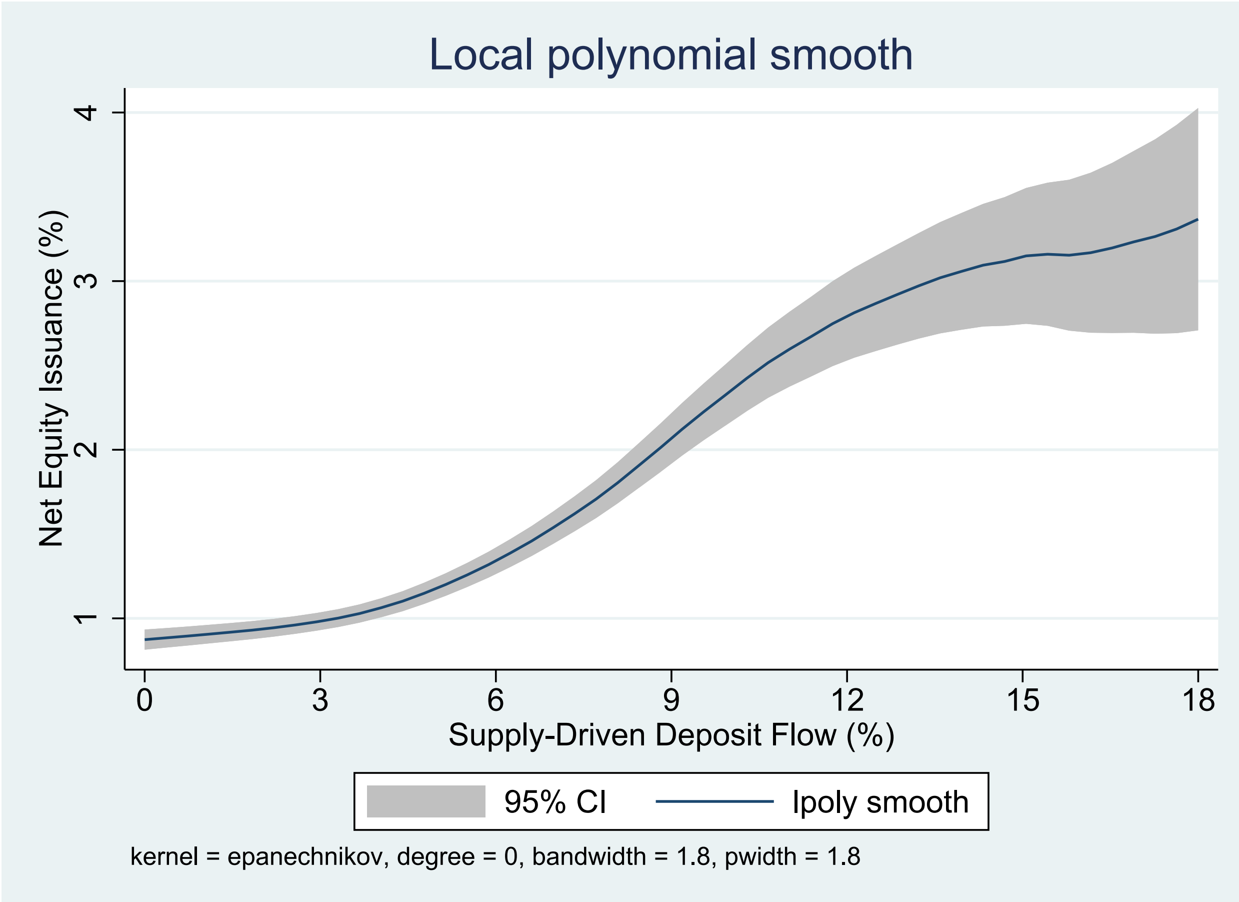

Figure 2: The figure plots the percent of equity issued as a function of the prior quarter's supply-driven deposit flow.

Figure 3: The figure plots the average supply-driven deposit flow for treatment and control banks for each quarter from 2019Q1 to 2021Q4. The deposit inflow shock occurs in 2020Q1 and 2020Q2 (shaded region). The treatment group are banks with supply-driven deposit inflows in the top tercile (among those banks with positive supply-driven inflow) in 2020Q1 and 2020Q2, while control banks are in the bottom tercile (among those banks with positive supply-driven inflow). Treatment and control banks are matched on bank characteristics as of 2019Q4.

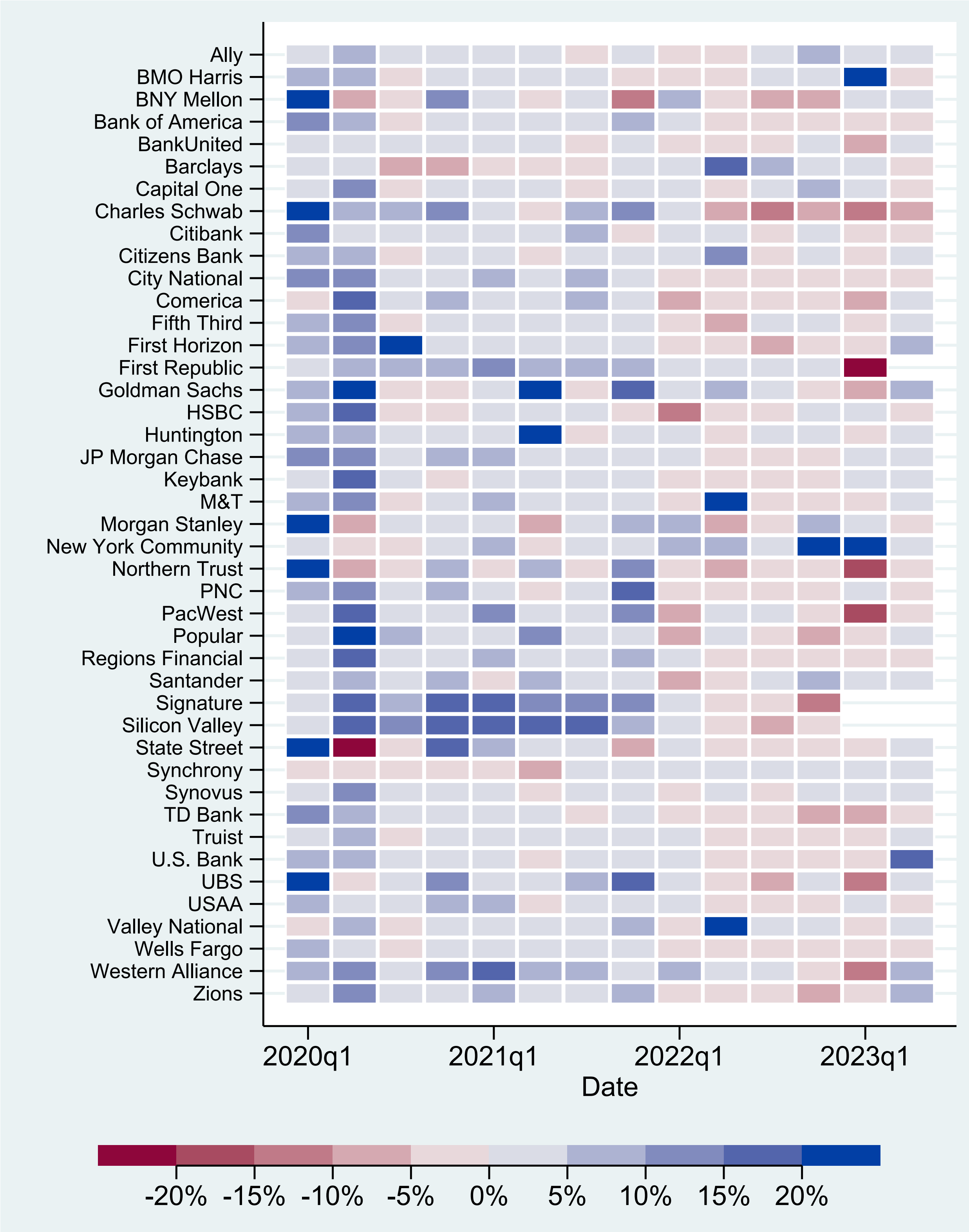

Figure 4: Quarterly deposit flows for largest banks, 2020Q1–2023Q2. Percent change in domestic deposits from Call Report data.

Table I: Summary Statistics

This table presents the summary statistics for our main variables. Our sample of U.S. banks is from 2001–2022. Variable definitions are provided in Appendix Table A.1.

	Mean	Std Dev	25th Pctile	Median	75th Pctile	# Obs.
Bank Asset and Risk Measures						
Securities Growth (%)	0.99	16.1	-5.10	-0.40	5.69	455,932
Δ Securities to Lag Assets (×100)	0.23	2.48	-0.84	-0.031	1.05	455,932
Loan Growth (%)	1.46	5.23	-1.18	1.11	3.59	455,932
Δ Loans to Lag Assets (×100)	1.02	3.33	-0.69	0.67	2.28	455,932
Δ Gross Income to Assets (×100)	-0.0050	0.15	-0.060	-0.000073	0.054	455,932
ROA (×100)	0.0022	0.0028	0.0013	0.0023	0.0033	455,932
Δ ROA (×100)	-0.0023	0.22	-0.054	0.0012	0.053	455,932
Maturity Gap (months)	55.3	32.1	31.9	49.1	72.4	455,928
Δ Maturity Gap (months)	0.38	3.98	-1.54	0.13	2.04	455,928
Risk-Weighted Assets (×100)	67.5	13.8	58.8	68.7	77.4	433,410
Δ Risk-Weighted Assets (×100)	0.025	3.38	-1.39	0.12	1.56	432,112
Interest Rate Sensitivity Gap (×100)	22.5	109.5	-18.1	-5.46	15.9	267,443
Δ Interest Rate Sensitivity Gap (×100)	-0.40	112.1	-9.11	-0.53	8.00	260,253
Risky Securities Growth (%)	-0.38	30.1	-3.63	0	1.22	146,211
Securities Losses to Lag Assets (×100)	-0.023	0.69	-0.27	-0.024	0.16	455,932
Δ NPL to Lag Assets (×100)	0.0090	0.44	-0.082	0	0.069	455,932
Equity Issuance Indicator	0.43	0.50	0	0	1	89,327
Net Equity Issuance (%)	1.34	5.60	0	0	0.36	89,327
Bank Deposit Measures						
Total Deposit Growth (%)	1.53	5.49	-1.42	0.98	3.75	455,928
Supply-Driven Deposit Flow (%)	1.00	3.61	0	0	0.91	455,932
Uninsured Deposit Growth (%)	1.80	17.3	-4.97	2.01	9.36	454,635
Supply-Driven Uninsured Deposit Flow (%)	1.31	9.46	0	0	0	454,650
Δ Supply-Driven Unins. to Total Dep. (×100)	0.47	2.94	0	0	0	455,932
Insured Deposit Growth (%)	1.48	7.07	-1.47	0.49	2.80	455,696
Supply-Driven Insured Deposit Flow (%)	0.90	4.69	0	0	0	455,705
Δ Supply-Driven Ins. to Total Dep. (×100)	0.62	2.99	0	0	0	455,932

Table I: Summary Statistics—*Continued*

	Mean	Std Dev	25th Pctile	Median	75th Pctile	# Obs.
Other Bank Controls						
Log Assets	12.2	1.41	11.3	12.1	12.9	455,932
NIM	0.034	0.0073	0.030	0.034	0.038	455,932
3-Year Loan Growth	0.20	0.33	0.022	0.16	0.32	455,932
Equity to Assets	0.11	0.042	0.088	0.10	0.12	455,932
Deposits to Assets	0.83	0.076	0.80	0.85	0.88	455,932
Securities to Assets	0.22	0.15	0.11	0.19	0.31	455,932
Loans to Assets	0.63	0.16	0.54	0.66	0.75	455,932
Commitments to Assets	0.045	0.048	0.0093	0.031	0.064	455,932
Δ Commitments to Lag Assets	0.0011	0.012	-0.0028	0	0.0038	455,932
Uninsured Deposits to Assets	0.27	0.13	0.18	0.26	0.35	455,932
Z-Score	1.62	1.30	0.68	1.29	2.18	455,696
Total Deposit Rate	-0.000036	0.00048	-0.00018	-0.000030	0.000093	455,932
Uninsured Deposit Rate	0.017	0.023	0.0038	0.0092	0.020	442,265
Core Deposit Rate	0.0026	0.0022	0.00087	0.0018	0.0039	455,732
ROE Volatility	0.015	0.023	0.0047	0.0079	0.015	455,696
Real Estate Loans to Assets	0.44	0.19	0.32	0.46	0.58	455,932
C&I Loans to Assets	0.025	0.054	0	0	0.0065	455,932
Wholesale Funding	0.19	0.11	0.12	0.18	0.25	455,932
Macroeconomic Variables						
Δ FF Rate (%)	-0.032	0.48	-0.032	0.0017	0.057	88
VW CRSP Return (%)	0.66	2.98	-0.36	1.23	2.41	88

Table II: Supply-Driven Deposit Flows and Bank Activities

The table presents the effect of deposit flows on bank assets. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. *Loan Growth* and *Securities Growth* are the quarterly growth in total loans and securities (as percents), respectively. Δ *Loans to Lag Assets* and Δ *Securities to Lag Assets* are the quarterly change in total loans and securities, respectively, divided by lagged assets (scaled by 100). All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Securities Growth (1)	Δ Securities to Lag Assets (2)	Loan Growth (3)	Δ Loans to Lag Assets (4)
Supply-Driven Deposit Flow	0.938***	0.190***	0.122***	0.0882***
	(0.0365)	(0.00601)	(0.0133)	(0.00813)
Log Assets	-0.630***	-0.203***	-2.167***	-1.553***
	(0.195)	(0.0296)	(0.103)	(0.0750)
NIM	-0.0827	0.00737	-0.662***	-0.314***
	(0.0586)	(0.00888)	(0.0294)	(0.0182)
3-Year Loan Growth	0.0911**	-0.0162**	0.733***	0.571***
	(0.0438)	(0.00656)	(0.0199)	(0.0140)
ROA	0.168***	0.0407***	0.417***	0.292***
	(0.0469)	(0.00638)	(0.0185)	(0.0118)
Equity to Assets	0.696***	0.116***	0.851***	0.516***
	(0.0937)	(0.0137)	(0.0600)	(0.0392)
Deposits to Assets	1.129***	0.206***	0.247***	0.149***
	(0.0706)	(0.0116)	(0.0293)	(0.0183)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Observations	431,984	431,984	431,984	431,984
R^2	0.050	0.062	0.170	0.196

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table III: Supply-Driven Deposits and Bank Risk

The table presents the effect of deposit flows on measures of bank income and risk. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. Δ *Gross Income to Assets* is the change in the bank's quarterly gross income divided by assets, scaled by 100. Δ *ROA* is the change in the bank's quarterly net income divided by assets, scaled by 100. Δ *Maturity Gap* is the bank's quarterly change in the average difference between asset maturity and liability maturity in months. Δ *Interest Rate Sensitivity Gap* is the quarterly change in the difference between the bank's interest income sensitivity and interest expense sensitivity, scaled by 100. Δ *Risk-Weighted Assets* is the quarterly change in the ratio of risk-weighted assets to total assets, scaled by 100. *Risky Securities Growth* is the quarterly growth rate in non-agency MBS, ABS, non-government domestic securities, and foreign securities holdings, scaled as a percent. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Δ Gross Income to Assets (1)	Δ ROA (2)	Δ Maturity Gap (3)	Δ Interest Rate Sensitivity Gap (4)	Δ Risk-Weighted Assets (5)	Risky Securities Growth (6)
Supply-Driven Deposit Flow	0.0123***	0.00825***	0.0506***	0.302***	0.223***	0.371***
	(0.000409)	(0.000412)	(0.00853)	(0.103)	(0.00936)	(0.100)
Log Assets	0.0155***	0.0190***	0.0643	-1.072***	0.690***	-0.551
	(0.00169)	(0.00406)	(0.0412)	(0.341)	(0.0380)	(0.653)
NIM	-0.0166***	0.0401***	0.0166	-0.627***	-0.538***	-0.937***
	(0.000633)	(0.00114)	(0.0141)	(0.133)	(0.0139)	(0.198)
3-Year Loan Growth	0.00352***	0.0152***	-0.101***	-0.302***	-0.0585***	-0.175
	(0.000357)	(0.000783)	(0.0103)	(0.0845)	(0.00800)	(0.135)
ROA	-0.0405***	-0.162***	-0.0431***	0.274**	0.105***	0.851***
	(0.000803)	(0.00131)	(0.0108)	(0.139)	(0.00985)	(0.141)
Equity to Assets	-0.00193**	-0.000556	0.0910***	-0.0404	0.0672**	1.006***
	(0.000911)	(0.00207)	(0.0226)	(0.279)	(0.0277)	(0.256)
Deposits to Assets	-0.00294***	-0.000508	0.163***	-0.385*	0.0772***	0.923***
	(0.000630)	(0.00115)	(0.0162)	(0.213)	(0.0186)	(0.198)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	431,984	431,984	431,984	238,170	431,984	138,005
R^2	0.120	0.351	0.069	0.735	0.078	0.060

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table IV: Supply-Driven Deposits and Bank Risk, Alternative Explanations

The table presents the effect of deposit flows on bank income and risk using alternative measures (Panel A) and robustness tests (Panel B). Each row presents a different specification of *Supply-Driven Deposit Flow* on different bank outcome variables. *Using Matched Sample* runs the baseline specification on a restricted sample that results from nearest-neighbor matching. *With Additional Advertising Costs Restriction* augments the main supply-driven deposit flow measure by requiring that banks do not increase advertising spending when receiving inflows. *Using County-Level Deposits* constructs the supply-driven deposit flow measure using annual county-level deposit data and rate changes. *Exclude Low Interest Rate Periods* drops all quarters with an effective fed funds rate below 0.25%. *Exclude QE Periods* drops quarters with quantitative easing activity. *Exclude TLGP Period* drops 2008–2010 when the FDIC's Temporary Loan Guarantee Program was active. *Exclude Post 2019* drops 2020–2022 which coincides with the COVID shock and subsequent stimulus activity. *Include Loans and Commitments* is run over the full sample but adds the following control variables: lagged *Commitments to Assets*, lagged *Loans to Assets*, contemporaneous Δ *Commitments to Lag Assets*, and contemporaneous Δ *Loans to Lag Assets*. *Observations* apply to Columns 1–3 within each specification. *Additional Controls* include the same control variables as in Tables II and III. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Panel A: Matched Sample and Alternative Measures			
	Δ Gross Income to Assets (1)	Δ Maturity Gap (2)	Δ Risk-Weighted Assets (3)	Observations (4)
Supply-Driven Deposit Flow				
Using Matched Sample	0.0107***	0.0489***	0.229***	205,244
	(0.000470)	(0.0102)	(0.0108)	
With Additional Advertising Costs Restriction	0.00879***	0.0293***	0.145***	431,984
	(0.000393)	(0.00785)	(0.00821)	
Using Spread from Average Rate	0.0111***	0.0158**	0.208***	431,984
	(0.000336)	(0.00770)	(0.00806)	
Using Spread from FF Rate	0.0113***	0.0650***	0.209***	431,984
	(0.000461)	(0.00872)	(0.00968)	
Using County-Level Deposits	0.00449***	0.0316**	0.0610***	109,190
	(0.000526)	(0.0135)	(0.0114)	
Additional Controls	Yes	Yes	Yes	
Bank Fixed Effects	Yes	Yes	Yes	
Year-Quarter Fixed Effects	Yes	Yes	Yes	

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table IV: Supply-Driven Deposits and Bank Risk, Alternative Explanations—*Continued*

	Panel B: Additional Robustness			
	Δ Gross Income to Assets (1)	Δ Maturity Gap (2)	Δ Risk-Weighted Assets (3)	Observations (4)
Supply-Driven Deposit Flow				
Exclude Low Interest Rate Periods	0.0155***	0.0305**	0.235***	233,479
	(0.000603)	(0.0131)	(0.0144)	
Exclude QE Periods	0.0139***	0.0396***	0.235***	281,366
	(0.000550)	(0.0116)	(0.0123)	
Exclude TLGP Period	0.0121***	0.0482***	0.230***	321,312
	(0.000477)	(0.0102)	(0.0115)	
Exclude Post 2019	0.0131***	0.0482***	0.227***	396,946
	(0.000442)	(0.00910)	(0.00971)	
Include Loans and Commitments	0.0120***	0.0637***	0.174***	431,984
	(0.000410)	(0.00847)	(0.00900)	
Additional Controls	Yes	Yes	Yes	
Bank Fixed Effects	Yes	Yes	Yes	
Year-Quarter Fixed Effects	Yes	Yes	Yes	

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table V: Supply-Driven Deposits and Bank Risk, Bartik Instruments

The table presents the effect of instrumented deposit flows on bank income and risk. Each row presents a different specification of *Supply-Driven Deposit Flow* on different bank outcome variables, using Bartik-type instruments. Column 1 presents the associated first-stage regression, and Columns 2–4 present the instrumented second-stage regressions. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. *Bank-Level Instrument* constructs the instrument at the bank-level by calculating the bank's deposit share from five years prior in its size quintile and quarterly deposit flow (excluding the current bank). *County-Based Instrument* constructs the instrument by using the bank's share of its overall deposits in each county from five years prior and annual deposit flow in its size quintile (excluding the current bank's and county's deposit flows). *State-Based Instrument* constructs the instrument by using the bank's share of its overall deposits in each state from five years prior and annual deposit flow in its size quintile (excluding the current bank's and state's deposit flows). *Observations* apply to Columns 1–4 within each specification. *Additional Controls* include the same control variables as in Tables II and III. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	First Stage	Second Stage			Observations
	Supply-Driven Deposit Flow	Δ Gross Income to Assets	Δ Maturity Gap	Δ Risk-Weighted Assets	
	(1)	(2)	(3)	(4)	(5)
Bank-Level Instrument	0.140***	0.0226***	0.212***	0.581***	361,943
	(0.00366)	(0.00277)	(0.0552)	(0.0575)	
County-Based Instrument	0.0563***	0.0543***	0.478**	0.966***	109,190
	(0.00358)	(0.00986)	(0.235)	(0.229)	
State-Based Instrument	0.0556***	0.0533***	0.497**	0.932***	109,190
	(0.00359)	(0.00998)	(0.239)	(0.232)	
Additional Controls	Yes	Yes	Yes	Yes	
Bank Fixed Effects	Yes	Yes	Yes	Yes	
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	

* p<.10, ** p<.05, *** p<.01

Table VI: Supply-Driven Deposits and Bank Risk, Equity Issuance Concerns

The table presents the effect of deposit flows on bank income and risk. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. In Panel A, *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. In Panel B, the difference-in-differences specifications are from 2018–2021 around the introduction of the community banking leverage ratio framework. Treated banks are community banks that qualify for the new framework, while control banks are similarly matched banks that are just above the size threshold for the regulation. *Post* is an indicator for 2020–2021, when the framework came into effect. *Additional Controls* include the same control variables as in Tables II and III. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Panel A: Subsamples by Equity Ratios					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	Low Equity	High Equity	Low Equity	High Equity	Low Equity	High Equity
	(1)	(2)	(3)	(4)	(5)	(6)
Supply-Driven Deposit Flow	0.0127***	0.0115***	0.0534***	0.0433***	0.225***	0.177***
	(0.000659)	(0.000733)	(0.0148)	(0.0152)	(0.0149)	(0.0187)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	143,671	143,561	143,671	143,561	143,671	143,561
R^2	0.133	0.147	0.095	0.092	0.121	0.085
	Panel B: Change in Community Banking Regulatory Ratios					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post × Supply-Driven Deposit Flow	-0.0389*	-0.0234*	-0.627*	-0.888**	-0.746**	-0.438**
	(0.0199)	(0.0141)	(0.349)	(0.392)	(0.310)	(0.201)
Additional Controls × Post	Yes	Yes	Yes	Yes	Yes	Yes
Matched Sample	No	Yes	No	Yes	No	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,124	38,078	39,124	38,078	31,728	30,853
R^2	0.074	0.074	0.173	0.176	0.183	0.187

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table VII: Bank Risk and Supply-Driven Uninsured and Insured Deposits

The table presents the effect of uninsured and insured deposit flows on bank income and risk. In Panel A, *Low Uninsured* (*High Uninsured*) is the sample of firms in the lowest tercile (highest tercile) by uninsured deposits to assets. In Panel B, *Supply-Driven Uninsured Deposit Flow* is the lagged quarterly growth in supply-driven uninsured deposits. *Supply-Driven Insured Deposit Flow* is the lagged quarterly growth in supply-driven insured deposits. Δ *Supply-Driven Uninsured to Total Dep.* is the lagged change in supply-driven uninsured deposits scaled by lagged total domestic deposits. Δ *Supply-Driven Insured to Total Dep.* is the lagged change in supply-driven insured deposits scaled by lagged total domestic deposits. *Additional Controls* include the same control variables as in Tables II and III. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Panel A: Subsamples by Uninsured Deposit Ratios					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	High Uninsured (1)	Low Uninsured (2)	High Uninsured (3)	Low Uninsured (4)	High Uninsured (5)	Low Uninsured (6)
Supply-Driven Deposit Flow	0.0121***	0.0106***	0.0581***	0.0486***	0.236***	0.157***
	(0.000626)	(0.000858)	(0.0128)	(0.0176)	(0.0138)	(0.0217)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	143,487	143,587	143,487	143,587	143,487	143,587
R^2	0.146	0.131	0.090	0.086	0.112	0.090

	Panel B: Insured and Uninsured Deposit Flows					
	Δ Gross Income to Assets (1)	Δ Maturity Gap (2)	Δ Risk-Weighted Assets (3)	Δ Gross Income to Assets (4)	Δ Maturity Gap (5)	Δ Risk-Weighted Assets (6)
Supply-Driven Uninsured Deposit Flow	0.00812***	0.0302***	0.156***			
	(0.000307)	(0.00707)	(0.00723)			
Supply-Driven Insured Deposit Flow	0.00455***	0.0224***	0.0209***			
	(0.000418)	(0.00860)	(0.00793)			
Δ Supply-Driven Uninsured to Total Dep.				0.00896***	0.0315***	0.176***
				(0.000314)	(0.00733)	(0.00755)
Δ Supply-Driven Insured to Total Dep.				0.00460***	0.0268***	0.0283***
				(0.000427)	(0.00877)	(0.00803)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	430,604	430,604	430,604	431,984	431,984	431,984
R^2	0.119	0.069	0.078	0.119	0.069	0.077

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table VIII: Supply-Driven Deposit Flows and Bank Performance

The table presents the effect of supply-driven deposit flows and changes in the Fed funds rate on different bank performance measures. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. Δ *FF Rate* is the lagged quarterly change in the Fed funds rate (as a percent). *Securities Losses to Lag Assets* is the quarterly total realized and unrealized securities losses divided by the prior quarter's assets (scaled by 100). Δ *NPL to Assets* is the quarterly change in the level of non-performing loans divided by the prior quarter's assets (scaled by 100). *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. *Additional Controls* include the same control variables as in Tables II and III, plus *Securities to Assets* and *Loans to Assets*. *Additional Controls* × Δ *FF Rate* indicates that the additional control variables are interacted with Δ *FF Rate*. All continuous control variables (except Δ *FF Rate*) are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Securities Losses to Lag Assets			Δ NPL to Lag Assets		
	Full Sample (1)	Low Equity (2)	High Equity (3)	Full Sample (4)	Low Equity (5)	High Equity (6)
Supply-Driven Deposit Flow	-0.00231**	-0.00491***	-0.00100	0.00547***	0.00734***	0.00438***
	(0.000973)	(0.00163)	(0.00167)	(0.000806)	(0.00139)	(0.00144)
Supply-Driven Deposit Flow × Δ FF Rate	0.00212	0.00710**	0.000416	0.00642***	0.00670**	0.00157
	(0.00221)	(0.00324)	(0.00384)	(0.00181)	(0.00292)	(0.00323)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls × Δ FF Rate	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	455,818	151,607	151,468	455,818	151,607	151,468
R^2	0.587	0.680	0.593	0.040	0.080	0.046

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table IX: Deposit Outflows Following Supply-Driven Deposit Inflows

The table presents the effect of supply-driven deposit flows and changes in the Fed funds rate on subsequent bank deposit outflows. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. Δ *FF Rate* is the lagged quarterly change in the Fed funds rate (as a percent). *Total Deposit Growth* is the current quarter's growth rate in total deposits (as a percent). *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. *Low Z-Score* (*High Z-Score*) is the sample of firms in the lowest tercile (highest tercile) by Z-score. *Additional Controls* include the same control variables as in Tables II and III, plus *Total Deposit Rate*. *Additional Controls* × Δ *FF Rate* indicates that the additional control variables are interacted with Δ *FF Rate*. All continuous control variables (except Δ *FF Rate*) are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Total Deposit Growth				
	Full Sample	Low Equity	High Equity	Low Z-Score	High Z-Score
	(1)	(2)	(3)	(4)	(5)
Supply-Driven Deposit Flow	-0.352***	-0.364***	-0.342***	-0.296***	-0.475***
	(0.0159)	(0.0233)	(0.0302)	(0.0253)	(0.0238)
Supply-Driven Deposit Flow × Δ FF Rate	-0.187***	-0.223***	-0.184***	-0.223***	-0.124***
	(0.0285)	(0.0428)	(0.0536)	(0.0489)	(0.0475)
Additional Controls	Yes	Yes	Yes	Yes	Yes
Additional Controls × Δ FF Rate	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	441,726	146,900	146,799	147,013	146,878
R^2	0.161	0.217	0.189	0.207	0.189

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table X: Uninsured Deposit Outflows Following Supply-Driven Uninsured Deposit Inflows

The table presents the effect of supply-driven uninsured deposit flows and changes in the Fed funds rate on subsequent bank uninsured deposit outflows. *Supply-Driven Uninsured Deposit Flow* is the lagged quarterly growth in supply-driven uninsured deposits. Δ *FF Rate* is the lagged quarterly change in the Fed funds rate (as a percent). *Uninsured Deposit Growth* is the current quarter's growth rate in uninsured deposits (as a percent). *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. *Low Z-Score* (*High Z-Score*) is the sample of firms in the lowest tercile (highest tercile) by Z-score. *Additional Controls* include the same control variables as in Tables II and III, plus *Total Deposit Rate*. *Additional Controls* $\times$ Δ *FF Rate* indicates that the additional control variables are interacted with Δ *FF Rate*. All continuous control variables (except Δ *FF Rate*) are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Uninsured Deposit Growth				
	Full Sample (1)	Low Equity (2)	High Equity (3)	Low Z-Score (4)	High Z-Score (5)
Supply-Driven Uninsured Deposit Flow	-2.020***	-1.928***	-2.093***	-1.901***	-2.359***
	(0.0418)	(0.0697)	(0.0700)	(0.0667)	(0.0711)
Supply-Driven Uninsured Deposit Flow $\times$ Δ FF Rate	-0.517***	-0.651***	-0.521***	-0.671***	-0.296*
	(0.0795)	(0.128)	(0.146)	(0.132)	(0.151)
Additional Controls	Yes	Yes	Yes	Yes	Yes
Additional Controls $\times$ Δ FF Rate	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	441,354	146,823	146,565	146,845	146,793
R^2	0.223	0.261	0.219	0.221	0.270

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table XI: Bank Risk Following 2020 Deposit Shock

The table presents the effect of supply-driven deposit flows on bank income and risk from 2019Q1–2021Q4. *Treated* is an indicator that equals one if *Supply-Driven Deposit Flow* is in the top tercile in 2020Q1–2020Q2 (among banks with positive supply-driven deposit flows), or zero if it is in the bottom tercile (among banks with positive supply-driven deposit flows). *Post* is an indicator that equals one for 2020Q3–2021Q4. *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. *Low Uninsured* (*High Uninsured*) is the sample of firms in the lowest tercile (highest tercile) by uninsured deposits to assets. *Additional Controls* × *Post* are the control variables as in Tables II and III, fixed at their 2019Q4 values and interacted with the *Post* indicator. Treated and control samples are constructed using nearest neighbor matching. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Panel A: Full Sample					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	0.0166***	0.0104***	0.686***	0.655***	1.220***	1.179***
	(0.00390)	(0.00397)	(0.133)	(0.141)	(0.140)	(0.142)
Additional Controls × Post	No	Yes	No	Yes	No	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,749	21,749	21,749	21,749	17,124	17,124
R^2	0.064	0.067	0.171	0.174	0.267	0.268

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table XI: Bank Risk Following 2020 Deposit Shock—*Continued*

	Panel B: Subsamples by Equity Ratios					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	Low Equity (1)	High Equity (2)	Low Equity (3)	High Equity (4)	Low Equity (5)	High Equity (6)
Treated × Post	0.00985 (0.00696)	0.00976 (0.00671)	0.864*** (0.239)	0.283 (0.233)	1.272*** (0.174)	1.064*** (0.304)
Additional Controls × Post	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,250	7,250	7,250	7,250	6,248	5,338
R^2	0.073	0.067	0.194	0.160	0.316	0.201

	Panel C: Subsamples by Uninsured Deposit Ratios					
	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	High Uninsured (1)	Low Uninsured (2)	High Uninsured (3)	Low Uninsured (4)	High Uninsured (5)	Low Uninsured (6)
Treated × Post	0.0213*** (0.00821)	0.000864 (0.00743)	1.146*** (0.300)	0.381 (0.234)	1.547*** (0.232)	1.120*** (0.237)
Additional Controls × Post	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,256	7,254	7,256	7,254	6,085	5,346
R^2	0.093	0.055	0.195	0.167	0.321	0.204

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table XII: Recent Period Outflows of Deposits

The table presents the effect of supply-driven deposit inflows and changes in the Fed funds rate on deposit outflows from 2019Q1–2022Q4. *Treated* is an indicator that equals one if *Supply-Driven Deposit Flow* is in the top tercile in 2020Q1–2020Q2 (among banks with positive supply-driven deposit flows), or zero if it is in the bottom tercile (among banks with positive supply-driven deposit flows). *Post* is an indicator that equals one in 2022Q1–2022Q4. *Total Deposit Growth* is the quarterly growth rate in total deposits, as a percent. *Low Equity* (*High Equity*) is the sample of firms in the lowest tercile (highest tercile) by equity to assets. *Low Z-Score* (*High Z-Score*) is the sample of firms in the lowest tercile (highest tercile) by Z-score. *Additional Controls* × *Post* are the control variables as in Tables II and III, fixed at their 2019Q4 values and interacted with the *Post* indicator. Treated and control samples are constructed using nearest neighbor matching. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Total Deposit Growth					
	Full Sample		Low Equity	High Equity	Low Z-Score	High Z-Score
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	-2.514***	-2.547***	-3.160***	-2.497***	-2.975***	-2.156***
	(0.176)	(0.189)	(0.345)	(0.313)	(0.403)	(0.242)
Additional Controls × Post	No	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,266	21,266	7,100	7,085	7,093	7,077
R^2	0.340	0.342	0.360	0.321	0.332	0.357

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table A.1: Variable Definitions

This table presents the data sources and the definitions of the variables used in our analysis.

	Definition	Data Sources
Bank Asset and Risk Measures		
Securities Growth	Quarterly log difference in securities holdings, excluding government securities that are three months or less in maturity (RCFD1772+RCFD1773-RCFDA549). Scaled as a percent.	Call Report
Δ Securities to Lag Assets	Quarterly difference in securities holdings, excluding government securities that are three months or less in maturity (RCFD1772+RCFD1773-RCFDA549). Divided by lagged assets (RCFD2170). Scaled by 100.	Call Report
Loan Growth	Quarterly log difference in loans (RCFD5369+RCFDB528). Scaled as a percent.	Call Report
Δ Loans to Lag Assets	Quarterly difference in loans (RCFD5369+RCFDB528). Divided by lagged assets (RCFD2170). Scaled by 100.	Call Report
Δ Gross Income to Assets	Quarterly gross income (RIAD4107+RIAD4079+RIAD3521+RIAD3196). Divided by assets (RCFD2170). Scaled by 100.	Call Report
ROA	Quarterly net income (RIAD4340) divided by assets (RCFD2170). Scaled as a percent.	Call Report
Δ ROA	Quarterly difference in ROA. Scaled as a percent.	Call Report
Maturity Gap	Following English, Van den Heuvel, and Zakrajšek (2018), difference between estimated maturity of assets and estimated maturity of liabilities, in months.	Call Report
Δ Maturity Gap	Quarterly difference in maturity gap, in months.	Call Report
Risk-Weighted Assets	Risk-weighted assets (RCFDA223) divided by assets (RCFD2170). Scaled by 100.	Call Report
Δ Risk-Weighted Assets	Quarterly difference in risk-weighted assets. Scaled by 100.	Call Report
Interest Rate Sensitivity Gap	Difference between interest income and interest expense sensitivities. Estimated by regressing the quarterly change in interest income or expense (RIAD4107 or RIAD4073 divided by average quarterly assets, RCFD3368) on the contemporaneous Fed funds rate change and three quarterly lags. Sensitivity is the sum of these four coefficients for each bank. Scaled by 100.	Call Report
Δ Interest Rate Sensitivity Gap	Quarterly change in Interest Rate Sensitivity Gap. Scaled by 100.	Call Report
Risky Securities Growth	Quarterly log difference in the following securities: other mortgage pass-through securities (Before 2009Q2: RCFD1709+RCFD1713, 2009Q2 on: RCFDG308+RCFDG311), ABS credit-card receivables (RCFDB838+RCFDB841), ABS home equity lines (RCFDB842+RCFDB845), ABS automobile loans (RCFDB846+RCFDB849), ABS other consumer loans (RCFDB850+RCFDB853), ABS C&I loans (RCFDB854+RCFDB857), other ABS (RCFDB858+RCFDB861), other domestic debt securities (RCFD1737+RCFD1741), and other foreign debt securities (RCFD1742+RCFD1746). Scaled as a percent.	Call Report
Securities Losses to Lag Assets	Realized losses on HTM and AFS securities -(RIAD3521+RIAD3196) plus unrealized losses on HTM securities (RCFD1754-RCFD1771) plus unrealized losses on AFS securities (RCFD1772-RCFD1773). Divided by lagged assets (RCFD2170). Scaled by 100.	Call Report
Δ NPL to Lag Assets	Quarterly difference in non-performing loans (NPL defined as sum of items in Schedule RC-N Column B (Past due 90 days or more and still accruing) and Column C (Nonaccrual)). Divided by lagged assets (RCFD2170). Scaled by 100.	Call Report

Table A.1: Variable Definitions—*Continued*

	Definition	Data Sources
Bank Asset and Risk Measures		
Equity Issuance Indicator	Indicator that bank's BHC reported net equity issuance in a quarter.	Y-9C
Net Equity Issuance	Dollar amount of perpetual preferred and common stock issued by the bank's BHC, net of retirements, divided by lagged equity capital (BHCK3577+BHCK3578+BHCK3579+BHCK3580)/BHCK3210. Scaled as a percent.	Y-9C
Bank Deposit Measures		
Total Deposit Growth	Quarterly log difference in total domestic deposits (RCON2200). Scaled as a percent.	Call Report
Supply-Driven Deposit Flow	Quarterly log difference in total supply-driven domestic deposits (RCON2200). To be a supply-driven inflow (outflow), the quarterly change in the total deposit rate for the current and prior quarter are both not positive (not negative). Scaled as a percent.	Call Report
Uninsured Deposit Growth	Quarterly log difference in uninsured domestic deposits (Pre-2006Q2: RCON2710; 2006Q2 on: RCONF051+RCONF047). Scaled as a percent.	Call Report
Supply-Driven Uninsured Deposit Flow	Quarterly log difference in uninsured supply-driven domestic deposits (Pre-2006Q2: RCON2710; 2006Q2 on: RCONF051+RCONF047). To be a supply-driven inflow (outflow), the quarterly change in the uninsured deposit rate for the current and prior quarter are both not positive (not negative). Scaled as a percent.	Call Report
Δ Supply-Driven Uninsured Deposits to Total Deposits	Quarterly difference in uninsured supply-driven domestic deposits (Pre-2006Q2: RCON2710; 2006Q2 on: RCONF051+RCONF047), divided by lagged total deposits (RCON2200). To be a supply-driven inflow (outflow), the quarterly change in the core deposit rate for the current and prior quarter are both not positive (not negative). Scaled by 100.	Call Report
Insured Deposit Growth	Quarterly log difference in insured domestic deposits (Pre-2006Q2: RCON2702; 2006Q2 on: RCONF049+RCONF045). Scaled as a percent.	Call Report
Supply-Driven Insured Deposit Flow	Quarterly log difference in insured supply-driven domestic deposits (Pre-2006Q2: RCON2702; 2006Q2 on: RCONF049+RCONF045). To be a supply-driven inflow (outflow), the quarterly change in the core deposit rate for the current and prior quarter are both not positive (not negative). Scaled as a percent.	Call Report
Δ Supply-Driven Insured Deposits to Total Deposits	Quarterly difference in insured supply-driven domestic deposits (Pre-2006Q2: RCON2702; 2006Q2 on: RCONF049+RCONF045), divided by lagged total deposits (RCON2200). To be a supply-driven inflow (outflow), the quarterly change in the core deposit rate for the current and prior quarter are both not positive (not negative). Scaled by 100.	Call Report
Other Bank Controls		
Log Assets	Log total assets (RCFD2170).	Call Report
NIM	Sum of net income (RIAD4074) over last four quarters divided by total assets (RCFD2170).	Call Report
3-Year Loan Growth	Log difference in loans (RCFD5369+RCFDB528) between current quarter and 12 quarters prior.	Call Report
Equity to Assets	Ratio of equity (RCFD3210) to assets (RCFD2170).	Call Report
Deposits to Assets	Ratio of total deposits (RCON2200+RCFN2200) to assets (RCFD2170).	Call Report

Table A.1: Variable Definitions—*Continued*

	Definition	Data Sources
Other Bank Controls		
Securities to Assets	Ratio of total securities (RCFD1754+RCFD1773) to assets (RCFD2170).	Call Report
Loans to Assets	Ratio of loans (RCFD5369+RCFDB528) to assets (RCFD2170).	Call Report
Commitments to Assets	Ratio of unused commitments (Item 1, Schedule RC-L) to assets (RCFD2170).	Call Report
Δ Commitments to Lag Assets	Unused commitments (Item 1, Schedule RC-L) divided by lagged assets (RCFD2170).	Call Report
Uninsured Deposits to Assets	Ratio of uninsured domestic deposits (Pre-2006Q2: RCON2710; 2006Q2 on: RCONF051+RCONF047) to assets (RCFD2170).	Call Report
Z-Score	ROA plus equity divided by ROA standard deviation. ROA standard deviation calculated over last 12 quarters. Divided by 100.	Call Report
Total Deposit Rate	Interest expense on domestic deposits (Pre-2017: RIAD4508+ RIAD0093+RIADA517+RIADA518; 2017 on: RIAD4508+ RIAD0093+RIADHK03+RIADHK04) divided by total domestic deposits.	Call Report
Uninsured Deposit Rate	Interest expense on uninsured domestic deposits (Pre-2017: RIADA518; 2017 on: RIADHK04) divided by uninsured domestic deposits.	Call Report
Core Deposit Rate	Interest expense on core domestic deposits (Pre-2017: RIAD4508+RIAD0093+RIADA518; 2017 on: RIAD4508+RIAD0093+RIADHK03) divided by core domestic deposits (Pre-2017: RCON2215+RCON6810+RCON0352+RCON6648; 2017 on: RCON2215+RCON6810+RCON0352+RCON6648+RCONJ473).	Call Report
ROE Volatility	Standard deviation of quarterly ROE (net income to equity) over the past three years.	Call Report
Real Estate Loans to Assets	Real estate loans (RCFD1410) divided by assets (RCFD2170).	Call Report
C&I Loans to Assets	Commercial and industrial loans (RCFD1763+RCFD1764) divided by assets (RCFD2170).	Call Report
Wholesale Funding	Wholesale funding (Pre-2002: RCON2604+RCFN2200+RCFD2800 +RCFD3190; 2002-2009: RCON2604+RCFN2200+RCFD3200 +RCONB993+RCFDB995+RCFD3190; 2010 on: RCONJ473 +RCONJ474+RCFN2200+RCFD3200+RCONB993+RCFDB995 +RCFD3190) divided by assets (RCFD2170).	Call Report
Macroeconomic Variables		
Δ FF Rate	Quarterly difference in the effective fed funds rate. Scaled as a percent.	FRED
VW CRSP Return	Quarterly return of the value-weighted CRSP index. Scaled as a percent.	CRSP

Table A.2: Longer Horizon Bank Risk

The table presents the effect of deposit flows on longer horizon measures of bank income and risk. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. Δ *Gross Income to Assets* is the four quarter change in the bank's gross income divided by assets, scaled by 100. Δ *ROA* is the four quarter change in the bank's net income divided by assets, scaled by 100. Δ *Maturity Gap* is the bank's four quarter change in the average difference between asset maturity and liability maturity in months. Δ *Interest Rate Sensitivity Gap* is the bank's four quarter change in the difference between its interest income and interest expense sensitivities, scaled by 100. *Risky Securities Growth* is the four quarter growth rate in non-agency MBS, ABS, non-government domestic securities, and foreign securities holdings, scaled by a percent. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Δ Gross Income to Assets (1)	Δ ROA (2)	Δ Maturity Gap (3)	Δ Interest Rate Sensitivity Gap (4)	Δ Risk-Weighted Assets (5)	Risky Securities Growth (6)
Supply-Driven Deposit Flow	0.00969***	0.00588***	0.0524***	0.205**	0.228***	0.767***
	(0.000597)	(0.000427)	(0.0179)	(0.0958)	(0.0131)	(0.228)
Log Assets	-0.00320	-0.00978**	-0.0341	-2.828***	1.188***	-5.245*
	(0.00412)	(0.00497)	(0.172)	(0.738)	(0.128)	(3.047)
NIM	-0.0464***	0.0185***	0.280***	0.786***	-1.403***	-1.328*
	(0.00153)	(0.00121)	(0.0544)	(0.262)	(0.0381)	(0.775)
3-Year Loan Growth	0.00309***	0.00661***	-0.273***	-1.105***	-0.190***	-0.999*
	(0.000862)	(0.000901)	(0.0407)	(0.193)	(0.0245)	(0.541)
ROA	-0.0568***	-0.167***	-0.169***	0.385**	0.349***	1.210***
	(0.00140)	(0.00114)	(0.0296)	(0.183)	(0.0202)	(0.414)
Equity to Assets	-0.00244	-0.00110	0.340***	0.118	0.366***	3.537***
	(0.00298)	(0.00220)	(0.0835)	(0.479)	(0.0688)	(1.072)
Deposits to Assets	0.000312	0.00726***	0.657***	-0.541	0.0323	3.177***
	(0.00153)	(0.00138)	(0.0635)	(0.335)	(0.0540)	(0.795)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	404,122	404,122	404,122	216,337	404,122	117,173
R^2	0.276	0.362	0.169	0.822	0.188	0.145

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table A.3: Nearest Neighbor Match

The table presents the Probit specification used to generate the nearest neighbor matched sample in Table IV. *Supply-Driven Deposit Inflow* is an indicator variable that the bank had a positive supply-driven deposit flow in a given quarter. All bank-level control variables are from the prior quarter. All continuous control variables are scaled by their sample standard deviations. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Supply-Driven Deposit Inflow (1)
Total Deposit Rate	-0.325***
	(0.00372)
ROE Volatility	-0.0166***
	(0.00363)
Real Estate Loans to Assets	0.00520
	(0.00430)
C&I Loans to Assets	-0.0134***
	(0.00428)
Wholesale Funding	0.0341***
	(0.00486)
Log Assets	0.0386***
	(0.00532)
NIM	-0.0890***
	(0.00425)
3-Year Loan Growth	0.00554
	(0.00369)
ROA	0.0151***
	(0.00333)
Equity to Assets	-0.0634***
	(0.00608)
Deposits to Assets	0.0888***
	(0.00638)
Δ FF Rate_{t-1}	-0.277***
	(0.00325)
Δ FF Rate_{t-2}	-0.373***
	(0.00292)
VW CRSP Return_{t-1}	0.134***
	(0.00215)
VW CRSP Return_{t-2}	0.135***
	(0.00223)
Observations	431,749
Pseudo R^2	0.131

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table A.4: Supply-Driven Deposits and Equity Issuance

The table presents the effect of deposit flows on bank equity issuance. *Supply-Driven Deposit Flow* is the subset of lagged quarterly growth in total domestic deposits that is driven by depositors. *Equity Issuance Indicator* is an indicator that the bank's holding company issued equity in a quarter. *Net Equity Issuance* is the dollar amount of equity issued (net of retirements) in a quarter, divided by lagged total equity (scaled as a percent). All continuous control variables are scaled by their sample standard deviations. Standard errors are clustered by bank.

	Equity Issuance Indicator	Net Equity Issuance
	(1)	(2)
Supply-Driven Deposit Flow	0.00408***	0.132***
	(0.00128)	(0.0255)
Log Assets	-0.00605	-1.696***
	(0.0236)	(0.264)
NIM	-0.00920*	-0.437***
	(0.00494)	(0.0657)
Loan Growth	0.0222***	0.500***
	(0.00374)	(0.0575)
ROA	0.000983	-0.278***
	(0.00250)	(0.0455)
Equity to Assets	0.0128	0.0471
	(0.00867)	(0.0889)
Deposits to Assets	-0.00691	-0.0133
	(0.00645)	(0.0597)
Additional Controls	Yes	Yes
Bank Fixed Effects	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes
Observations	88,002	88,002
R^2	0.605	0.217

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01

Table A.5: Bank Risk, Controlling for Investment Opportunities

The table presents the effect of supply-driven deposit flows on bank income and risk from 2019Q1–2021Q4. The specifications are the same as in Table XI Panel A, except the nearest neighbor match between treated and control banks includes a geographic similarity measure to match banks on investment opportunities. Variable definitions are provided in Appendix Table A.1. Standard errors are clustered by bank.

	Δ Gross Income to Assets		Δ Maturity Gap		Δ Risk-Weighted Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated × Post	0.0158***	0.0101**	0.596***	0.625***	1.125***	1.073***
	(0.00424)	(0.00420)	(0.142)	(0.148)	(0.154)	(0.154)
Additional Controls	No	Yes	No	Yes	No	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,526	20,526	20,526	20,526	16,295	16,295
R^2	0.066	0.069	0.175	0.177	0.275	0.277

Standard errors in parentheses. * p<.10, ** p<.05, *** p<.01