Do Banks Hedge Using Interest Rate Swaps?

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First Version: April 2023
This Version: June 2026

Abstract

We use regulatory data on U.S. banks to examine how banks manage interest rate risk through swaps. Banks hold large swap positions, with notional amounts averaging five times assets. However, after netting offsetting positions, interest rate risk from swaps is close to zero: a 100-basis-point rate change moves swap value by only 0.2% of equity. Swap dealers hold positions for market making, while non-dealer banks use swaps to meet borrower demand. There is no evidence that riskier banks used swaps to increase risk during the 2022/23 monetary tightening. Overall, swaps neither meaningfully increase nor hedge banks' overall interest rate risk.

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1 Introduction

Banks borrow short and lend long, which exposes them to interest rate risk. When market interest rates rise, the values of fixed-rate loans and securities decline. These losses reduce bank equity and can push banks into financial distress and trigger bank runs.

The 2022–23 monetary tightening provides a stark illustration. Market interest rates increased from January 2022 to March 2023 as central banks around the world tightened monetary policy to combat inflation. In the United States, the Federal Reserve increased the short-term market interest rate, i.e., the Fed Funds rate, from close to 0% in early January 2022 to 5% in March 2023. As a result, the long-term interest rate, i.e., 10-year Treasury rate, increased by about 2.5%. These large increases in market interest rates significantly lowered the value of bank loans and securities. Drechsler et al. (2026) estimate that the U.S. banking sector lost around $700 billion on security investments and a total of $1.5 trillion on both securities and loans, a loss roughly comparable in magnitude to the aggregate equity of the sector. Several banks failed in large part because of their interest rate exposure, including Silicon Valley Bank and First Republic Bank.

These losses raise the question of how banks manage their interest rate risk. Interest rate swaps are a natural instrument for this purpose. In a swap, one party exchanges fixed interest payments for floating payments, allowing banks to transfer interest rate risk to another party. Banks could use swaps to hedge individual assets, portfolios, or their entire balance sheet. The aggregate banking sector could also use swaps to transfer interest rate risk to non-bank financial institutions. Such hedging would lower their exposure to interest rate risk.

At the same time, banks could use swaps to increase their exposure to interest rate risk rather than reduce it. Banks may use swaps for such risk-taking for several reasons. First, swaps have embedded leverage, thereby allowing more risk-taking with limited funding. Second, swaps can require less regulatory capital than on-balance-sheet positions, creating scope for regulatory arbitrage. Third, swaps are harder for outsiders to evaluate, potentially allowing risk-taking without proper supervision by management, outside investors, or regulators.

The main challenge in answering this question is measurement. To evaluate whether swaps hedge bank assets requires detailed, position-level data on each swap. Publicly available data are limited to bank-level totals of notional amounts and market values, which are insufficient to measure interest rate risk. Prior work has relied on indirect proxies constructed from these data, but these proxies require strong assumptions that cannot be verified with publicly available data.

We address this challenge using regulatory data from the Commodity Futures Trading Commission (CFTC). Our data cover the individual swap positions of the 250 largest U.S. commercial banks, amounting to more than 8 million swap contracts and constituting nearly all swap activity in the U.S. banking sector. Our preferred measure of interest rate risk is DV01, the decline in the value of a swap position for a one-basis-point increase in interest rates. DV01 is the standard metric for interest rate risk management across the financial industry. It can only be computed using detailed information on each swap contract, including notional amount, maturity, swap rate, and direction. Banks use DV01 internally to manage their interest rate risk, and it can be aggregated across positions to produce bank-level and system-level measures of exposure. To the best of our knowledge, this is the first paper to measure the interest rate risk of bank swap positions for the U.S. banking sector using such position-level data.

Our first set of results describes bank swap exposure. The U.S. banking sector holds swap positions with a total notional amount of $83 trillion. The positions are concentrated among the top 250 banks, which account for 99.9% of total notional value. Among these banks, the average notional amount is $383 billion, about five times average bank assets. Despite these large notional amounts, the average bank has almost no net interest rate risk from swaps. The average DV01 among the largest 250 banks is $2 million and the median is close to zero. Scaled by bank equity, the mean ratio of DV01 to equity is -0.002% and the median is near zero. This means that for the average bank, a 100-basis-point increase in interest rates raises the value of swap positions by the economically small amount of 0.2% of equity. Changes in interest rates barely affect the value of the average bank's swap portfolio. The stark difference between notional amounts and DV01 arises because the notional amount of a portfolio simply adds the notional amounts of individual positions, while these positions cancel out once long and short exposures are netted.

There is some variation in DV01 across banks. DV01 relative to equity ranges from -0.094% at the 5^{th} percentile to 0.057% at the 95^{th} percentile. But the distribution is close to symmetric, implying that losses from interest rate changes at one bank are offset by gains at another bank. We find a similar result when aggregating DV01 for the banking system as a whole. Total DV01 is $511 million, or 0.031% of aggregate bank equity. Most swap positions cancel out within the banking sector, and there is limited risk transfer from the banking sector to other sectors.

We also separately analyze swap dealers and non-dealers. Swap dealers are banks designated by the CFTC to make markets in swaps. There are 14 swap dealer banks in our sample, and all are among the largest banks by assets. Swap dealers account for over

98% of total notional amounts. The average swap dealer has notional exposure of $6.5 trillion, about 7.5 times bank assets. Yet their average DV01 is only about 0.02% of bank equity. Non-dealer banks have much smaller notional amounts and similarly limited interest rate risk from swaps.

A separate but important finding is that commonly used publicly available proxies for swap exposure have close to zero correlations with our DV01 measure. We compare DV01 against the major alternatives used in the literature, including gross notional amounts, non-trading notional amounts, and market swap values. The correlations are low in both levels and changes. This suggests that these proxies are unlikely to provide a reliable measure of banks' interest rate risk.

Our second set of results asks why banks hold swap positions. We consider four explanations: risk-taking, market making, facilitating borrower demand for fixed-rate loans, and hedging.

We find no evidence of risk-taking with swaps. We first examine the 2022–23 monetary tightening, which provides a natural setting to test whether banks used swaps to increase interest rate risk. The most salient case is Silicon Valley Bank, which failed in March 2023 after the rapid rise in rates eroded the value of its long-duration securities portfolio. A Federal Reserve report documents that in the run-up to its failure, SVB unwound the pay-fixed swaps that had hedged its securities, thereby increasing its net interest rate exposure through the swap market. The tightening cycle therefore provides a natural setting to test whether SVB's behavior reflected a broader pattern of risk-shifting. We measure each bank's risk characteristics at the start of the cycle (2021Q4) and examine how swap DV01 to equity subsequently changed through 2022Q4. We find that banks with lower capitalization reduced, rather than increased, their interest rate risk through swaps. None of the other risk proxies — uninsured deposits, asset duration, or asset liquidity — is associated with a significant change in exposure. SVB's behavior was an outlier rather than representative of the broader banking sector.

We corroborate this finding in the cross-section. We relate each bank's swap DV01 relative to equity to four standard proxies for risk-taking incentives: asset duration, the equity ratio, the uninsured deposit share, and asset illiquidity. A bank with stronger incentives to take interest rate risk — longer-duration assets, lower capital, more run-prone deposits, or less liquid assets — should hold larger swap exposures if swaps are used to amplify rather than offset that risk. The data do not support this pattern. None of the four proxies is statistically associated with swap DV01 relative to equity, and the point estimates are economically small.

We then ask why banks hold such large notional values even though their interest rate risk is low, distinguishing between swap dealers and non-swap dealers. The 14 swap dealers in our sample hold the overwhelming majority of notional exposure: \$82.4 trillion, over 98% of the sector total, or \$6.5 trillion for the average dealer (about 7.5 times its assets). Yet they take very little interest rate risk. Once long and short positions within each dealer's book are netted, aggregate dealer notional falls from \$82.4 trillion to just \$506 billion, and aggregate dealer DV01 is only 0.05% of dealer equity. This combination of very large gross notional and very small net exposure is consistent with dealers using swaps for market making. In other words, dealers appear to trade on behalf of clients while hedging much of their exposure, rather than using swaps to make large directional bets on interest rates.

Among non-dealer banks, a large share of receive-fixed swap positions are with customers. Banks typically prefer to originate floating-rate loans because they are easier to securitize, while many borrowers prefer fixed-rate exposure. To bridge this gap, banks offer floating-rate loans paired with swaps that convert the borrower's obligation into a fixed rate. The bank then hedges its resulting swap exposure by entering an offsetting swap with a dealer on the same day, with the same notional amount and maturity. Our contract-level data show that non-dealer banks with less than \$100 billion in assets hedge at least 70% of their customer-facing swap positions through such back-to-back trades in the pre-2020 period. This share declines after 2020, consistent with banks' increased use of portfolio compression, which reduces reliance on hedging individual contracts one at a time.[2]

Next, we evaluate whether banks use swaps for hedging. If banks use swaps to hedge, changes in the value of their swap portfolios should be offset by opposite changes in the hedged assets, leaving equity returns unaffected. To test this, we compute the quarterly return on each bank's swap portfolio and regress bank equity returns on this swap return. The coefficient is indistinguishable from zero after controlling for bank and time effects, and the marginal R^2 of including swap returns is near zero. These results are consistent with hedging at the margin but the economic magnitudes are small: the standard deviation of swap returns is only 5.7%, compared with 18.2% for bank equity returns. Swaps are thus neither a first-order driver of bank equity values nor an economically important hedge.

The last step of our analysis evaluates the overall contribution of swaps to banks' interest rate risk. We use Call Report data to estimate the interest rate risk of bank assets and liabilities and compare it to the risk from swaps. A central part of this exercise is to

[2]In both periods, these percentages are lower bounds: they capture only single swaps with perfectly offsetting terms and miss portfolio-level hedging, which is precisely what compression promotes.

measure the interest rate exposure of deposits. Because most deposits have no contractual maturity, the prior literature typically treats them as carrying no interest rate risk; we instead measure the duration of the deposit franchise following Drechsler et al. (2026), who show that the value of deposits to the bank rises when rates increase, so that the deposit franchise has negative duration.

We find substantial interest rate risk on both sides of the balance sheet, and the two largely offset. As of 2023Q4, a 100-basis-point increase in rates reduces the value of aggregate bank assets by 24.6% of equity, reflecting loans with a duration of about 2.5 years and securities with a duration of about 4.7 years. This exposure is almost entirely offset on the liability side, which contributes −25.8% of equity, almost all of it (−25.0 percentage points) coming from the deposit franchise. The hedge thus comes from deposits, not swaps: expressed in the same units, the interest rate risk of swaps is only −0.28% of equity, roughly two orders of magnitude smaller than the exposure on either side of the balance sheet. The interest rate risk of banks is driven by their assets and their deposit franchise, not by their swap positions.

Our paper connects to several strands of the literature. Interest rate risk from derivatives is not directly observable in publicly available data, so prior work has relied on indirect proxies. Gorton and Rosen (1995) propose a methodology to infer swap positions from notional amounts, reported market values, and assumptions about portfolio evolution. Begenau, Piazzesi and Schneider (2015) build on this approach using changes in derivatives market values and conclude that banks use derivatives to increase their interest rate risk. Granja et al. (2024) use changes in gross notional amounts during the 2022–23 tightening to argue that riskier banks reduced hedging. All of these papers acknowledge that their conclusions depend on assumptions that cannot be tested with publicly available data.[3] Most closely related to our work, Hoffmann et al. (2019) use supervisory data to analyze interest rate risk across European banks and find that swaps hedge roughly one quarter of balance-sheet exposure. Our paper conducts a parallel analysis for U.S. banks using CFTC position-level data and reaches a different conclusion: swaps contribute almost nothing to net interest rate exposure. We also show that commonly used proxies

[3]There is a broader literature on banks' overall interest rate risk exposure. Flannery (1981) documents that bank equity has surprisingly low sensitivity to interest rate shocks; see also Flannery (1983), Flannery and James (1984), English (2002), and English, Van den Heuvel and Zakrajšek (2018). Drechsler, Savov and Schnabl (2021) explain this finding by showing that banks hedge long-term assets with their deposit franchise. Purnanandam (2007) shows that banks using interest rate derivatives respond less to changes in monetary policy. There is also a large literature on why firms hedge; see, among others, Smith and Stulz (1985), Stulz (1996), Froot, Scharfstein and Stein (1993), and Stulz (2004). Hirtle (1997) and Brewer, Minton and Moser (2000) study how interest rate derivatives affect bank stock price sensitivity and loan growth, respectively.

have low correlations with our direct measure, suggesting that the conclusions of prior work are driven by the proxies rather than by actual bank behavior.

The 2022–23 monetary tightening raised concerns that banks had used derivatives to build up hidden interest rate exposures. Jiang et al. (2024) estimate that rising rates lowered bank asset values by $2.2 trillion. Flannery and Sorescu (2023) find that many banks would fall below regulatory capital levels if losses were fully recognized. Granja et al. (2024) argue that banks reclassified securities to held-to-maturity portfolios rather than hedging with derivatives. Drechsler et al. (2026) examine how banks' exposure to interest rate risk can lead to bank runs, Greenwald, Schulhofer-Wohl and Younger (2023) argue that convexity in deposit franchise values amplified fragility, and Haddad, Hartman-Glaser and Muir (2023) find that deposit relationships are sticky but can break during a crisis.[4] Our paper tests directly whether riskier banks increased their interest rate exposure through swaps during the tightening. We find no evidence of this.

Finally, a growing literature uses post-GFC regulatory data to study how financial intermediaries participate in swap markets (Baker et al., 2021; Abad et al., 2016; Khetan et al., 2024; Dalla Fontana et al., 2019; Bolandnazar, 2020; Cenedese, Ranaldo and Vasios, 2020). A central question in this literature is who bears the interest rate risk intermediated through swaps. The swap spread literature argues that dealers' balance sheet constraints help explain why swap rates fall below Treasury yields (Jermann, 2020; Boyarchenko et al., 2018; Klingler and Sundaresan, 2019; Du, Hébert and Li, 2023; Siriwardane, Sunderam and Wallen, 2025). A natural implication of this explanation is that dealers should be significantly short swaps. Our finding that both dealer and non-dealer banks are close to flat—consistent with Lu and Wallen (2025), who show that bank trading desks bear little market risk—challenges this view: the intermediaries on the other side of the swap spread trade are apparently not banks but other market participants such as fixed-income hedge funds (Du, Hébert and Li, 2023; Hanson, Malkhozov and Venter, 2024; Khetan et al., 2024).

2 Interest Rate Swaps in Banking

This section provides an overview of interest rate swaps, explains how their risk is measured, and documents the growth of swap usage in the U.S. banking sector using

[4] On run dynamics, see Caglio, Dlugosz and Rezende (2023), Benmelech, Yang and Zator (2023), Koont, Santos and Zingales (2023), and Cookson et al. (2023). Metrick (2024) provides an overview. Hanson et al. (2024) document the rise of uninsured deposits.

publicly available data. We also discuss how to properly measure interest rate risk.[5]

2.1 What is an interest rate swap?

In a fixed-for-floating interest rate swap, one party agrees to receive a fixed rate and pay a floating rate on a notional amount for a specified term, while the counterparty takes the opposite position. The fixed rate, called the swap rate, is set so that the swap has zero value at initiation. The notional amount is used only to compute interest payments and is never exchanged. Receiving fixed in a swap is economically equivalent to a levered purchase of a default-free bond financed by short-term borrowing. We therefore refer to the fixed receiver as "long" the swap and the fixed payer as "short" the swap.[6]

Several metrics are used to measure the interest rate risk of swap positions. Notional amount is the most widely cited but is a poor measure of risk: a 1-year and a 30-year swap with the same notional amount have very different interest rate exposures. Net notional, the difference between long and short notional amounts, improves on gross notional by netting offsetting positions but still does not account for maturity differences. Market value, the sum of the net present values of individual swaps, reflects past rate movements rather than current risk exposure. A swap can have high interest rate risk and zero market value simultaneously.

Our preferred measure is DV01, defined as the decline in the value of a swap or portfolio of swaps for a one-basis-point increase in interest rates. DV01 is the standard metric for interest rate risk management across the financial industry. It captures both the direction and magnitude of interest rate exposure, accounting for maturity, coupon, and netting effects that notional and market value miss.

2.2 The rise of interest rate swaps

We now document the growth of interest rate swap usage in the U.S. banking sector using publicly available call report data. Banks report the total notional amount of their interest rate swap and derivative positions each quarter. As discussed above, notional amount is a poor measure of interest rate risk. It is nevertheless widely used in the literature and in regulatory reporting because it is the only measure of swap activity available in public data. We present it here for that reason, while emphasizing that the notional figures overstate the true interest rate exposure of banks.

[5]A more detailed exposition, including examples, is provided in Internet Appendix A. For a textbook description of interest rate swaps and their risks, see Tuckman and Serrat (2022).

[6]Practitioners typically speak of "receiving fixed" and "paying fixed" rather than "long" and "short."

Panel A of Table 1 gives summary statistics computed from publicly available call reports on banks' usage of interest rate derivatives in five-year intervals from 1985 to 2020 and then for the years 2022 and 2024. While 1995 and later data include interest rate derivatives other than swaps, the vast majority of derivative interest rate risk is from swaps. We find that the notional amount of interest rate derivatives in 1985 was $186 billion, which was about 7% of bank assets at the time. By 2010, notional value had increased more than 1,000-fold to $193.4 trillion, which was 16.3 times bank assets. Notional amounts declined after 2010 because the regulatory mandate to clear swaps facilitated "compression," that is, the reduction of notional amounts without altering risk profiles. In 2024, the total notional amount was $125.8 trillion, which was still large at 5.6 times bank assets.[7]

Interest rate derivatives are highly concentrated in large banks. Panel A of Table 1 shows that the percentage of all commercial banks with interest rate derivative positions increased from 2% to 26% from 1985 to 2024. Hence, while the percentage of banks having exposure to these derivatives gradually increased, most banks still have no exposure to interest rate derivatives. Panel B shows that the participation of the largest 250 banks, by asset size, is more significant, growing from 53% to 93%, and that their notional amounts dominate the market. Although the largest 250 banks represented a bit over 6% of the somewhat less than 4,000 commercial banks operating in 2024, they accounted for over 99.9% of all notional amounts outstanding. Not surprisingly then, notional amount relative to assets (or to equity) is greater for the largest 250 banks than for the banking sector as a whole, peaking at 18.7 times assets in 2010 and remaining at a relatively high multiple of 6.2 times assets in 2024.

Panel C of Table 1 focuses on banks registered with the CFTC as swap dealers, a designation created by the Dodd-Frank Act that identifies market makers. There were 17 registered swap dealers over this period. The data show that these relatively few dealers account for nearly all of interest rate derivative notional amounts, at $192.6 trillion of the total $193.3 trillion in 2010 and $123.7 trillion of the total $125.7 trillion in 2024. Notional amount relative to assets for this group is larger than for the largest 250 banks at 27.4 times assets in 2010 and 8.8 times assets in 2024. This is not surprising since dealers engage in the sale and purchase of interest rate derivatives when acting as market makers.

[7]Before the clearing mandate, swap contracts were bilateral, that is, between pairs of individual market participants. Since the mandate, the vast majority of swap notional amount is between individual market participants and a clearinghouse or central counterparty (CCP). This change in market structure enabled compression cycles in which the risks of all swaps between each market participant and a CCP are aggregated, netted, and then replaced by a smaller number of swaps that preserve each of these aggregated and netted risks.

Table 2 examines the concentration of notional amounts across banks by analyzing the largest 20 banks by assets as of December 2024.[8] The nine largest banks are all swap dealers. These swap dealers stand out with large notional amounts ranging from $37.7 trillion to $243 billion. These notional amounts are also large multiples of assets, of up to 67.2. The remaining 11 banks on this top-20 list have much lower notional amounts. Five of them are swap dealers, but collectively they are smaller banks by assets and notional amounts. Their total notional amount ranges from $337 billion to $30 billion, or, as multiples of assets, from about 1.1 to 0.1.

Panel B summarizes the concentration of swaps across all commercial banks, the 250 largest banks in terms of assets, and swap dealers. Moving from the first group to the last, the percentage of banks engaged in derivatives increases; gross notional over assets increases; and gross notional over equity increases. This shows that the notional amount of interest rate derivatives is highly concentrated in a small number of banks. Almost all of the outstanding notional amount is accounted for by the largest 250 banks, and within this group it is concentrated in swap dealers. Motivated by these findings, our empirical work focuses on the largest 250 banks and pays special attention to swap dealers.

To summarize, the publicly available data paint a picture of enormous swap exposure. But notional amounts are a poor measure of actual interest rate risk. A bank with large offsetting long and short positions will have a high notional amount but little net exposure. Without position-level data, it is impossible to determine how much of the notional exposure translates into true interest rate risk. In the next section, we use confidential CFTC data to answer this question directly.

3 Bank Swap Exposure

This section presents bank-level analysis of interest rate risk using CFTC data. Unlike publicly available data, the CFTC data include the DV01 of each swap, computed directly from its contractual features. This provides an accurate measure of each bank's interest rate exposure from swaps. Our analysis is primarily descriptive. We document the distribution of swap exposure across banks, compare DV01-based measures to the publicly available proxies used in prior work, and show that these proxies are poor approximations of actual interest rate risk. The next section then tests different theories of why banks hold swap positions.

[8] This table is based on publicly available call reports. It does not contain confidential CFTC data.

3.1 Data

This section provides an overview of the swap data; Internet Appendix B describes the regulatory framework, product coverage, variable definitions, and sample construction in detail. We obtain data on swap contracts from the Commodity Futures Trading Commission (CFTC). The Dodd-Frank Act of 2010 required that all swap trades and open positions be reported to swap data repositories (SDRs), which are accessible by the CFTC in its role as a swap regulator. The definition of "swap" under Dodd-Frank is broad, encompassing interest rate swaps, forward rate agreements, overnight index swaps, swaptions, caps, floors, and other over-the-counter interest rate derivatives.[9] The most prevalent form is the fixed-for-floating swap, which accounts for 87% of interest rate risk outstanding. Overnight index swaps account for 6%, swaptions for 5%, forward rate agreements for 2%, and caps or floors for less than 1%. The outstanding quantity of interest rate risk in swaps is between 6 and 9 times as large as that in exchange-traded interest rate derivatives.[10]

A swap is reported if at least one U.S. "person" is a counterparty, if it is executed on a U.S. registered platform, or if it is cleared by a U.S.-registered clearing organization. U.S. commercial banks qualify as U.S.-reporting entities, so their swap trades are included in our data. Swap positions are concentrated in large banks. Our analysis therefore focuses on the 250 largest U.S. commercial banks, by assets, as reported by the Federal Reserve Board as of June 2018.[11] The assets of these top 250 banks range from about \$3 billion to over \$2 trillion. We obtain CFTC data on the swap positions of these banks from the third quarter of 2017 through the fourth quarter of 2023. We drop banks that are subsidiaries of other banks in the list along with those that were acquired over the sample period. This leaves a sample of 218 banks that we use throughout the paper.

Our data are at the level of the individual swap position and include the full contractual features of every swap held by each bank in the sample. From these positions we construct the long, short, and net notional amounts for each bank. In principle, we could also compute the DV01 of each swap ourselves. Instead, we deliberately tie our hands and use the DV01 computed by the CFTC's Office of the Chief Economist as part of its ongoing public reporting of Entity-Netted Notionals (ENNs), a risk-adjusted measure of

[9]Security-based swaps (e.g., credit default swaps on individual entities) are regulated by the SEC and are not included in our data. Exchange-traded interest rate derivatives, such as futures and futures options, are also excluded.

[10]See Baker et al. (2021) and Baker, Haynes and Tuckman (2019).

[11]https://www.federalreserve.gov/releases/lbr/20180630/default.htm

the size of various derivatives markets. Relying on the CFTC's published DV01 anchors our analysis to a transparent, replicable methodology and removes any researcher discretion in valuing swaps; we have checked these DV01s against our own calculations and find them closely aligned. The DV01s are computed quarterly as of a date in the middle of the last month of each quarter so as to avoid quarter-end effects that might temporarily distort notional amounts outstanding.[12] The methodology follows standard industry conventions, taking as input industry-generated curves of fixed-for-floating swap rates across tenors.[13]

The direct measurement of DV01 represents a significant improvement over alternative measures, as interest rate risk exposure is difficult to measure from publicly available data. Gorton and Rosen (1995) propose a methodology using a combination of notional amounts, reported swap market values, and assumptions about the evolution of swap positions over time. Granja et al. (2024) suggest using the total notional value of pay floating swaps not held for trading from call reports to proxy for the value of hedged assets. Begenau, Piazzesi and Schneider (2015) estimate the interest rate exposure of bank swap positions from changes in the market values of swap positions over time. All of these papers rely on assumptions that cannot be tested with publicly available data. Because the DV01 of each swap is computed from its actual contractual features, our measures avoid these assumptions entirely.

3.2 Interest rate swap positions

Before turning to the CFTC data, it is useful to consider what can be learned from publicly available call report data. Call reports distinguish between swap positions held for trading and those not held for trading. Trading positions are primarily associated with market-making activity at dealer banks. As shown in Table 3, aggregate trading notional amounts to 874% of bank assets, reflecting the large intermediation volumes at dealer banks. Non-trading positions, which are more likely to reflect hedging or other non-intermediation uses, are much smaller: aggregate non-trading notional is 18.7% of assets,

[12] Because balance-sheet variables such as assets and equity are reported at quarter end, a timing mismatch arises when scaling DV01 by these variables. From a measurement perspective, the mid-quarter snapshot may introduce classical measurement error relative to true quarter-average exposure, but it avoids the systematic bias that would result from quarter-end window dressing in risk positions. Moreover, balance-sheet variables used for scaling are relatively stable within a quarter, so this timing mismatch is unlikely to have an economically meaningful effect on our results.

[13] When computing the DV01 of a swap, it is most common to start with a term structure of fixed-for-floating swap rates, value the swap, reduce the term structure of rates across all terms by one basis point, recompute the value of the swap, and take the change in the value of the swap as its DV01.

and the average bank holds non-trading notional of 8.6% of assets. The large gap between trading and non-trading notional is consistent with the view that market making, rather than hedging or risk-taking, drives the headline notional figures.

A further refinement available from call reports is the net non-trading notional, which nets long and short non-trading positions within each bank.[14] This measure is smaller still: aggregate net non-trading notional is 6.8% of assets, with a mean of 2.7% and a median of only 0.5% of assets. These numbers suggest that even among non-trading positions, a substantial fraction offset each other. However, all call-report-based measures share a fundamental limitation: they cannot account for differences in maturity, rate, or direction across positions. Two swaps with the same notional but different maturities have very different interest rate risk. For this reason, we turn to the CFTC data, which allow us to compute true risk-adjusted measures by netting at the position level and measuring DV01 directly.

Table 3 presents summary statistics on swap positions using the CFTC data at the bank level and in aggregate. Our data are quarterly from the third quarter of 2017 to the fourth quarter of 2023 and include 218 of the largest U.S. banks.[15] The total value of bank assets in our sample is \$16.1 trillion. The mean bank size is \$77 billion and the median is \$11 billion. On the asset side, loans account for 51.2% of aggregate assets and 66.7% for the average bank; securities account for 21.6% in aggregate and 18.5% for the average bank; and cash accounts for 11.7% in aggregate and 6.4% for the average bank.

The total notional amount of swaps in our sample is \$83.2 trillion, which is about five times as large as total assets. Most of the notional value is concentrated in the largest banks, as can be seen from the distribution of notional value across banks. The mean notional value per bank is \$383 billion, or about five times bank assets, which is much larger than the median notional value of \$0.4 billion, or 3.9% of bank assets. There is large dispersion in notional value relative to bank assets, ranging from 0% at the 5^{th} percentile to 48% at the 95^{th} percentile. We find that 93% of banks hold some swap positions, meaning

[14]Standard call reports do not separately report receive-fixed and pay-fixed notional amounts for non-trading interest rate derivatives, so the direction of a bank's interest rate exposure cannot be directly observed. This is a key reason why prior work (e.g., Begenau, Piazzesi and Schneider (2015)) had to estimate direction indirectly from the comovement of fair values with interest rates. However, since 2011, expanded reporting in Schedule RC-L includes a breakout of receive-floating notional for non-trading swaps. Our net non-trading notional measure uses this information: we subtract the reported receive-floating notional from total non-trading notional to obtain a proxy for the net directional position. This measure is an improvement over total non-trading notional but remains an imperfect proxy because it does not adjust for differences in maturity or rate across positions.

[15]We exclude three large banks focused on custody and asset servicing rather than commercial banking, whose balance sheets differ fundamentally from those of the commercial banks we study.

that even among the top 250 banks, 7% do not use any swaps. This is consistent with our finding in Section 2.2 that the vast majority of small banks, which are not included in our sample, have no position in swaps.

Our data also include the fair market value of swaps. As discussed earlier, the market value of an interest rate swap is zero at initiation and changes as interest rates change. As shown in Column 1 of Table 3, the total market value of bank derivatives is $57 billion, or about 0.4% of bank asset values. Similar to notional value, the market value is concentrated among large banks. The mean market value is $264 million, which is a small fraction of bank asset value, and the median market value is close to zero. There is significant dispersion across banks with market value relative to bank asset value ranging from -0.016% at the 5^{th} percentile to 0.192% at the 95^{th} percentile. As discussed above, even though market value is commonly reported, it does not provide any information on a bank's exposure to interest rate risk.

3.3 Interest rate risk of swap positions

Table 3 shows that the $83.2 trillion aggregate notional amount falls by a factor of more than 100 to $667 billion after netting. This illustrates, as discussed earlier, that notional amount without netting is meaningless in terms of measuring interest rate risk. Netting long and short positions further reveals that most smaller banks have little net interest rate exposure. Across all banks, the mean net notional is $3.1 billion, while the median is nearly zero. Also, net notional is concentrated in the largest banks.[16]

We now turn to our preferred measure of interest rate exposure, DV01, described earlier. Swap DV01 for the aggregate banking system is $511 million and, like notional and net notional amounts, is concentrated among large banks. The mean and median swap DV01 are $2 million and close to zero, respectively. And there is considerable dispersion across banks: the swap DV01 is $5 million at the 95^{th} percentile and $-\$5$ million at the 5^{th} percentile. Furthermore, as discussed earlier, swap DV01, which measures risk, can be compared with bank equity, which measures capacity to absorb risk. Swap DV01 relative to equity is 0.031% for the aggregate banking system, with mean and median values of -0.002% and near zero, respectively.

We find that the interest rate risk of swaps varies across banks. Figure 1 shows the

[16] Net notional actually exaggerates the reduction of exposure, because, in the presence of counterparty risk, longs with one counterparty do not fully offset the risk of shorts with another counterparty. Baker et al. (2021) show, however, that exposure is dramatically reduced even when netting longs and shorts only within counterparty relationships. In their sample, $231 trillion of notional exposure reduces to $13.9 trillion in 5-year risk equivalents.

distributions of gross notional to assets for swap dealers (Panel A) and non-swap-dealers (Panel B), net notional to assets for swap dealers (Panel C) and non-swap-dealers (Panel D), and of swap DV01 to equity for swap dealers (Panel E) and non-swap-dealers (Panel F). The large mass at zero in Panels B, D, and F reflects the absence of any swap position in about 8% of non-dealer banks. The ratio of DV01 to equity varies from -0.094% at the 5^{th} percentile to 0.057% at the 95^{th} percentile. That this distribution is close to symmetric indicates that losses from interest rate changes at one bank are offset by gains at another bank.

Another way to understand the magnitude of swap DV01 is in terms of balance sheet volatility, i.e., in terms of swap gains or losses, quantified using historical rate volatility, relative to bank assets. We assume a daily standard deviation of interest rates of 5 basis points. This assumption is supported by the data: over our sample period (Q3 2017 through Q4 2023), the daily standard deviation of rate changes computed from FRED constant maturity Treasury yields is 5.6 basis points for the 2-year, 5.8 for the 5-year, 5.6 for the 10-year, and 5.3 for the 30-year maturity. The range across maturities is only 0.5 basis points, so a single 5 basis point assumption is a reasonable approximation across the yield curve. In that case, a one-standard deviation change in rates over a 63-trading day quarter is about $5 \times \sqrt{63}$, or 40 basis points. Combining this standard deviation with DV01 statistics gives balance sheet volatilities. More specifically, with a mean bank DV01 of $2 million, the quarterly standard deviation of changes to the value of swap positions due to changes in rates is 40 times $2 million, or $80 million. For the median bank, with a DV01 near zero, this quarterly standard deviation is much smaller. These standard deviations are economically small compared with mean and median bank assets of $77 billion and $11 billion, respectively.

3.4 Swap dealers vs. non-swap dealers

Table 4 provides a breakdown of the summary statistics for swap dealers relative to non-swap dealers. Total bank assets of swap dealers are much larger than for non-swap dealers. Swap dealers account for $10.9 trillion in bank assets with an average of $860 billion per bank. Non-swap-dealers account for $5.1 trillion in bank assets and an average of $26 billion.

Swap dealers and non-swap dealers are comparable in terms of their asset holdings. Both primarily hold loans, 49.4% versus 67.9%, though dealers hold a smaller share than non-dealers. Dealers hold more securities than non-dealers, 22.5% versus 18.2%, and also hold more cash, 11.9% versus 6.1%.

The empirical evidence is consistent with a large portion of swap positions being generated by market-making businesses, which are characterized by large notional amounts and offsetting long and short positions. First, swap dealers account for the vast majority of swap notional amount, with \$82.4 trillion versus \$878 billion for non-swap-dealers. Second, the vast majority of netting happens at the swap dealers: their notional amount of \$82.4 trillion falls by a factor of more than 150 to a net notional of \$506 billion. While netting reduces non-swap-dealer notional amount as well, the reduction is not nearly as large, falling from \$878 billion to \$161 billion.

Turning to our preferred measure of interest rate risk, DV01, we find that the aggregate DV01 of swap dealers is almost the same as that of the entire sample at \$594 million. Conversely, the DV01 of non-swap-dealers is much smaller at −\$83 million. Aggregate DV01 to equity is limited for both groups, however, at 0.05% for swap dealers and −0.01% for non-swap-dealers. In contrast, the interest rate risk of bank assets relative to equity is much larger, as we document in Section 5.2.

Table 4 also provides direct evidence that non-dealer banks use swaps to facilitate their lending business. For the average non-dealer bank, 86% of the notional amount of swaps in which the bank receives fixed is with customers rather than with other dealers, and the share is nearly identical in risk terms, with 86% of receive-fixed DV01 with customers. These customer swaps likely facilitate borrowers' transforming the floating-rate loans they take from banks into fixed-rate obligations: a customer paying a floating rate on a bank loan, combined with a swap with the bank in which the customer receives a floating rate and pays a fixed rate, nets to a fixed-rate obligation. For swap dealers, by contrast, the customer share is much lower, at about 34%, because their receive-fixed swaps are dominated by market making rather than their lending business.[17]

3.5 Can interest rate risk from swaps be measured with publicly available data?

A central question is whether the interest rate risk of bank swap positions can be approximated using publicly available data. Table 5 addresses this question by reporting correlations across all measures of swap exposure available in our data.

We distinguish between measures computed from CFTC position-level data and measures available from publicly available call reports. The CFTC-based measures are: swap DV01 scaled by assets (our preferred measure of interest rate risk), swap DV01 scaled by

[17] All of these percentages are computed using the positions of banks with strictly positive notional amounts.

equity, net notional scaled by assets, and gross notional scaled by assets. These measures can only be computed with access to position-level data on each swap contract. The call-report-based measures, which are available to all researchers, are: gross notional scaled by assets, fair market value of derivatives scaled by assets, non-trading notional scaled by assets, and net non-trading notional scaled by assets. Prior work has relied on these publicly available measures, or on estimates inferred from changes in derivatives market values over time, to draw conclusions about bank interest rate risk from swaps.

Panel A of Table 5 reports correlations in levels; Panel B reports correlations in changes. Standard errors are clustered by bank and quarter. The correlations between DV01 and the publicly available measures are low. Gross notional from call reports has a correlation of only -0.02 with DV01. Fair market value is -0.06. Non-trading notional, which excludes positions held for market making, is only 0.10. Net non-trading notional, which further nets long and short positions, is 0.09. Even net notional from CFTC data, which offsets long and short positions but does not adjust for maturity differences, has a correlation of only 0.32 with DV01. The results are similar in changes, indicating that the poor correspondence is not driven by fixed cross-sectional differences across banks. Figure 2 provides binscatter plots for these correlations.

These findings have direct implications for the interpretation of prior work. Studies that infer interest rate risk from notional amounts or market values reach conclusions that do not hold when exposure is measured at the position level. In particular, the conclusion that U.S. banks increase their interest rate exposure through swaps (Begenau, Piazzesi and Schneider, 2015; Granja et al., 2024) appears to be an artifact of the methodologies used rather than a feature of actual bank behavior. Our results suggest that interest rate risk from swaps cannot be reliably measured or even approximated with publicly available data.

Taken together, the summary statistics reveal a clear finding. Notional amounts suggest that large banks are heavily exposed to swaps. Measured by DV01, however, the swap positions of most large banks have close to zero interest rate risk and aggregate interest rate risk from swaps is quantitatively small.

4 Why Do Banks Use Swaps?

The previous section documented that banks hold large notional swap positions but have close to zero net interest rate risk from swaps. This raises a natural question: why do banks hold swaps? We consider four explanations. First, banks may use swaps to take on interest rate risk. Second, swap dealer banks may hold positions as part of their market-making business. Third, non-dealer banks may use swaps to meet borrower demand for fixed-rate loans. Fourth, banks may use swaps to hedge interest rate risk. We examine each in turn.

4.1 Risk-taking

If banks use swaps for risk-taking, we would expect banks with stronger incentives to take risk (those with lower capitalization, higher reliance on uninsured deposits, greater asset duration, or lower asset liquidity) to hold larger swap exposures.[18] We examine this in two ways: by testing whether riskier banks increased their swap exposure during the 2022–23 monetary tightening cycle, and by relating swap exposure to bank risk characteristics in the cross-section.

4.1.1 Did riskier banks increase swap exposure during the 2022–23 rate hike?

The 2022–23 monetary tightening provides a natural setting to test for risk-taking with swaps. Between March 2022 and March 2023, the Federal Reserve raised the federal funds rate from near zero to 5%. This was the fastest and largest tightening cycle in two decades. Rising rates exposed banks with long-duration assets to substantial losses, and the resulting stress contributed to the failure of Silicon Valley Bank (SVB) in March 2023.

SVB is a relevant case because a Federal Reserve report documents that SVB increased its interest rate risk exposure through the swap market as rates were rising, unwinding pay-fixed swaps that had hedged its securities portfolio. This behavior is consistent with risk-shifting. The question is whether SVB was representative or an outlier.

We test this by measuring bank risk characteristics prior to the start of the tightening cycle, in 2021Q4, and examining subsequent changes in swap-based interest rate risk exposure. The risk measures are: the equity ratio, the share of uninsured deposits, asset duration, and asset liquidity. We estimate:

$$\Delta y_i = \alpha + \beta \, \text{Bank Risk}_{i,2021Q4} + \gamma \, X_{i,2021Q4} + \varepsilon_i, \tag{1}$$

where Δy_i is the change in swap DV01 scaled by equity from 2021Q4 to 2022Q4, and $X_{i,2021Q4}$ includes controls such as log bank assets. Standard errors are robust.

Table 6 reports the results. The coefficient on the equity ratio is -0.36 and statistically significant: banks with higher equity ratios take on less interest rate risk through swaps.

[18] These proxies are standard measures of bank fragility used in the literature; see, e.g., Chen et al. (2024). We also include asset duration as a natural measure of interest rate risk (Drechsler et al., 2026).

A one standard deviation increase in the equity ratio is associated with roughly a half standard deviation decrease in swap DV01. This runs counter to the risk-shifting hypothesis, under which less-capitalized banks would take on more interest rate risk.

We find no economically or statistically significant effects for the uninsured deposit share, asset duration, or asset liquidity. The null results on uninsured deposits are noteworthy given that run risk from uninsured depositors was a central concern during this episode. If run risk amplified incentives to hedge, we would expect banks with more uninsured deposits to reduce their interest rate exposure. We find no such effect. Figure 3 provides binscatter plots.

Taken together, our evidence indicates that riskier banks did not increase interest rate risk through swaps during the 2022–23 tightening cycle. SVB's behavior was atypical rather than representative of the broader banking sector.[19]

4.1.2 Cross-sectional determinants of swap exposure

We also examine whether swap exposure correlates with standard proxies for bank risk-taking incentives in the cross-section. We estimate regressions of swap DV01 scaled by equity on each proxy separately and jointly:

$$\frac{SwapDV01_{it}}{Equity_{it}} = \alpha_t + \beta \times \text{Risk Proxy}_{it} + \gamma \times X_{it} + \varepsilon_{it}, \tag{2}$$

where α_t are time fixed effects, and X_{it} includes control variables (log assets, loan share, securities share, and an indicator for swap dealer status). Standard errors are clustered by bank. Table 7 reports the results.

We consider four proxies for risk-taking incentives. The first is asset duration. Banks with longer-duration assets are more exposed to interest rate changes and may have a stronger incentive to either hedge or amplify that exposure through swaps. The coefficient on asset duration is -0.001 with a standard error of 0.001 (Column 2). The point estimate is close to zero and not statistically significant, indicating that banks with longer-duration assets do not hold larger swap positions.

The second proxy is the equity ratio. Banks with lower equity ratios have less capacity to absorb losses and may have stronger incentives for risk-shifting. A positive coefficient would indicate that better-capitalized banks hold more swap exposure, which would be inconsistent with risk-taking. The coefficient is 0.052 with a standard error of 0.046 (Column 4). The point estimate is positive but not statistically significant.

[19] The Internet Appendix provides robustness checks for other quarters.

The third proxy is the share of uninsured deposits. Banks with a higher share of uninsured deposits face greater run risk, which could amplify incentives to take on interest rate risk or, alternatively, to hedge more aggressively. The coefficient is 0.003 with a standard error of 0.008 (Column 6), which is small and not statistically significant. There is no evidence that banks with more uninsured deposits hold larger swap exposures.

The fourth proxy is asset illiquidity, measured following Berger and Bouwman (2009). Banks with less liquid asset portfolios may face greater difficulty adjusting their balance sheets and could use swaps as an alternative channel for managing or increasing interest rate exposure. The coefficient is -0.010 with a standard error of 0.017 (Column 8), which is not statistically significant. The point estimate is small and provides no evidence that banks with less liquid assets use swaps to take on interest rate risk.

Column 9 includes all four proxies together. The results are similar: asset duration (-0.001), equity ratio (0.074), uninsured deposit share (0.006), and asset illiquidity (-0.022) are all statistically insignificant.

Overall, the cross-sectional evidence does not support the view that riskier banks hold larger swap exposures. None of the four risk proxies is statistically associated with swap DV01 relative to equity.[20]

4.2 Market making

Swap dealing is concentrated among a small number of banks. Our sample includes 14 swap dealer banks, though not all are active dealers in every quarter.[21]

The numbers make the case clearly. As reported in Table 4, swap dealers account for \$82.4 trillion of the \$83.2 trillion in total notional amounts, over 98% of the total. Non-dealer banks hold just \$878 billion. In terms of notional relative to assets, dealers average about 7.5 times assets, while non-dealers average a small fraction.

The key observation is the contrast between notional amounts and DV01. Dealers' \$82.4 trillion in notional falls by a factor of more than 150 after netting to just \$506 billion in net notional. Their aggregate DV01 is \$594 million, which is only 0.05% of equity. For non-dealers, the aggregate DV01 is $-$\$83 million, or -0.01% of equity. In other words,

[20] The Internet Appendix (Table IA.1) reports specifications that also include bank fixed effects, so that identification comes from within-bank variation over time. The conclusions are the same.

[21] The "swap dealer banks" in our paper are the banks in the intersection of CFTC-registered swap dealers and the largest 250 commercial banks. This is a narrower group than either the "G16 derivatives dealing banks," which is not an officially designated group and refers to firms at a consolidated level rather than at the level of legal entities (see, e.g., Boneva, Böninghausen, Rousová, and Letizia, 2019), or "primary dealers," which are trading counterparties of the New York Fed for monetary policy implementation and are not themselves commercial banks.

despite holding nearly all of the notional exposure in the banking system, swap dealers have close to zero interest rate risk from swaps. This is the signature of market making: dealers intermediate large volumes on both the long and short sides, and their positions largely offset.

This finding is not surprising in itself: dealers are in the business of facilitating trades, not taking directional bets. But it is important because it rules out the hypothesis that dealers use their market-making positions to build up large interest rate exposures. The large notional amounts that attract attention in public reporting and regulatory discussion reflect intermediation volume, not risk-taking.

4.3 Borrower hedging of floating-rate loans

Banks extend loans to firms and other borrowers, and these loans are predominantly floating rate. Banks prefer floating-rate loans in part because they are easier to securitize and sell (Faulkender, 2005; Vickery, 2008; Saunders et al., 2025). Many borrowers, however, prefer fixed-rate exposure to match the duration of their assets and liabilities. To accommodate this demand, banks offer a floating-rate loan together with an interest rate swap in which the borrower pays fixed and receives floating. The bank then typically hedges the resulting interest rate exposure by entering an offsetting swap with a dealer. This practice is widely discussed in the business and policy literature.[22] The borrower's net obligation is a synthetic fixed-rate loan: its floating-rate payments on the loan are offset by floating receipts on the swap, leaving only the fixed payments. The bank receives fixed and pays floating on the swap, creating a long swap position.

We define a "customer" as any swap counterparty other than a registered swap dealer or clearinghouse. In practice, customers are predominantly nonfinancial firms. When a firm takes out a floating-rate loan and enters a swap to convert it to fixed rate, the firm pays fixed to the bank (i.e., the bank receives fixed). The bank then typically hedges this position by entering an offsetting swap with a dealer in which it pays fixed. To measure the importance of this channel, we examine the customer share of banks' receive-fixed (long) swap positions. We define $\text{CustomerShare}_{it} = NRC_{it}/NR_{it}$, where NRC_{it} is the gross notional on which bank i receives fixed from customers and NR_{it} is total gross notional on which bank i receives fixed. By construction, this measure is bounded between zero and one.

[22] See, for example, Chatham Financial (2025a, 2025b, 2025c), which describes how banks structure loan-swap packages for commercial borrowers; Frost Brown Todd (2023), which discusses the legal and operational aspects of these transactions; and The Financial Services Roundtable (2012), which documents the role of back-to-back dealer hedging.

Underlying this measure is the identifying assumption that a bank's receive-fixed swaps with customers reflect the facilitation of borrower demand rather than the bank's own risk management. Two features of the transaction support this assumption. First, a corporate borrower that has taken a floating-rate loan and wants fixed-rate exposure demands exactly this position from the bank: the borrower pays fixed and receives floating, so the bank takes the receive-fixed side and then lays off the resulting exposure by entering an offsetting pay-fixed swap with a dealer. The borrower's demand for a fixed-rate obligation is thus what generates the bank's receive-fixed swap. Second, the identity of the counterparty is itself informative. A swap executed with a customer indicates that the bank is providing a service to that customer, because a bank seeking to manage its own interest rate risk would transact in the interdealer market rather than with a nonfinancial firm. Receive-fixed swaps with customers are therefore unlikely to reflect the bank's own directional positioning on interest rates.

We estimate the following regression:

$$CustomerShare_{it} = \alpha_t + \beta \times X_{it} + \varepsilon_{it}, \tag{3}$$

where α_t are time fixed effects, and X_{it} includes bank characteristics such as an indicator for swap dealer status, log assets, loan share, securities share, and asset illiquidity. Standard errors are clustered by bank. We restrict the analysis to banks with a non-zero notional value for long swaps.[23] Table 8 reports the results for the full bank sample.[24] Banks with a higher share of illiquid assets, a proxy for the intensity of their lending business, have a higher customer share. This is consistent with customer swaps being driven by borrower demand for fixed-rate exposure. The effect of bank size is negative and statistically significant: smaller banks conduct a larger share of their swap business with customers, reflecting their more concentrated focus on relationship lending.

This raises the question whether banks hedge the interest rate risk arising from these customer-facing swap positions. We can gauge this using our position-level data. We identify instances where a bank hedges a long swap by simultaneously initiating a short swap position on the same day through an identical, offsetting contract with a dealer. This practice is relevant for non-swap-dealer banks, whose smaller swap businesses make it practical to hedge swaps one at a time rather than hedging all swaps together as a port-

[23]This restriction is necessary because the customer share is undefined for banks with no long swap positions. The results therefore characterize the intensive margin of swap usage, conditional on a bank participating in the swap market.

[24]The Internet Appendix (Table IA.2) reports results excluding swap dealer banks. The conclusions are the same.

folio. We divide the sample into two periods: pre-2020 (2017Q3–2019Q4) and post-2020 (2020Q1–2023Q4). The split is motivated by a push by industry and regulators to lower the number and notional value of outstanding swaps for given quantities of interest rate risk, recognizing that banks increased their efforts to compress their swap portfolios over time by replacing multiple individual swaps with a smaller number of swaps that preserve the same net risk. Compression reduces the number of outstanding contracts without changing interest rate exposure. A consequence is that it becomes harder to identify back-to-back hedges in the data, because banks are more likely to hedge several customer swaps at once with a single offsetting position rather than matching each swap individually. The fraction of back-to-back hedges we identify in the post-2020 period is therefore likely to understate true hedging activity by more than in the pre-2020 period.[25]

We focus on non-swap dealer banks. Table 9 presents the results, starting with non-dealers with assets less than $100 billion (116 banks). These banks hold long swaps with an aggregate notional value of $167 billion and $217 billion in the pre- and post-2020 subsamples, respectively. Of these, $113 billion and $160 billion are with customers, representing 68% and 74% of long swaps. Among long swaps with customers, we identify $80 billion and $52 billion hedged through back-to-back short swaps with dealers. This indicates that banks hedged at least 70% and 32% of their long swaps with customers using identical offsetting short swaps. The decline from 70% to 32% is consistent with the increased prevalence of compression in the post-2020 period, which makes individual back-to-back hedges harder to identify even if overall hedging activity has not declined. These percentages are lower bounds for overall hedging activity because swaps can also be hedged on a portfolio basis.

The outcomes for the average and median bank are similar, with even more pronounced customer involvement. The average bank has customer shares of 86% and 90%, and the median bank trades long swaps exclusively with customers (customer share of 100%). We are able to match 57% and 37% of the average bank's long customer positions, and 73% and 30% of the median bank's, to identical offsetting short swap positions executed on

[25]Dealer-to-customer compression rose significantly over our sample period. For May 2017, Clarus Financial Technology (2017) report at least $325 billion of dealer-to-customer USD interest rate swap notional compressed out of $1.4 trillion traded on dealer-to-customer swap execution facilities, a ratio of at least 23%. By 2024, Clarus Financial Technology (2024*a*) report that dealer-to-customer notional compressed had risen to $58.2 trillion, constituting 50% of total compression volume of $117 trillion. Furthermore, Clarus Financial Technology (2024*b*) report that dealer-to-customer SOFR SEF compression trades accounted for roughly 56% of all dealer-to-customer trades from January to May 2024. This increase in customer compression can explain the smaller proportion of identifiable back-to-back hedges in the later years of our sample.

the same day with a dealer.[26] We perform the same analysis for non-swap dealers with assets exceeding \$100 billion (11 banks pre-2020, 13 post-2020). As shown in Table 9, these banks hold aggregate long swap notional of \$326 billion and \$207 billion, of which \$88 billion and \$73 billion are with customers. Relative to smaller banks, these larger banks have a smaller fraction of long swaps with customers because they use long swaps for various non-customer purposes, such as hedging fixed-rate liabilities. For long swaps with customers, we identify \$35 billion and \$20 billion in back-to-back hedges, or 39% and 27%. These percentages are a lower bound because large banks are more likely to hedge on a portfolio basis.

Overall, our findings show that non-dealer banks hold swap positions primarily to provide services to their customers. Banks receive fixed in swaps as part of their lending business and hedge the resulting interest rate risk by paying fixed to dealers. The high customer shares and the prevalence of back-to-back hedging suggest that these swap positions are driven by borrower demand for fixed-rate loans rather than by banks' own interest rate views.

4.4 Hedging

If banks use swaps to hedge interest rate exposure on their balance sheets, then changes in the value of swap portfolios should be offset by opposite changes in the value of the hedged assets or liabilities. The key implication is that swap returns should have little explanatory power for bank equity returns: the gains or losses on swaps would be absorbed by offsetting movements in the rest of the balance sheet.

We test this implication using data on DV01s and bank stock returns for publicly listed banks (145 banks). We measure the quarterly return on bank i's swap portfolio as:

$$SwapReturn_{it} = -\frac{SwapDV01_{it-1} \times \Delta y_t \times 10{,}000}{Equity_{it-1}}, \tag{4}$$

where $SwapDV01_{i,t-1}$ is the swap DV01 at the start of the quarter, Δy_t is the change in the five-year swap rate, and $Equity_{it-1}$ is market equity. This variable isolates the component of equity returns attributable to changes in swap values.

Panel A of Table 10 reports summary statistics. The average quarterly swap return is -0.48% with a standard deviation of 5.7%. For comparison, the average bank equity return is 1.4% with a standard deviation of 18.2%. The variation in swap returns is small

[26] Mean and median customer and hedging shares do not have to equal the appropriate ratios of the mean and median notional amounts.

relative to the variation in bank equity returns, consistent with swaps playing a marginal role in overall bank risk.

We estimate the following regression:

$$BankReturn_{it} = \alpha_t + \delta_i + \beta \times SwapReturn_{it} + \epsilon_{it}, \tag{5}$$

where α_t and δ_i are quarter and bank fixed effects, and standard errors are clustered at the bank level. If banks hedge with swaps, we expect $\beta = 0$: swap gains and losses are offset by the hedged positions, so swap returns do not move equity returns.

Panel B of Table 10 presents the results. The coefficient on swap returns is insignificantly different from zero in specifications with fixed effects and is significantly different from one. The marginal R^2 of including swap returns is near zero.[27]

These results are consistent with banks using swaps for hedging. Changes in swap values do not predict bank equity returns, as one would expect if the interest rate exposure from swaps is offset by opposite exposure elsewhere on the balance sheet. At the same time, the small magnitude of swap returns relative to equity returns confirms that the quantitative importance of swaps for overall bank risk is limited. Banks appear to use swaps for hedging on the margin, but swaps are not a first-order driver of bank equity values.

5 How important are swaps for banks' overall exposure to interest rate risk?

The previous sections established that banks' interest rate risk from swaps, measured by DV01, is close to zero. But how does this compare to the interest rate risk embedded in banks' assets and liabilities? To answer this question, we estimate the duration and DV01 of bank balance sheets using Call Report data and compare them to swap exposure.

5.1 Measuring interest rate risk of bank assets and liabilities

We obtain data on bank assets and liabilities from the U.S. Call Reports provided by Wharton Research Data Services, which contain quarterly income statements and balance sheets for all U.S. commercial banks. We match these data to the CFTC swap data using bank-level identifiers and verify the merge against bank names and locations reported in

[27] The Internet Appendix provides robustness after dropping the early COVID period (2019Q4–2020Q4).

both datasets. We measure the interest rate risk of bank assets and liabilities—on both the asset and the liability side—following Drechsler et al. (2026).[28] Three features distinguish this approach from much of the prior literature. First, we adjust our estimates for the amortization and prepayment risk of mortgage assets, which materially shortens their effective duration. Second, we convert the maturity and repricing buckets reported in the Call Reports into estimated durations using contemporaneous swap rates, rather than treating reported repricing maturities as durations. Third, we estimate the effective duration for deposit liabilities.

Assets and non-deposit liabilities. For assets and liabilities other than deposits, the Call Reports report the outstanding amount within term buckets defined by remaining maturity or, for floating-rate instruments, time to the next repricing. For non-amortizing, fixed-rate instruments—non-MBS debt securities, other loans and leases, and non-deposit liabilities—most of the present value is repaid at maturity, so maturity is a good indicator of interest rate risk. We treat each position as a par bond with maturity equal to the center of its term bucket and a yield equal to the swap rate of that maturity in that quarter, a rule we refer to as "par correspondence." Because positions are allocated to buckets by repricing date, floating-rate instruments with short-term resets are assigned near-zero duration.

Mortgage assets require a different treatment because they amortize and are subject to the borrower's prepayment option, both of which shorten effective duration in a rate-contingent way. For RMBS, residential mortgage loans, and other MBS with a remaining maturity above one year, we assign durations from Bloomberg MBS indexes of matching maturity, which embed prepayment risk.[29] For mortgage positions maturing within a year, where prepayment is less relevant, and for other MBS, where the Call Reports distinguish only whether expected average life is above or below three years, we apply par correspondence at the midpoint maturity.

Deposits. Deposits are the largest item on the liability side and require a fundamentally different treatment. Although deposits are contractually short-term, the deposit franchise has substantial economic duration: banks pay deposit rates that adjust only partially and

[28]Their framework builds on Drechsler, Savov and Schnabl (2017) and Drechsler, Savov and Schnabl (2021).

[29]For example, RMBS in the 5- to 15-year term bucket are assigned a duration equal to that of the Bloomberg U.S. MBS Fixed-Rate GNMA 15-Year Index in the corresponding quarter, a standard industry benchmark for agency MBS whose duration reflects interest rate and prepayment risk without credit risk.

with a lag to market rates, so the present value of future deposit spreads—the franchise—rises when interest rates rise. The deposit franchise therefore has negative duration and hedges the positive duration of bank assets. We measure it following Drechsler et al. (2026), who show that the dollar duration of the deposit franchise per dollar of deposits is a function of the deposit beta, the decay rate of the deposit base, and operating costs. We take their estimated dollar duration of the deposit franchise and scale it by each bank's nominal deposits, separately for insured and uninsured deposits. Because insured deposits have lower betas and higher operating costs, their franchise is more interest-rate-sensitive and carries a longer duration than that of uninsured deposits.

Coverage. The deposit franchise value can be measured only for banks that are funded primarily by domestic deposits. We therefore follow Drechsler et al. (2026) in restricting the sample to banks that fund at least 60% of their balance sheet with deposits and in excluding foreign banking subsidiaries.

Regarding the estimation of duration of assets and non-deposit liabilities, our methodology covers the large majority of bank balance sheets. On average, it covers 86% of assets (standard deviation 11%) and 96% of liabilities (standard deviation 6%). The main omitted categories—federal funds and repurchase agreements, trading assets and liabilities, real estate, intangibles, and items classified as "other"—carry little interest rate risk or are economically small.[30] Internet Appendix C describes the measurement for each asset and liability category in detail.

5.2 Overall interest rate risk

Table 11 reports the interest rate risk of bank assets and liabilities for our sample of banks as of 2023Q4. On the asset side, banks hold \$7.8 trillion in loans (duration 2.55 years) and \$3.5 trillion in securities (duration 4.72 years), together with \$2.3 trillion in cash. Assets total \$13.7 trillion with an average duration of 2.67 years. On the liability side, deposits are by far the largest item at \$11.0 trillion. Following Drechsler et al. (2026), the deposit franchise carries substantial duration: because the value of deposits to the bank falls when rates rise, deposits contribute negative duration to bank equity and hedge the interest rate risk of assets. We estimate an aggregate deposit duration of -3.39 years, with insured deposits longer (-4.02 years) than uninsured deposits (-2.64 years), reflecting the lower deposit betas of insured balances. Non-deposit liabilities (\$0.83 tril-

[30] Across the 250 largest banks as of June 2018, trading assets averaged about 0.4% of bank assets, with a standard deviation of less than 2%.

lion) have a short duration of -1.30 years.

The results have two main implications. First, banks carry substantial interest rate duration on both the asset and the liability side of the balance sheet, and the two largely offset one another. A 100 basis point increase in interest rates reduces the value of aggregate assets by \$3.65 billion while raising the value of equity by \$3.83 billion through the decline in the value of liabilities, of which the deposit franchise accounts for nearly all. The gross interest rate exposures on each side of the balance sheet are therefore large, but they net to a small residual: the deposit franchise hedges the long duration of loans and securities, leaving aggregate equity close to immune to interest rate changes. The same pattern holds for the average bank (Panel B), for which the asset and liability exposures are of comparable magnitude and opposite sign.

Second, both of these exposures are two orders of magnitude larger than the exposure from swaps. To compare them on a common basis, we scale the DV01 of assets, liabilities, and swaps by book equity. A 100 basis point increase in interest rates changes asset value by 24.6% of equity and liability value by -25.8% of equity, but changes equity value through swaps by only -0.28%. In the aggregate, the swap DV01 is $-\$41.9$ million, equal to -0.28% of equity; for the average bank, the swap DV01 is $-\$0.2$ million, equal to -0.002% of equity. Swap exposure is thus much smaller than the exposure on either side of the balance sheet. Swaps are accordingly neither a quantitatively important channel through which banks take on interest rate risk nor a material source of hedging, whether for the average bank or for the banking system as a whole. The interest rate risk of banks is determined by their assets and their deposit franchise, not by their swap positions.

6 Conclusion

Despite holding substantial swap positions with an average notional value of \$383 billion, banks' net interest rate exposure from swaps is close to zero. A 100-basis-point increase in interest rates raises the value of swap positions by the economically small amount of 0.2% of equity. The variation in swap positions across banks shows that some use swaps to decrease while others use them to increase interest rate risk, facilitating risk transfer within the banking sector rather than hedging balance-sheet exposure.

The large notional amounts reflect two distinct functions. Swap dealer banks hold large positions to facilitate trading and provide liquidity in swap markets. Non-dealer banks use swaps to satisfy borrower demand for fixed-rate loans, receiving fixed from customers and hedging the resulting exposure with dealers. In both cases, gross positions are large but net interest rate risk is small. Banks use swaps for hedging on the margin, but swaps are not a first-order determinant of banks' overall interest rate risk.

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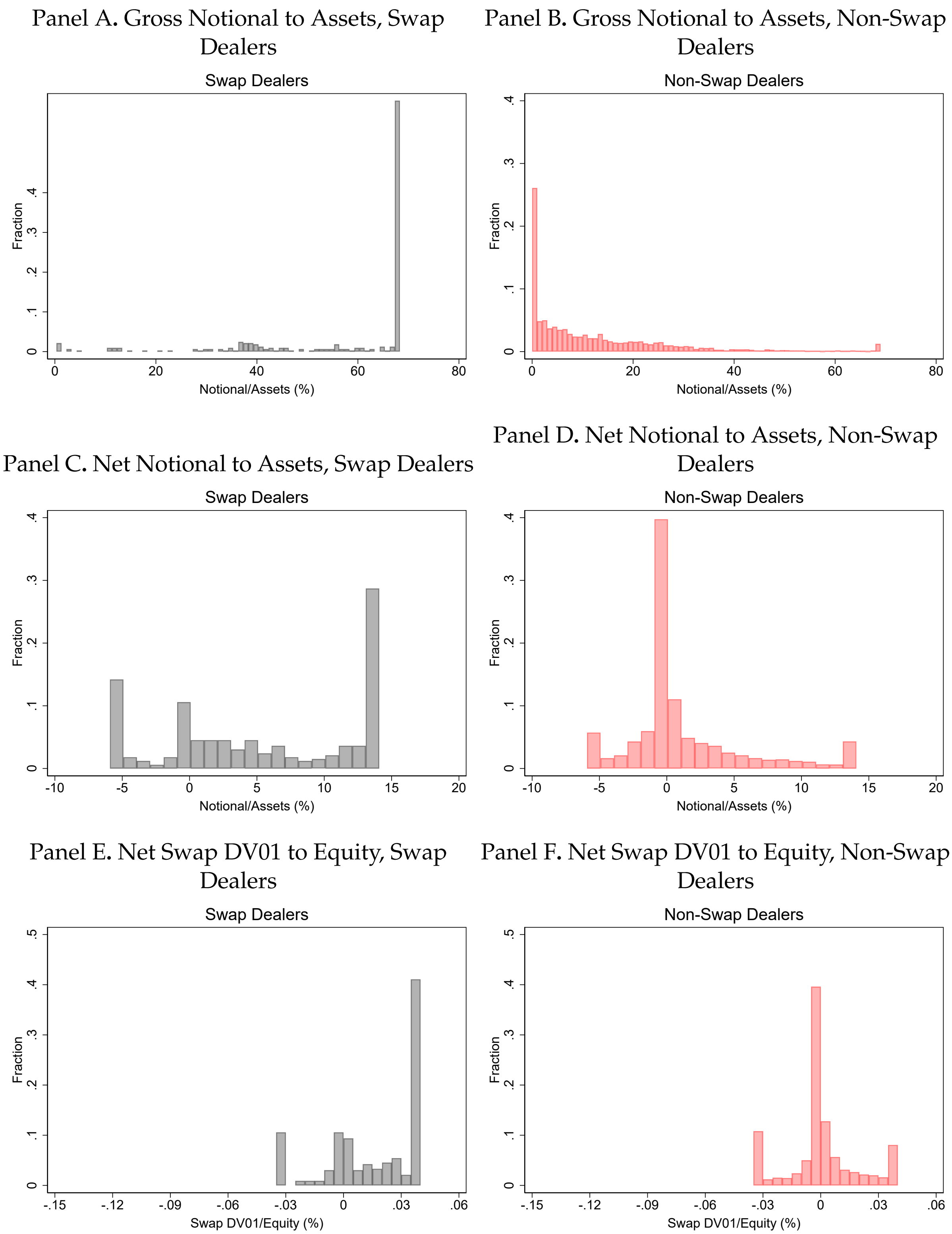

Figure 1. **Gross notional/assets, net notional/assets, and swap DV01/equity**. The figure plots the distributions of gross notional over assets for swap dealer banks (Panel A) and non-swap-dealer banks (Panel B), net notional over assets for swap dealer banks (Panel C) and non-swap-dealer banks (Panel D), and of swap DV01 over equity for swap dealer banks (Panel E) and non-swap-dealer banks (Panel F). The data are quarterly from 2017.III to 2023.IV, winsorized by quarter at 5%. Gross notional amounts are from the Call Reports.

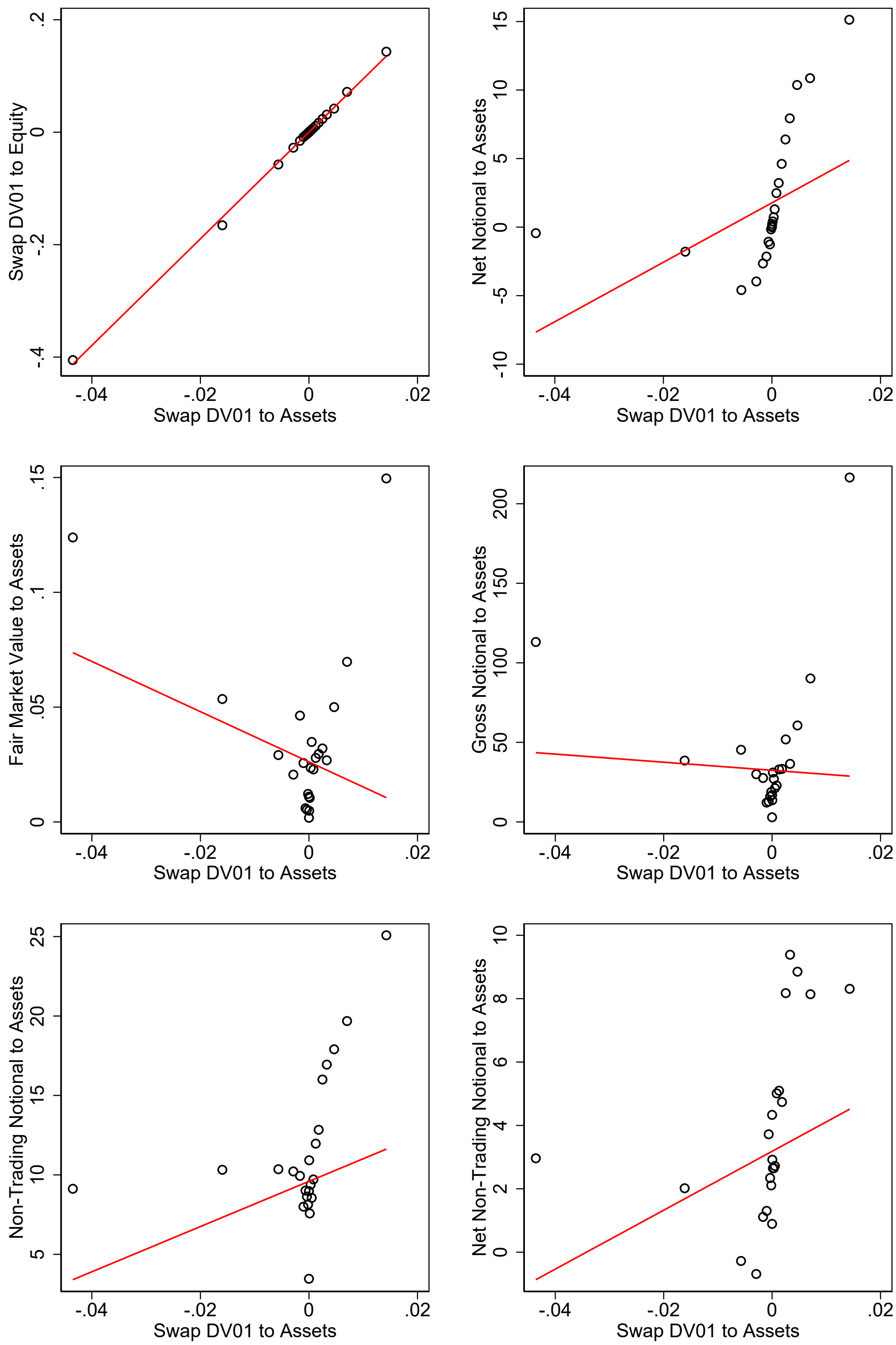

Figure 2. Swap DV01 to Assets and Other Swap Exposure Measures. This figure presents bin scatter plots of swap DV01 to assets with other swap exposure measures. The sample period is quarterly data from 2017Q3 to 2023Q4. The sample consists of the full bank sample (218 banks) as in Table 3. Data for Swap DV01 and Net Notional are from CFTC while all others are from Call Reports.

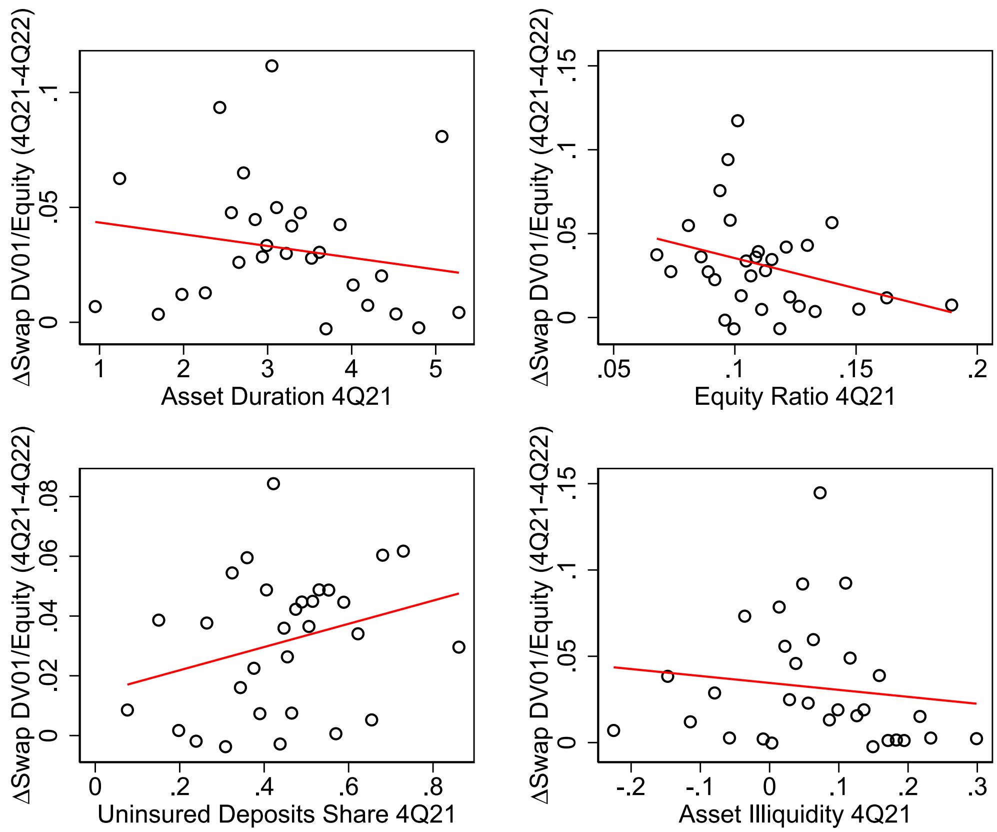

Figure 3. Risk Proxy and Change in Swap Exposure, Bin Scatter. This figure presents bin scatter plots of cross-sections between the change in swap exposure over 2021Q4-2022Q4, which is measured as swap DV01 scaled to equity winsorized at 5%, and risk proxy indicators at the beginning of the period. The risk proxy indicators are assets duration, equity ratio, uninsured deposits scaled to total deposits, and asset illiquidity. Assets duration is estimated using the method described in sub-section 5.1. The sample consists of the 208 banks with nonzero swap positions in both 2021Q4 and 2022Q4.

Table 1
Growth in Interest Rate Derivatives

The data are from the Call Reports. Prior to 1995, interest rate derivatives (IRDs) included swaps only. A bank is engaged in IRDs if it has a non-zero value in the gross notional amount of IRDs.

Panel A: All U.S. Commercial Banks						
Year	No. of Banks	Engaged in Derivatives	Gross Notional (bn. $)	Gross Notional over Assets	Gross Notional over Equity	Type of IRDs
1985	14,261	2%	186	0.07	1.11	Swaps only
1990	12,195	4%	1,717	0.51	7.94	Swaps only
1995	9,852	5%	11,093	2.60	32.09	All types
2000	8,234	4%	32,941	5.40	63.60	All types
2005	7,442	10%	84,390	9.61	95.48	All types
2010	6,466	16%	193,359	16.32	147.92	All types
2015	5,300	22%	138,301	9.43	84.09	All types
2020	4,338	27%	115,911	5.73	56.23	All types
2022	4,056	24%	139,620	6.39	67.53	All types
2024	3,850	26%	125,760	5.63	56.09	All types
Panel B: Top 250 Largest Banks in Each Year						
Year	No. of Banks	Engaged in Derivatives	Gross Notional (bn. $)	Gross Notional over Assets	Gross Notional over Equity	Type of IRDs
1985	250	53%	185	0.11	2.05	Swaps only
1990	250	71%	1,703	0.77	13.77	Swaps only
1995	250	86%	11,053	3.61	47.94	All types
2000	250	63%	32,933	6.66	81.26	All types
2005	250	70%	84,374	11.49	114.45	All types
2010	250	76%	193,333	18.71	167.43	All types
2015	250	87%	138,271	10.56	94.00	All types
2020	250	92%	115,796	6.33	62.55	All types
2022	250	90%	139,563	7.06	74.30	All types
2024	250	93%	125,659	6.23	62.02	All types
Panel C: Swap Dealers						
Year	No. of Banks	Engaged in Derivatives	Gross Notional (bn. $)	Gross Notional over Assets	Gross Notional over Equity	Type of IRDs
2010	15	100%	192,608	27.38	263.79	All types
2015	15	100%	137,294	15.64	147.29	All types
2020	17	100%	114,090	9.03	93.17	All types
2022	17	100%	137,535	10.20	109.43	All types
2024	17	100%	123,699	8.78	90.99	All types

Table 2
Interest Rate Derivative Positions at Banks

This table examines interest rate derivative positions of large U.S. banks. The data are collected from publicly available bank call reports as of the fourth quarter of 2024. Bank rank is the rank in terms of asset size. A bank is a swap dealer if the bank is registered as a dealer with the Commodity Futures Trading Commission as of the fourth quarter of 2023. Bank assets are total assets. The other variables are defined in Table 1. Panel A reports interest rate derivative positions for the 20 largest banks by asset size. Panel B reports interest rate derivative positions by bank size and dealer status.

Panel A: Interest Rate Derivatives Positions at Top 20 Banks

Bank Rank	Bank Name	Swap Dealer	Gross Notional (bn. $)	Assets (bn. $)	Gross Notional over Assets	Gross Notional over Equity
1	J.P. Morgan Chase Bank	Yes	29,742.71	3,459.26	8.60	95.09
2	Bank of America	Yes	14,554.21	2,589.06	5.62	59.29
3	Wells Fargo Bank	Yes	9,455.45	1,705.54	5.54	56.90
4	Citibank	Yes	28,716.92	1,696.82	16.92	168.00
5	U.S. Bank	Yes	1,144.93	662.91	1.73	18.02
6	Goldman Sachs Bank	Yes	37,684.32	561.18	67.15	597.85
7	PNC Bank	Yes	661.13	556.14	1.19	12.37
8	Truist Bank	Yes	339.39	523.13	0.65	5.58
9	Capital One	Yes	243.37	487.19	0.50	4.35
10	TD Bank	No	337.46	372.78	0.91	7.24
11	State Street B&TC	Yes	92.82	348.99	0.27	3.37
12	Bank of NY Mellon	Yes	256.37	335.95	0.76	9.17
13	BMO Bank	No	150.92	263.65	0.57	4.35
14	Morgan Stanley Bank	Yes	164.22	230.71	0.71	7.43
15	First-Citizens B&TC	No	30.47	223.54	0.14	1.39
16	Morgan Stanley Private Bank	No	54.74	221.31	0.25	3.20
17	Citizens Bank	Yes	243.60	217.18	1.12	9.99
18	Fifth Third Bank	Yes	107.38	212.20	0.51	4.87
19	M&T Bank	No	84.57	207.56	0.41	3.07
20	Huntington National Bank	No	97.34	203.43	0.48	4.94

Panel B: Interest Rate Derivatives Positions by Bank Groups

Bank Group	No. of Banks	Engaged in Derivatives	Gross Notional (bn. $)	Gross Notional over Assets	Gross Notional over Equity
All U.S. Commercial Banks	3,850	26%	125,760	5.63	56.09
Top 250 Largest Banks	250	93%	125,659	6.23	62.02
Swap Dealers	17	100%	123,699	8.78	90.99

Table 3
Summary Statistics, All Banks (2017Q3-2023Q4)

The sample includes quarterly observations for the 218 largest commercial banks in the U.S. from 2017Q3 to 2023Q4. Aggregate amounts are computed by first summing across banks in each quarter and then averaging across quarters. The scaled (by assets or equity) derivatives exposure variables are expressed as ratios. Bank characteristics ratios (cash, loan, securities, and equity) are scaled by assets, and the uninsured deposits share is scaled by deposits. Equity is book equity. All ratios are winsorized at the 5% level.

	Aggregate (1)	Mean (2)	St. Dev. (3)	Median (4)	p5 (5)	p95 (6)
Derivatives Exposure (in bn. $)						
Notional	83,246	383	(2,702)	0.366	0.000	106
Net Notional	667	3.1	(66.4)	0.000	−1.1	13.6
Fair Market Value	57.4	0.264	(2.4)	0.000	−0.025	0.300
Swap DV01	0.511	0.002	(0.041)	0.000	−0.005	0.005
Derivatives Exposure						
Uses Interest Rate Derivatives (%)		92.8	(25.8)	100	0.000	100
Notional/Assets (%)	537	10.5	(14.6)	3.9	0.000	51.0
Net Notional/Assets (%)	4.4	1.4	(4.4)	0.000	−5.5	12.8
Gross Notional/Assets (%)	584	14.5	(17.2)	7.8	0.000	60.7
Trading Notional/Assets (%)	874	8.3	(14.5)	0.000	0.000	50.0
Non-Trading Notional/Assets (%)	18.7	8.6	(10.2)	4.5	0.000	34.4
Net Non-Trading Notional/Assets (%)	6.8	2.7	(6.4)	0.486	−6.8	20.3
Fair Market Value/Assets (%)	0.358	0.014	(0.050)	0.000	−0.016	0.192
Swap DV01/Equity (%)	0.031	−0.002	(0.033)	0.000	−0.094	0.057
Swap DV01/Assets (%)	0.003	0.000	(0.003)	0.000	−0.009	0.006
Derivatives Characteristics						
Share of Long DV01 with Customers (%)	27.5	80.8	(32.6)	100	0.003	100
Share of Long Swaps with Customers (%)	29.0	81.0	(32.1)	100	1.2	100
Bank Characteristics						
Swap Dealer		0.059	(0.235)	0.000	0.000	1.0
Assets (bn. $)	16,085	76.6	(299)	11.3	3.7	211
Log Assets	23.5	2.8	(1.4)	2.4	1.3	5.3
Equity (bn. $)	1,664	7.9	(29.0)	1.3	0.384	24.3
Cash Ratio	0.117	0.064	(0.055)	0.043	0.013	0.184
Loan Ratio	0.512	0.668	(0.115)	0.690	0.414	0.821
Equity Ratio	0.104	0.113	(0.025)	0.110	0.072	0.165
Uninsured Deposits Share	0.482	0.397	(0.155)	0.399	0.121	0.670
Securities Ratio	0.216	0.185	(0.095)	0.170	0.049	0.394
Asset Duration	2.4	3.1	(1.1)	3.0	0.949	5.3
Asset Illiquidity	−0.029	0.112	(0.118)	0.129	−0.110	0.279
Observations		5,655				
# of Banks		218				

Table 4
Summary Statistics, by Swap Dealer Status (2017Q3-2023Q4)

The sample includes quarterly observations for the 218 largest commercial banks in the U.S. from 2017Q3 to 2023Q4. Aggregate amounts are computed by first summing across banks in each quarter and then averaging across quarters. The scaled (by assets or equity) derivatives exposure variables are expressed as ratios. Bank characteristics ratios (cash, loan, securities, and equity) are scaled by assets, and the uninsured deposits share is scaled by deposits. Equity is book equity. All ratios are winsorized at the 5% level.

	Swap Dealers			Non-Swap Dealers		
	Aggregate (1)	Mean (2)	St. Dev. (3)	Aggregate (4)	Mean (5)	St. Dev. (6)
Derivatives Exposure (in bn. $)						
Notional	82,369	6,470	(9,254)	878	4.3	(17.1)
Net Notional	506	39.8	(272)	161	0.785	(5.3)
Fair Market Value	55.8	4.4	(8.7)	1.6	0.008	(0.126)
Swap DV01	0.594	0.047	(0.161)	−0.083	0.000	(0.006)
Derivatives Exposure						
Uses Interest Rate Derivatives (%)		100	(0.000)		92.4	(26.5)
Notional/Assets (%)	791	44.7	(14.2)	17.1	8.3	(11.5)
Net Notional/Assets (%)	5.0	5.1	(6.8)	3.1	1.2	(4.1)
Gross Notional/Assets (%)	852	52.6	(15.0)	25.3	12.0	(14.1)
Trading Notional/Assets (%)	1,290	43.4	(13.0)	14.3	6.0	(11.4)
Non-Trading Notional/Assets (%)	18.4	16.5	(9.7)	19.4	8.1	(10.0)
Net Non-Trading Notional/Assets (%)	6.0	10.0	(7.6)	8.7	2.2	(6.0)
Fair Market Value/Assets (%)	0.513	0.104	(0.097)	0.030	0.008	(0.038)
Swap DV01/Equity (%)	0.055	0.018	(0.043)	−0.014	−0.003	(0.032)
Swap DV01/Assets (%)	0.005	0.002	(0.004)	−0.001	0.000	(0.003)
Derivatives Characteristics						
Share of Long DV01 with Customers (%)	27.1	33.1	(33.9)	58.7	85.5	(28.5)
Share of Long Swaps with Customers (%)	28.9	34.1	(32.2)	46.2	85.6	(28.2)
Bank Characteristics						
Swap Dealer	1.0	1.0	(0.000)	0.000	0.000	(0.000)
Assets (bn. $)	10,960	861	(891)	5,126	26.0	(45.1)
Log Assets	23.1	6.2	(1.0)	22.4	2.6	(1.0)
Equity (bn. $)	1,084	85.2	(84.3)	580	2.9	(5.2)
Cash Ratio	0.135	0.118	(0.065)	0.077	0.061	(0.053)
Loan Ratio	0.451	0.495	(0.108)	0.643	0.679	(0.107)
Equity Ratio	0.100	0.104	(0.015)	0.114	0.114	(0.025)
Uninsured Deposits Share	0.517	0.499	(0.117)	0.422	0.391	(0.155)
Securities Ratio	0.225	0.226	(0.077)	0.197	0.182	(0.096)
Asset Duration	2.2	2.2	(0.679)	2.9	3.2	(1.1)
Asset Illiquidity	−0.080	−0.039	(0.100)	0.079	0.122	(0.112)
Observations	1	331		1	5,324	
# of Banks		14			207	

Table 5

Correlation Matrix of Swap Exposure Measures, 2017Q3-2023Q4

The sample includes quarterly observations for the 218 largest commercial banks in the U.S. from 2017Q3 to 2023Q4. All ratios are winsorized at the 5% level. Unless specified to be from Call Reports, data are from CFTC. The measures are defined as follows. *Swap DV01* is the change in the value of a bank's swap portfolio for a one-basis-point decline in interest rates, scaled by assets (SDV01A) or by equity (SDV01E). *Net Notional to Assets* (NNA) is long minus short swap notional, and *Gross Notional to Assets* (GNA) is total swap notional, both from CFTC data. The Call Report measures are *Fair Market Value to Assets* (FMVACR), the net fair value of interest rate derivatives; *Gross Notional to Assets* (GNACR), total interest rate derivative notional; *Non-Trading Notional to Assets* (NTNACR), notional of interest rate derivatives not held for trading; and *Net Non-Trading Notional to Assets* (NNTNACR), non-trading notional net of reported receive-floating positions. All measures are scaled by total assets except SDV01E, which is scaled by equity.

Panel A: Correlation of Level

	SDV01A	SDV01E	NNA	GNA	FMVACR	GNACR	NTNACR	NNTNACR
Swap DV01/Assets (SDV01A)	1.00***							
Swap DV01/Equity (SDV01E)	0.98***	1.00***						
Net Notional/Assets (NNA)	0.32***	0.32***	1.00***					
Gross Notional/Assets (GNA)	-0.01	0.00	0.12***	1.00***				
Fair Market Value/Assets, Call Rep. (FMVACR)	-0.06***	-0.06***	0.06***	0.48***	1.00***			
Gross Notional/Assets, Call Rep. (GNACR)	-0.02	-0.01	0.10***	0.98***	0.49***	1.00***		
Non-Trading Notional/Assets, Call Rep. (NTNACR)	0.10***	0.11***	0.33***	0.11***	0.06***	0.13***	1.00***	
Net Non-Trading Notional/Assets, Call Rep. (NNTNACR)	0.09***	0.09***	0.40***	0.09***	0.05***	0.08***	0.52***	1.00***

Panel B: Correlation of Quarterly Change

	SDV01A	SDV01E	NNA	GNA	FMVACR	GNACR	NTNACR	NNTNACR
Swap DV01/Assets (SDV01A)	1.00***							
Swap DV01/Equity (SDV01E)	0.97***	1.00***						
Net Notional/Assets (NNA)	0.39***	0.38***	1.00***					
Gross Notional/Assets (GNA)	-0.01	-0.02	0.03**	1.00***				
Fair Market Value to Assets (FMVACR)	-0.01	-0.01	-0.04***	-0.02*	1.00***			
Gross Notional/Assets, Call Rep. (GNACR)	0.01	0.01	-0.02*	0.50***	0.00	1.00***		
Non-Trading Notional/Assets, Call Rep. (NTNACR)	0.02*	0.03*	0.08***	0.11***	0.02	0.26***	1.00***	
Net Non-Trading Notional/Assets, Call Rep. (NNTNACR)	0.04***	0.04***	0.14***	0.07***	0.00	0.11***	0.53***	1.00***

Table 6
Change in Swap DV01 and Bank Characteristics

This table reports cross-sectional regressions of the change in net swap DV01 to equity over 2021Q4 to 2022Q4 on bank characteristics in end of 2021Q4. The sample is the subset of banks in Table 3 for which swap positions are nonzero in 2021Q4 and 2022Q4. Assets duration is estimated using the method described in sub-section 5.1. Equity ratio is equity scaled by assets. Uninsured deposits share is uninsured deposits scaled by total deposits. Asset illiquidity is calculated following Berger and Bouwman (2009). Control variables include the natural logarithm of bank assets, loans scaled by total assets, securities scaled by assets, and an indicator variable for whether a bank is a swap dealer. Standard errors are robust.

	Δ Swap DV01 to Equity, 2021q4-2022q4								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asset Duration 4Q21	−0.005	−0.004							−0.003
	(0.004)	(0.005)							(0.005)
Equity Ratio 4Q21			−0.361**	−0.305*					−0.330*
			(0.143)	(0.159)					(0.185)
Uninsured Deposits Share 4Q21					0.039	0.006			−0.008
					(0.028)	(0.028)			(0.031)
Asset Illiquidity 4Q21							−0.040	0.040	0.069
							(0.029)	(0.054)	(0.057)
Log Assets 4Q21		0.024***		0.024***		0.024***		0.025***	0.024***
		(0.007)		(0.006)		(0.007)		(0.006)	(0.007)
Loan Ratio 4Q21		0.064		0.033		0.053		0.027	−0.002
		(0.048)		(0.050)		(0.053)		(0.063)	(0.073)
Securities Ratio 4Q21		0.093		0.032		0.065		0.072	0.064
		(0.059)		(0.057)		(0.053)		(0.052)	(0.073)
Swap Dealer		−0.078*		−0.081**		−0.077*		−0.077*	−0.081*
		(0.040)		(0.040)		(0.041)		(0.040)	(0.042)
Obs.	208	208	208	208	208	208	204	204	204
R^2	0.006	0.106	0.014	0.112	0.008	0.103	0.004	0.101	0.114

Table 7
Swap DV01 and Bank Characteristics, 2017Q3-2023Q4

This table reports regressions of net swap DV01 to equity on bank characteristics. The sample is the full bank sample as in Table 3. Assets duration is estimated using the method described in sub-section 5.1. Equity ratio is equity scaled by assets. Uninsured deposits share is uninsured deposits scaled by total deposits. Asset illiquidity is calculated following Berger and Bouwman (2009). Control variables include the natural logarithm of bank assets, loans scaled by total assets, securities scaled by assets, and an indicator variable for whether a bank is a swap dealer. All regressions include time fixed effects. Standard errors are clustered at the bank level.

	Swap DV01/Equity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asset Duration	−0.002	−0.001							−0.001
	(0.001)	(0.001)							(0.001)
Equity Ratio			0.036	0.052					0.074
			(0.043)	(0.046)					(0.051)
Uninsured Deposits Share					0.001	0.003			0.006
					(0.008)	(0.008)			(0.008)
Asset Illiquidity							0.014	−0.010	−0.022
							(0.015)	(0.017)	(0.018)
Log Assets		−0.002		−0.002		−0.002		−0.002	−0.003*
		(0.002)		(0.002)		(0.002)		(0.002)	(0.002)
Loan Ratio		0.031		0.036		0.031		0.036	0.057
		(0.035)		(0.036)		(0.035)		(0.035)	(0.042)
Securities Ratio		−0.009		−0.004		−0.012		−0.015	0.002
		(0.040)		(0.040)		(0.038)		(0.038)	(0.043)
Swap Dealer		0.034***		0.036***		0.035***		0.035***	0.036***
		(0.009)		(0.009)		(0.009)		(0.009)	(0.009)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	5,458	5,458	5,458	5,458	5,454	5,454	5,409	5,409	5,405
No. of clusters	218	218	218	218	218	218	218	218	218
R^2	0.051	0.095	0.048	0.096	0.047	0.095	0.051	0.096	0.100

Table 8
Share of Swap DV01 with Customers and Bank Characteristics, 2017Q3-2023Q4

This table reports regressions of customer share on bank characteristics. The sample consists of the full bank sample as in Table 3, excluding banks with zero notional amounts. A swap counterparty is classified as a customer if they are not a swap dealer or a clearing house. The outcome variable is the share of customers computed based on DV01. Assets duration is estimated using the method described in sub-section 5.1. Equity ratio is equity scaled by assets. Uninsured deposits share is uninsured deposits scaled by total deposits. Asset illiquidity is calculated following Berger and Bouwman (2009). Control variables include the natural logarithm of bank assets, loans scaled by total assets, securities scaled by assets, and an indicator variable for whether a bank is a swap dealer. Standard errors are clustered at the bank level.

	Share of DV01 with Customers								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asset Duration	9.678***	2.690*							3.786***
	(2.179)	(1.467)							(1.406)
Equity Ratio			−165.101	−75.937					−175.062***
			(100.471)	(56.722)					(60.277)
Uninsured Deposits Share					−31.761*	6.436			0.871
					(17.579)	(11.271)			(7.350)
Asset Illiquidity							124.116***	71.641*	92.478***
							(20.417)	(36.850)	(32.470)
Log Assets		−9.060***		−9.440***		−9.556***		−9.038***	−8.569***
		(1.482)		(1.552)		(1.664)		(1.378)	(1.339)
Loan Ratio		91.373***		89.547***		99.955***		44.800	2.259
		(24.459)		(23.937)		(25.777)		(37.575)	(39.210)
Securities Ratio		94.318***		96.441***		111.108***		113.705***	61.680***
		(23.509)		(24.768)		(26.400)		(21.641)	(20.828)
Swap Dealer		−5.501		−7.292		−5.470		−5.207	−8.094
		(6.912)		(7.020)		(7.128)		(6.686)	(6.589)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,523	3,523	3,523	3,523	3,523	3,523	3,507	3,507	3,507
No. of clusters	168	168	168	168	168	168	166	166	166
R^2	0.110	0.434	0.038	0.432	0.046	0.430	0.196	0.444	0.463

Table 9
Hedging floating-rate loans

This table examines whether non-swap dealer banks immediately hedge long swaps with customers. The sample includes all non-swap dealer banks with non-zero swap positions (127 banks for pre-2020 data and 170 banks for 2020-2023 data). A long swap is a swap in which the bank receives fixed and pays floating, typically used to turn floating-rate loans into fixed-rate loans. A back-to-back hedge is a hedge in which a long swap is offset by a short swap entered on the same day, for the same notional amount, and with the same maturity. The customer share is the share of long swaps where the swap counterparty is a customer. The hedging share is the share of long swaps with customers that have an offsetting back-to-back hedge. Panel A presents results for banks with less than $100 billion in assets (116 banks for pre-2020 data and 157 banks for 2020-2023 data). Panel B presents results for banks with more than $100 billion in assets (11 banks for pre-2020 data and 13 banks for 2020-2023 data). For 2020-2023 period, data is yearly from Q2 of each year. The aggregate non-ratio measures are calculated by first summing across all banks for each year then taking a simple average across years.

Pre-2020

Panel A: Assets ¡ $100bn					
	Long Swap Notional	Long Swap with Customers	Back-to-back Hedge	Customer Share	Hedging Share
Aggregate ($ bn)	166.8	113.29	79.7	68%	70%
Mean ($ mil)	1,438	977	687	86%	57%
Stand Dev	(3,005)	(1,756)	(1,228)	(28%)	(37%)
Median	385.3	304.60	194.6	100%	73%
N. Banks	116	116	116	116	116
Panel B: Assets ¿= $100bn					
	Long Swap Notional	Long Swap with Customers	Back-to-back Hedge	Customer Share	Hedging Share
Aggregate ($ bn)	325.9	87.90	34.5	27%	39%
Mean ($ mil)	29,627	7,991	3,135	25%	26%
Stand Dev	(27,899)	(8,394)	(4,275)	(21%)	(27%)
Median	23,750	6,723	1,281	27%	20%
N. Banks	11	11	11	11	11

2020-2023

Panel A: Assets ¡ $100bn, Non-Swap Dealers						
	Long Swap Notional	Long Swap with Cust.	Customer Share	Back-to-back Hedge	Hedging Share	Hedging Share (excl. zeros)
Aggregate ($ bn)	216.8	160.1	74%	51.8	32%	33%
Mean ($ mil)	1,674	1,236	90%	400	37%	47%
Stand Dev	(3,623)	(2,186)	(18%)	(701)	(35%)	(32%)
Median	522	454	100%	138	30%	42%
N Obs.	518	518	518	518	518	401
N Banks	157	157	157	157	157	132
Panel B: Assets ¿= $100bn, Non-Swap Dealers						
	Long Swap Notional	Long Swap with Cust.	Customer Share	Back-to-back Hedge	Hedging Share	Hedging Share (excl. zeros)
Aggregate ($ bn)	207.4	72.5	35%	19.8	25%	31%
Mean ($ mil)	26,762	9,354	58%	2,554	23%	29%
Stand Dev	(28,798)	(6,731)	(33%)	(3,733)	(27%)	(27%)
Median	22,071	9,953	47%	646	15%	24%
N Obs.	31	31	31	31	31	24
N Banks	13	13	13	13	13	12

Table 10
Swap Return and Bank Return, Panel 2017Q3-2023Q4

This table examines the relationship between bank stock returns and swap returns. The sample includes all publicly listed top 250 banks (145 banks). Bank stock return is the return from quarter t to $t+1$. Swap return is the change in the value of the swap portfolio relative to bank market value solely due to interest rate changes from t to $t+1$. Quarter-end dates align with the reporting dates of the swap data in calculating stock returns and swap returns. These dates are 9/29/2017, 12/15/2017, 3/16/2018, 6/15/2018, 9/14/2018, 12/14/2018, 3/15/2019, 6/14/2019, 9/13/2019, 12/13/2019, 3/13/2020, 6/12/2020, 9/11/2020, 12/11/2020, 3/12/2021, 6/11/2021, 9/10/2021, 12/10/2021, 3/11/2022, 6/10/2022, 9/9/2022, 12/2/2022, 3/17/2023, 6/16/2023, and 9/15/2023. Panel A reports summary statistics of bank stock return and swap return. Panel B reports regressions of bank stock return on swap return. Columns 1 and 3 include only time fixed effects whereas columns 2 and 4 also include bank fixed effects. Columns 3 and 4 exclude the early COVID period comprising of quarters starting 12/13/2019, 3/13/2020, 6/12/2020, 9/11/2020, and 12/11/2020. Standard errors are clustered at the bank level.

Panel A: Summary Statistics	
Mean of Bank Stock Return (pp)	1.436
... SD (pp)	18.161
Swap DV01 (bn. \$)	0.004
Mean of Mkt. Eq. (bn. \$)	13.993
Mean of $\Delta y^{(5)}$ (bps)	6.484
Mean of Swap DV01/Mkt. Eq. $\times$ 100	-0.482
... 10th Percentile	-0.986
... 90th Percentile	1.066
... SD	5.725
Obs.	3614

Panel B: Swap DV01 and Bank Returns

	Bank Stock Return			
	(1)	(2)	(3)	(4)
(Swap DV01 $\times$ $\Delta y^{(5)}$)/Mkt. Eq. (pp)	-0.015	-0.018	-0.004	-0.004
	(0.032)	(0.037)	(0.025)	(0.029)
Time FE	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	Yes
Includes early COVID	Yes	Yes	No	No
Obs.	3614	3614	2861	2861
No. of clusters	157	157	157	157
R^2	0.702	0.712	0.540	0.559
Marginal R^2	0.000	0.010	0.000	0.019

Table 11
Interest Rate Risk of Bank Assets and Liabilities

This table reports the interest rate exposure of bank assets and liabilities as of 2023Q4 for all banks for which we estimate the deposit franchise. Amounts are in $ billion and represent either assets or liabilities. We measure interest rate exposure as duration (in years) and DV01 (in $ million), and we also express DV01 as a percentage of book equity (DV01/Equity), the percentage change in equity value for a 100 basis point increase in interest rates. The liability side includes the deposit franchise: following Drechsler et al. (2026), because the value of deposits to the bank falls when rates rise, deposits contribute negative duration to bank equity and hedge asset interest rate risk. The main text discusses the estimation of these variables. Panel A reports the aggregate banking sector. Panel B reports the average bank, with standard deviations in parentheses.

	Panel A: Aggregate Banking Sector			
	Amount ($bn)	Duration (yr)	DV01 ($mn)	DV01/Equity (%)
Assets	13,701.2	2.67	3,654.5	24.55
Cash	2,347.7	0.00	0.0	0.00
Loans	7,840.9	2.55	1,997.0	13.42
Residential Loans	1,640.9	4.84	793.4	5.33
Non-Residential Loans	6,200.0	1.94	1,203.6	8.09
Securities	3,512.6	4.72	1,657.5	11.14
Treasury Securities	1,677.6	4.09	686.9	4.61
MBS	1,835.0	5.29	970.7	6.52
Liabilities	12,072.8	−3.18	−3,834.1	−25.76
Non-Deposit Liabilities	830.0	−1.30	−108.2	−0.73
Deposits	10,982.4	−3.39	−3,725.9	−25.03
Insured Deposits	5,986.1	−4.02	−2,407.7	−16.18
Uninsured Deposits	4,996.3	−2.64	−1,318.3	−8.86
Fed Funds & Repo Liab.	260.4	0.00	0.0	0.00
Equity	1,488.5			
No. of Banks	174			

Table 11
Interest Rate Risk of Bank Assets and Liabilities (continued)

	Panel B: Average Bank			
	Amount (\$bn)	Duration (yr)	DV01 (\$mn)	DV01/Equity (%)
Assets	78.7	3.21	21.0	30.18
	(319.5)	(1.08)	(80.4)	(13.17)
Cash	13.5	0.00	0.0	0.00
	(81.5)	(0.00)	(0.0)	(0.00)
Loans	45.1	3.02	11.5	20.54
	(156.1)	(1.17)	(37.5)	(10.07)
Residential Loans	9.4	4.17	4.6	5.49
	(35.8)	(0.93)	(17.7)	(4.62)
Non-Residential Loans	35.6	2.75	6.9	15.05
	(120.9)	(1.37)	(20.4)	(8.31)
Securities	20.2	4.79	9.5	9.64
	(90.2)	(1.72)	(43.8)	(7.19)
Treasury Securities	9.6	5.37	3.9	5.35
	(47.9)	(2.74)	(17.9)	(5.73)
MBS	10.5	4.24	5.6	4.29
	(47.8)	(0.97)	(27.7)	(3.60)
Liabilities	69.4	−3.11	−22.0	−27.56
	(274.3)	(0.63)	(91.3)	(9.47)
Non-Deposit Liabilities	4.8	−1.25	−0.6	−0.66
	(21.2)	(1.26)	(3.0)	(0.97)
Deposits	63.1	−3.28	−21.4	−26.89
	(246.0)	(0.69)	(88.9)	(9.34)
Insured Deposits	34.4	−3.79	−13.8	−19.23
	(132.5)	(0.69)	(56.6)	(7.39)
Uninsured Deposits	28.7	−2.45	−7.6	−7.67
	(116.9)	(0.69)	(33.0)	(4.00)
Fed Funds & Repo Liab.	1.5	0.00	0.0	0.00
	(11.1)	(0.00)	(0.0)	(0.00)
Equity	8.6			
	(34.0)			
No. of Banks	174			