Do Banks Hedge Using Interest Rate Swaps? Internet Appendix

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A Interest Rate Swaps: A Detailed Primer

This appendix provides a more detailed discussion of interest rate swaps and their risk metrics, supplementing the overview in Section 2.1 of the main text.

A.1 How swaps work

The most prevalent form of swap is a fixed-for-floating swap, in which one party agrees to receive a fixed rate and to pay a floating rate on some notional amount for a fixed term, while the other party takes the opposite position.[2]

To illustrate, suppose that Bank A and Bank B enter into an agreement in which Bank A will receive annual interest payments at a rate of 2% per year for 10 years on a notional amount of $100 million and, in exchange, will pay Bank B quarterly interest payments based on 3-month LIBOR for 10 years on the same $100 million. The fixed rate of 2% is called the swap rate and is set so that the value of the swap at initiation is zero. The $100 million notional amount is used only to calculate interest payments; it is never exchanged between counterparties.

While the value of a swap is zero at initiation, it changes over time as interest rates move. If the market 10-year swap rate declines from 2% to 1%, the value of the swap to Bank A increases to about $9.5 million: it locked in receiving 2% in a market where the fair rate is now only 1%. By the same logic, the value to Bank B is approximately negative $9.5 million. If instead the swap rate rose from 2% to 3%, the value would be about negative $8.5 million to Bank A and positive $8.5 million to Bank B.[3]

Receiving fixed in a swap is economically equivalent to a levered purchase of a default-free bond financed by short-term borrowing. Bank A pays nothing at initiation, receives 2% on $100 million over 10 years, and pays the floating rate on the same amount. These cash flows are the same as purchasing a 10-year bond financed fully by short-term borrowing. Hence, the fixed receiver may be said to be "long" the swap, while the fixed payer is "short" the swap.[4]

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[2]The floating-rate index of swaps has transitioned from LIBOR to SOFR (Secured Overnight Financing Rate). Since our sample period overlaps mostly with the LIBOR regime, we describe swaps in terms of LIBOR. Swaps based on SOFR are identical except for the difference in the floating rate.

[3]The positive value of one counterparty is usually protected from default by the other counterparty through collateral or margin.

[4]Practitioners almost always speak of "receiving fixed" and "paying fixed" rather than "long" and "short." Historically, the convention was actually reversed; see Gorton and Rosen (1995).

A.2 Metrics of swap exposure

For a single swap, notional amount is used to compute interest payments but is a very coarse measure of interest rate risk: a 1-year swap with $100 million notional is far less exposed to rate changes than a 30-year swap with the same notional.

For a portfolio of swaps, "long notional amount" is the sum of notional amounts across all positions that increase in value when rates fall, and "short notional amount" is the corresponding sum for positions that decrease in value when rates fall. Total notional amount adds long and short exposures, while the risks of the two sides typically offset each other. Net notional amount, the difference between long and short notional amounts, corrects this problem and is comparable to the notional of an individual swap.

Market value, defined as the sum of the net present values of individual swaps, is not a measure of interest rate risk. It reflects past rate movements, not current exposure. A swap can have high interest rate risk and zero market value simultaneously.[5]

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. In the example above, the value of the swap changed by $9.5 million for a 100-basis-point decline, so the DV01 is $95,000.

A.3 Types of interest rate swaps

Fixed-for-floating swaps account for 87% of interest rate risk outstanding. Other forms include overnight index swaps (OIS), in which fixed payments are exchanged for floating payments based on compounded overnight rates such as the federal funds rate (6% of risk outstanding); swaptions, which are options on swaps (5%); forward rate agreements (FRAs), which are single-period swaps for forward settlement (2%); and interest rate caps and floors, which are options on rates (less than 1%). Exchange-traded interest rate derivatives, most notably futures on short-term rates and longer-term bonds, are not classified as swaps. The outstanding quantity of interest rate risk in swaps is between 6 and 9 times as large as that in these exchange-traded contracts.

[5]Market value is also a poor measure of counterparty risk: it adds values across counterparties (which do not offset in default) and does not incorporate posted collateral.

B Data Appendix: CFTC Swap Data

This appendix provides a detailed description of the swap data used in this paper. Our primary data source is the Commodity Futures Trading Commission (CFTC), which collects position-level data on swap contracts as part of its regulatory mandate under the Dodd-Frank Act of 2010.

B.1 Regulatory framework

The Dodd-Frank Act required that all "swap" trades and positions be reported to swap data repositories (SDRs), which are accessible by the CFTC in its role as a swap regulator. The definition of a "swap" under Dodd-Frank is very broad. With respect to interest rate products, it includes: interest rate swaps (IRS); forward rate agreements (FRAs); overnight index swaps (OIS); constant maturity swaps (CMS); swaps on rates or yields of U.S. Government and municipal securities; interest rate basis swaps; cross-currency interest rate swaps; interest rate caps, floors, and collars; interest rate options; swaptions; and broad-based total return swaps on bonds or loans.

Security-based swaps (swaps based on the yields or prices of individual bonds or narrow indexes of bonds, other than governments and municipals) are reported separately under the regulation and supervision of the Securities and Exchange Commission (SEC) and are not included in our sample. Other significant exclusions from the Dodd-Frank definition of swap with respect to interest rate products are futures contracts, futures options contracts, and securities options (e.g., an option on a U.S. Treasury security), which are also not included in our sample.

For further details on the CFTC's swap reporting framework, see CFTC (2026).[6]

B.2 Reporting requirements and jurisdictional scope

Swaps are required to be reported to an SDR if the swap falls under U.S. jurisdiction. Broadly speaking, this means that a swap is reported if at least one U.S. "person" is a counterparty; if it is executed on a U.S. registered execution platform or arranged by U.S.-based agents; or if it is cleared by a U.S.-registered clearing organization. An implication is that swaps between banks in our sample and their non-U.S. counterparties are included in our data.

[6] CFTC (2026), "Weekly Swaps Report: Explanatory Notes," https://www.cftc.gov/MarketReports/SwapsReports/ExplanatoryNotes/index.htm, accessed March 2026.

B.3 Data cleaning and filtering

The CFTC data used in this paper were cleaned and filtered by the CFTC's Office of the Chief Economist. The most significant elements of this cleaning and filtering were: (i) removal of duplicate entries for the same swap in the SDR data; (ii) removal of inter-affiliate swaps, that is, swaps between entities of the same holding company; (iii) restriction to IRS, FRAs, OIS, interest rate caps and floors, and swaptions (other product types were excluded); and (iv) conversion of notional amounts denominated in currencies other than the U.S. dollar to U.S. dollars at the exchange rate as of the data date. For a detailed discussion of the data and methodology, see Baker et al. (2021) and Haynes, Roberts, Sharma, and Tuckman (2018).

B.4 Key variable definitions

- **Notional amount.** The face value of the swap contract, used to compute periodic interest payments. The notional amount is not exchanged between counterparties.
- **Long notional amount.** The sum of notional amounts across all swap positions that increase in value when interest rates fall (i.e., positions that are receiving fixed).
- **Short notional amount.** The sum of notional amounts across all swap positions that decrease in value when interest rates fall (i.e., positions that are paying fixed).
- **Net notional amount.** The difference between long and short notional amounts.
- **DV01 (Dollar Value of a Basis Point).** The change in the net present value of a swap or portfolio of swaps for a one-basis-point decline in interest rates. DV01s are computed quarterly by the CFTC's Office of the Chief Economist as of a date in the middle of the last month of each quarter, to avoid quarter-end effects. The computation follows standard industry conventions using industry-generated curves of fixed-for-floating swap rates across tenors. This is our preferred measure of interest rate risk exposure.
- **Swap DV01 / Equity.** The ratio of a bank's aggregate swap DV01 to its book equity, expressed as a percentage. This measures the interest rate risk from swaps relative to bank size.
- **Market value.** The sum of the net present values of individual swaps in a bank's portfolio. Unlike DV01, market value reflects past rate movements rather than current risk exposure.

- **CustomerShare.** The share of a bank's long (receiving-fixed) swap notional that is with customers, defined as counterparties other than registered swap dealers and clearinghouses: CustomerShare $= NRC/NR$, where NRC is the notional receiving fixed from customers and NR is total notional receiving fixed. Bounded between 0 and 1 by construction.

- **Swap dealer.** An indicator variable equal to one if the bank is registered with the CFTC as a swap dealer under the Dodd-Frank Act. Fourteen banks in our sample were registered as swap dealers at some point during the sample period (though not all at the same time).

B.5 Sample construction

Our sample starts with the 250 largest U.S. commercial banks by assets as reported by the Federal Reserve Board's "Large Commercial Banks" report as of June 2018. 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, leaving a final sample of 218 banks. Of these, 170 reported swap positions to the CFTC and 14 were registered as swap dealers (though not all at the same time).

Bank balance sheet data are obtained from U.S. Call Reports provided by Wharton Research Data Services. We match these data to the CFTC data using bank-level identifiers and verify the accuracy of the merge using bank names and locations. We construct bank asset, liability, and income variables following Drechsler et al. (2026).

C Measuring the Interest Rate Risk of Bank Assets and Liabilities

This appendix describes in detail how we measure the interest rate risk of bank assets and liabilities, supplementing Section 5.1 of the main text. We construct bank asset, liability, and income variables following Drechsler et al. (2026).

C.1 Data

We obtain data on bank assets and liabilities from the U.S. Call Reports provided by Wharton Research Data Services. The data contain quarterly observations of the income statements and balance sheets of all U.S. commercial banks, together with bank-level identifiers that we use to match the bank data to the CFTC swap data. We verify the merge using bank names and locations reported in both datasets. Call reports provide detailed information on loans, securities, deposits, and non-deposit liabilities. For securities, they report maturity information for residential mortgage-backed securities (RMBS), other mortgage-backed securities (other MBS), and other non-MBS debt securities. For loans, they report maturity information for residential mortgage loans and for other loans and leases. They also report total deposits by type (checking, savings, and small and large time deposits) and total non-deposit liabilities. For assets and liabilities other than deposits, the call reports provide term buckets specifying the remaining maturity or the time to the next repricing date; the level of detail varies across categories and is least granular for other MBS. For deposits, the call reports include maturity information for term deposits.

C.2 Assets and non-deposit liabilities

We estimate the interest rate risk, measured as DV01 and duration, of each asset and liability category as follows.

1. *Non-MBS debt securities* are mostly non-amortizing, fixed-rate assets for which most of the present value is paid at maturity, so that maturity is a good indicator of interest rate risk. We compute interest rate risk as that of a par bond of the corresponding maturity, a rule we refer to as "par correspondence." Call reports provide the remaining maturity (or, for floating-rate assets, the time to the next reset) for the buckets: less than 3 months, 3–12 months, 1–3 years, 3–5 years, 5–15 years, and greater than 15 years. For all but the last bucket, we set the maturity equal to the

center of the bucket; for the bucket of 15 years or greater, we assume a maturity of 22.5 years, halfway between 15 years and the typical maximum of 30 years. We discount cash flows at the swap rate of the matching maturity in that quarter. For example, if the 10-year swap rate is 2% and a bank holds $100 million of non-MBS securities in the 5- to 15-year bucket, we assume that its DV01 and duration in that bucket are those of a 10-year par bond at a 2% yield. Because positions are allocated to buckets by repricing date, floating-rate instruments with short-term resets are assigned near-zero duration.[7]

2. *RMBS* are amortizing, fixed-rate assets in which much of the principal is repaid before maturity and which are subject to the borrower's prepayment option. Both features shorten effective duration, with the prepayment option doing so in a rate-contingent manner. Call reports provide the same term buckets as for non-MBS securities, and we again set the term equal to the center of the bucket. For RMBS with a remaining maturity of less than one year, prepayment is less relevant and we apply par correspondence as for non-MBS securities. For RMBS with a remaining maturity greater than one year, we account for prepayment using industry risk models, assigning the duration of the nearest applicable Bloomberg index in that quarter. For example, RMBS in the 5- to 15-year bucket are assigned a duration equal to that of the Bloomberg U.S. MBS Fixed-Rate GNMA 15-Year Index in that quarter.

3. *Other MBS* are amortizing, fixed-rate assets similar to RMBS, but the call reports provide less term detail, specifying only whether the expected average life is less or more than three years. We assume a remaining maturity of 1.5 years or 4.5 years, respectively, and apply par correspondence using expected average life.

4. *Residential mortgage loans* are generally amortizing, fixed-rate assets like RMBS. Call reports provide the same information on term buckets as for RMBS, and we follow the same methodology.

5. *Other loans and leases* are mostly non-amortizing, fixed-rate assets like non-MBS securities, with the same term buckets, and we apply par correspondence.

6. *Non-deposit liabilities* are usually fixed-rate borrowings with principal repaid at maturity, with term buckets similar to those for non-MBS securities, and we apply par

[7]For example, a 30-year floating-rate bond that resets its interest rate every three months has interest rate risk equivalent to that of a three-month fixed-rate asset.

correspondence.

We make the additional assumptions that instruments within a bucket do not sell at large premiums or discounts and that their maturities (or times to the next repricing) are distributed symmetrically around the center of the bucket.

C.3 Deposits

We handle deposits separately because their interest rate risk is determined by the deposit franchise rather than by their contractual maturity. Although deposits are contractually short-term, banks pay deposit rates that adjust only partially and with a lag to market rates. As a result, the present value of future deposit spreads—the deposit franchise—rises when interest rates rise, giving the deposit franchise a negative duration that hedges the positive duration of bank assets.

We measure the deposit franchise following Drechsler et al. (2026). They show that, for a deposit base D with deposit beta β, decay rate δ, and operating cost c, the value of the deposit franchise is

$$DF(r) = \frac{(1-\beta)\, r - c}{r + \delta}\, D, \tag{C1}$$

and its dollar duration is

$$T_{DF} \equiv -\frac{\partial DF}{\partial r} = -\frac{c + (1-\beta)\, \delta}{(r+\delta)^2}\, D \;\leq\; 0, \tag{C2}$$

where r is the relevant long-term rate. The dollar duration is negative, so the deposit franchise becomes more valuable when interest rates rise. We compute the dollar duration per dollar of deposits from their estimates of β, δ, and c, and scale it by each bank's nominal deposits to obtain the deposit DV01 and duration. We do this separately for insured and uninsured deposits. Because insured deposits have lower betas, their franchise is more interest-rate-sensitive and carries a longer duration than that of uninsured deposits.

C.4 Coverage

Our methodology does not cover assets and liabilities for which the call reports do not provide detailed maturity data. The main omitted categories are federal funds and repurchase agreements; trading assets and liabilities; direct holdings of real estate; investments in subsidiaries; intangibles; equity; and items classified as "other." These categories carry little interest rate risk or are economically small. Federal funds and repurchase agreements have very short terms, mostly overnight, and thus little interest rate sensitivity.

Trading assets and liabilities are a small fraction of the balance sheet.[8] On average, our methodology covers 86% of assets, with a standard deviation of 11%, and only 13 banks have coverage below 70%. Coverage of liabilities is greater, averaging 96%, with a standard deviation of 6% and only 6 banks below 70%.

[8] 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% and just three banks above 10%. Trading liabilities averaged less than 0.2% of liabilities.

Table IA.1
Swap DV01 and Bank Characteristics, Time and Bank Fixed Effects, 2017Q3-2023Q4

This table reports regressions of net swap DV01 to equity on bank characteristics, corresponding to Table 7 in the main text but including both time and bank fixed effects. 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. Standard errors are clustered at the bank level.

	Swap DV01/Equity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asset Duration	−0.001	−0.002							−0.001
	(0.002)	(0.002)							(0.002)
Equity Ratio			0.070	0.041					0.004
			(0.065)	(0.072)					(0.069)
Uninsured Deposits Share					−0.011	−0.010			−0.012
					(0.012)	(0.012)			(0.012)
Asset Illiquidity							0.049**	0.066	0.067
							(0.020)	(0.051)	(0.051)
Log Assets		−0.001		−0.001		−0.001		−0.000	−0.000
		(0.005)		(0.005)		(0.005)		(0.005)	(0.005)
Loan Ratio		0.049**		0.043*		0.045*		−0.009	−0.007
		(0.024)		(0.025)		(0.025)		(0.051)	(0.050)
Securities Ratio		0.023		0.015		0.014		0.015	0.023
		(0.029)		(0.030)		(0.029)		(0.029)	(0.030)
Swap Dealer									
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank 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	0.431	0.433	0.432	0.433	0.431	0.433	0.434	0.435	0.435

Table IA.2
Share of Swap DV01 with Customers and Bank Characteristics, Excluding Swap Dealers, 2017Q3-2023Q4

This table reports regressions of customer share on bank characteristics, corresponding to Table 8 in the main text but excluding swap dealer banks from the sample. 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, and securities scaled by assets. Standard errors are clustered at the bank level.

	Share of DV01 with Customers								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asset Duration	6.876***	2.681*							3.597**
	(2.283)	(1.455)							(1.398)
Equity Ratio			−223.123**	−24.431					−124.001**
			(97.075)	(56.413)					(62.525)
Uninsured Deposits Share					−17.661	8.475			2.847
					(18.829)	(11.137)			(7.587)
Asset Illiquidity							83.132***	74.642**	88.139***
							(26.813)	(34.945)	(31.760)
Log Assets		−9.152***		−9.552***		−9.735***		−9.185***	−8.780***
		(1.539)		(1.614)		(1.716)		(1.429)	(1.419)
Loan Ratio		119.616***		121.812***		129.245***		72.307**	37.197
		(21.992)		(24.602)		(23.656)		(36.331)	(42.102)
Securities Ratio		123.023***		133.260***		140.970***		143.992***	96.904***
		(18.957)		(24.641)		(22.788)		(18.034)	(22.616)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,208	3,208	3,208	3,208	3,208	3,208	3,192	3,192	3,192
No. of clusters	157	157	157	157	157	157	155	155	155
R^2	0.070	0.326	0.054	0.319	0.021	0.321	0.096	0.343	0.360