

Bank Regulation Affects Monetary Policy Transmission

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How does monetary policy impact banks' lending behavior when interest rate changes revalue their securities? Detailed supervisory data show that banks with larger losses on securities during the 2022–23 monetary policy tightening cycle extended less credit to firms. This spillover effect was especially strong for securities that were marked to market and not hedged, and for banks required to include unrealized losses in regulatory capital. These conditions lead to larger reductions in corporate debt and investment, increasing monetary policy's impact on the economy.

The U.S. banking system experienced stress in March 2023 when depositors suddenly withdrew funds from several regional banks. Leading up to this event, these midsize banks had built up large portfolios of long-term securities. As interest rates rose rapidly in 2022, the market value of these securities dropped, leading to unrealized losses that were widely believed to have sparked the depositor withdrawals.

The regional bank crisis has brought attention to the regulatory treatment of bank securities. Under U.S. regulation, unrealized securities losses of such midsize banks did not pass through to their regulatory capital. Because of this disconnect, these banks appeared relatively well capitalized from a regulatory perspective despite their risk exposure. This has spurred discussions about broadening the types of securities that impact regulatory capital (see, for instance, Chicago Booth 2023). Such changes would push banks that face unexpected losses on their securities to improve their capital ratios—say, by raising more equity—to avoid falling short of capital requirements. In turn, higher capital ratios could reduce the risk of future bank collapses. However, such changes could also prompt banks to reduce lending to households and businesses, which would shrink their risk-weighted assets and strengthen their capital positions. A reduced flow of credit could also constrain business investment and household spending and thus affect the overall economy.

In recent work (Greenwald, Krainer, and Paul 2026), we study how interest rates affect regulatory capital through value changes of bank securities. We assess how this may in turn affect bank lending and business investment. When interest rates rose in 2022–23, we find that banks with larger losses on their securities were more likely to cut business lending. This was primarily driven by banks that were required to account for unrealized gains and losses on securities in their regulatory capital.

Building on these empirical findings, we estimate how changes to the regulation of bank securities would affect the transmission of monetary policy. Our estimates show that, if all banks must include unrealized gains and losses from their securities in regulatory capital, then the more overall lending to businesses is affected, and thus the more powerful monetary policy becomes. The regulatory treatment of bank securities

therefore not only has financial stability implications but also affects the strength of monetary transmission. Thus, while bank regulation and monetary policy are often considered separately, we show that the two are inherently linked.

Assessing data on bank portfolios

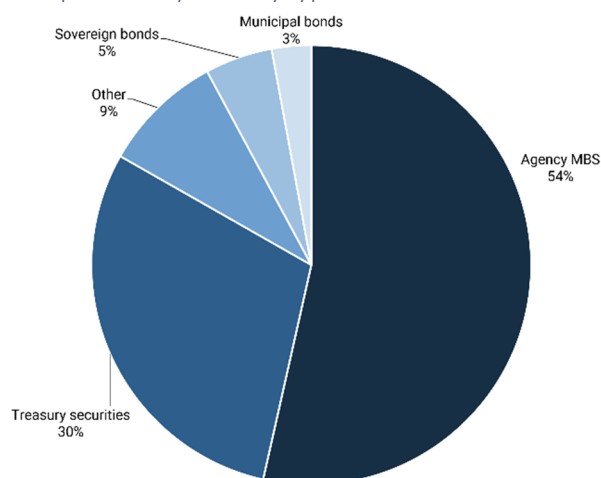
For our analysis, we gathered a unique data set that combines supervisory information on securities portfolios, hedging positions, and corporate credit for large U.S. banks from the Federal Reserve's Y-14Q data set. The Y-14Q data set, which is collected for bank stress testing, gives us a comprehensive view of various credit relationships and bank securities holdings. For example, the data show specific securities held, their gains and losses over time, and their associated accounting hedges.

The bank securities portfolios we study are large, making up around 23% of total bank assets in the fourth quarter of 2021. Agency mortgage-backed securities and Treasury securities account for about 85% of the total portfolio value of bank securities, as shown in panel A of Figure 1. These types of assets are safer on average, coming primarily from highly rated issuers or guaranteed by government-sponsored enterprises, resulting in minimal default risk. Instead, the dominant risk exposure for these bank portfolios is interest rate risk.

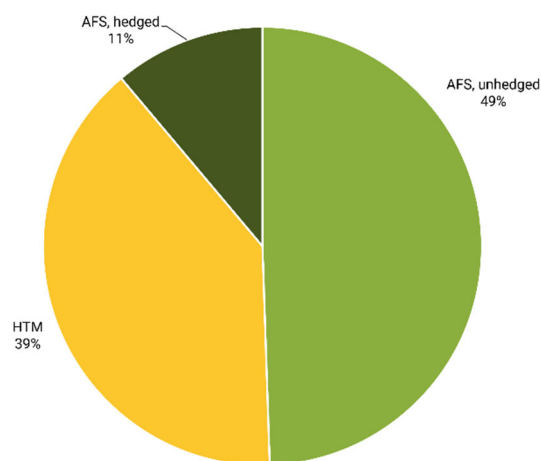
Panel B of Figure 1 breaks down these securities by their accounting classification. Around 60% of all bank securities were held as available-for-sale (AFS), which are valued according to current market prices on banks' balance sheets, known as marked to market. The remainder are classified as held-to-maturity (HTM), which are recorded at book value and remain unaffected by price fluctuations. Additionally, 19% of the set of available for sale assets was hedged against potential risk using some form of accounting hedge.

Figure 1
Composition of large U.S. bank securities portfolios, 2021:Q4

A. Composition by security type



B. Composition by accounting classification



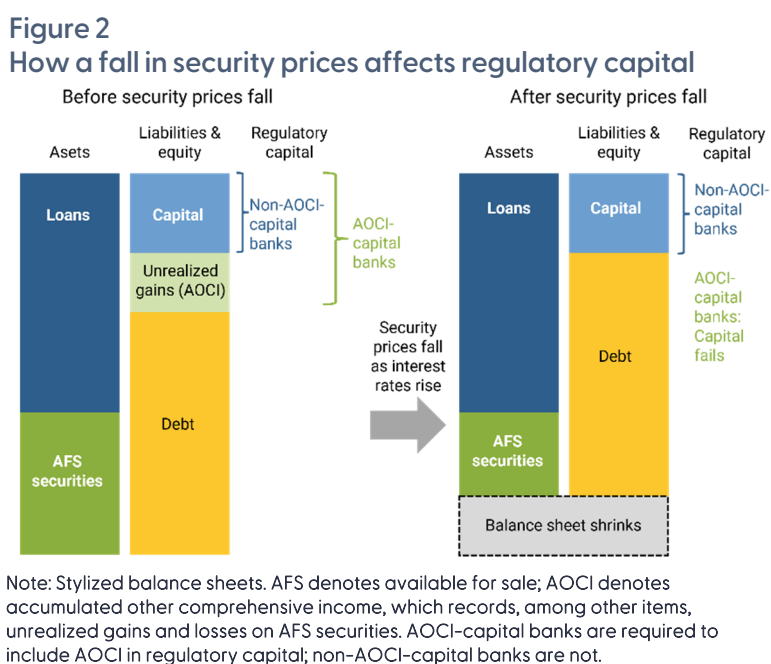
Note: Same overall portfolio shown in two ways; each panel sums to 100%. MBS are mortgage-backed securities; AFS are securities available for sale; HTM are securities held to maturity.

Source: Federal Reserve's Y14-Q data set.

Classifying securities according to whether they are held to maturity or available for sale has significant implications for bank capital. Changes in the market value of AFS securities affect a bank's equity position as part of the account known as "accumulated other comprehensive income" (AOCI). AOCI is treated differently as part of regulatory capital across U.S. banks of different sizes. This treatment has evolved over time. Until 2013, bank regulators excluded AOCI from the calculation of regulatory capital. However, this exclusion ended for larger U.S. banks in 2013 using the advanced approaches capital framework. With the Federal Reserve's tailoring rule in 2019, the exclusion was reinstated for all except the largest or most systemically important banks. To simplify, we refer to banks required to include unrealized gains and losses on AFS securities in their regulatory capital calculation as AOCI-capital banks, and the rest as non-AOCI-capital banks.

Balance-sheet dynamics and credit supply

Within this context, we analyze how changes in security prices affect bank balance sheets. The left side of Figure 2 shows a stylized bank that holds loans and AFS securities, funded by debt and capital. We assume that the bank has made unrealized gains on its security portfolio in the past, leading to a positive AOCI account; this is shown on the liability side of the balance sheet. The braces show how banks measure regulatory capital differently: A non-AOCI-capital bank (blue brace) excludes AOCI from its regulatory capital, while an AOCI-capital bank (green brace) includes AOCI in its regulatory capital.



The right side of the figure shows a simple example of what happens when security prices drop, say, because interest rates rise, which drives the value of AOCI exactly to zero. The balance sheet shrinks because AFS securities are marked to market. An AOCI-capital bank would suffer a regulatory capital decline equal to the lost AOCI. Meanwhile, a non-AOCI-capital bank would experience no change in regulatory capital. The fall in measured regulatory capital would require AOCI-capital banks to either raise capital or reduce certain asset holdings. One way to do that would be to reduce their risk-weighted assets by cutting lending.

In our empirical analysis, we measure the effect of changes in securities values on bank credit supply using the fixed effects approach of Khwaja and Mian (2008), which allows us to account for credit demand by businesses. To isolate the strength of effects related to regulatory capital, we need to account for other effects unrelated to regulatory accounting that could lead securities' values to affect bank lending. To do this, our data analysis uses the idea that only a subset of securities at a subset of banks are marked to market to compute regulatory capital. We differentiate AFS and HTM securities in separate statistical exercises and further distinguish whether AFS securities are hedged or not. We find that banks that

experienced larger value losses on their AFS portfolios extended relatively less credit to firms, and these results are driven by unhedged securities. In contrast, we obtain substantially smaller and insignificant results for value changes of HTM securities and hedged AFS securities that do not affect regulatory capital at any bank.

Next, we directly test our regulatory capital mechanism by using the fact that changes in AFS values at AOCI-capital banks pass through into regulatory capital, which is not the case for non-AOCI capital banks. We repeat our main empirical analysis, allowing for value changes of AFS securities to have different effects depending on whether banks are required to include AOCI in their regulatory capital. We find lending responses are several times stronger for AOCI-capital banks, and we cannot reject the hypothesis of zero response by non-AOCI capital banks. Combined, these results point to changes in regulatory capital as a primary channel of interest rate transmission through security value changes into bank-firm credit.

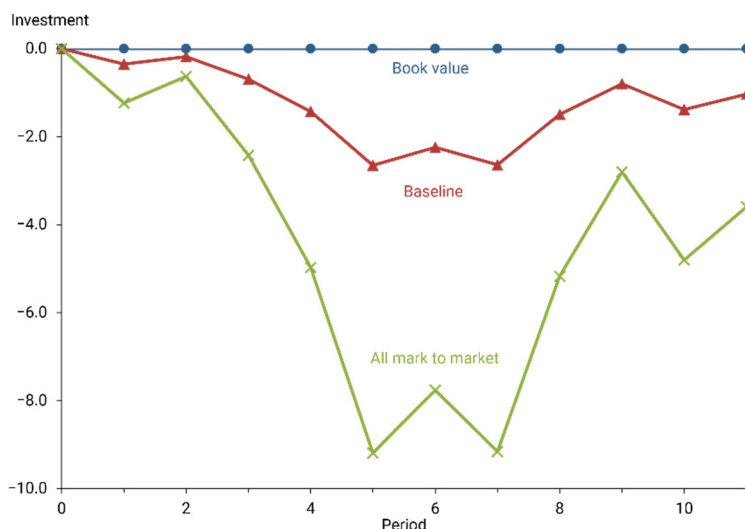
Policy scenarios

Inspired by these empirical findings, we developed a structural model that builds on our previous research in Greenwald, Krainer, and Paul (2025). We use the model to study how the effects of monetary policy are shaped by the regulatory framework of the banking system. Banks in our model hold long-term securities that are revalued when interest rates change.

Within this framework, we consider the impact of a rise in interest rates under various policy scenarios. If banks are required to adjust their regulatory capital for unrealized value changes of securities, their capital positions will deteriorate when monetary policy tightens and security prices fall. In response, banks cut lending to nonfinancial businesses, which in turn lowers their investment.

To ensure that our model accurately reflects reality, we fine-tune its parameters based on our empirical evidence, aligning the model with the data to draw broader implications. We find that transmission of an increase in interest rates through measured regulatory capital leads to larger declines in overall firm debt and investment compared with an alternative economy where regulatory capital ignores unrealized security losses. For instance, Figure 3 compares the case of a baseline economy in which some securities are marked to market (red line) and a hypothetical economy in which no securities are marked to market (blue line), such that all securities are recorded at book value. Following shocks that correspond to the observed tightening cycle in 2022–23, bank-dependent firms reduce investment by around 2.5 percentage points more after a year in our baseline economy relative to the hypothetical economy. By contrast, the

Figure 3
Model response investment of bank-dependent firms



green line shows an economy in which all securities are marked to market, which displays substantially greater amplification to a monetary tightening. Investment is around 9 percentage points lower at the same horizon relative to the hypothetical policy with no securities marked to market, even after we account for banks responding to holding fewer securities under this policy.

Conclusion

Our findings in this *Letter* provide evidence for a powerful monetary policy transmission mechanism that works through bank securities portfolios and is shaped by the regulatory framework of the banking system. We show that the regulatory treatment of bank securities can have important effects on the dynamics of the economy outside of its direct financial stability role. If banks were required to reflect all security gains and losses in their regulatory capital, monetary policy would become more potent, with a stronger effect on credit supply in the economy and important consequences for overall investment.

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Data

[Download data for figures](#) (Excel, 248 kb)

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