Replication Package for

"Monetary Tightening, Commercial Real Estate Distress, and US Bank Fragility"

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This note provides description of data sources, our main methodology, and the replication program for the empirical analysis in our paper.

Data sources:

1. Bank call reports are downloaded from https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx
2. Fed Fund rates are downloaded from https://fred.stlouisfed.org/series/FEDFUNDS
3. Market index prices are downloaded from various sources
    a. RMBS: https://finance.yahoo.com/quote/SPMB/history?p=SPMB
    b. CMBS: https://finance.yahoo.com/quote/CMBS
    c. Treasury by maturities:
    https://www.spglobal.com/spdji/en/indices/fixed-income/sp-us-treasury-bond-index/#overview
    https://finance.yahoo.com/quote/IBTU.L?p=IBTU.L&.tsrc=fin-srch
    https://finance.yahoo.com/quote/IBTS.MI/history?p=IBTS.MI
    https://www.spglobal.com/spdji/en/indices/fixed-income/sp-us-treasury-bond-3-5-year-index/#overview
    https://finance.yahoo.com/quote/IEF/history?p=IEF
    https://finance.yahoo.com/quote/TLH/history?p=TLH
    https://finance.yahoo.com/quote/TLT/history?p=TLT
4. Proprietary data subject to a data licensing agreement: Loan-level commercial real estate (CRE) records are sourced from Morningstar DBRS, while regional CRE property price indices are obtained from the Green Street (both accessed in December 2023).
    a. Loan-level records for loans included in CMBS deals are sourced from Morningstar DBRS and are available—subject to a data licensing agreement—at https://credit.morningstar.com/ through the Morningstar CRE Analytics platform.
    b. The Green Street regional CRE price indices are available—subject to a data licensing agreement—at https://greenstreet.com/contact-us.

Code: Replication_Package/Code

Step0: Preparing the data

Combine and clean call report filings downloaded from the FFIEC website: step0_clean_callreport.do

Clean DBRS data: step0_clean_DBRS.do

Cleaning market index prices: step0_clean_index_price.do

Step1: Construct measures

Construct mark-to-market losses along with other variables: step1_build_loss_measures.do

Construct dynamic loss measures for figures 8-10: step1_build_dynamic_plot.do

Step2: Tables and Figures

Produce tables and figures in the paper: step2_analysis.do

Datasets and Pseudo Datasets: Replication_Package/Data

We provide data or pseudo datasets to illustrate each do-file above, except for step0_clean_callreport.do, which takes the raw call report filings downloaded from the FFIEC website and combines them into one STATA dataset, and step0_clean_DBRS.do, which cleans the licensed data obtained from Morningstar DBRS and Green Street. All data in the folder are actual data except for cre_loan_pseudo.dta, which is a pseudo dataset we created based on the licensed DBRS and Green Street data.

Appendix: Outline of Our Methodology

Marking-to-Market Bank Asset Values due to Higher Interest Rates

We start by using the methodology developed by Jiang et al. (2024)[1] to mark-to-market bank assets to reflect the decline in their values following higher interest rates. We exactly follow the three steps of their methodology:

1) We obtain the asset maturity and repricing data for all FDIC-insured banks in their regulatory filings (Call Report Form 031 and 051) in 2022:Q1. Banks are required to report the values of residential MBS and non-residential MBS securities (Schedule RC-B). They are also required to report the values of loans that are secured by first liens on 1- 4 family residential properties and all loans and leases excluding loans that are secured by first liens on 1-4 family residential properties (Schedule RC-C) by maturity and repricing breakdowns.[2]

2) We use traded indexes in real estate and treasuries to impute the market value of real estate loans held on bank balance sheet.[3] Longer duration fixed income assets were affected more by interest rate increases, so we want to adjust the market values of loans based on their maturity. Because of limited maturity information across RMBS maturities, we use one RMBS exchange traded fund, and then adjust across maturities using treasury prices. As a baseline, we use changes in the market prices of U.S. Treasury bonds and RMBS from Q1 2022 to Q1 2024. We also assess the impact of rising interest rates on the value of bank assets across the entire interest rate path observed from Q1 2022 to Q2 2024. To adjust for maturity, we use the iShares U.S. Treasury Bond ETFs and the S&P Treasury Bond Indices across various maturities, matching the maturity and repricing breakdowns in the call reports.

3) We compute the mark-to-market value loss as

$$Loss = \sum_t RMBS\ multiplier \times (RMBS_t + Mortgage_t) \times \Delta TreasuryPrice_t + Treasury\ and\ Other\ Securities\ and\ Loans_t \times \Delta TreasuryPrice_t,$$

[1] Jiang, E., G. Matvos, T. Piskorski, and A. Seru, 2024, Monetary Tightening and U.S. Bank Fragility in 2023: Mark-to-Market Losses and Uninsured Depositor Runs?, *Journal of Financial Economics*, 103899.

[2] The breakdowns are "less than three months," "three months to one year," "one to three years," "three to five years," "five to fifteen years," and "more than fifteen years."

[3] Variable rate notes are recorded as maturity at the repricing date in bank call reports.

where t indicates the maturity and repricing breakdowns: less than 1 year, 1-3 years, 3-5 years, 5-10 years, 10-15 years, and 15 years or more. $\Delta TreasuryPrice_t$ is the market price change of Treasury bonds with maturity t from 2022:Q1 to 2024:Q1 that we obtained in the second step. RMBS and residential mortgages have additional risk due to prepayment risk. We account for this by constructing an $RMBS\ multiplier$ that uses average market price changes of RMBS and Treasury bonds across various maturities over this period:

$$RMBS\ multiplier = \frac{\Delta iShare\ MBS\ ETF}{\Delta \text{S\&P}\ Treasury\ Bond\ Index}.$$

We then define the mark-to-market asset value in 2024:Q1 as total assets in 2022:Q1 minus the mark-to-market value loss defined above.

Quantifying the Decline in Bank Asset Values due to CRE Distress

We quantify the banks' balance sheet exposure to the CRE loan distress by using the face value of CRE loans at each bank from the call report data. More specifically, for bank i we define a credit loss of bank asset value due to a given level of credit distress (d) as follows:

$$\text{Credit Loss}(i, d) = \$\text{Amount of Bank CRE Loans}(i) \times d \times (LGD) \quad (1)$$

where *$Amount of Bank CRE Loans* is the outstanding dollar amount of CRE loans on the bank's balance sheet based on the call report data, d is the loan default rate, and LGD is the loss given default expressed as a percentage of loan balance.

To assess the banks' ability to withstand the CRE credit distress, we consider a range of CRE loan default scenarios (d) starting from 2% default rate to 20% default rate at each bank. We assume that in the case of default, banks experience a loss of value amounting to approximately 30% of the outstanding principal balance. This is broadly consistent with historical data on loan recovery rates, which show that banks, on average, recover about 70% of loan balances in default.