# Replication Package ReadMe: "Monetary Transmission through Bank Securities Portfolios"

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## Overview

Our replication package contains two components, each with its own directory.

1. `Empirical`: contains the code used for the empirical analysis in Sections III–V of the paper. Due to confidentiality, these results can only be reproduced using pseudo data and will not match the results found in the paper.

2. `Model`: contains the data and code used for the structural model results in Section VI of the paper. This component uses no confidential data and should exactly reproduce the results found in the paper.

The base package directory also includes the following files:

1. `CITATION.cff`: a machine readable citation file.

2. `LICENSE`: the MIT License governing the use of the code.

3. `MANIFEST.sha256`: a manifest used to validate the files.

Full details for running each component now follow in the sections below.

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# Empirical Analysis

The empirical scripts retain historical filenames: `Figure_5_1.pdf` and `Figure_5_2.pdf` correspond to current Figures 2 and 3; `Table_6_1.tex`, `Table_6_2.tex`, and `Table_6_3.tex` correspond to Tables I, II, and III.

## Software

Codes are written in Stata (version 18.0 was used) and in Matlab (version 2020a was used).

## Data Sets

For the empirical analysis, data from the following sources were used:

1. **H.1 schedule of FR Y-14 data:** These are confidential data that cover corporate loans and borrower financials. Only employees within the Federal Reserve System can apply for access to these data. The data were last updated in May 2023. A data dictionary can be found at: `https://www.federalreserve.gov/apps/reportingforms/Report/Index/FR_Y-14Q`.

2. **B.1 and B.2 schedules of FR Y-14 data:** These are confidential data that cover bank securities holdings and the associated designated accounting hedges. Only employees within the Federal Reserve System can apply for access to these data. The data were last updated in May 2023. A data dictionary can be found at: `https://www.federalreserve.gov/apps/reportingforms/Report/Index/FR_Y-14Q`

3. **S&P's Compustat database:** These are proprietary data and cannot be shared publicly. The data was obtained from WRDS and last updated in May 2023. These data can be purchased from S&P: `https://www.marketplace.spglobal.com/en/datasets/compustat-financials-(8)`

4. **FR Y-9C data:** These data are publicly available at `https://www.ffiec.gov/npw/FinancialReport/FinancialDataDownload`. They were last updated in May 2023.

5. **CPI data:** This series is publicly available from the Federal Reserve Economic Data (FRED) database of the Federal Reserve Bank of St. Louis. Our CPI series (FRED code CPALTT01USQ661S) was last updated in May 2023 and can be found at `https://fred.stlouisfed.org/series/CPALTT01USQ661S`

## Replication of Tables and Figures

Due to the confidentiality of the data, pseudo data sets are made available to replicate the figures and tables in the empirical section of the paper. Results computed from these data will not match the confidential estimates in the paper.

To run all Stata results, open `Empirical/run_all.do` and set the local macro `replication_dir` near the top to the full path of the extracted package root, which contains both `Empirical` and `Model`. Replace the placeholder path supplied in the file, then run the entire do-file in Stata. The runner sets the working directories and enables both figures and all three tables automatically.

The runner first calls `install_packages.do`, which installs missing Stata packages from SSC: `ftools`, `require`, `reghdfe`, `estout`, and `outreg`. Internet access is required when packages are missing; existing installations are retained. It then produces the following outputs:

1. **Descriptive Evidence:** `run_figures.do` reads the pseudo data in `Input` and writes `Output/data_fig_5_1.xlsx` and `Output/data_fig_5_2.xlsx`, containing the content for Figures 2 and 3.

2. **Regression Evidence:** `run_regressions.do` writes `Output/Table_6_1.tex`, `Output/Table_6_2.tex`, and `Output/Table_6_3.tex`. Before each selected table, it automatically calls `prepare_regression_data.do` to reload `Input/data_for_replication.dta` and initialize the fixed effects and regression variables.

MATLAB is a separate step and is not called by the Stata runner. Set the MATLAB working directory to `Empirical/Matlab Figures` and run `Run_Graphs.m` to produce `Output/Figure_5_1.pdf` and `Output/Figure_5_2.pdf`. By default, it reads the checked, frozen Excel files in `Matlab Figures/Input`. To plot newly generated Stata results instead, first copy `data_fig_5_1.xlsx` and `data_fig_5_2.xlsx` from `Descriptive Evidence/Output` into `Matlab Figures/Input`, replacing the corresponding files.

To run individual results, first run `install_packages.do` from `Empirical`, then run the relevant do-file from its own directory. Set each selection global to `1` to include an output or `0` to omit it before running the script:

- From `Empirical/Descriptive Evidence`, run `run_figures.do` with `bc_run_figure_5_1` and `bc_run_figure_5_2`. In a fresh Stata session, their defaults are `0` and `1`, respectively.

- From `Empirical/Regression Evidence`, run `run_regressions.do` with `bc_run_table_6_1`, `bc_run_table_6_2`, and `bc_run_table_6_3`. In a fresh session, their defaults are `1`, `0`, and `0`, respectively.

For example, use `global bc_run_table_6_2 1` to enable Table II. Explicitly set all flags for the selected script when choosing a subset; otherwise, existing globals or the script defaults apply. The master runner enables all five outputs and clears these globals on successful completion.

# Structural Model

This portion of the package includes or generates the following additional subdirectories:

1. `data`: contains the data used for calibration and the shock-fitting exercise.
2. `paper-assets`: contains the reproduced tables and figures. This directory is generated once the results have been produced and collected using `make paper-assets`.
3. `reference-outputs`: contains frozen model results used for validation.
4. `scripts`: contains scripts used by the `Makefile` to generate the results.
5. `src`: contains the main code used to solve the model and produce its output.

In addition, this directory contains several files at the top level:

1. `Makefile`: a file containing `make` targets used to produce the results.
2. `environment.yml`: a YAML file that can be used to recreate the Python environment in Anaconda.
3. `requirements.txt`: a text file that can be used to recreate the Python environment using `pip`.

## Software

The structural model code is entirely written in Python. Our code was last run using Python version 3.13.12, installed using Miniforge. Our Python packages and environment can be replicated in a conda environment using the command

```
conda env create -f environment.yml
```

from the `Model` directory. Alternatively, you can create the environment using pip via the command

```
pip install -r requirements.txt
```

again executed from the `Model` directory.

## Data Sets

Our model plots use basic aggregate data obtained via Federal Reserve Economic Data (FRED), see Internet Appendix Section IA.A.2 for details. We provide the vintage version of our macroeconomic data set used in the paper, containing data through 2024:Q1, in the file `Model/data/irf_data_bank_capital.csv`. An updated version of this dataset created from raw FRED sources can be created using the command

```
make model-data-update
```

from the `Model` directory. This will create a new CSV file `Model/outputs/data/irf_data_bank_capital_u` containing the updated data. Due to revisions, re-running the analysis using this data set will lead to slightly different results that will not exactly match those in the paper.

## Replication of Tables and Figures

The bundled model seeds and reference outputs were frozen together from the completed production run on October 14, 2026. The MTM Share From AC (6.38% of assets) and MTM Share From Static Model (12.7% of assets) experiments were added from production outputs on October 15, 2026, and appear as Figures IA.5 and IA.6.

Replication of the model results is largely automated using the `make` utility, as specified in the `Makefile`. All commands in this section should be executed from the `Model` directory. Upon downloading the replication package, an initial check that the model machinery is intact can be run using

```
make check
```

For a full end-to-end replication of the model results, users can run the command

```
make model-refit
```

This will perform a full recalibration of the model, as well as producing all figures and tables used in the paper. For a faster run, the command

```
make model-fast
```

uses the supplied calibrated parameters and saved time-series sequences, recomputes impulse responses, and regenerates all figures and tables. Once the results have been computed using either of the commands above, the results can be checked against the archived paper versions using

```
make verify
```

Verification allows numerical refit variation in plotted values using `rtol=1e-6` and `atol=0.0005` percentage points (half of the last decimal at three-decimal precision). Period indices and labels must match exactly. The figures and tables can be collected using the command

```
make paper-assets
```

after which the relevant figures and tables can be found in the `Model/paper-assets` directory, named `fig4.pdf`–`fig6.pdf` for Figures 4–6, `figIA_1.pdf`–`figIA_13.pdf` for Figures IA.1–IA.13, and `tableIV.txt` for Table IV.