Replication Package Instructions for "Q-Monetary Transmission"

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This file describes the data and code to replicate the empirical results and model simulations in "Q-Monetary Transmission" (Journal of Political Economy, 2023).

1 Replication Instructions

1.1 Empirical Results

The empirical analysis is run in R (Version 4.1.0), employing the package **lfe** (Version 2.8-6) for estimating both the OLS and IV local projection regressions.

Executing the R script `QMT_data_replication.r` loads the final database[3] `JL_QMT_data.csv`, constructs variables used in the analysis, implements some final data cleaning procedures (as described in Appendix E), and estimates all the local projection regressions in the paper and the results relevant for the back-of-the-envelope calculations in Section 5 of the paper.

More precisely, the script will return the local projection results presented in Figures 1–5 and 8–14 in the paper by creating the folder `saved_figs/_figX` corresponding to Figure X and saving the relevant Figures panels therein. The script also saves the point estimate and confidence interval values seen in Figure 4(b) as .csv-files in `saved_figs`, to be read by the quantitative structural model code to construct Figure 7 (see Section 1.2 below). After the estimation of all the local projections, the script estimates the regressions and computations employed in Section 5 of the paper, returning the values of point estimates, as necessary, and also constructing Figure 6, saved in `saved_figs/_fig6`.

The last few lines of the script also return the data-based calibration target moments seen in Table 1 of the paper.

1.2 Structural Model

The quantitative structural model of Section 6 in the paper is solved in Julia (Version 1.5.2).

Executing the Julia script `QMT_model_replication.jl` loads `QMT_ihzn_1_xirs.jl` – the Julia module which contains all the functions necessary for solving the firm's recursive problem and generating the stationary distribution of firms. To run this script, the `dir_path` variable in line 6 should be manually set to refer to the local directory of the replication package. The value function interpolation procedures and iterations make use of the `CompEcon` package initially written to accompany Miranda and Fackler (2004), ported to Julia (Lyon, 2022).

After solving the firm's problem in steady state and generating the stationary distribution of firms, the script conducts the unexpected nominal policy rate shock exercise, as described

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[3] The prior analysis that goes into constructing this final database is described in Section 2 below.

in Section 6 of the paper, and computes the cross-sectional average impulse responses of log investment rates in order to construct Figure 7. Note that in order to allow Figure 7 to contain the empirical IV estimates alongside the model responses, the `saved_figs` folder needs to include the .csv-files which contain the point estimate and confidence interval values seen in Figure 4(b), as created by the R script discussed in Section 1.1 above.

Executing lines 333–397 also returns the model-based calibration moments seen in Table 1 of the paper, if requested.

2 Description of Files and Folders

The replication package contains the following files:

1. `JL_QMT_data.csv` – This file contains the complete database employed in the empirical analysis of the paper. It is constructed based on the quarterly Compustat database for U.S. public firms, which has been appended with additional data and undergone some prior data cleaning steps, as described in the following:

   (a) **CRSP data** – We first use the full daily CRSP (The Center for Research in Security Prices) database between 1985Jan01–2019Dec31 to construct our main quarterly stock turnover variable by computing daily stock turnover for each security (by `PERMNO`), and averaging these daily turnovers across calendar quarters to construct quarterly turnover series.

   With this daily database, we also estimate equation (204) in the paper, by security i, for securities with at least 90 days of observations data, regressing the security return `RETX` (trimming top and bottom 0.5% observations) on the Fama-French pricing factors to get security i specific sets of factor exposures $\{\hat{\beta}_j^i\}_{j=1}^3$.[4]

   We also compute the standard deviations of security i's daily returns `RETX` over each quarter to construct a quarterly series of stock return volatility.

   We then merge the resulting quarterly turnover and return standard deviation series and the security-specific factor exposures to the quarterly Compustat database using the CRSP-Compustat Merge (CCM) table provided by the Wharton Research Data Services (WRDS), matching via `gvkey` and `LPERMNO` identifiers.

   (b) **Monetary shock data** – We introduce measures of high-frequency identified monetary policy shocks by appending to the quarterly database the implied 3-month fed funds futures contract (FF4) rate changes occuring in a 30-minute window around the time of FOMC announcements, as in the dataset used by Jarocinski and Karadi (2020). For robustness tests, we also include the shock series implied by their "poor man's sign restrictions" approach. We go from the monthly series in their database to quarterly by simple summation within quarter.

[4]The data for the three Fama-French factors are available from Kenneth R. French's website: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

(c) **Aggregate outcome data** – For additional calculations, we introduce measures of aggregate variables for the U.S. economy in the quarterly database by appending quarterly data on the *Federal Funds Effective Rate* (average within quarter, retrieved from the Board Governors of the Federal Reserve via FRED), *real GDP* (BEA NIPA Table 1.1.6) and the *Gross Value Added Deflator for the U.S. Nonfarm Business Sector* (BEA NIPA Table 1.3.4).

(d) **Additional data cleaning and variable construction** – In prior data cleaning steps, we have also dropped all the Compustat firm-quarters with `FIC` (*Foreign Identifier Code*) not equal to `USA`, and reporting currency (`curcdq`) not equal to `USD`, and SIC codes (`sic`) between 4900–4999 and 6000–6999.

Also, we have dropped all firm-quarters for which the measurements of *Total Assets* (`atq`) and *Property, Plant and Equipment (Net)* (`ppentq`) are missing or not positive. We then also dropped firm-quarters before a firm's first observation of *Property, Plant and Equipment (Gross)* (`ppegtq`) in the full quarterly Compustat dataset, to construct a measure of a firm's capital stock based on the perpetual inventory method for robustness tests. And we finally drop all firm-quarters for which the measurements of *Debt in Current Liabilities* (`dlcq`), *Total Long-Term Debt* (`dlttq`), and *Cash and short-term investments* (`cheq`) are missing or negative.

We have also pre-created our main measure of a firm's (average) Tobin's q as the book value of *Total Assets* (`atq`) plus the difference between the market value of common equity (*Common Shares Outstanding*$\times$*Price*, `cshoq * prccq`) and the book value of *Common/Ordinary Equity* (`ceqq`), all scaled by the book value of total assets.

(e) **Worldscope data** – Finally, we append to the resulting quarterly Compustat database the data on firms' *incorporation dates* from the Worldscope database, matching via `gvkey` and `CUSIP` identifiers following the CCM table.

2. `bu_gdp_beta_temp.csv` – This file contains the estimation results for the firm-specific sales cyclicality estimates $\hat{\beta}^i$ from estimating specification (203) in the paper. It is pre-saved to save time in executing the full estimation procedures contained in `QMT_data_replication.r`. This file can be generated by executing lines 757–774 of `QMT_data_replication.r`.

3. `QMT_data_replication.r` – The main R script executing the empirical analysis and returning all the relevant results as presented in the paper.

4. `QMT_model_replication.jl` – The main Julia script executing the solution of the quantitative structural model of Section 6 in the paper.

5. `QMT_ihzn_1_xirs.jl` – Julia module containing all the functions necessary for solving the quantitative structural model of Section 6 in the paper.

Executing the scripts `QMT_data_replication.r` and `QMT_model_replication.jl`, as discussed in Section 1 above will create the following folders:

1. `saved_figs` – This folder contains the subfolders `_figX`, each containing the saved Figures necessary for constructing Figure X in the paper, and the .csv-files which containing the

point estimate and confidence interval values seen in Figure 4(b), as created by the R script discussed in Section 1.1 above.

2. `mod_savedout` – This folder contains additional files created when running the quantitative structural model script `QMT_model_replication.jl`, such as the printed Julia output (in `mod_output.txt`) or plots of the firms' policy functions and the stationary distribution of firms if requested in the script.

References

Jarocinski, M. and P. Karadi (2020). Deconstructing Monetary Policy Surprises – The Role of Information Shocks. *American Economic Journal: Macroeconomics 12*(2), 1–43.

Lyon, S. (2022). CompEcon.jl GitHub repository. https://github.com/QuantEcon/CompEcon.jl.

Miranda, M. J. and P. L. Fackler (2004). *Applied Computational Economics and Finance*. The MIT Press.