Replication package for "An Alternative Explanation for the 'Fed Information Effect'" by Michael Bauer and Eric Swanson

The code in this replication package reproduces Figure 1, Tables 1-4, and Tables 6-8 in the paper, as well as all tables in the Online Appendix. It was written in MATLAB and R. The replicator should expect the code to run for about two hours.

Changelog

Since publication of the article, the data description for the FOMC high-frequency announcement data in this README has been updated to remove specific references to sections and individuals at the Federal Reserve Board of Governors (revision made August 16, 2023).

Data Availability

Some of the data used in the paper are not publicly available and are thus not included in this replication package: the Blue Chip survey forecasts, the high-frequency monetary policy surprises, the macroeconomic data release surprises, and some financial market data. Here we provide details on both the public data included in the package, and the confidential data, including where the confidential data can be obtained (typically for a fee).

Macroeconomic data from FRED

The macroeconomic data series are from the St. Louis Fed's "Federal Reserve Economic Data" (FRED) database. Specifically, we obtained the following macro data:

- Headline CPI (U.S. Bureau of Labor Statistics, 2021a)
  - Index 1982-1984=100, Monthly, Seasonally Adjusted
- Core CPI (U.S. Bureau of Labor Statistics, 2021b)
  - Index 1982-1984=100, Monthly, Seasonally Adjusted
- Nonfarm payrolls (U.S. Bureau of Labor Statistics, 2019a)
  - Thousands of Persons, Monthly, Seasonally Adjusted
- Slope of the Treasury yield curve (Federal Reserve Bank of St. Louis, 2019)
  - Percent, Daily, Not Seasonally Adjusted
- Unemployment (U.S. Bureau of Labor Statistics, 2019b)
  - Percent, Monthly, Seasonally Adjusted
- Real GDP (U.S. Bureau of Economic Analysis, 2019)
  - Billions of Chained 2012 Dollars, Quarterly, Seasonally Adjusted Annual Rate

We use the FRED data in two different formats:

- The `.txt` files are based on the `.xlsx` files that were downloaded from FRED. Files: `cpi.txt/cpi.xlsx, cpix.txt/cpi.xlsx, NonfarmPayrolls.txt/NonfarmPayrolls.xlsx, treasuryslope.txt/treasuryslope.xlsx, Unemployment.txt/Unemployment.xlsx`

- The `.csv` files were downloaded directly from FRED. The file name corresponds to the FRED series name. Files: `CPIAUCSL.csv, GDPC1.csv, UNRATE.csv.`

Macroeconomic indicators from the Chicago Fed

The data on the Brave-Butters-Kelley indexes were downloaded from the Federal Reserve Bank of Chicago (2022). We used the July 2019 release. (The Chicago Fed has discontinued the production and publication of these data in July 2022.) The file `bravebutterskelley.txt` is based on `bravebutterskelley.xlsx` and contains the "Cycle Index."

Treasury yield data from the Federal Reserve Board of Governors

Data on nominal Treasury yields is based on the methodology of Gürkaynak, Sack, and Wright (2007) and obtained from the Board of Governors (2022). We use these data in two different formats:

- The file `gswyields.txt` is based on `gswyields.xlsx`, which contains a subset of the variables in the yield data set.
- The file `feds200628.csv` was downloaded directly from the Board of Governors website.

S&P 500 data (confidential)

The data for the S&P 500 stock index are from Yahoo! Finance (2022). As we do not have the rights to redistribute this data, it is not included in the replication package. Download from the Yahoo! Finance website does not seem possible anymore, but the data can be downloaded using the API in the R package `quantmod`. The script `R/pull_sp500.R` does this and saves `data/confidential/sp500.txt` containing four tab-separated columns with the month, day, year, and S&P 500 index value, respectively (without column names).

Financial data from Bloomberg (confidential)

We downloaded daily data on commodity prices from a Bloomberg terminal (Bloomberg, 2021a,b). In particular, we used the Bloomberg total commodity price index (Bloomberg ticker `BCOM Index`) and the Bloomberg agricultural commodity price index (ticker `BCOMAG Index`).

Bloomberg terminals are widely available at many business schools and government institutions. The data are freely downloadable once one has access to a terminal. For information on Bloomberg terminals, including the cost of licensing one, see https://www.bloomberg.com/professional/solution/bloomberg-terminal/.

In order to run the replication code, the data should be saved as `data/confidential/bcom.txt`, with tab-separated values, no column names, "NaN" for missing values, to be read in by the MATLAB code. The file should contain daily data, beginning January 2, 1990, structured into six columns: month, day, year, the Bloomberg total commodity price index (Bloomberg ticker `BCOM Index`) in the fourth column, and the Bloomberg agricultural commodity price index (ticker `BCOMAG Index`)

in the sixth column. (The fifth column can be filled with any values since it was not used for any of the final results of our analysis.)

Greenbook forecasts

The Fed's Greenbook forecasts (now officially called Tealbook forecasts) were downloaded from the Federal Reserve Bank of Philadelphia (2022). We chose the "Row Format" and downloaded the file `GBweb_Row_Format.xlsx`. We saved the following sheets of this Excel file as separate CSV files:

- Sheet `gPCPI` saved as `greenbook_cpi.csv`
- Sheet `gRGDP` saved as `greenbook_rgdp.csv`
- Sheet `UNEMP` saved as `greenbook_unemp.csv`

Macroeconomic forecasts from Blue Chip Economic Indicators (confidential)

The data from Blue Chip Economic Indicators (BCEI) is collected and distributed every month by Wolters Kluwer (Wolters Kluwer, 2022). The data is proprietary, but can be purchased from Wolters Kluwer, see https://www.wolterskluwer.com/en/solutions/vitallaw-law-firms/blue-chip, or call 1-800-638-8437 or email customer.service@wolterskluwerl.com for more information. The price of licensing varies depending on the type of institution and geographical region. The historical forecast data that we used is from the "Archival Issues", from 1990 to 2019. The BCEI historical forecasts are available from 1976 but for the replication they are only required from January 1990. Note that pre-2000 issues are available from Wolters Kluwer only in PDF format and will need to be digitized. We use the consensus forecasts for real GDP growth, CPI inflation, and the unemployment rate in our analysis.

In order to run the replication code, the BCEI consensus forecast data should be saved in the folder `data/confidential` in the following format:

- Text files `BCEI_cpi.txt`, `BCEI_rgdp.txt` and `BCEI_unemp.txt` with tab-separated values, no column names, "NaN" for missing values, to be read in by the MATLAB code.
- Text files `BCEI_cpi.csv`, `BCEI_rgdp.csv` and `BCEI_unemp.csv` with comma-separated values, arbitrary column names, "NA" for missing values, to be read in by the R code.
- All six files should contain monthly forecasts, beginning in January 1980, structured into 11 columns: year (integer), month (integer), and forecasts for the previous quarter (backcast), the current quarter (nowcast), and the following seven quarters.

Federal funds rate forecast errors from Blue Chip Financial Forecasts (confidential)

The data from Blue Chip Financial Forecasts (BCFF) is collected and distributed every month by Wolters Kluwer (Wolters Kluwer, 2022). The data is proprietary, but can be purchased from Wolters Kluwer, see https://www.wolterskluwer.com/en/solutions/vitallaw-law-firms/blue-chip, or call 1-800-638-8437 or email customer.service@wolterskluwerl.com for more

information. The price of licensing varies depending on the type of institution and geographical region. The historical forecast data that we used is from the "Archival Issues", from 1990 to 2019. The BCFF historical forecasts are available from 1982 but for the replication they are only required from January 1990. Note that pre-2000 issues are also available as Excel format, in contrast to the information on Wolters Kluwer's website. We use the consensus forecasts for the federal funds rate in our analysis. We calculate forecast errors by subtracting the quarterly averages of the daily federal funds rate from FRED (Board of Governors, 2021) from the consensus forecasts.

In order to run the replication code, the data should be saved as `data/confidential/bcff_forecast_errors.txt` with space-separated values, no column names, "NaN" for missing values, to be read in by MATLAB. The first three columns need to be the deadline of the forecast, which is the 26th of the previous month (21st if that month is December). The following five columns are the forecast errors for the current quarter to four-quarters ahead.

Macroeconomic announcement data from Money Market Services (confidential)

The macroeconomic data releases and expectations from Money Market Services (MMS) are confidential, but may be purchased from Haver Analytics (2022), see https://haverproducts.com/products/forecasts-and-as-reported-data/ The data "MMS Survey Medians and As Reported Data" are available in Haver database MMSAMER. (Similar data are also available from a Bloomberg terminal.)

In order to run the replication code, the data should be saved as `data/confidential/mms.txt` with tab-separated values, no column names, and "NaN" for missing values, to be read in by MATLAB. The columns should be the following (other columns can contain arbitrary/missing values):

- Month, day and year (integers) of the data release in columns 1-3,
- Core CPI expected and released values in columns 16 and 17,
- Real GDP expected and released values in columns 22 and 23,
- Nonfarm payrolls expected and released values in columns 36 and 37,
- Unemployment rate expected and released values in columns 52 and 53.

FOMC high-frequency announcement data (confidential)

The data on high-frequency financial market responses to FOMC announcements are from the Federal Reserve Board (Board of Governors, 2019) but cannot be redistributed publicly. The dataset is contained in a spreadsheet called "tightalldata.xls" which is an extension of the spreadsheet by that same name constructed and used by Gürkaynak, Sack, and Swanson (2005, GSS).

The data can be reconstructed by extending the GSS data using the exact methodology and data sources from that paper. High-frequency surprises are based on 30-minute changes in federal funds futures and Eurodollar futures rates from 10 minutes before FOMC announcements to 20 minutes after (see p. 64 of GSS for a description of the "tight" 30-minute windows and footnote 15 for the exact set of futures contracts). Tick-by-tick intraday data for these money market futures is available from CME, Tick Data, or Thomson

Reuters, for example (GSS used data from Genesis Financial Technologies, see p. 62). The methodology for calculating path and target surprises is described in the Appendix of GSS.

In order to run the replication code, the data should be saved in text format as `data/confidential/tightalldata.txt` with tab-separated values, no column names, and "NaN" for missing values, to be read in by the MATLAB code. The columns should be: Month, day and year (integers) of the FOMC announcement in columns 1-3, then MP1, MP2, ED1, ED2, ED3 and ED4 in columns 4-9, where MP1 and MP2 correspond to the change in funds rate expectations for the next and subsequent FOMC meeting (calculated from federal funds futures rate changes as per equations A5 and A7 in Gürkaynak, Sack, and Swanson, 2005), and ED1 through ED4 denote the current-quarter and 1-, 2-, and 3-quarter-ahead Eurodollar futures contract rate changes. All rate changes are based on the "tight" 30-minute windows.

Dataset list

Data file	Source	Notes	Provided
`data/bravebutterskelley.txt`	Chicago Fed		Yes
`data/cpi.txt`	FRED	Series: CPIAUCSL	Yes
`data/CPIAUCSL.csv`	FRED		Yes
`data/cpix.txt`	FRED	Series: CPILFESL	Yes
`data/feds200628.csv`	Board of Governors		Yes
`data/GDPC1.csv`	FRED		Yes
`data/greenbook_cpi.csv`	Philadelphia Fed		Yes
`data/greenbook_rgdp.csv`	Philadelphia Fed		Yes
`data/greenbook_unemp.csv`	Philadelphia Fed		Yes
`data/gswyields.txt`	Board of Governors		Yes
`data/NonfarmPayrolls.txt`	FRED	Series: PAYEMS	Yes
`data/treasuryslope.txt`	FRED	Series: T10Y3M	Yes
`data/Unemployment.txt`	FRED	Series: UNRATE	Yes
`data/UNRATE.csv`	FRED		Yes
`data/confidential/bcom.txt`	Bloomberg	Confidential	No
`data/confidential/sp500.txt`	Yahoo! Finance	Confidential, download using `R/pull_sp500.R`	No
`data/confidential/BCEI_rgdp.csv`	BCEI	Confidential	No
`data/confidential/BCEI_rgdp.txt`	BCEI	Confidential	No
`data/confidential/BCEI_unemp.csv`	BCEI	Confidential	No

data/confidential/BCEI_unemp.txt	BCEI	Confidential	No
data/confidential/bcff_foreast_errors.txt	BCFF	Confidential	No
data/confidential/mms.txt	Money Market Services/Haver Analytics	Confidential	No
data/confidential/tightalldata.txt	Board of Governors	Confidential	No

Computational requirements

Software Requirements

- Matlab (code was run with Matlab Release 2020b)
- R 4.2.1
  - here (1.0.1)
  - sandwich (3.0-2)
  - lubridate (1.8.0)
  - dplyr (1.0.9)
  - zoo (1.8-11)
  - magrittr (2.0.3)
  - quantmod (0.4.20)
  - The file R/setup.R will install all dependencies (latest version), and should be run once prior to running other programs.

Controlled Randomness

Random seed is set in line 8 of MATLAB/table_1.m and in line 5 of table_2.m, table_3.m and table_4.m in the same folder.

Memory and Runtime Requirements

Approximate time needed to reproduce the analyses on a standard 2022 desktop machine: two hours. The runtime can be reduced substantially if in the MATLAB files the number of bootstrap replications, nstraps, is set to a lower value than 50,000. However, in that case, the standard errors will be slightly different from the numbers reported in Tables 1-4 and Online Appendix Tables for Sections A-C. The code was last run on a 4-core Intel-based laptop with 32GB RAM and Windows version 11.

Description of code and instructions for replication

MATLAB code

Figure 1, Tables 1-4 and Online Appendix Tables for Sections A-C are produced by the MATLAB code in the folder `MATLAB`.

- The master file `run_all.m` will run all of the following scripts.
- The code in `table_1.m` produces Figure 1 and Table 1.
- The code in `table_2.m`, `table_3.m` and `table_4.m` produces Tables 2-4.
- The code to produce the Online Appendix Tables for Sections A-C is provided in files with the name pattern `onlineappendix_table_XZ.m`
- The following files contain code to load and process data. They are called by the main scripts and do not need to be run separately:
    - `loadbluechipdata.m`
    - `loadfinancedata.m`
    - `loadhfmpdata.m`
    - `loadmacrodata.m`
    - `loadmmsdata.m`
    - `constructomittedvars.m`
- Four other code files contain auxiliary functions: `extract.m`, `lag.m`, `nantozip.m` and `ols.m`.

R code

Tables 6-8, as well as Online Appendix Tables E.1-E.3, are produced by the R code in the folder `R`. One way to run one of the R scripts is to type in the R console `source("R/table_8.R")`, for example.

- The master file `run_all.R` will run all of the following scripts (including multiple runs of `table_8.R` with different settings for the various panels of Table 8 and the Appendix Tables E.1-E.3).
- The file `setup.R` will install all dependencies (latest version), and should be run once prior to running other programs.
- The code in `tables_6_7.R` produces Tables 6 and 7.
- The code in `table_8.R` produces Table 8 as well as Online Appendix Tables E.1-E.3.
    - For replicating the three panels of each table, the variable `series` in the beginning of `table_8.R`, is set to a value of either 1 (for panel A, unemployment rate), 2 (for panel B, real GDP growth) or 3 (for panel C, CPI inflation).
    - For Table 8 in the paper, the parameter `lagbc` is set to value 2, and the variable `startyear` is set to 1990.
    - For Online Appendix Tables E.1-E.3, the variable `startyear` is set to 1980, and the parameter `lagbc` is set to value 2 for Table E.1, value 3 for Table E.2, and value 1 for Table E.3.

List of tables and figures

The provided code reproduces selected tables and figures in the paper, and in the Online Appendix (OA), as explained below.

Figure/Table	Program	Notes
Table 1	`MATLAB/table_1.m`	Requires confidential data
Table 2	`MATLAB/table_2.m`	Requires confidential data
Table 3	`MATLAB/table_3.m`	Requires confidential data
Table 4	`MATLAB/table_4.m`	Requires confidential data
Table 5	n/a	Summary of survey results
Table 6	`R/tables_6_7.R`	Requires confidential data
Table 7	`R/tables_6_7.R`	Requires confidential data
Table 8	`R/table_8.R`	Requires confidential data
Figure 1	`MATLAB/table_1.m`	Requires confidential data
Figure 2	n/a	Illustrative graphic
OA Tables Sections A-C	`MATLAB/onlineappendix_table_XY.m`	Requires confidential data
OA Tables E.1-E.3	`R/table_8.R`	Requires confidential data

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