

mpshock: An R Package for Cross-Country Monetary Policy Shock Analysis

by Charles Coverdale

Abstract Empirical monetary economics relies on identified policy shock series as the exogenous input to impulse response functions, local projections, and proxy-SVARs. Those series live today as Excel and CSV files scattered across individual authors' personal pages, Federal Reserve research data pages, and GitHub mirrors, with inconsistent column names, date formats, and update cadences. This paper introduces **mpshock**, an R package that bundles thirteen monetary policy shock and stance series across three countries (United States, United Kingdom, Australia) as tidy, versioned, and tested data frames with provenance metadata. Each series loads in a single call, carries its paper citation and source URL, and plugs directly into the dominant downstream R packages for impulse response estimation (**lpirfs**, **BVAR**, **vars**). I demonstrate the package by replicating cross-series comparisons and by producing the first published cross-country cumulative monetary-shock chart from a single R pipeline.

1 Introduction

The **mpshock** package bundles thirteen monetary policy shock and stance series from the empirical macroeconomics literature. Series span three countries (United States, United Kingdom, Australia), load in a single call, carry citation and source metadata, and plug into the dominant downstream R packages for impulse response estimation: **lpirfs** (Adämmer, 2019), **BVAR** (Kuschnig and Vashold, 2021), and **vars** (Pfaff, 2008). Version 0.1.0 is available on CRAN.

The motivating problem is fragmentation. Identified monetary policy shock series live today as XLS and CSV files on individual authors' personal pages, Federal Reserve research data pages, openICPSR replication archives, and GitHub mirrors, with inconsistent column names, date formats, and update cadences. Correlations between alternative series on common samples range from 0.4 to 0.7 (Aeberhardt et al., 2024). Reporting impulse responses under several identification strategies as a robustness check is now standard practice, but assembling the inputs has remained a research-time tax.

mpshock is the first R package to bundle shock series for more than one country in a common schema. Comparable resources, such as the **hfdshocks** GitHub repository and individual replication archives, are single-country and unmaintained. The package treats provenance as a first-class design property: each bundled dataset carries the DOI, URL, licence, and download date of its upstream source, and each help file discusses identification, known critiques, and aggregation caveats.

2 Background

A monetary policy shock is the component of a central bank's policy decision orthogonal to the bank's real-time information set. Five identification strategies dominate the current literature, and the bundled series span all five.

Narrative identification. Romer and Romer (2004) regress policy-rate changes on the Fed's Greenbook forecasts and interpret the residual as the exogenous policy innovation. Cloyne and Hürtgen (2016) produce the United Kingdom equivalent from Bank of England *Inflation Report* forecasts. Beckers (2020) produce an Australian series from Reserve Bank of Australia internal forecasts, augmented with credit-spread information following Hambur and Haque (2024).

High-frequency identification. Kuttner (2001) identifies the unexpected component of policy moves from 30-minute jumps in federal funds futures around FOMC announcements. Gürkaynak et al. (2005) decompose several futures surprises into two factors: a target factor capturing the current-meeting move and a path factor capturing guidance about future rates. Nakamura and Steinsson (2018) refine this using five interest-rate futures and rescaling to one-year Treasury-yield equivalents. Cesa-Bianchi et al. (2020) produce the UK analogue from sterling interbank rate surprises. Hambur and Haque (2024) produce the Australian equivalent from OIS and AGS yields around RBA board meetings.

Sign restrictions. Jarociński and Karadi (2020) exploit the joint response of short-term interest rates and stock prices. A positive pure monetary policy shock raises rates and lowers stocks; a positive central bank information shock raises both. The identification is set-valued, so the package bundles the median rotation. Acosta (2023) shows that the rate-stock sign pattern is a weak discriminator

between the two shock types.

Informationally-robust identification. [Miranda-Agrippino and Ricco \(2021\)](#) project high-frequency FF4 surprises onto the Fed’s Greenbook forecast revisions for GDP, unemployment, and inflation at horizons zero to four quarters. The residual addresses the Fed information effect at its source.

Shadow-rate term-structure models. [Wu and Xia \(2016\)](#) estimate a three-factor affine model for Treasury yields in which the observed short rate equals $\max(r_t^*, r_t^{\text{ELB}})$. The latent shadow rate r_t^* can go negative during zero-lower-bound episodes. Shadow rates are stance measures, not shocks; first differences are a reasonable proxy ([Krippner, 2020](#)).

3 Package design

3.1 Architecture and dependencies

Each bundled series lives as a compressed R data object under `data/`. The package provides a uniform loader, a provenance accessor, and a small set of transformation helpers. Imports are `cli`, `stats`, and `utils`. No runtime dependency on `tidyverse` or any HTTP client, because all data is bundled at build time. R 4.1.0 or later is required.

3.2 The `mp_shock` class

Every bundled series is a `data.frame` carrying the `mp_shock` S3 class, with three required columns: `date` (first of the month, `Date`), `shock` (percentage points), and `series` (identifier). Multi-factor series carry additional columns: `target`, `path`, and `qe` for the UK Monetary Policy Event-Study Database ([Braun et al., 2025](#)); `action`, `path`, and `term_premium` for the Australian three-factor decomposition ([Hambur and Haque, 2024](#)); `shadow_rate` and `effr` for Wu-Xia. A `print.mp_shock` method emits a one-line provenance header before the tabular output.

3.3 The loader

The single entry point is `mp_shock(series, start, end)`. The `series` argument is matched against an internal allow-list; unknown names raise a structured error listing the available series. Optional `start` and `end` arguments filter by date. Input validation uses `cli::cli_abort`.

3.4 Metadata

`mp_list()` returns a metadata table with one row per series and eleven columns: `series`, `author`, `country`, `frequency`, `type`, `start`, `end`, `n`, `doi`, `source_url`, and `description`. `mp_source(series)` returns the one-row subset and prints the citation to the console.

3.5 Helpers

Three helpers cover the pre-modelling preparation every user needs. `mp_align()` left-joins a shock series onto a target data frame by date. `mp_to_quarterly()` aggregates monthly series to quarterly via `sum`, `mean`, or end-of-quarter value. `mp_cumulate()` computes cumulative or rolling-window shock sums. For anything beyond preparation, users should reach for `lpirfs`, `BVAR`, or `vars`.

3.6 Reproducibility

The package ships a `data-raw/` directory containing an R script per bundled series. Each script records the upstream URL, the download date, and the exact transformations applied. Re-running the scripts regenerates the bundled data from source, subject to upstream availability.

4 US series

`nakamura_steinsson` ([Nakamura and Steinsson, 2018](#)): policy news shock, first principal component of five interest-rate futures in a 30-minute FOMC window, rescaled to one-year Treasury-yield equivalents. 2000-02 to 2014-03, 170 monthly observations. Harvard Dataverse replication archive, CC0 1.0.

bauer_swanson (Bauer and Swanson, 2023): orthogonalised monetary policy surprise (MPS_ORTH), the OLS residual of the raw MPS on six pre-announcement predictors (nonfarm payrolls surprise, trailing 12-month employment growth, log S&P 500 change over the prior three months, 10y-2y Treasury slope change, log commodity-price-index change, Bauer-Chernov option-implied 10-year Treasury yield skewness). 1988-02 to 2023-12, 431 observations. Maintained by the San Francisco Fed.

gss_target and gss_path (Swanson, 2021; Gürkaynak et al., 2005): the federal funds rate factor and forward guidance factor from the Swanson three-factor extension of Gürkaynak-Sack-Swanson. 1991-07 to 2015-10, 292 observations each.

jarocinski_karadi_mp and jarocinski_karadi_cbi (Jarociński and Karadi, 2020): pure monetary policy and central bank information shocks identified by sign restrictions on the joint response of 3-month fed funds futures and the S&P 500 in 30-minute FOMC windows. Median decomposition. 1990-02 to 2024-01, 404 observations each.

miranda_agrippino_ricco (Miranda-Agrippino and Ricco, 2021): informationally-robust monetary policy shock, residual of the FF4 surprise projected on the Fed's Greenbook forecast revisions. 1991-01 to 2019-06, 342 observations.

wu_xia (Wu and Xia, 2016): monthly shadow federal funds rate from the three-factor SRTSM. 1960-01 to 2022-02, 746 observations. Maintained by the Atlanta Fed. Updates paused in February 2022 once policy rates normalised.

5 UK series

ukmpd (Braun et al., 2025): the UK Monetary Policy Event-Study Database, the UK analogue of the Swanson three-factor decomposition. Columns shock (Target factor), path (Forward Guidance factor), and qe (QE factor) are computed from high-frequency surprises in OIS rates, gilt yields, short-sterling futures, and the FTSE 100 around MPC announcements and Monetary Policy Report press conferences. Live-maintained by the Bank of England. 1997-06 to 2026-02, 345 observations.

cesa_bianchi_uk (Cesa-Bianchi et al., 2020): UK high-frequency surprise from 60-minute tight-window changes in the three-month sterling interbank rate around MPC announcements. 1997-06 to 2015-01, 212 observations.

cloyne_hurtgen_uk (Cloyne and Hürtgen, 2016): UK narrative monetary policy shock. 1997-06 to 2009-02, 141 observations.

6 Australian series

hambur_haque_au (Hambur and Haque, 2024): three-component high-frequency shock with columns shock (action factor, current-meeting cash-rate surprise), path (forward guidance), and term_premium. 2001-04 to 2019-12, 225 observations. RBA Research Discussion Paper 2023-04, CC BY 4.0.

beckers_au (Beckers, 2020): Australian narrative shock from RBA cash-rate changes residualised on the Bank's internal forecasts and credit-spread information. Quarterly 1994-Q1 to 2018-Q4, 100 observations.

7 Aggregation convention

All event-study series are bundled at monthly frequency by summing event-level surprises within each calendar month; months with no meeting are coded zero. This follows Gertler and Karadi (2015) and the authors' own maintained releases. Bu et al. (2021) argue for NA-coding of no-meeting months in proxy-SVAR or LP-IV estimation. Users who want this can recode after loading.

8 Cross-series replication

Figure 1 plots cumulative Federal Reserve monetary policy shocks under four identification strategies on the common sample February 2000 to March 2014.

Figure 2 presents the pairwise correlation matrix across all seven bundled US series on their common sample. The block across the four shock-type series shows correlations in the 0.4-0.7 range, matching Aeberhardt et al. (2024). The practical implication: report results under several identification strategies rather than selecting a single preferred shock.

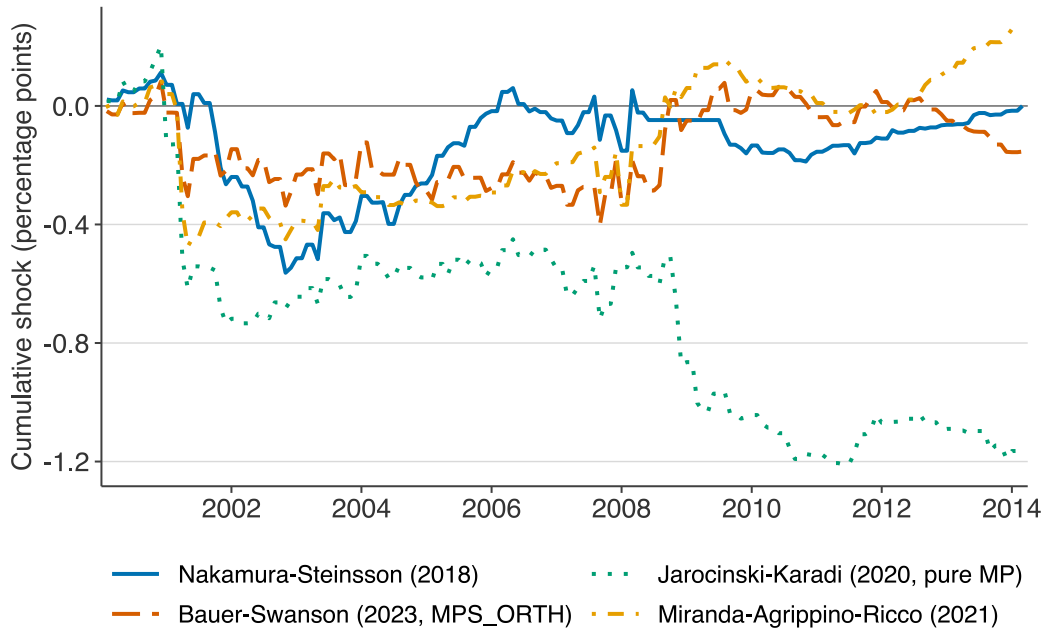


Figure 1: Cumulative US monetary policy shocks under four identification strategies on a common sample, 2000-02 to 2014-03. Series are Nakamura and Steinsson (2018) policy news shock, Bauer and Swanson (2023) orthogonalised surprise (MPS_ORTH), Jarociński and Karadi (2020) pure monetary policy component under the median decomposition, and Miranda-Agrippino and Ricco (2021) informationally-robust shock. All four agree on direction and broad timing of major identified policy innovations but disagree materially on magnitude around the 2008 financial crisis and on the interpretation of the December 2013 tapering surprise. Each series is loaded with a single mp_shock() call.



Figure 2: Pairwise Pearson correlations among seven US shock and stance series, common monthly sample 2000-02 to 2014-03. Short labels: NS = Nakamura-Steinsson (2018); BS = Bauer-Swanson (2023) MPS_ORTH; GSS-T and GSS-P = the target and path factors from the Swanson (2021) three-factor decomposition; JK-MP and JK-CBI = Jarociński-Karadi (2020) pure monetary policy and central bank information shocks; MAR = Miranda-Agrippino-Ricco (2021) informationally-robust shock. The diagonal block across the four identified-shock series shows correlations in the 0.4-0.7 range, consistent with [Aeberhardt et al. \(2024\)](#).

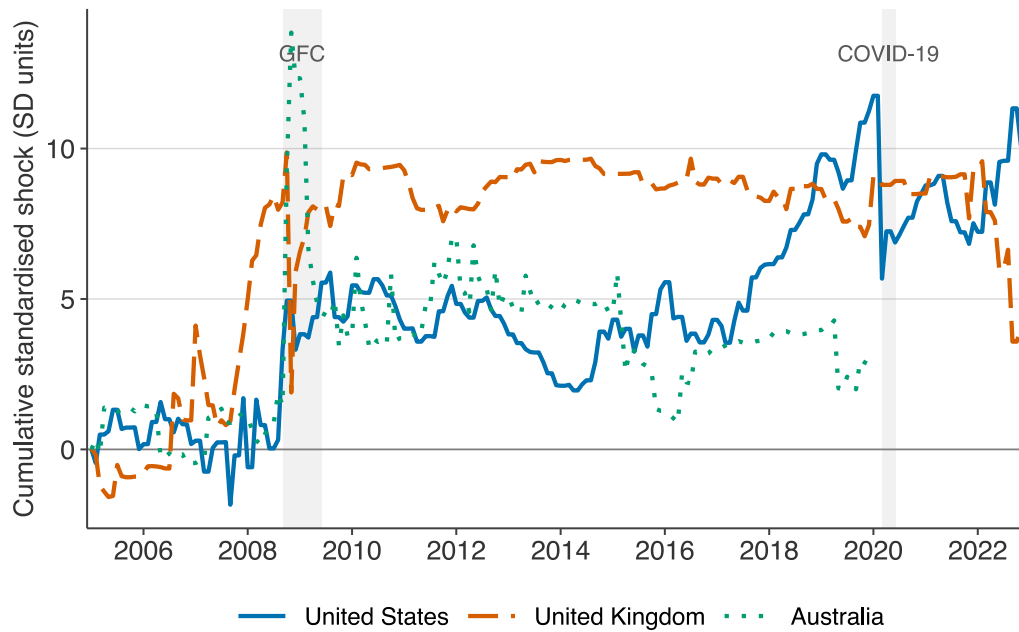


Figure 3: Cross-country cumulative monetary policy shocks, standardised, January 2005 to December 2022. Each series is divided by its full-sample standard deviation of nonzero shocks before cumulating, so the y-axis is in units of standard deviations; scales are comparable across countries despite different native units in the source data (percentage-point surprises for US and UK, unit-variance PC score for AU). The three traces are `bauer_swanson` (United States, `MPS_ORTH`), `ukmpd` Target factor (United Kingdom), and `hambur_haque_au` action factor (Australia). Shaded bands mark the global financial crisis (September 2008 to June 2009) and the COVID-19 monetary response (March to June 2020). The three central banks share the direction of policy around major global events but differ sharply in timing and magnitude.

9 Cross-country shocks

Figure 3 plots cumulative monthly monetary policy shocks for the United States, United Kingdom, and Australia, 2005 to 2022. The traces are `bauer_swanson` (`MPS_ORTH`), the `ukmpd` Target factor, and the `hambur_haque_au` action factor. No existing R resource produces this chart from a single pipeline.

Directions align around major global events (GFC, 2013 taper tantrum, 2022-23 tightening cycle). Magnitudes differ. The US trace shows compressed shock variance through the 2009-2015 zero-lower-bound period. The UK trace shows non-trivial target-factor shocks throughout, reflecting the MPC's occasional departures from the Bank Rate floor. The Australian trace shows a shallower and later move to zero.

10 Limitations

Six limitations apply.

1. `mpshock` is a data-curation project. It does not propose a new identification strategy, a new aggregation rule, or a new econometric test.
2. Version 0.1.0 covers three countries. Euro-area shocks (Jarociński-Karadi ECB, Altavilla Event-Study Database) are the v0.2.0 priority. The cross-country panel of Bolhuis et al. (2024) is a candidate for v0.3.0 subject to licence.
3. Monthly aggregation sums event-level surprises within each calendar month and codes no-meeting months zero. Bu et al. (2021) argue for NA-coding in LP-IV estimation.
4. Identification itself is contested. The Nakamura-Steinsson information-effect interpretation is challenged by Bauer and Swanson (2023) and Miranda-Agrippino and Ricco (2021). The Jarociński-Karadi sign restrictions are critiqued by Acosta (2023). Wu-Xia shadow rate estimates are sensitive to the lower-bound choice, number of factors, and yield maturities (Krippner, 2020).
5. Series cut-off dates differ. UKMPD is live-maintained by the Bank of England. Bauer-Swanson is updated annually. Nakamura-Steinsson, Cesa-Bianchi-Thwaites-Vicondoa, and Wu-Xia are

static at their published end dates.

6. Licences vary across sources. Users should cite the underlying paper for any series used in academic work, not **mpshock** alone.

11 Conclusion

mpshock lowers the cost of cross-series and cross-country robustness checks from hours to minutes. The package is available on CRAN; source and issue tracker at <https://github.com/charlescoverdale/mpshock>.

Acknowledgements

I thank the authors of each bundled series for making their data publicly available: Emi Nakamura, Jón Steinsson, Michael Bauer, Eric Swanson, Refet Gürkaynak, Brian Sack, Marek Jarociński, Peter Karadi, Silvia Miranda-Agrippino, Giovanni Ricco, Jing Cynthia Wu, Fan Dora Xia, Robin Braun, Tuli Saha, Ambrogio Cesa-Bianchi, Gregory Thwaites, Alejandro Vicondoa, James Cloyne, Patrick Hürtgen, Jonathan Hambur, Qazi Haque, and Benjamin Beckers.

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