Assessing Monetary-Fiscal Interactions in New Zealand with a Regime-Switching Bayesian Local Projections Model

Naveed Javed[1] James Morley[2]

[1]Reserve Bank of New Zealand

[2]University of Sydney

The views expressed in this paper are those of the authors and do not necessarily represent the views of the RBNZ.

ACE 2025, Economic Policy Modelling Session
9 July 2025

Monetary-Fiscal Interactions

- Small, but growing empirical literature (longer more theoretical literature, including Sargent & Wallace, Leeper, Cochrane, Bianchi, etc...)
- Relatively little research on effects of fiscal regimes on monetary policy compared to vice versa
- But recent panel local projection models for euro area
  - Kloosterman, Bonam, & van der Veer (2024) find expansionary monetary policy raises output and inflation, but only when fiscal policy is also expansionary
  - Afonso, Alves, & Ionta (2025) find "fiscal inflation" where monetary tightening raises prices in a high-debt (or low sustainability) regime

Local Projections

- Local projections (LPs, Jordà, 2005) provide convenient estimation of impulse response functions (IRFs) given narrative or high-frequency measures of shocks
- A challenge with LP IRFs is their often implausible fluctuations in small samples due to no parametric restrictions tying estimates together across horizons
- Recent quasi-maximum-likelihood Bayesian approach by Ferreira, Miranda-Agrippino, & Ricco (forthcoming)
- They use Bayesian Local Projections (BLPs) to shrink LP IRFs closer to those for structural vector autoregressions (SVARs)
- However, their approach requires long sample period that includes training sample for estimating a VAR to inform conjugate priors (why not just use the VAR?)

"Bayesian Simulation Tying Local Projection Estimates Together"

- In Javed and Morley (2025a), we also take a Bayesian approach, but develop a posterior simulation algorithm that:
  1. Allows direct smoothing/long-run shrinkage priors on IRFs, particularly useful given small samples (similar to Canova, Kociecki, & Piffer, 2023, for Bayesian VARs)
  2. Addresses generated regressor issues for 2SLS (Pagan, 1984) and controlling for serial correlation (related to Lusompa, 2023, Mumtaz and Piffer, 2023)
  3. Estimates common parameters across horizons and/or endogenous variables (e.g., threshold parameters for smooth transition models)
  4. Provides direct posterior inference about any object of interest, such as differences in IRFs across regimes

This Paper

- We apply our BLP approach to estimate the effects of New Zealand monetary policy shocks and how they depend on fiscal conditions
  - See also Buckle et al. (2003), Dungey and Fry (2009) for SVAR; Haug and Smith (2012), Kirby and Vu (2024) for LP; Culling et al. (2019) for DSGE, SVAR, FAVAR
- Short available sample period (2000-2023) for good Romer-Romer style measure of monetary policy shocks from Bayarmagnai (forthcoming)

Main Findings

- Romer-Romer style shocks more informative than high-frequency surprise measures for New Zealand
- Fiscal conditions matter for effects of expansionary vs. contractionary monetary policy shocks, similar to Kloosterman et al. (2024) for euro area
- Disinflations more successful given fiscal consolidation

Regime-Switching BLP Model

- Two-regime smooth transition specification:

$$y_{i,t+h} = \sum_{r=0}^{1} F_r(z_t) \left(\psi_{ih,r} \epsilon_{mt} + \beta'_{ih,r} x_t \right) + u^{(h)}_{i,t+h}$$

where z_t is the standardised transition variable and the transition function $F_r(\cdot)$ has a logistic form:

$$F_0(z_t) = \frac{exp(-\gamma(z_t - \tau))}{1 + exp(-\gamma(z_t - \tau))}, F_1 = 1 - F_0$$

- For the fiscal variables in our application, the higher debt or deficit, the less the "contractionary" regime applies, with $F_0 \to 0$

Estimation

- Gibbs sampler (plus Metropolis step to estimate threshold parameters)
- Equation-by-equation equivalent to seemingly unrelated regressions given lack of correlation between residuals
- Conditional on parameter draws, can treat residuals as data, addressing generated regressor issue
- Sampler converges quickly and performs well
- Given flat/improper priors, produces OLS equivalent moments for small number of draws (2000 after 1000 burn-in)

Smoothing/Long-Run Priors for $h > 0$

- Case 1 – smooth across horizons given small λ:

$$\psi_{ih}|\psi_{i,h-1} \sim N\left(\psi_{i,h-1}, \lambda^2\sigma_i^2\right)$$

- Case 2 – shrink to zero in long run given $|\delta| < 1$:

$$\psi_{ih}|\psi_{i,h-1} \sim N\left(\delta^h\psi_{i,h-1}, \left(\frac{\lambda}{h}\right)^2\sigma_i^2\right)$$

- Case 3 – shrink away from a prior peak horizon $\bar{h} > 0$:

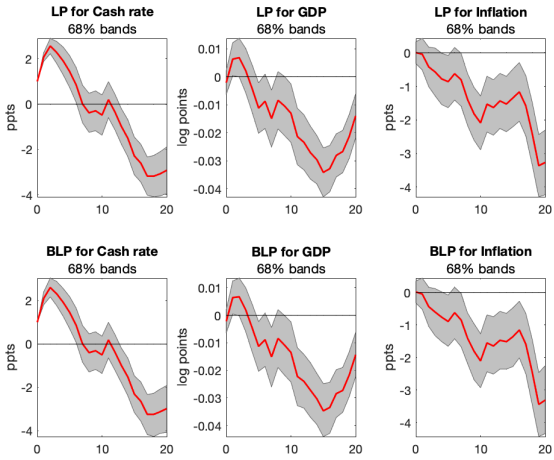
$$\psi_{ih}|\psi_{i,h-1} \sim N\left(\psi_{i,h-1} + \frac{h-\bar{h}}{|h-\bar{h}|}(\delta^{|h-\bar{h}|} - 1)\psi_{i,h-1}, \left(\frac{\lambda}{|h-\bar{h}| + \bar{\lambda}}\right)^2\sigma_i^2\right)$$

Data

- New Zealand data for sample period 2000Q1-2023Q4
- Endogenous variables: OCR (Reuters), log real GDP (Stats NZ), CPI inflation (Stats NZ)
- "Pandemic prior" correction (intercept dummies) as in Cascaldi-Garcia (2024) for real GDP in 2020Q2 and 2020Q3
- Monetary policy shocks:
  - Romer & Romer (RR)-type measure of Bayarmagnai (forthcoming)
  - Gürkaynak, Sack, & Swanson (GSS)-type measure of Bernhard & Leong (2022) and Nahavandi & Vermeulen (2024), from 2000Q3
- Fiscal regimes measured using cyclical stance for debt-to-GDP (IMF) or primary deficit (NZ Treasury) (both as % of GDP) based on HP or BN filtering

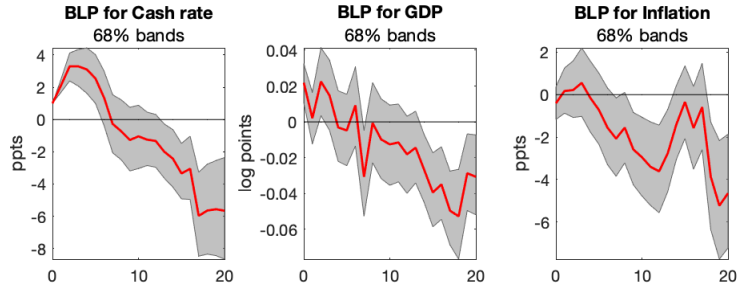
A Baseline Linear Case

Flat priors, no correction for serial correlation, normalised, 2000Q1-2023Q4



BLP with GSS-style shocks

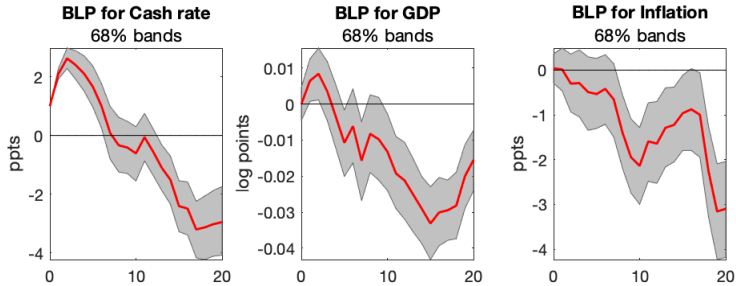
Flat priors, no correction for serial correlation, normalised, 2000Q3-2023Q4



Less precise estimates for GSS-style shocks than RR-style shocks

BLP-IV with Multiple Instruments

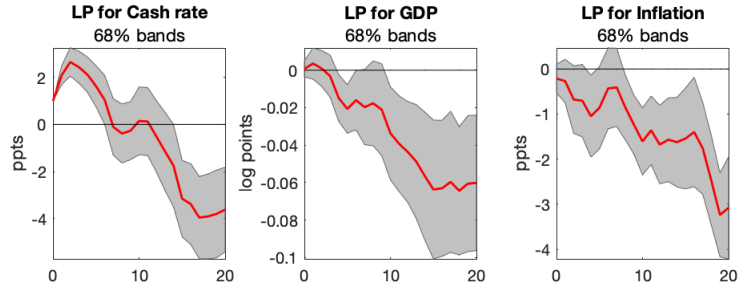
Flat priors, no correction for serial correlation, IV, 2000Q3-2023Q4



Very similar to just using just RR-style shocks

Classical Long Differences IRFs

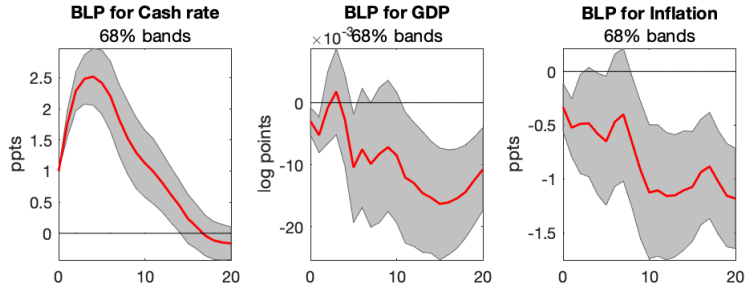
Newey-West, normalised, 2000Q1-2023Q4



- Herbst and Johannsen (2024) point out problems with small sample biases for LP and Newey-West understating uncertainty
- Piger and Stockwell (2025) show that using long differences for persistent variables helps reduce bias and improve coverage of confidence intervals

Smoothed BLP IRFs

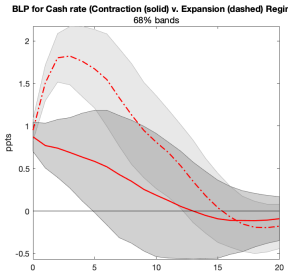
Long differences, AD signs for $h \leq 1$, $\lambda = 12$, $\bar{\lambda} = 10$, $\bar{h} = 6$, $\delta = 0.95$, SCC, normalised, 2000Q1-2023Q4

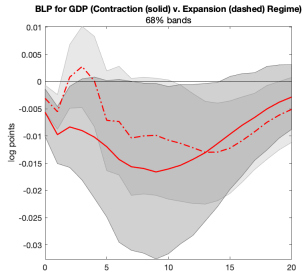


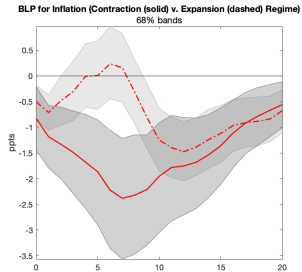
Smoothed BLP IRFs with sign restrictions but relatively loose priors confirm qualitative effects of MP shocks

Smoothed IRFs for Two Fiscal Regimes

Cyclical Debt Regimes, LD, AD $h \leq 1$, $\lambda = 12$, $\bar{\lambda} = 10$, $\bar{h} = 6$, $\delta = 0.95$, SCC, normalised, 2000Q1-2023Q4

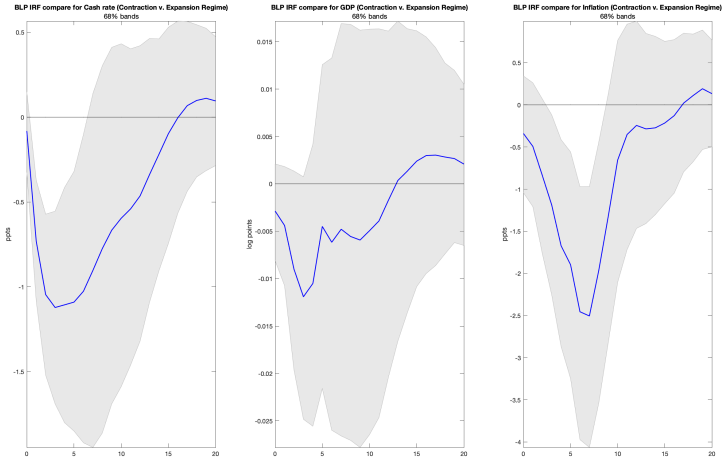






Larger effects of monetary policy, especially for inflation, under fiscal consolidation

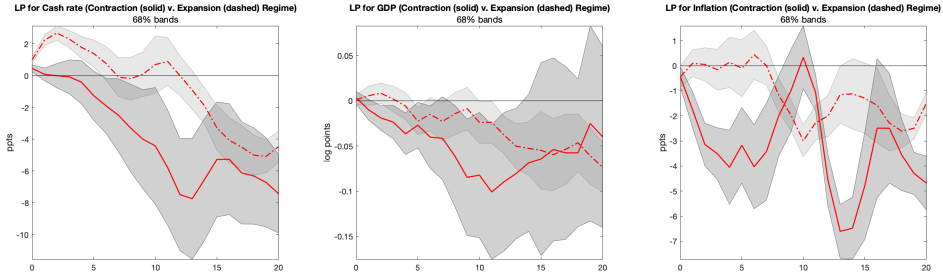
Comparison of IRFs across Fiscal Regimes



Significantly less persistent policy and more effect on inflation under fiscal consolidation

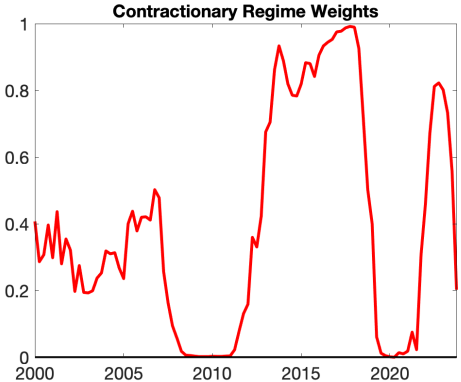
Classical IRFs for Two Fiscal Regimes

LD, Newey-West, normalised, 2000Q1-2023Q4



Noisier and exhibiting severe normalisation issues for fiscal contraction regime with impact effect on OCR of 0.45 (0.22)

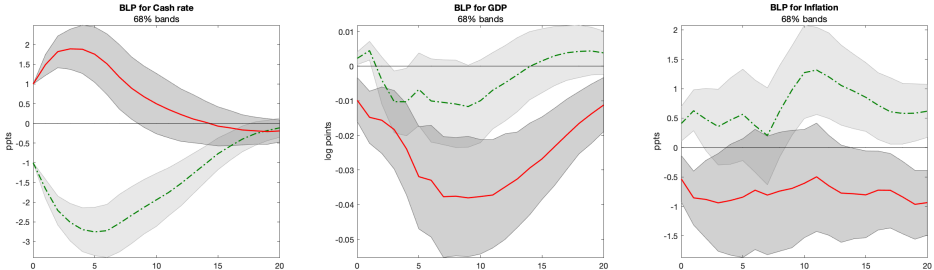
Regime Weights Using BN Cyclical Gov't Debt



Consolidation in mid-2010s, while GFC and Covid correspond to fiscal profligacy

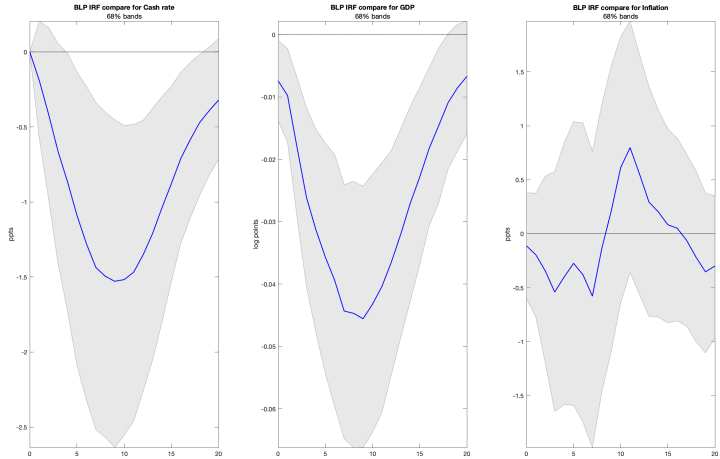
Smoothed IRFs Allowing for Sign Asymmetry

LD, AD $h \leq 1$, $\lambda = 12$, $\bar{\lambda} = 10$, $\bar{h} = 6$, $\delta = 0.95$, SCC, normalised, 2000Q1-2023Q4



Evident "pushing on a string" and convex aggregate supply dynamics

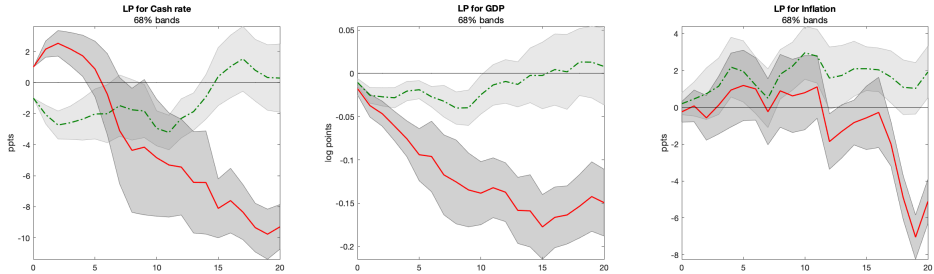
Comparison of IRF Magnitudes across Sign



Contractionary policy significantly less persistent, but with larger effects on output

Classical IRFs Allowing for Sign Asymmetry

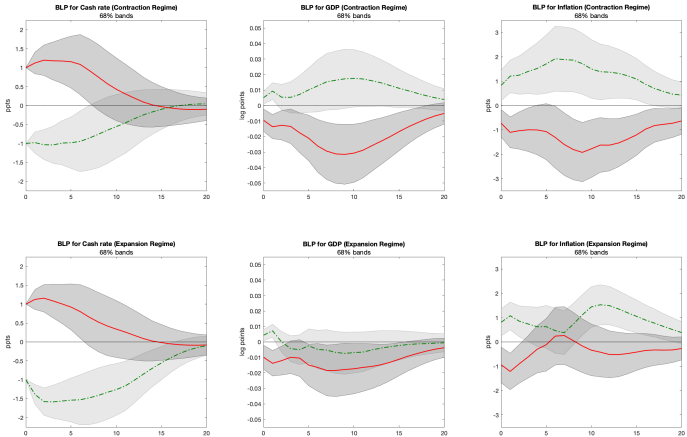
LD, Newey-West, normalised, 2000Q1-2023Q4



Similar story, but much noisier estimates

Smoothed IRFs for Sign Asymmetry/Estimated Fiscal Regimes

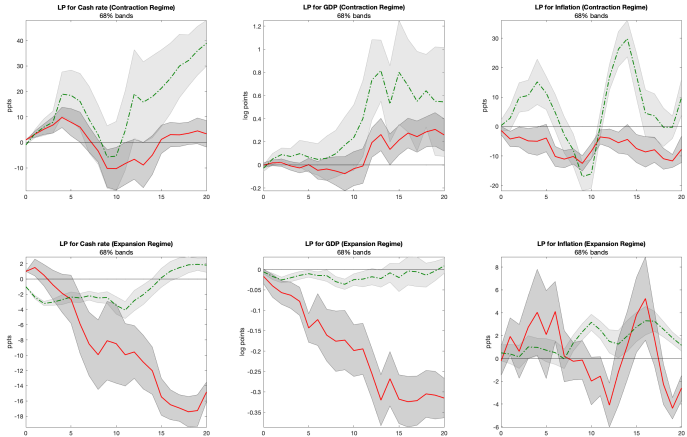
Cyclical Debt Regimes, LD, AD $h \leq 1$, $\lambda = 12$, $\bar{\lambda} = 10$, $\bar{h} = 6$, $\delta = 0.95$, SCC, normalised, 2000Q1-2023Q4



In fiscal expansion, monetary policy generally less effective

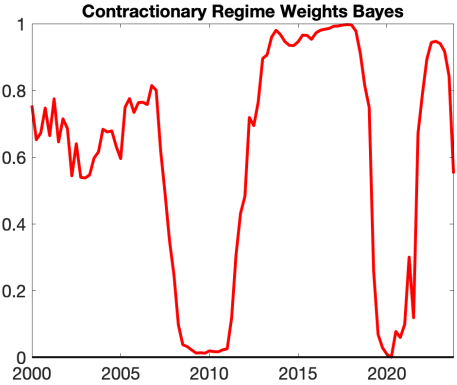
Classical IRFs for Sign Asymmetry/Fiscal Regimes

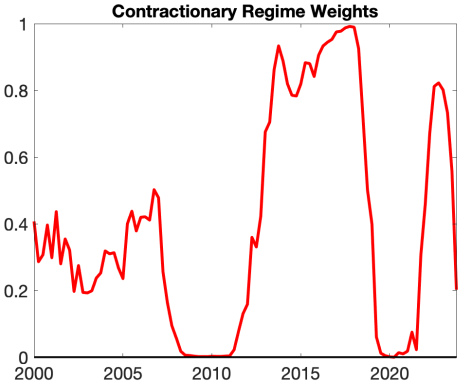
LD, Newey-West, normalised, 2000Q1-2023Q4



Huge normalisation issues

Regime Weights with Estimated v. Fixed Threshold Parameters





$\hat{\tau} = 0.53$ (0.02) (70th percentile) and $\hat{\gamma} = 2.77$ (0.05) versus $\tau = 0$ and $\gamma = 3$

Summary

- BLP approach provides flexible way to investigate monetary-fiscal interactions given a short sample period such as for New Zealand
- Contractionary monetary policy shocks appear to be more effective than expansionary shocks
- Effect on inflation depends on fiscal regime, with more disinflation occurring in presence of fiscal contraction
- Similar results to De Luigi and Huber (2018), who use TVP-SVAR for US and find MP effects less pronounced in high debt regime
- Also related to Bianchi and Ilut (2017), who estimate MS-DSGE model for US and find successful disinflation requires "fiscal backing"