Are the Effects of Monetary Policy Asymmetric? A Bayesian Investigation

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Concept and Definition

Monetary policy shock in this framework: the change in monetary policy that is orthogonal to output.

There are three main types of monetary policy asymmetry, related to:

- The size of the shock
- The direction of the shock
- The phase of the business cycle

Motivation

The asymmetric effects of monetary policy on output is important to central bankers.

- How much does monetary policy affect output during recessions and expansions?
- Do positive and negative monetary policy changes have different effects on output?
- Are the effects of monetary policy on output non-linear?

Research Question

Are the effects of monetary policy on output asymmetric across these three dimensions?

I will be answering this question using Bayesian methods.

Literature

Directional Asymmetry Literature:

Cover (1992); Kandil (1995); Karras (1996); Angrist et. al. (2018)

Business Cycle Asymmetry Literature:

Thoma (1994); Weise (1999); Peersman and Smets (2002); Garcia and Schaller (2002); Kaufmann (2002), Lo and Piger (2005); Tenreyro and Thwaites (2016)

Size Asymmetry Literature:

Weise (1999); Ravn and Sola (2004)

My Previous Work

Tenreyro and Thwaities (2016) popularized the use of local projections to study business cycle asymmetry.

I have been using local projections to study the asymmetric effects of monetary policy on my field paper and job market paper.

My field paper focuses on business cycle asymmetry. I found that monetary policy affects output more in recessions than expansions.

My job market paper incorporates the other two types of asymmetry into my model. I found similar results regarding business cycle asymmetry and that positive shocks have more of an effect on output than negative shocks.

Contribution

No one has taken a Bayesian approach to modeling asymmetry.

Why should Bayesian methods be used? Bayesian methods have three advantages over classical methods.

- Allows for the comparison of non-nested models, allowing me to compare models with different types of asymmetry.
- It allows for the exploration of a potentially large set of covariates.
  - Asymmetry types
  - Controls
  - Lag structure
- Allows for searching for structural breaks.

Local Projections

Developed in Jorda (2005), local projection models are a popular tool for generating impulse responses in a macroeconomic framework.

They offer a few advantages over VAR models:

- They are simple to estimate and draw inference on.
- Impulse responses are directly estimated rather than relying on short-run extrapolation of dynamics as in a VAR model.
- They are more robust to misspecification.
- They can more easily accommodate non-linear specifications in multivariate contexts.

Bayesian Estimation of Local Projection Models

The error term in local projection models is autocorrelated across horizons.

Due to this, the error structure across horizons was thought to be unknown making it impossible to write down the likelihood function and do Bayesian estimation in local projection models.

However, Lusompa (2020) showed that under standard time series assumptions the autocorrelation process is known.

This makes Bayesian estimation possible in my framework and I can use this result to study the asymmetric effects of monetary policy.

Plan for Future Work

I follow Tenreyro and Thwaites (2016) in their use of local projections to study asymmetry. My local projection model will take the following form:

$$y_{t+h} = \alpha_h + \gamma_h' x_t + \beta_h \varepsilon_t + \beta_h^{rec} rec_t \varepsilon_t + \beta_h^{sml} sml_t \varepsilon_t + \beta_h^{neg} neg_t \varepsilon_t + \beta_h^{recsml} rec_t sml_t \varepsilon_t + \beta_h^{recneg} rec_t neg_t \varepsilon_t + \beta_h^{negsml} neg_t sml_t \varepsilon_t + u_t \quad (1)$$

- y_{t+h} is the first difference of real GDP measured at horizon h.
- rec_t is a dummy variable that is one if quarter t is in a recession and zero otherwise.
- sml_t is a dummy variable that is one if the shock ε_t is within one standard deviation of its mean during quarter t and zero otherwise.
- neg_t is a dummy variable that is one if the shock during quarter t is negative and zero otherwise.
- ε_t are the Romer and Romer (2004) monetary shocks for quarter t.
- x_t is a vector of controls

Plan for Future Work

There are endogenous or anticipatory movements in monetary policy measures such as the money supply or the Federal funds rate.

Romer and Romer (2004) use a two-step process to derive a shock measure free from these problems

1. The intended Federal Funds rate for a given Federal Open Market Committee (FOMC) meeting is found by reading the narrative record of each FOMC meeting.
2. This series is regressed around the forecast dates of the Fed's Greenbook forecasts that contain projections of output, prices, employment, and investment.

By regressing the intended funds rate on these forecasts, the residuals from this regression are now free of anticipatory movements.

Plan for Future Work

Bayesian analysis of Equation 1 will accomplish the following goals:

- Determine which type(s) of asymmetry are the most important for explaining output.
- Directly compare non-nested models with different types of asymmetry.
- Analyze the contents of the x_t control vector.
- Explore structural breaks in the model.

Bayesian estimation is important in this framework because the number of possible variables could be very large relative to my sample size.

Conclusion

The asymmetric effects of monetary policy on output is an important area of research.

Using Bayesian methods to analyze asymmetry has not been done before.

I have a lot of ground work completed for this project.

- Data
- Code that estimates Equation 1
- Knowledge about the asymmetry literature