

• EFFECTS OF MONETARY POLICY ON GDP USING BVAR, SVAR AND BSVAR

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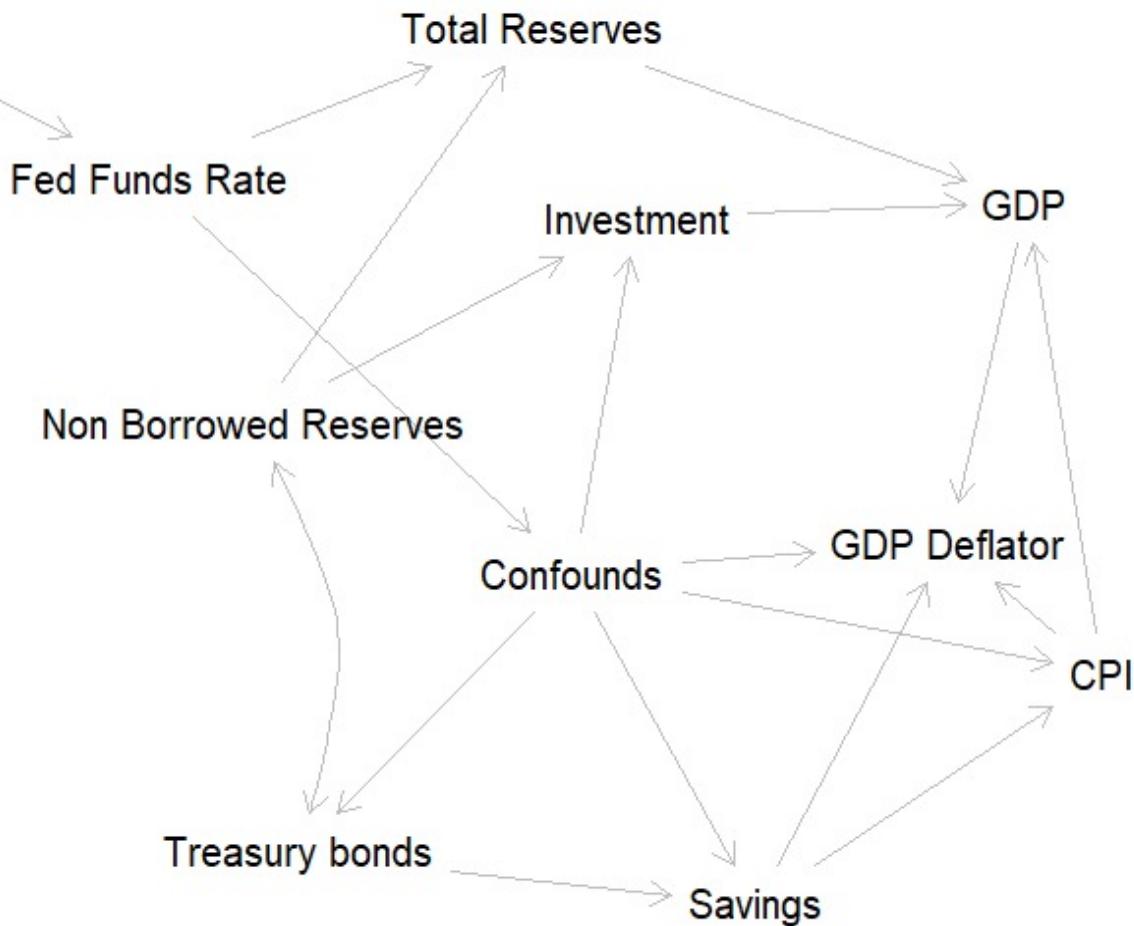
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The Problem

- Outcome: To observe causal effects of monetary policy shocks on GDP
- General Equilibrium
- How are we going to model DSGE ?
- Identification Problem with Vector Auto Regression
- What are confounds and Lags in here
- How to overcome these challenges

Monetary Policy Shocks



Introduction to the world of Bayesian VAR

Gibbs sampler

- Joint distribution is unknown but conditional distribution of each variable is known.
- Iterations repeated (n-1) times, alternating between conditional probability distribution of X and Conditional probability distribution of Y.
- Gibbs Sampling to approximate the posterior distribution.
- The conditional probabilities are normal distributions, function of mu and sigma

Introduction to the world of Bayesian VAR

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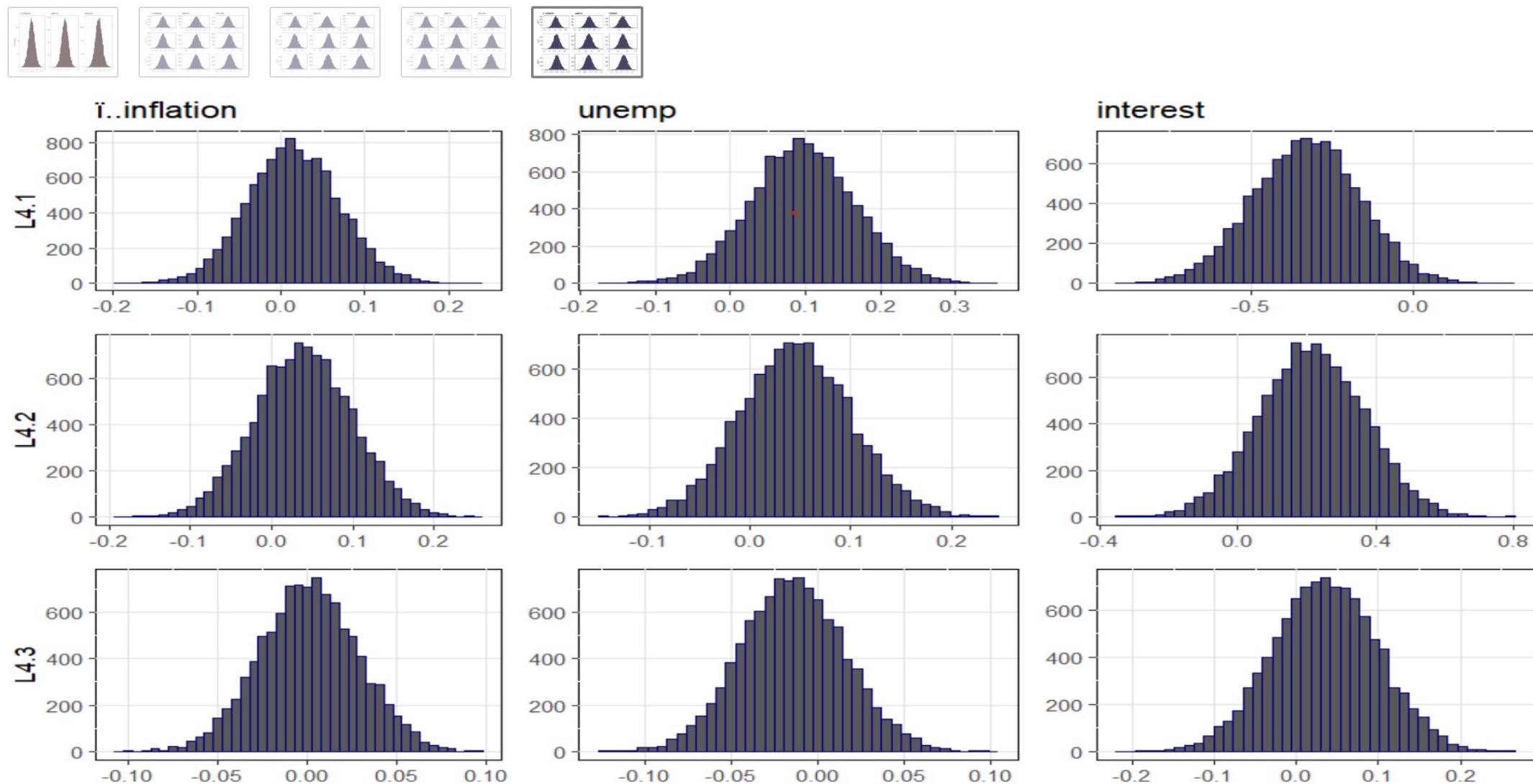
Normal-inverse-Wishart Prior

- Prior for variance and covariance matrix

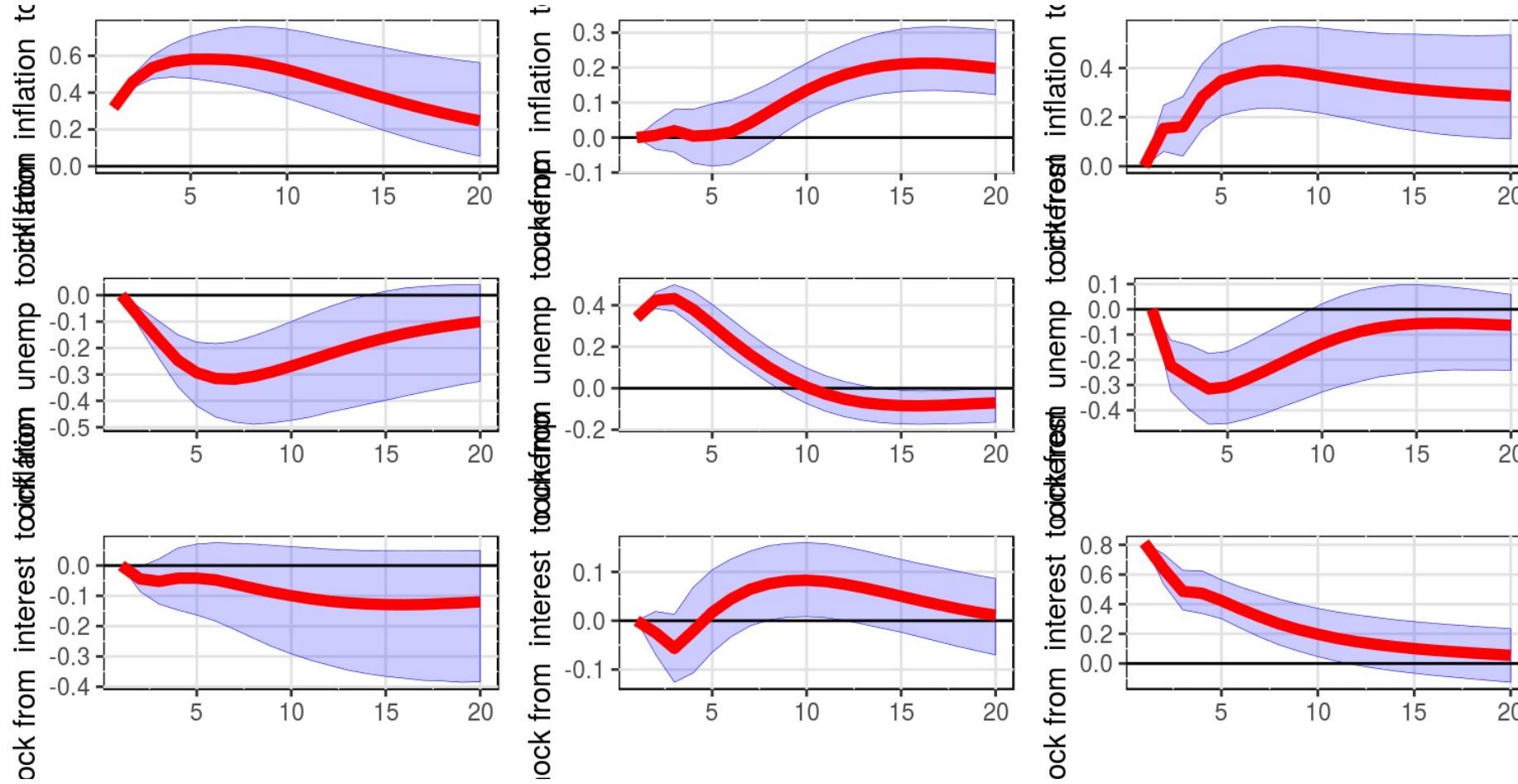
Minnesota Prior

- Have one or more J^*J Matrices of autoregressive parameters in a Var Model, user specifies two tuning hyperparameters for prior: theta and lambda.
- Specify prior covariance for Var autoregressive parameters
- Prior means are set to 0 or 1, in our model, set up as identity matrix (1,1,1).

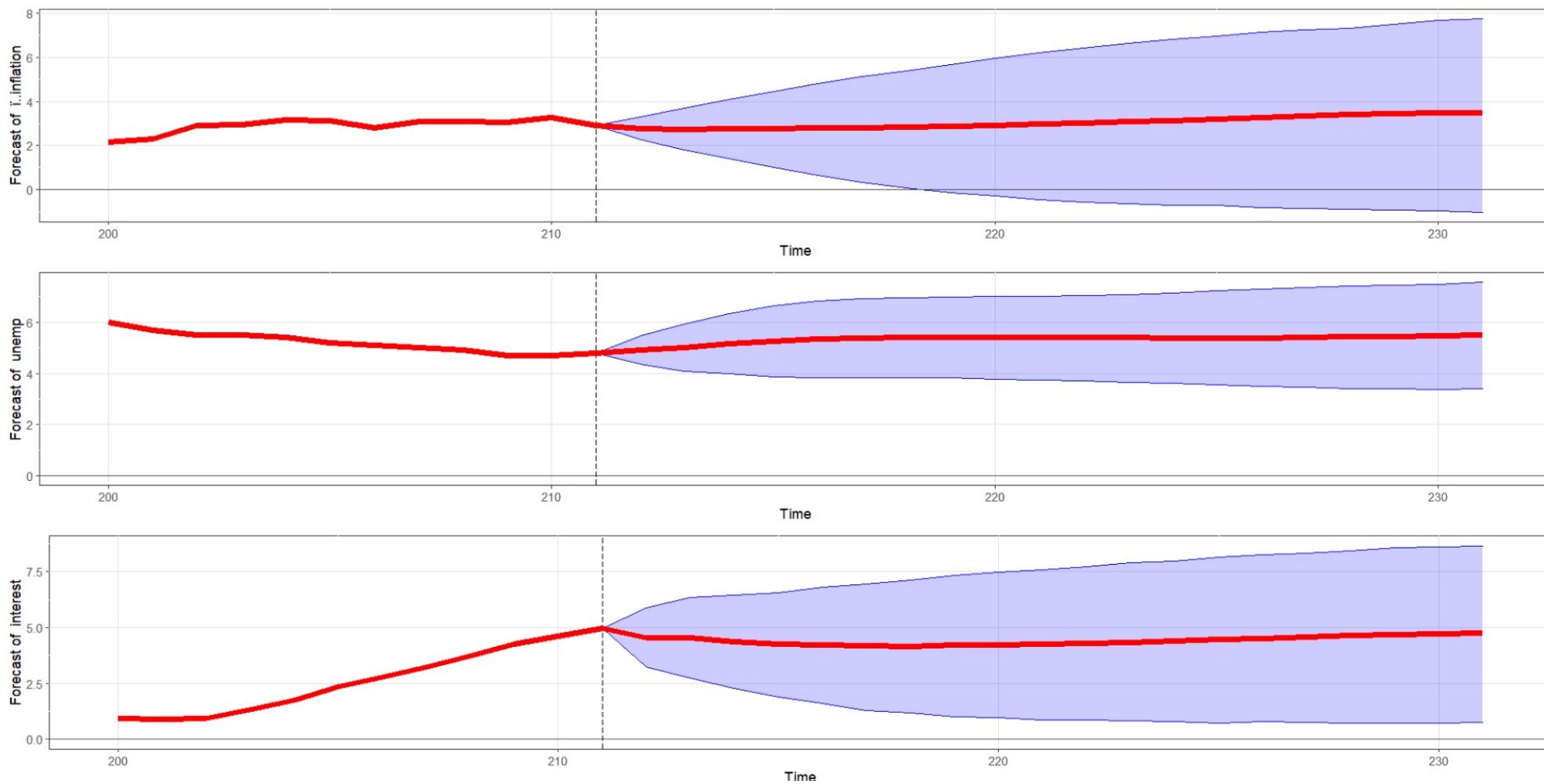
Bayesian VAR model with Minnesota prior



Impulse Response Function for inflation, unemployment and interest rate



Forecasting using BVAR



SVAR- Structural Vector Autoregression Model

With restriction on

1. Unemployment rate and Interest rate- kept as NA and followed Amat restriction
2. Unemployment rate and Inflation rate-kept as NA and followed Amat restriction

SVAR Estimation Results:

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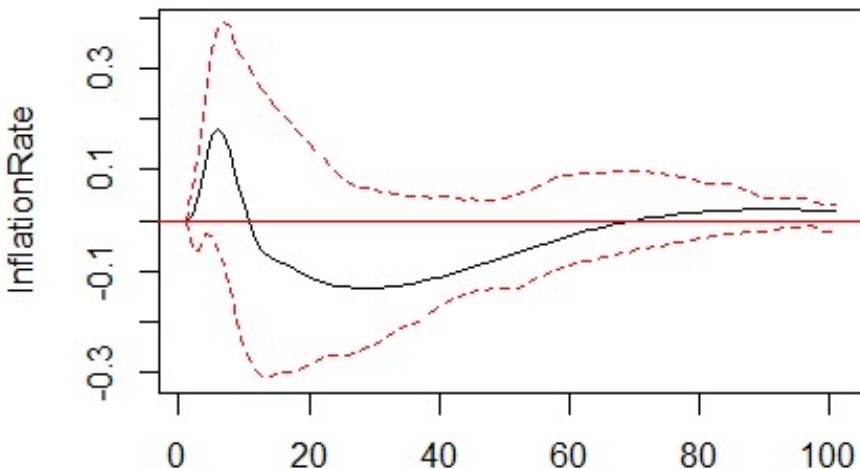
Estimated A matrix:

	interestrate	InflationRate	Unemprate
interestrate	1.0000	0.0000	0
InflationRate	0.0000	1.0000	0
Unemprate	0.1766	0.0727	1

SVAR- IMPULSE RESPONSE FUNCTION

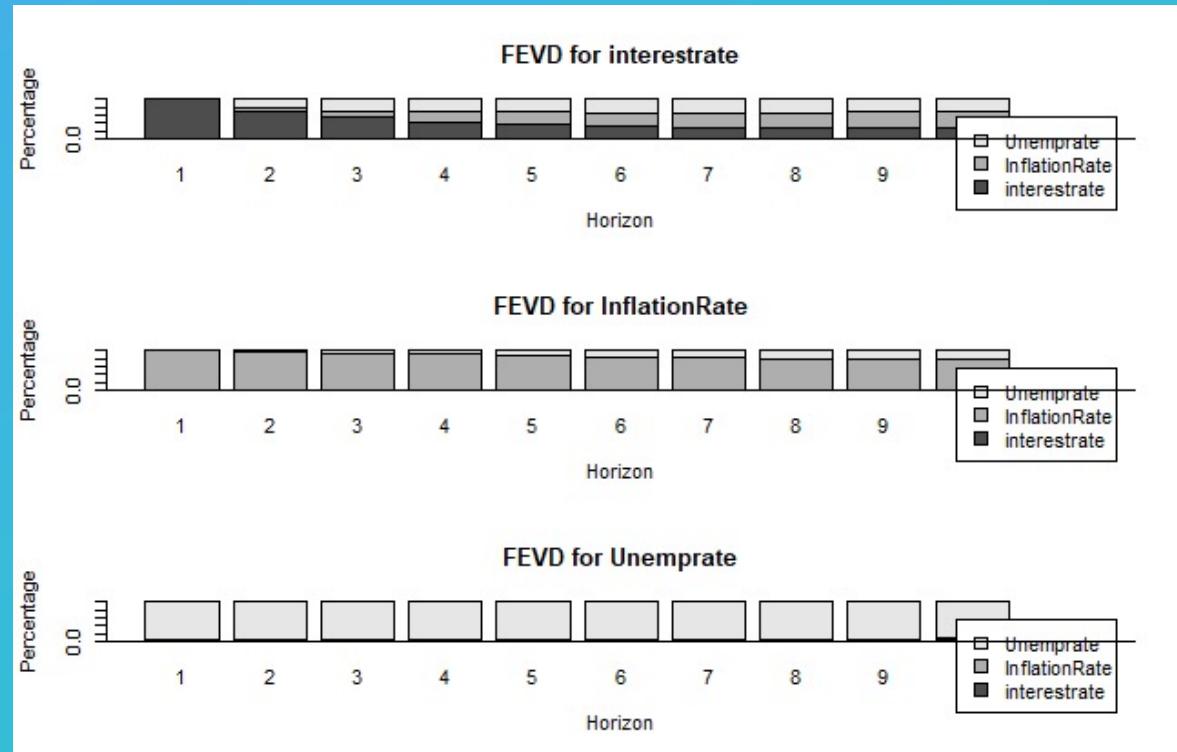
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SVAR Impulse Response from interestrate

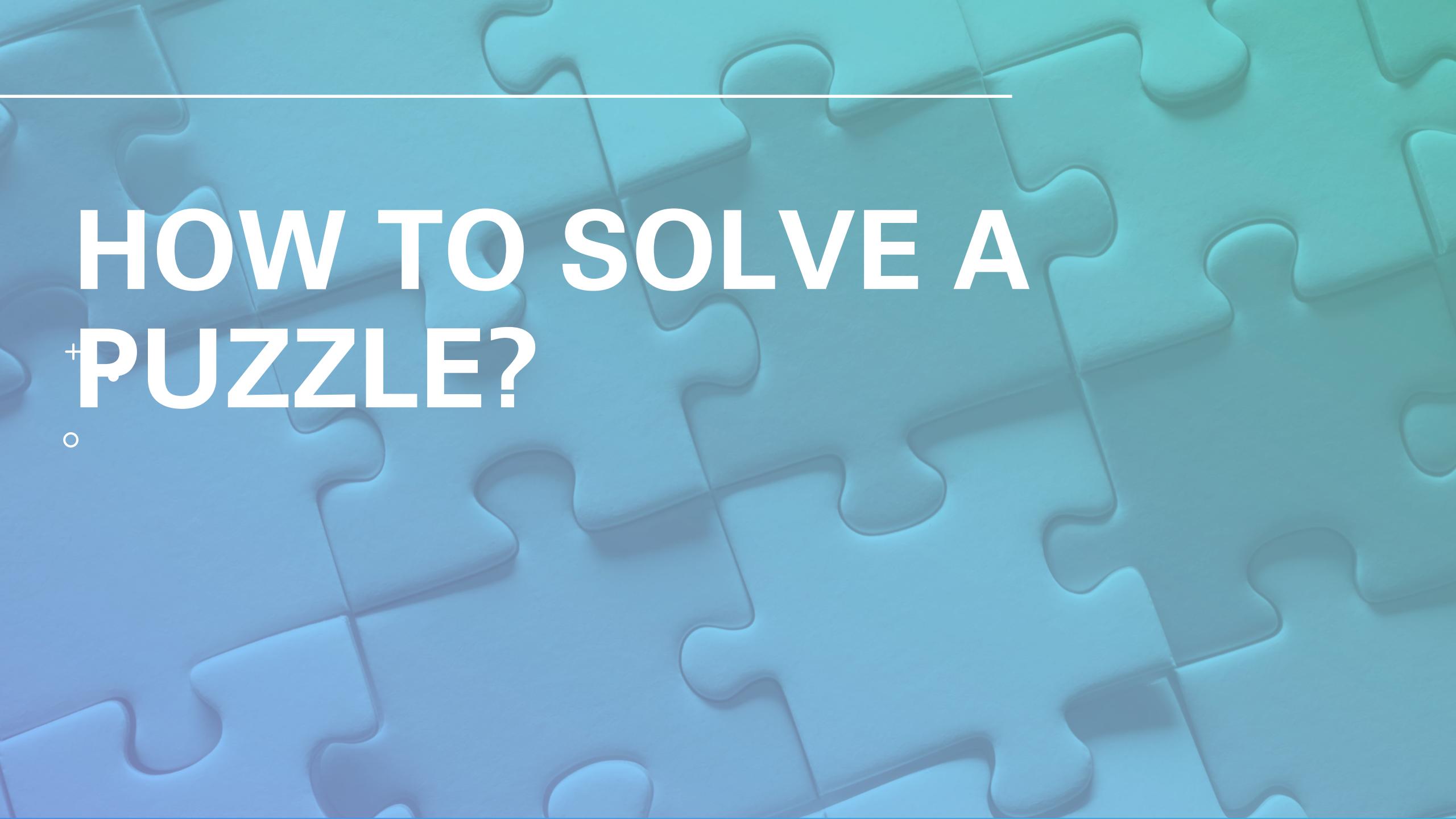


95 % Bootstrap CI, 100 runs

FORECASTING ERROR VARIANCE DECOMPOSITION



HOW TO SOLVE A PUZZLE?



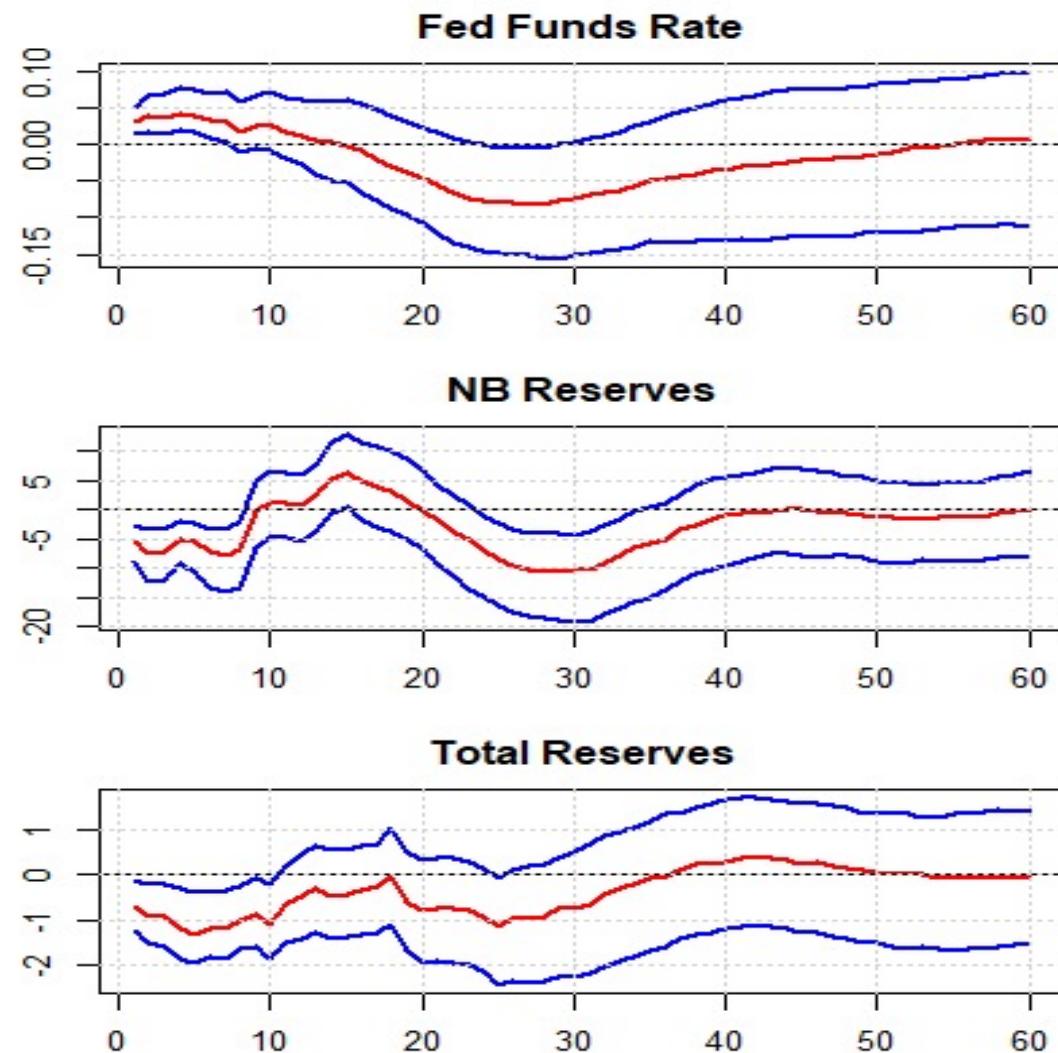
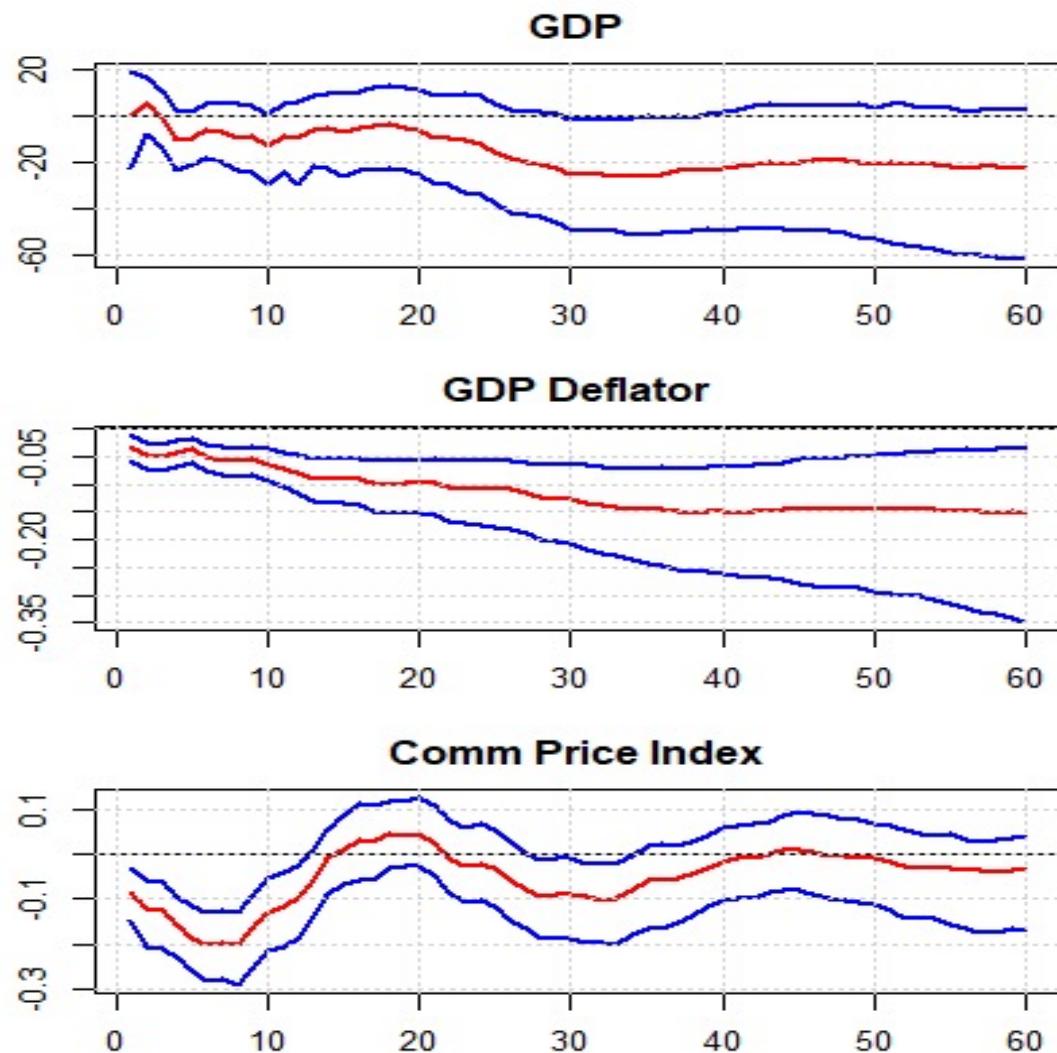
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Sign Restrictions

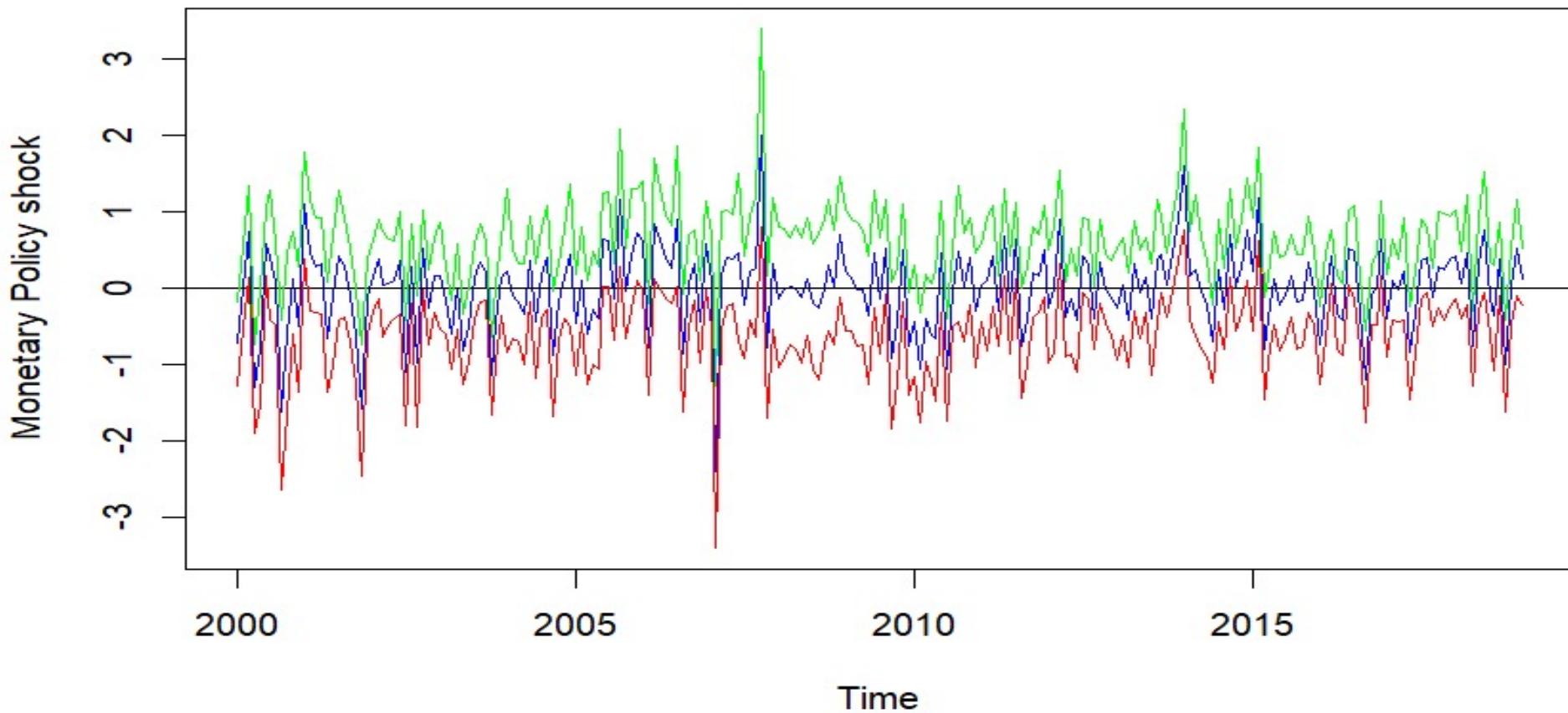
- As mentioned on Uhlig 2005 paper : For monetary tightening shock
- Fourth variable: do not decrease the FED's policy rate for x months after the shock
- Third variable: do not increase commodity prices for x months after the shock
- Second variable: do not increase inflation for x months after the shock
- Fifth variable: do not increase non-borrowed reserves for x months after the shock



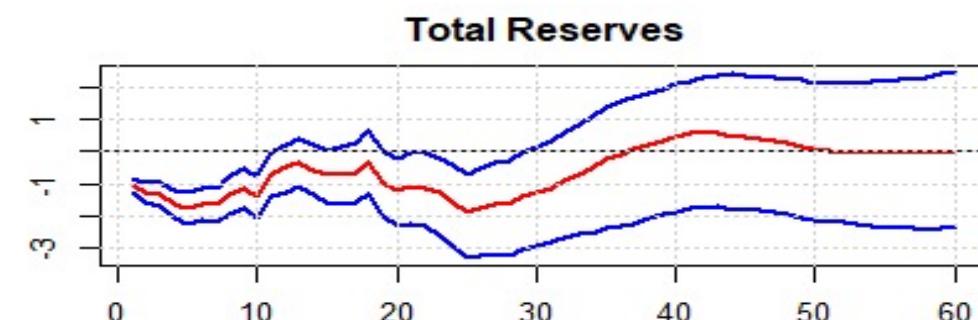
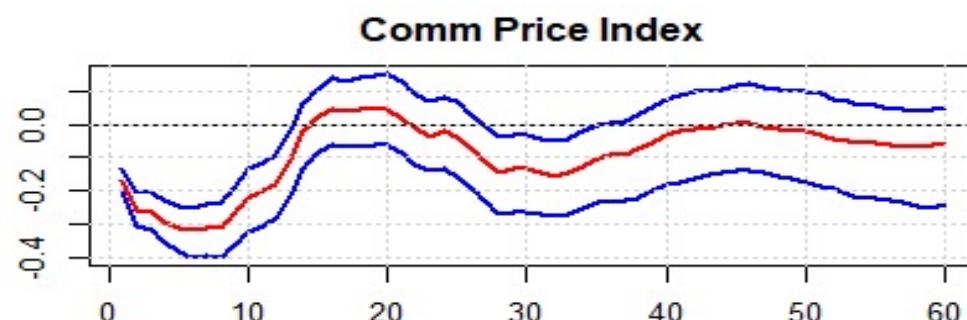
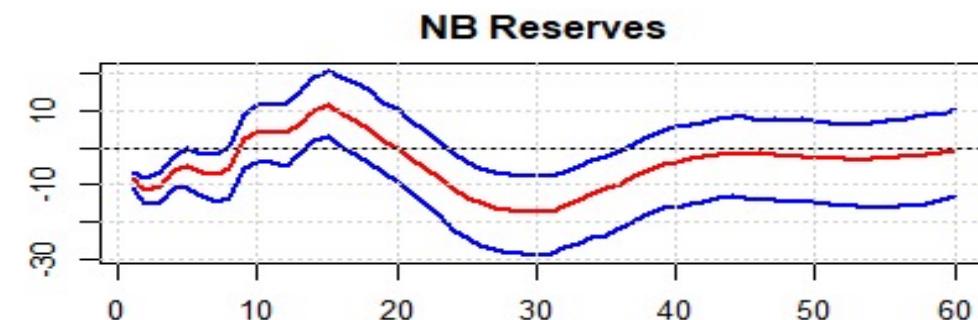
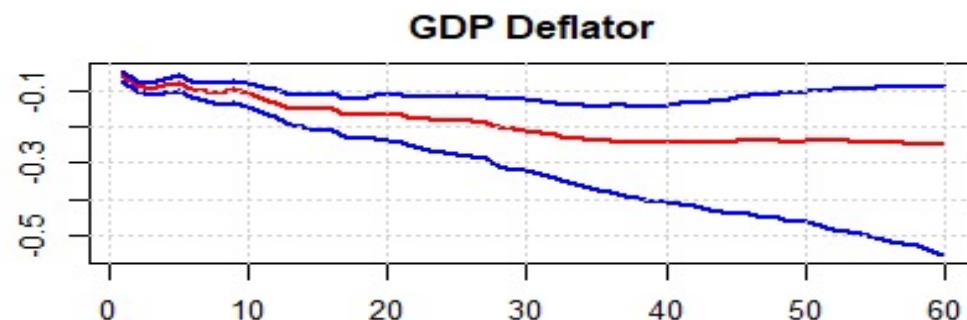
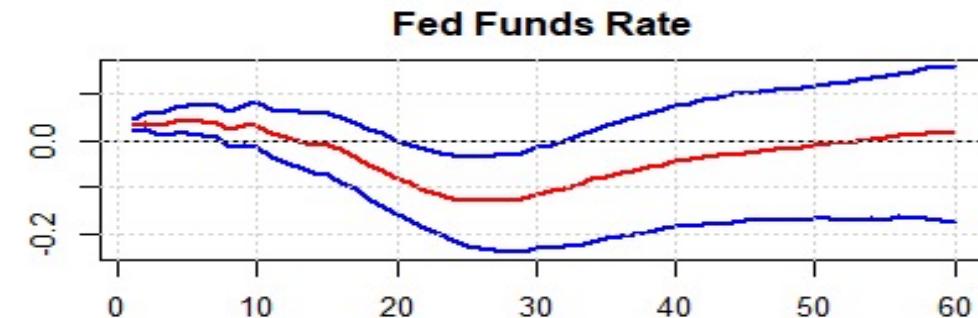
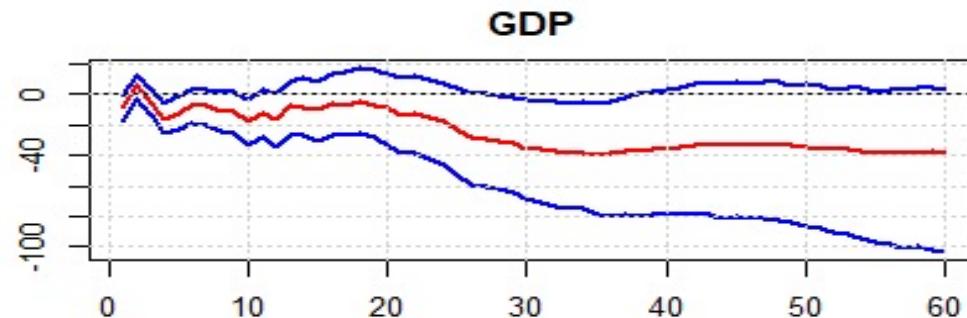
IRF Uhlig



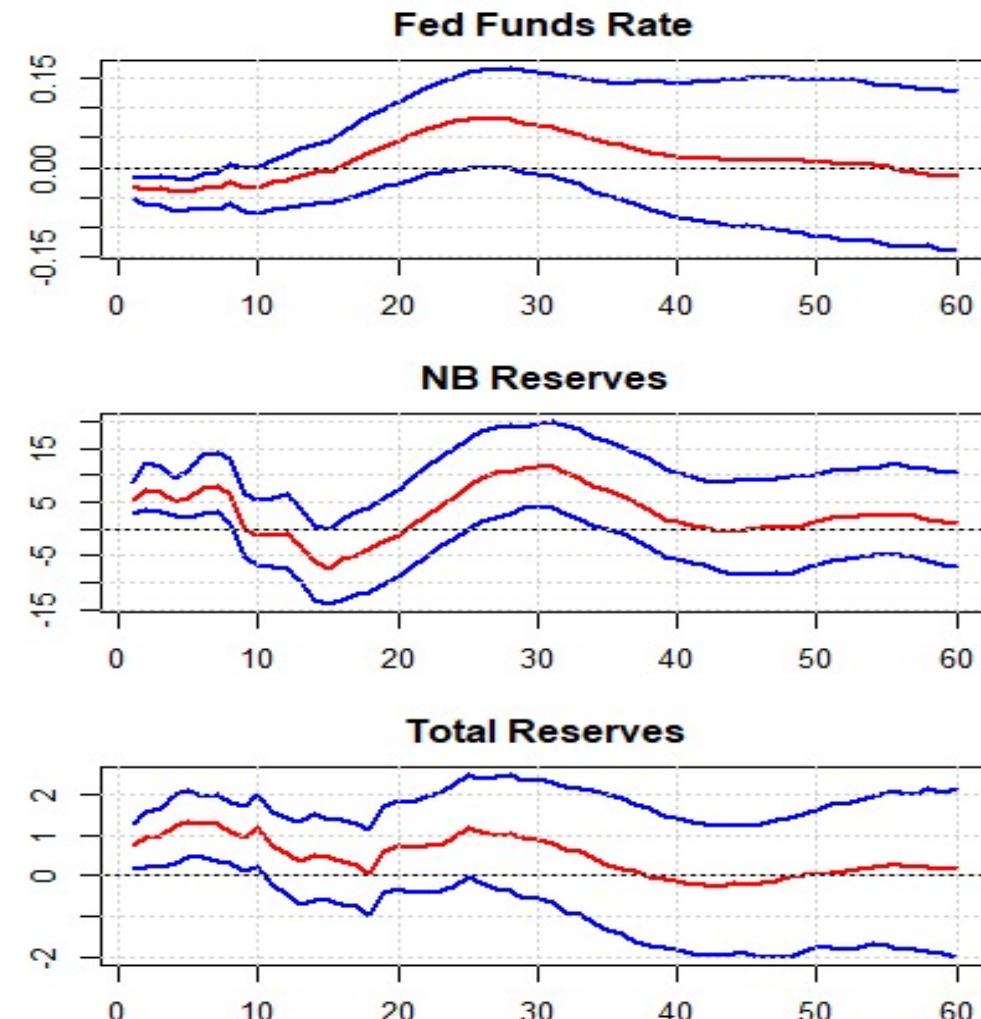
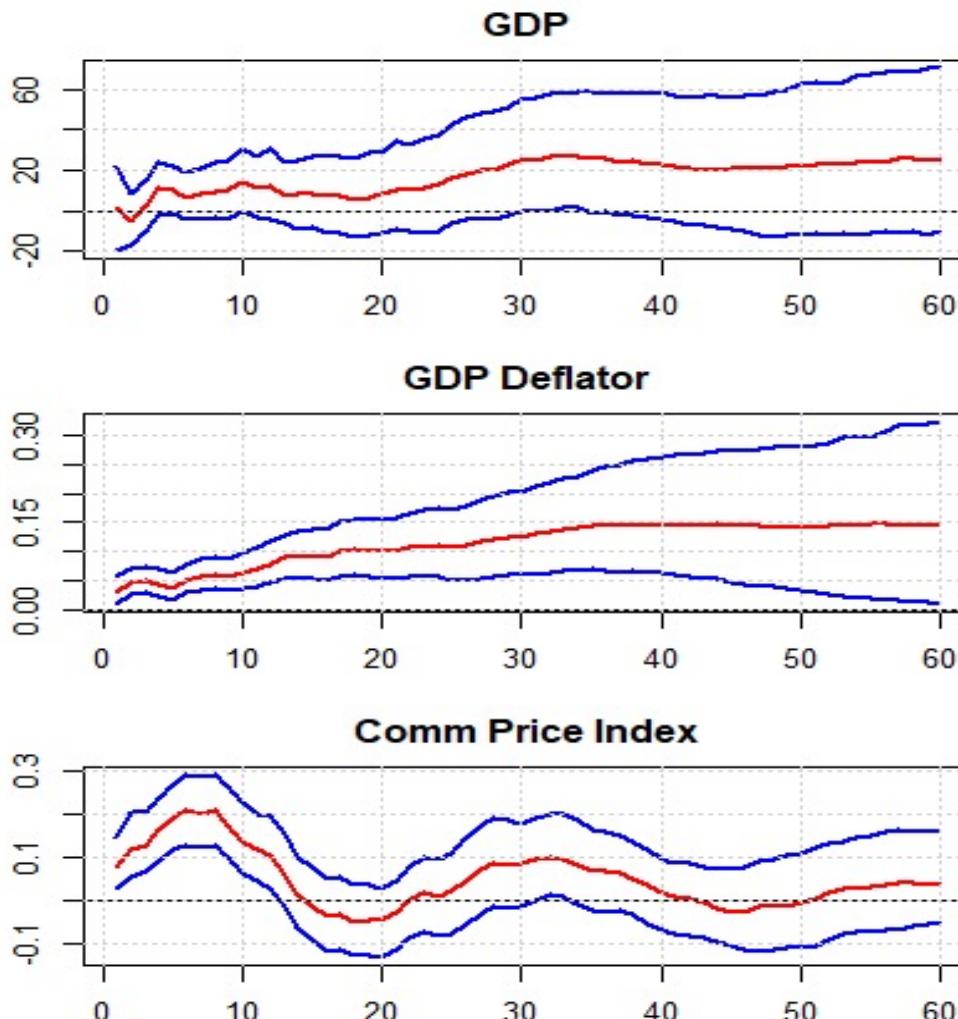
Shocks



Additional Restrictions



Expansionary Monetary Policy



Benefits of using Bayesian

- BVAR model overcomes the problem of short time series data by using prior statistical information.
- Overcome the issue of too little freedom-introducing statistical properties in traditional model.
- Make in-sample fitting less dramatic and improve out-of-sample performance.
- Scientific method that can be evaluated on its own, without reference to the forecaster running the model.
- Generates not only a forecast but a complete, multivariate probability distribution for future outcomes of the economy that appears to be more realistic.



A large, bright yellow 3D question mark is positioned in the center of the frame, standing out from a dense background of numerous smaller, dark gray or black question marks. The background question marks are slightly blurred, creating a sense of depth. The lighting highlights the yellow question mark, making it the focal point.

ANY
QUESTIONS?