

# Monetary Policy Uncertainty and Inflation Expectations

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- Credibility: necessary condition for an effective monetary policy.
- Period characterized by high uncertainty about the future of MP

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  - Time-Varying Parameters (TVP).

# Related Literature

## Macroeconomic Effects of Uncertainty Shocks

- Jurado et al. (2015): time varying volatility of the forecast error is taken as the uncertainty measure.
- Baker et al. (2016): uncertainty measure is extracted from newspaper articles.
- Chan and Song (2018) and Alessandri and Mumtaz (2019): Time-varying volatility as a measure of uncertainty.

## Effects of MP shocks on Inflation expectations

- Leduc et al. (2007): inflation expectations response to a Monetary Policy shock is significant only in the post-1979 period.
- Barnett et al. (2010): macroeconomic shocks on inflation expectations using time-varying MS SVAR.
- Canova and Gambetti (2010): expectations explain partly the dynamics of inflation and interest rate (unchanged over time).

# Data Specification

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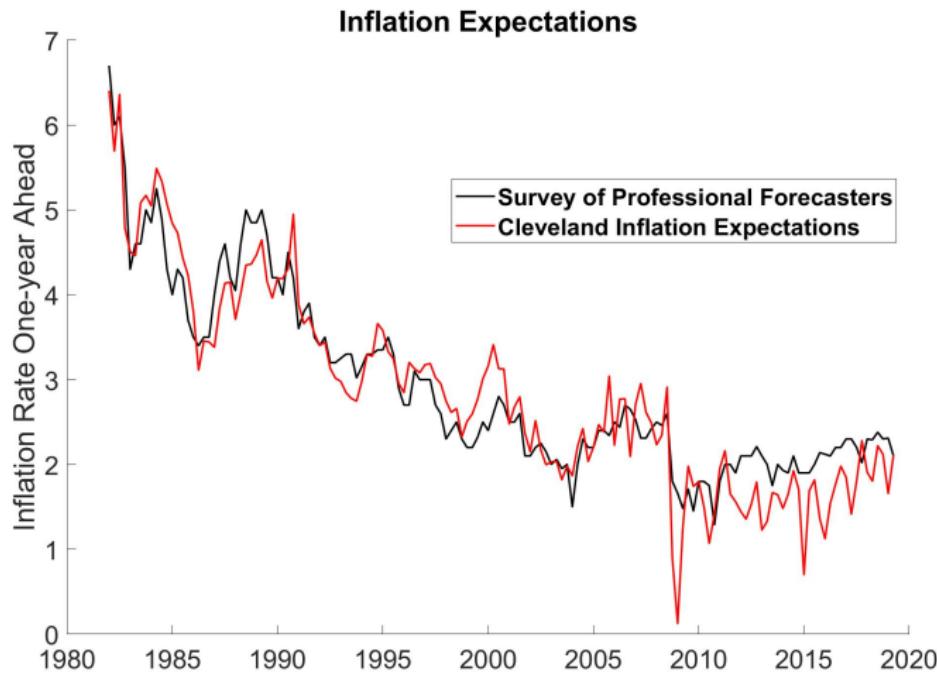
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  - **Short and Long Run Inflation expectations:** Based on Haubrich et al. (2012). Taken from Federal Reserve Bank of Cleveland.

# Inflation Expectations



# SVAR with Stochastic Volatility in Mean

- Modelling Monetary Policy Volatility Shocks

$$Z_t = c_t + \sum_{j=1}^P \beta_j Z_{t-j} + \sum_{k=0}^K \gamma_j \tilde{h}_{t-k} + \Omega_t^{1/2} e_t, \quad e_t \sim N(0, I_K) \quad (1)$$

$$\Omega_t = A^{-1} H_t A^{-1'} \quad (2)$$

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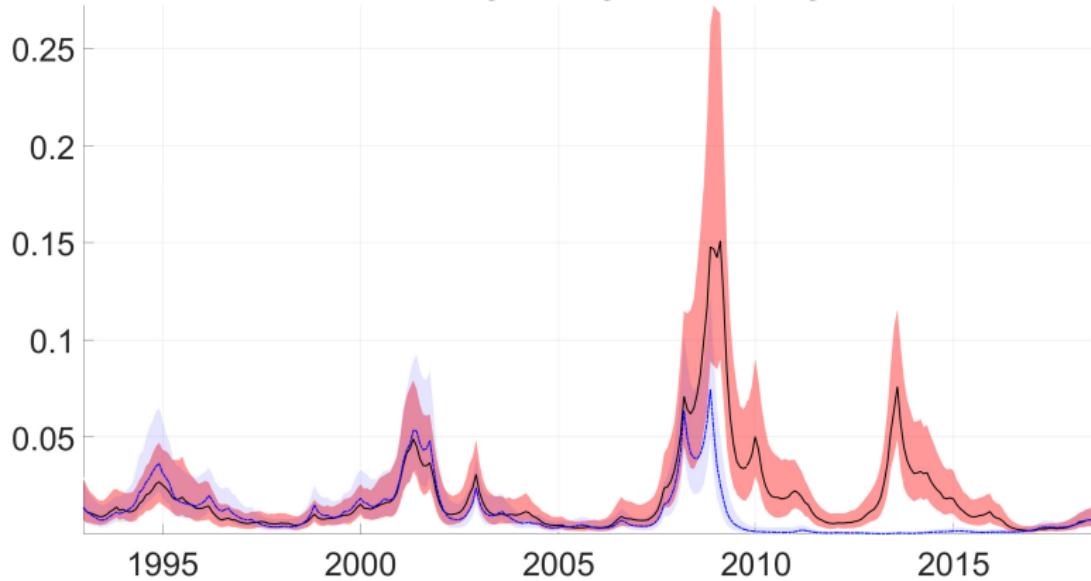
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- Structural shocks: identified via Cholesky.
- $\tilde{h}_t$  are the volatility of the **structural** shocks
- $\eta_t$  is the vector of **volatility** shocks
- Model is estimated as in Mumtaz and Zanetti (2013) using Bayesian methods.

# Monetary Policy Uncertainty

Monetary Policy Uncertainty



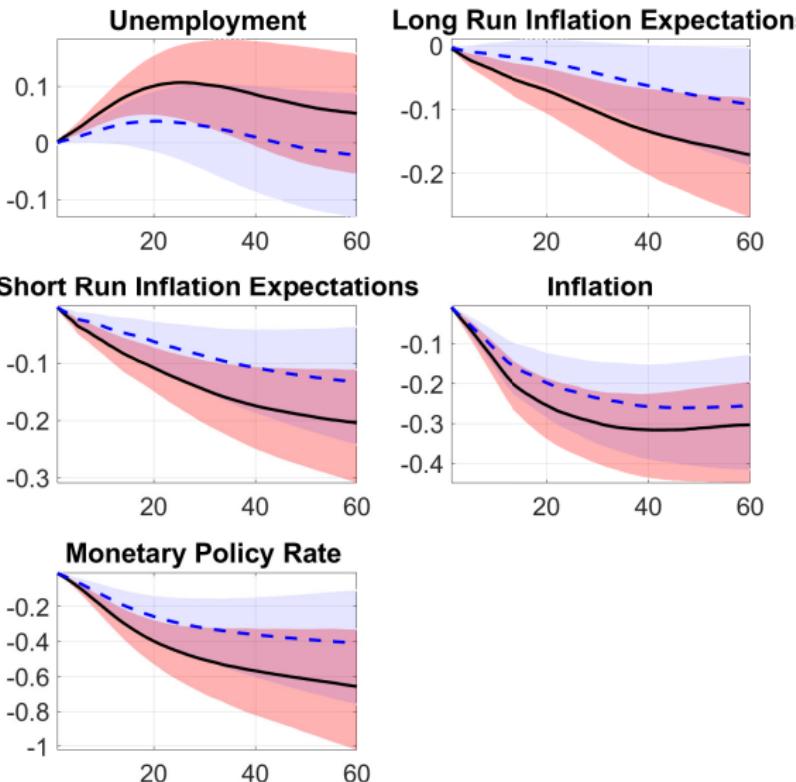
# Log Volatilities of Inflation Expectations



# Impulse Responses



# Impulse Responses



# Stochastic Volatility in Mean SVAR with TVP

- Modelling the time variation:

$$Z_t = c_t + \sum_{j=1}^P \beta_{t,j} Z_{t-j} + \sum_{k=0}^K \gamma_{t,j} \tilde{h}_{t-k} + \Omega_t^{1/2} e_t, \quad e_t \sim N(0, I_K) \quad (4)$$

$$B = \text{vec}([c_t, \beta_t, \gamma_t]) \quad (5)$$

$$B_t = B_{t-1} + v_t, \quad \text{VAR}(v_t) = Q_B \quad (6)$$

$$\Omega_t = A_t^{-1} H_t A_t^{-1'} \quad (7)$$

$$a_t = a_{t-1} + g_t, \quad \text{VAR}(g_t) = G \quad (8)$$

- The covariance matrix is factorized as in Primiceri (2005) where G is block diagonal.

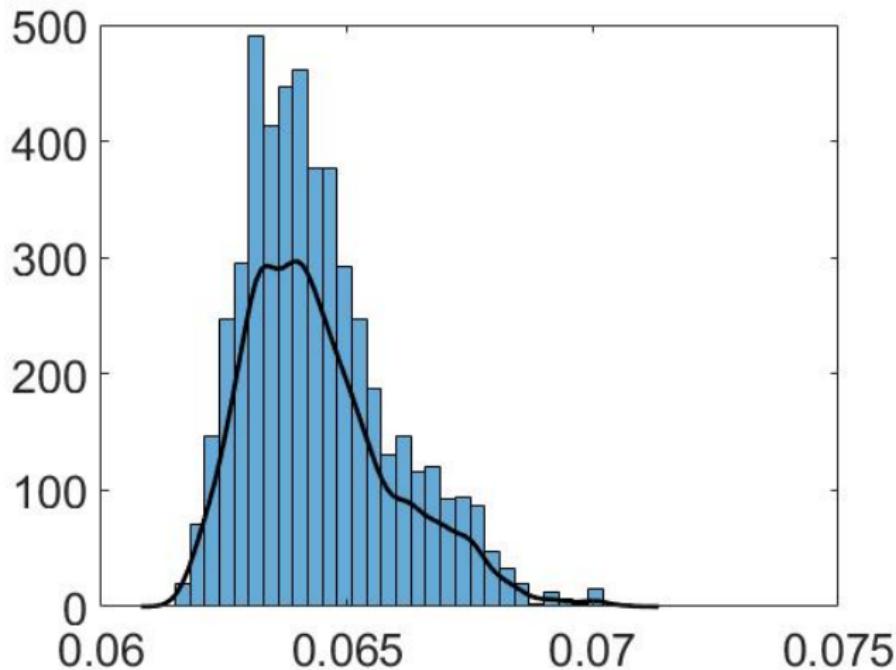
# How much time variation?

- A key step in the estimation of TVP Models is the choice for the prior variances of the transition equations.

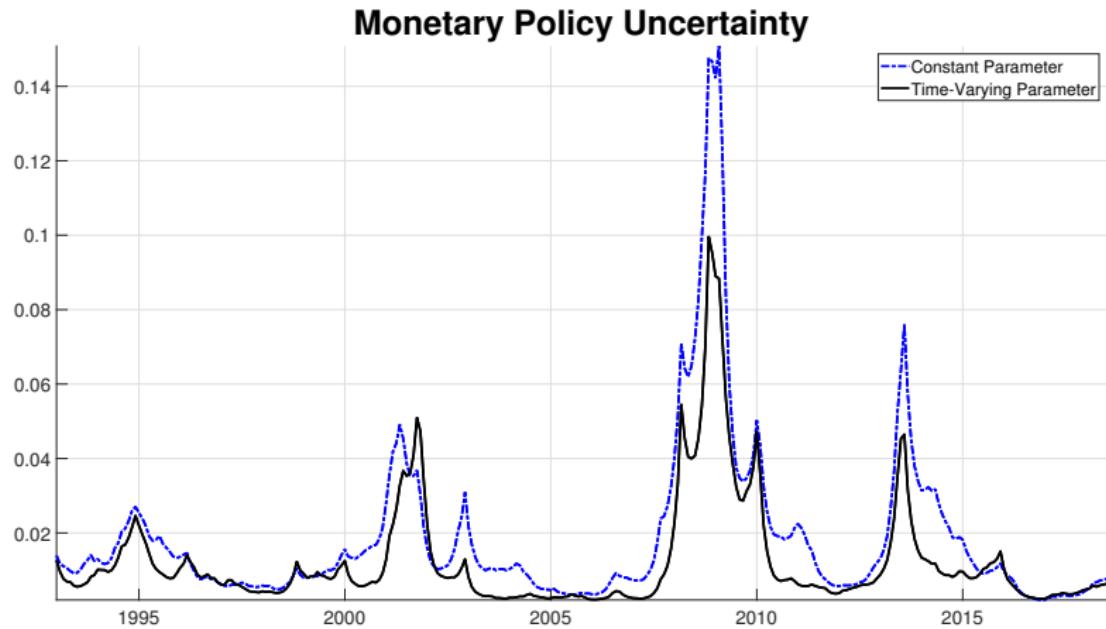
$$P(Q_B) \sim IW(Q_{B,OLS} \times T_0 \times k_Q, T_0) \quad (9)$$

- $k_Q$  is a scaling parameter that determines the degree of time variation in the prior.
- Small  $k_Q$  imposes (almost) no time-variation.
- High  $k_Q$  allows for rapid changes in the coefficients.
- We follow Amir-Ahmadi et al. (2018) and treat  $k_Q$  as a hyper-parameter that we estimate from the data (we don't want to "impose" TVP on our results).

# Posterior Distribution of $kQ$

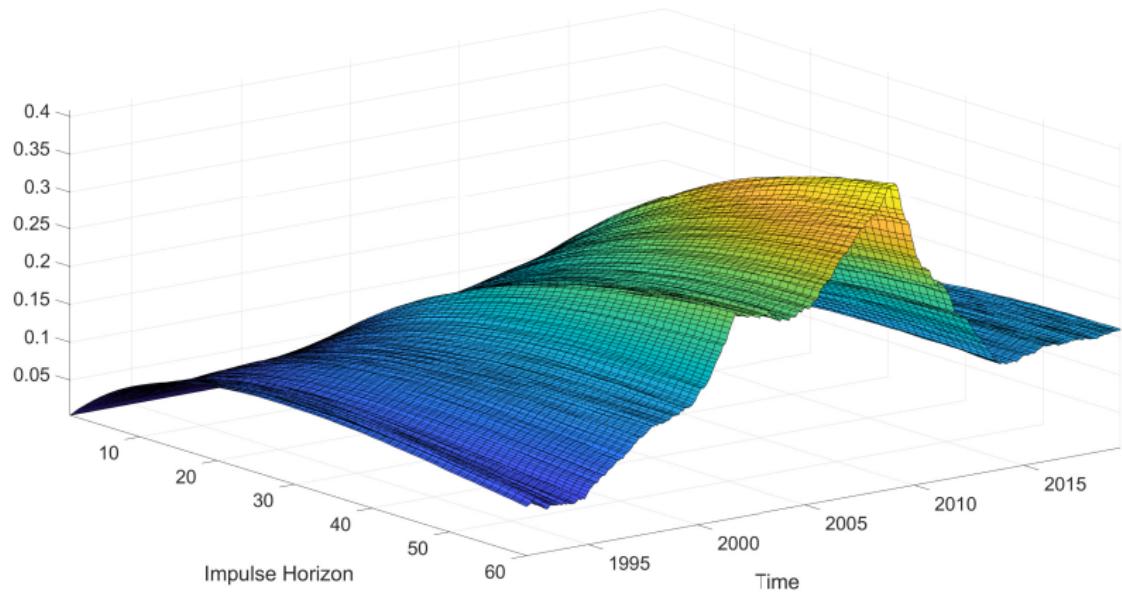


# MPU Measures



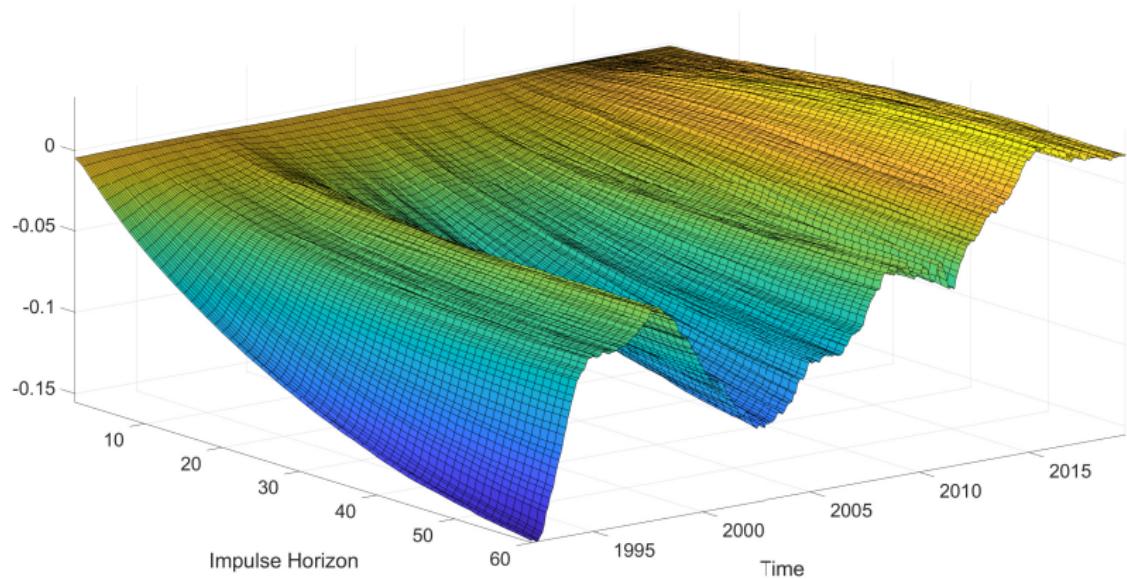
# Time-Varying Impulse Responses

Unemployment



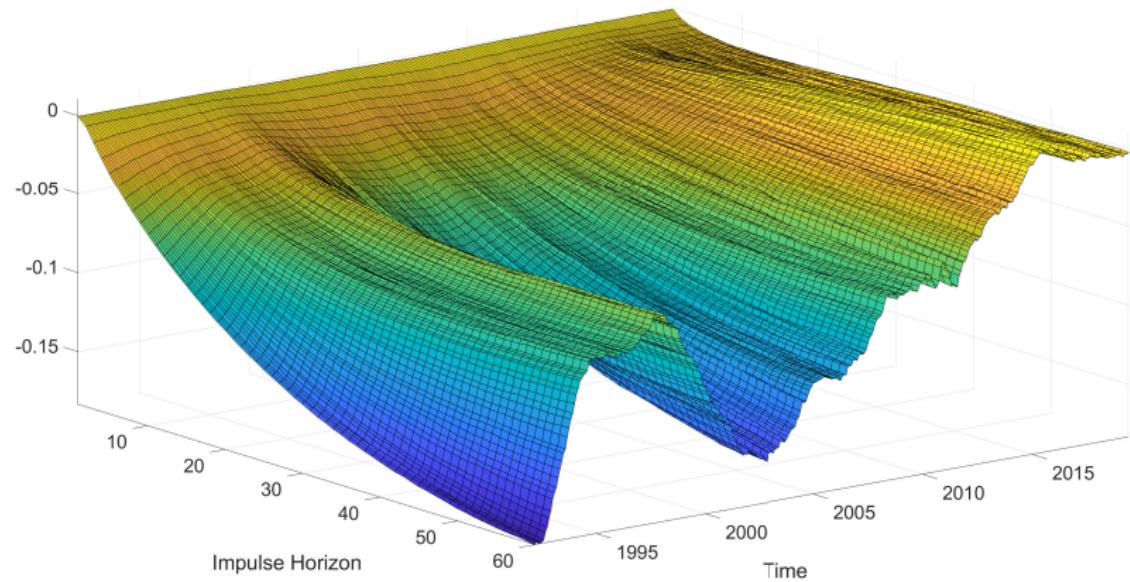
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## Long Run Inflation Expectations

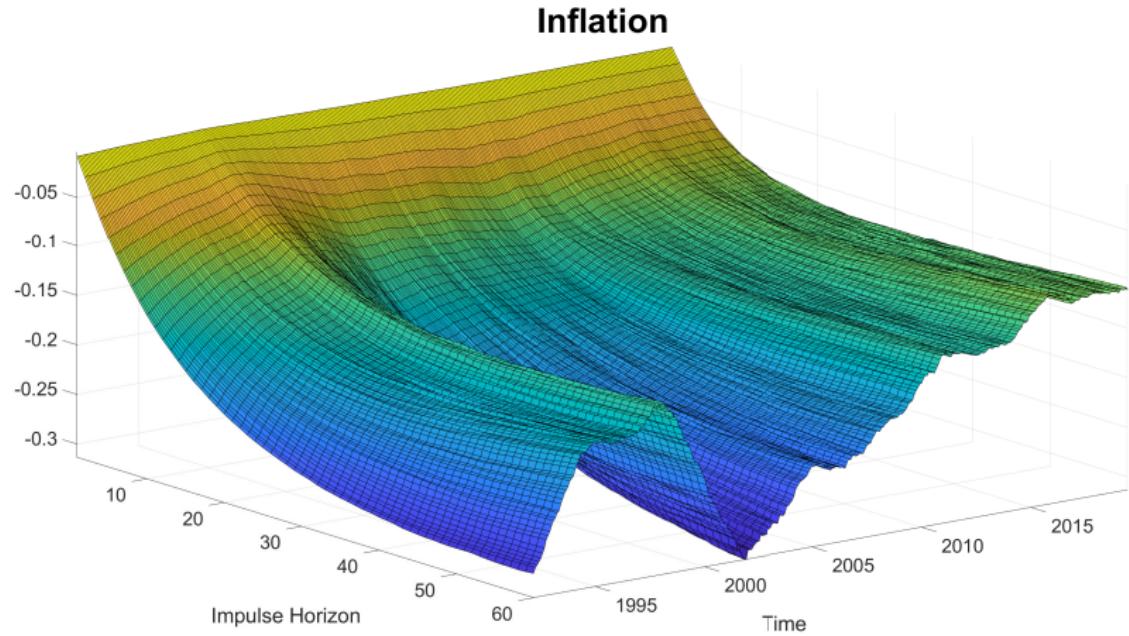


# Time-Varying Impulse Responses

## Short Run Inflation Expectations



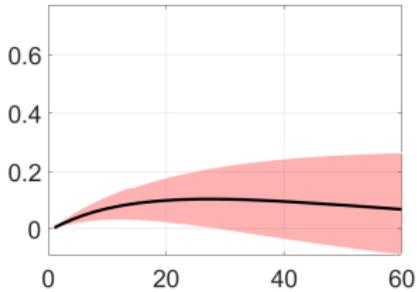
# Time-Varying Impulse Responses



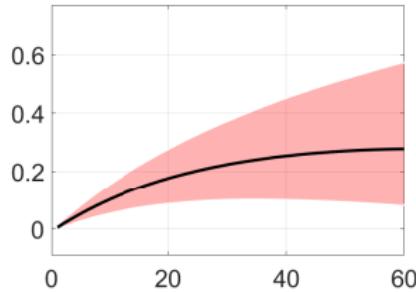
# Shock to Monetary Policy Uncertainty

Response of Unemployment

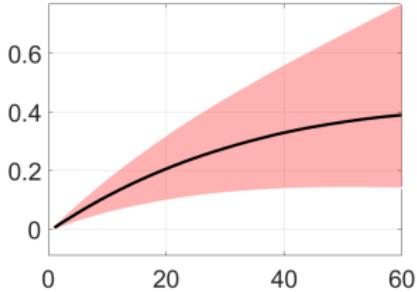
1993



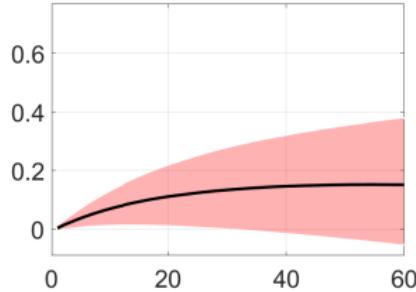
2003



2008

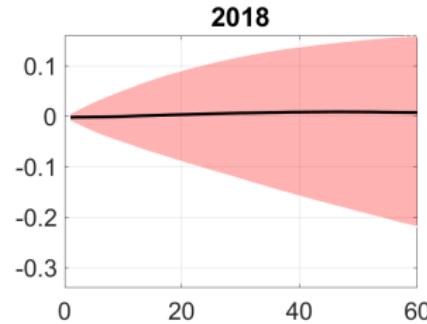
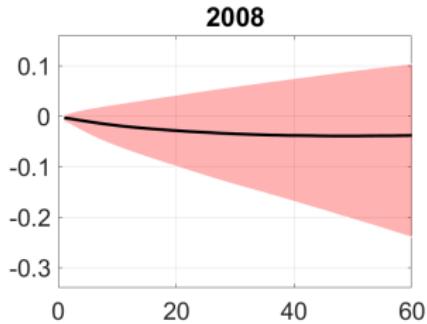
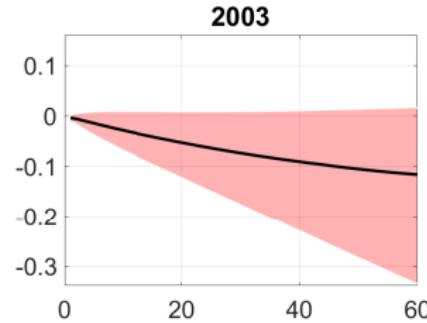
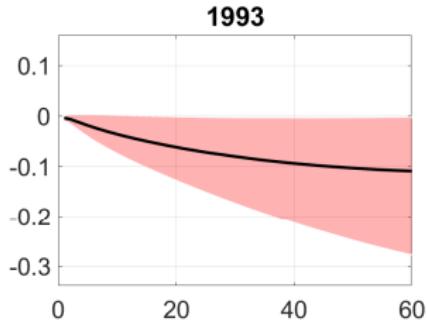


2018



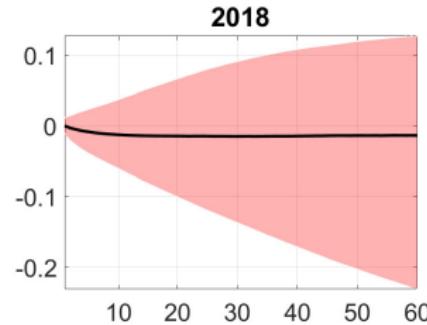
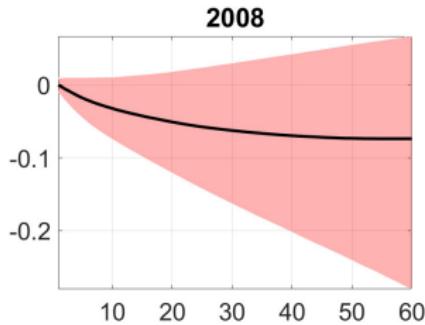
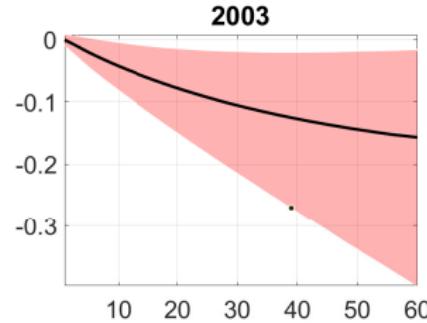
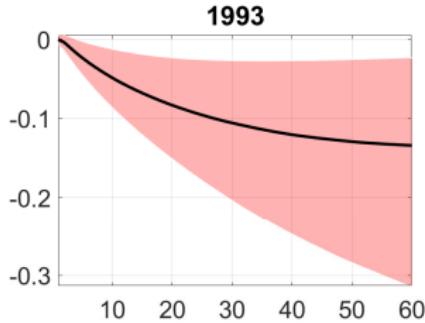
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Response of Long Run Inflation Expectations



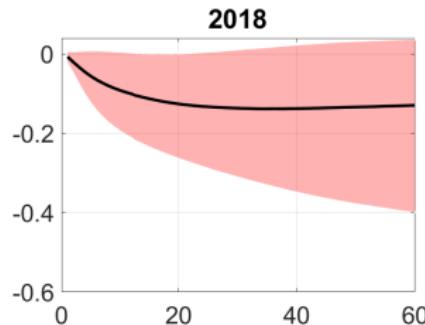
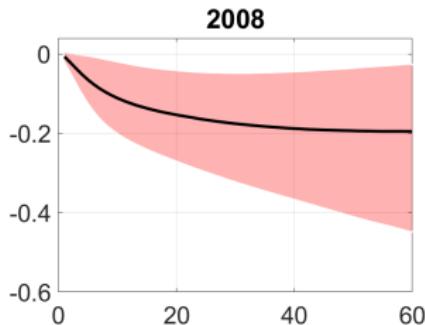
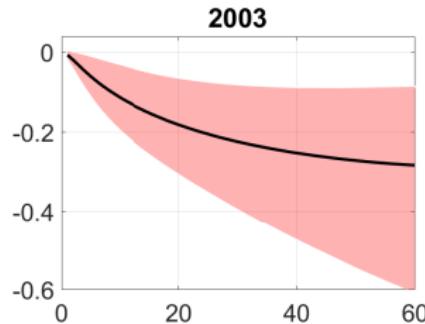
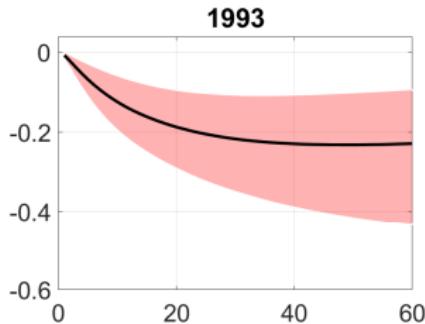
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Response of Short Run Inflation Expectations



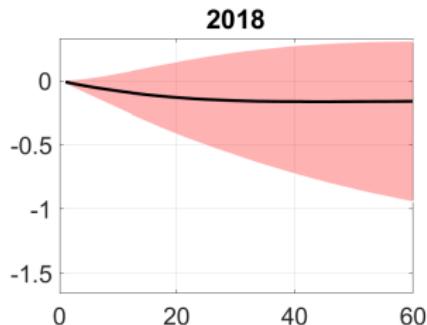
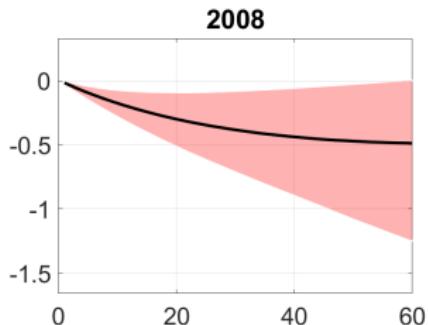
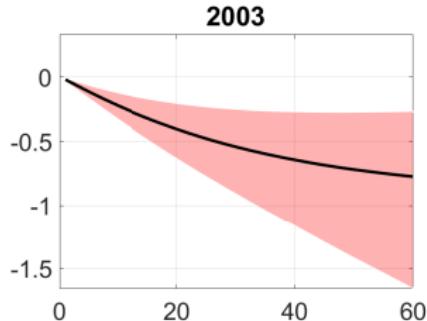
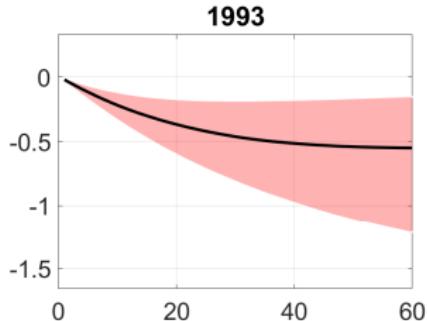
# Shock to Monetary Policy Uncertainty

**Response of Inflation**



# Shock to Monetary Policy Uncertainty

Response of Monetary Policy Rate



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- We estimated  $k_Q$  from the data in order to choose the appropriate amount of time variation.
- Extended the model benchmark model to incorporate time-varying effects.

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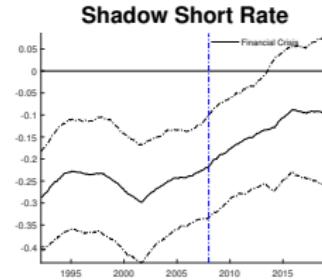
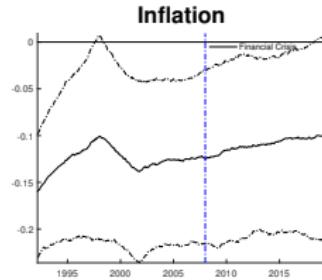
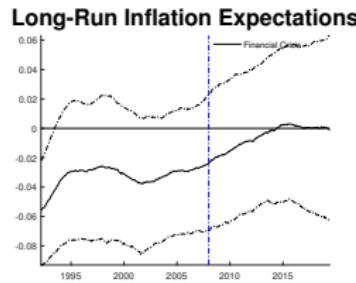
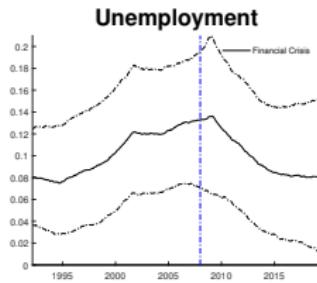
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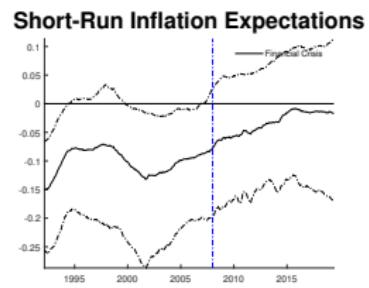
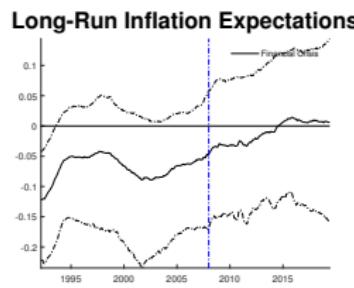
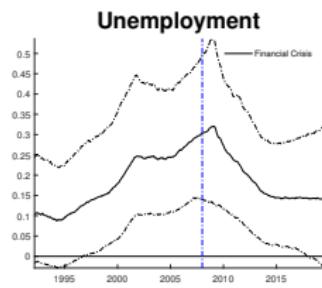
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- Monetary Policy response has become less evident in recent years.

# Thank you!

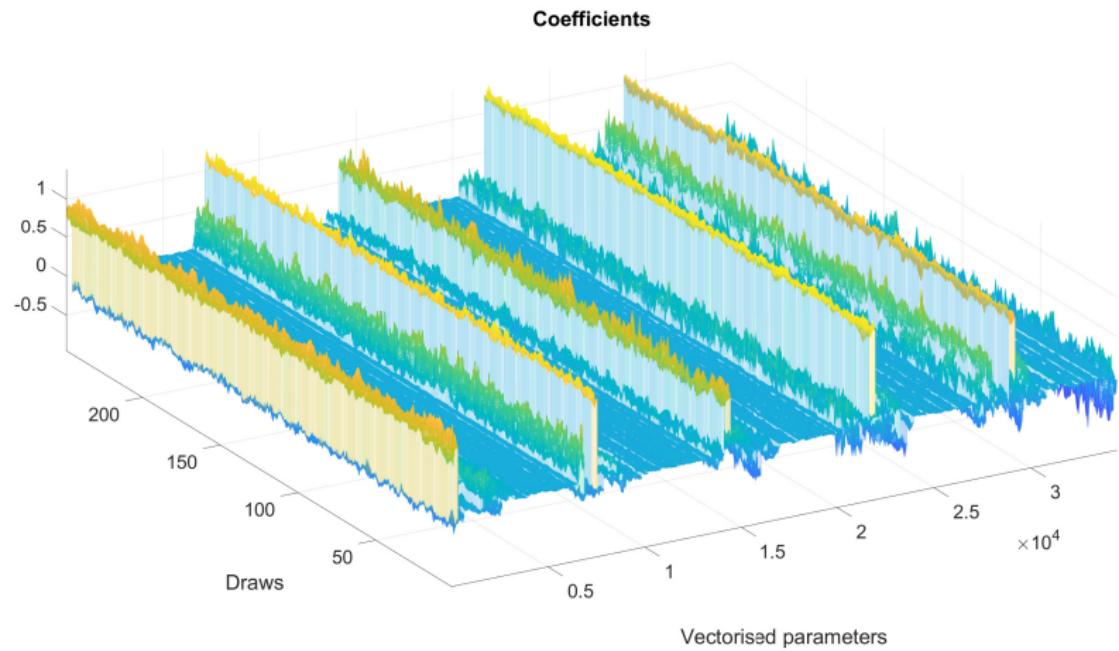
# Monetary Policy Uncertainty Shock: Time-Varying One-year ahead Response



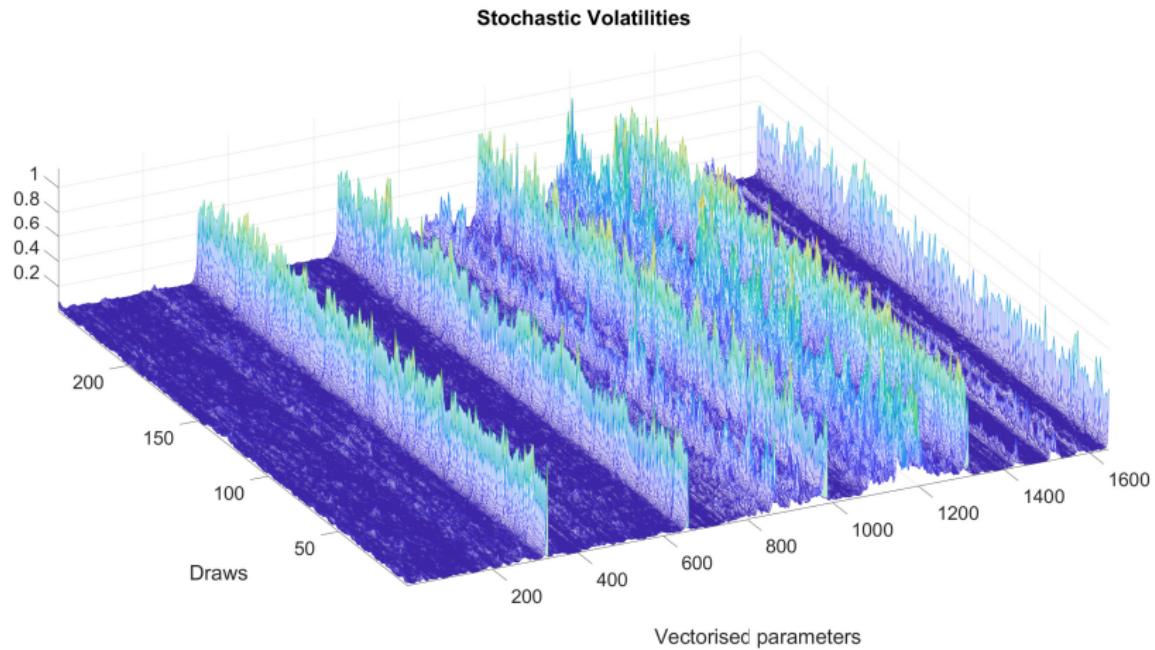
# Monetary Policy Uncertainty Shock: Time-Varying Three-year ahead Response



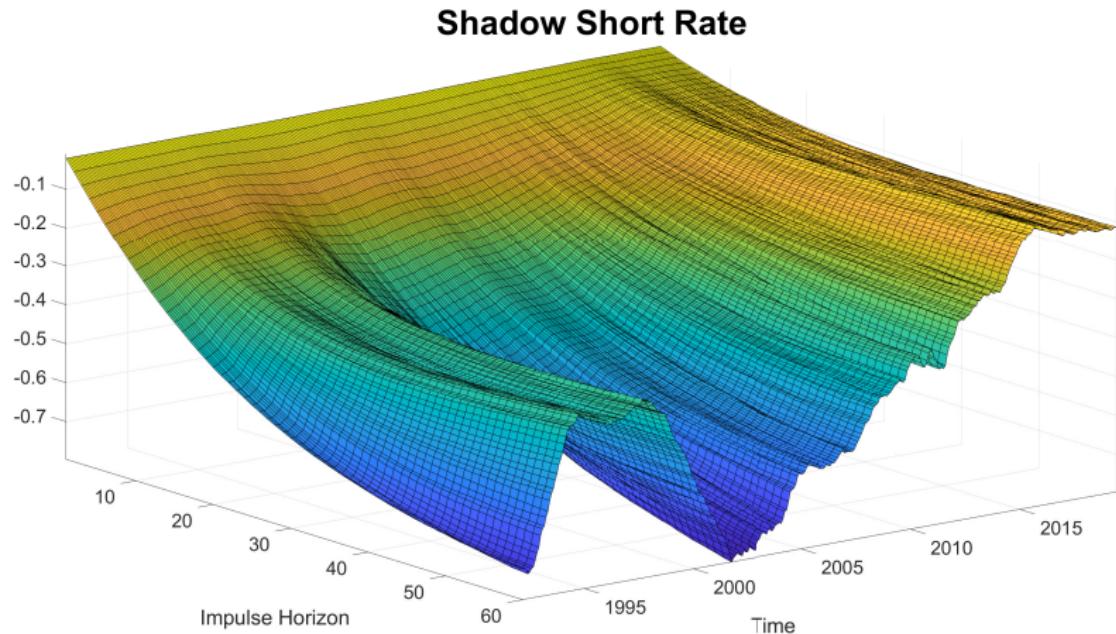
# Convergence: VAR coefficents



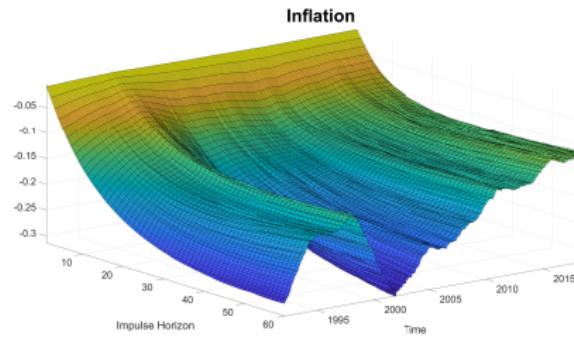
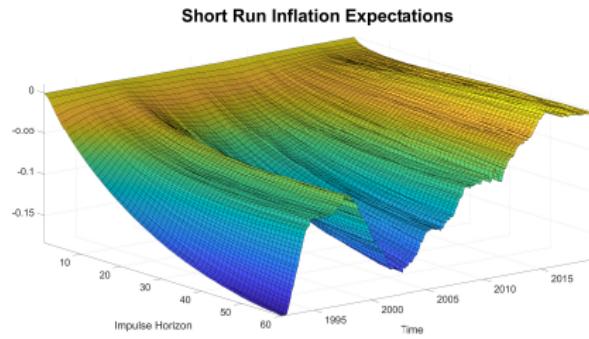
# Convergence: log volatilities



# Time-Varying IRF's



# Time-Varying Inflation Expectations



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