Monetary Policy Communication Shocks and the Macroeconomy

Robert Goodhead   Benedikt Kolb

European University Institute

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Introduction
Research Questions

- How exactly does the US central bank surprise the public, i.e. what "constitutes" monetary policy (MP) shocks?
- in particular, distinguish the effect of two surprise (shock) types:
    1. unanticipated MP actions
    2. unanticipated MP communication (about future actions)
- assess how these shocks affect the macro-economy

Introduction
What do we mean by "communication shocks"?

- high-frequency identification literature: use changes in federal funds futures during small time windows around Federal Open-Market Committee (FOMC) meetings
- under some (light) assumptions, these represent surprises by MP to the markets/the public, i.e. MP shocks
- there are six futures contract maturities that can be used (concurrent month up to five months into the future)
- "standard approach": use a factor over the maturity spectrum (interpreted as "level shock"), e.g. Barakchian and Crowe (JME, 2013)

Introduction

- Contributions:
  - develop a new decomposition of futures contract movements into actions and communication surprises
  - use a SVAR to study of the effects of these shocks on macro variables
- Key Results:
  - only communication shocks yield the "expected" responses of industrial production
  - communication shocks explain more variation in macro variables than action shocks

$\rightarrow$ MP shocks seem to be driven more by "surprise communication" than "surprise actions"

▸ Literature Review

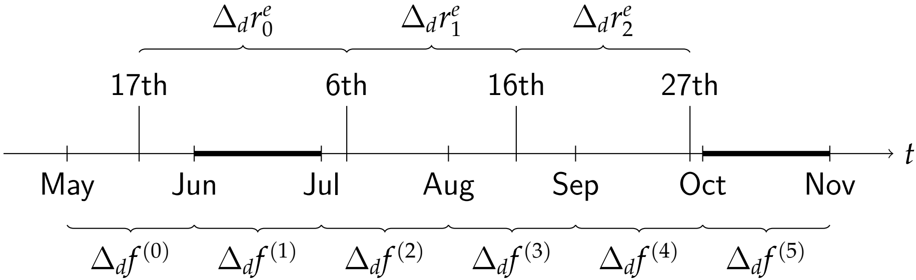
Step 1: Extracting Surprises
Jumps and Meeting Dates

- sample from March 1994 to June 2008
- FOMC meetings are not monthly: around every 6 weeks
- important: meeting dates published one year in advance
- the 6 maturities contain (at least) 3 future meeting dates
- we extract the changes in expectations about policy rates valid between the meetings:

$$\Delta_d r_j^e,\ j \in \{0, 1, 2\}$$

Step 1: Extracting Surprises
Jumps and Meeting Dates

- consider the example of May 17, 1994
- future meetings: July 6, August 16, September 27
- no meeting in June and October



▸ FFF contract ▸ Example Comm. ▸ mp(j) Extraction ▸ HFI Assumptions ▸ Current Month

Step 2: Decomposing Surprises

- assume the jump vector is a linear combination of shocks
- shocks about meetings for future months are not relevant for contracts over prior months
- implies lower triangular restriction:

$$\Delta R_t \equiv \begin{bmatrix} \Delta_d r_0^e \\ \Delta_d r_1^e \\ \Delta_d r_2^e \end{bmatrix} = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \cdot \begin{bmatrix} \epsilon_t^A \\ \epsilon_t^{NC} \\ \epsilon_t^{FC} \end{bmatrix} = \mathbf{M} \cdot \mathbf{E}_t,$$

  where we obtain $\mathbf{M}$ from a Cholesky decomposition
- cumulate the shocks to attain a time-series S_t of policy surprises in levels (see Romer and Romer, 2004)

▸ Shock Series

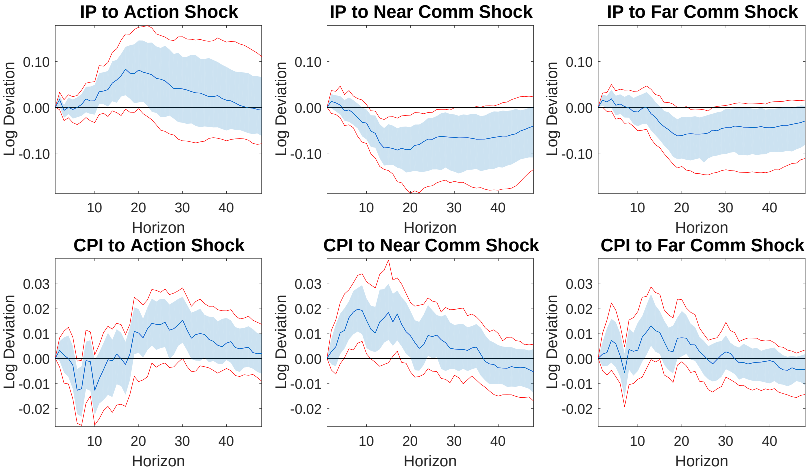
Step 3: SVAR Model

- examine the effects of the three shocks on industrial production (IP_t) and consumer price inflation (CPI_t):

$$\mathbf{Y}_t \equiv \begin{bmatrix} \log(IP_t) \\ \log(CPI_t) \\ S_t^A \\ S_t^{NC} \\ S_t^{FC} \end{bmatrix} = \mathbf{C}_c + \mathbf{C}_d \cdot t + \sum_{l=1}^{lags} \mathbf{C}_l \mathbf{Y}_{t-l} + \mathbf{D} \cdot \epsilon_{\mathbf{t}}$$

  - $\epsilon_t \sim (0, \Sigma_\epsilon = diag\{\sigma_i\})$.
- 12 lags in the baseline
- use recursive identification (ordering as above)

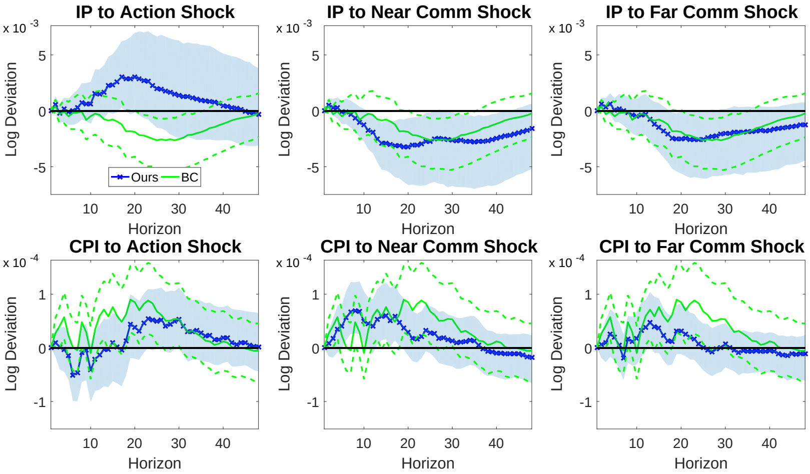
Responses of $\log(IP_t)$ and $\log(CPI_t)$



Note: 95% (red) and 84% (blue shade) confidence intervals

▸ Robustness ▸ Shock Persistence ▸ Local Projections ▸ Greenbook ▸ 3-var VARs

Compare to Barakchian & Crowe (2013)



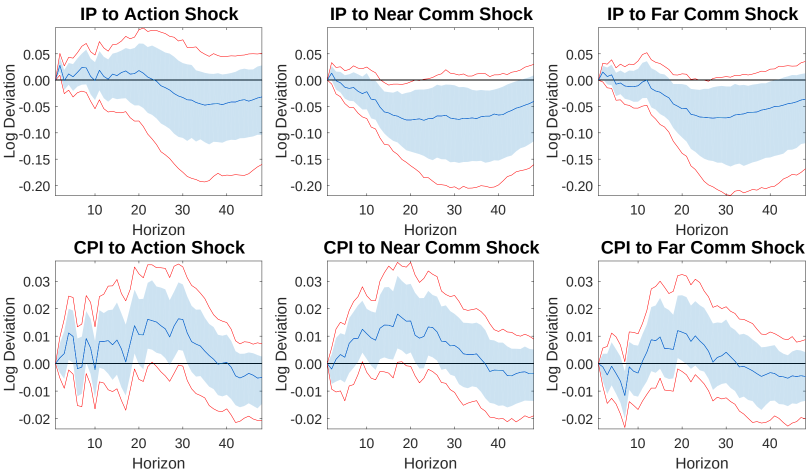
Note: 95% confidence intervals each

Forecast Error Variance Decomposition

		Shock				
		"IP"	"CPI"	Action	NComm	FComm
Series	IP_t	0.0837	0.1604	0.2078	0.3473	0.2008
	CPI_t	0.0186	0.3141	0.2637	0.2847	0.1189

Note: For 48th month

The Price Puzzle and Commodity Prices



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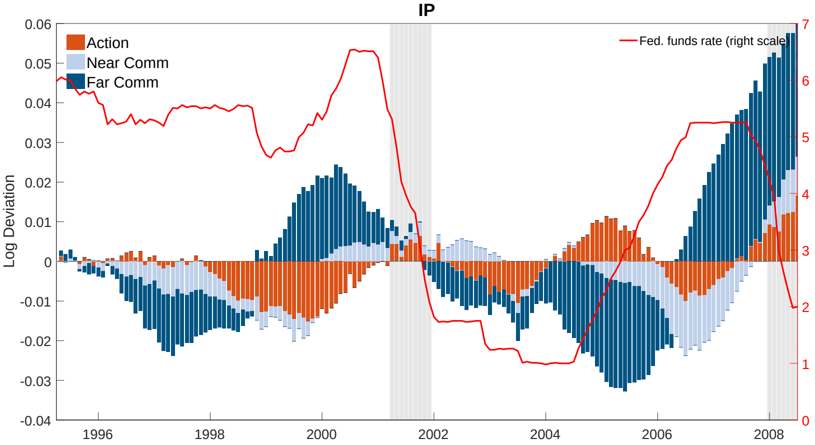
Historical Decomposition of $\log(IP_t)$



Conclusion

- we use a novel decomposition of high-frequency federal funds futures rates to distinguish between US MP communication and action shocks
- communication shocks seem to capture what we understand under a "MP shock"
- this changes the interpretation of high-frequency literature results (e.g. Barakchian/Crowe 2013, Gertler/Karadi 2015)
- MP communication matters already before forward guidance!

The End

Thanks for your attention! Any questions?

Literature Review

- early VAR papers on monetary policy shocks
  - Christiano, Eichenbaum and Evans (1994); Romer and Romer (2004)
- High-Frequency Identification (HFI) literature
  - Kuttner (2001); Gürkaynak, Swanson and Sack (2005)
- VAR HFI literature
  - Barakchian and Crowe (2013); Gertler and Karadi (2015)
- Forward Guidance VAR literature
  - Bundick and Smith (2016)
- the "Forward Guidance Puzzle"
  - Del Negro, Giannoni and Patterson (2015); McKay, Nakamura and Steinsson (2015).

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an Example for FOMC Communication

- On October 28, 2015, the FOMC press release stated:

  > "The Committee anticipates that it will be appropriate to raise the target range for the federal funds rate when it has seen some further improvement in the labor market and is reasonably confident that inflation will move back to its 2 percent objective over the medium term.

- On December 16, 2015, the FOMC announced the first federal funds rate increase since June 2006.

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Step 1: Extracting Surprises
The Federal Funds Futures Contract

- buyers of the FFF contract essentially agree to “borrow” federal reserves for a month at a fixed rate: $f_{d,t}^{(h)}$
  - h is the maturity of the contract
  - trade takes place on day d of month t
- no arbitrage implies:

$$f_{d,t}^{(h)} = \mathbb{E}_{d,t}[\bar{r}_{t+h}] + \delta_t^h,$$

  where $\bar{r}_{t+h} - f_{d,t}^{(h)}$ is realised FF rate and δ_t^h is risk-premium
- policy surprise as the difference in futures rates before and after FOMC meeting day

$$\Delta f_t^{(h)} \equiv f_{d,t}^{(h)} - f_{d-1,t}^{(h)} = \Delta_{d,d-1}\mathbb{E}_t[\bar{r}_{t+h}^e]$$

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Step 1: Extracting Surprises
Correction

- need to correct the jump for the concurrent contract
- recall underlying defined as the average interest rate over the month
- implies: If we have a meeting on the 20^{th}, traders already know 19 of the realizations that make up the monthly average.
- need to weight the jump upwards to account for this
- corrected measure:

$$\Delta f_{d,t}^{(0)*} = \frac{M_t}{M_t - d}\left(f_{d,t}^{(0)} - f_{d-1,t}^{(0)}\right)$$

  - M_t is the number of days in month t
- replace concurrent contract jump with next month's jump for meetings in the last 3 days

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Step 1: Extracting Surprises
HFI Assumptions

- in order for the jumps to identify a monetary policy shock, we need to assume:
  1. risk-premium, δ_t^h, does not change at a daily frequency
  2. no systematic targeting error at daily frequency
  3. no other "news" that day
  4. FOMC does not reveal news about its reaction function
  5. FOMC does not reveal news about its information set
- the advantage of the SVAR is that we are able to relax Assumption 5

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Step 1: Extracting Surprises
Translating Jumps to Expectation Revisions (1/2)

- the true change in expected rates for the concurrent month is the same as the jump in futures rates: $mp0_t = \Delta f_{d,t}^{(0)*}$.
- suppose there is a meeting next month
- the pricing of the next futures contract is

$$f_{t,d}^{(1)} = \frac{d_1}{M_1}\mathbb{E}_{t,d}[r_0] + \frac{M_1 - d_1}{M_1}\mathbb{E}_{t,d}[r_1],$$

where:

  - d_1 is the day of the month the next meeting takes place
  - M_1 is the number of days in that month

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Step 1: Extracting Surprises
Translating Jumps to Expectation Revisions (2/2)

- lagging and differencing:

$$f_{t,d}^{(1)} - f_{t,d-1}^{(1)} = \frac{d_1}{M_1}\left(\mathbb{E}_{t,d}[r_0] - \mathbb{E}_{t,d-1}[r_0]\right)\ldots \\ + \frac{M_1 - d_1}{M_1}\left(\mathbb{E}_{t,d}[r_1] - \mathbb{E}_{t,d-1}[r_1]\right).$$

- therefore:

$$mp1_t = \frac{M_1}{M_1 - d_1}\left([f_{t,d}^{(1)} - f_{t,d-1}^{(1)}] - \frac{d_1}{M_1} mp0_t\right).$$

- $mp2_t$ is backed out similarly

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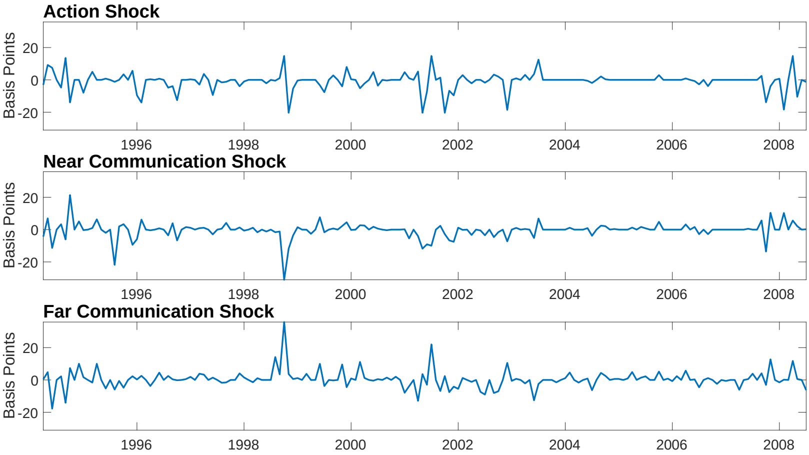
Shock Series



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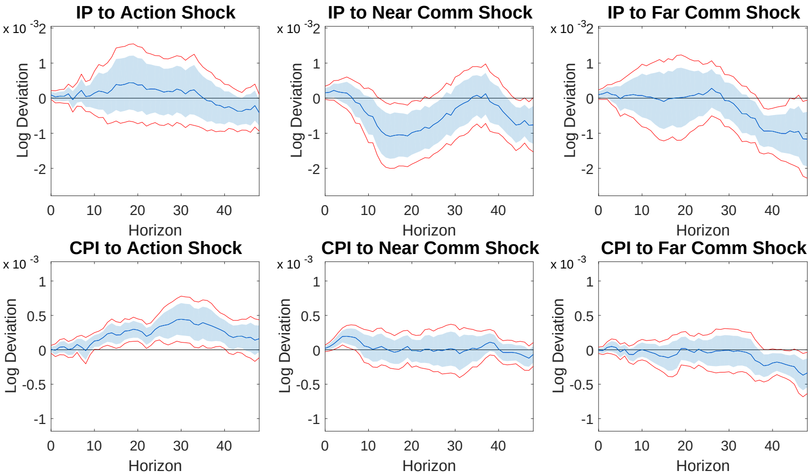
Local Projection Approach



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Local Projection Approach

- employ the local projection approach of Jordà (2005)
- project Y_{t+q} onto $(Y_{t-1}, Y_{t-2}, ..., Y_{t-q})$:

$$Y_{t+q} = D_c + \Sigma_{l=1}^{lags} D_l^q Y_{t-l} + u_{t+q}^q, \text{ for } q = 0, 1, 2, ..., Q,$$

  where D_c is an $(n \times 1)$ vector of constants, and the D_l^s are coefficient matricies for given lags l, and horizons q up to Q
- include $\log(IP)$, $\log(CPI)$, and each of our shock series (in 3 sequential studies)
- use 2 lags for the macro-variables; 1 lag for the shock

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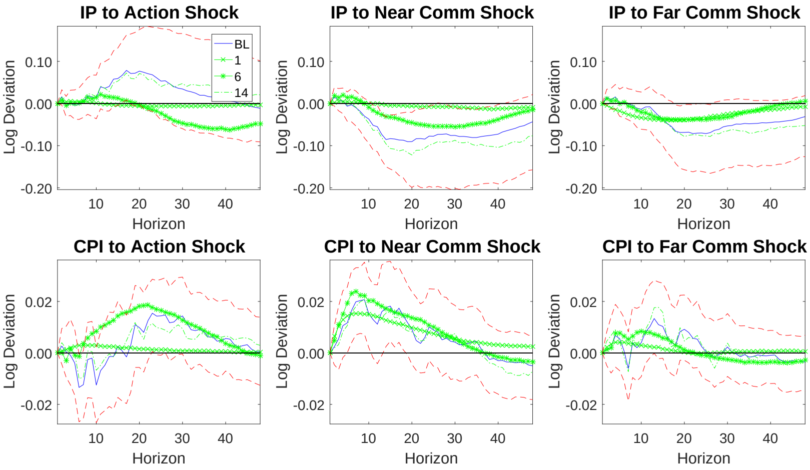
Robustness Checks



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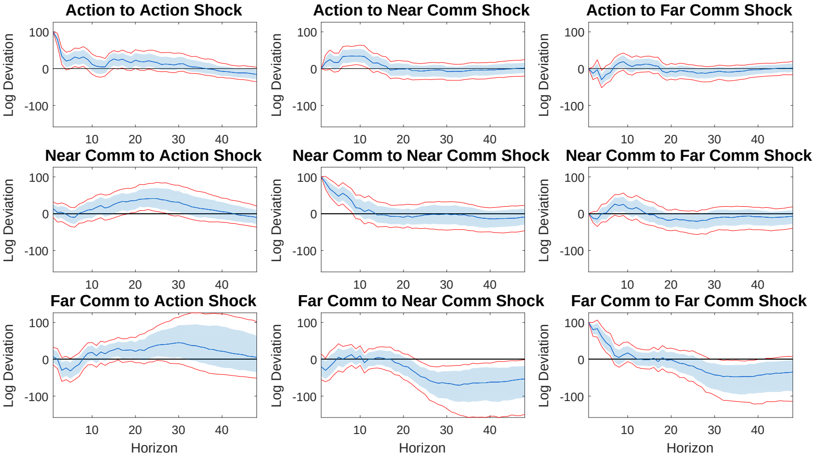
Persistence



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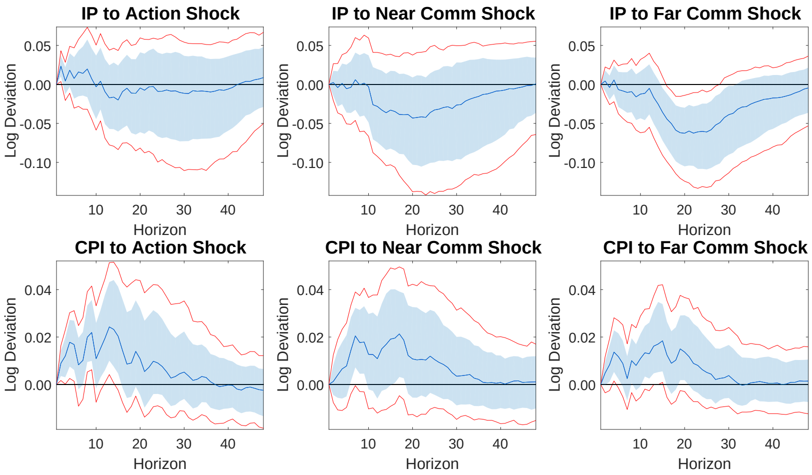
Information Transmission by the Fed
IRFs



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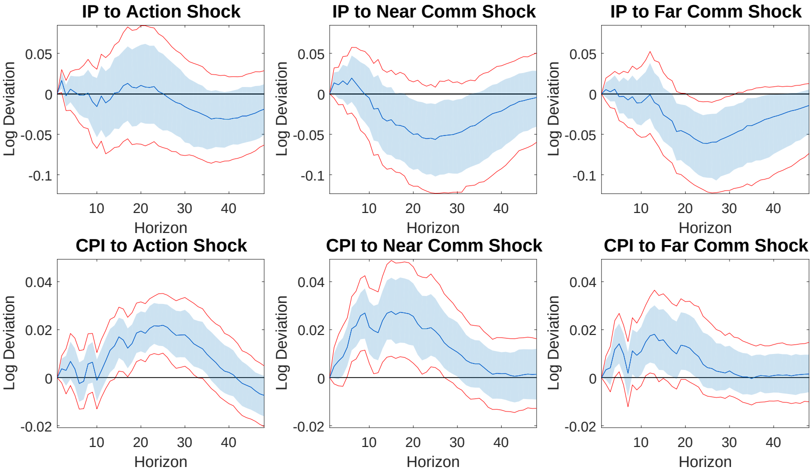
Three Separate (3-Variable) Systems



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