Disentangling Central Bank Information, Fed Response to News and Monetary Policy Shocks

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Motivation

- High-frequency surprises around Fed announcements can proxy for monetary policy shocks (exogenous variation in policy)

- Assumptions:

  - Market incorporates available information about the state of the economy and policy rule $\Rightarrow$ **prices-in endogenous monetary policy**

  - High-frequency surprise captures **exogenous** variation in policy

- Recent literature raises concerns about this approach

Challenges for the HF identification

- Concern that HF surprises are **contaminated by endogenous policy**

  - Central Bank Information (**CBI**), Romer and Romer 2000

  - Fed Response to News (**FRN**), Bauer and Swanson 2023a,b

- Few FOMC meetings (8/year): **low instrument relevance** (Ramey 2016)

- Sign restrictions help with identification (interest rate-stock co-movement, Jarocinski and Karadi 2020) $\rightarrow$ only set identification, **low precision**

What we do?

- Propose a way to disentangle 3 shocks in HF surprises

  - Monetary Policy (MP), Fed Response to News (FRN), Central Bank Information (CBI)

  - Separate MP and FRN using the predictability of surprises (Bauer and Swanson 2023a,b)

  - New: Separate FRN and CBI based on different interest rate-stock price comovement

- Extend the dataset to include more Fed events (speeches etc., like Swanson and Jayawickrema 2023)

- Improve the precision of the estimates using heteroskedasticity identification (Rigobon 2003)

What do we find?

- Response to monetary policy shocks - stronger, purged of endogeneity bias

- Relevance of central bank information shocks

- Smaller role of the Fed response to news shocks

Simple theoretical framework

Fed policy rate i responds systematically to the state of the economy x (output gap)

- Fed's policy rule: $i = \alpha^F x^F + \varepsilon$

- Markets' perceived policy rule: $E^M(i) = \alpha^M x^M$

- Announcement day monetary policy surprise (MPS):

$$\underbrace{i - E^M(i)}_{MPS} = \alpha^F(x^F - x^M) + (\alpha^F - \alpha^M)x^M + \varepsilon$$

Unpacking the surprise

$$\underbrace{i - E^M(i)}_{MPS} = \underbrace{\alpha^F(x^F - x^M)}_{\text{Central Bank Info}} + \underbrace{(\alpha^F - \alpha^M)x^M}_{\text{Fed Response to News}} + \underbrace{\varepsilon}_{MP \text{ shock}}$$

- $\varepsilon \rightarrow$ Monetary Policy shock

- $\alpha^F(x^F - x^M) \rightarrow$ different views of the economy $\Rightarrow$ CBI shock

- $(\alpha^F - \alpha^M)x^M \rightarrow$ misperceived Fed reaction function $\Rightarrow$ FRN shock

Questions

1. Does the presence of CBI and/or FRN **bias** the estimates of Monetary Policy effects in monthy VARs/LPs? $\rightarrow$ Yes

2. Do CBI and FRN have the same effect on the high-frequency **stock price surprises**? $\rightarrow$ No

Minimum addition to the simple framework

State of the economy x_t follows

$$x_t = \rho x_{t-1} - \theta i_{t-1} + \underbrace{\eta_t}_{\text{public news}} + \underbrace{\eta_t^F}_{\text{CB information}}$$

Implications for the MPS:

CBI term: $\alpha^F(x_t^F - x_t^M) = \alpha^F \eta_t^F$

FRN term: $(\alpha^F - \alpha^M)x_t^M = ... + (\alpha^F - \alpha^M)\eta_t$

$\Rightarrow$ MPS is a function of non-monetary shocks η, η^F
$\Rightarrow$ Regression of MPS on the public η has R-squared> 0

Bias of monthly VARs and LPs

$$MPS = \varepsilon_t + \alpha^F \eta_t^F + ... + (\alpha^F - \alpha^M)\eta_t$$

$$\underbrace{E_t(x_{t+1}) - E_{t-1}(x_{t+1})}_{\Delta} = -\theta\varepsilon_t + (\rho - \theta\alpha^F)(\eta_t + \eta_t^F)$$

MP shock $\varepsilon > 0 \to$ MPS > 0, $\Delta < 0$

CBI shock $\eta^F > 0 \to$ MPS > 0, $\Delta > 0$

FRN shock $\eta > 0 \to$ MPS > 0*, $\Delta > 0$ * assuming $\alpha^F > \alpha^M$

High-frequency reaction of stock prices

Define "stock price" $s_t = E_t(x_{t+1} - i_t)$

$$\underbrace{s_t - s_{t-\delta}}_{\delta^s} = \rho\eta_t^F - (\theta+1)MPS$$

MP shock $\varepsilon > 0 \rightarrow$ MPS > 0, $\delta^s < 0$

CBI shock $\eta^F > 0 \rightarrow$ MPS > 0, $\delta^s > 0$ †   † assuming α^F not too high

FRN shock $\eta > 0 \rightarrow$ MPS > 0*, $\delta^s < 0$*   * assuming $\alpha^F > \alpha^M$

Lessons from this simple framework

1. MPS contaminated by endogenous policy response to other shocks ($\eta_t^F \to$ CBI, $\eta_t \to$ FRN)

2. Attenuation bis in monthly VARs/LPs for estimating mon.pol. effects (episodes where MPS> 0 is followed by strong economy)

3. High-frequency co-movement between interest rate and stock prices: CBI $\to$ **positive**; FRN and MP $\to$ **negative**

4. FRN (policy rule misperception) implies **predictability of the MPS** by public news (Bauer&Swanson)

Data: Extending the dataset of Fed policy surprises

Fed event types following Swanson and Jayawickrema 2023

Event type	Count	Duration (min)	Med($|$ED3$|$)	#$|$ED3$| > 3$bp
FOMC Announcement	361	0	0.020	160
Non-FOMC Events	1258	-	0.010	339
of which				
Chair Speech	579	90	0.010	136
Minutes	221	30	0.010	38
Press Conference	83	60	0.015	27
Testimony	365	180	0.015	136
Testimony Release	10	30	0.003	2

Sample January 1988 - March 2025

Correct for *interfering events*: adjust windows to exclude US macro announcements, Treasury auctions, ECB announcements

Samples

- Baseline: all FOMC announcements $+$ "big" Non-FOMC events
  (700 obs)

- FOMC subsample: all FOMC announcements
  (361 obs)

- Non-FOMC subsample: "big" Non-FOMC events
  (339 obs)

Bauer-Swanson regressions (MPS predictability)

$$MPS_t = \beta y_t + \varepsilon_t$$

MPS - interest rate surprise - 1st principal component of ED1,ED2,ED3,ED4

y_t - vector of variables known to the market participants before the Fed event window, combining variables used in Bauer Swanson 2023a AER, 2023b MA, Swanson 2024 IMF.

Output of the regression:

- FIT - $\hat{\beta}y$, the part of MPS spanned by publicly available data y.

- RES - residual $\hat{\varepsilon}$

	Baseline	FOMC	Non-FOMC
(Intercept)	-0.012	-0.021**	-0.003
	(0.008)	(0.010)	(0.013)
Unemployment surprise	0.013	0.006	0.017
	(0.017)	(0.020)	(0.028)
Payrolls surprise	0.015	0.013	0.020
	(0.012)	(0.013)	(0.040)
Real GDP surprise	0.011**	0.004	0.014*
	(0.005)	(0.007)	(0.008)
Core CPI surprise	0.021	0.027	0.012
	(0.026)	(0.032)	(0.041)
Core CPI median forecast	-0.016	-0.009	-0.006
	(0.035)	(0.042)	(0.059)
6-month change in core CPI	-0.007	-0.003	-0.014*
	(0.004)	(0.005)	(0.007)
BBK index	-0.001	-0.001	0.001
	(0.001)	(0.002)	(0.002)
Δ log S&P500 (3m)	0.069	0.131**	0.007
	(0.048)	(0.064)	(0.071)
Δyield curve slope (3m)	-0.070	-0.214	0.228
	(0.161)	(0.210)	(0.241)
Δ log pcommodity (3m)	0.104***	0.155***	0.045
	(0.038)	(0.052)	(0.056)
Treasury yield skewness (1m)	0.028**	0.033**	0.030
	(0.011)	(0.013)	(0.019)
Employment growth (12m)	0.404*	0.499**	0.074
	(0.216)	(0.243)	(0.412)
Δ 2-year Treasury (3m)	-0.012	-0.065	0.088
	(0.049)	(0.064)	(0.073)
Δ 10-year Treasury (3m)	0.022	0.079	-0.094
	(0.062)	(0.080)	(0.093)
Δ Baa spread (3m)	-0.007	-0.014	0.019
	(0.011)	(0.014)	(0.018)
Δ shadow fed funds rate (3m)	-0.007	0.015	-0.015
	(0.008)	(0.010)	(0.012)
Δ Chicago Fed NFCI (1m)	0.060***	0.048*	0.039
	(0.017)	(0.025)	(0.024)
N	700	361	339
R-squared	0.060	0.182	0.060

Bauer-Swanson regressions: fit across subsamples

	Baseline	FOMC	Non-FOMC
N	700	361	339
R-squared	0.060	0.182	0.060
Adj.R-squared	0.036	0.147	0.005

R-squared (FOMC) > R-squared (Non-FOMC)

Heteroskedasticity: different mix of shocks in FOMC and Non-FOMC

1. FRN shocks larger on FOMC events $\leftarrow$ R-squared (FOMC) $>$ R-squared (Non-FOMC)

2. CBI shocks larger on Non-FOMC events $\leftarrow$ more instances of positive co-movement of interest rate and stock price surprises
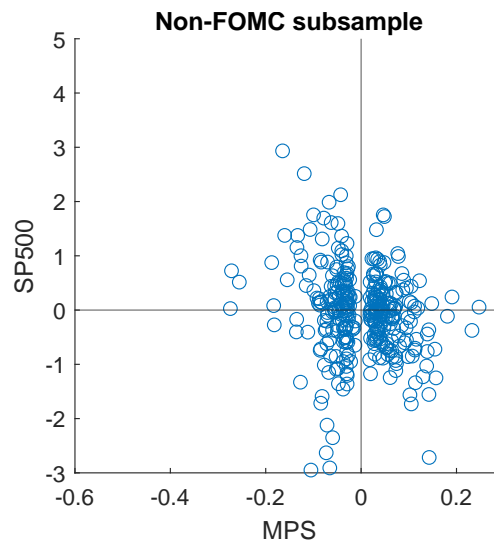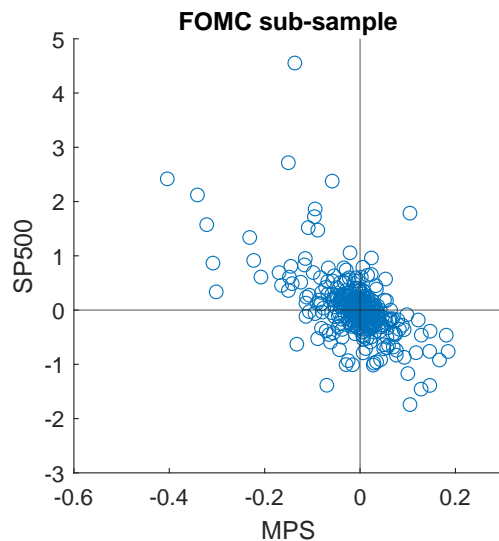
Heteroskedasticity identification

Estimate model:

$$y_t = C'u_t, \qquad u_t : \begin{array}{l} \text{heteroskedastic, different std devs} \\ \text{on FOMC and Non-FOMC events} \end{array}$$
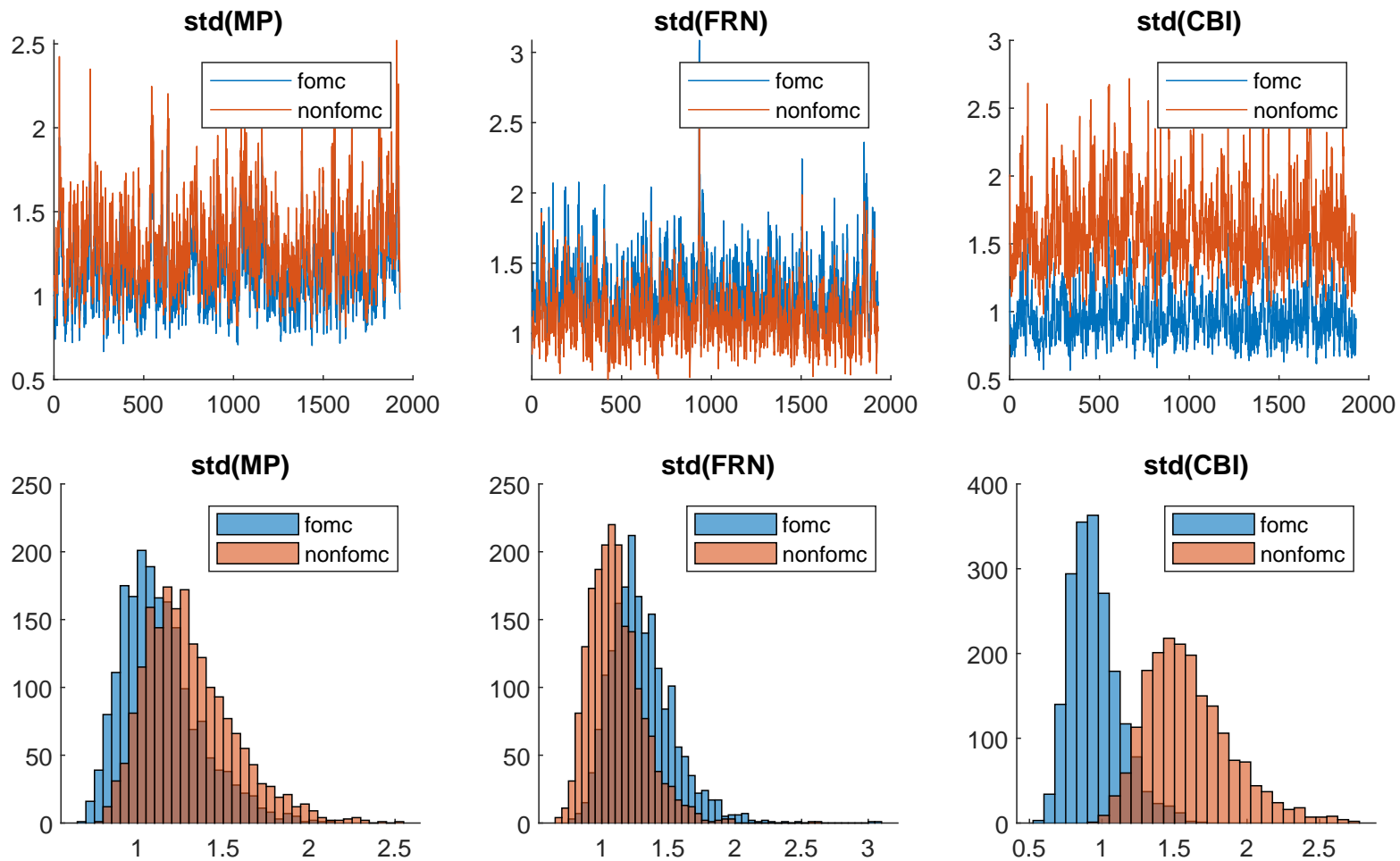
y_t - data: RES, FIT, SP500

u_t - three orthogonal shocks

C - impact of shocks u_t on variables y_t

Heteroskedasticity of $u_t \rightarrow$ identifies C (Rigobon 2003)

Standard deviations of the estimated shocks across subsamples

Shock impacts and variance decomposition of RES,FIT,SP500

	Shock impacts				Variance decomposition		
	RES	FIT	SP500		RES	FIT	SP500
MP	5.91	-0.70	-38.21	MP	**0.73**	**0.17**	**0.35**
	(0.36)	(0.19)	(5.45)		(0.12)	(0.11)	(0.14)
FRN	2.41	1.62	-23.74	FRN	**0.14**	**0.83**	**0.15**
	(0.68)	(0.07)	(5.13)		(0.09)	(0.11)	(0.08)
CBI	2.52	0.04	50.03	CBI	**0.13**	**0.00**	**0.50**
	(0.63)	(0.13)	(4.26)		(0.08)	(0.01)	(0.14)
					1.00	1.00	1.00

Posterior mean (posterior standard deviation in parenthesis)

Tracking the effects of the shocks on the macroeconomy

- Vector Autoregression (VAR) with monthly data:

  - MP, FRN, CBI - aggregated to the monthly frequency

  - 1-year Treasury yield, SP500, Excess Bond Premium, Real GDP, GDP deflator

- MP, FRN, CBI as *internal instruments*

- Bayesian estimation: Minnesota prior; account for uncertainty about the identification: draw MP, FRN, CBI from their posterior distribution; draw VAR parameters conditional on MP, FRN, CBI
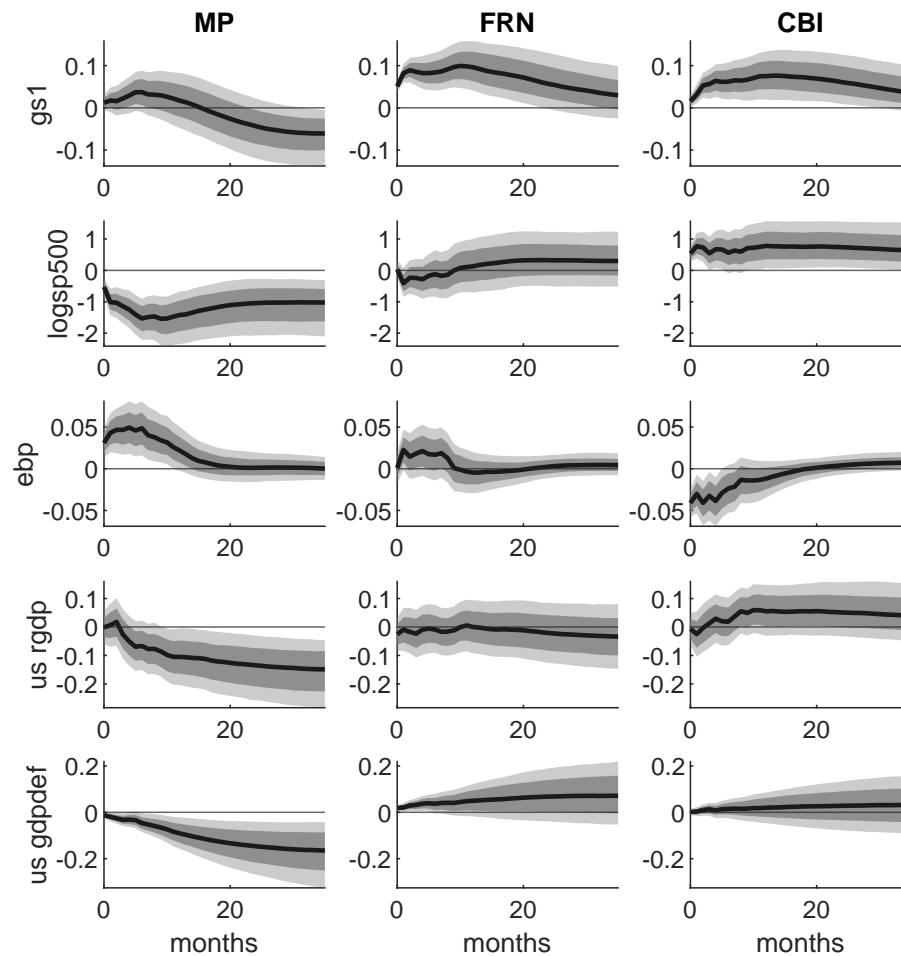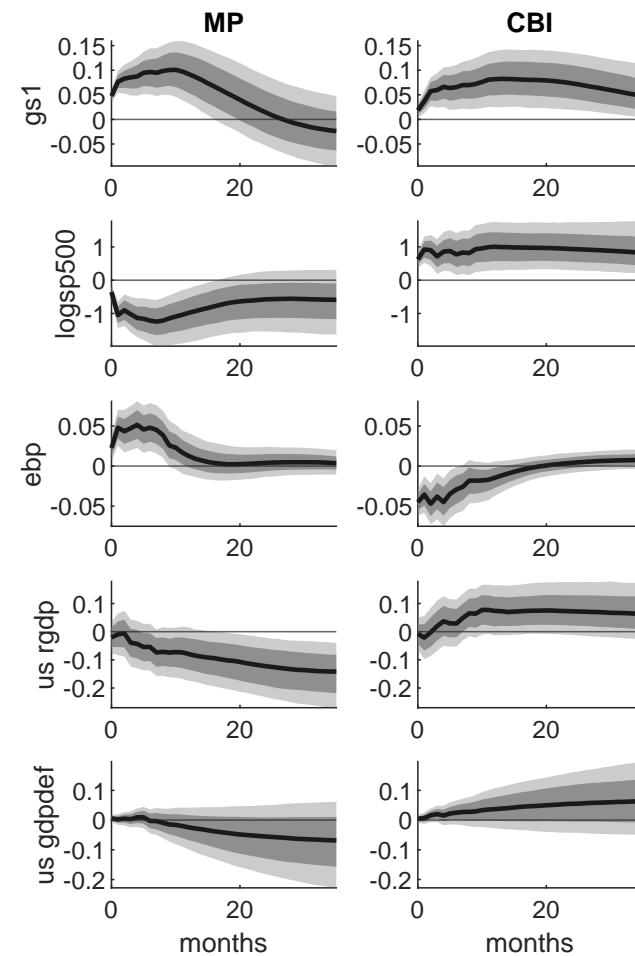
Model with FIT, RES, SP500
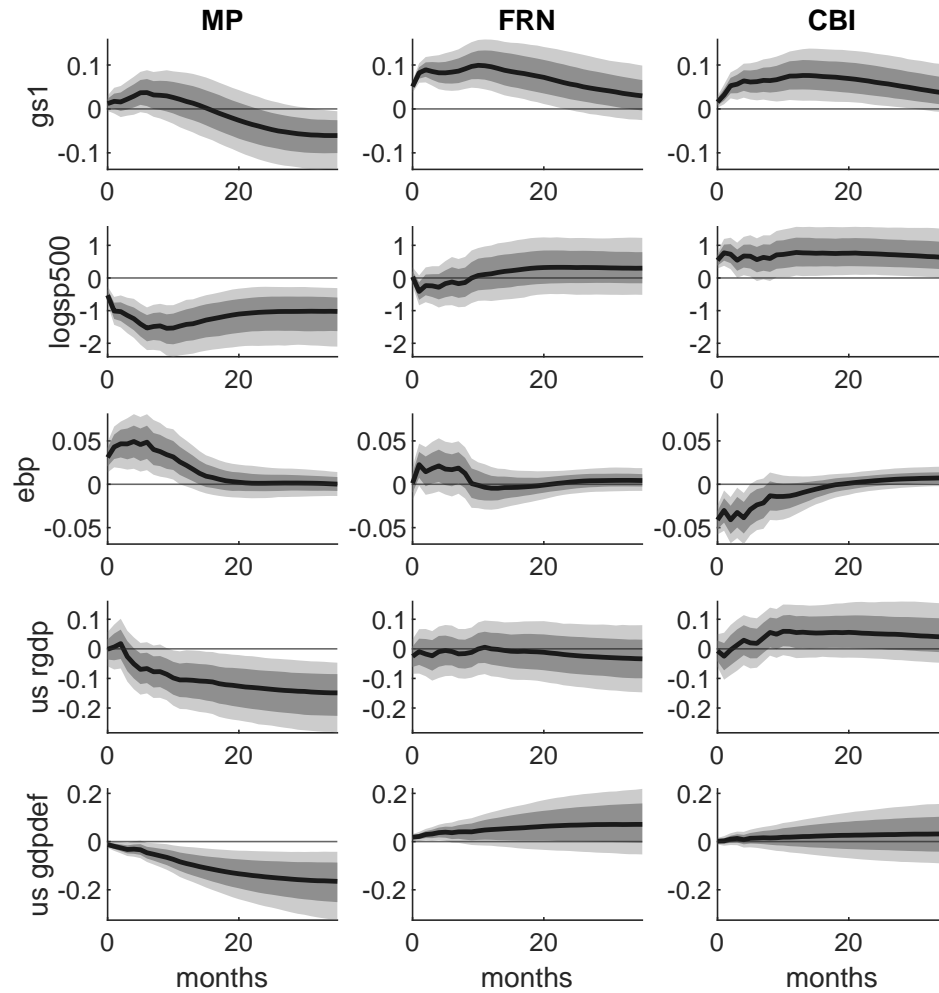
Two simplified approaches

- "Only Jarocinski-Karadi":

  - Data on MPS and SP500

  - Identify MP and CBI using heteroskedasticity (FOMC/Non-FOMC)

- "Only Bauer-Swanson":

  - Regression to decompose MPS into RES and FIT

  - Identification: RES=MP, FIT=FRN

Model with FIT, RES, SP500
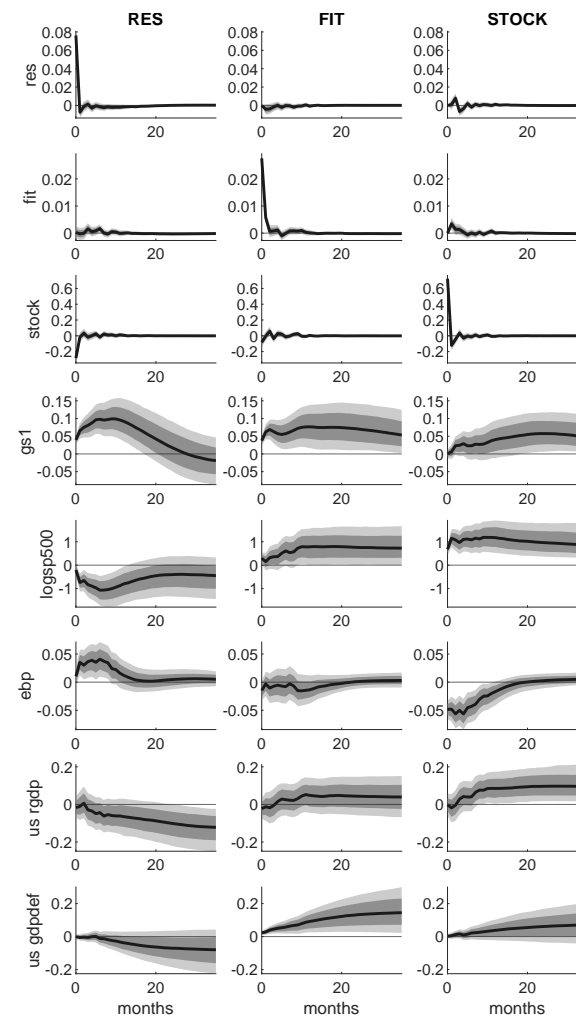
"Only Jarocinski-Karadi" Model with MPS, SP500

"Only Bauer-Swanson" approach misses something: SP500 carry info over and above interest rate surprises

RES=MP, FIT=FRN

Variance decomposition of surprises

	RES	FIT	SP500
MP contrib.	1.00	0.00	0.13
FRN contrib.	0.00	1.00	0.01
? contrib.	0.00	0.00	**0.87**

Conclusions

- We exploit (1) sign and magnitude restrictions and (2) heteroskedasticity between FOMC and Non-FOMC events to disentangle MP, FRN, CBI shocks

- Macroeconomic effects:

  – MP consistent with theory

  – CBI more empirically relevant than FRN

    $\rightarrow$ SP500 surprises carry information over and above MPS surprises