Deconstructing Monetary Policy Surprises - The Role of Information Shocks

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What we do?

- We study how financial markets react to **central bank policy announcements**, within the first half-hour.

  We separate the effects of

  - **news about monetary policy** and
  - **news about the central bank's outlook on the economy.**

- We track the response of the economy, in the US and the euro area, using a vector autoregression (VAR).

What we find

- Market reactions reflect both news about **monetary policy** and **news about the economy**. Variance shares: US: 65:35, EA: 55:45.

- The responses of the economy are **very different**.
  Surprise interest rates **increases** are ...

  - **contractionary** (output, prices decline) when reflecting news about monetary policy (monetary policy shock),

  - **expansionary** (output, prices increase) when reflecting news about the economy (central bank information shock).

Implications

1. Private agents **learn something about the economy** (not just about monetary policy) from central bank annoucements.

2. These news about the economy **attenuate the standard estimates of monetary policy effects**.

Plan of the presentation

- Key data
- Selected literature
- VAR, Identification, IRFs
- A structural DSGE interpretation

Key data: "surprises"

p - price of a financial asset

τ - time of a central bank announcement

surprise: $m = p(\tau + 20\text{min}) - p(\tau - 10\text{min})$

We compute m for

- interest rate derivatives (US: fed funds futures, Euro area: Eonia swaps). These instruments include also near term forward guidance.
- stock prices (US: S&P500, Euro area: EuroStoxx50)

Motivating example: FOMC announcement on March 20, 2001, 2:15pm

`For immediate release`

`The Federal Open Market Committee at its meeting today decided to lower its target for the federal funds rate by 50 basis points to 5 percent. (...)`

`[The Committee's analysis] (...) suggests substantial risks that demand and production could remain soft.`

$\rightarrow$ fed funds futures and stock prices both drop between 2:05pm and 2:35pm

Expected effect on stock prices

- Textbook asset pricing: A monetary policy surprise $\rightarrow$ negative co-movement between interest rates and stock markets
  - *lower* fed funds rate:

  $\rightarrow$ lower credit costs, higher demand $\rightarrow$ higher future dividends

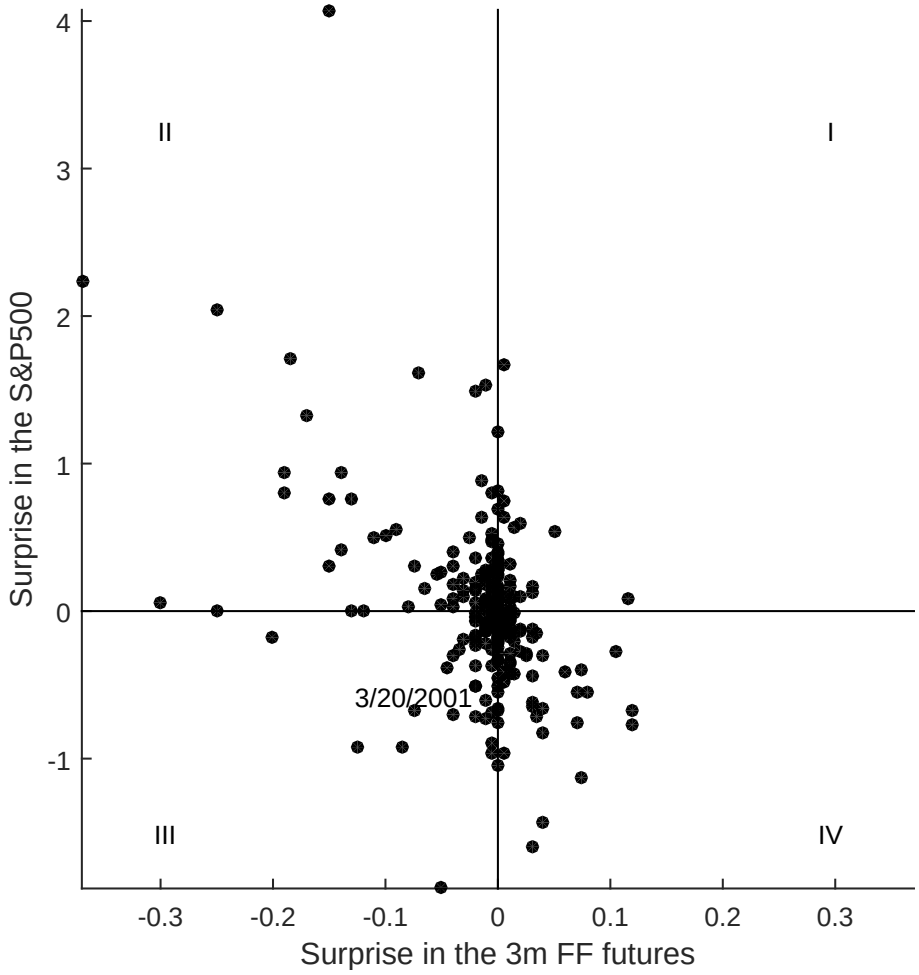
  $\rightarrow$ lower discount rate

  $\Rightarrow$ present discounted value of dividends goes up = stock price *goes up*

An empirical observation

Stock prices do **not always** go up after a surprise interest rate cut.

- noise?
- information about the economy in the central bank announcement?



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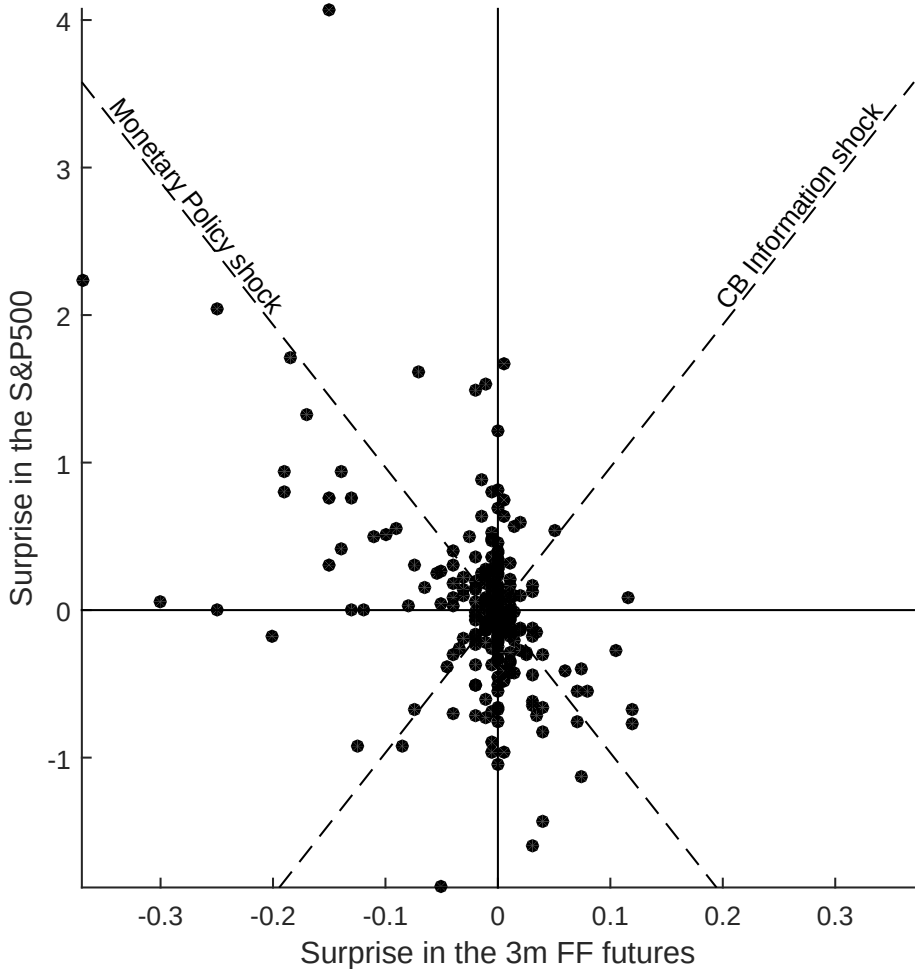


Further investigation

- We separate the shock that makes interest rates and stock prices co-move negatively (as they should after Mon.Pol. shock) from the shock that makes them co-move positively.

- We use a Structural VAR with a mix of *high-frequency identification* and *sign restrictions*.

- We study how the economy responds.

Selected literature

- Interest rate surprise $\approx$ monetary policy shock: Kuttner, 2001; Gürkaynak, Sack, Swanson, 2005; Barakchian, Crowe, 2013; Gertler, Karadi, 2015
  $\rightarrow$ we add the central bank information shock

- Measurement of CB information shocks: Campbell et.al., 2016; Miranda-Agrippino, Ricco, 2018; Lakdawala, Schaffer, 2016 – use **Fed private info**; Hansen and McMahon, 2016 – **textual analysis** of statements
  $\rightarrow$ we use the **markets** as Andrade, Ferroni, 2016, Cieślak, Shrimpf, 2018, Kerssenfischer, 2018

- Models of the information channel of monetary policy: Nakamura and Steinsson, 2018 QJE; Melosi, 2017 REStud
  $\rightarrow$ we add communication policy, use VAR for estimation

Monthly VAR - data (US)

- 7×1 vector $\begin{pmatrix} m_t \\ y_t \end{pmatrix}$ where
  - m_t (2×1): interest rate and stock price surprises that occurred in month t
    source: updated Gürkaynak, Sack and Swanson (2005) dataset
  - y_t (5×1): standard macroeconomic and financial variables in month t

    $\rightarrow$ government bond yields, S&P500, real GDP and GDP deflator (interpolated using Kalman filter, Stock and Watson 2010), Excess bond premium (Gilchrist and Zakrajsek, 2012)

VAR with surprises – restriction

m_t - surprises (monthly), y_t - macroeconomic variables (monthly)

m_t are i.i.d.:

$$\begin{pmatrix} m_t \\ y_t \end{pmatrix} = \sum_{p=1}^{P} \begin{pmatrix} 0 & 0 \\ B_{YM}^{p} & B_{YY}^{p} \end{pmatrix} \begin{pmatrix} m_{t-p} \\ y_{t-p} \end{pmatrix} + \begin{pmatrix} 0 \\ c_y \end{pmatrix} + \begin{pmatrix} u_t^m \\ u_t^y \end{pmatrix}$$

- Bayesian estimation with a Minnesota prior on the nonzero parameters
- Within the Gibbs sampler we also draw the missing observations on m_t

Our identification (Restrictions on the impact responses)

variable	shock		
	Monetary policy (negative co-movement)	CB information (positive co-movement)	other
Interest rate surprise (m_t^1)	+	+	0
Stock price surprise (m_t^2)	–	+	0
All other variables (y_t)	•	•	•

- Two surprises: interest surprise and stock price surprise
- Zero restrictions: other shocks are unlikely to occur systematically in the narrow time window around the announcements
- Sign restriction on the co-movement of surprises
- No restrictions on y_t

Sign restrictions

- m_t is decomposed into two **orthogonal** shocks (MP,CBI)

- Set identification: uniform prior on rotations, provided that they are consistent with sign restrictions.

Robustness check: 'poor man's sign restrictions'

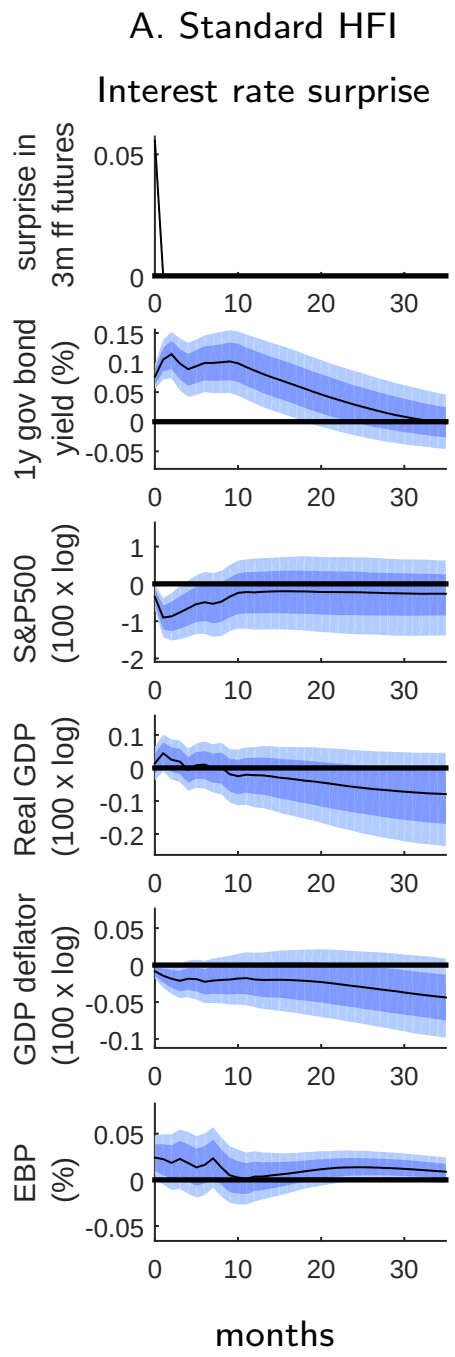
- Quadrants II and IV: MP shocks; quadrants I and III: CBI shocks

For comparison: Standard high-frequency identification (HFI)

	shock	
variable	Interest rate surprise	other
Interest rate surprise (m_t^1)	$+$	0
All other variables (y_t)	$\bullet$	$\bullet$

- Single surprise: interest rate
- Zero restrictions: other shocks are unlikely to occur systematically in the narrow time window around the announcements
- Interest rate surprise $\approx$ monetary policy shock.

United States impulse responses



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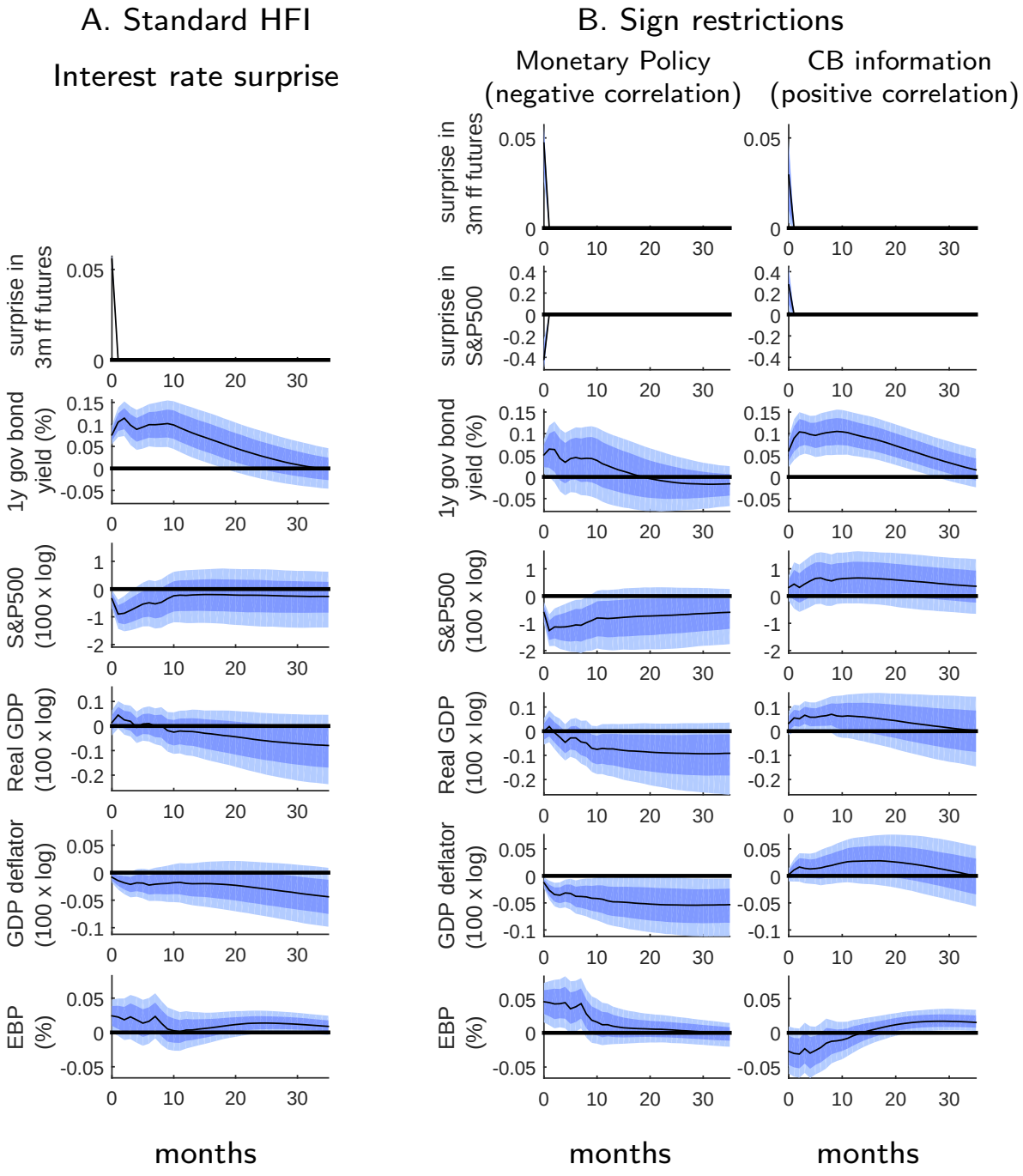
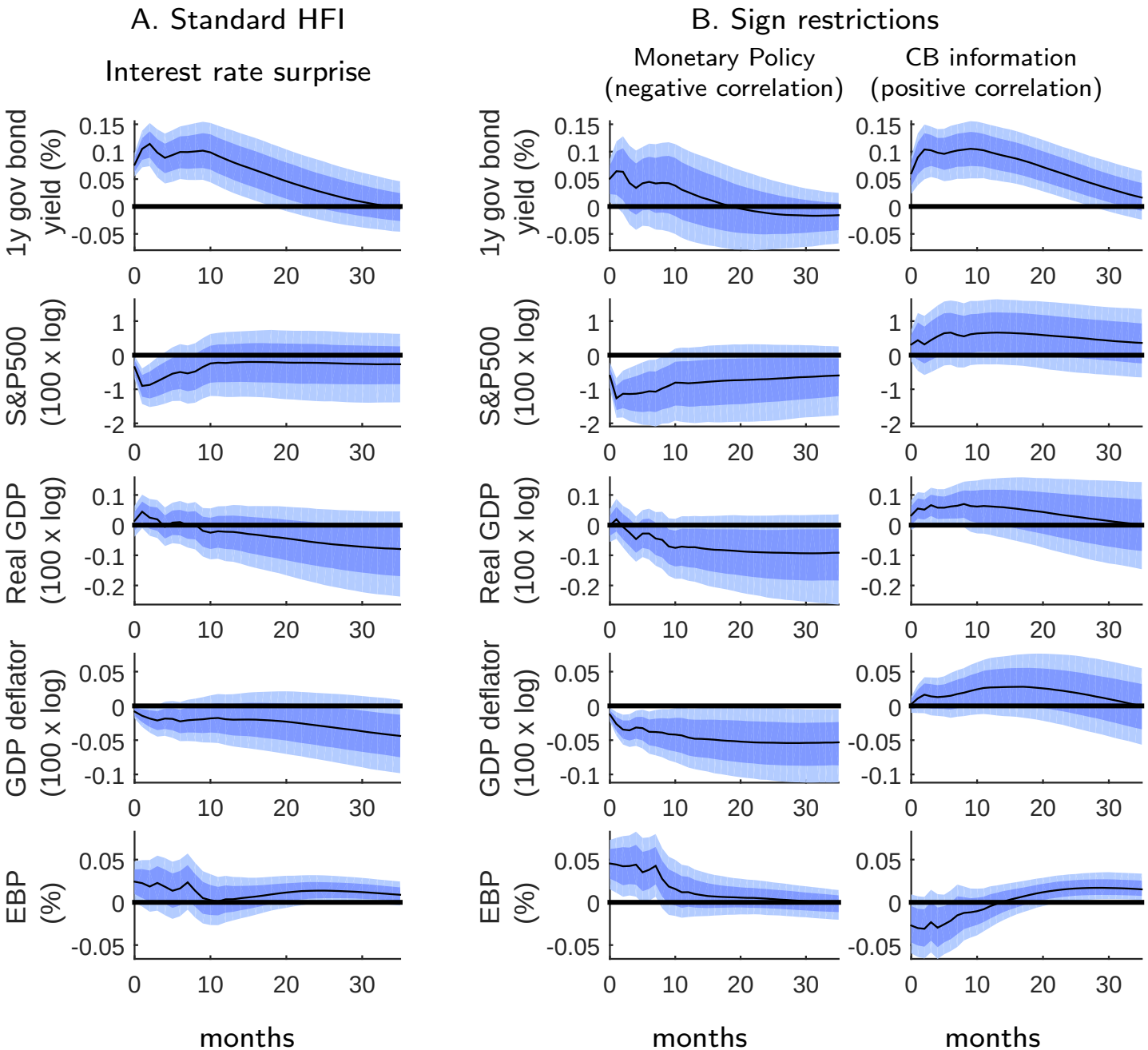
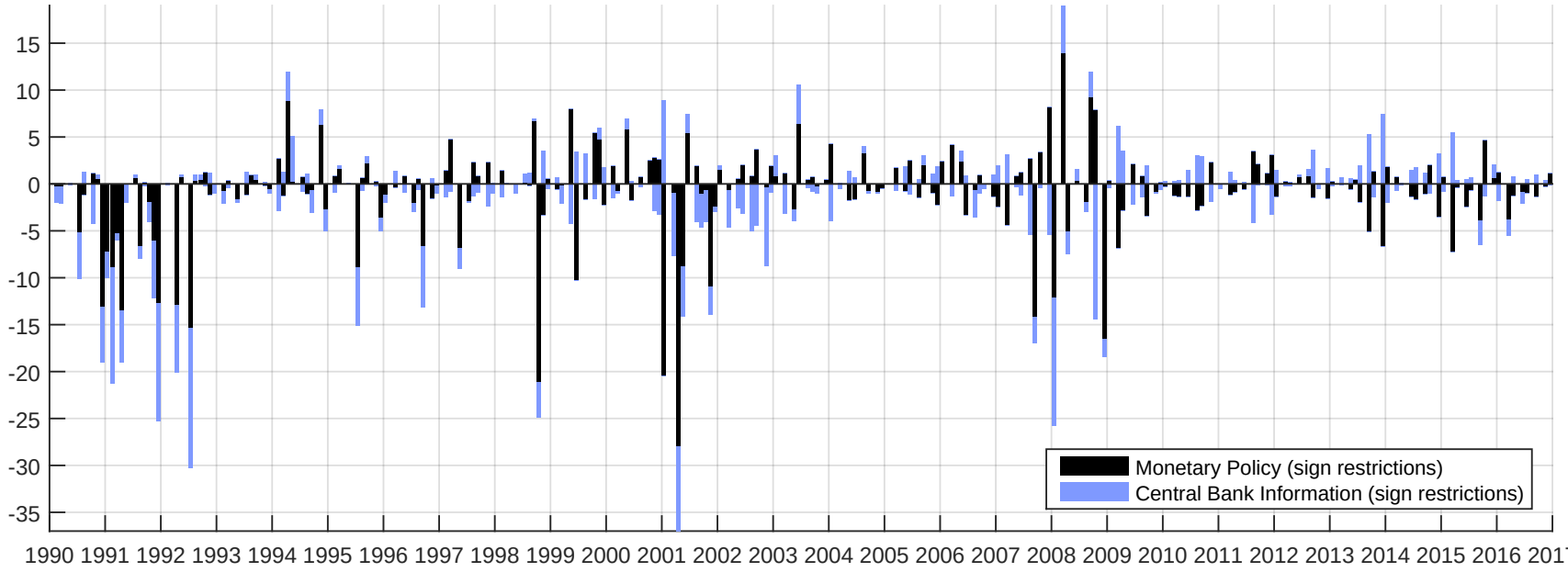


United States impulse responses - zooming in on y_t



United States: shocks over time



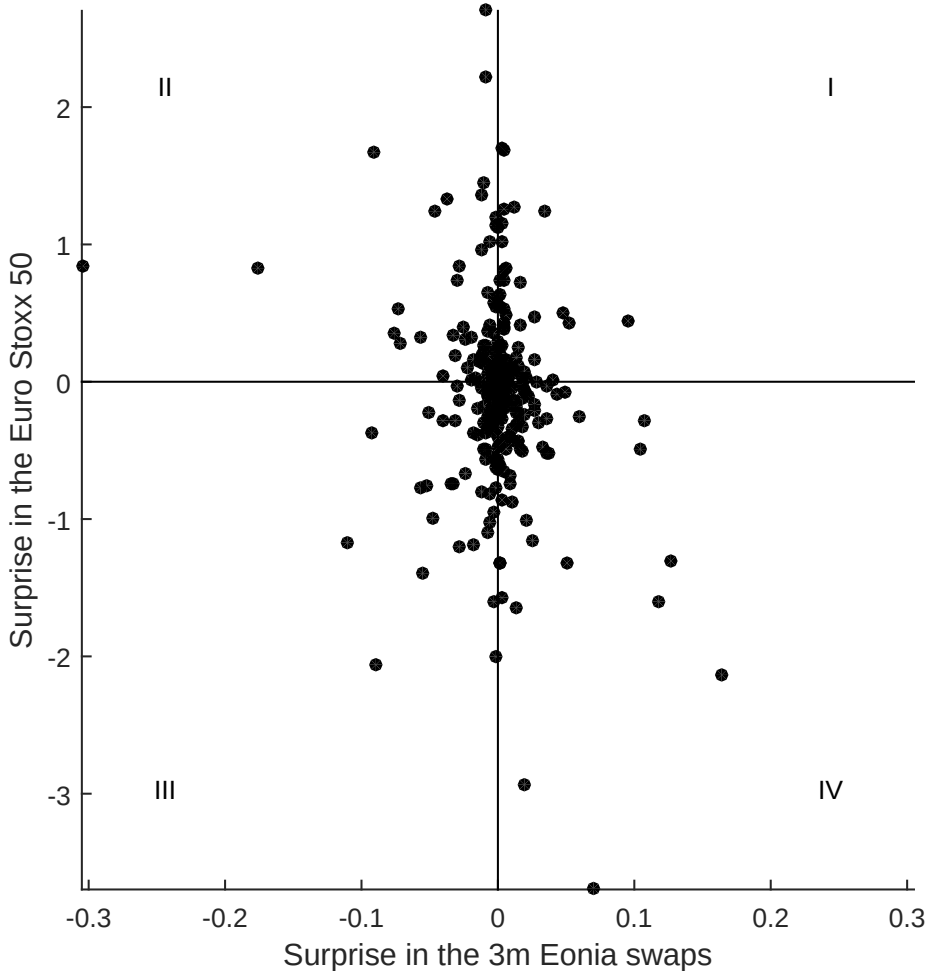
- Every month different mix of policy and information shock
- Both shocks occur throughout the sample.

Euro area results

We have created a dataset of ECB announcement surprises.

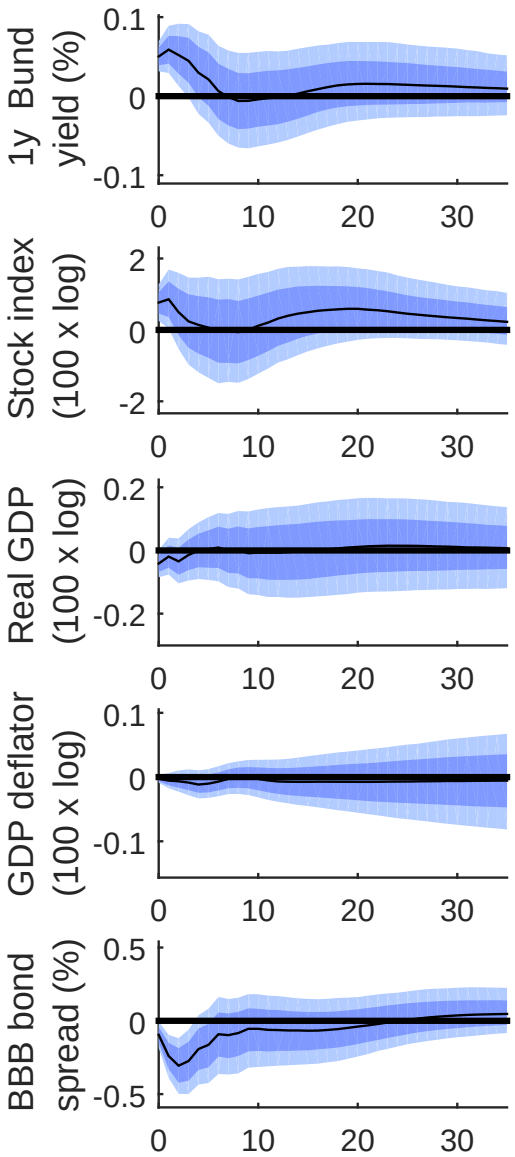
284 ECB policy announcements from 1999 to 2016. press release + press conference.

VAR results similar to the US



Euro area: IRFs (More information shocks in the mix)

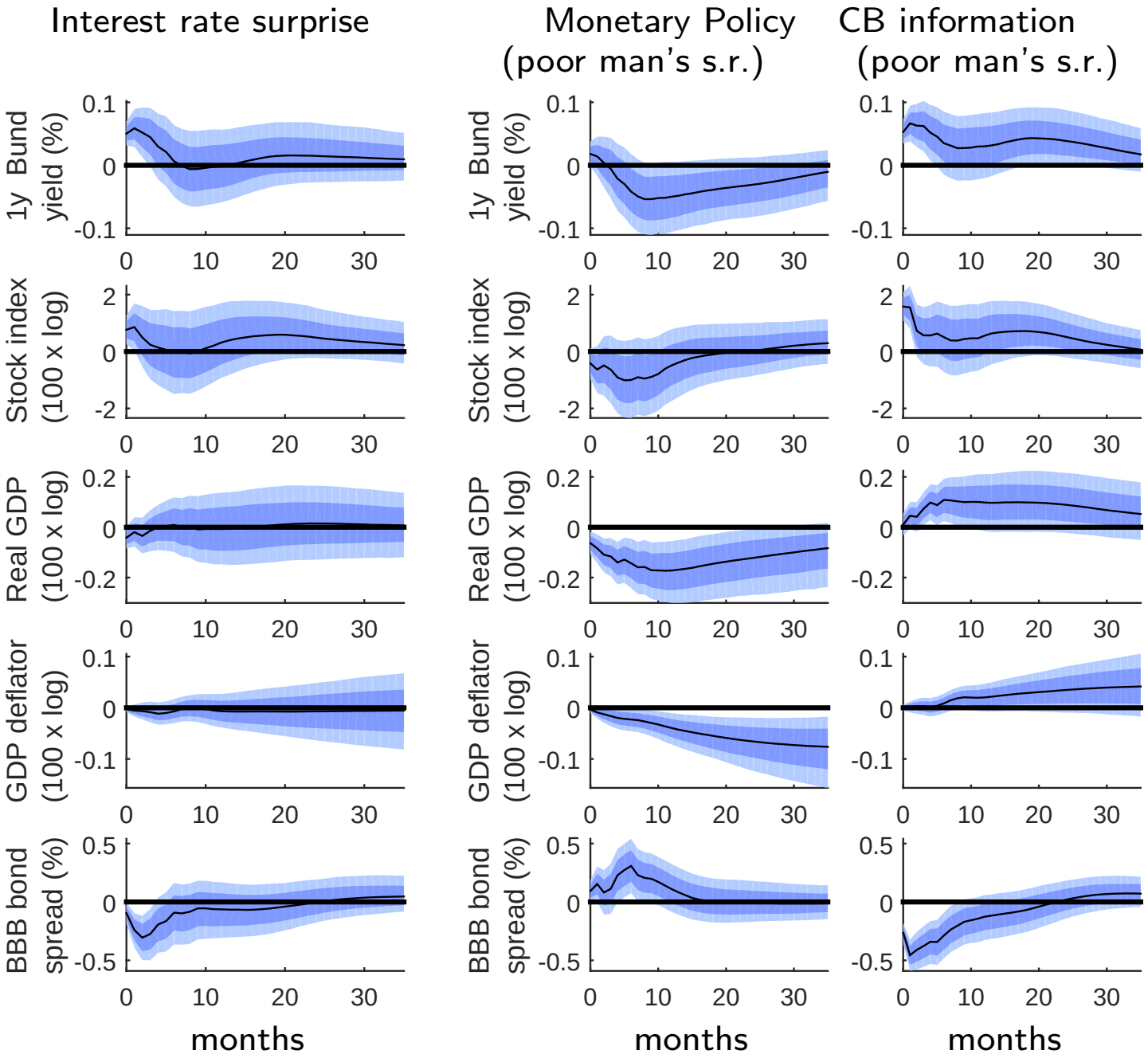
Interest rate surprise



months

months

Euro area: IRFs (More information shocks in the mix)



A structural interpretation

- ... through the lenses of a standard DSGE model with financial frictions Gertler-Karadi, 2011, 2013). We match impulse responses.

- To explain real effects of monetary policy shocks
  - Nominal frictions less important
  - Financial frictions more important

  in our identification vs. the standard HFI identification.

Why does the economy respond to the CB information shock?

Alternative stories behind the IRFs

- Central banks have superior information on fundamentals (Romer and Romer 2000). This information would have become apparent anyway, central bank merely reveals it a bit earlier. Announcements **predict** the trajectory of the economy. $\rightarrow$ Nakamura and Steinsson (2018)

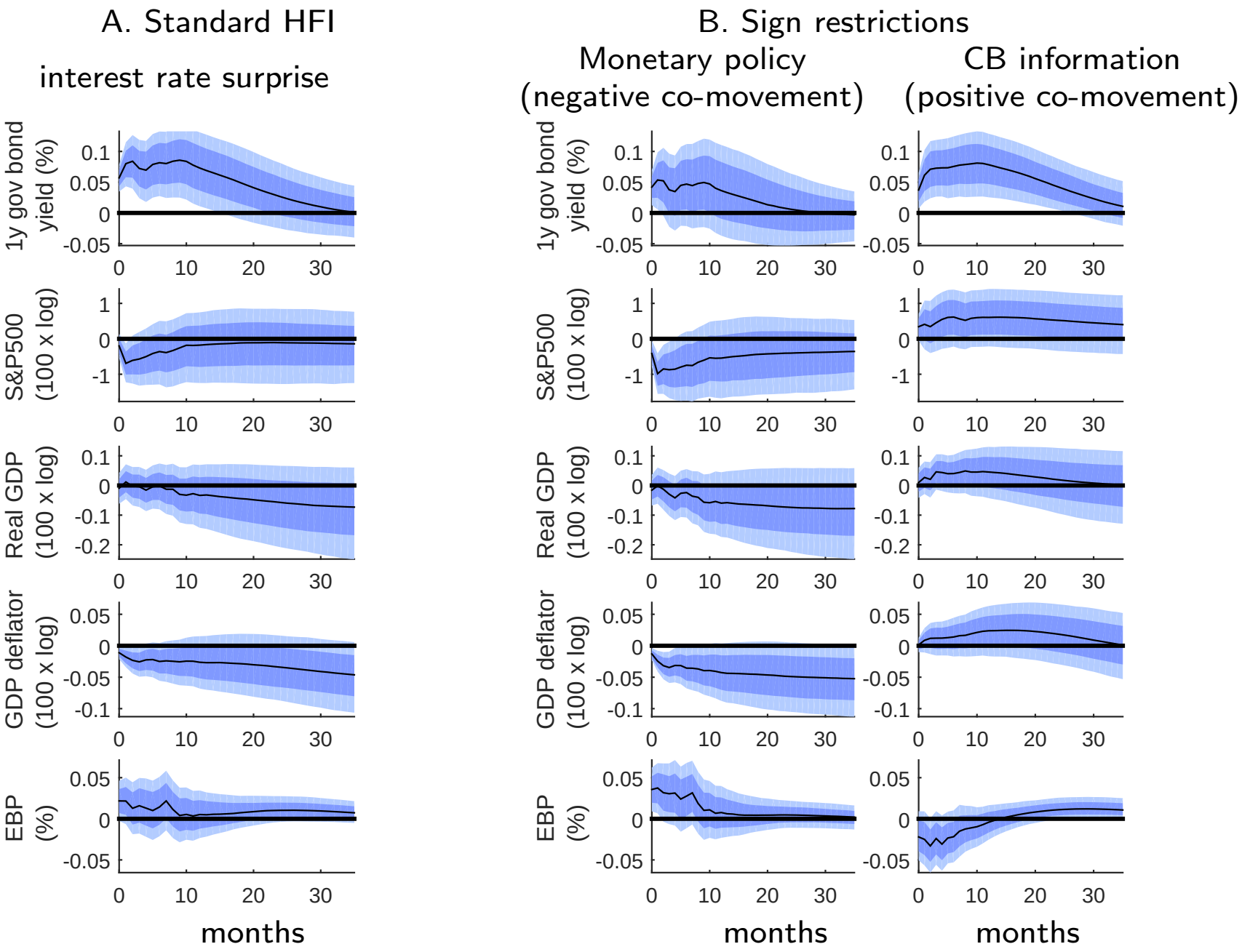
- Self-fulfilling announcements (unexplored). Confidence; strategic complementarities. Public signal, even imprecise, affects the equilibrium. Announcements **cause** the trajectory of the economy.

Conclusions

- We partition interest rate surprises into two components:
  - **monetary policy shock** - an interest rate increase followed by a contraction,
  - **central bank information shock** - an interest rate increase followed by an expansion.
- Lessons
  - Stronger effects of monetary policy on the economy (we purge the attenuation bias from the information effects)
  - Central bank information is relevant. We don't know if it causes or merely predicts the trajectory of the economy.

Additional slides

US VAR with longer maturity surprises

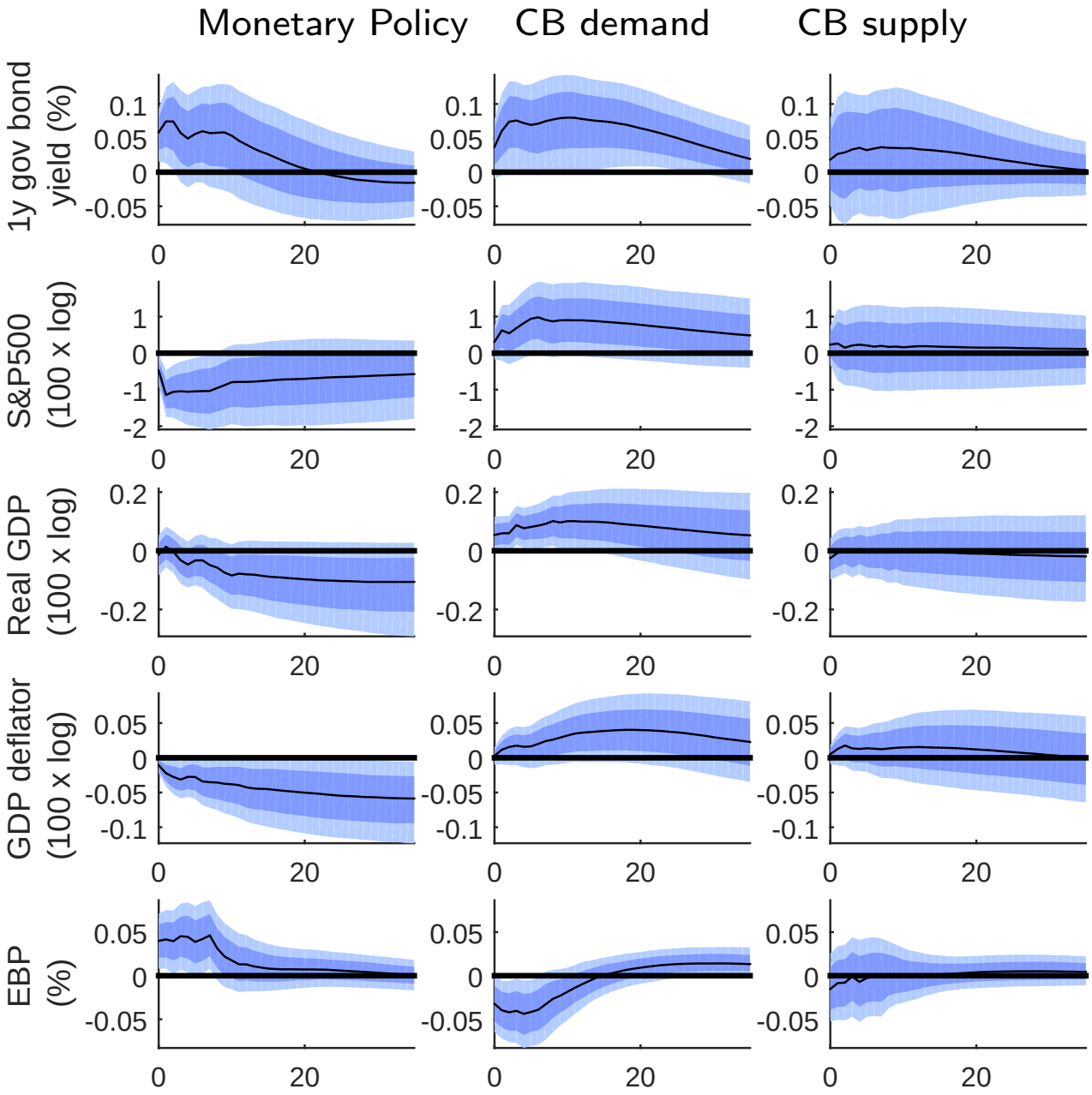


Refining the information shocks

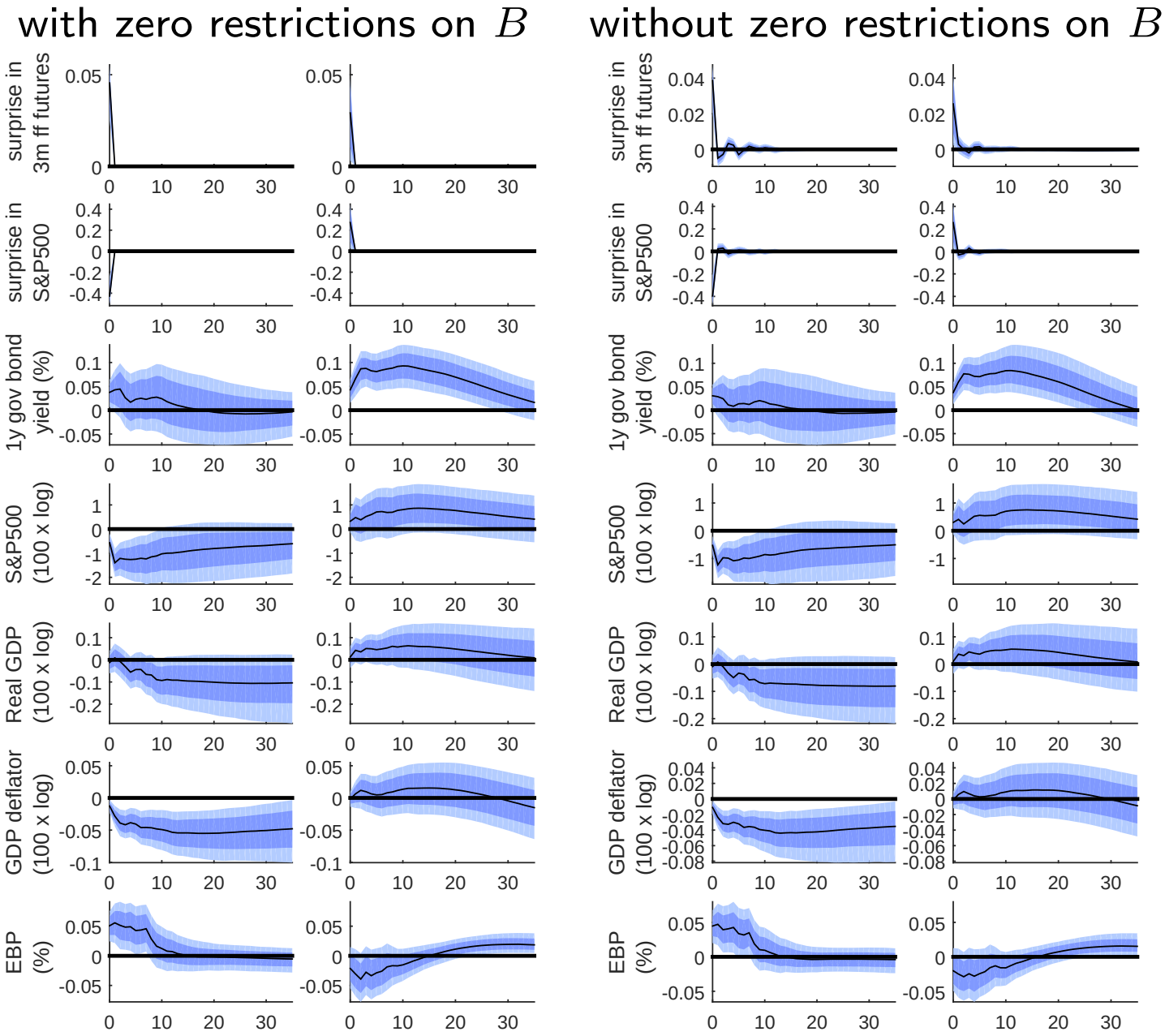
We add daily change in inflation compensation to high-frequency variables

	shock			
variable	Monetary Policy	Central Bank Demand	Central Bank Supply	all
m_t *(high frequency)*				
interest rate	+	+	+	0
stock index	−	+	−	0
inflation compensation	−	+	+	0
y_t *(low frequency)*				
...	•	•	•	•

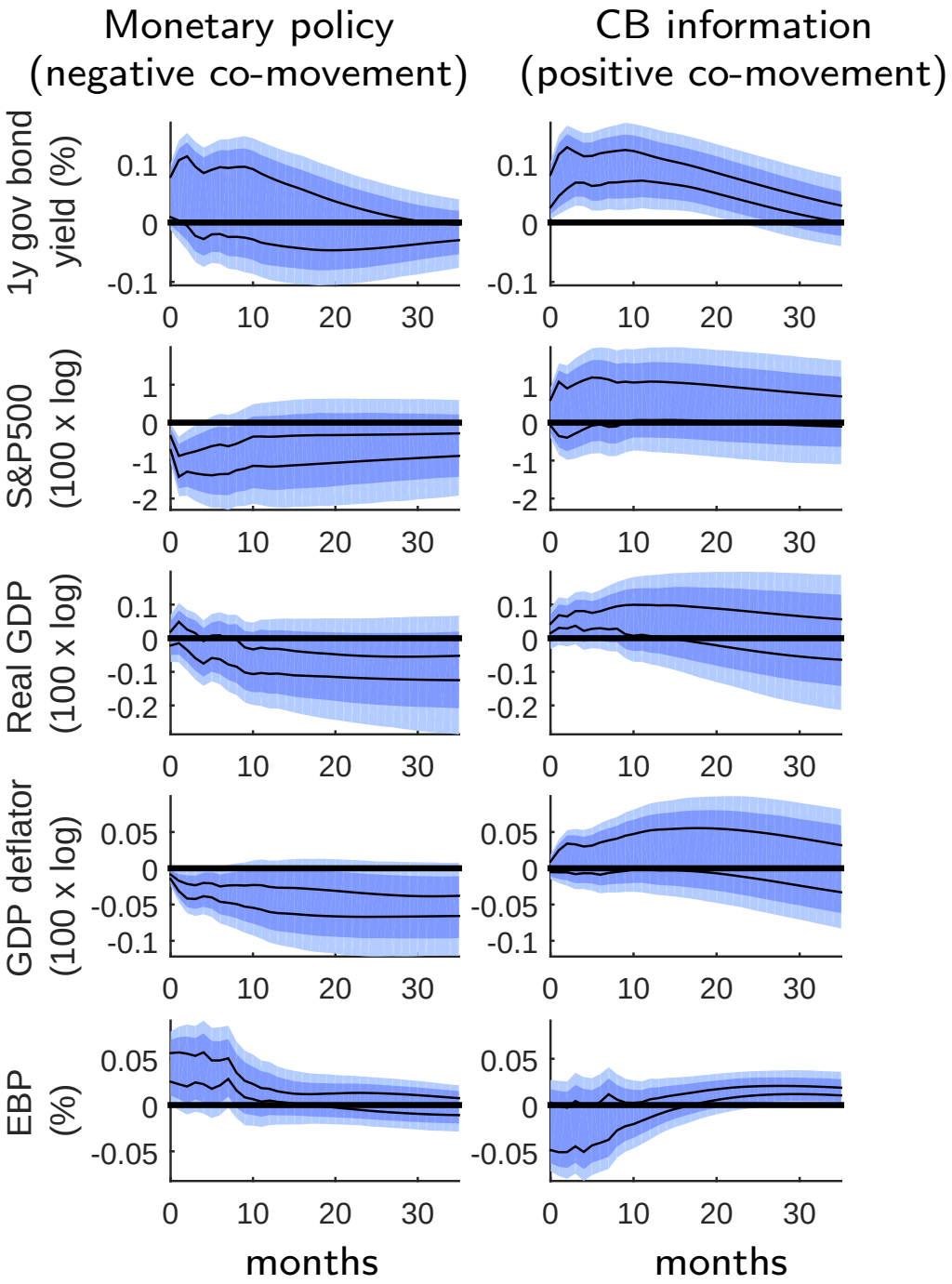
Refining the information shocks: results



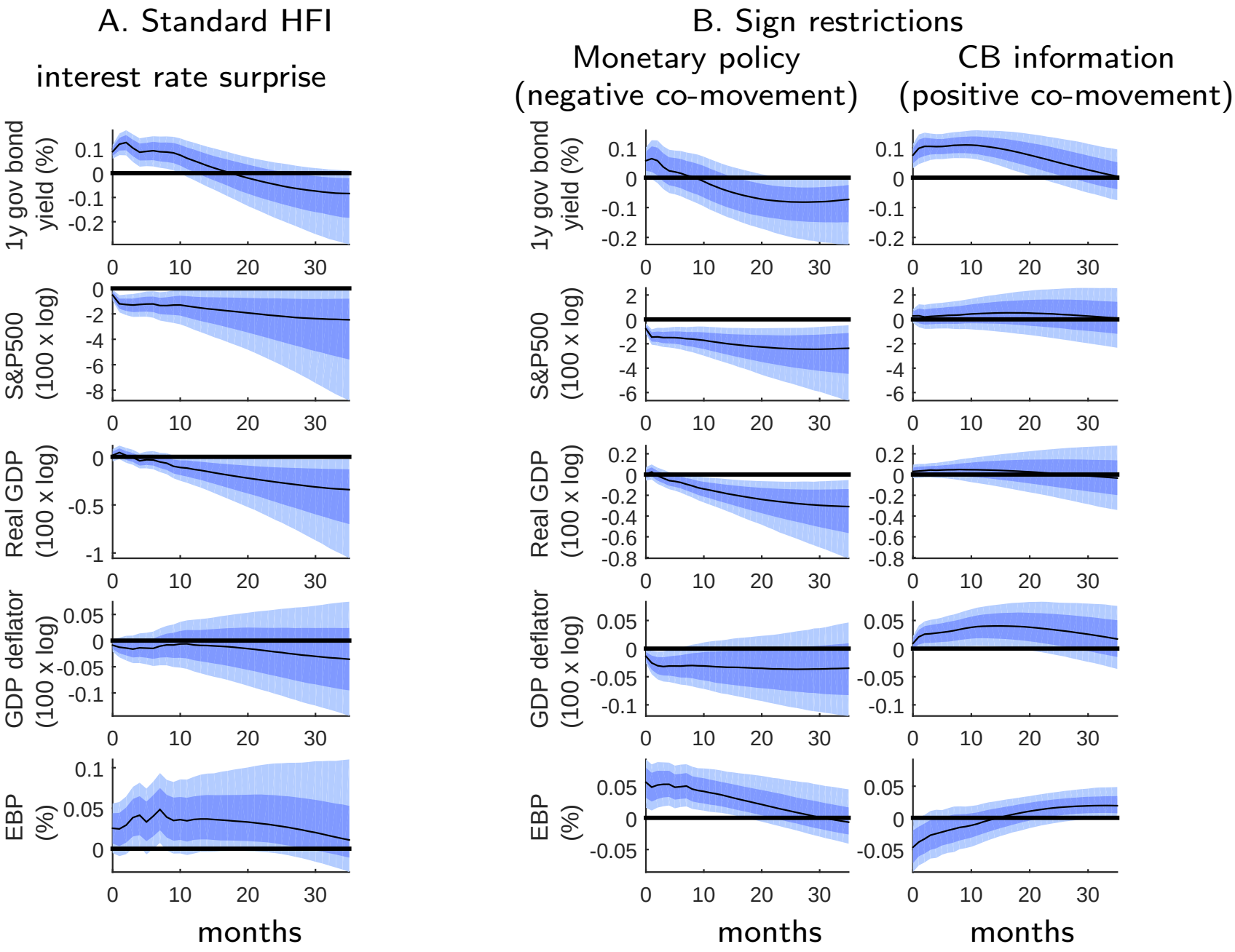
Relaxing the zero restrictions - almost the same



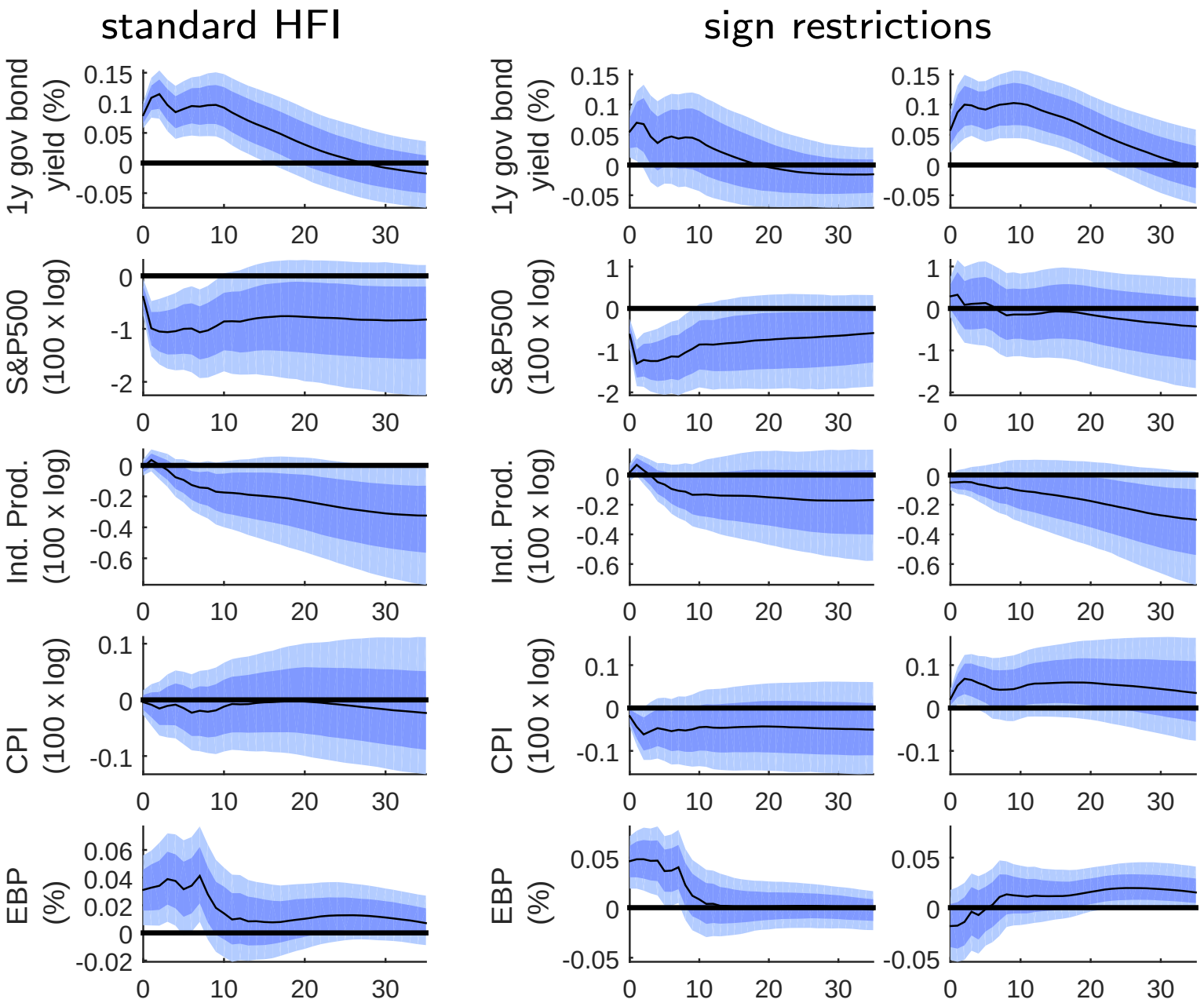
US VAR: Robust error bands (Giacomini-Kitagawa, 2015)



US VAR: sample until December 2008

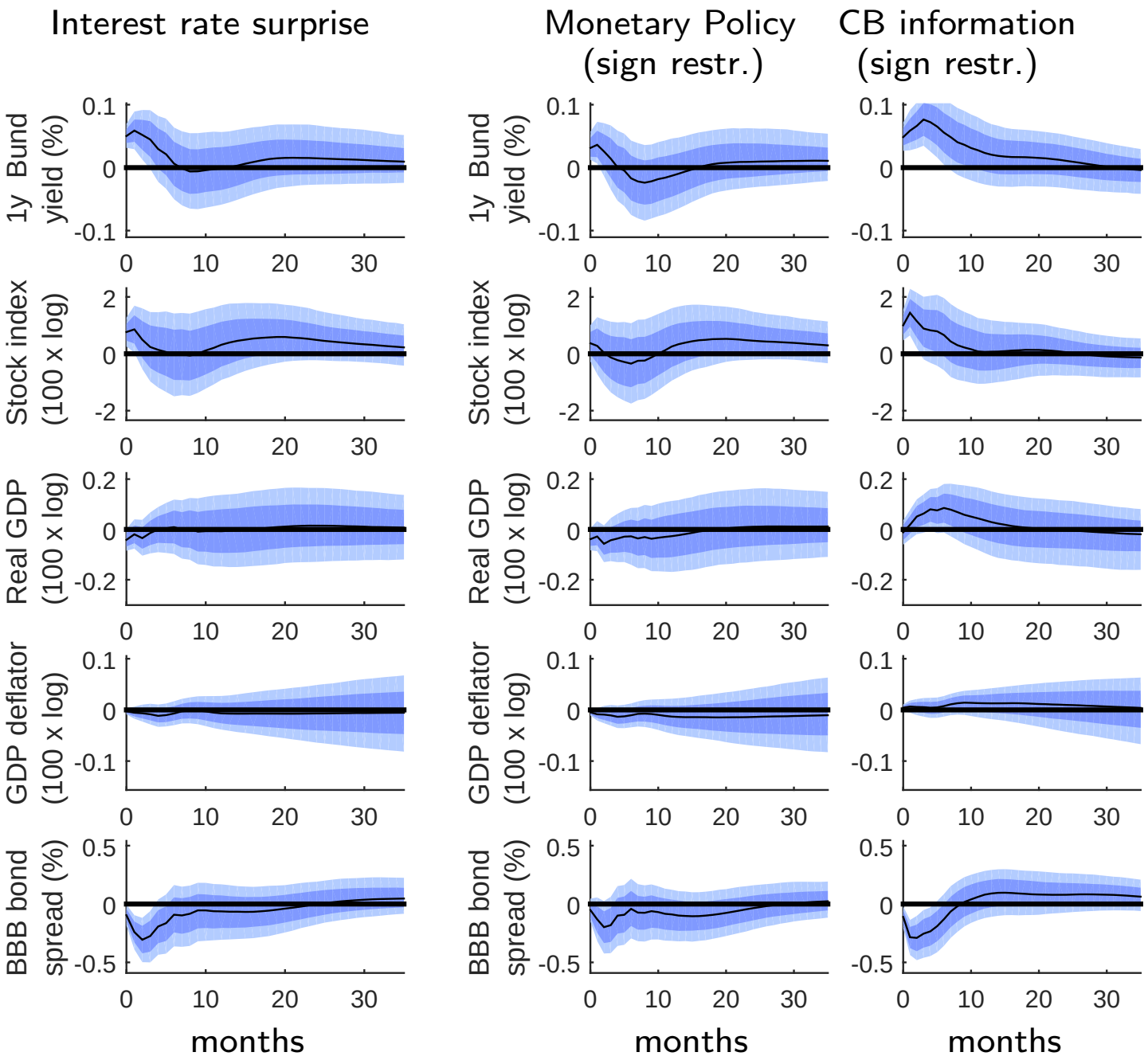


US VAR with IP and CPI

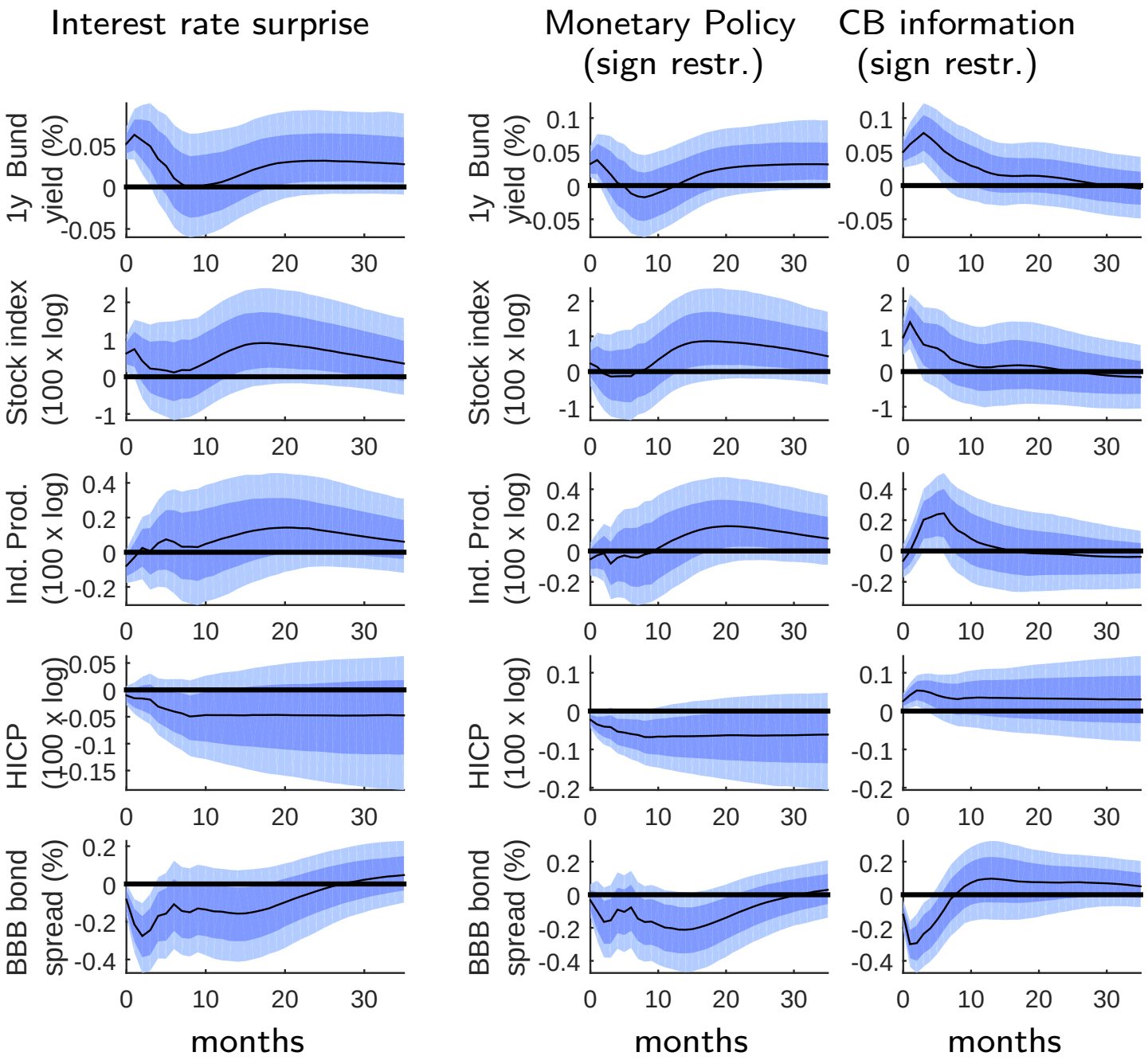


Euro area VAR: IRFs

(More information shocks in the mix)



Euro area VAR with IP and HICP



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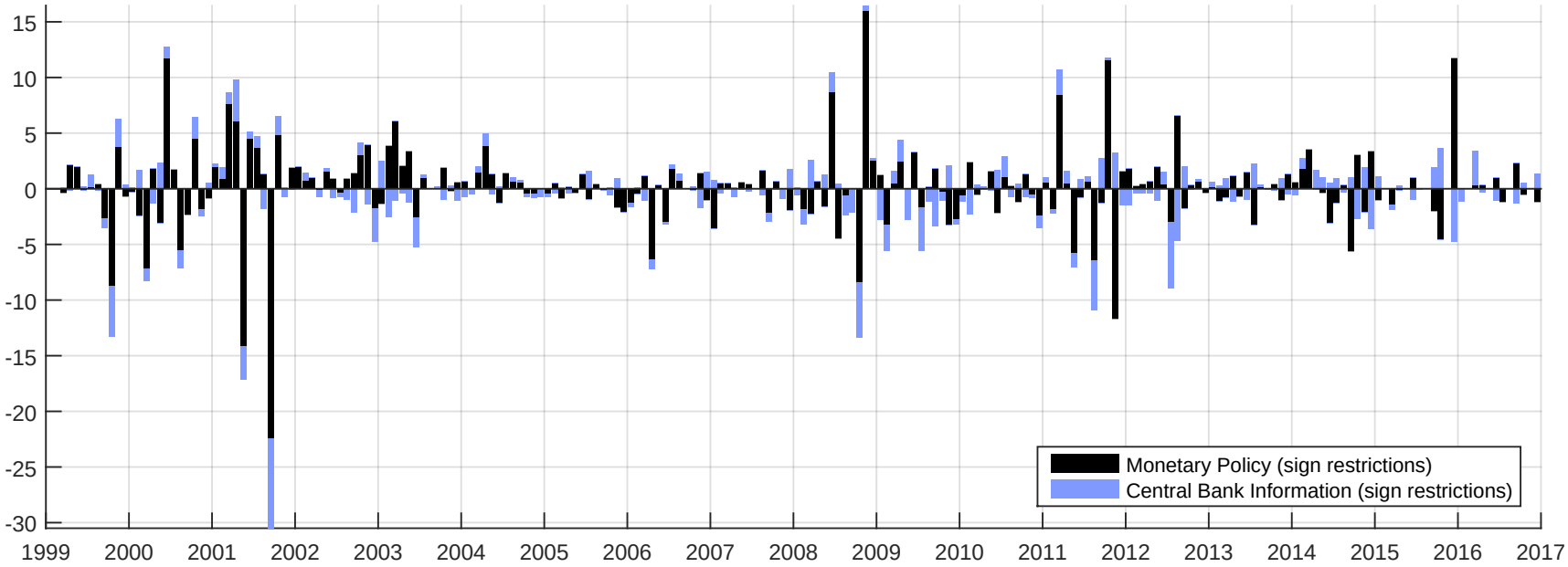

- August 2011: no IR change; "particularly high" uncertainty
- July 2012: IR cut, because "downside risks have materialized"
- October 1999: Millenium bug