Unsurprising Shocks: Information, Premia, and the Monetary Transmission

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[▷]

State of the Art in MP Identification:

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- Market-based forecasts are accurate predictors of future rates [Gürkaynak *et al.* (2006), Joyce *et al.* (2008)]
- Price adjustment at announcements measures the unexpected component of monetary policy [e.g. Rudebusch (1998), Bernanke and Kuttner (2005), Gürkaynak *et al.* (2005)]

Interest Rate Futures

Contract that pays (a function of) the interest rate at time $t + h$

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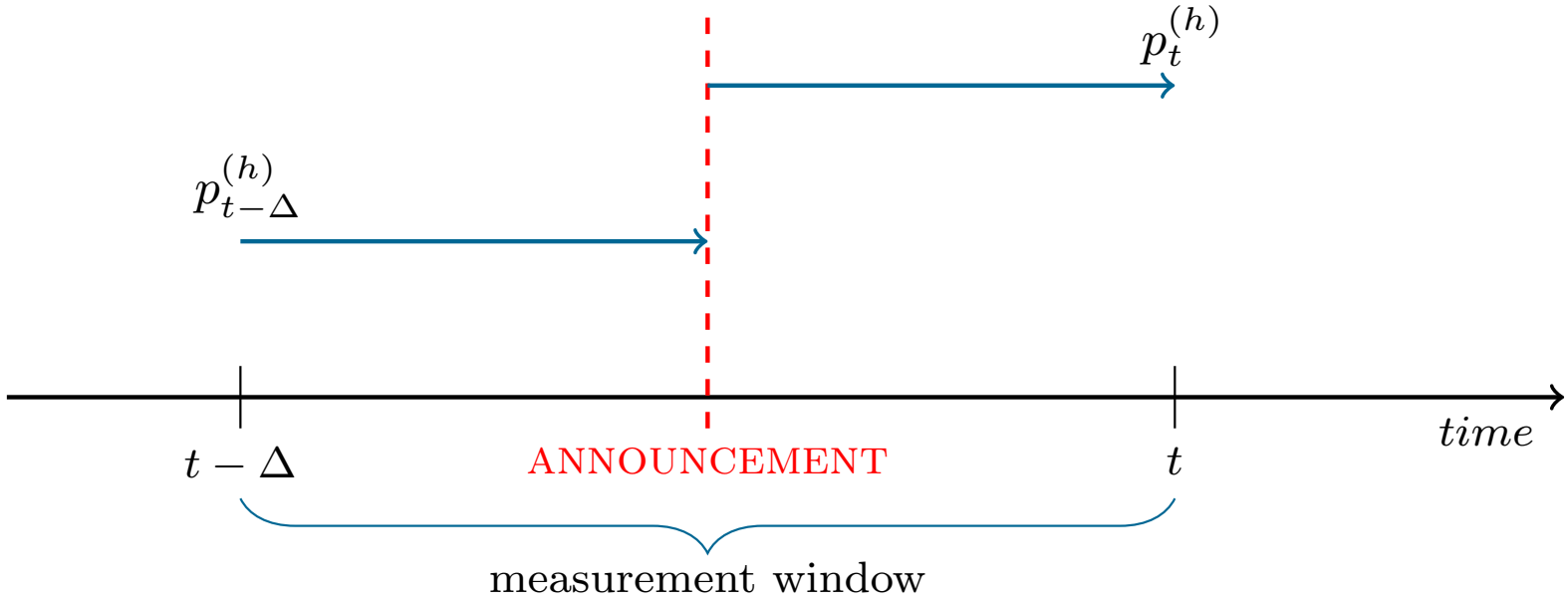
- $p_t^{(h)}$ ➔ price of futures contract expiring at $t + h$
- $\mathbb{E}_t \left(i_{t+h} \right)$ ➔ $t + h$ interest rate expected at time t
- $\zeta_t^{(h)}$ ➔ risk compensation/premium

[Rudebusch (1998), Kuttner (2001), Sack (2004)]

Monetary Surprises



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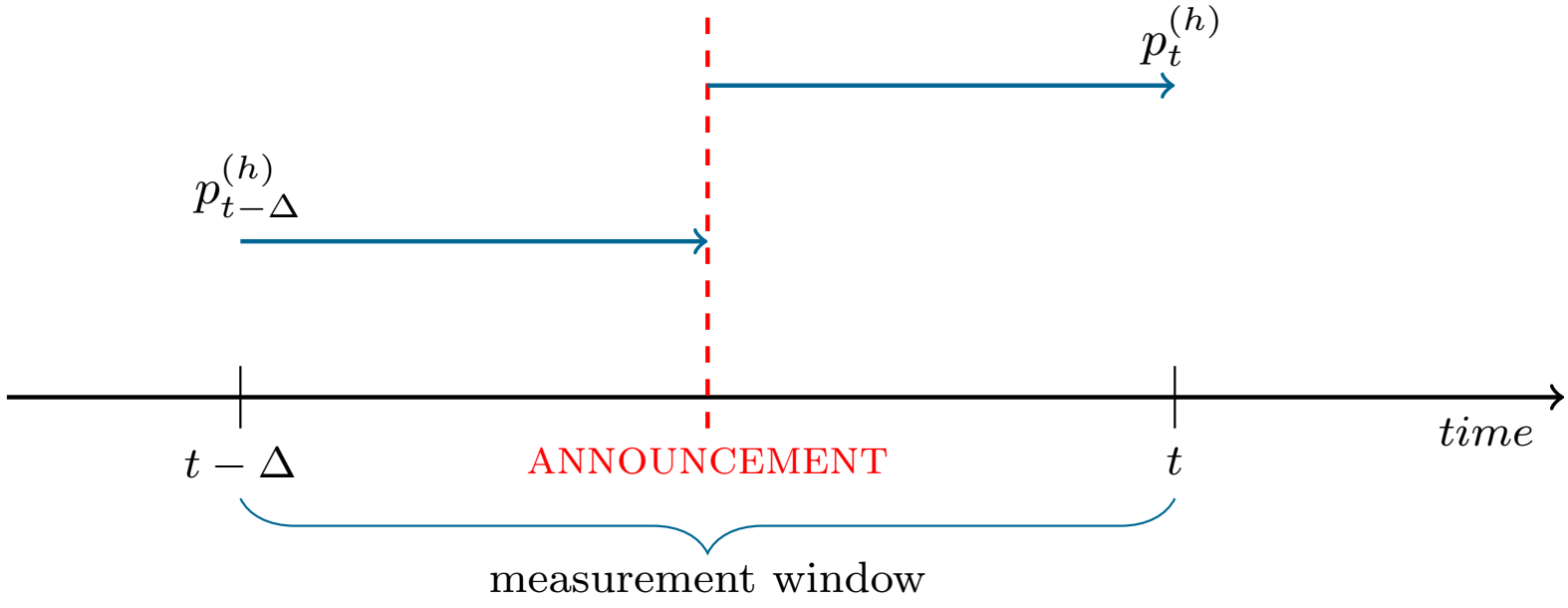

$$mps_t^{(h)} \equiv p_t^{(h)} - p_{t-\Delta}^{(h)} = \underbrace{\left[\mathbb{E}_t\left(i_{t+h}\right) - \mathbb{E}_{t-\Delta}\left(i_{t+h}\right)\right]}_{} + \underbrace{\left[\zeta_t^{(h)} - \zeta_{t-\Delta}^{(h)}\right]}_{}$$

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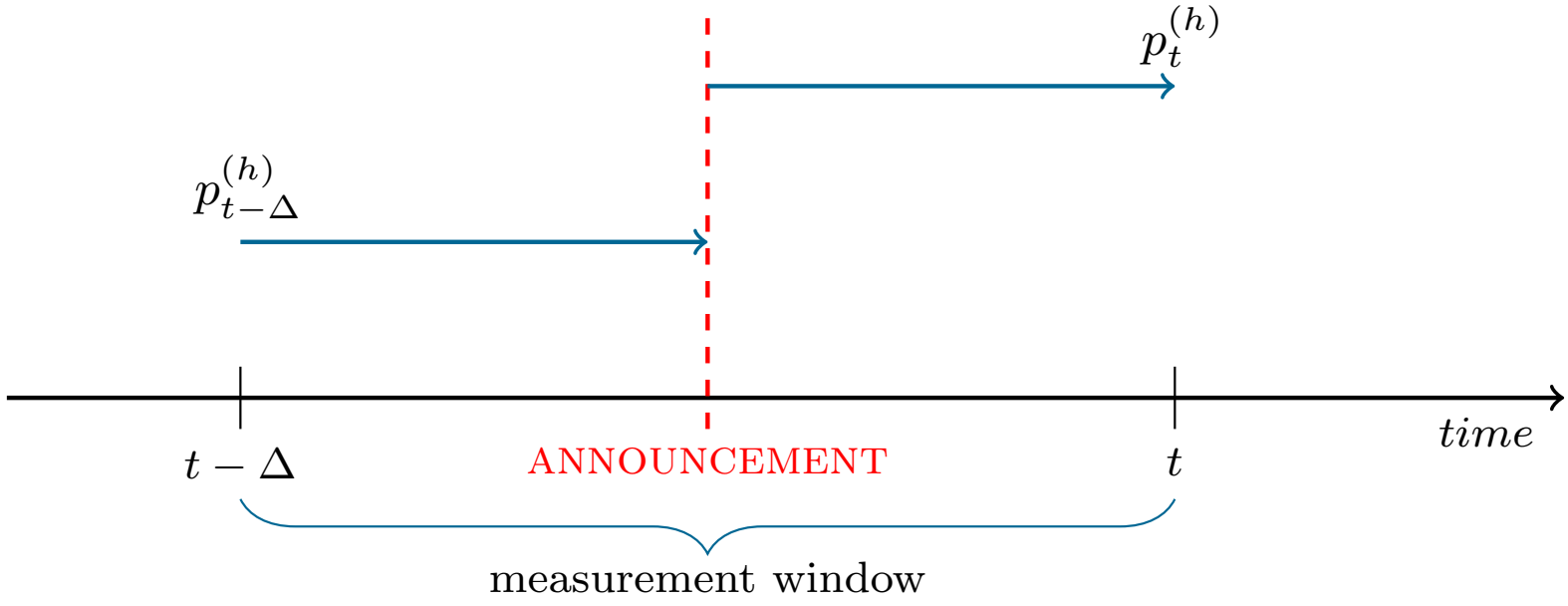

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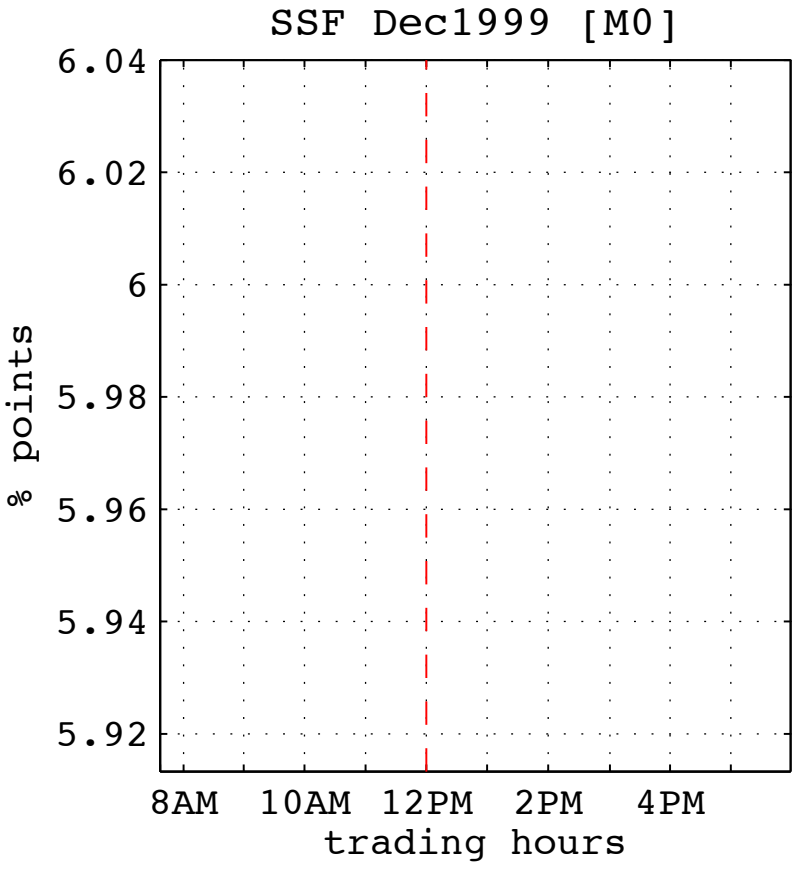
[Gürkaynak, Sack, Swanson (2005)]

A Typical Announcement Day



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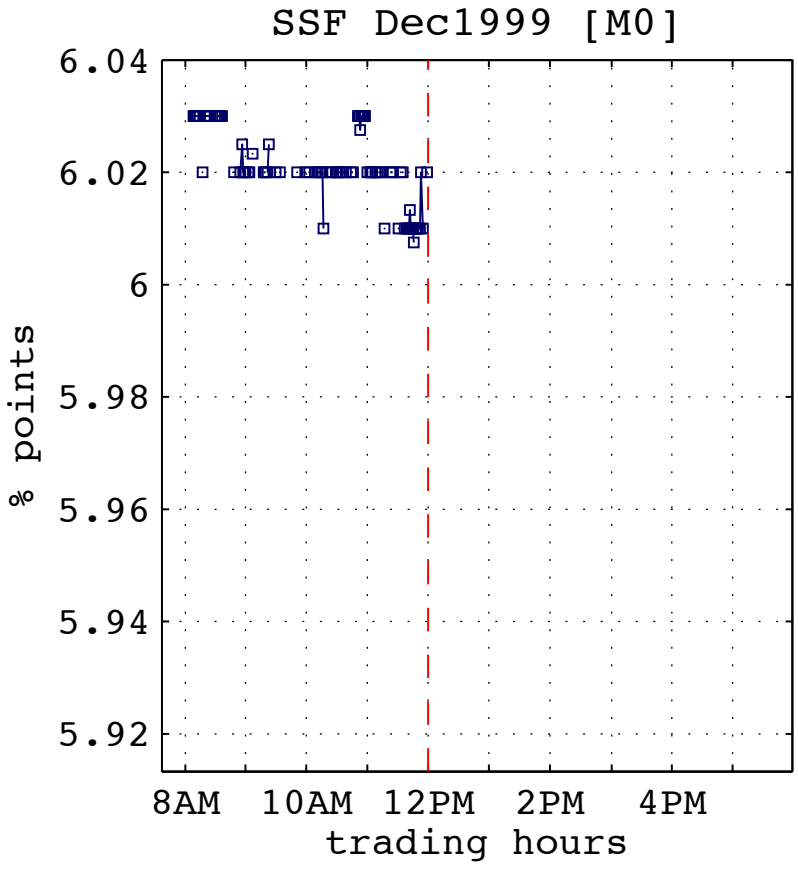

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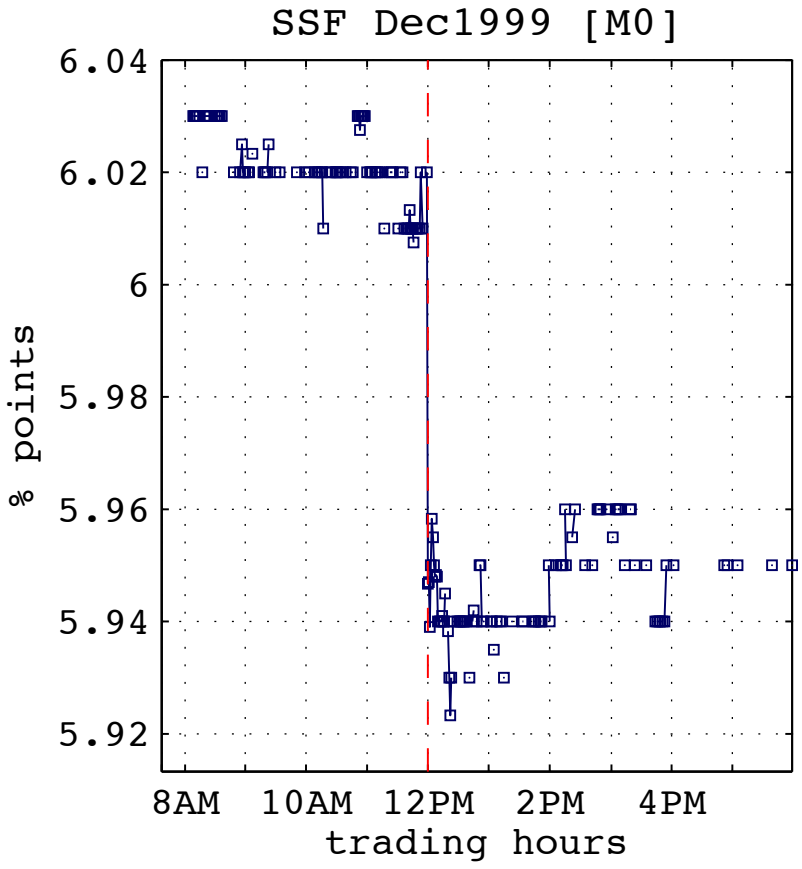

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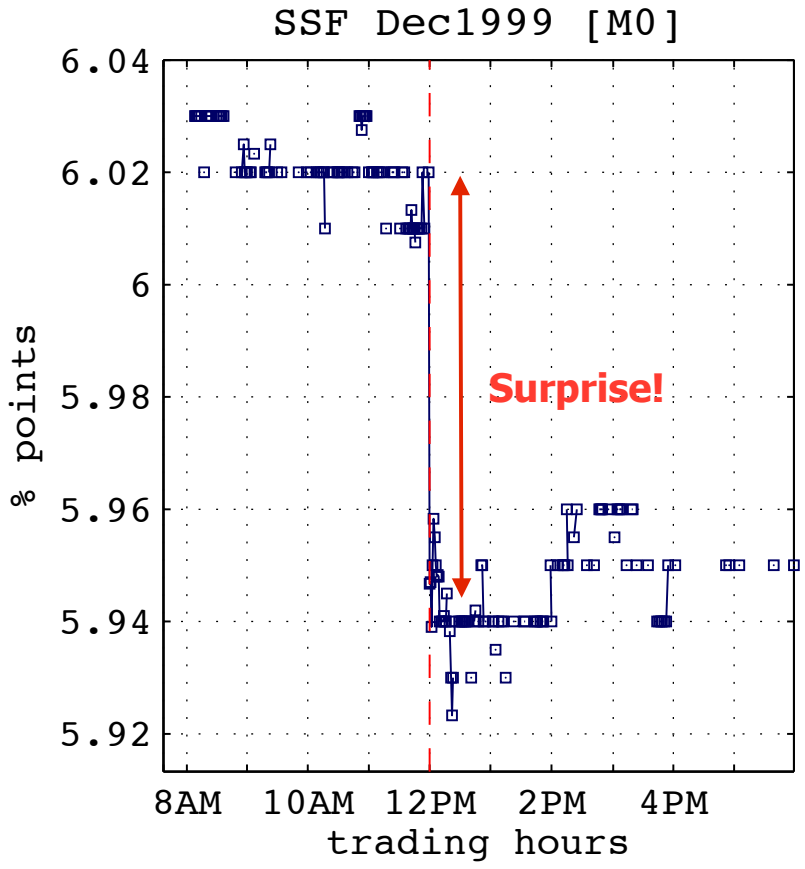

MPS → MP Shocks: Implicit Assumptions

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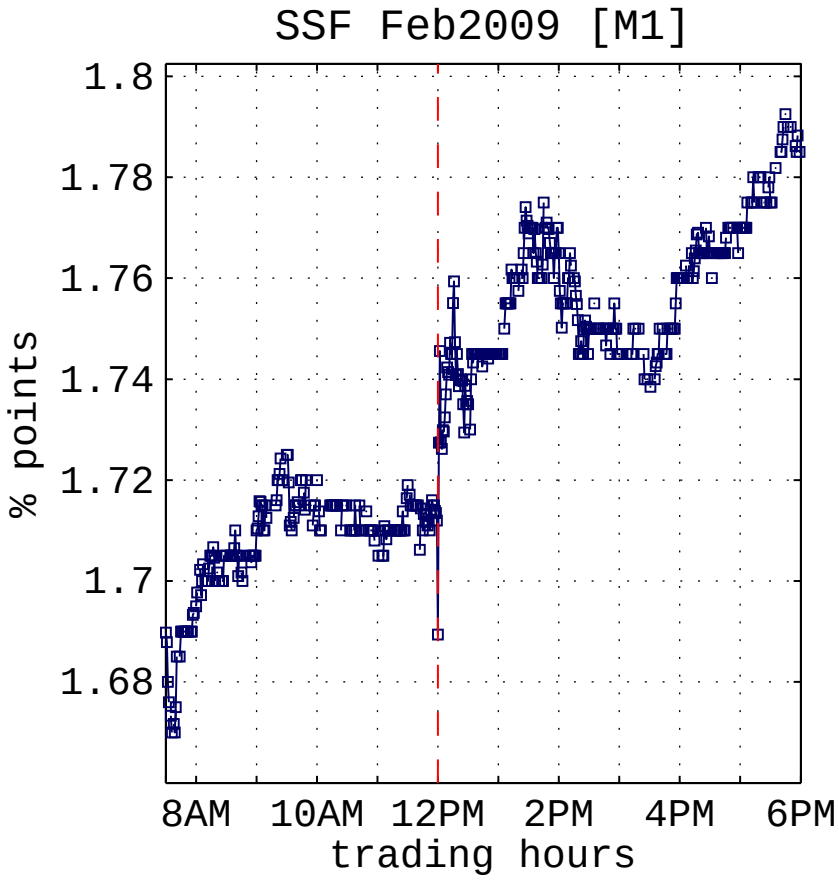
$$= e_t^{mp} + \text{measurement error}$$

UK: Q1-2009



event type: Rate Decision
date: 05/02/2009 12:00
new rate: 1 (old: 1.5)
forecast: 1

conflicts:
none

UK: Q1-2009

BANK OF ENGLAND

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News release

5 February 2009

Bank of England Reduces Bank Rate by 0.5 Percentage Points to 1.0%

The Bank of England's Monetary Policy Committee today voted to reduce the official Bank Rate paid on commercial bank reserves by 0.5 percentage points to 1.0%.

The global economy is in the throes of a severe and synchronised downturn. Output in the advanced economies fell sharply in the fourth quarter of 2008, and growth in the emerging market economies appears to have slowed markedly. Business and household sentiment in many countries has deteriorated. The weakness of the global banking and financial system means that the supply of credit remains constrained.

In the United Kingdom, output dropped sharply in the fourth quarter of 2008 and business surveys point to a similar rate of decline in the early part of this year. Credit conditions faced by companies and households have tightened further. The underlying picture for consumer spending appears weak. Businesses have

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$$
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p_t^{(h)} - p_{t-\Delta}^{(h)} &= \left[\mathbb{E}_t\left(i_{t+h}\right) - \mathbb{E}_{t-\Delta}\left(i_{t+h}\right)\right] + \left[\zeta_t^{(h)} - \zeta_{t-\Delta}^{(h)}\right] \\
&= e_t^{mp} + \ldots + \text{measurement error}
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This Paper: Results

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- Consequences for MP identification
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- Consequences for MP identification
  (see also Miranda-Agrippino and Ricco 2016 – tomorrow)
- Some more puzzles!

Related Literature (subset!)

- **Market Surprises:** Kuttner (2001), Rudebusch (1998), Cochrane and Piazzesi (2002), Bernanke and Kuttner (2005), Sack (2004), Gürkaynak (2005), Gürkaynak, Sack, Swanson (2005), Joyce, Relleen and Sorensen (2006), Swanson (2015), Gürkaynak, Kisacikoglu and Wright (2017), ...

- **Information in MP:** Barackian and Crowe (2013), Ramey (2016), Nakamura and Steinsson (2015), Campbell, Evans, Fisher and Justiniano (2012), Campbell, Fisher, Justiniano and Melosi (2016), Romer and Romer (2000), ...

- **HFI in VARs** Gertler and Karadi (2015), Caldara and Herbst (2016), Miranda-Agrippino and Ricco (2016), Hanson and Stein (2015), Glick an Leduc (2015), Rogers, Scotti and Wright (2014, 2016), ...

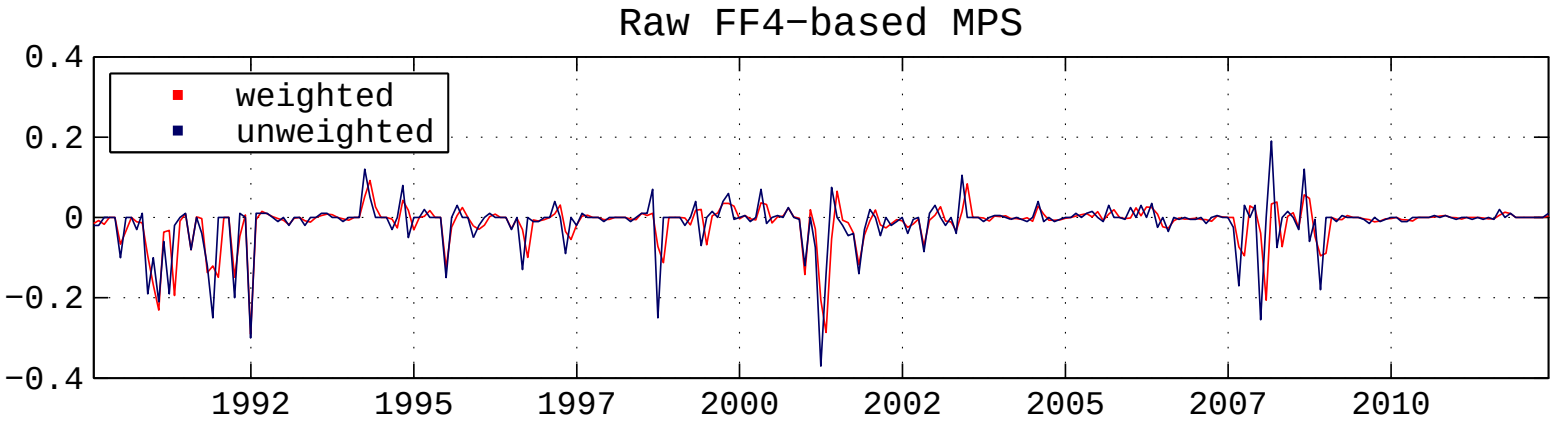
Construction of Monetary Surprises

Daily Surprises

- **US** [Gürkaynak *et al.* (2005)]
  - i. Federal funds futures: $p_{t,FF}^{(h)} = \mathbb{E}_t \left[N^{-1} \sum_{j=1}^{N} i_j^{(h)} \right] + \zeta_{t,FF}^{(h)}$
  - ii. Eurodollar futures: $p_{t,ED}^{(h)} = \mathbb{E}_t \left[\$\text{lib}_h^{(h+90)} \right] + \zeta_{t,ED}^{(h)}$

- **UK** [**NEW!**]
  - i. Short sterling futures: $p_{t,SS}^{(h)} = \mathbb{E}_t \left[£\text{lib}_h^{(h+90)} \right] + \zeta_{t,SS}^{(h)}$

Average US Monthly Surprises in VARs



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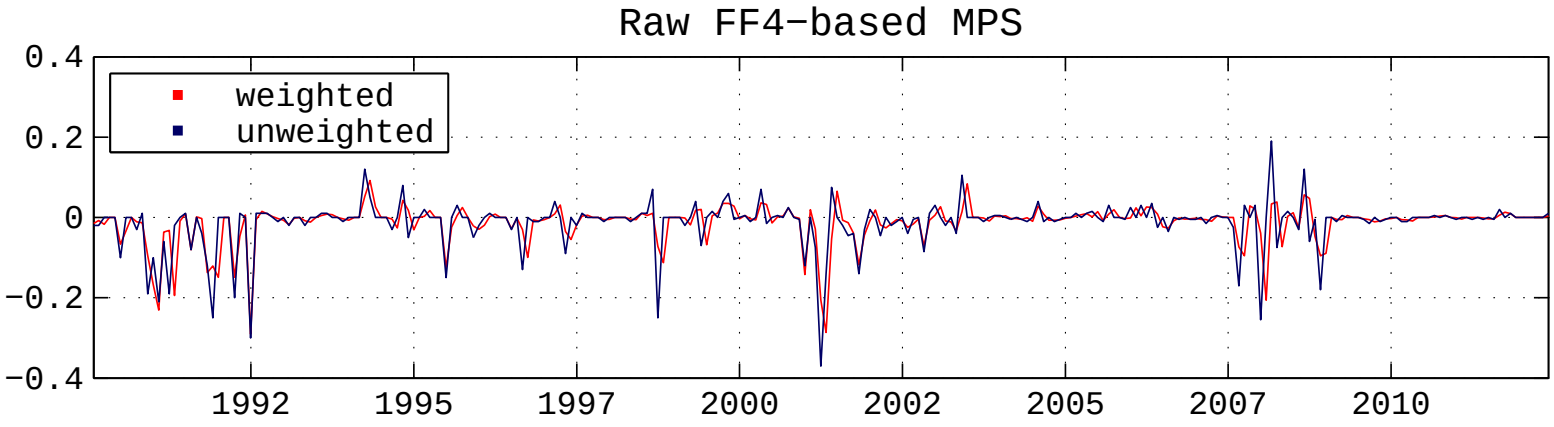
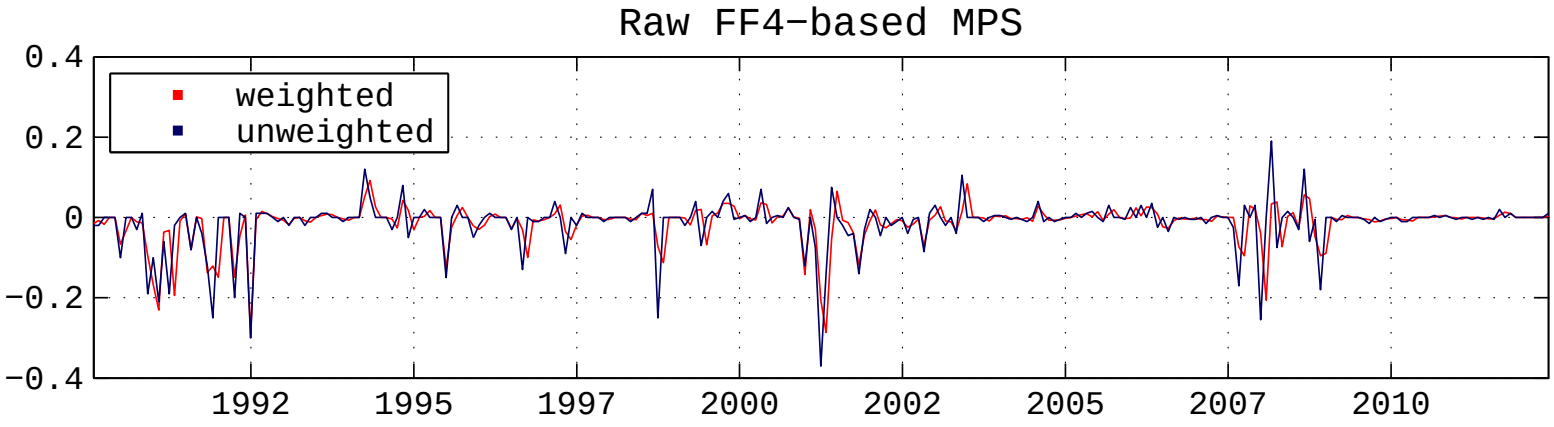


Gertler and Karadi (2015):

- Daily surprise equal to sum of surprises in FOMC days in the past month

- Monthly surprises are average of daily figures within a month

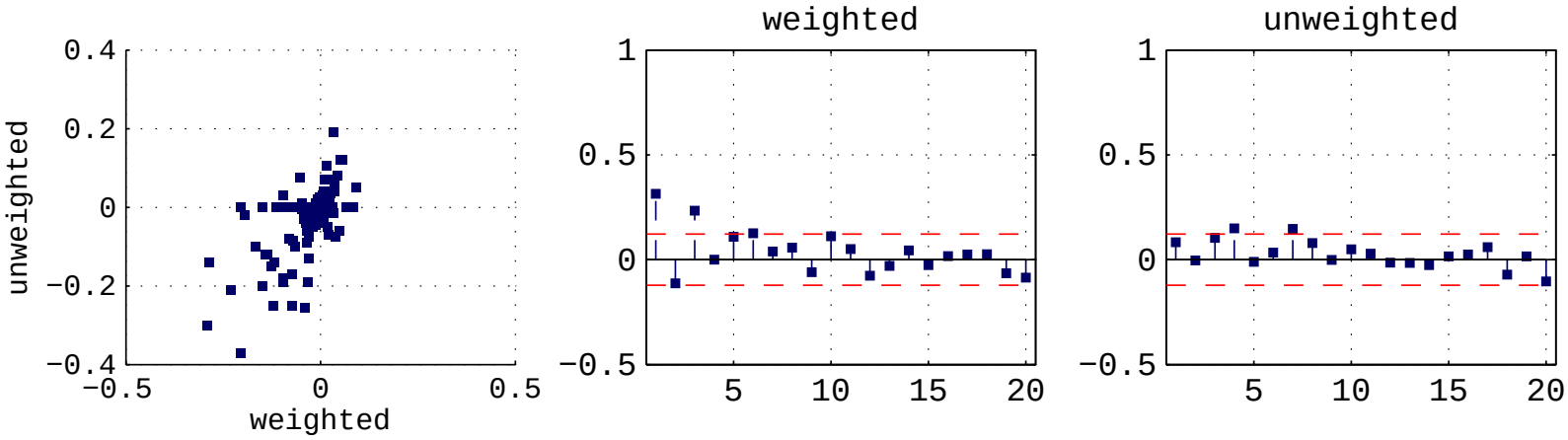
Average US Monthly Surprises in VARs: Autocorrelation



Gertler and Karadi (2015):

- Daily surprise equal to sum of surprises in FOMC days in the past month
- Monthly surprises are average of daily figures within a month
- Surprises are autocorrelated [(Ramey, 2016)]

US Monthly Monetary Surprises



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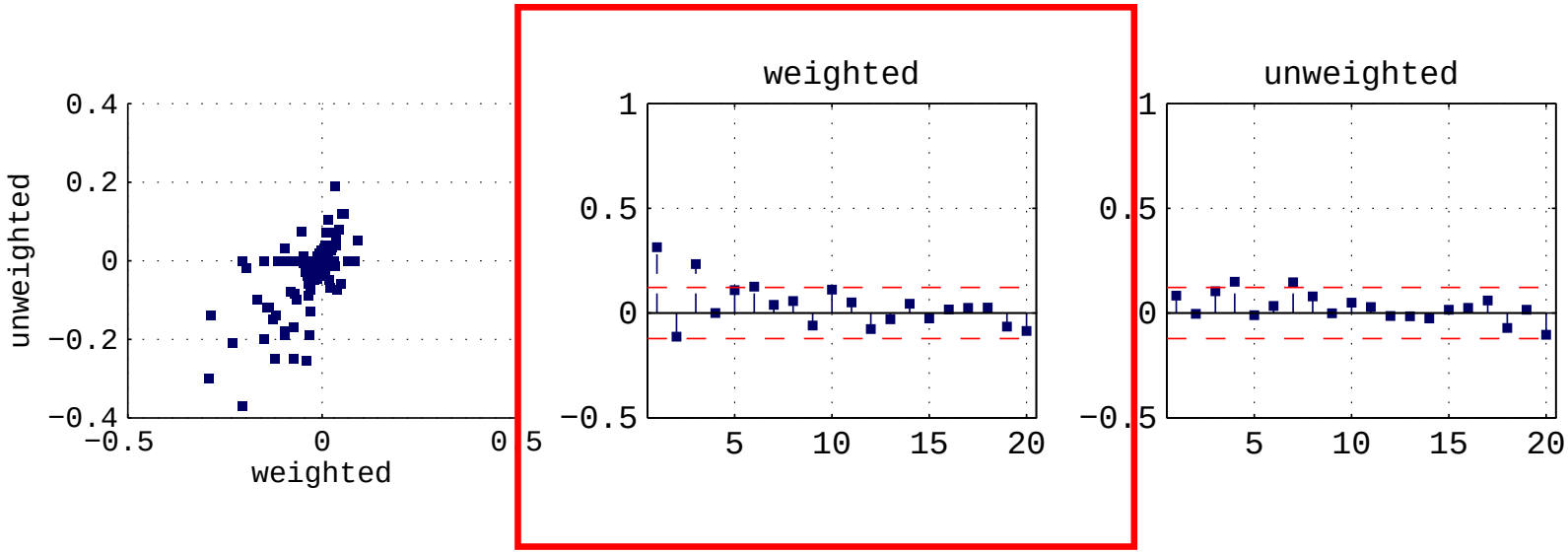
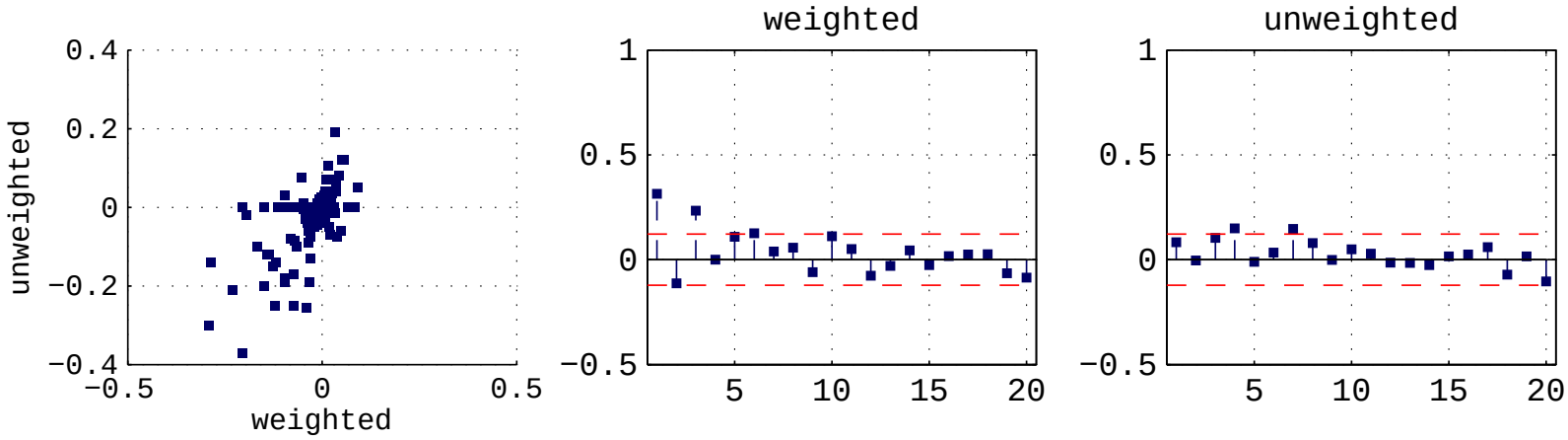


- The weighting introduces autocorrelation!

US Monthly Monetary Surprises



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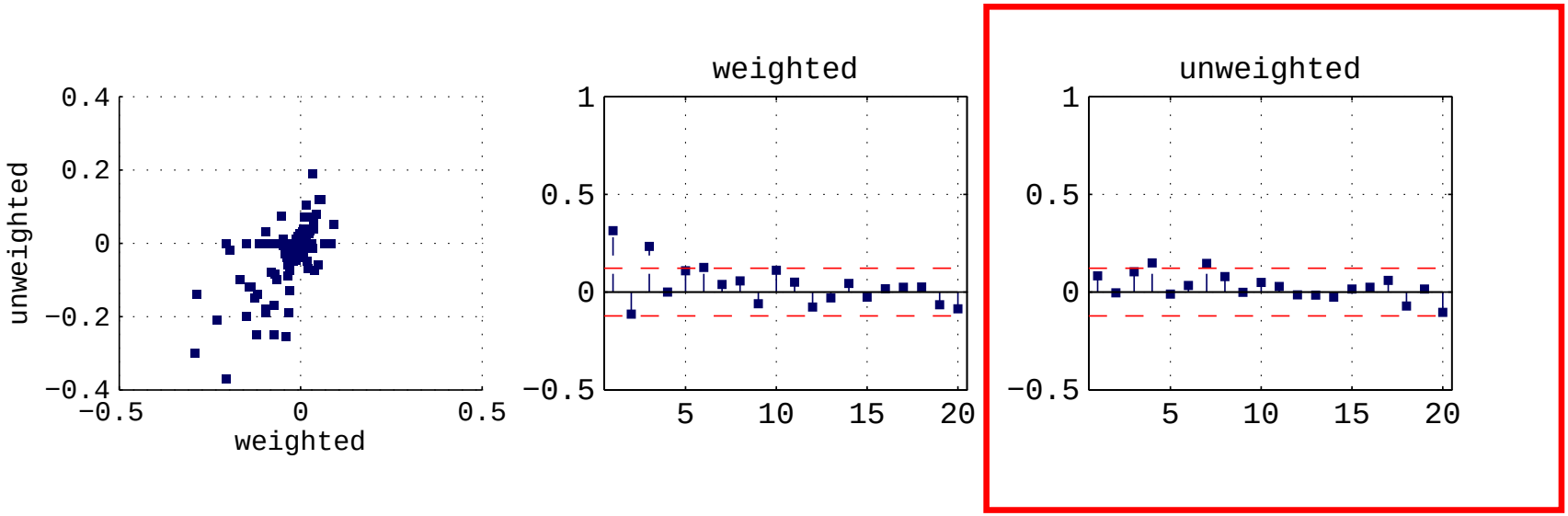
- **Alternative:** monthly surprises as sum of daily surprises

US Monthly Monetary Surprises



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- **Alternative:** monthly surprises as sum of daily surprises
- Some autocorrelation remains...

UK Short Sterling Futures

- No FF-equivalent that tracks Bank Rate
- Start date in June 1997: independent MPC
- Contracts traded at the Intercontinental Exchange (ICE), minute-by-minute data
- 26 expiration dates, two of which are the current and next month
- Contract used is the front contract ➔ expectations up to 3 months
- If announcement date $\approx$ expiration date ➔ roll-over to next contract

Source: Thomson Reuters Tick History database

UK Monetary Surprises

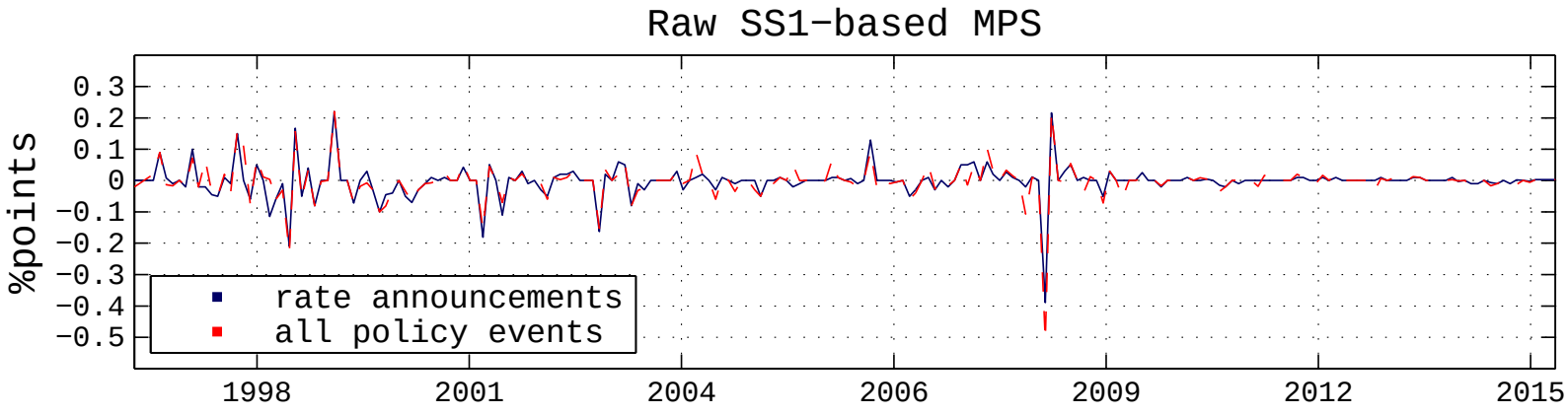
- Monetary policy surprise from Short Sterling (SS) futures

$$p_{SS.t}^{(h)} - p_{SS,t-\Delta}^{(h)} = \left(\mathbb{E}_t \left[\pounds\text{lib}_h^{(h+90)} \right] - \mathbb{E}_{t-\Delta} \left[\pounds\text{lib}_h^{(h+90)} \right] \right) + \left(\zeta_{SS,t}^{(h)} - \zeta_{SS,t-\Delta}^{(h)} \right)$$

- Correction for Bank Rate [Sack (2004)]

$$\begin{aligned} mps_{SS,t}^{(h)} &= \left(SS_t^{(h)} - SS_{t-\Delta}^{(\iota)} \right) - \left(BS_t^{(\iota)} - BS_{t-\Delta}^{(\iota)} \right) \\ &= \left[\mathbb{E}_t \left(\bar{\mathbf{r}}_\iota^{\iota+90} \right) - \mathbb{E}_{t-\Delta} \left(\bar{\mathbf{r}}_\iota^{\iota+90} \right) \right] + \left[\zeta_t^{(\iota)} - \zeta_{t-\Delta}^{(\iota)} \right] \end{aligned}$$

UK Monthly Monetary Surprises – SS1



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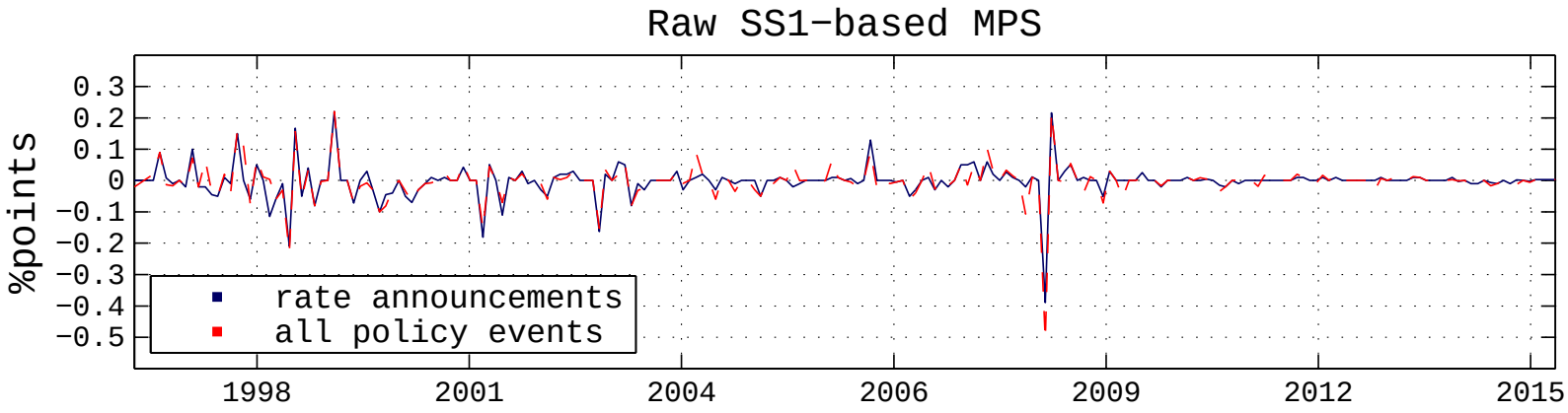

- All events = Minutes & Inflation Report (larger window)

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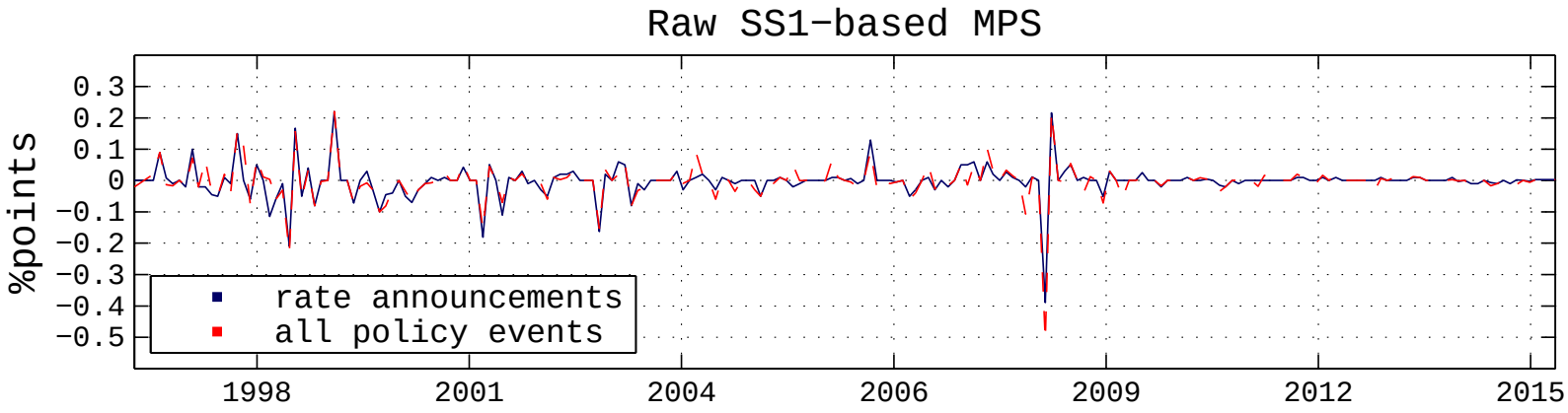

- All events = Minutes & Inflation Report (larger window)
- Series are **remarkably similar...**

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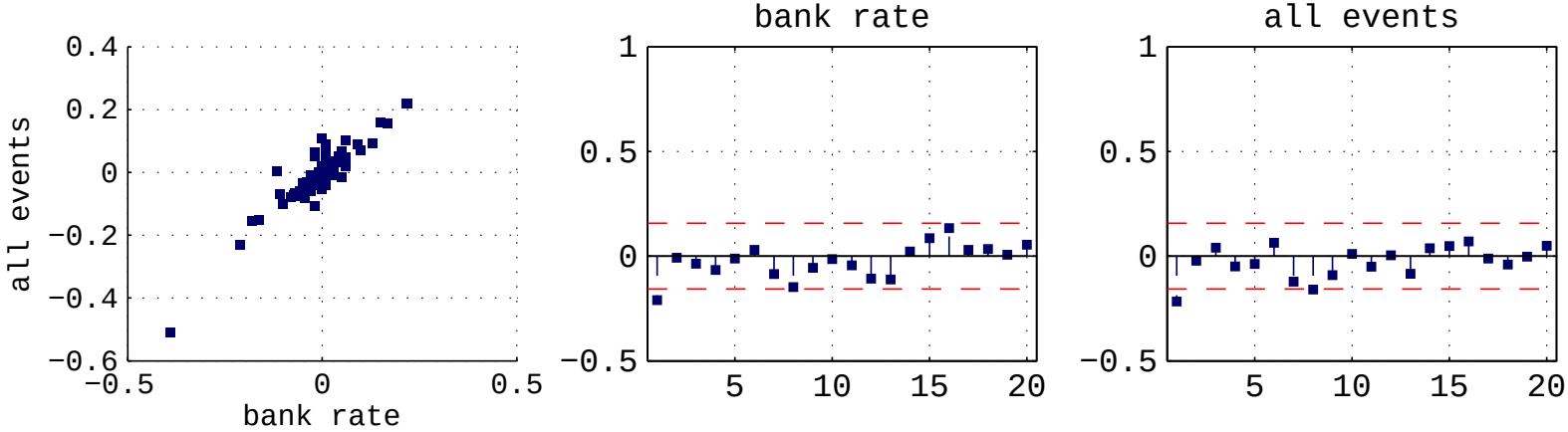

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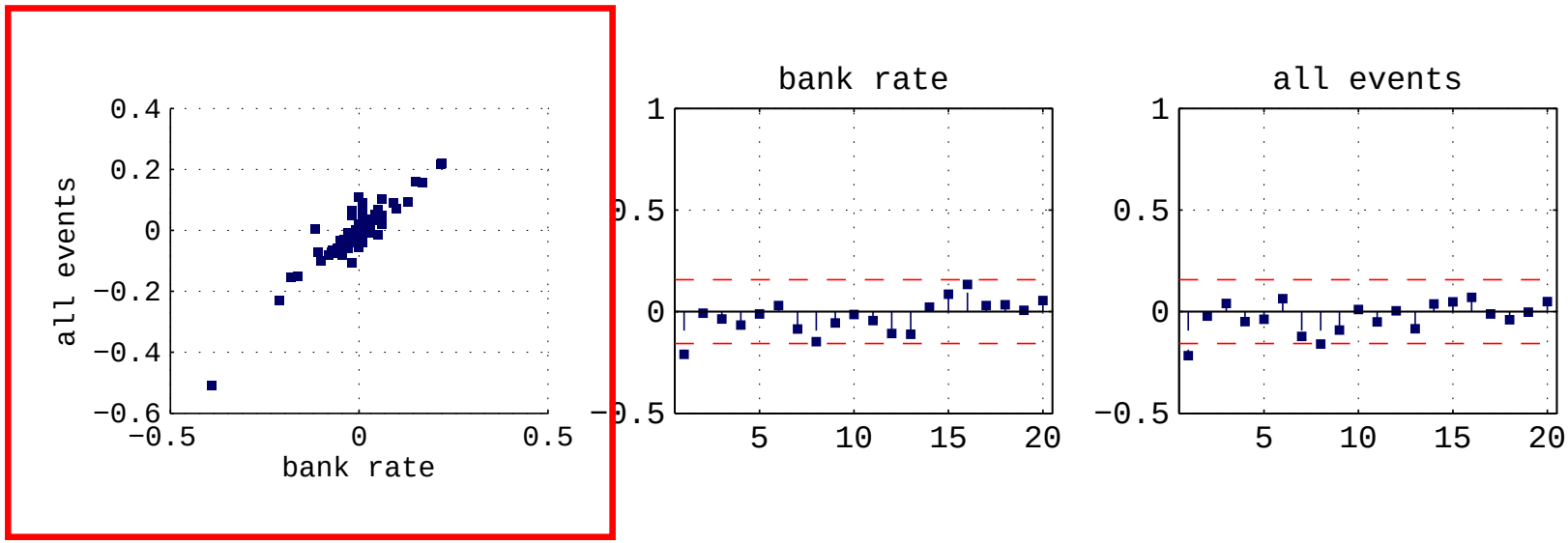

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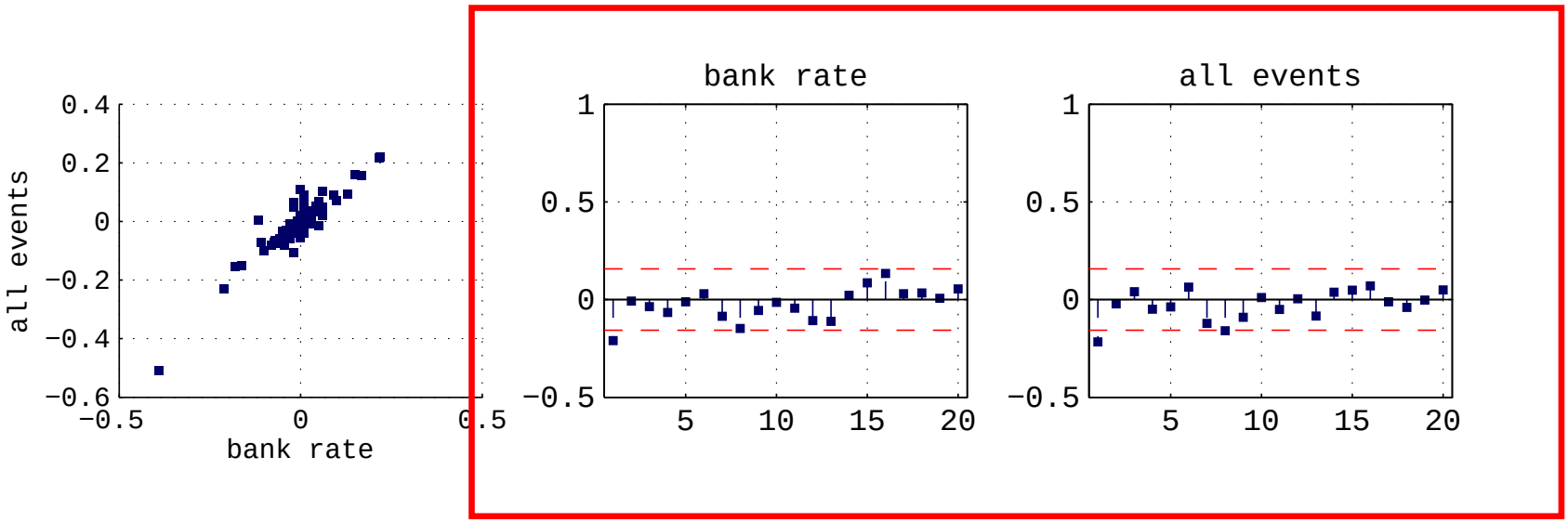

- Similar information content...
- Some autocorrelation without any of the weighting

Predictability of Monetary Surprises

Lagged Information

$$mps_t = \kappa_c + \kappa_x x_{t-1} + \sum_{j=1}^{J} \kappa_j mps_{t-j} + \epsilon_t$$

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- Estimated (dynamic) factors extracted from large data
- Revised and Unrevised data
- All available history (no ZLB), lagged one month

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- Estimated (dynamic) factors extracted from large data
- Revised and Unrevised data
- All available history (no ZLB), lagged one month
- Lots of robustness:
  i. Pre-crisis, post 1994
  ii. Scheduled vs Unscheduled

US Surprises and Past Information

Table II: Predictability of Monetary Surprises: Past Information

	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$f_{1,t-1}$	-0.014	[-1.51]	-0.011	[-1.67]*	-0.021	[-3.05]***	-0.023	[-3.25]***	-0.021	[-3.21]***
$f_{2,t-1}$	0.003	[0.63]	0.002	[0.74]	0.004	[1.07]	0.004	[1.18]	0.004	[1.07]
$f_{3,t-1}$	-0.01	[-1.50]	0.002	[0.37]	0.003	[0.63]	0.003	[0.58]	0.004	[0.72]
$f_{4,t-1}$	0.015	[1.43]	0.015	[2.05]**	0.015	[2.07]**	0.015	[2.02]**	0.013	[1.91]*
$f_{5,t-1}$	0.003	[0.34]	0.001	[0.21]	-0.001	[-0.14]	0.001	[0.15]	0.004	[0.57]
$f_{6,t-1}$	-0.013	[-2.02]**	-0.012	[-2.19]**	-0.011	[-1.89]*	-0.012	[-1.90]*	-0.013	[-2.18]**
$f_{7,t-1}$	-0.014	[-1.32]	-0.007	[-0.98]	-0.009	[-1.21]	-0.01	[-1.33]	-0.009	[-1.35]
$f_{8,t-1}$	-0.004	[-0.70]	-0.002	[-0.49]	-0.001	[-0.16]	-0.001	[-0.27]	0.000	[0.07]
$f_{9,t-1}$	0.002	[0.26]	-0.003	[-0.68]	-0.008	[-1.63]	-0.006	[-1.32]	-0.006	[-1.26]
$f_{10,t-1}$	0.000	[0.01]	0.005	[0.84]	0.003	[0.71]	0.003	[0.64]	0.004	[0.74]
$f^*_{1,t-1}$	0.022	[2.36]**	0.015	[2.30]**	0.020	[2.78]***	0.022	[3.17]***	0.021	[3.12]***
$f^*_{2,t-1}$	-0.011	[-1.73]*	-0.004	[-0.75]	-0.005	[-0.88]	-0.005	[-0.84]	-0.005	[-0.92]
$f^*_{3,t-1}$	0.006	[1.51]	0.006	[1.47]	0.011	[2.34]**	0.013	[2.62]***	0.014	[3.14]***
$f^*_{4,t-1}$	0.014	[1.73]*	0.006	[0.95]	0.004	[0.70]	0.004	[0.65]	0.003	[0.49]
$f^*_{5,t-1}$	-0.006	[-0.79]	-0.002	[-0.37]	-0.003	[-0.57]	-0.003	[-0.57]	-0.003	[-0.62]

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	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$f_{1,t-1}$	-0.014	[-1.51]	-0.011	[-1.67]*	-0.021	[-3.05]***	-0.023	[-3.25]***	-0.021	[-3.21]***
$f_{2,t-1}$	0.003	[0.63]	0.002	[0.74]	0.004	[1.07]	0.004	[1.18]	0.004	[1.07]
$f_{3,t-1}$	-0.01	[-1.50]	0.002	[0.37]	0.003	[0.63]	0.003	[0.58]	0.004	[0.72]
$f_{4,t-1}$	0.015	[1.43]	0.015	[2.05]**	0.015	[2.07]**	0.015	[2.02]**	0.013	[1.91]*
$f_{5,t-1}$	0.003	[0.34]	0.001	[0.21]	-0.001	[-0.14]	0.001	[0.15]	0.004	[0.57]
$f_{6,t-1}$	-0.013	[-2.02]**	-0.012	[-2.19]**	-0.011	[-1.89]*	-0.012	[-1.90]*	-0.013	[-2.18]**
$f_{7,t-1}$	-0.014	[-1.32]	-0.007	[-0.98]	-0.009	[-1.21]	-0.01	[-1.33]	-0.009	[-1.35]
$f_{8,t-1}$	-0.004	[-0.70]	-0.002	[-0.49]	-0.001	[-0.16]	-0.001	[-0.27]	0.000	[0.07]
$f_{9,t-1}$	0.002	[0.26]	-0.003	[-0.68]	-0.008	[-1.63]	-0.006	[-1.32]	-0.006	[-1.26]
$f_{10,t-1}$	0.000	[0.01]	0.005	[0.84]	0.003	[0.71]	0.003	[0.64]	0.004	[0.74]
$f^*_{1,t-1}$	0.022	[2.36]**	0.015	[2.30]**	0.020	[2.78]***	0.022	[3.17]***	0.021	[3.12]***
$f^*_{2,t-1}$	-0.011	[-1.73]*	-0.004	[-0.75]	-0.005	[-0.88]	-0.005	[-0.84]	-0.005	[-0.92]
$f^*_{3,t-1}$	0.006	[1.51]	0.006	[1.47]	0.011	[2.34]**	0.013	[2.62]***	0.014	[3.14]***
$f^*_{4,t-1}$	0.014	[1.73]*	0.006	[0.95]	0.004	[0.70]	0.004	[0.65]	0.003	[0.49]
$f^*_{5,t-1}$	-0.006	[-0.79]	-0.002	[-0.37]	-0.003	[-0.57]	-0.003	[-0.57]	-0.003	[-0.62]

US Surprises and Past Information

Table II: Predictability of Monetary Surprises: Past Information

	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$f_{1,t-1}$	-0.014	[-1.51]	-0.011	[-1.67]*	-0.021	[-3.05]***	-0.023	[-3.25]***	-0.021	[-3.21]***
$f_{2,t-1}$	0.003	[0.63]	0.002	[0.74]	0.004	[1.07]	0.004	[1.18]	0.004	[1.07]
$f_{3,t-1}$	-0.01	[-1.50]	0.002	[0.37]	0.003	[0.63]	0.003	[0.58]	0.004	[0.72]
$f_{4,t-1}$	0.015	[1.43]	0.015	[2.05]**	0.015	[2.07]**	0.015	[2.02]**	0.013	[1.91]*
$f_{5,t-1}$	0.003	[0.34]	0.001	[0.21]	-0.001	[-0.14]	0.001	[0.15]	0.004	[0.57]
$f_{6,t-1}$	-0.013	[-2.02]**	-0.012	[-2.19]**	-0.011	[-1.89]*	-0.012	[-1.90]*	-0.013	[-2.18]**
$f_{7,t-1}$	-0.014	[-1.32]	-0.007	[-0.98]	-0.009	[-1.21]	-0.01	[-1.33]	-0.009	[-1.35]
$f_{8,t-1}$	-0.004	[-0.70]	-0.002	[-0.49]	-0.001	[-0.16]	-0.001	[-0.27]	0.000	[0.07]
$f_{9,t-1}$	0.002	[0.26]	-0.003	[-0.68]	-0.008	[-1.63]	-0.006	[-1.32]	-0.006	[-1.26]
$f_{10,t-1}$	0.000	[0.01]	0.005	[0.84]	0.003	[0.71]	0.003	[0.64]	0.004	[0.74]
$f^*_{1,t-1}$	0.022	[2.36]**	0.015	[2.30]**	0.020	[2.78]***	0.022	[3.17]***	0.021	[3.12]***
$f^*_{2,t-1}$	-0.011	[-1.73]*	-0.004	[-0.75]	-0.005	[-0.88]	-0.005	[-0.84]	-0.005	[-0.92]
$f^*_{3,t-1}$	0.006	[1.51]	0.006	[1.47]	0.011	[2.34]**	0.013	[2.62]***	0.014	[3.14]***
$f^*_{4,t-1}$	0.014	[1.73]*	0.006	[0.95]	0.004	[0.70]	0.004	[0.65]	0.003	[0.49]
$f^*_{5,t-1}$	-0.006	[-0.79]	-0.002	[-0.37]	-0.003	[-0.57]	-0.003	[-0.57]	-0.003	[-0.62]

UK Surprises and Past Information

Table IV: Predictability of UK Monetary Surprises: Past Information

	$SS1_t$		$SS1M_t$		$SS1MIR_t$	
$f_{1,t-1}$	-0.007	[-0.67]	-0.008	[-0.72]	-0.019	[-1.42]
$f_{2,t-1}$	0.006	[1.09]	0.005	[0.89]	0.002	[0.34]
$f_{3,t-1}$	0.005	[0.86]	0.005	[0.83]	0.007	[1.06]
$f_{4,t-1}$	-0.011	[-1.27]	-0.011	[-1.29]	-0.016	[-1.70]*
$f_{5,t-1}$	-0.015	[-1.79]*	-0.015	[-1.76]*	-0.02	[-2.04]**
$f_{6,t-1}$	-0.012	[-1.54]	-0.011	[-1.44]	-0.013	[-1.43]
$f_{7,t-1}$	0.011	[1.56]	0.013	[1.71]*	0.017	[1.89]*
$f_{8,t-1}$	0.003	[0.73]	0.005	[1.00]	0.007	[1.28]
$f_{9,t-1}$	0.012	[1.18]	0.013	[1.25]	0.019	[1.53]
$f_{10,t-1}$	0.001	[0.21]	0.003	[0.44]	0.005	[0.82]
$f^*_{1,t-1}$	0.000	[-0.05]	0.000	[-0.03]	0.007	[0.62]
$f^*_{2,t-1}$	0.013	[1.29]	0.012	[1.21]	0.017	[1.45]
$f^*_{3,t-1}$	0.001	[0.14]	0.000	[0.00]	-0.003	[-0.49]
$f^*_{4,t-1}$	-0.007	[-1.07]	-0.005	[-0.76]	-0.003	[-0.35]
$f^*_{5,t-1}$	-0.011	[-1.19]	-0.012	[-1.28]	-0.015	[-1.40]

UK Surprises and Past Information

Table IV: Predictability of UK Monetary Surprises: Past Information

	$SS1_t$		$SS1M_t$		$SS1MIR_t$	
$f_{1,t-1}$	-0.007	[-0.67]	-0.008	[-0.72]	-0.019	[-1.42]
$f_{2,t-1}$	0.006	[1.09]	0.005	[0.89]	0.002	[0.34]
$f_{3,t-1}$	0.005	[0.86]	0.005	[0.83]	0.007	[1.06]
$f_{4,t-1}$	-0.011	[-1.27]	-0.011	[-1.29]	-0.016	[-1.70]*
$f_{5,t-1}$	-0.015	[-1.79]*	-0.015	[-1.76]*	-0.02	[-2.04]**
$f_{6,t-1}$	-0.012	[-1.54]	-0.011	[-1.44]	-0.013	[-1.43]
$f_{7,t-1}$	0.011	[1.56]	0.013	[1.71]*	0.017	[1.89]*
$f_{8,t-1}$	0.003	[0.73]	0.005	[1.00]	0.007	[1.28]
$f_{9,t-1}$	0.012	[1.18]	0.013	[1.25]	0.019	[1.53]
$f_{10,t-1}$	0.001	[0.21]	0.003	[0.44]	0.005	[0.82]
$f^*_{1,t-1}$	0.000	[-0.05]	0.000	[-0.03]	0.007	[0.62]
$f^*_{2,t-1}$	0.013	[1.29]	0.012	[1.21]	0.017	[1.45]
$f^*_{3,t-1}$	0.001	[0.14]	0.000	[0.00]	-0.003	[-0.49]
$f^*_{4,t-1}$	-0.007	[-1.07]	-0.005	[-0.76]	-0.003	[-0.35]
$f^*_{5,t-1}$	-0.011	[-1.19]	-0.012	[-1.28]	-0.015	[-1.40]

UK Surprises and Past Information

Table IV: Predictability of UK Monetary Surprises: Past Information

	$SS1_t$		$SS1M_t$		$SS1MIR_t$	
$f_{1,t-1}$	-0.007	[-0.67]	-0.008	[-0.72]	-0.019	[-1.42]
$f_{2,t-1}$	0.006	[1.09]	0.005	[0.89]	0.002	[0.34]
$f_{3,t-1}$	0.005	[0.86]	0.005	[0.83]	0.007	[1.06]
$f_{4,t-1}$	-0.011	[-1.27]	-0.011	[-1.29]	-0.016	[-1.70]*
$f_{5,t-1}$	-0.015	[-1.79]*	-0.015	[-1.76]*	-0.02	[-2.04]**
$f_{6,t-1}$	-0.012	[-1.54]	-0.011	[-1.44]	-0.013	[-1.43]
$f_{7,t-1}$	0.011	[1.56]	0.013	[1.71]*	0.017	[1.89]*
$f_{8,t-1}$	0.003	[0.73]	0.005	[1.00]	0.007	[1.28]
$f_{9,t-1}$	0.012	[1.18]	0.013	[1.25]	0.019	[1.53]
$f_{10,t-1}$	0.001	[0.21]	0.003	[0.44]	0.005	[0.82]
$f^*_{1,t-1}$	0.000	[-0.05]	0.000	[-0.03]	0.007	[0.62]
$f^*_{2,t-1}$	0.013	[1.29]	0.012	[1.21]	0.017	[1.45]
$f^*_{3,t-1}$	0.001	[0.14]	0.000	[0.00]	-0.003	[-0.49]
$f^*_{4,t-1}$	-0.007	[-1.07]	-0.005	[-0.76]	-0.003	[-0.35]
$f^*_{5,t-1}$	-0.011	[-1.19]	-0.012	[-1.28]	-0.015	[-1.40]

Central Bank Private Information

$$mps_t = \kappa_c + \kappa_x \hat{x}_t^{cb} + \sum_{j=1}^{J} \kappa_j mps_{t-j} + \epsilon_t$$

Central Bank Private Information

$$mps_t = \kappa_c + \kappa_x \hat{x}_t^{cb} + \sum_{j=1}^{J} \kappa_j mps_{t-j} + \epsilon_t$$

- Forecast revisions between consecutive meetings
- Greenbook (US) & Inflation Report (UK) [Romer and Romer (2004), Cloyne and Hürtgen (2016)]
- Greenbook aligned to FOMC meeting
- Most recent IR forecast for MPC meeting

US Surprises and CB Forecasts

Table I: Predictability of Monetary Surprises: Central Bank Forecasts

	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$\Delta y^{GB}_{t\|t}$	0.013	[1.48]	0.012	[2.02]**	0.012	[1.75]*	0.013	[1.86]*	0.013	[1.96]*
$\Delta y^{GB}_{t+1\|t}$	0.040	[2.90]***	0.028	[2.31]**	0.034	[2.75]***	0.030	[2.33]**	0.021	[1.81]*
$\Delta y^{GB}_{t+2\|t}$	-0.035	[-1.81]*	-0.023	[-1.84]*	-0.017	[-1.35]	-0.004	[-0.40]	0.007	[0.68]
$\Delta \pi^{GB}_{t\|t}$	-0.004	[-0.30]	0.004	[0.37]	0.009	[0.58]	0.01	[0.64]	0.010	[0.67]
$\Delta \pi^{GB}_{t+1\|t}$	-0.010	[-0.47]	-0.003	[-0.17]	-0.017	[-0.96]	-0.017	[-0.94]	-0.011	[-0.62]
$\Delta \pi^{GB}_{t+2\|t}$	0.044	[1.39]	0.036	[1.67]*	0.045	[2.09]**	0.047	[2.10]**	0.042	[1.85]*
$\Delta u^{GB}_{t\|t}$	0.109	[1.49]	0.094	[2.23]**	0.155	[2.37]**	0.141	[2.13]**	0.147	[2.10]**
$\Delta u^{GB}_{t+1\|t}$	-0.311	[-2.02]**	-0.305	[-2.83]***	-0.316	[-2.80]***	-0.270	[-2.52]**	-0.250	[-2.38]**
$\Delta u^{GB}_{t+2\|t}$	0.156	[1.30]	0.156	[1.76]*	0.119	[1.54]	0.084	[1.13]	0.068	[0.96]

US Surprises and CB Forecasts

Table I: Predictability of Monetary Surprises: Central Bank Forecasts

	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$\Delta y^{GB}_{t\|t}$	0.013	[1.48]	0.012	[2.02]**	0.012	[1.75]*	0.013	[1.86]*	0.013	[1.96]*
$\Delta y^{GB}_{t+1\|t}$	0.040	[2.90]***	0.028	[2.31]**	0.034	[2.75]***	0.030	[2.33]**	0.021	[1.81]*
$\Delta y^{GB}_{t+2\|t}$	0.035	[1.81]*	0.023	[1.84]*	0.017	[1.35]	0.004	[0.40]	0.007	[0.68]
$\Delta \pi^{GB}_{t\|t}$	-0.004	[-0.30]	0.004	[0.37]	0.009	[0.58]	0.01	[0.64]	0.010	[0.67]
$\Delta \pi^{GB}_{t+1\|t}$	-0.010	[-0.47]	-0.003	[-0.17]	-0.017	[-0.96]	-0.017	[-0.94]	-0.011	[-0.62]
$\Delta \pi^{GB}_{t+2\|t}$	0.044	[1.39]	0.036	[1.67]*	0.045	[2.09]**	0.047	[2.10]**	0.042	[1.85]*
$\Delta u^{GB}_{t\|t}$	0.109	[1.49]	0.094	[2.23]**	0.155	[2.37]**	0.141	[2.13]**	0.147	[2.10]**
$\Delta u^{GB}_{t+1\|t}$	-0.311	[-2.02]**	-0.305	[-2.83]***	-0.316	[-2.80]***	-0.270	[-2.52]**	-0.250	[-2.38]**
$\Delta u^{GB}_{t+2\|t}$	0.156	[1.30]	0.156	[1.76]*	0.119	[1.54]	0.084	[1.13]	0.068	[0.96]

US Surprises and CB Forecasts

Table I: Predictability of Monetary Surprises: Central Bank Forecasts

	$MP1_t$		$FF4_t$		$ED2_t$		$ED3_t$		$ED4_t$	
$\Delta y^{GB}_{t\|t}$	0.013	[1.48]	0.012	[2.02]**	0.012	[1.75]*	0.013	[1.86]*	0.013	[1.96]*
$\Delta y^{GB}_{t+1\|t}$	0.040	[2.90]***	0.028	[2.31]**	0.034	[2.75]***	0.030	[2.33]**	0.021	[1.81]*
$\Delta y^{GB}_{t+2\|t}$	-0.035	[-1.81]*	-0.023	[-1.84]*	-0.017	[-1.35]	-0.004	[-0.40]	0.007	[0.68]
$\Delta \pi^{GB}_{t\|t}$	-0.004	[-0.30]	0.004	[0.37]	0.009	[0.58]	0.01	[0.64]	0.010	[0.67]
$\Delta \pi^{GB}_{t+1\|t}$	-0.010	[-0.47]	-0.003	[-0.17]	-0.017	[-0.96]	-0.017	[-0.94]	-0.011	[-0.62]
$\Delta \pi^{GB}_{t+2\|t}$	0.044	[1.39]	0.036	[1.67]*	0.045	[2.09]**	0.047	[2.10]**	0.042	[1.85]*
$\Delta u^{GB}_{t\|t}$	0.109	[1.49]	0.094	[2.23]**	0.155	[2.37]**	0.141	[2.13]**	0.147	[2.10]**
$\Delta u^{GB}_{t+1\|t}$	-0.311	[-2.02]**	-0.305	[-2.83]***	-0.316	[-2.80]***	-0.270	[-2.52]**	-0.250	[-2.38]**
$\Delta u^{GB}_{t+2\|t}$	0.156	[1.30]	0.156	[1.76]*	0.119	[1.54]	0.084	[1.13]	0.068	[0.96]

UK Surprises and CB Forecasts

Table III: Predictability of UK Monetary Surprises: Central Bank Forecasts

	$SS1_t$		$SS1M_t$		$SS1MIR_t$	
$\Delta y^{IR}_{t\|t}$	-0.023	[-0.31]	-0.042	[-0.51]	-0.051	[-0.64]
$\Delta y^{IR}_{t+1\|t}$	0.042	[0.54]	0.042	[0.52]	0.085	[1.10]
$\Delta y^{IR}_{t+2\|t}$	0.046	[0.76]	0.06	[0.94]	0.058	[0.80]
$\Delta \pi^{IR}_{t\|t}$	-0.05	[-0.73]	-0.053	[-0.87]	-0.126	[-1.76]*
$\Delta \pi^{IR}_{t+1\|t}$	0.013	[0.11]	-0.013	[-0.11]	0.107	[0.76]
$\Delta \pi^{IR}_{t+2\|t}$	0.052	[0.46]	0.072	[0.62]	0.027	[0.19]
$\Delta u^{IR}_{t\|t}$	-0.245	[-1.28]	-0.281	[-1.34]	-0.243	[-1.00]
$\Delta u^{IR}_{t+1\|t}$	0.576	[1.72]*	0.705	[1.91]*	0.764	[1.76]*
$\Delta u^{IR}_{t+2\|t}$	-0.431	[-2.03]**	-0.51	[-2.21]**	-0.601	[-2.17]**

UK Surprises and CB Forecasts

Table III: Predictability of UK Monetary Surprises: Central Bank Forecasts

	$SS1_t$		$SS1M_t$		$SS1MIR_t$	
$\Delta y^{IR}_{t\|t}$	-0.023	[-0.31]	-0.042	[-0.51]	-0.051	[-0.64]
$\Delta y^{IR}_{t+1\|t}$	0.042	[0.54]	0.042	[0.52]	0.085	[1.10]
$\Delta y^{IR}_{t+2\|t}$	0.046	[0.76]	0.06	[0.94]	0.058	[0.80]
$\Delta \pi^{IR}_{t\|t}$	-0.05	[-0.73]	-0.053	[-0.87]	-0.126	[-1.76]*
$\Delta \pi^{IR}_{t+1\|t}$	0.013	[0.11]	-0.013	[-0.11]	0.107	[0.76]
$\Delta \pi^{IR}_{t+2\|t}$	0.052	[0.46]	0.072	[0.62]	0.027	[0.19]
$\Delta u^{IR}_{t\|t}$	-0.245	[-1.28]	-0.281	[-1.34]	-0.243	[-1.00]
$\Delta u^{IR}_{t+1\|t}$	0.576	[1.72]*	0.705	[1.91]*	0.764	[1.76]*
$\Delta u^{IR}_{t+2\|t}$	-0.431	[-2.03]**	-0.51	[-2.21]**	-0.601	[-2.17]**

The Informational Content of Monetary Surprises

$$p_t - p_{t-\Delta} = e_t^{mp} + \underbrace{f\left(x_t \mid \widehat{\Omega}^M_{t|t}\right) - f\left(x_t \mid \widehat{\Omega}^M_{t|t-\Delta}\right)}_{\text{forecast revision}} + \underbrace{\zeta\left(x_t \mid \widehat{\Omega}^M_{t|t}\right) - \zeta\left(x_t \mid \widehat{\Omega}^M_{t|t-\Delta}\right)}_{\text{time-varying premium}}$$

unexpected by markets $\neq$ MP shock

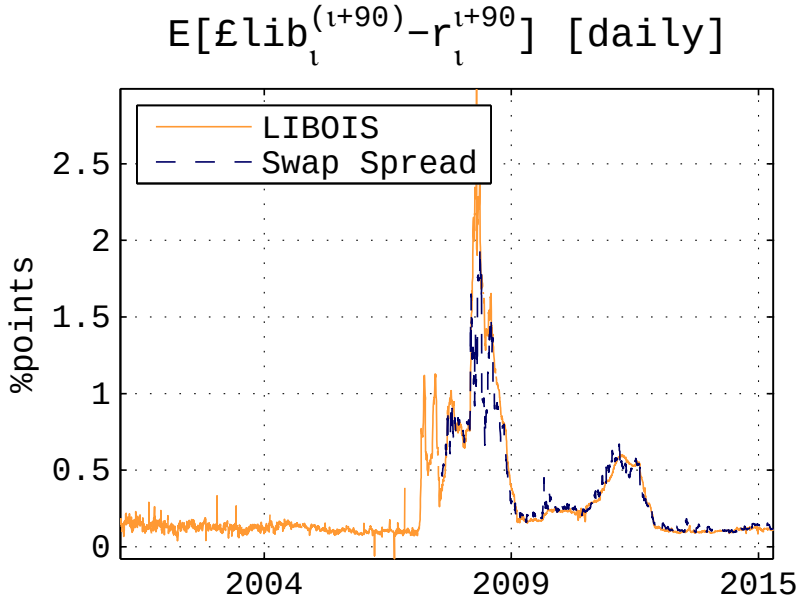
Information and Monetary Policy Shocks

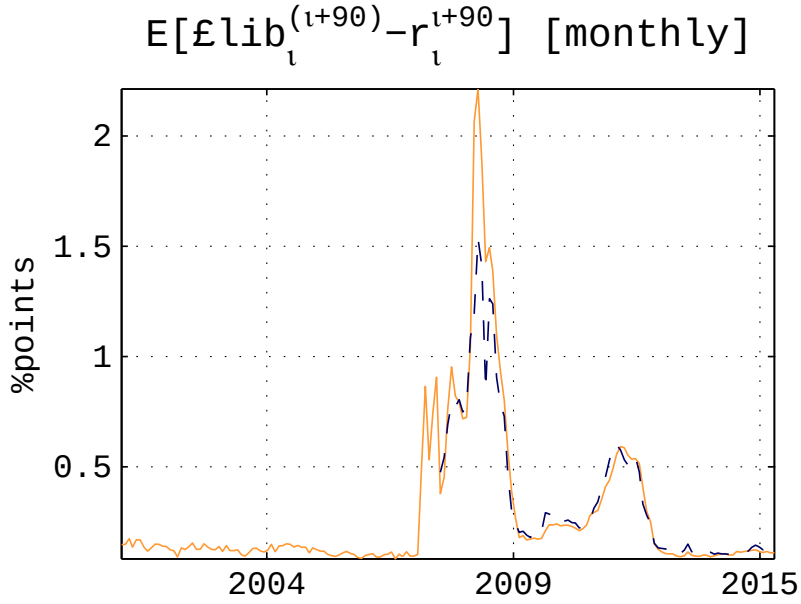
Surprises Correction

$$mps_t = \mu + \alpha i_{t-1} + \underbrace{\sum_{j=-1}^{3} \gamma_j \, \widehat{\Omega}^{CB}_{q+j|t}}_{\text{level forecasts}} + \underbrace{\sum_{j=-1}^{2} \delta_j \left[\widehat{\Omega}^{CB}_{q+j|t} - \widehat{\Omega}^{CB}_{q+j|t-1} \right]}_{\text{forecast revisions}} + mps^{\star}_t$$

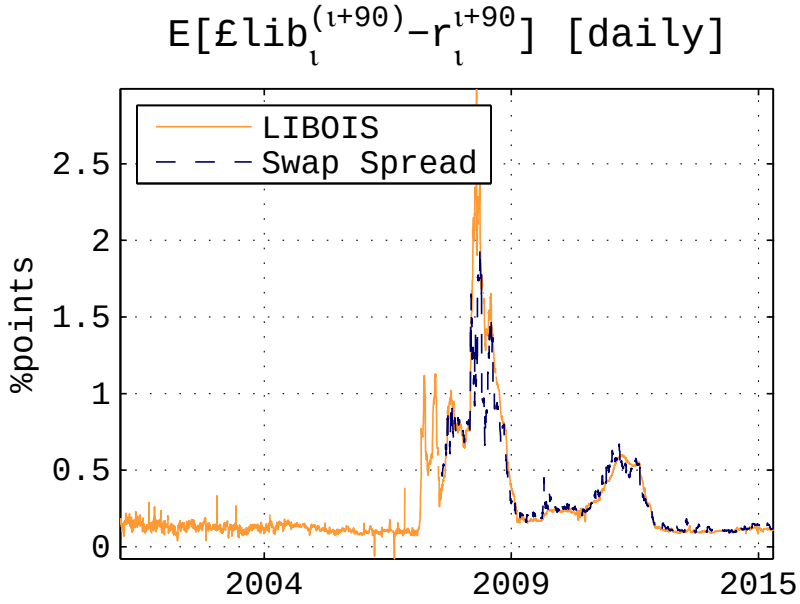
- CB forecasts for output, inflation and unemployment
- Lagged level policy rate i_t
- Lagged level of the Libor-ois spread (UK)

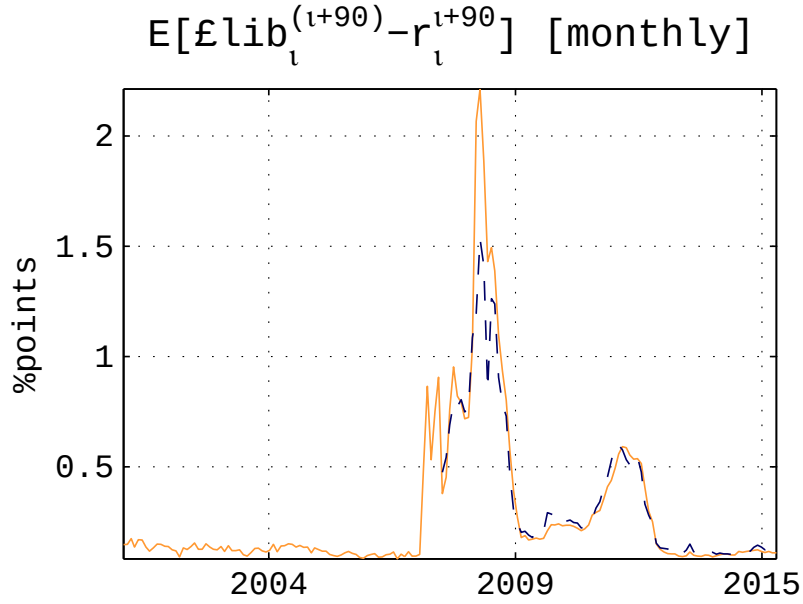
Sterling Libor and Bank Rate





Sterling Libor and Bank Rate





- Relation neither zero nor constant
- Spread is a watched measure of strains in financial markets

Orthogonal Surprises – US

Table V: Orthogonal Surprises and Past Information

	$MP1_t^\star$		$FF4_t^\star$		$ED2_t^\star$		$ED3_t^\star$		$ED4_t^\star$	
$f_{1,t-1}$	0.005	[0.65]	0.003	[0.44]	0.004	[0.65]	0.002	[0.36]	0.001	[0.22]
$f_{2,t-1}$	0.003	[0.56]	0.002	[0.66]	0.004	[1.29]	0.005	[1.25]	0.004	[1.18]
$f_{3,t-1}$	0.004	[0.74]	0.008	[1.64]	0.009	[1.88]*	0.009	[1.70]*	0.007	[1.45]
$f_{4,t-1}$	0.010	[1.09]	0.011	[1.66]*	0.008	[1.21]	0.008	[1.24]	0.007	[1.05]
$f_{5,t-1}$	0.001	[0.12]	-0.002	[-0.31]	0.000	[-0.04]	0.001	[0.19]	0.003	[0.38]
$f_{6,t-1}$	-0.008	[-1.39]	-0.007	[-1.35]	-0.005	[-0.86]	-0.005	[-0.89]	-0.006	[-1.12]
$f_{7,t-1}$	-0.009	[-0.94]	-0.007	[-1.09]	-0.007	[-1.06]	-0.009	[-1.37]	-0.01	[-1.45]
$f_{8,t-1}$	-0.005	[-0.91]	-0.001	[-0.37]	0.002	[0.45]	0.002	[0.49]	0.004	[0.91]
$f_{9,t-1}$	0.000	[-0.02]	-0.004	[-0.93]	-0.007	[-1.51]	-0.005	[-1.12]	-0.004	[-0.89]
$f_{10,t-1}$	-0.006	[-1.02]	-0.001	[-0.12]	0.000	[-0.07]	-0.001	[-0.16]	0.001	[0.16]
$f_{1,t-1}^*$	-0.001	[-0.14]	-0.001	[-0.12]	-0.004	[-0.68]	-0.002	[-0.36]	-0.001	[-0.11]
$f_{2,t-1}^*$	0.000	[-0.06]	0.001	[0.15]	-0.001	[-0.13]	-0.001	[-0.18]	-0.002	[-0.31]
$f_{3,t-1}^*$	0.001	[0.39]	0.002	[0.76]	0.005	[1.40]	0.006	[1.58]	0.007	[1.92]*
$f_{4,t-1}^*$	0.009	[1.23]	0.004	[0.83]	0.002	[0.30]	0.002	[0.44]	0.003	[0.50]
$f_{5,t-1}^*$	0.001	[0.24]	0.005	[1.11]	0.005	[1.01]	0.006	[1.28]	0.006	[1.18]
$F-stat$	0.74	(0.592)	0.92	(0.470)	0.92	(0.471)	1.29	(0.267)	1.47	(0.201)

Orthogonal Surprises – US

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Orthogonal Surprises – US

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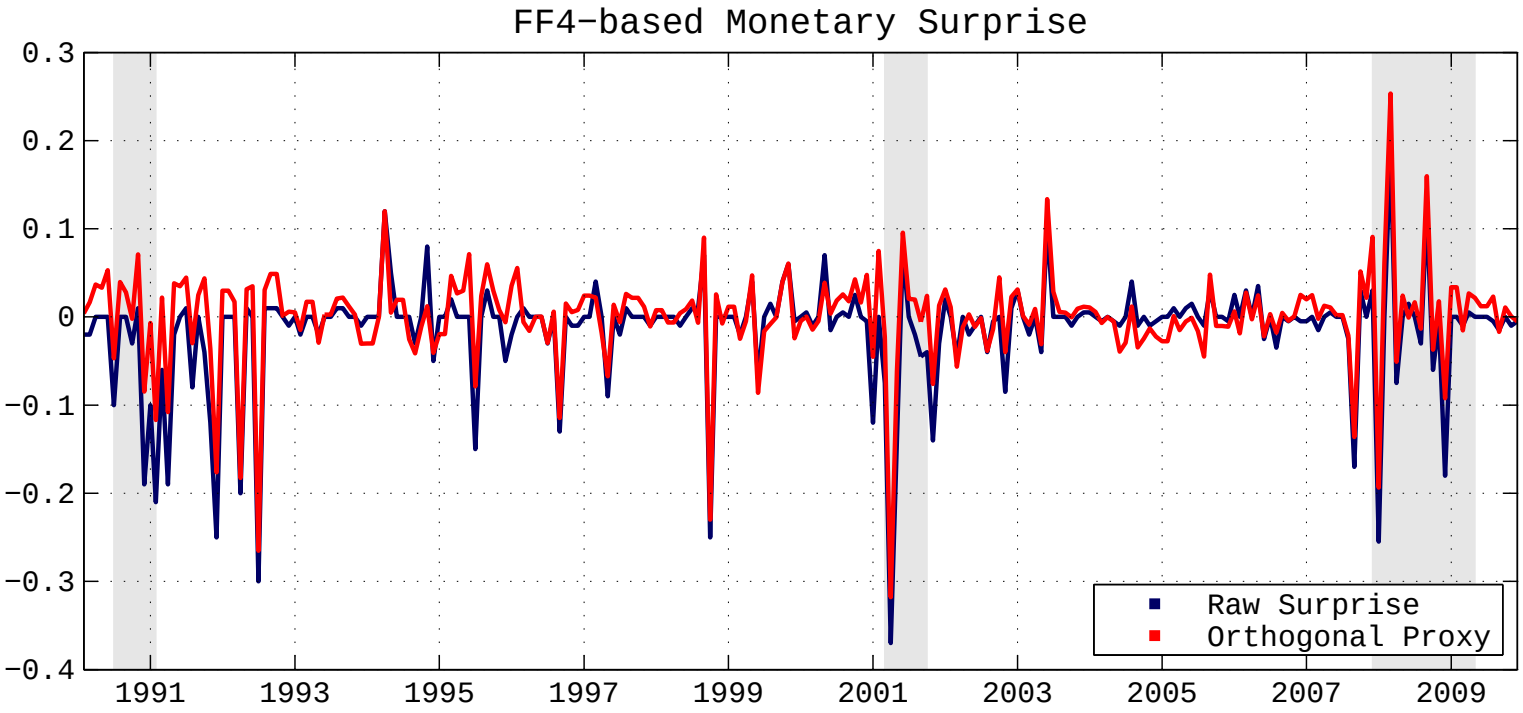
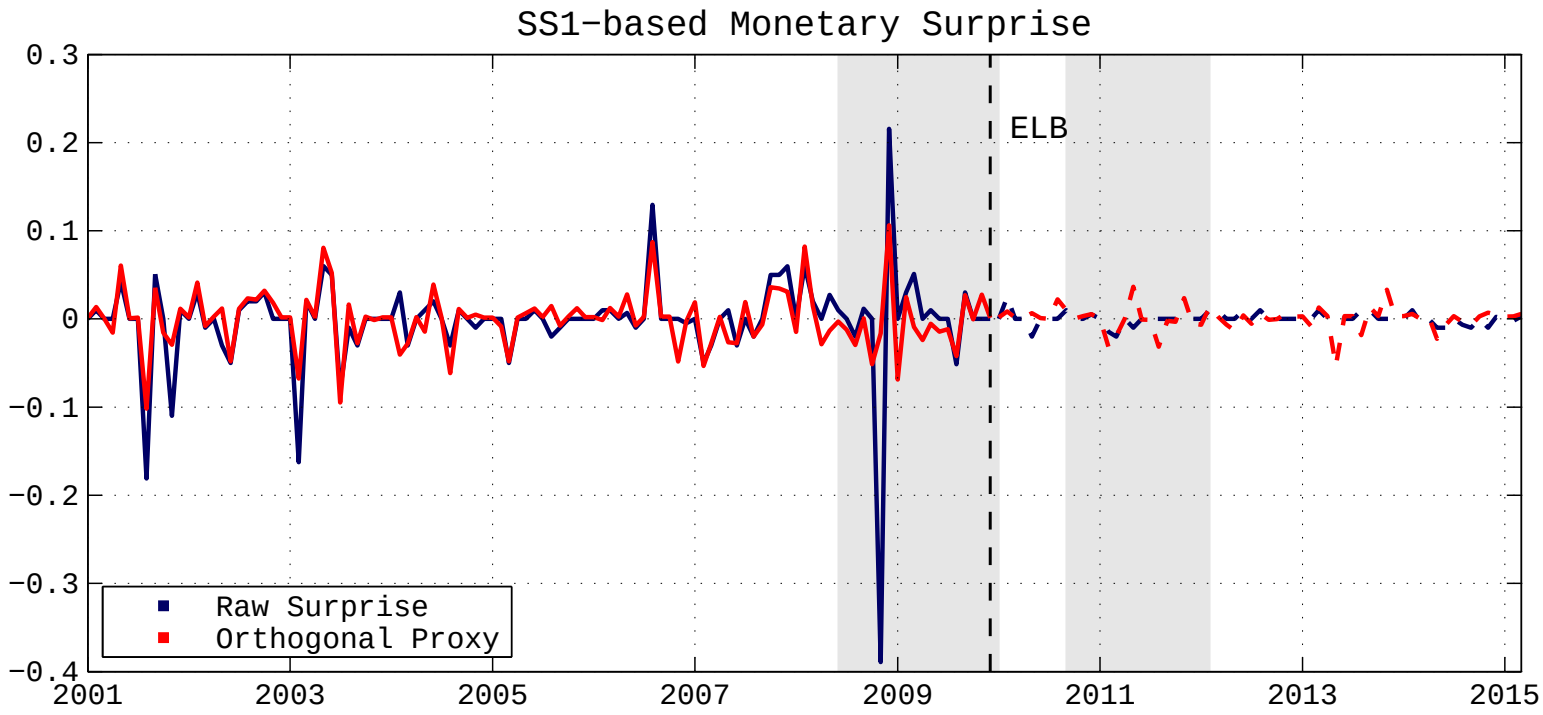
Orthogonal Surprises – US



Orthogonal Surprises – UK



VAR setup – US

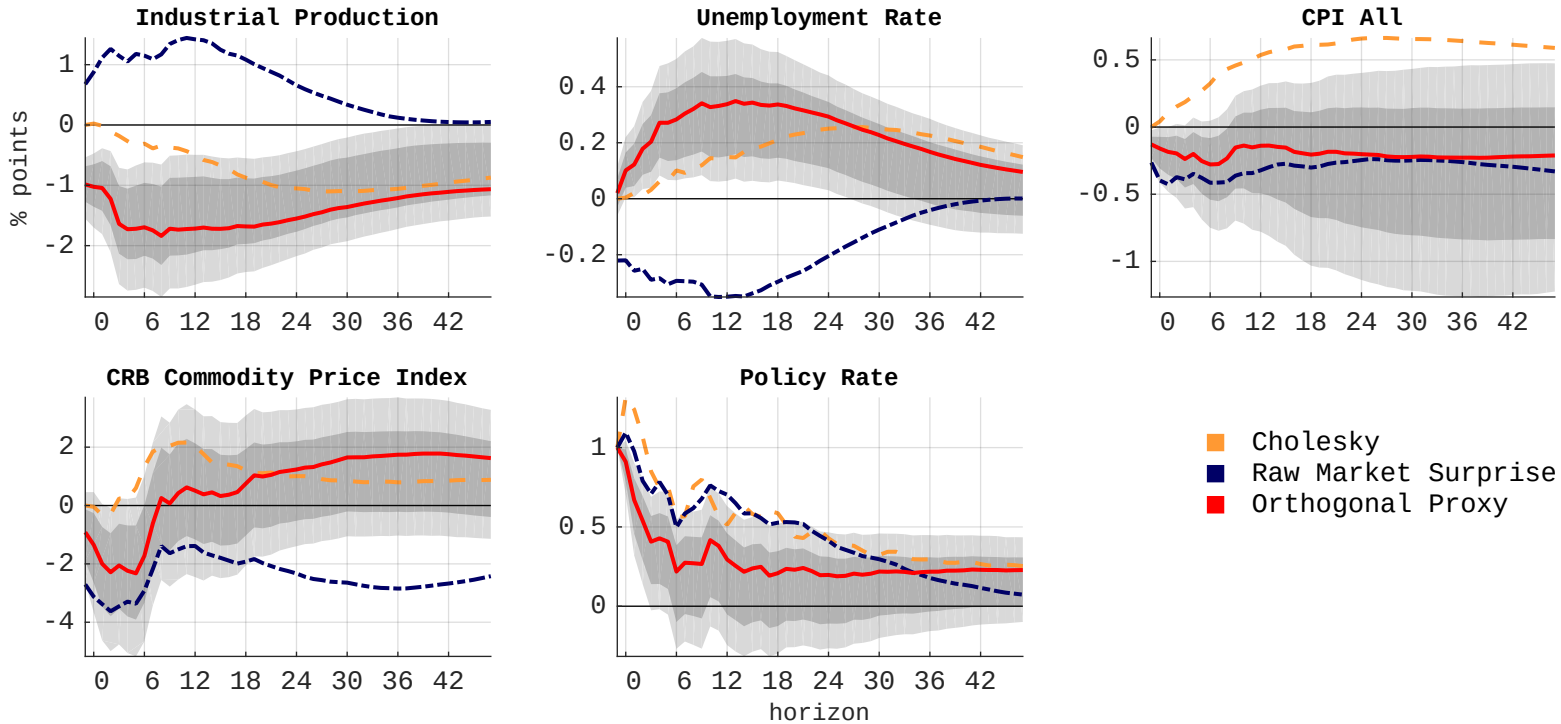
Estimation

- Monetary policy variable: 1-Year rate
- VAR(12) in (log) levels
- Estimation sample 1969:1 - 2014:12

Identification

- External instrument: orthogonal FF4* – 1990:1 - 2009:12
- Recursive Cholesky scheme with the effective FFR ordered last
- External instrument: Gertler and Karadi (2015)'s FF4

Responses to a Monetary Policy Shock – US



Information vs MP Shocks

- **MP Shock Instrument:** residuals of projection

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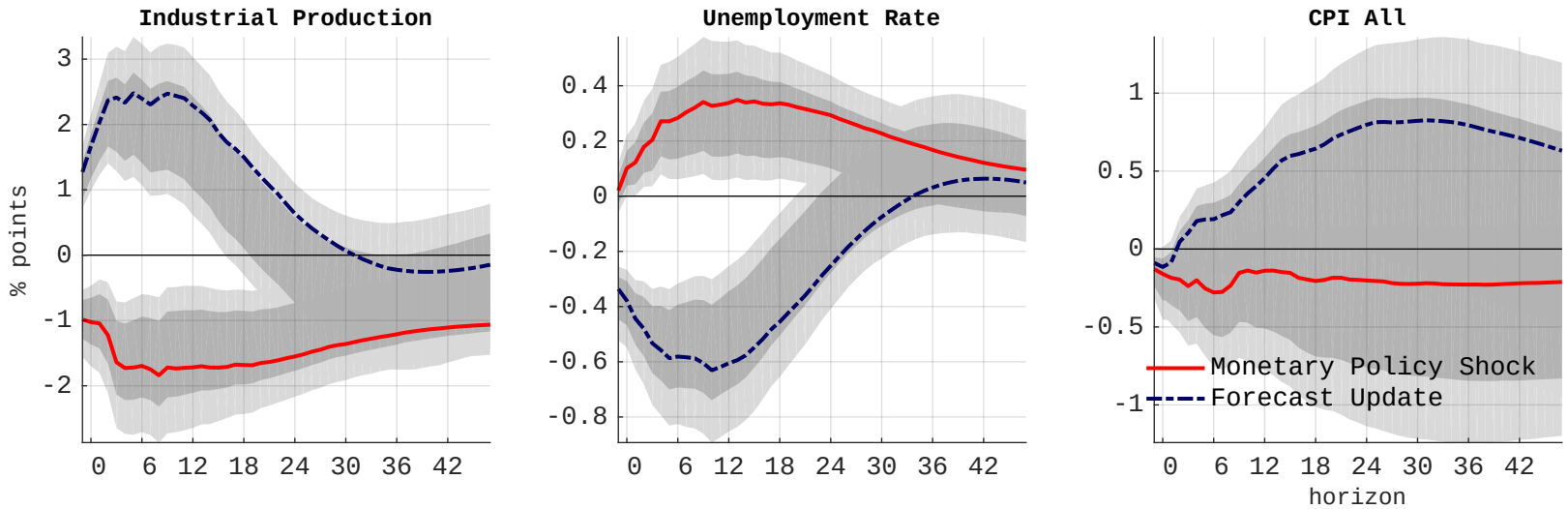


VAR setup – UK

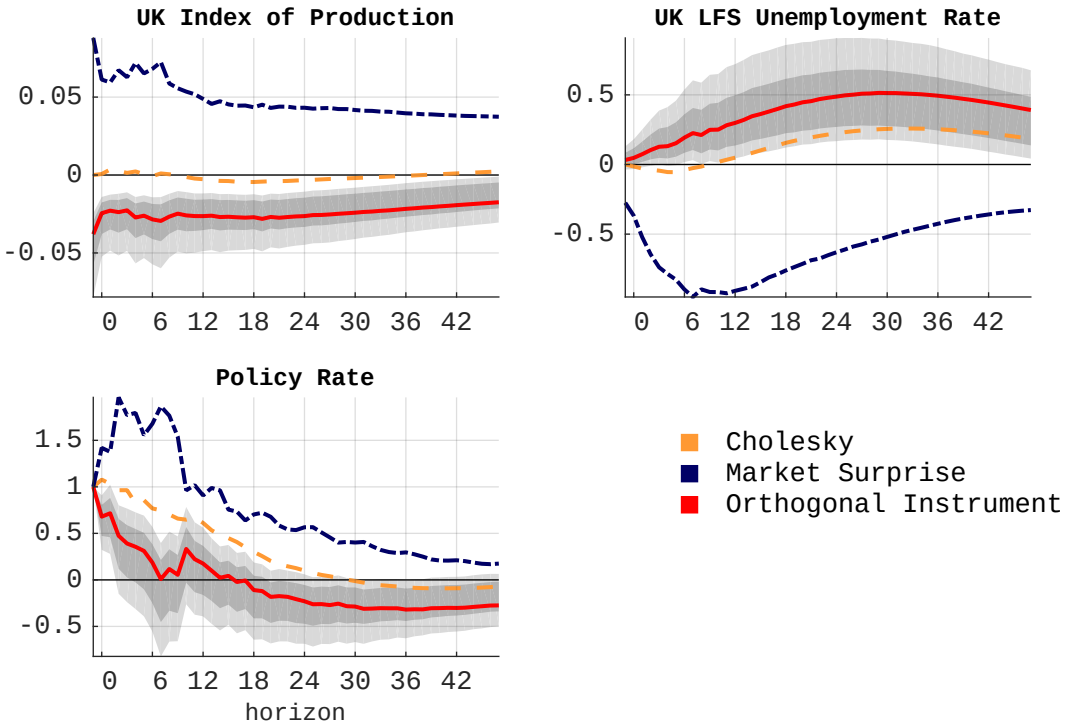
Estimation

- Monetary policy variable: 1-Year rate
- VAR(12) in levels
- Estimation sample 1979:1 - 2014:12

Identification

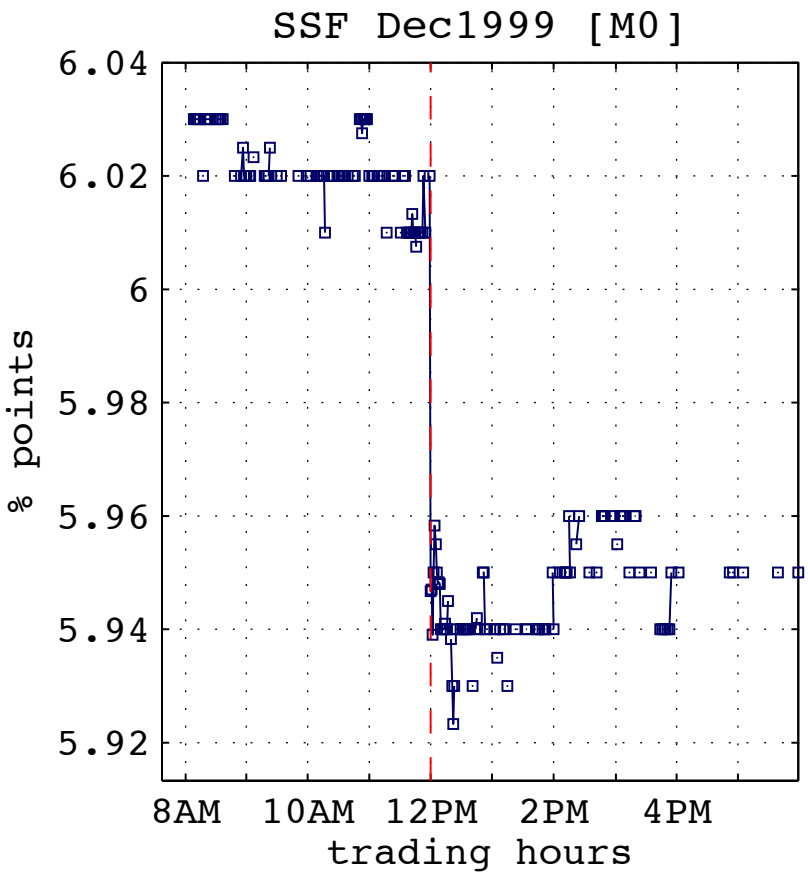
- External instrument: orthogonal ss1* – 1997:6 - 2009:12
- Recursive Cholesky scheme with Bank Rate ordered last
- External instrument: raw ff1

Responses to a Monetary Policy Shock – UK

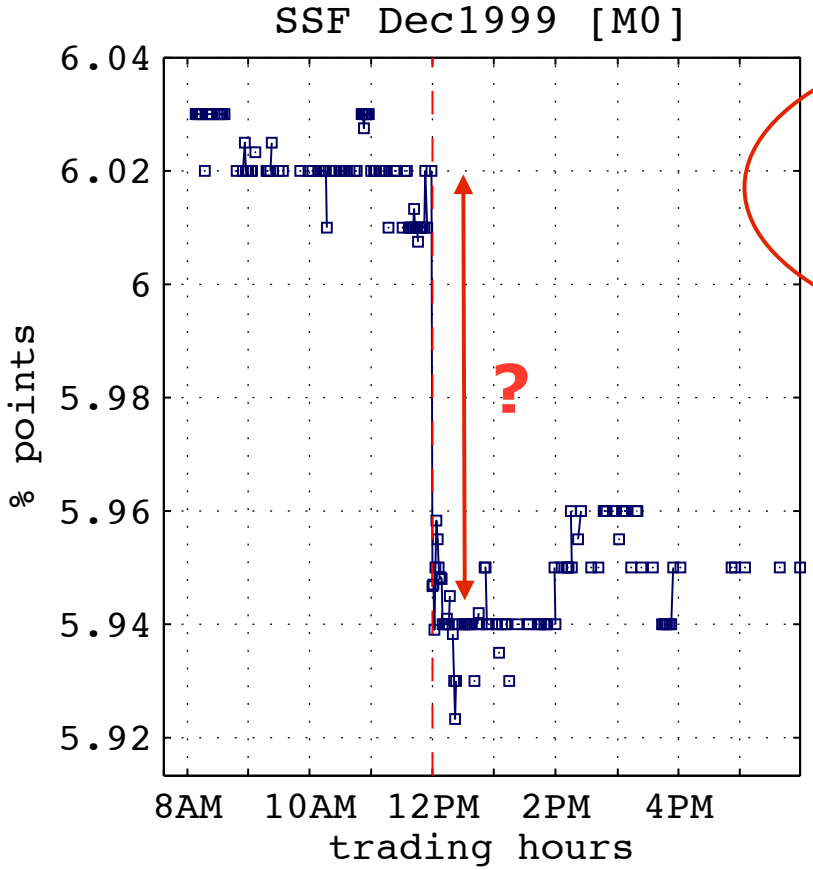


More Puzzles

Surprise without news...



Surprise without news...



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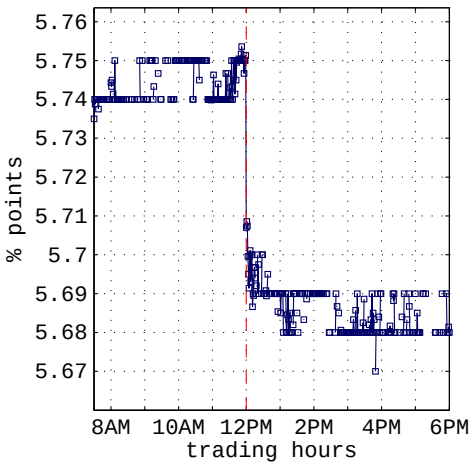
forecast: 5.5

conflicts:
none

...Some More



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new rate: 5.25 (old: 5.25)
forecast: 5.25

conflicts:
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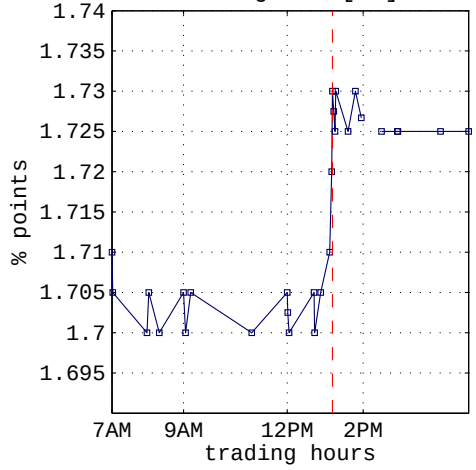

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new rate: 1.75 (old: 1.75)
forecast: 1.75

conflicts:
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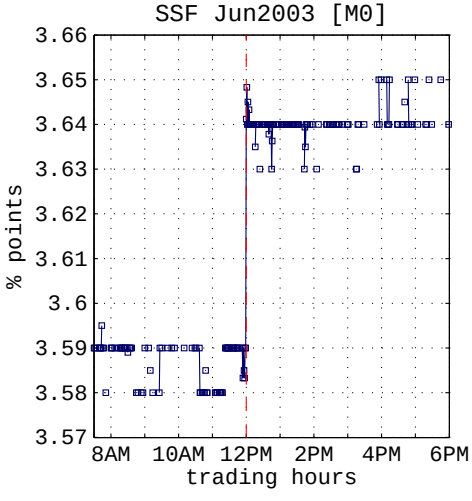

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new rate: 3.75 (old: 3.75)
forecast: 3.75

conflicts:
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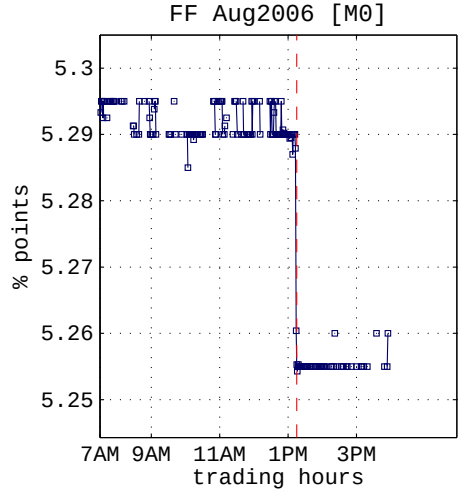

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new rate: 5.25 (old: 5.25)
forecast: 5.25

conflicts:
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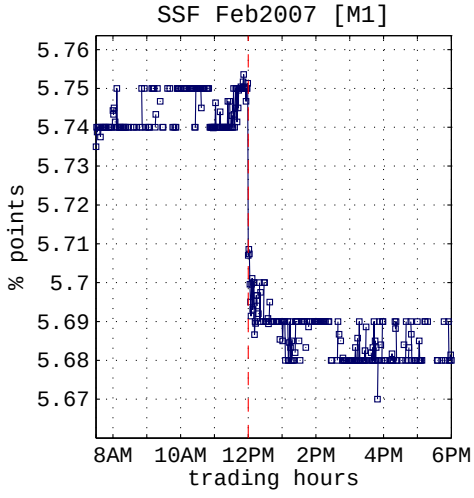
...Some More



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conflicts:
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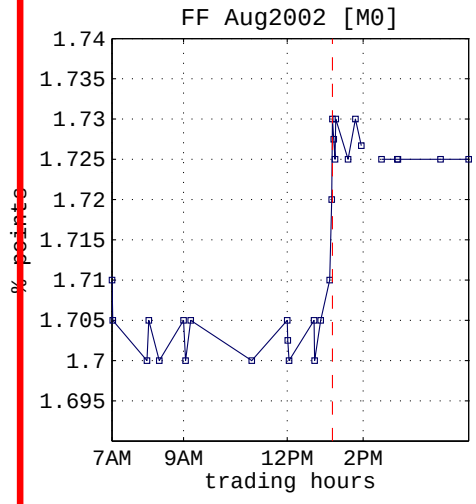

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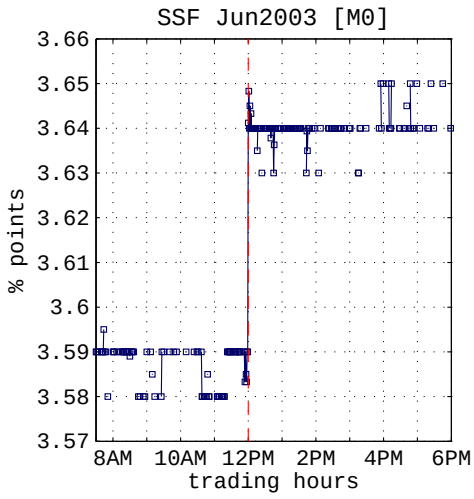

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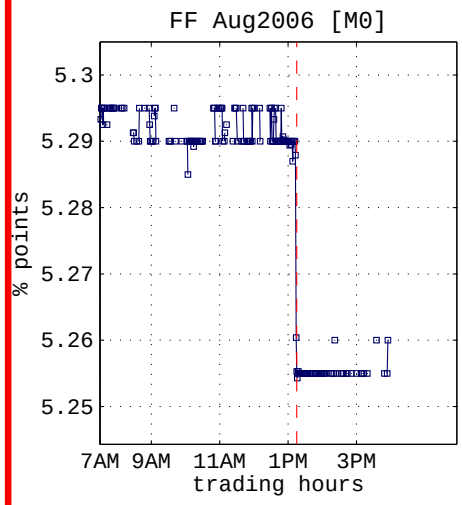

event type: Rate Decision
date: 08/08/2006 13:15
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conflicts:
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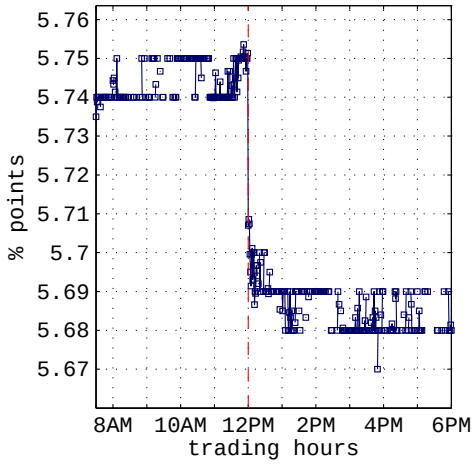

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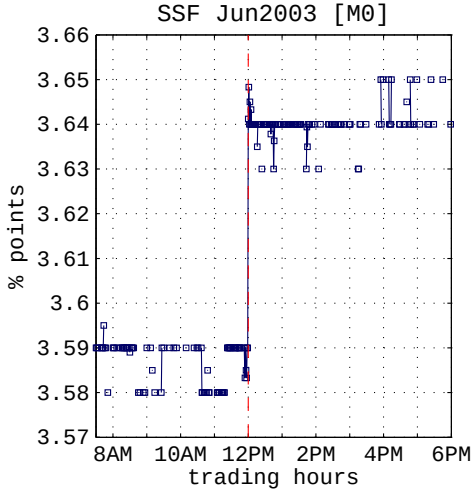

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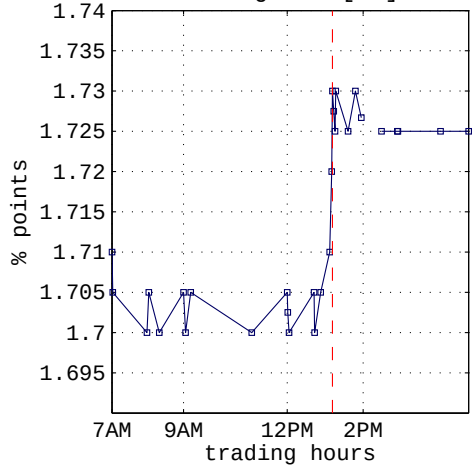

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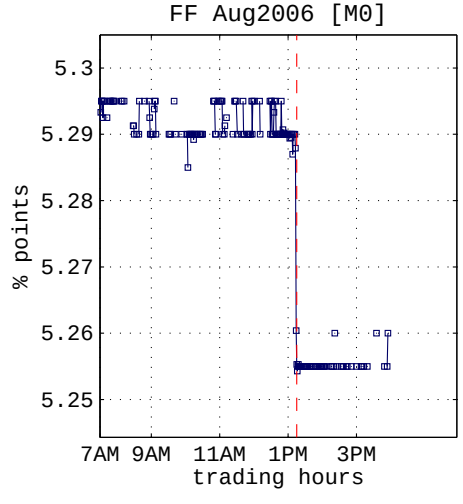

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Potential Explanations

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- Median/central scenario-forecast vs mean forecast (weight on tail events)
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- Noise...
- ...

High frequency surprises:

- **more than just the MP shocks**...
- Robust evidence (in US and UK) of **information transfer**...
- ... revision of **risk premia** (?)
- More to learn?
  - Learning about CB reaction function
  - Behavioural responses?