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Information Effects of Euro Area Monetary Policy: New Evidence from High-Frequency Futures Data

Mark Kerssenfischer

Deutsche Bundesbank

Why do markets move around central bank announcements?

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supposedly obvious answer: monetary policy news

- policy rate change
- "forward guidance"
- "QE"
- etc.

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If yields ...	↑ rise:	contractionary surprise
	↓ fall:	expansionary surprise

Example 1/3: "forward guidance surprise" 4 July 2013
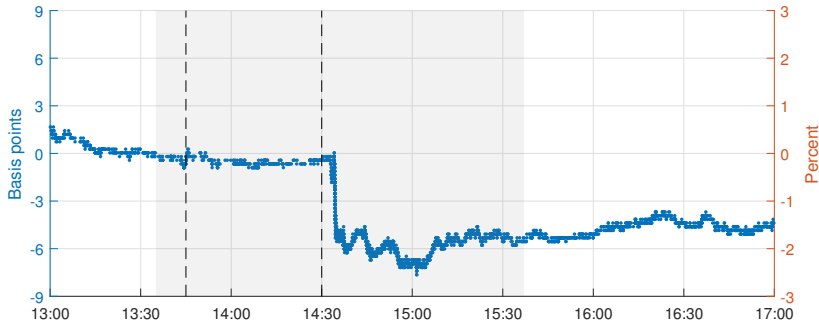
2-year German bond yield
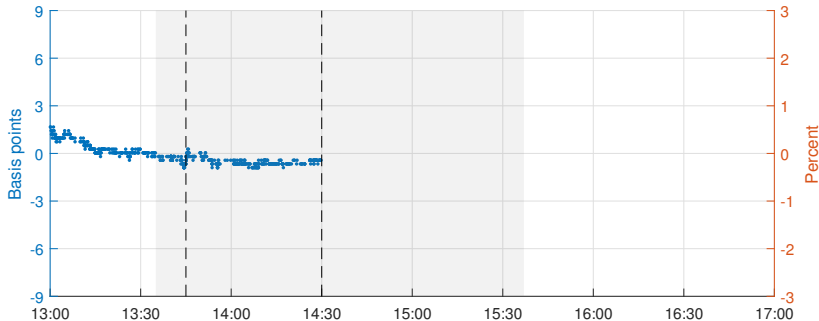
- Press release at 13:45, no rate change, no surprise, no market reaction
- Press conference at 14:30, forward guidance surprise:

  "*interest rates remain at present or lower levels for an extended period of time*"
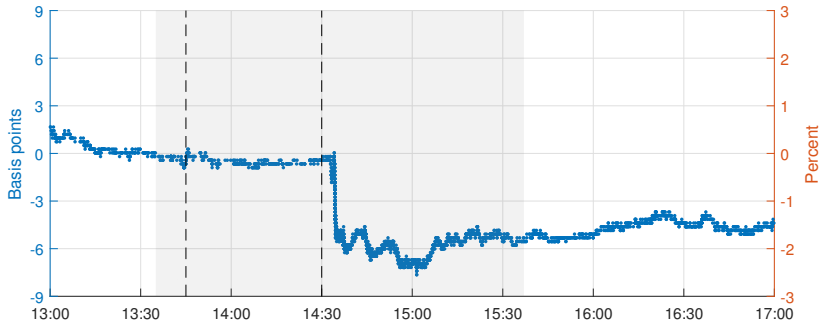
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2-year German bond yield

- yield ↓

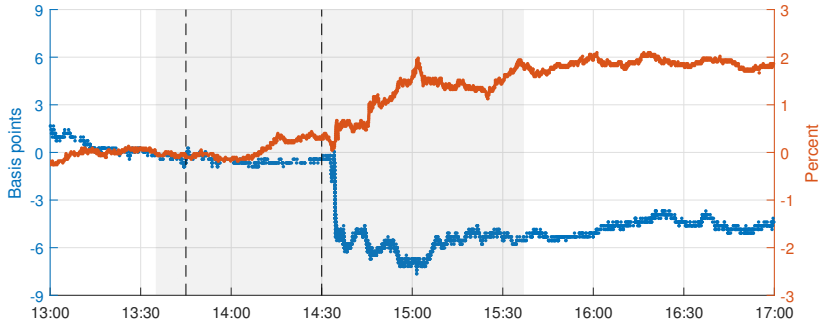## Example 1/3: "forward guidance surprise" 4 July 2013

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Example 1/3: "forward guidance surprise" 4 July 2013

2-year German bond yield   Euro STOXX 50 Index

- yield ↓
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- hence stocks ↑

Example 2/3: "rate cut surprise" 7 November 2013

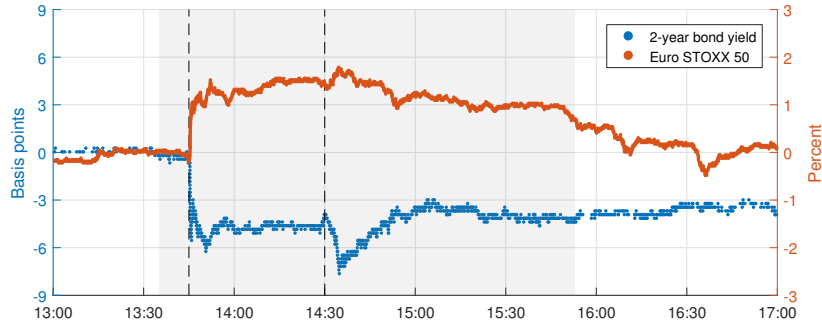2-year German bond yield   Euro STOXX 50 Index
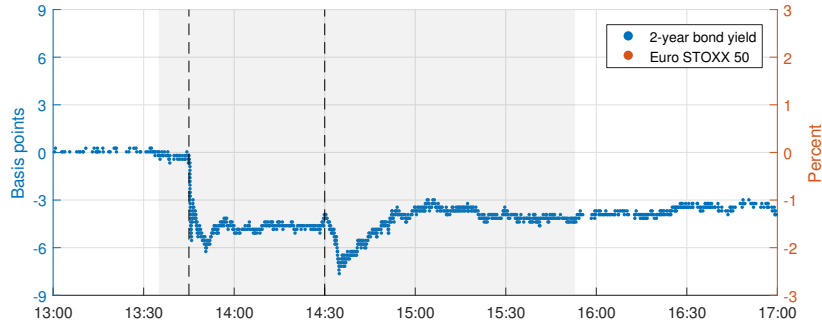
- Press release at 13:45: policy rates cut by 25bp
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Example 2/3: "rate cut surprise" 7 November 2013

2-year German bond yield   **Euro STOXX 50 Index**
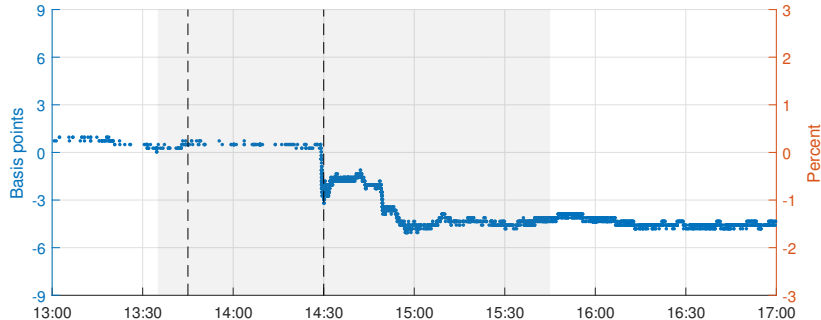

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Example 3/3: "QE surprise" 22 October 2015

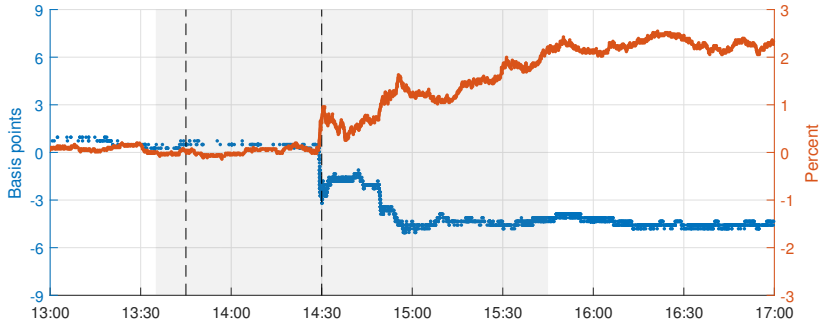**2-year German bond yield**   **Euro STOXX 50 Index**

- Press conference at 14:30: PSPP extension indicated
  (announced in December)
- yield ↓

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All examples consistent with "high-frequency identification" approach

Assumption: Yield change $=$ monetary policy surprise

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- Large literature

  US: Kuttner (2001); Cochrane-Piazzesi (2002); Gürkaynak et al. (2005); Swanson (2017); ...

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- Broad consensus: Policy announcements have strong effects ...

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but "expansionary" announcements (those that lower yields)

- raise expected unemployment (Campbell et al., 2012)
- lower (short-term) inflation expectations (Hanson-Stein, 2015)
- decrease expected GDP growth (Nakamura-Steinsson, 2018)
- often coincide with falling stock prices (Jarocinski-Karadi, 2019)

"Central Bank Information Effects"

Idea: Yield change = monetary policy surprise

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if true, yields ↓ could be due to
- expansionary policy surprise
- or downward revision to economic outlook
  - ↪ explaining the aforementioned puzzles

ECB GovC meeting 7 March 2019
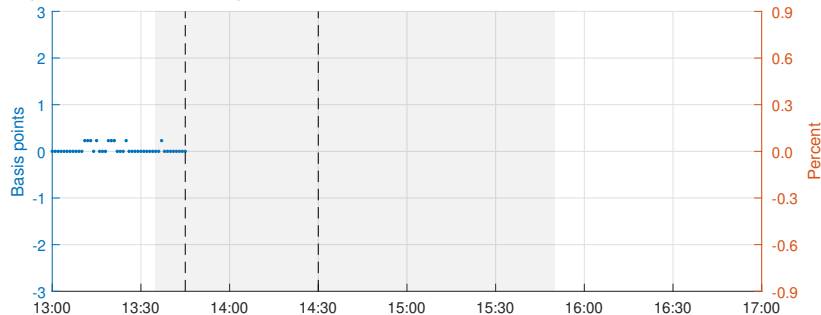
- press release at 13:45:
    - "forward guidance" surprise
      "*interest rates [...] remain at their present levels at least through the end of 2019*"
    - "TLTRO" surprise
      "*new series of [TLTROs] will be launched*"

ECB GovC meeting 7 March 2019

2-year German bond yield   **Euro STOXX 50 Index**
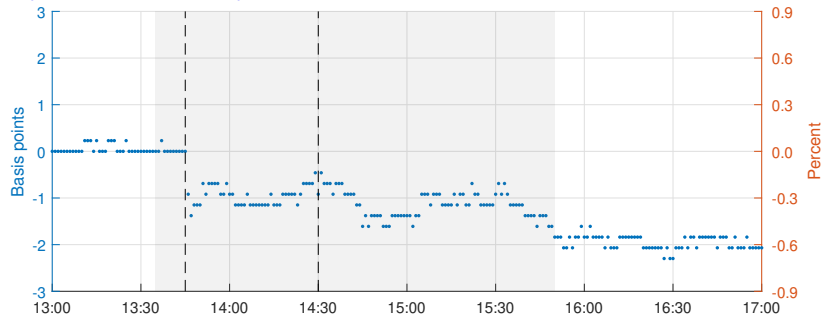
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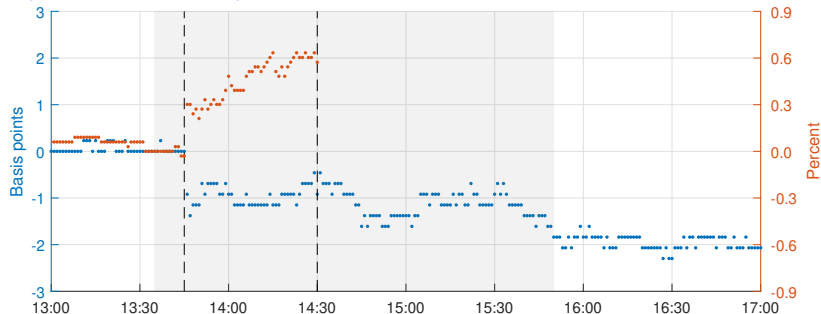## ECB GovC meeting 7 March 2019

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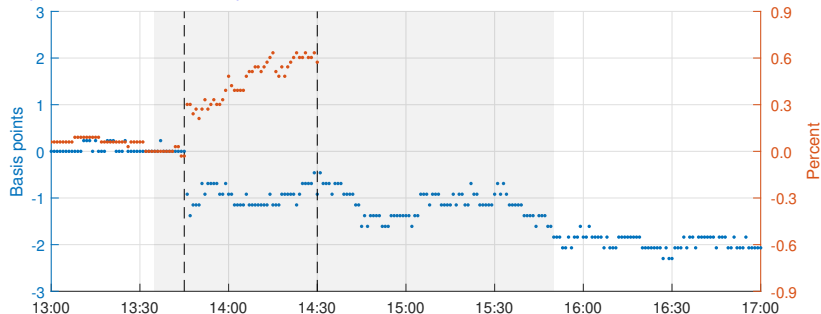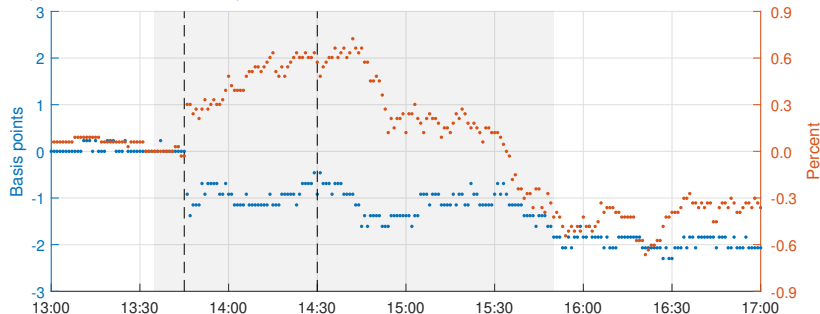
- yield ↓
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- yes, stocks ↑

ECB GovC meeting 7 March 2019

2-year German bond yield   Euro STOXX 50 Index

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  "*weakening in economic data points*", "*uncertainties related to geopolitical factors, the threat of protectionism and vulnerabilities in emerging markets*", "*weaker economic momentum*", ...

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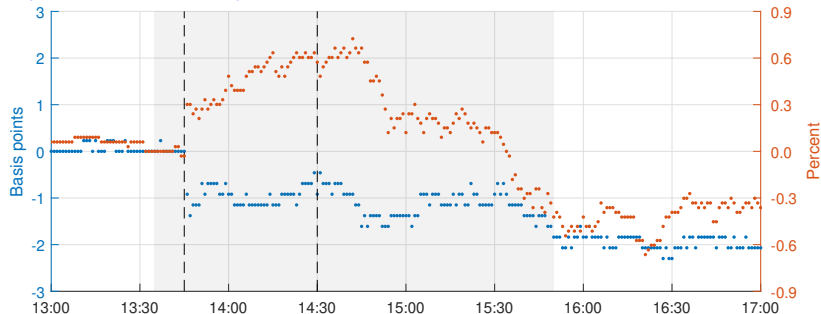
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- hence stocks ↓

ECB GovC meeting 6 March 2003

2-year German bond yield   Euro STOXX 50 Index
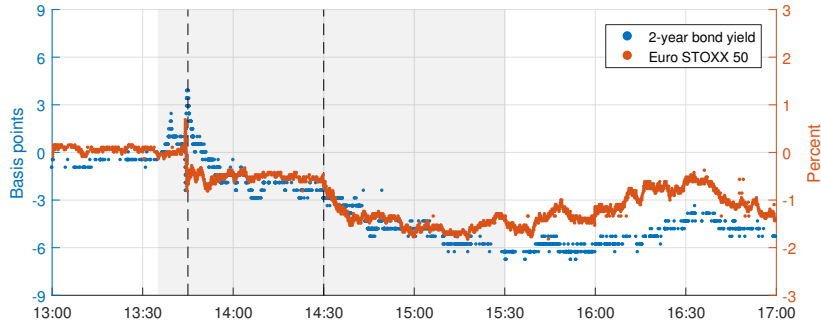
"*the outlook for economic growth in the euro area in 2003 has weakened compared with previous expectations*"

"*growth figures and the inflation figures had, sorry to say it, to be revised downward and not insignificantly*"

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ECB GovC meeting 5 July 2012

2-year German bond yield · Euro STOXX 50 Index
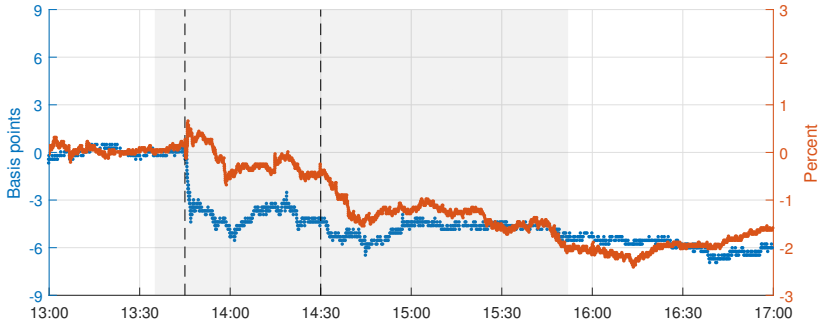
"*downside risks to the euro area growth outlook have materialised*"

"*economic growth in the euro area continues to remain weak*"

High Frequency Identification

Study market movements

- around all 186 ECB GovC meetings since March 2002

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- US macro data releases Thursdays at 14:30
- → control for all releases details

Identification

Two approaches:

		Naive Measure	
intraday reaction	2-year yield	$\widehat{=}$	

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All three shock series are available on my website

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Effects on Financial Markets and Economic Expectations

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$$\Delta Y_{it} = \alpha + \beta Z_t^j + \epsilon_{it}$$

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normalization: all shocks raise 2-year yield by 100bp
bootstrap 90% confidence bands details

German Bond Yields   Inflation Swaps
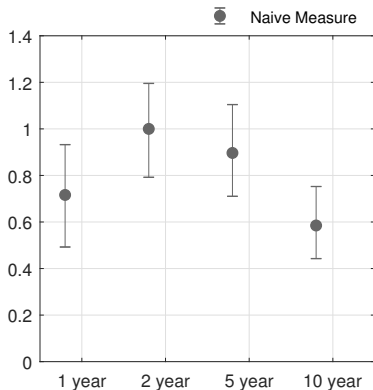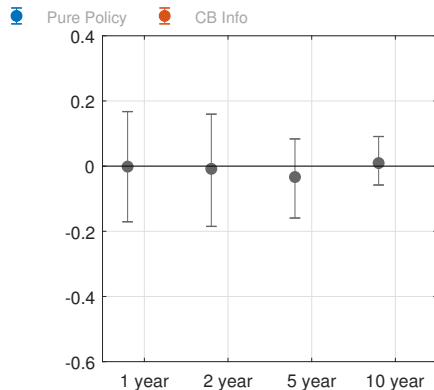
the "naive" monetary policy shocks

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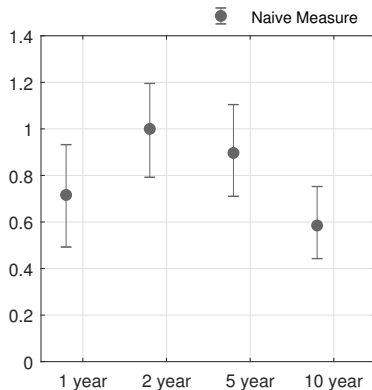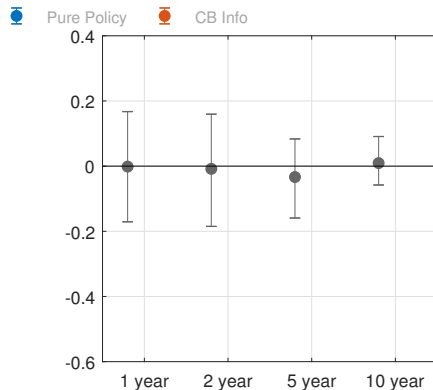
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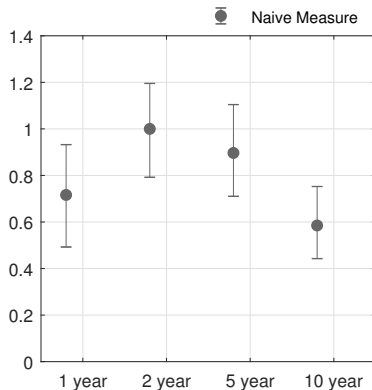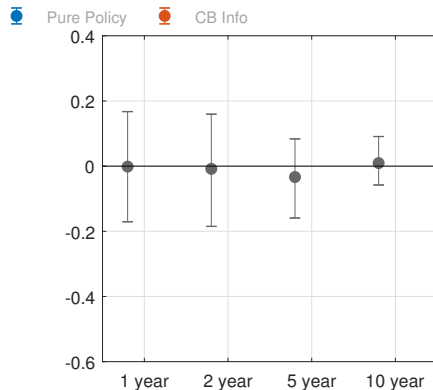
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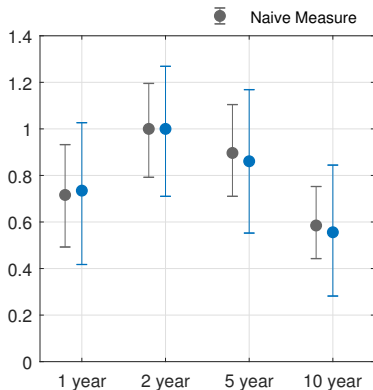
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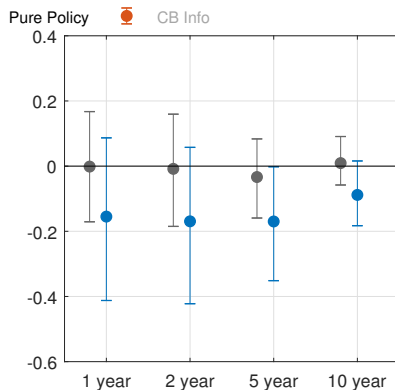
pure policy shocks

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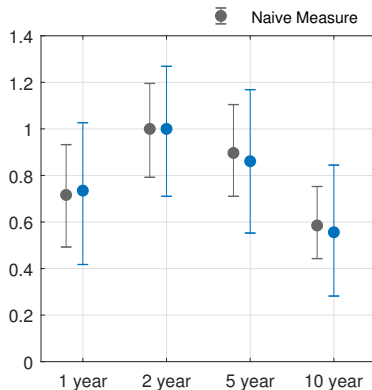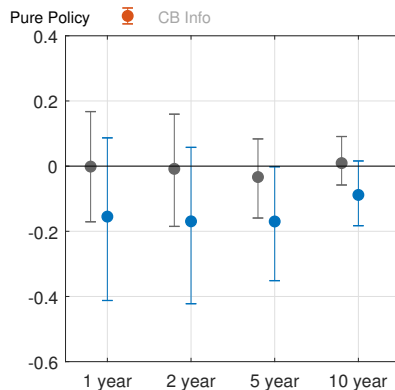
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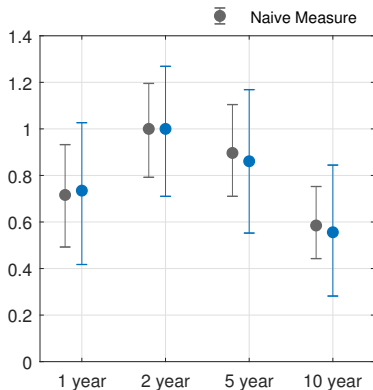
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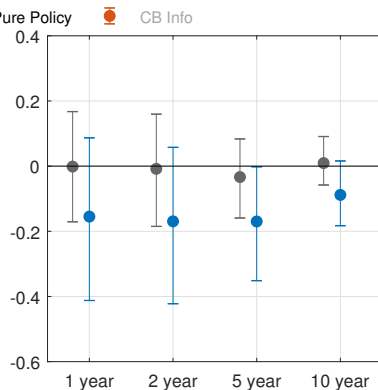
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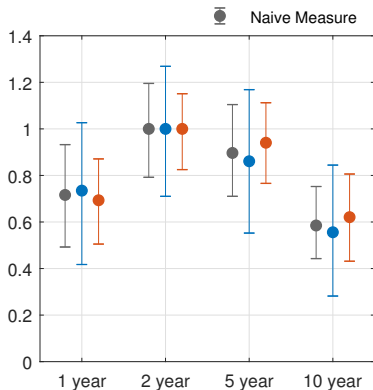
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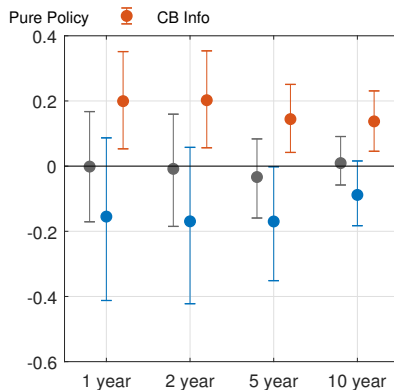
a positive central bank information shock

- also raises yields

German Bond Yields | Inflation Swaps
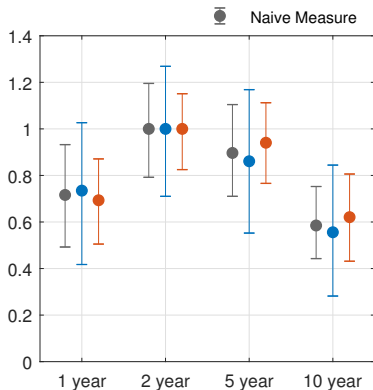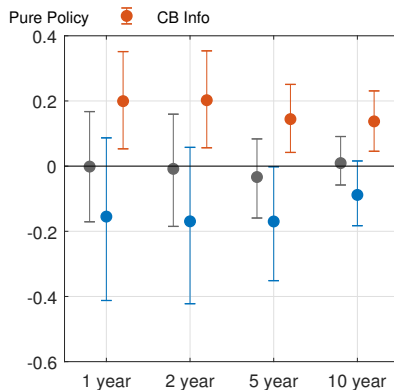
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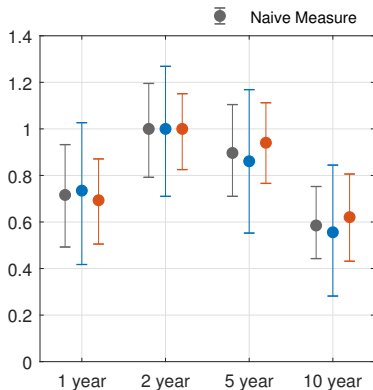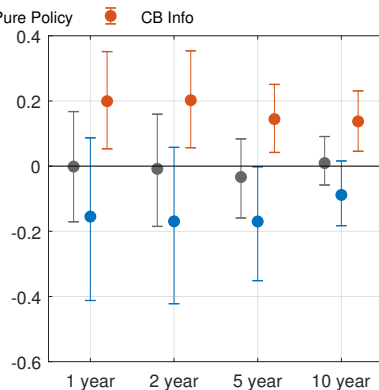
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Survey Expectations
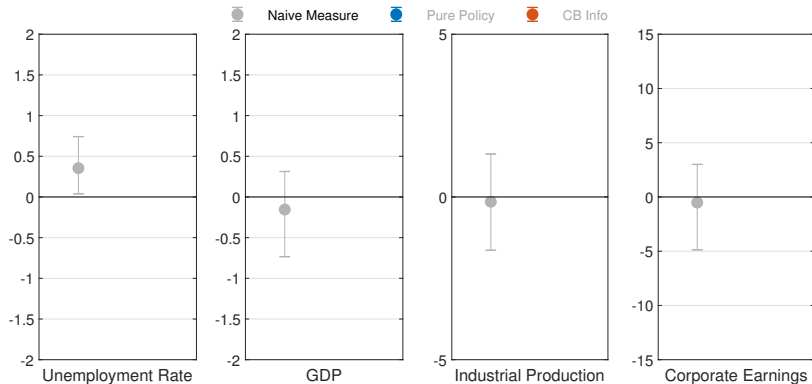
the "naive" shock measure

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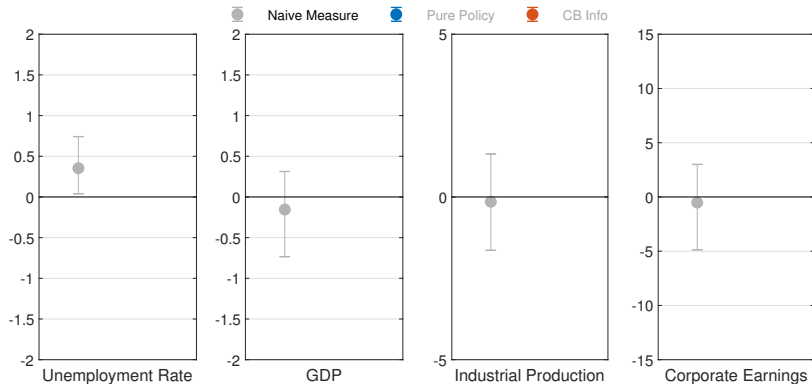
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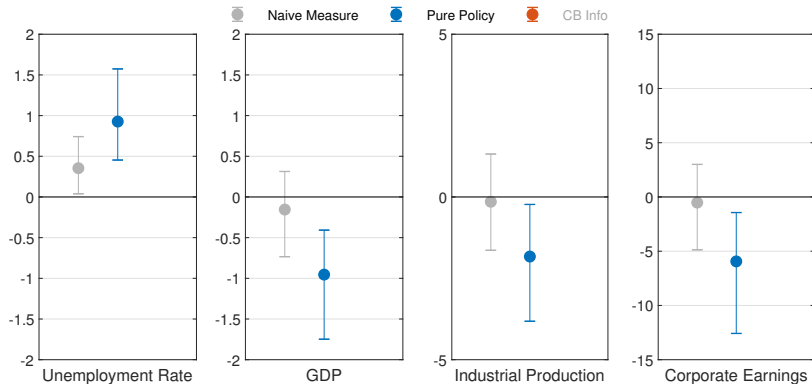- ⇒ in line with literature, at odds with monetary theory
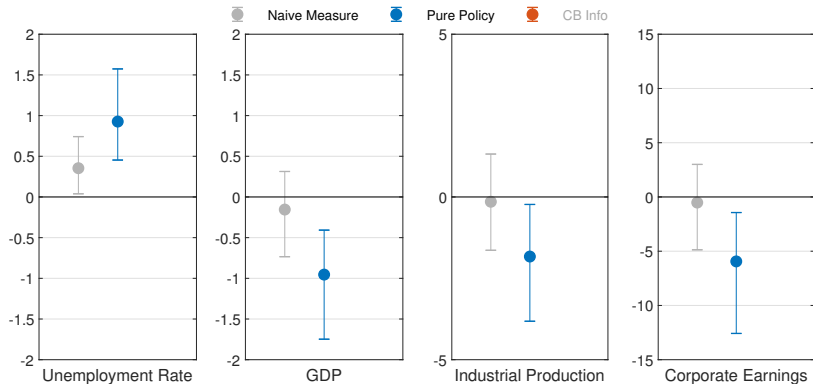
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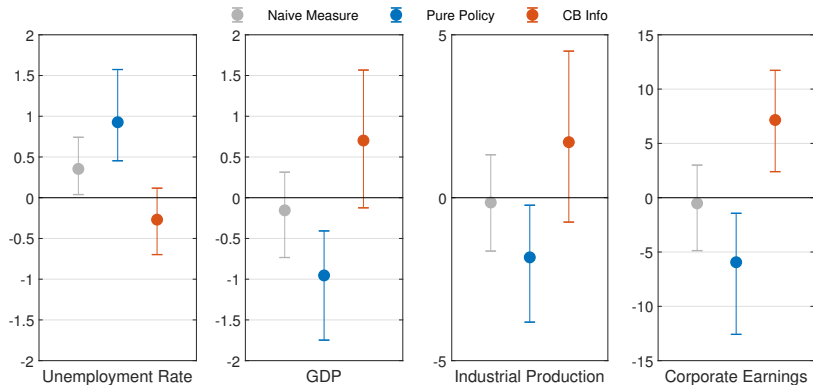
- depress survey expectations

Survey Expectations

pure policy shocks

- depress survey expectations
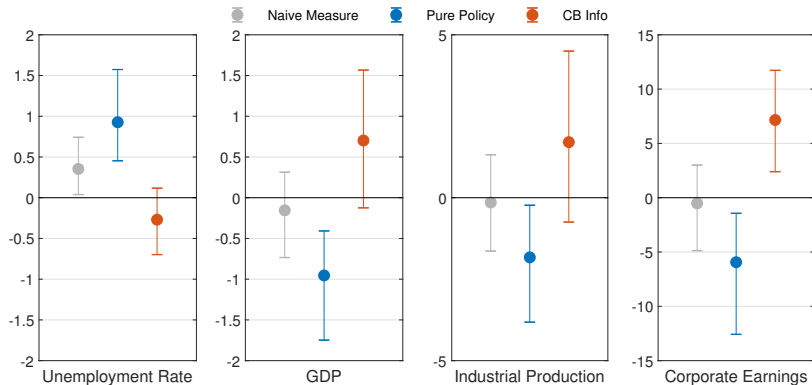⇒ in line with monetary theory

Survey Expectations

favourable economic information

- raises expectations

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favourable economic information

- raises expectations
- ⇒ in line with "central bank information" literature

Dynamic Macroeconomic Effects

estimate a standard VAR model

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and 5 variables in X:

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- log(consumer price index)
- log(Euro STOXX 50 index)
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use Z^j as instrument to identify structural shocks ϵ_t

- $e_t = H\epsilon_t$, $E(e_t Z_t^j) = H_1 \alpha$
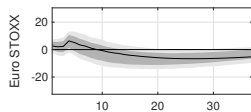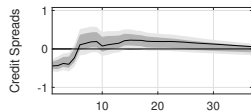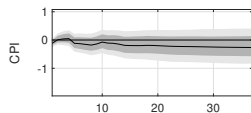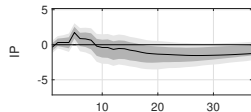- see Stock & Watson (2012), Mertens & Ravn (2012), Gertler & Karadi (2015), ...

VAR results

VAR results

Intro
○

Policy Surprises
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Information Effects
○○○○○

Method
○○
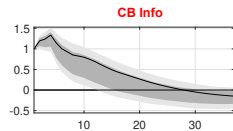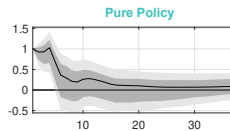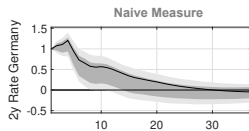
Results
○○○○○○○○●

Conclusion
○○

Appendix
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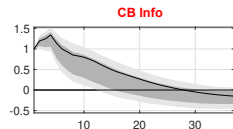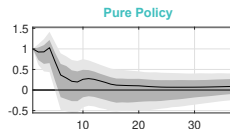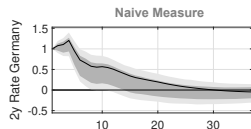
VAR results

VAR results

Conclusion

ECB announcements

- convey news about monetary policy

- but also about the economic outlook

Conclusion

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Yield reaction alone not informative

joint response of yields **and** stocks critical

Conclusion

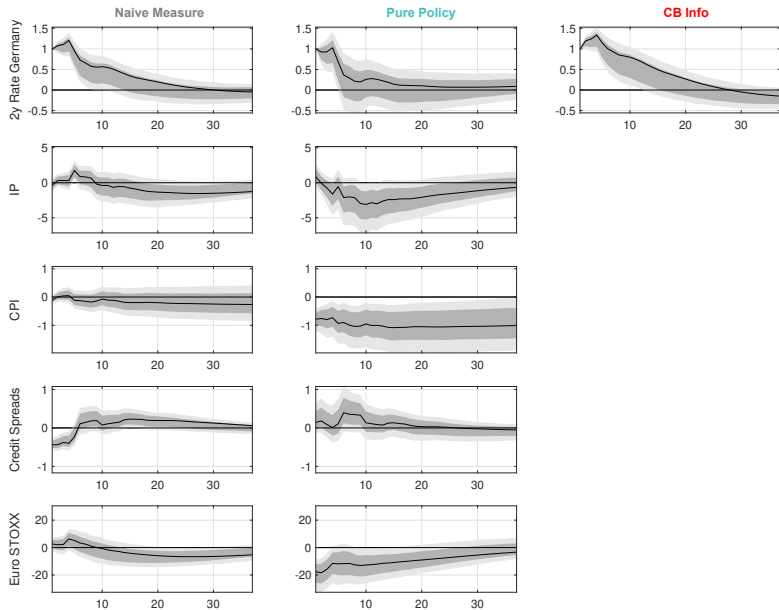### ECB announcements

- convey news about monetary policy

- but also about the economic outlook

Yield reaction alone not informative

joint response of yields **and** stocks critical

"Information Effects" no (durable) policy instrument

- ECB is only the messenger
- economic information would be revealed sooner or later
- sugarcoating the economic outlook would undermine credibility

Thank you for your attenation!

High-Frequency Data

	Underlying	avg. # of traded contracts on GCM days	avg. abs. change around event window
2-year yield	German bonds maturing in 1.75-2.25y	581,525	3.0 bp
Stock prices	Euro STOXX 50 index	762,527	50.8 bp

Each German bond future has a contract value of EUR 100,000. The Euro STOXX 50 future has a contract value of EUR 10 per index point, with a base value of the index of 1000 on December 31, 1991.

- tick-by-tick prices from Eurex exchange
- of actual trades (not indicative OTC quotes)
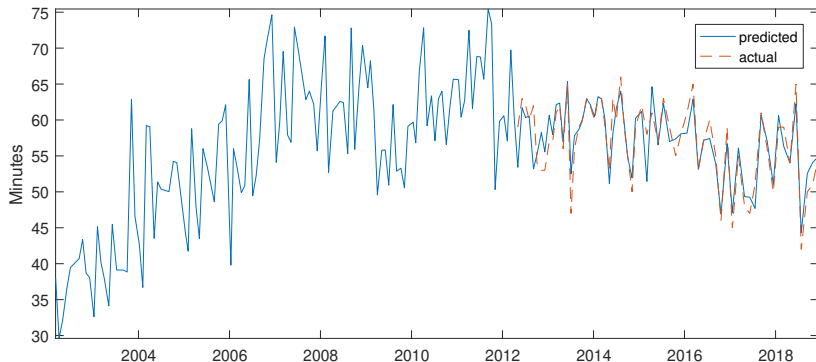- on 186 ECB Governing Council Meeting days since 2002

Determine ECB Press Conference Length

regress $D_t = \mu + \delta_t \# Words_t + \zeta_t$ for $t =$ {62 GCMs with video recording}

predict $\hat{D}_t = \hat{\mu} + \hat{\delta}_t \# Words_t$ for $t =$ {117 GCMs without recording}

$\# Words_t$: number of words in press conference transcript, $R^2 = 78\%$

Purge Effect of US Data Releases

$$x_{it}^{30min} = \gamma_i + \Theta_i s_t + e_{it}$$ for $t = \{1465$ releases outside event windows$\}$

s_t: "surprises" (actual release minus median forecast, divided by std of forecasts)

	2-year yield		Stock prices		
	$\hat{\Theta}$	$s.e.$	$\hat{\Theta}$	$s.e.$	# releases in event windows
Constant	0.00	0.03	2.07**	0.92	
Initial Jobless Claims	-0.30***	0.04	-8.34***	1.20	167
Continuing Claims	-0.11**	0.05	-2.07	1.33	155
Nonfarm Productivity	0.04	0.13	8.36***	2.90	48
Trade Balance	0.17**	0.08	5.37**	2.42	16
Employment Change (ADP Report)	0.35***	0.08	11.32***	2.56	11
Philadelphia Fed Business Outlook	0.42***	0.10	10.86***	3.06	6
Retail Sales Advance MoM	0.34***	0.10	15.50***	3.01	5
Change in Nonfarm Payrolls	1.64***	0.24	36.38***	3.99	3
PPI MoM	0.24**	0.11	-4.53	3.19	3

back

ECB GovC meeting 4 April 2002
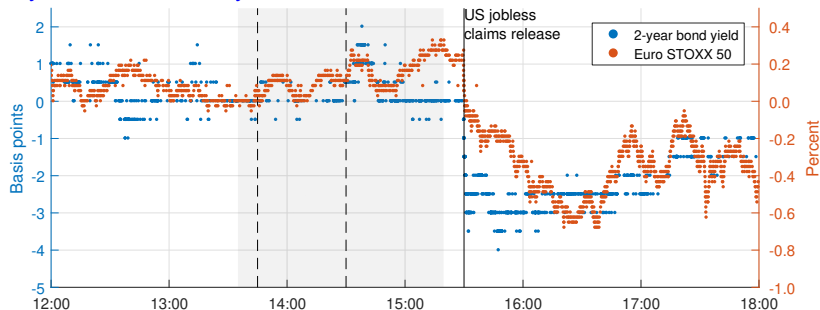
- press conference only 30 minutes long
- unexpectedly bad US job market data released at 15:30 (due to different daylight saving time not at 14:30)

back

Implementation of Sign-Restrictions

Denote by X the $T \times N$ (186×2) matrix of high-frequency changes

$$\underset{T \times N}{X} = \underset{T \times N}{Z} \underset{N \times N}{\Pi}$$

$$\iff (\text{2y yield, stocks}) = (Z^{PP}, Z^{I}) \begin{pmatrix} \Pi^{PP}_{2y\ yield} & \Pi^{PP}_{stocks} \\ \Pi^{I}_{2y\ yield} & \Pi^{I}_{stocks} \end{pmatrix}$$

Generate 2×2 matrices $\hat{\Pi}$, such that

- $\hat{\Pi}^{PP}_{2y\ yield} > 0$ and $\hat{\Pi}^{PP}_{2y\ yield} > 0$, i.e. both shock raise the 2-year bond yield
- $\hat{\Pi}^{PP}_{stocks} < 0$, i.e. a pure policy shock lowers stock prices
- $\hat{\Pi}^{I}_{stocks} > 0$, i.e. a central bank information shock raises stock prices
- and Z^{PP} and Z^{I} are orthogonal to each other.

Each candidate matrix $\hat{\Pi}$ is obtained as a QR decomposition of 2×2 matrices drawn from a standard normal distribution

Having drawn 2000 matrices $\hat{\Pi}$, apply the "median target" criterion of Fry and Pagan (2011) to select a unique matrix Π

(compute the median of each entry across all draws of $\hat{\Pi}$, and select the matrix Π that minimizes the sum of squared deviations from these median values) back to main text

Bootstrap Algorithm

For 2000 bootstrap repetitions,

- randomly select $T{=}186$ time periods τ with replacement from $\tau \in \{1, ..., T\}$
- collect the high-frequency futures movements $x_{i\tau}$ in matrix **X**
  - define $\mathbf{Z}^{PN}$ as the resampled 2-year yield changes
  - obtain $\mathbf{Z}^{PP}$ and $\mathbf{Z}^{I}$ by applying the (identification scheme) to **X**
- obtain $\hat{\beta}_i^j$ by regressing $\Delta Y_{i\tau}$ on $\mathbf{Z}^j$, for $j \in \{PN, PP, I\}$

Boostrapped standard errors are based on the empirical distribution of $\hat{\beta}_i^j$

To keep the algorithm manageable, I only draw 200 admissible rotations $\hat{\Pi}$ for each bootstrap sample (instead of 2000 for the point estimates)

(back to main text)

Survey data

- All data refers to survey expectations of constant-horizon 1-year ahead forecasts

- unemp. rate, GDP & IP growth surveys from Consensus Economics
- refer to aggregate euro area
- revisions = monthly forecast prior vs post ECB announcement

- corporate earnings surveys are from I/B/E/S
- refer to Euro STOXX 50 index (each constituent stock covered by $\sim$ 30 analysts)
- revisions = weekly forecast prior vs 2 weeks after ECB announcement