Measuring Euro Area Monetary Policy

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Disclaimer

The opinions in this presentation are those of the authors and do not necessarily reflect the views of the European Central Bank and the Eurosystem.

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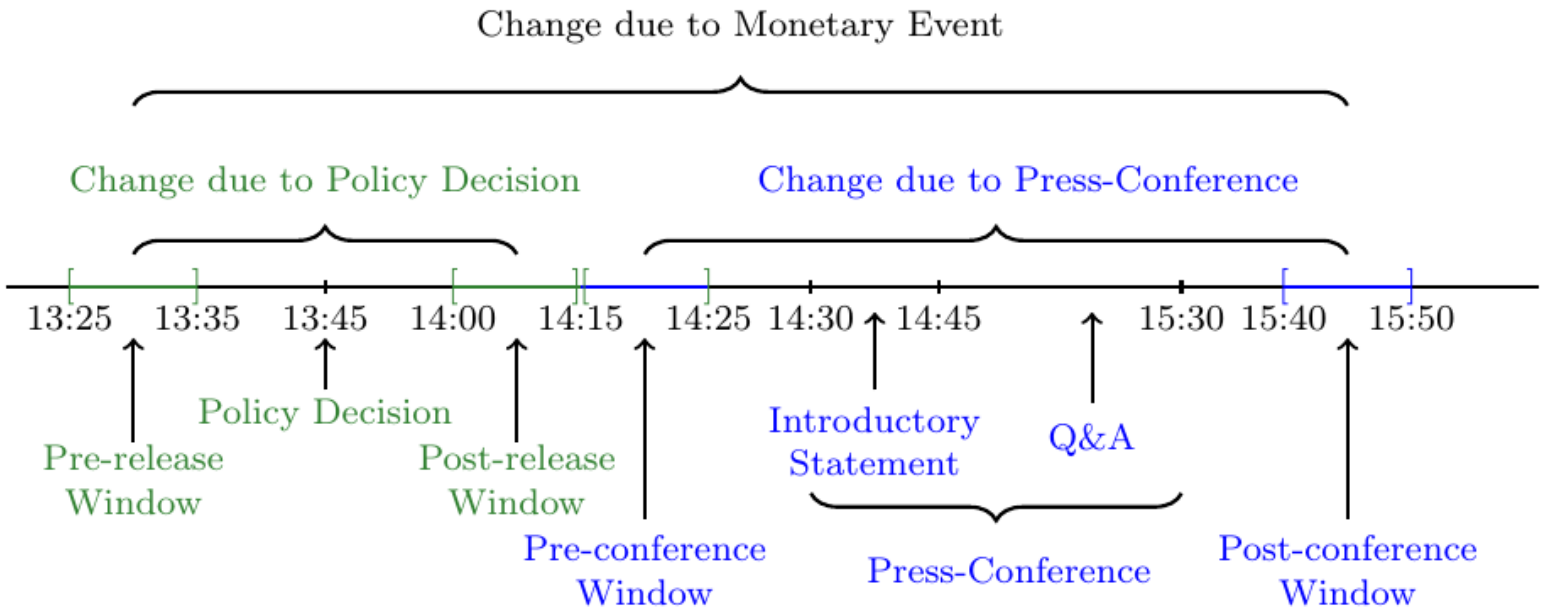
  - *Results suggest communication impulses have been changing, not responses.*
  - Find strong persistence of effects, more so than US.
  - Little effect of nonlinearity, in contrast to US real effects to monetary policy.

Event day timeline



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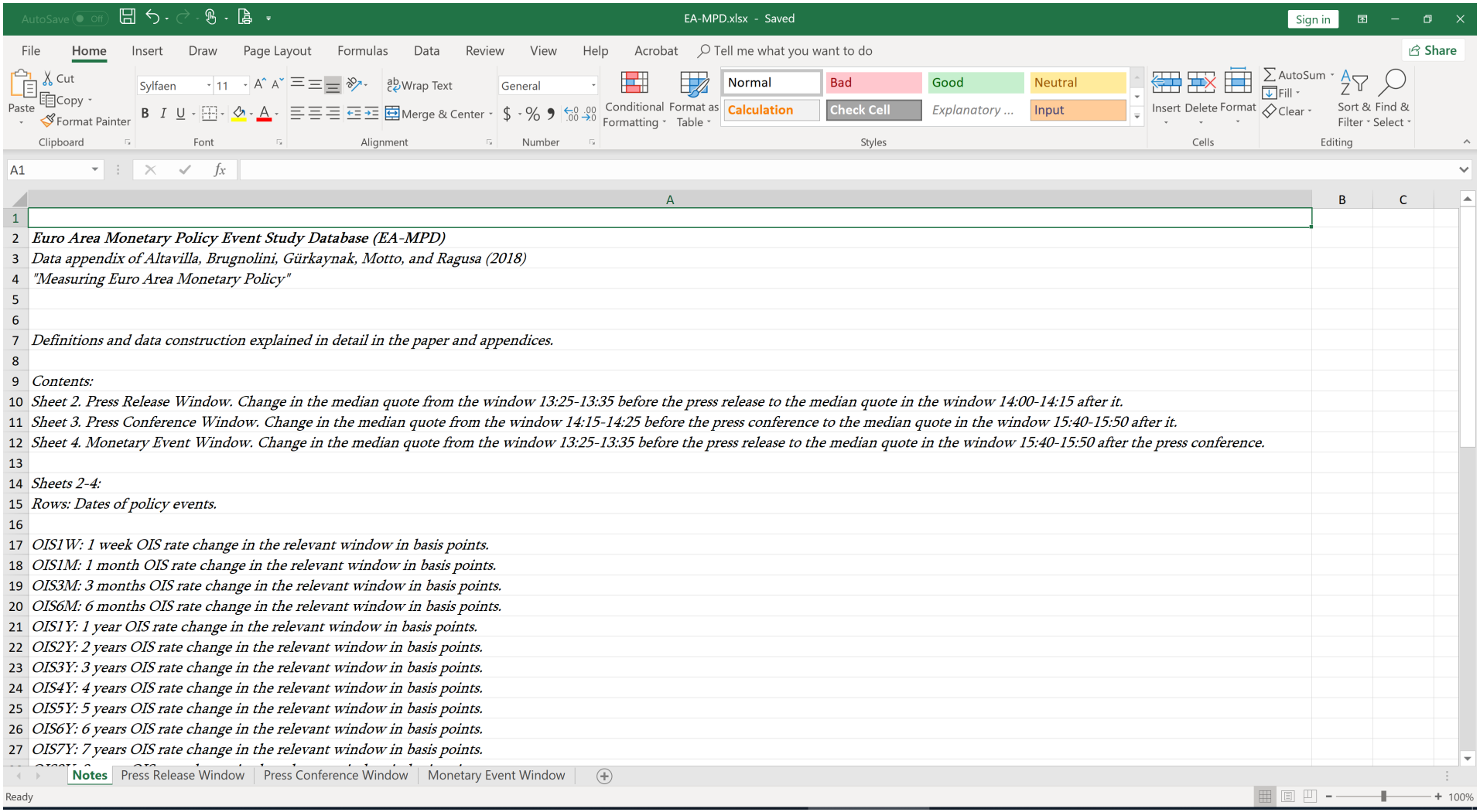
- Up to date and will be kept updated.
- Will help in increased attention for and research on euro area monetary policy.

EA-MPD Sample I

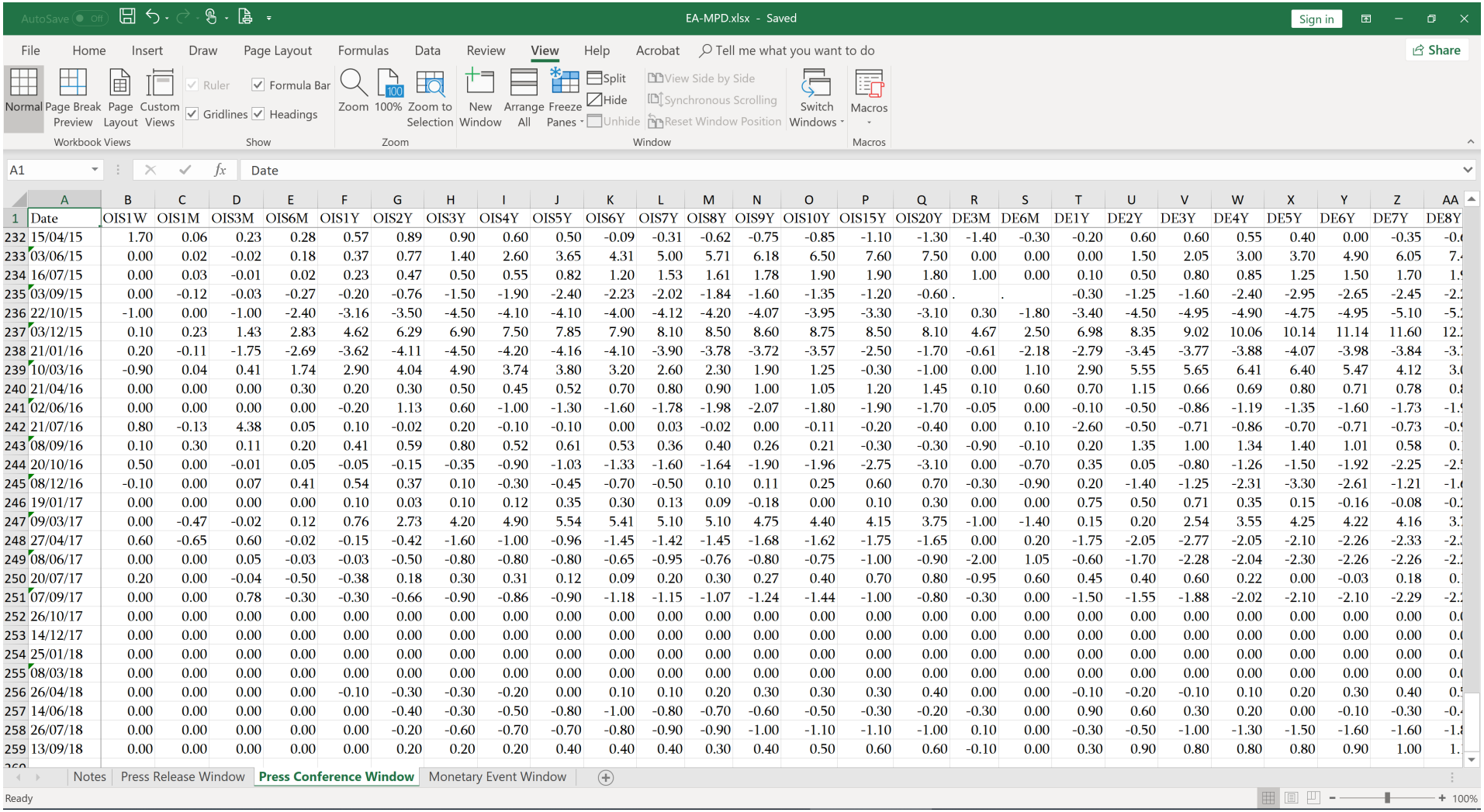


EA-MPD.xlsx - Saved

	A
1	
2	*Euro Area Monetary Policy Event Study Database (EA-MPD)*
3	*Data appendix of Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2018)*
4	*"Measuring Euro Area Monetary Policy"*
5	
6	
7	*Definitions and data construction explained in detail in the paper and appendices.*
8	
9	*Contents:*
10	*Sheet 2. Press Release Window. Change in the median quote from the window 13:25-13:35 before the press release to the median quote in the window 14:00-14:15 after it.*
11	*Sheet 3. Press Conference Window. Change in the median quote from the window 14:15-14:25 before the press conference to the median quote in the window 15:40-15:50 after it.*
12	*Sheet 4. Monetary Event Window. Change in the median quote from the window 13:25-13:35 before the press release to the median quote in the window 15:40-15:50 after the press conference.*
13	
14	*Sheets 2-4:*
15	*Rows: Dates of policy events.*
16	
17	*OIS1W: 1 week OIS rate change in the relevant window in basis points.*
18	*OIS1M: 1 month OIS rate change in the relevant window in basis points.*
19	*OIS3M: 3 months OIS rate change in the relevant window in basis points.*
20	*OIS6M: 6 months OIS rate change in the relevant window in basis points.*
21	*OIS1Y: 1 year OIS rate change in the relevant window in basis points.*
22	*OIS2Y: 2 years OIS rate change in the relevant window in basis points.*
23	*OIS3Y: 3 years OIS rate change in the relevant window in basis points.*
24	*OIS4Y: 4 years OIS rate change in the relevant window in basis points.*
25	*OIS5Y: 5 years OIS rate change in the relevant window in basis points.*
26	*OIS6Y: 6 years OIS rate change in the relevant window in basis points.*
27	*OIS7Y: 7 years OIS rate change in the relevant window in basis points.*

Notes | Press Release Window | Press Conference Window | Monetary Event Window

EA-MPD Sample II



EA-MPD.xlsx - Saved

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	Date	OIS1W	OIS1M	OIS3M	OIS6M	OIS1Y	OIS2Y	OIS3Y	OIS4Y	OIS5Y	OIS6Y	OIS7Y	OIS8Y	OIS9Y	OIS10Y	OIS15Y	OIS20Y	DE3M	DE6M	DE1Y	DE2Y	DE3Y	DE4Y	DE5Y	DE6Y	DE7Y	DE8Y
232	15/04/15	1.70	0.06	0.23	0.28	0.57	0.89	0.90	0.60	0.50	-0.09	-0.31	-0.62	-0.75	-0.85	-1.10	-1.30	-1.40	-0.30	-0.20	0.60	0.60	0.55	0.40	0.00	-0.35	-0.6
233	03/06/15	0.00	0.02	-0.02	0.18	0.37	0.77	1.40	2.60	3.65	4.31	5.00	5.71	6.18	6.50	7.60	7.50	0.00	0.00	0.00	1.50	2.05	3.00	3.70	4.90	6.05	7.4
234	16/07/15	0.00	0.03	-0.01	0.02	0.23	0.47	0.50	0.55	0.82	1.20	1.53	1.61	1.78	1.90	1.90	1.80	1.00	0.00	0.10	0.50	0.80	0.85	1.25	1.50	1.70	1.9
235	03/09/15	0.00	-0.12	-0.03	-0.27	-0.20	-0.76	-1.50	-1.90	-2.40	-2.23	-2.02	-1.84	-1.60	-1.35	-1.20	-0.60	.	.	-0.30	-1.25	-1.60	-2.40	-2.95	-2.65	-2.45	-2.2
236	22/10/15	-1.00	0.00	-1.00	-2.40	-3.16	-3.50	-4.50	-4.10	-4.10	-4.00	-4.12	-4.20	-4.07	-3.95	-3.30	-3.10	0.30	-1.80	-3.40	-4.50	-4.95	-4.90	-4.75	-4.95	-5.10	-5.2
237	03/12/15	0.10	0.23	1.43	2.83	4.62	6.29	6.90	7.50	7.85	7.90	8.10	8.50	8.60	8.75	8.50	8.10	4.67	2.50	6.98	8.35	9.02	10.06	10.14	11.14	11.60	12.2
238	21/01/16	0.20	-0.11	-1.75	-2.69	-3.62	-4.11	-4.50	-4.20	-4.16	-4.10	-3.90	-3.78	-3.72	-3.57	-2.50	-1.70	-0.61	-2.18	-2.79	-3.45	-3.77	-3.88	-4.07	-3.98	-3.84	-3.7
239	10/03/16	-0.90	0.04	0.41	1.74	2.90	4.04	4.90	3.74	3.80	3.20	2.60	2.30	1.90	1.25	-0.30	-1.00	0.00	1.10	2.90	5.55	5.65	6.41	6.40	5.47	4.12	3.0
240	21/04/16	0.00	0.00	0.00	0.30	0.20	0.30	0.50	0.45	0.52	0.70	0.80	0.90	1.00	1.05	1.20	1.45	0.10	0.60	0.70	1.15	0.66	0.69	0.80	0.71	0.78	0.8
241	02/06/16	0.00	0.00	0.00	0.00	-0.20	1.13	0.60	-1.00	-1.30	-1.60	-1.78	-1.98	-2.07	-1.80	-1.90	-1.70	-0.05	0.00	-0.10	-0.50	-0.86	-1.19	-1.35	-1.60	-1.73	-1.9
242	21/07/16	0.80	-0.13	4.38	0.05	0.10	-0.02	0.20	-0.10	-0.10	0.00	0.03	-0.02	0.00	-0.11	-0.20	-0.40	0.00	0.10	-2.60	-0.50	-0.71	-0.86	-0.70	-0.71	-0.73	-0.9
243	08/09/16	0.10	0.30	0.11	0.20	0.41	0.59	0.80	0.52	0.61	0.53	0.36	0.40	0.26	0.21	-0.30	-0.30	-0.90	-0.10	0.20	1.35	1.00	1.34	1.40	1.01	0.58	0.1
244	20/10/16	0.50	0.00	-0.01	0.05	-0.05	-0.15	-0.35	-0.90	-1.03	-1.33	-1.60	-1.64	-1.90	-1.96	-2.75	-3.10	0.00	-0.70	0.35	0.05	-0.80	-1.26	-1.50	-1.92	-2.25	-2.5
245	08/12/16	-0.10	0.00	0.07	0.41	0.54	0.37	0.10	-0.30	-0.45	-0.70	-0.50	0.10	0.11	0.25	0.60	0.70	-0.30	-0.90	0.20	-1.40	-1.25	-2.31	-3.30	-2.61	-1.21	-1.6
246	19/01/17	0.00	0.00	0.00	0.00	0.10	0.03	0.10	0.12	0.35	0.30	0.13	0.09	-0.18	0.00	0.10	0.30	0.00	0.00	0.75	0.50	0.71	0.35	0.15	-0.16	-0.08	-0.1
247	09/03/17	0.00	-0.47	-0.02	0.12	0.76	2.73	4.20	4.90	5.54	5.41	5.10	5.10	4.75	4.40	4.15	3.75	-1.00	-1.40	0.15	0.20	2.54	3.55	4.25	4.22	4.16	3.7
248	27/04/17	0.60	-0.65	0.60	-0.02	-0.15	-0.42	-1.60	-1.00	-0.96	-1.45	-1.42	-1.45	-1.68	-1.62	-1.75	-1.65	0.00	0.20	-1.75	-2.05	-2.77	-2.05	-2.10	-2.26	-2.33	-2.3
249	08/06/17	0.00	0.00	0.05	-0.03	-0.03	-0.50	-0.80	-0.80	-0.80	-0.65	-0.95	-0.76	-0.80	-0.75	-1.00	-0.90	-2.00	1.05	-0.60	-1.70	-2.28	-2.04	-2.30	-2.26	-2.26	-2.2
250	20/07/17	0.20	0.00	-0.04	-0.50	-0.38	0.18	0.30	0.31	0.12	0.09	0.20	0.30	0.27	0.40	0.70	0.80	-0.95	0.60	0.45	0.40	0.60	0.22	0.00	-0.03	0.18	0.1
251	07/09/17	0.00	0.00	0.78	-0.30	-0.30	-0.66	-0.90	-0.86	-0.90	-1.18	-1.15	-1.07	-1.24	-1.44	-1.00	-0.80	-0.30	0.00	-1.50	-1.55	-1.88	-2.02	-2.10	-2.10	-2.29	-2.2
252	26/10/17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
253	14/12/17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
254	25/01/18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
255	08/03/18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
256	26/04/18	0.00	0.00	0.00	0.00	-0.10	-0.30	-0.30	-0.20	0.00	0.10	0.10	0.20	0.30	0.30	0.30	0.40	0.00	0.00	-0.10	-0.20	-0.10	0.10	0.20	0.30	0.40	0.5
257	14/06/18	0.00	0.00	0.00	0.00	0.00	-0.40	-0.30	-0.50	-0.80	-1.00	-0.80	-0.70	-0.60	-0.50	-0.30	-0.20	-0.30	0.00	0.90	0.60	0.30	0.20	0.00	-0.10	-0.30	-0.4
258	26/07/18	0.00	0.00	0.00	0.00	0.00	-0.20	-0.60	-0.70	-0.70	-0.80	-0.90	-0.90	-1.00	-1.10	-1.10	-1.00	0.10	0.00	-0.30	-0.50	-1.00	-1.30	-1.50	-1.60	-1.60	-1.8
259	13/09/18	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.40	0.40	0.40	0.30	0.40	0.50	0.60	0.60	-0.10	0.00	0.30	0.90	0.80	0.80	0.80	0.90	1.00	1.1

EA-MPD will be live...

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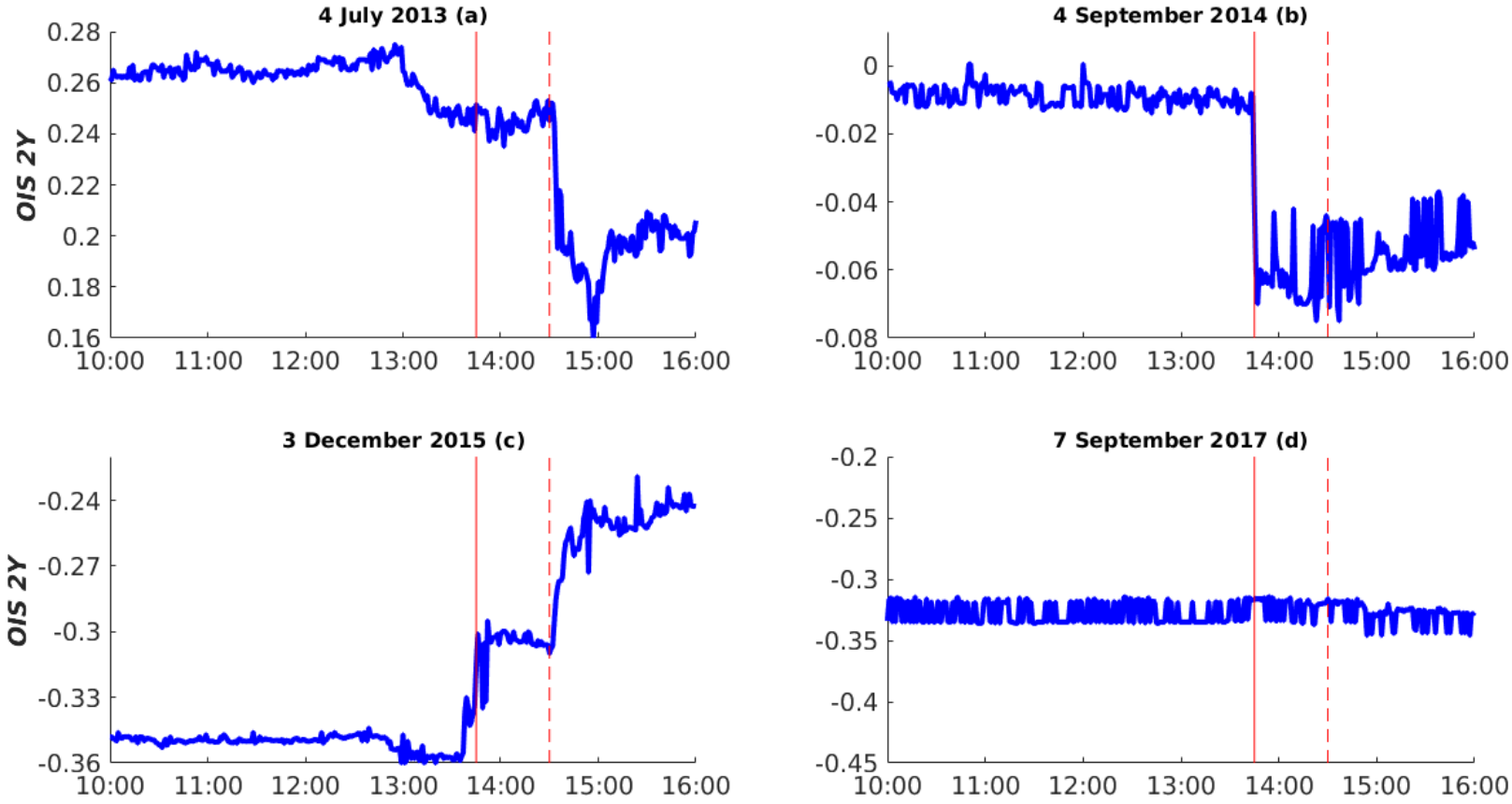
EA-MPD will be live...

when the paper is out as an ECB WP.

Market behavior in the two windows

- Very different reactions in press release and conference windows.
- Information flow can be in neither, either, or both windows.

Examples of different market reactions across windows



Policymaking practice has been changing over time

- Meetings twice a month with press conference once a month at the beginning,
- Then monthly meetings (since 2001),
- Then six-week cycles (since 2015),
- And QE announcements (since 2014).

Factors

- How many dimensions of policy do the market reactions suggest?
- Cragg and Donald test of significant factors.

Number of factors

	Press Release Window		Conference Window	
	Pre-QE	Full sample	Pre-QE	Full sample
$H_0 : k = 0$	46.20	49.12	105.49	108.438
	(0.001)	(0.000)	(0.000)	(0.000)
$H_0 : k = 1$	18.77	22.54	33.73	39.63
	(0.173)	(0.068)	(0.002)	(0.000)
$H_0 : k = 2$			14.86	17.44
			(0.061)	(0.025)
$H_0 : k = 3$				3.97
				(0.263)

Rotating the factors

- To make the factors admit economic interpretation, rotate such that:

1. One factor is orthogonal to 1-month OIS (GSS, 2005),

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4. Factors normalized to aid interpretation, statistical result invariant to normalization.

Rotated factors have names

- In Press Release window:

Rotated factors have names

- In Press Release window:
  - Target.

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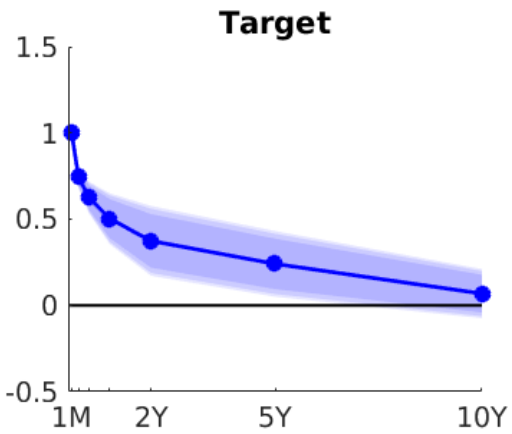
  - No information in the press conference on the current setting of rates.

Rotated factors have names

- In Press Release window:
  - Target.
- In press conference window:
  - Forward guidance and QE. Differentiated by loadings.
  - Also Timing. Shorter horizon forward guidance.
  - No information in the press conference on the current setting of rates.
- Different policy signals affect different parts of the yield curve.

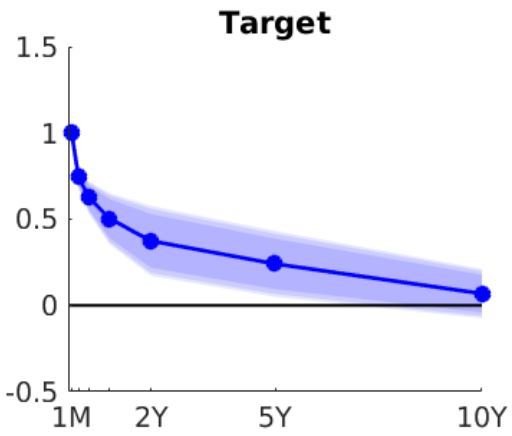
The factors

Press Release Window

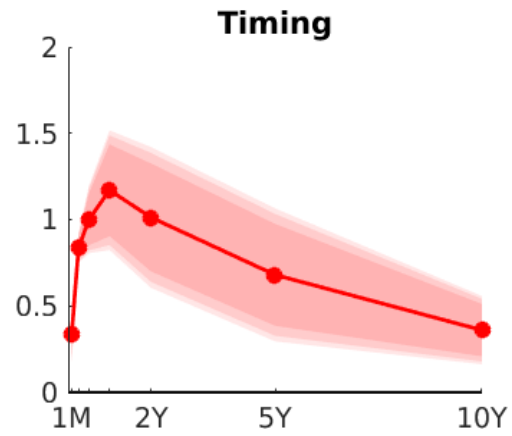


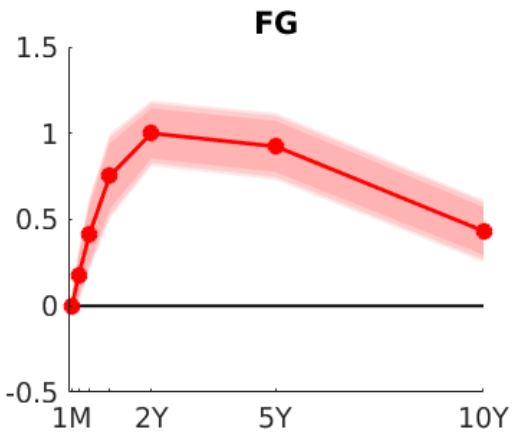
The factors

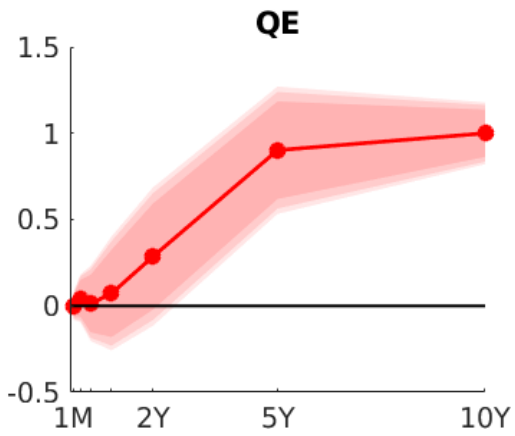
Press Release Window



Press Conference Window







Factor loadings

Panel (A): Press release window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Target	1.00***	0.74***	0.63***	0.50***	0.37***	0.24***	0.07
	(0.02)	(0.03)	(0.04)	(0.06)	(0.08)	(0.08)	(0.06)
Constant	0.20***	0.09**	0.11**	0.14**	0.05	-0.03	-0.05
	(0.02)	(0.04)	(0.05)	(0.07)	(0.09)	(0.11)	(0.09)
Observations	185	185	185	185	185	185	185
R-squared	0.98	0.91	0.83	0.60	0.33	0.12	0.02

Panel (B): Conference window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Timing	0.33***	0.84***	1.00***	1.17***	1.01***	0.68***	0.36***
	(0.07)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
FC	0.00	0.17***	0.41***	0.75***	1.00***	0.92***	0.43***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.02)
QE	0.00	0.04*	0.02	0.07***	0.29***	0.90***	1.00***
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.05)	(0.03)
IJC	0.04	-0.04	0.02	0.00	-0.01	0.01	-0.01
	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Constant	-0.13**	-0.13***	-0.15***	-0.22***	-0.35***	-0.25***	-0.13***
	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.04)
Observations	180	180	180	180	180	180	180
R-squared	0.55	0.96	0.98	0.99	0.99	0.98	0.97

Do the factors make sense?

- Yes.
- We check the large readings of the factors and verify that they correspond to known events.

Do the factors make sense?

- Yes.
- We check the large readings of the factors and verify that they correspond to known events.
- Hansen & McMahon (2016) style quantification of statement and these surprises now can work together.

What do the factors capture?

	1-month	3-month	6-month	1-year	2-year	5-year	10-year	SD Factor
Press release window								
Target	97.8	91.3	82.7	60.4	32.9	11.9	1.5	2.2
Residual	2.2	8.7	17.3	39.6	67.1	88.1	98.5	
SD OIS	2.2	1.7	1.5	1.4	1.4	1.5	1.2	
Conference window								
Timing	54.7	86.6	70.3	50.1	29.5	14.8	9.7	2.3
Forward Guidance	0.0	9.0	28.1	48.9	68.0	64.2	33.2	3.6
QE	0.0	0.2	0.0	0.1	1.7	18.7	53.8	2.0
Residual	45.3	4.2	1.6	0.9	0.8	2.3	3.3	
SD OIS	1.1	2.1	2.8	3.9	4.4	4.1	2.7	

Factors and yields

- Press release yield volatility curve is downwards sloping. Target captures the short-end volatility. Long-end is idiosyncratic noise.
- Press conference yield volatility curve is upwards sloping, peaking at 2 to 5 years.
- FG and QE both affect these maturities.
- Timing is related to volatility of shorter (but not 1-month) maturities.
- We capture *all* of the variance of the high volatility maturities.

Sub samples: pre-crisis. 2002-2007

Panel (A): Press release window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Target	1.03***	0.62***	0.42***	0.22***	0.01	-0.04	-0.07
	(0.02)	(0.03)	(0.03)	(0.06)	(0.09)	(0.11)	(0.10)
Constant	0.19***	0.13**	0.14**	0.23**	0.08	0.06	-0.08
	(0.03)	(0.06)	(0.06)	(0.09)	(0.09)	(0.10)	(0.09)
Observations	72	72	72	72	72	72	72
R-squared	0.98	0.85	0.69	0.22	0.00	0.01	0.03
Sample	01/2002	01/2002	01/2002	01/2002	01/2002	01/2002	01/2002
blank	12/2007	12/2007	12/2007	12/2007	12/2007	12/2007	12/2007

Panel (B): Conference window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Timing	0.23***	0.87***	0.98***	1.18***	1.07***	0.57***	0.44***
	(0.07)	(0.05)	(0.04)	(0.03)	(0.04)	(0.15)	(0.07)
FG	0.02	0.16***	0.43***	0.80***	1.01***	1.16***	0.63***
	(0.03)	(0.04)	(0.01)	(0.02)	(0.04)	(0.13)	(0.06)
IJC	-0.03	-0.05	0.10**	-0.01	-0.13***	-0.04	-0.19*
	(0.06)	(0.04)	(0.05)	(0.03)	(0.05)	(0.12)	(0.10)
Constant	-0.06	-0.15***	-0.12***	-0.24***	-0.39***	-0.16	-0.18
	(0.06)	(0.05)	(0.04)	(0.03)	(0.06)	(0.14)	(0.13)
Observations	67	67	67	67	67	67	67
R-squared	0.34	0.92	0.97	0.99	0.98	0.86	0.75
Sample	01/2002	01/2002	01/2002	01/2002	01/2002	01/2002	01/2002
blank	12/2007	12/2007	12/2007	12/2007	12/2007	12/2007	12/2007

Crisis, before QE. 2008-2013

Panel (A): Press release window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Target	1.00***	0.77***	0.67***	0.58***	0.47***	0.31***	0.10
	(0.03)	(0.03)	(0.02)	(0.04)	(0.06)	(0.09)	(0.08)
Constant	0.21***	0.03	0.10*	0.07	0.01	-0.07	0.04
	(0.04)	(0.05)	(0.05)	(0.10)	(0.15)	(0.22)	(0.17)
Observations	71	71	71	71	71	71	71
R-squared	0.98	0.97	0.95	0.79	0.53	0.20	0.04
Sample	01/2008	01/2008	01/2008	01/2008	01/2008	01/2008	01/2008
blank	12/2013	12/2013	12/2013	12/2013	12/2013	12/2013	12/2013

Panel (B): Conference window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Timing	0.34***	0.81***	1.02***	1.17***	0.97***	0.62***	0.27***
	(0.08)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.06)
FG	0.02	0.18***	0.39***	0.73***	1.00***	0.84***	0.36***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.05)	(0.06)
IJC	0.21**	-0.06	-0.08**	-0.03	-0.03	-0.33	-0.32
	(0.09)	(0.05)	(0.04)	(0.05)	(0.08)	(0.29)	(0.28)
Constant	-0.24**	-0.14**	-0.12***	-0.18***	-0.36***	-0.35	-0.11
	(0.10)	(0.05)	(0.04)	(0.05)	(0.09)	(0.26)	(0.27)
Observations	71	71	71	71	71	71	71
R-squared	0.64	0.98	0.99	0.99	0.98	0.84	0.48
Sample	01/2008	01/2008	01/2008	01/2008	01/2008	01/2008	01/2008
blank	12/2013	12/2013	12/2013	12/2013	12/2013	12/2013	12/2013

QE. 2014-

Panel (A): Press release window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Target	0.88***	1.05***	1.11***	1.04***	1.09***	0.92***	0.45*
	(0.08)	(0.12)	(0.18)	(0.14)	(0.17)	(0.18)	(0.25)
Constant	0.22***	0.08	0.02	0.05	-0.03	-0.20	-0.22
	(0.05)	(0.08)	(0.11)	(0.10)	(0.14)	(0.18)	(0.21)
Observations	42	42	42	42	42	42	42
R-squared	0.91	0.85	0.80	0.79	0.65	0.43	0.11
Sample	01/2014	01/2014	01/2014	01/2014	01/2014	01/2014	01/2014
blank	09/2018	09/2018	09/2018	09/2018	09/2018	09/2018	09/2018

Panel (B): Conference window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Timing	0.60***	0.92***	0.93***	1.02***	1.04***	0.87***	0.19**
	(0.14)	(0.07)	(0.04)	(0.05)	(0.04)	(0.09)	(0.07)
FG	-0.04	0.15***	0.48***	0.72***	1.00***	0.92***	0.44***
	(0.07)	(0.05)	(0.02)	(0.03)	(0.02)	(0.05)	(0.04)
QE	-0.07**	-0.03	0.03*	0.16***	0.30***	0.76***	1.12***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.05)	(0.04)
IJC	-0.03	-0.06	0.04	0.06	-0.06*	-0.01	0.02
	(0.11)	(0.13)	(0.07)	(0.05)	(0.03)	(0.07)	(0.06)
Constant	-0.08	-0.09	-0.25***	-0.22***	-0.25***	-0.35***	-0.07
	(0.10)	(0.07)	(0.04)	(0.05)	(0.03)	(0.08)	(0.06)
Observations	42	42	42	42	42	42	42
R-squared	0.70	0.87	0.96	0.96	0.99	0.98	0.99
Sample	01/2014	01/2014	01/2014	01/2014	01/2014	01/2014	01/2014
blank	09/2018	09/2018	09/2018	09/2018	09/2018	09/2018	09/2018

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- To ask whether the responses have changed for different times/markets require first estimating the different policy signals perceived by markets.
- We find that keeping the definitions of policy surprises constant, we explain about all of the variance in the OIS curve
  - But the variance shares change over time.
  - *Not fixing the different types of communication surprises would necessarily have found reactions to "communication" were changing over time.*
- Understanding the inherent heterogeneity of communication is crucial in interpreting the market response.
- Cannot be done without differentiating the signals in the Press

Effects on spreads: Italy

Panel (A): Press release window

VARIABLES	(1) IT 2Y	(2) IT 2Y	(3) IT 2Y	(4) IT 5Y	(5) IT 5Y	(6) IT 5Y	(7) IT 10Y	(8) IT 10Y	(9) IT 10Y
Target	0.10	0.45**	0.99***	-0.03	0.39**	0.85**	-0.06	0.16	0.80
	(0.11)	(0.20)	(0.34)	(0.12)	(0.19)	(0.42)	(0.09)	(0.12)	(0.62)
Constant	0.15	-0.20	-0.74	0.03	-0.09	-0.94**	-0.07	-0.07	-0.88**
	(0.11)	(0.29)	(0.46)	(0.10)	(0.31)	(0.42)	(0.09)	(0.25)	(0.43)
Observations	72	71	42	72	71	42	72	71	42
R-squared	0.04	0.22	0.12	0.00	0.16	0.10	0.03	0.05	0.08
Sample	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014
blank	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018

Panel (B): Conference window

VARIABLES	(1) IT 2Y	(2) IT 2Y	(3) IT 2Y	(4) IT 5Y	(5) IT 5Y	(6) IT 5Y	(7) IT 10Y	(8) IT 10Y	(9) IT 10Y
Timing	1.05***	0.61***	0.75*	0.77***	0.24	1.21**	0.42***	0.14	0.84*
	(0.06)	(0.18)	(0.44)	(0.07)	(0.19)	(0.54)	(0.07)	(0.11)	(0.47)
FG	1.03***	0.98***	0.92***	0.94***	0.76***	1.20***	0.62***	0.30***	1.11***
	(0.06)	(0.10)	(0.25)	(0.07)	(0.11)	(0.32)	(0.06)	(0.08)	(0.31)
QE			0.82***			1.07***			1.77***
			(0.27)			(0.31)			(0.20)
IJC	-0.10	0.03	-0.19	-0.17*	-0.59	-0.03	-0.21**	-0.57	-0.03
	(0.06)	(0.48)	(0.27)	(0.09)	(0.59)	(0.39)	(0.09)	(0.41)	(0.41)
Constant	-0.23***	-0.04	-1.18***	-0.32***	0.43	-1.58***	-0.25*	0.61	-1.01**
	(0.07)	(0.72)	(0.41)	(0.11)	(0.85)	(0.46)	(0.13)	(0.75)	(0.43)
Observations	67	71	42	67	71	42	67	71	42
R-squared	0.96	0.44	0.55	0.90	0.26	0.67	0.76	0.08	0.81
Sample	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014
blank	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018

Spreads: Spain

Panel (A): Press release window

VARIABLES	(1) ES 2Y	(2) ES 2Y	(3) ES 2Y	(4) ES 5Y	(5) ES 5Y	(6) ES 5Y	(7) ES 10Y	(8) ES 10Y	(9) ES 10Y
Target	0.06	0.39**	1.00***	-0.04	0.26*	0.87**	-0.07	0.25	0.81
	(0.10)	(0.18)	(0.33)	(0.12)	(0.14)	(0.41)	(0.09)	(0.15)	(0.67)
Constant	0.14	-0.33	-0.46**	0.04	-0.39	-0.55*	-0.09	-0.14	-0.63
	(0.11)	(0.30)	(0.21)	(0.11)	(0.26)	(0.28)	(0.09)	(0.24)	(0.40)
Observations	72	71	42	72	71	42	72	71	42
R-squared	0.02	0.16	0.43	0.01	0.11	0.22	0.03	0.12	0.10
Sample	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014
blank	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018

Panel (B): Conference window

VARIABLES	(1) ES 2Y	(2) ES 2Y	(3) ES 2Y	(4) ES 5Y	(5) ES 5Y	(6) ES 5Y	(7) ES 10Y	(8) ES 10Y	(9) ES 10Y
Timing	0.61***	0.52***	1.01***	0.41***	0.30**	1.25***	0.20*	0.11	0.68
	(0.12)	(0.12)	(0.31)	(0.14)	(0.13)	(0.45)	(0.11)	(0.10)	(0.43)
FG	0.84***	0.90***	0.72***	0.68***	0.71***	1.00***	0.32***	0.32***	0.87***
	(0.09)	(0.08)	(0.15)	(0.08)	(0.08)	(0.26)	(0.08)	(0.08)	(0.27)
QE			0.49***			0.71***			1.45***
			(0.10)			(0.14)			(0.19)
IJC	-0.10	0.04	0.09	-0.63*	-0.52	-0.11	-0.82**	-0.71*	-0.01
	(0.33)	(0.41)	(0.22)	(0.38)	(0.46)	(0.38)	(0.35)	(0.40)	(0.37)
Constant	-0.56	-0.33	-1.02***	-0.36	0.14	-1.45***	0.16	0.61	-0.79*
	(0.36)	(0.54)	(0.22)	(0.45)	(0.65)	(0.38)	(0.49)	(0.67)	(0.39)
Observations	113	71	42	113	71	42	113	71	42
R-squared	0.51	0.54	0.74	0.32	0.35	0.68	0.11	0.12	0.79
Sample	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014	01/2002	01/2008	01/2014
blank	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018	12/2007	12/2013	09/2018

Spreads

- QE causes spreads to narrow, works as expected and desired.
- This is a very robust finding
- Note that QE is extracted from OIS curve *only*, is *not* defined as factor that makes spreads narrower. This is a finding, not an assumption.

Exchange rates

Panel (A): Press release window

VARIABLES	(1) EUR	(2) EUR	(3) EUR	(4) EUR
Target	0.02*	-0.01	0.02*	0.16*
	(0.01)	(0.01)	(0.01)	(0.09)
Constant	-0.02	0.01	-0.02	-0.09**
	(0.02)	(0.02)	(0.02)	(0.04)
Observations	185	72	71	42
R-squared	0.04	0.01	0.10	0.25
Sample	01/2002	01/2002	01/2008	01/2014
blank	09/2018	12/2007	12/2013	09/2018

Panel (B): Conference window

VARIABLES	(1) EUR	(2) EUR	(3) EUR	(4) EUR
Timing	0.06***	0.07***	0.05***	0.21***
	(0.01)	(0.02)	(0.01)	(0.06)
FG	0.05***	0.02	0.04***	0.22***
	(0.01)	(0.01)	(0.01)	(0.06)
QE	0.08***			0.11***
	(0.02)			(0.03)
IJC	0.05**	0.08**	-0.00	-0.01
	(0.03)	(0.03)	(0.05)	(0.09)
Constant	-0.02	0.01	-0.01	-0.12*
	(0.03)	(0.03)	(0.04)	(0.06)
Observations	180	67	71	42
R-squared	0.35	0.25	0.40	0.64
Sample	01/2002	01/2002	01/2008	01/2014
blank	12/2017	12/2007	12/2013	09/2018

Exchange rates

- Euro appreciates in response to surprise tightenings.

Exchange rates

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- UIP is alive and kicking.

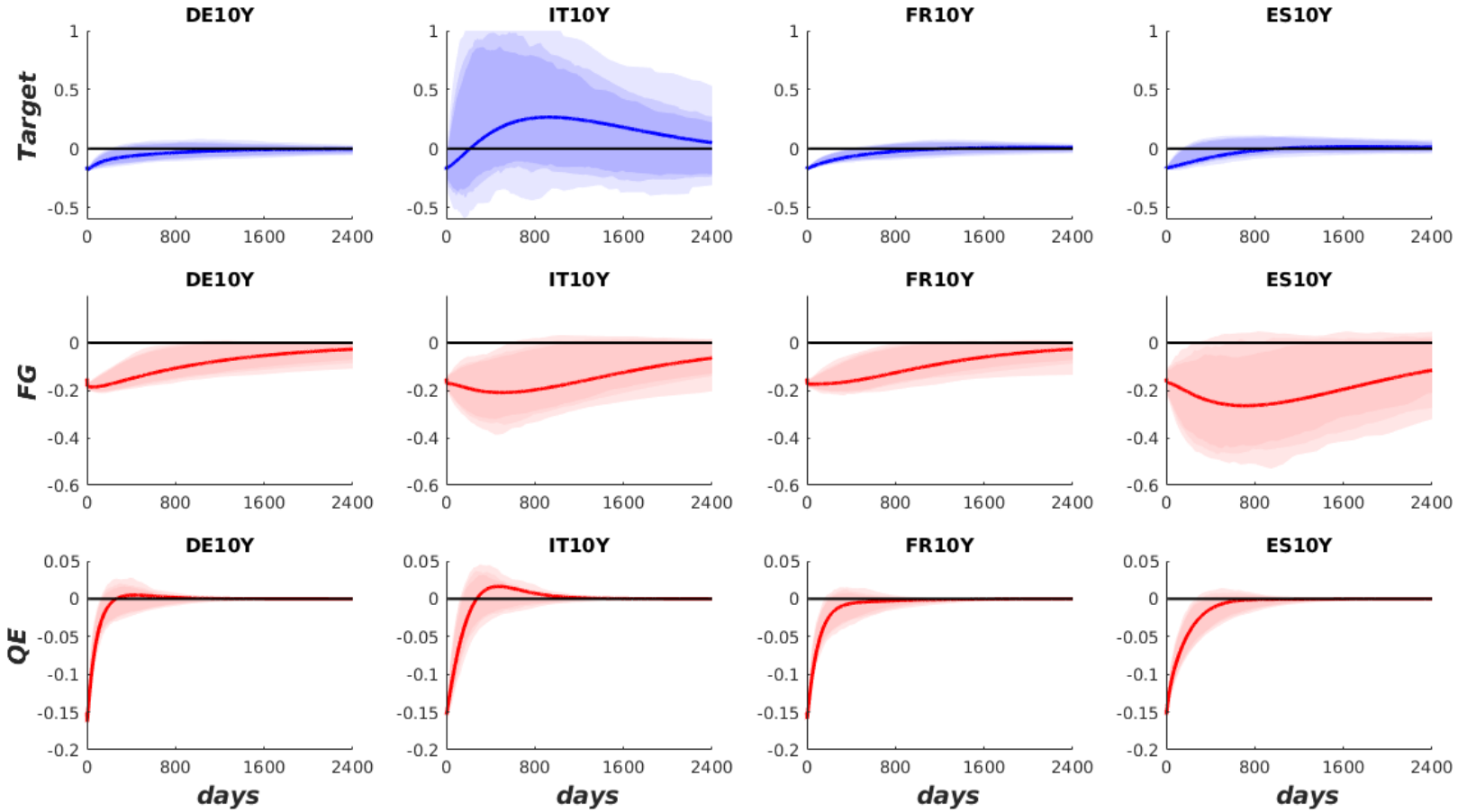
Exchange rates

- Euro appreciates in response to surprise tightenings.
- UIP is alive and kicking.
- We do not find a "saving the euro" effect.

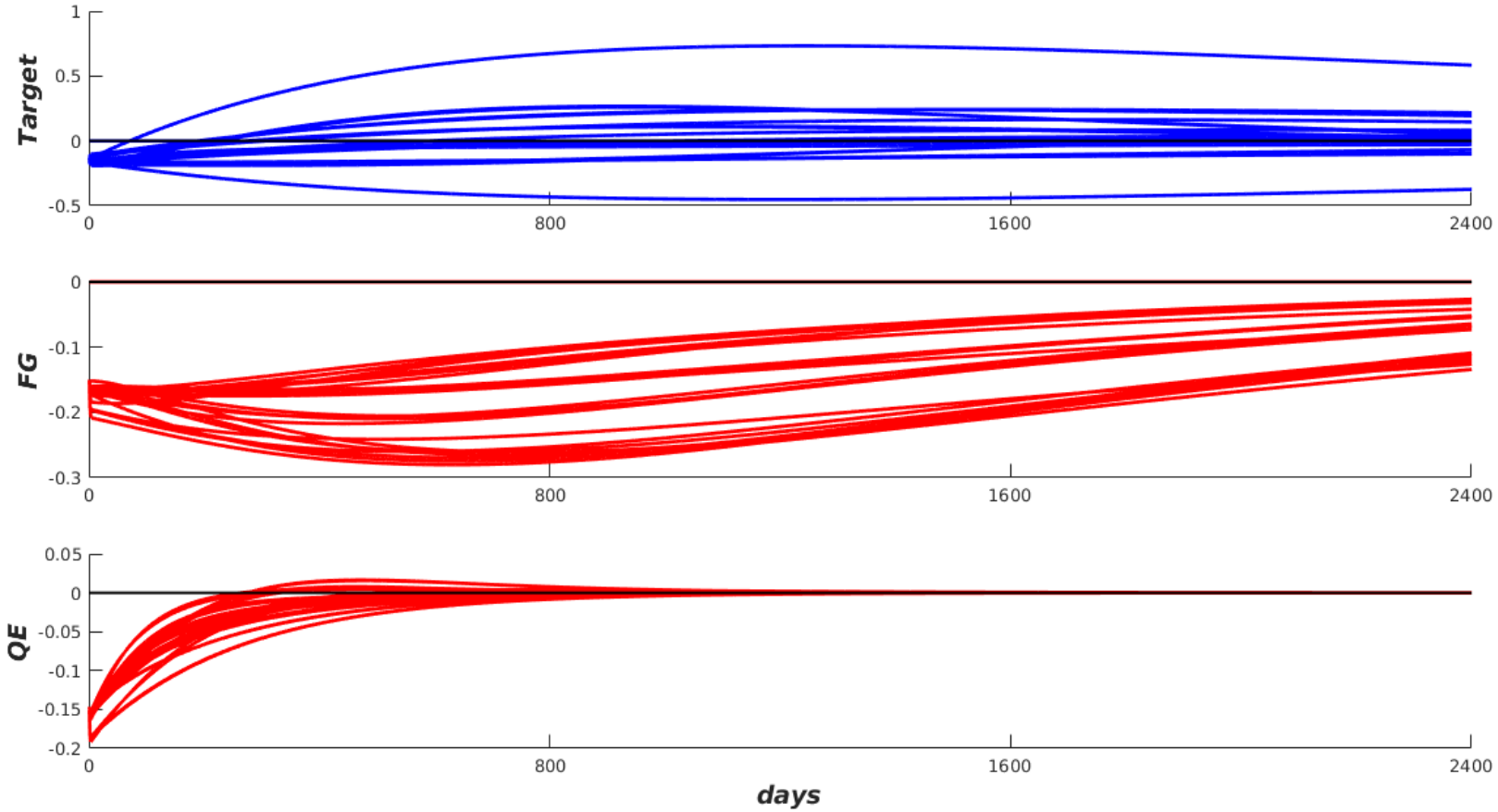
Persistence

- Based on a daily VAR.
- We employ various different VARs, with policy surprise factors used as instruments to identify VAR.

Persistence, baseline



Persistence, robustness



Persistence results (effects on 10-year yields)

- Target is not very persistent.

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- QE also quite persistent.
- Persistence present for IT and ES sovereign yields as well.
- QE more persistent in EA than US, or methodology matters.
- Wright (2012), Swanson (2018): 3m half life in US. We find 6m (GE) to 18m (ES) half lives.

Nonlinearity

Panel (A): Press release window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Target	1.01***	0.71***	0.64***	0.47***	0.35***	0.20	0.04
	(0.02)	(0.04)	(0.08)	(0.10)	(0.13)	(0.14)	(0.11)
Targetx(Target<0)	-0.01	0.07	0.02	0.12	0.12	0.13	0.10
	(0.05)	(0.06)	(0.09)	(0.11)	(0.16)	(0.16)	(0.13)
Target<0	0.02	0.07	0.17*	0.32**	0.40**	0.33	0.20
	(0.05)	(0.08)	(0.10)	(0.15)	(0.20)	(0.26)	(0.20)
Observations	185	185	185	185	185	185	185
R-squared	0.98	0.92	0.83	0.62	0.35	0.14	0.03

Panel (B): Conference window

VARIABLES	(1) OIS 1M	(2) OIS 3M	(3) OIS 6M	(4) OIS 1Y	(5) OIS 2Y	(6) OIS 5Y	(7) OIS 10Y
Timing	-0.04	-0.10	-0.07	-0.03	0.04	0.08	0.04
	(0.16)	(0.15)	(0.12)	(0.10)	(0.08)	(0.09)	(0.06)
FG	0.13	0.13	0.12	0.04	-0.03	-0.08	-0.10*
	(0.17)	(0.13)	(0.12)	(0.11)	(0.10)	(0.06)	(0.06)
QE	0.12	0.04	0.09	0.15	0.18	0.14	0.09
	(0.16)	(0.18)	(0.18)	(0.17)	(0.19)	(0.18)	(0.12)
Timingx(Timing<0)	-0.04	0.06	0.02	-0.01	-0.12	-0.14	-0.10
	(0.18)	(0.16)	(0.13)	(0.11)	(0.10)	(0.11)	(0.08)
FGx(FG<0)	-0.02	-0.06	-0.06	0.04	0.11	0.18**	0.14*
	(0.19)	(0.15)	(0.13)	(0.12)	(0.11)	(0.08)	(0.07)
QEx(QE<0)	-0.16	-0.15	-0.19	-0.21	-0.23	-0.33	-0.25
	(0.24)	(0.23)	(0.22)	(0.21)	(0.22)	(0.24)	(0.22)
Timing<0	-0.25	-0.23	-0.02	-0.05	0.06	-0.00	-0.07
	(0.40)	(0.30)	(0.27)	(0.26)	(0.26)	(0.26)	(0.22)
FG<0	0.41	0.17	0.19	0.10	0.07	0.04	-0.03
	(0.35)	(0.27)	(0.25)	(0.22)	(0.23)	(0.25)	(0.22)
QE<0	-0.13	-0.04	0.05	0.08	0.15	-0.31	-0.34
	(0.41)	(0.34)	(0.30)	(0.27)	(0.30)	(0.35)	(0.32)
IJC	0.12	0.08	-0.01	-0.04	-0.06	-0.12	-0.13
	(0.15)	(0.12)	(0.10)	(0.09)	(0.09)	(0.10)	(0.08)
Observations	180	180	180	180	180	180	180
R-squared	0.03	0.04	0.05	0.04	0.04	0.06	0.06

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- Much to do. We make the data and code available for research on ECB monetary policy.