

Monetary policy and financial markets: evidence from Twitter traffic

Donato Masciandaro¹, Davide Romelli² and Gaia Rubera¹

¹Bocconi University

²Trinity College Dublin

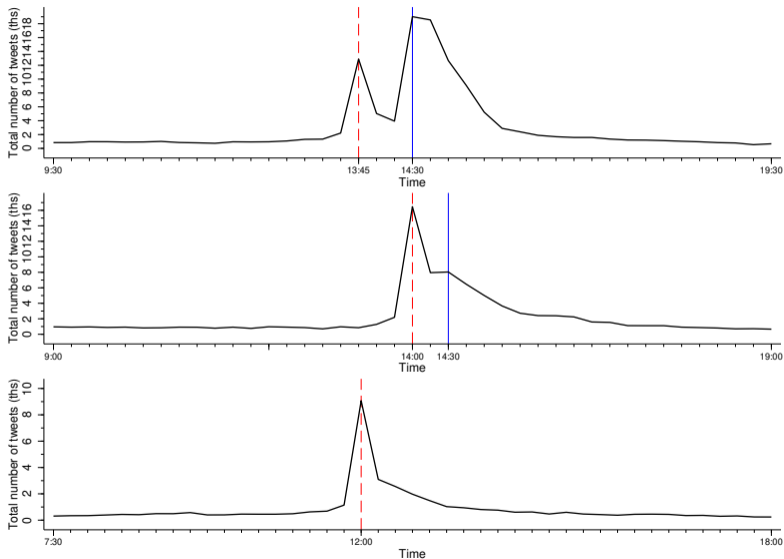
CEPR Central Bank Communication RPN
University of Oxford

March 13, 2024

Motivation

1. An increasing number of central banks use an institutional Twitter account to communicate their monetary policy decisions
 2. Twitter traffic by experts and non-experts is responsive to central bank communications
 3. Market participants closely monitor every detail of central bank communication, including tweets related to monetary policy
- Key question:
 1. **Is Twitter traffic associated with bond and stock market reactions around monetary policy announcements?**

Twitter traffic around monetary policy announcements



Motivation

1. Extensive literature on the effects of central bank communication on financial markets:
 - ▶ Gürkaynak (2005), Gürkaynak et al. (2005)

Key finding in the literature

Central bank communication matters for financial markets returns and volatility

2. Few studies on textual similarity:
 - ▶ Acosta and Meade (2015) and Ehrmann and Talmi (2020)
3. Limited research on Twitter and central bank communication
 - ▶ Evidence for the role of central bank communication via Twitter in shaping expectations (Gorodnichenko et al., 2021)
 - ▶ Evidence of differences in engagement to tweets by experts and non-experts (Ehrmann and Wabitsch, 2022)
 - ▶ Association between Twitter traffic and magnitude of monetary policy surprise (Ehrmann and Hubert, 2023)

What do we do?

1. Create a new database on tweets about monetary policy for 3 major central banks: the ECB, the Fed and the BoE
 - ▶ We select tweets related to monetary policy announcements
2. Measure the similarity between tweets on monetary policy and central banks' communication
 - ▶ Build a measure of similarity between tweets and central banks' monetary policy decisions
3. Investigate the association between changes in similarity and markets volatility and returns

Findings and contribution

- We find that our Twitter-based indicator is associated with bond and stock market reactions around monetary policy announcements
 1. Larger dissimilarities between tweets are associated with higher asset prices volatility and returns following the ECB monetary policy announcements
 2. Less evidence is found to the Fed and the Bank of England
- The suggested procedure is easily applicable to other countries
- This procedure could be used to study the role of non-experts' interactions in explaining financial markets' reactions to monetary policy announcements

Data & Methodology

Tweets

1. Tweets extraction:

- ▶ Our data sample is obtained by extracting tweets written in English, containing the following keywords:
 - ★ ECB = @ecb, #ecb, #trichet, #draghi, #lagarde
 - ★ Fed = @federalreserve, #fed, #bernanke, #yellen, #powell
 - ★ BoE = @bankofengland, #boe, #bankofengland, #carney
- ▶ Sample of 2,541,381 tweets from January 2011 to February 2020
 - ★ of which 467,777 tweets in the +/- 2 days around monetary policy decisions

2. Identification of tweets of interest:

- ▶ We trained a Machine Learning algorithm on a manually labeled train set to extract relevant tweets
- ▶ The final data set contains **228,348** tweets

Relevant vs non-relevant tweets

● Relevant



Mauro
@Trader_Mauro

#ECB's #Draghi says #euro is irreversible

2:13 PM · Oct 2, 2014 · TweetDeck



PropTraderz
@Proptraderz

Chicago Fed President #Evans: #FED could look at a #ratehike in June if the economy is strong enough. news.yahoo.com/feds-evans-say...

11:56 AM · May 18, 2015 · Twitter for BlackBerry®

● Non-relevant



Faisal Shafi
@faisal4media

@ecb to engage further with south #asian #cricket #communities ~ @DESIBlitz @PujaVedi ~ bit.ly/1pRrqnq



9:01 PM · Jun 4, 2014 · Twitter Web Client



Ammad Wakil
@AmmadWakil

#Carney calls for crackdown on #cryptocurrency 'mania' -



Carney calls for crackdown on crypto-currency 'mania'
Bitcoin and other digital currencies must be regulated, Bank of England governor Mark Carney warns.
bbc.co.uk

4:00 PM · Apr 18, 2018 · Twitter for Android

Monetary policy events

Monetary policy events from January 2011 to February 2020:

- 89 ECB
 1. 13:45 CET: press release
 2. 14:30 CET: press conference
 - ★ Introductory statement
 - ★ Q&A Session

- Fed
 1. 14:00 EST: 72 press release
 2. 14:30 EST: 40 press conferences

- 96 BoE
 1. 12:00 GMT: press release

Similarity

September 17, 2014

Federal Reserve issues FOMC statement

For immediate release

Share ↗

Information received since the Federal Open Market Committee met in July suggests that economic activity is expanding at a moderate pace. On balance, labor market conditions improved somewhat further, however, the unemployment rate is little changed and a range of labor market indicators suggests that there remains significant underutilization of labor resources. Household spending appears to be rising moderately and business fixed investment is advancing, while the recovery in the housing sector remains slow. Fiscal policy is restraining economic growth, although the extent of restraint is diminishing. Inflation has been running below the Committee's longer-run objective. Longer-term inflation expectations have remained stable.

Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic activity will expand at a moderate pace, with labor market indicators and inflation moving toward levels the Committee judges consistent with its dual mandate. The Committee sees the risks to the outlook for economic activity and the labor market as nearly balanced and judges that the likelihood of inflation running persistently below 2 percent has diminished somewhat since early this year.

The Committee currently judges that there is sufficient underlying strength in the broader economy to support ongoing improvement in labor market conditions. In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions since the inception of the current asset purchase program, the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in October, the Committee will add to its holdings of agency mortgage-backed securities at a pace of \$5 billion per month rather than \$10 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of \$10 billion per month rather than \$15 billion per month. The Committee is maintaining its existing



Donald J. Trump 
@realDonaldTrump · Follow



It is incredible that with a very strong dollar and virtually no inflation, the outside world blowing up around us, Paris is burning and China way down, the Fed is even considering yet another interest rate hike. Take the Victory!

1:27 PM · Dec 17, 2018



 65.7K  Reply  Share



Donald J. Trump 
@realDonaldTrump

Jay Powell and the Federal Reserve Fail Again. No "guts," no sense, no vision! A terrible communicator!

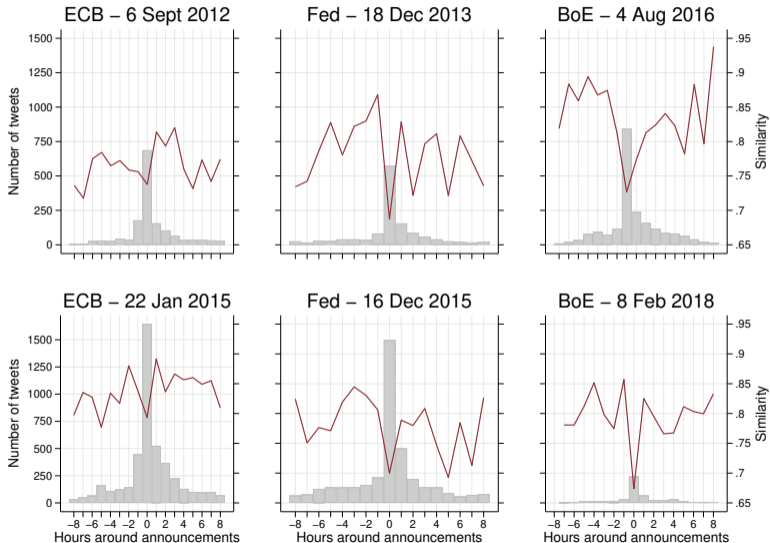
2:25 PM · Sep 18, 2019 · Twitter for iPhone

15.5K Retweets 60.5K Likes

Similarity between the text of central bank communication c and tweets on monetary policy t at horizon h in day d :

$$\cos \theta_{tc_d,h} = \frac{\vec{t}_{d,h} \cdot \vec{c}_{d,h}}{|\vec{t}_{d,h}| |\vec{c}_{d,h}|}$$

Evolution of similarity for key dates



Methodology

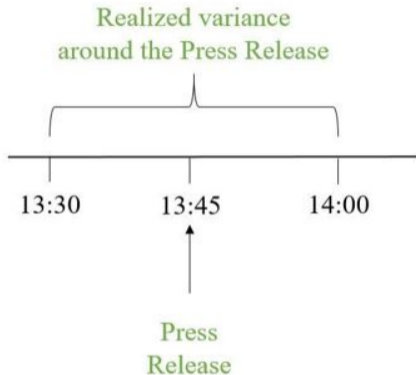
- We use high-frequency, intraday data to test whether changes in absolute similarity are associated with asset price volatility
- The estimation takes the following form:

$$RV_{\tau,MPD} = \beta_0 + \beta_1|\Delta\text{Similarity}_{h,MPD}| + \epsilon_{\tau,MPD}; \quad (1)$$

where

- ▶ $RV_{\tau,MPD}$ is the realised variance of the returns around the time τ of a communication event MPD (-15/+15 minutes around an event)
- ▶ $|\Delta\text{Similarity}_{h,MPD}|$ is the absolute change in the similarity measure between the tweets published in the 5 hours before an announcement and those released in the 15 minutes after it
- ▶ Regressions weighted by the number of tweets in the 5 hours prior to a monetary policy announcement

ECB event day timeline



PRESS RELEASE

Monetary policy decisions

4 September 2014

At today's meeting the Governing Council of the ECB took the following monetary policy decisions:

1. The interest rate on the main refinancing operations of the Eurosystem will be decreased by 10 basis points to 0.05%, starting from the operation to be settled on 10 September 2014.
2. The interest rate on the marginal lending facility will be decreased by 10 basis points to 0.30%, with effect from 10 September 2014.
3. The interest rate on the deposit facility will be decreased by 10 basis points to -0.20%, with effect from 10 September 2014.

The President of the ECB will comment on the considerations underlying these decisions at a press conference starting at 2.30 p.m. CET today.

ECB event day timeline

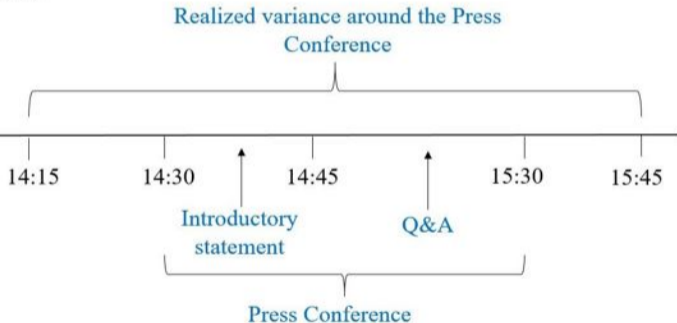
Introductory statement to the press conference (with Q&A)

Mario Draghi, President of the ECB, Frankfurt am Main, 22 January 2015

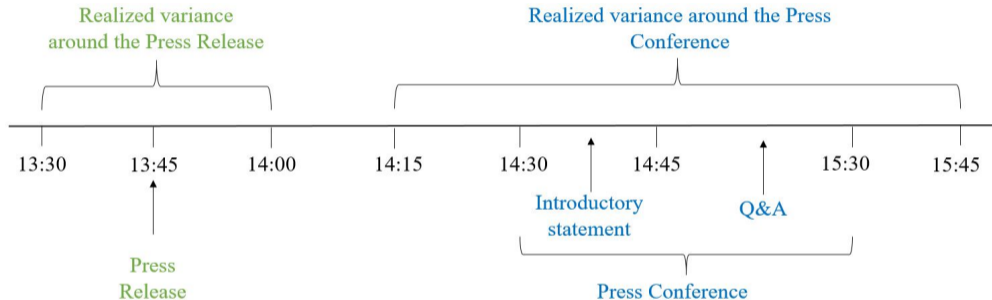
[Jump to the transcript of the questions and answers](#)

Ladies and gentlemen, the Vice-President and I welcome you all to our press conference. Let me wish you all a happy New Year and take this opportunity to welcome Lithuania as it adopts the euro as its currency. Accordingly, Mr. Dombrovskis, Chairman of the Board of Lietuvos bankas, became a member of the Governing Council in January 2015. The accession of Lithuania to the eurozone triggered a system under which NCB governors are appointed to the Governing Council. The details on this reform are available on the ECB's website. We will now report on the monetary policy decision of the Governing Council, which was also attended by Mr. Dombrovskis.

Based on our regular economic and monetary analysis and a thorough reassessment of the outlook for price stability, the Governing Council has decided to maintain the current monetary stimulus achieved. As a result, the Governing Council has decided on the following decisions:



ECB event day timeline



Results

Changes in similarity and Euro area stock market indices volatility

Panel A: Press release window

	(1)	(2)	(3)	(4)	(5)	(6)
	CAC 40	DAX	FTSE MIB	IBEX	STOXX50E	SX7E
Δ Similarity	0.436 (1.296)	-0.006 (0.928)	0.386 (0.948)	0.011 (1.120)	0.307 (1.373)	1.647 (1.903)
Observations	89	89	89	89	89	89
R-squared	0.002	0.000	0.003	0.000	0.001	0.017

Panel B: Press conference window

	(1)	(2)	(3)	(4)	(5)	(6)
	CAC 40	DAX	FTSE MIB	IBEX	STOXX50E	SX7E
Δ Similarity	10.365*** (2.795)	9.008*** (2.575)	10.545*** (2.579)	11.973*** (2.720)	12.037*** (3.163)	17.002*** (5.322)
Observations	89	89	89	89	89	89
R-squared	0.300	0.267	0.306	0.341	0.310	0.226

Changes in similarity and US and UK stock market indices volatility

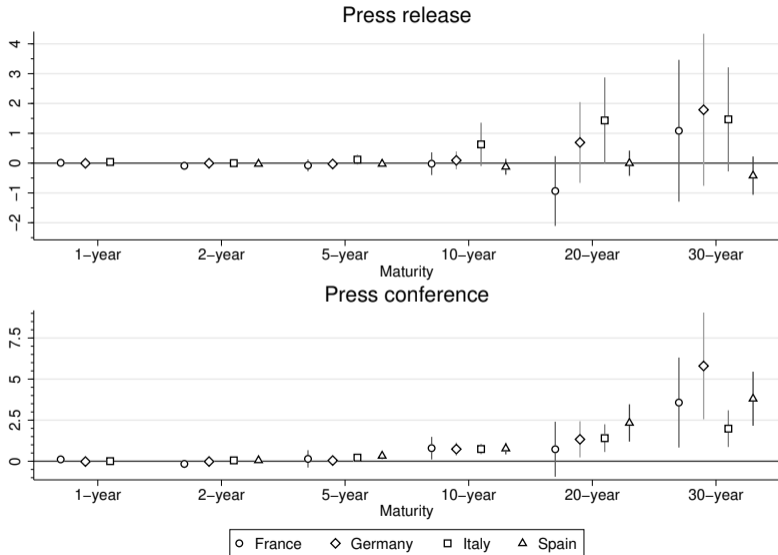
Panel A: Press release window

	Federal Reserve			Bank of England
	(1)	(2)	(3)	(4)
	Dow Jones	Nasdaq	S&P 500	FTSE 100
Δ Similarity	0.959 (0.786)	1.288** (0.508)	0.923* (0.547)	0.273* (0.155)
Observations	72	72	72	95
R-squared	0.038	0.175	0.065	0.059

Panel B: Press conference window

	(1)	(2)	(3)
Δ Similarity	2.295* (1.247)	1.884* (1.001)	2.256* (1.225)
Observations	40	40	40
R-squared	0.122	0.093	0.107

Similarity and sovereign yields volatility during ECB events



Changes in similarity and US and UK sovereign yield volatility

Panel A: United States

(1)	Press release				Press conference			
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	2-year	5-year	10-year	30-year	2-year	5-year	10-year	30-year
Δ Similarity	0.002	0.010*	0.017	0.102	0.144	0.254	0.041	1.613**
	(0.001)	(0.006)	(0.021)	(0.086)	(0.120)	(0.422)	(0.665)	(0.694)
Observations	71	71	62	71	40	40	40	40
R-squared	0.130	0.361	0.228	0.239	0.025	0.010	0.000	0.118

Panel B: United Kingdom

	(1)	(2)	(3)	(4)	(5)	(6)
	1-year	2-year	5-year	10-year	15-year	30-year
Δ Similarity	0.141*	0.302*	0.736*	1.631*	0.922	3.486*
	(0.076)	(0.158)	(0.438)	(0.910)	(0.589)	(1.996)
Observations	96	96	96	96	96	96
R-squared	0.050	0.056	0.043	0.046	0.043	0.041

Changes in similarity and Euro area stock market indices returns

$$|\text{Return}|_{\tau,MPD} = \beta_0 + \beta_1 |\Delta \text{Similarity}_{h,MPD}| + \epsilon_{\tau,MPD}; \quad (2)$$

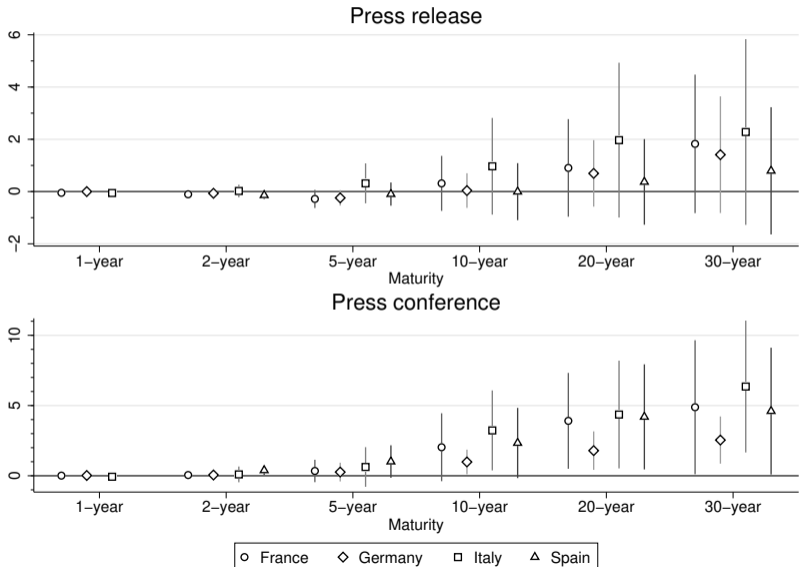
Panel (A): Press release window [13:30 - 14:00]

	(1)	(2)	(3)	(4)	(5)	(6)
	CAC 40	DAX	FTSE MIB	IBEX	STOXX50E	SX7E
\Delta Similarity	-0.307 (0.515)	-0.351 (0.408)	0.187 (0.607)	-0.249 (0.531)	-0.314 (0.503)	0.219 (1.187)
Observations	89	89	89	89	89	89
R-squared	0.003	0.005	0.000	0.001	0.002	0.000

Panel (B): Press conference window [13:45 - 15:45]

	(1)	(2)	(3)	(4)	(5)	(6)
	CAC 40	DAX	FTSE MIB	IBEX	STOXX50E	SX7E
\Delta Similarity	3.018*** (1.115)	2.643* (1.455)	3.691* (2.072)	4.814*** (1.705)	3.802** (1.511)	5.838** (2.368)
Observations	89	89	89	89	89	89
R-squared	0.113	0.072	0.072	0.137	0.116	0.093

Changes in similarity and European sovereign yields returns



Conclusions

1. Create a new database on tweets about monetary policy for 3 major central banks: ECB, the Fed and the BoE
2. Measure the similarity between tweets on monetary policy and central bank announcements
3. Provide evidence that large variations in similarity around monetary policy announcements are associated with spikes in volatility and absolute returns, in particular during ECB press conferences