Fed Communication, News, Twitter, and Echo Chambers

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Introduction

- Central bank officials communicate monetary policy actions in order to affect long-term interest rates and expectations of investors, households and businesses
- Prior literature evaluates how direct central bank communications affect interest rates and expectations
- In this paper we evaluate how media and Twitter coverage of central bank communications affect these variables
- Why is this important?

Why is this important?

1. Media and Twitter are more likely to affect investor, household and business expectations than the direct communication from central banks

2. Extraordinary growth in the use of automated textual analysis of news articles and Twitter by the private sector

3. Media and Twitter can amplify the effect of information (e.g. SVB bank-run, GameStop asset price bubble)

4. Important for policy makers to understand what is driving monetary policy surprises (actual announcement minus expectations) and disagreement between central bank communication and media/Twitter coverage

Paper in a Slide

- We construct monetary policy surprises (sentiment indexes) using three sources of information: FOMC communication, news article, and Tweets
  - We find that, while they are correlated, there are also differences across the sentiments
- We investigate whether they help or harm monetary policy transmission mechanism
  - Evidence suggests that they help: News sentiment correlates better with US yield changes, and better predicts revisions in economic forecasts and FOMC decisions
- We use Sastry (2022)'s theoretical model to understand determinants of monetary policy surprises and disagreement
  - Asymmetric info, different beliefs about MP rules, different confidence in public signals

Contribution to Literature I

1. Importance of words in central bank communications (i.e, Gardner et al., 2022; Gürkaynak et al., 2005; Lucca and Trebbi, 2009; Swanson, 2020)
   - Contribution: journalists' and investors' interpretation of this information is crucial

2. Drivers of monetary policy surprises (i.e, Sastry, 2022; Bauer and Swanson, 2020; Cieslak, 2018)
   - Contribution: surprises are ex-post predictable, but this does not imply people make mistakes, instead it highlights challenges of real-time forecasting. Disagreement is highest after a recession: Media/Twitter are more optimistic about the economy than the Fed after a recession and helps the Fed achieve its goals

Contribution to Literature II

3. Value of alternative data (i.e, Dessaint et al., 2022; Pedersen, 2022)
   - Contribution: dominating equilibria may depend on the prevalence of journalists and institutional investors

4. Textual analysis techniques to extract useful info (i.e, Baker et al., 2016; Caldara and Iacoviello, 2018; Gardner et al., 2022)
   - Contribution: using a Federal Reserve-specific dictionary to sign FOMC statements, Twitter and news coverage of central bank communication works better than using machine learning (artificial intelligence) techniques and general dictionaries

Textual Data

- FOMC: Text of statements and press conference transcripts from Federal Reserve public website
- News: Dow Jones Newswire, WSJ, NY Times, Washington Post
- Twitter
- Sample: January 2000-December 2021. Twitter starts to pick up in June 2009
    - 183 FOMC statements
    - 56 FOMC press conference transcripts (2011 every other meeting. 2018 every meeting)

FOMC Dictionary, I

- We employ the user-defined dictionary from Gardner et al. (2022)
  1. topic-keywords (output, inflation, labor market, financial conditions, future monetary policy)
  2. modifier-keywords (increasing, decreasing etc.)
  3. phrases (for future monetary policy)

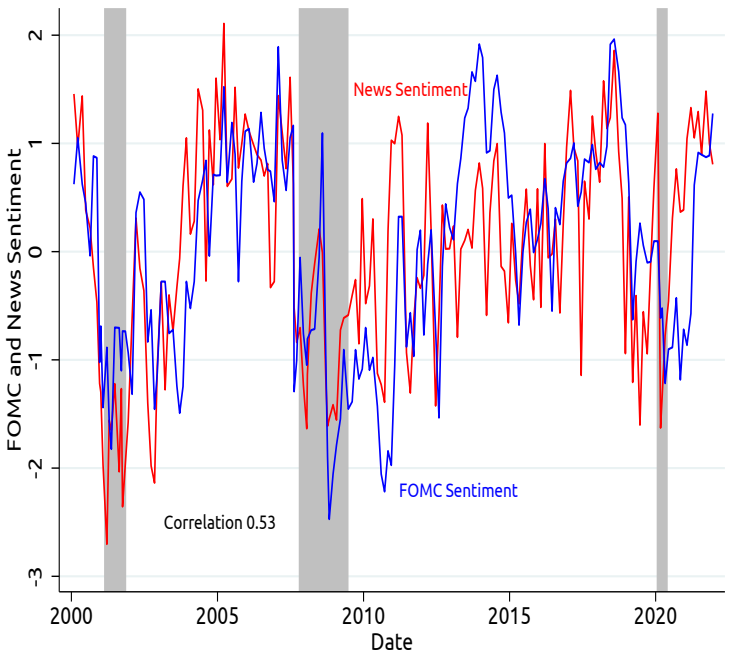
- Words or phrases added to each topic-keyword dictionary based on relative frequency of most frequently used words in FOMC statements (dropping common stop words such as "a," "the," etc.)

FOMC Dictionary, II

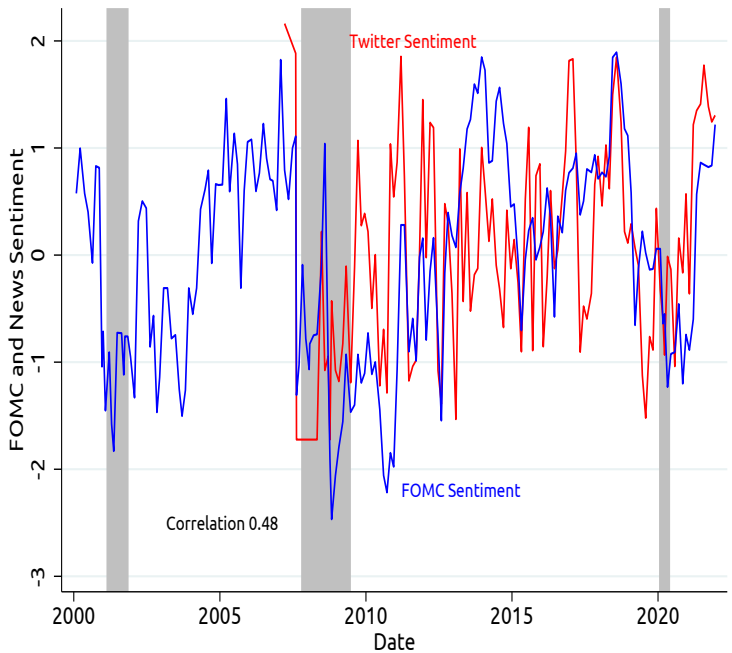
- Match each topic-keyword with closest modifier.
  - Example 1: "low unemployment"
    - topic-keyword unemployment has a value -1 for labor
    - modifier-keyword low has a value -1
    - Multiply -1$\times$(-1)$=$ $+1$ to obtain the keyword-modifier value $+1$
  - Example 2: "labor market conditions deteriorated"
    - topic-keyword labor market conditions has a value 1 for labor
    - modifier-keyword deteriorated has a value -1
    - Multiply 1$\times$(-1)$=$ -1 to obtain the keyword-modifier value -1

Sentiment Indexes

- Sentiment index is sum of each topic-modifier sentiment divided by number of unique sentences



(a) FOMC and News Sentiments



(b) FOMC and Twitter Sentiments

U.S. Treasury yields analysis, I

- Do interest rates react to news and Twitter information?

$$\Delta y^m_{\tau,t} = \alpha + \beta_{Surp}\text{Target Surprise}_t + \beta_{Sent}\text{Sentiment}_t + \epsilon_t, \quad (1)$$

- $y^m_{\tau,t}$ yield on day t at time τ=(mid-quote at 4:59 p.m. ET) of U.S. Treasury notes with maturity $m = 3$ and 6 months, 2, 5, and 10 years, or the fourth Eurodollar futures contract;
- Target surprise is difference between the announced target fed funds rate and expectations from fed funds futures
- Sentiment is either the FOMC sentiment index, news sentiment, or Twitter sentiment
- Dual causality between news, Twitter and interest rate reaction

U.S. Treasury yields analysis, II

	(1) 3-Month	(2) 6-Month	(3) Eurodollar	(4) 2-Year	(5) 5-Year	(6) 10-Year
Panel A: Target Rate Surprise						
Target Surprise	0.813***	0.730***	0.247***	0.524***	0.323***	0.189**
	(0.0563)	(0.0520)	(0.0605)	(0.0786)	(0.100)	(0.0806)
Observations	183	183	183	183	183	183
Adjusted R^2	0.535	0.521	0.084	0.198	0.054	0.029
Panel B: FOMC Statement and Press Conference Sentiment						
FOMC Statement Sentiment	2.384***	2.154***	0.580	0.879	0.767	0.367
	(0.601)	(0.548)	(0.478)	(0.662)	(0.778)	(0.619)
Press Conference	-1.001	-0.675	0.423	0.333	0.747	0.936
	(1.087)	(0.990)	(0.864)	(1.197)	(1.407)	(1.119)
Observations	183	183	183	183	183	183
Adjusted R^2	0.080	0.079	0.011	0.012	0.009	0.007
Panel C: News Sentiment						
News Sentiment	3.051***	2.760***	1.302***	1.848***	1.752**	1.355**
	(0.558)	(0.508)	(0.451)	(0.625)	(0.739)	(0.588)
Observations	183	183	183	183	183	183
Adjusted R^2	0.142	0.140	0.044	0.046	0.030	0.028

- One standard deviation shock to sentiment increases 3-month yields by 3 basis points

U.S. Treasury yields analysis, III

	(1) 3-Month	(2) 6-Month	(3) Eurodollar	(4) 2-Year	(5) 5-Year	(6) 10-Year
Panel F: FOMC Statement, Press Conference and News Sentiment						
FOMC Statement Sentiment	0.580	0.558	-0.330	-0.422	-0.435	-0.649
	(0.725)	(0.662)	(0.592)	(0.820)	(0.970)	(0.770)
Press Conference	-1.920*	-1.488	-0.0404	-0.330	0.135	0.418
	(1.066)	(0.973)	(0.870)	(1.205)	(1.426)	(1.133)
News Sentiment	3.002***	2.655***	1.514**	2.165***	2.001**	1.691**
	(0.732)	(0.668)	(0.597)	(0.827)	(0.979)	(0.777)
Observations	183	183	183	183	183	183
Adjusted R^2	0.159	0.154	0.046	0.048	0.031	0.033
Panel G: Target Rate Surprise, FOMC Statement, Press Conference and News Sentiment						
Target Surprise	0.748***	0.672***	0.220***	0.498***	0.286***	0.159*
	(0.0563)	(0.0522)	(0.0627)	(0.0817)	(0.104)	(0.0836)
FOMC Statement Sentiment	0.177	0.197	-0.448	-0.690	-0.589	-0.735
	(0.516)	(0.479)	(0.575)	(0.749)	(0.954)	(0.766)
Press Conference	-1.035	-0.693	0.220	0.259	0.473	0.606
	(0.760)	(0.705)	(0.847)	(1.103)	(1.406)	(1.129)
News Sentiment	1.707***	1.491***	1.133*	1.303*	1.505	1.416*
	(0.529)	(0.490)	(0.589)	(0.767)	(0.978)	(0.785)
Observations	183	183	183	183	183	183
Adjusted R^2	0.578	0.562	0.107	0.212	0.071	0.052

U.S. Treasury yields analysis, IV

	(1) 3-Month	(2) 6-Month	(3) Eurodollar	(4) 2-Year	(5) 5-Year	(6) 10-Year
Panel F: FOMC Statement, Press Conference and Twitter Sentiment						
FOMC Statement Sentiment	0.619	0.597	0.318	-0.00384	0.401	-0.0779
	(0.630)	(0.553)	(0.491)	(0.800)	(0.927)	(0.871)
Press Conference	-1.780*	-1.100	0.284	0.355	0.159	0.219
	(0.904)	(0.794)	(0.704)	(1.148)	(1.330)	(1.249)
Twitter Sentiment	2.668***	1.891***	0.415	0.607	1.327	1.597*
	(0.677)	(0.595)	(0.528)	(0.860)	(0.997)	(0.936)
Observations	120	120	120	120	120	120
Adjusted R^2	0.174	0.132	0.024	0.009	0.031	0.036
Panel F: FOMC Statement, Press Conference and News Sentiment						
FOMC Statement Sentiment	0.356	0.368	-0.0745	-0.510	0.0178	-0.508
	(0.673)	(0.588)	(0.514)	(0.842)	(0.980)	(0.918)
Press Conference	-1.913**	-1.233	-0.0506	-0.0743	-0.133	-0.105
	(0.924)	(0.807)	(0.705)	(1.156)	(1.345)	(1.260)
News Sentiment	3.165***	2.344***	1.323**	1.776*	2.171*	2.540**
	(0.844)	(0.737)	(0.644)	(1.056)	(1.229)	(1.151)
Observations	120	120	120	120	120	120
Adjusted R^2	0.165	0.132	0.053	0.028	0.042	0.051

Blue Chip forecast revision, I

- Do expectations react to news and Twitter information?

$$\begin{aligned}\text{BCrev}_{t+1} =& \alpha + \beta_{TS}\text{Target Surprise}_t + \\ &+ \beta_{PS}\text{Path Surprise}_t + \beta_{LSAP}\text{LSAP Surprise}_t + \\ &+ \beta_S\text{Sentiment}_t + \beta_N\text{MacroNews}_t + \epsilon_t,\end{aligned} \tag{2}$$

- *BCrev* one-month revision in Blue Chip consensus forecast of a given variable averaged over the one-, two-, and three-quarter-ahead horizons
- *Target Surprise*, *Path Surprise* and *LSAP Surprise* are monetary policy surprises
- *MacroNews* are macro news as in Bauer and Swanson (2020),
- Endogeneity (dual-causality) mitigated because sentiment is lagged

Blue Chip forecast revision, II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GDP				UR				GDP Deflator			
Panel A: Keep monthly revisions when there is an FOMC meeting in between forecasts												
FOMC Sentiment		0.246**		0.0228		-0.312***		-0.0740		0.320***		0.0940
		(0.0987)		(0.102)		(0.0861)		(0.0895)		(0.0902)		(0.0944)
Press Conference Sentiment		0.0852		0.0251		0.0306		0.0719		0.110		0.0537
		(0.0834)		(0.0718)		(0.0727)		(0.0627)		(0.0754)		(0.0654)
News Sentiment	0.505***		0.245***	0.219*	-0.467***		-0.221***	-0.210**	0.505***		0.403***	0.318***
	(0.0851)		(0.0918)	(0.114)	(0.0742)		(0.0805)	(0.0993)	(0.0785)		(0.0827)	(0.103)
Target Surprise			0.000693	0.00185			0.0891	0.0928			-0.0989	-0.0967
			(0.0797)	(0.0802)			(0.0699)	(0.0700)			(0.0735)	(0.0736)
Forward Guidance Surprise			-0.0178	-0.0193			0.0436	0.0518			-0.105	-0.112
			(0.0876)	(0.0886)			(0.0768)	(0.0773)			(0.0811)	(0.0816)
LSAP			-0.105	-0.105			0.0169	0.0152			-0.0465	-0.0456
			(0.0814)	(0.0818)			(0.0714)	(0.0715)			(0.0755)	(0.0755)
NFP Surprise			-0.142***	-0.142***			0.0430	0.0436			-0.0728**	-0.0734**
			(0.0376)	(0.0378)			(0.0330)	(0.0330)			(0.0337)	(0.0337)
S&P500 Returns			0.500***	0.505***			-0.257***	-0.265***			0.0461	0.0630
			(0.0906)	(0.0925)			(0.0794)	(0.0807)			(0.0818)	(0.0829)
ADS Index			0.126	0.126			-0.325***	-0.317***			0.174***	0.172***
			(0.0796)	(0.0804)			(0.0698)	(0.0702)			(0.0275)	(0.0275)
Constant	-0.273***	-0.251***	-0.282***	-0.285***	0.0357	0.000797	0.0576	0.0470	-0.153*	-0.137	-0.116	-0.119*
	(0.0853)	(0.0916)	(0.0762)	(0.0772)	(0.0744)	(0.0799)	(0.0668)	(0.0674)	(0.0787)	(0.0833)	(0.0706)	(0.0710)
Observations	175	175	175	175	175	175	175	175	177	177	177	177
Adjusted R^2	0.169	0.057	0.362	0.363	0.186	0.075	0.368	0.374	0.191	0.109	0.377	0.385

- One standard deviation shock to sentiment increases GDP forecasts by 0.5 percentage points

FOMC decisions forecast, I

- Can news and Twitter predict future FOMC decisions?

$$Pr(MPD_t = s|X_{t-1}) = \Phi(X_{t-1}\mathrm{B} + \epsilon_t), \tag{3}$$

- MPD_t is the monetary policy stance variable, 1, -1, 0
- X_{t-1} is the matrix of predictors available day before FOMC meeting

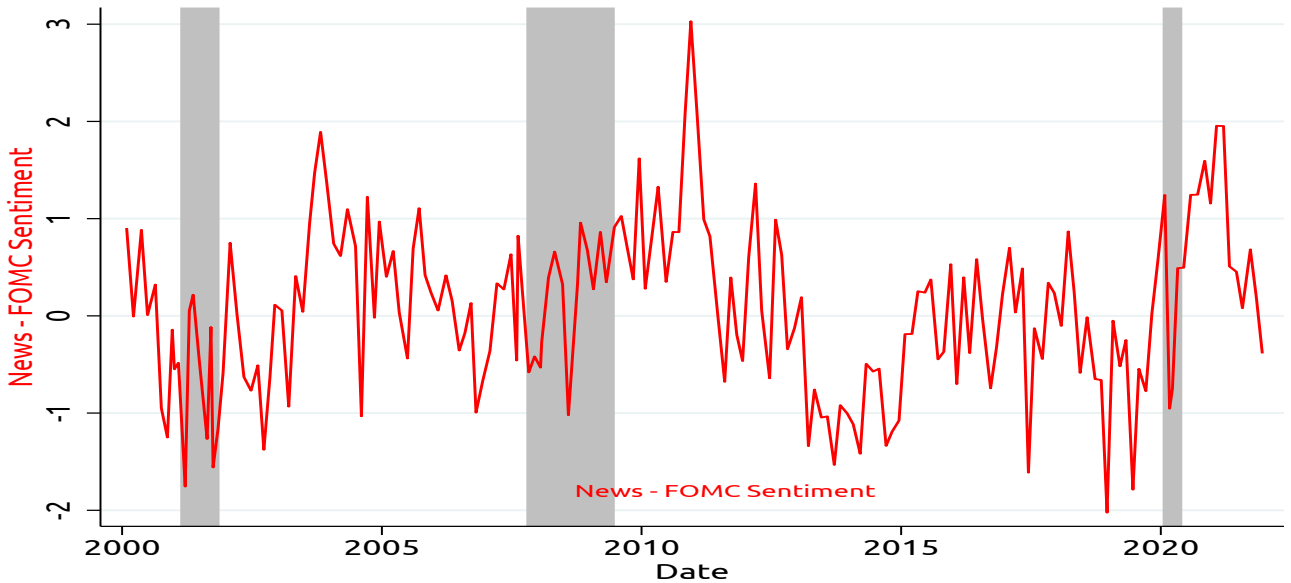
FOMC decisions forecast, II

	(1)	(2)	(3)
FOMC Sentiment	0.079***		0.135***
	(0.025)		(0.024)
Press Conference Sentiment	-0.026*		-0.03**
	(0.015)		(0.013)
News Sentiment	0.119***	0.073***	0.044*
	(0.024)	(0.027)	(0.026)
FFF Expectations		0.075**	0.084**
		(0.036)	(0.033)
Eurodollar Expectations		0.199***	0.217***
		(0.073)	(0.069)
BC Expectations		-0.013	-0.035
		(0.025)	(0.023)
Δ UR Gap		-0.015**	-0.013*
		(0.007)	(0.008)
Inflation Rate		0.034**	0.034***
		(0.015)	(0.012)
ADS Index		-0.036***	-0.028***
		(0.009)	(0.008)

	(1)	(2)	(3)
EBP		0.034	0.003
		(0.031)	(0.028)
Inverse Yield Curve		0.022	-0.016
		(0.075)	(0.065)
Recession		-0.184***	-0.163***
		(0.039)	(0.04)
FFR		-0.321***	-0.373***
		(0.066)	(0.061)
Δ Monetary Policy	0.153***	0.061*	-0.014
	(0.031)	(0.035)	(0.036)
5-Year Yield		0.087	0.105**
		(0.057)	(0.052)
Δ 5-Year Yield		0.01	0.02
		(0.02)	(0.018)
PD Ratio		0.005	0.007
		(0.015)	(0.014)
VIX		-0.097***	-0.039
		(0.032)	(0.028)
Observations	182	182	182
Pseudo R^2	0.424	0.585	0.680

- One standard deviation shock to sentiment increases probability of tightening by 0.12

Sentiment Disagreement



(a) Difference between News and FOMC Sentiment Indexe

- Positive (negative) values indicate news coverage of FOMC decisions is more hawkish (dovish) or puts a higher (lower) probability on Fed raising rates in the near future than the FOMC sentiment itself.
- News tends to be more hawkish than the FOMC right after recessions.

Sastry (2022)'s Theoretical Model

- News sentiment conveys information about how journalists update their beliefs about future macroeconomic variables and future monetary policy after the central bank announces its policy
- Disagreement and surprises depend on
  - CB having private information
  - Journalists having erroneous beliefs about MP rule
  - Different confidence in public signals
- If public information predicts surprises and disagreement, then private information alone cannot explain surprises and disagreement

Disagreement and Public Information

- Regress surprises and disagreement on public information

$$\begin{aligned}\text{Disagreement}_{t+1} = \alpha &+ \beta_A \text{ADS}_t + \beta_S \text{S\&P500 Return}_t \\ &+ \beta_N \text{NFP Surprise}_t + \beta_{Before} \text{Before Recession}_t \\ &+ \beta_{After} \text{After Recession}_t + \epsilon_t\end{aligned} \tag{4}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Panel A: Disagreement			
ADS Index	0.0463						-0.0194
	(0.0294)						(0.0323)
S&P 500 Returns		3.5047***					3.1002***
		(0.7509)					(0.8480)
NFP Surprise			0.0338				-0.0182
			(0.0501)				(0.0486)
GDP Deflator Surprise				0.0345			-0.0031
				(0.0610)			(0.0557)
Two-Years Before Recession					-0.2832*		-0.1010
					(0.1473)		(0.1432)
Two-Years After Recession						0.7397***	0.5976***
						(0.1335)	(0.1424)
Constant	0.0837	0.0153	0.0636	0.0729	0.1321*	-0.1245*	-0.1159
	(0.0637)	(0.0606)	(0.0631)	(0.0644)	(0.0714)	(0.0677)	(0.0840)
Observations	183	183	183	183	183	183	183
Adjusted R^2	0.0135	0.1074	0.0025	0.0018	0.0200	0.1450	0.2122

Sastry (2022)'s Theoretical Model Predictions

- Since public information predicts surprises and disagreement, private information alone cannot explain surprises and disagreement
- The response of forecast revisions to Twitter and news sentiment will help us differentiate between journalists having erroneous beliefs about MP rule or journalists placing different weight on public signals than the FOMC
- Previous results show that positive surprises predict positive revisions to GDP, Employment and Inflation forecasts, this means that journalists and FOMC place different weight on public signals
- In particular journalist and Twitter put more weight on S&P500 information and are more optimistic about the economy than the Fed after recessions

Conclusion

- News and Twitter sentiment correlates better with US yield changes, and better predicts revisions in economic forecasts and FOMC decisions
- Evidence suggests that news and Twitter help the monetary policy transmission mechanism. Given SVB and GameStop, this result may depend on journalist and institutional investor presence
  - Caveat: We analyze a relatively short sample period and news and Twitter may have been "lucky" in predicting the end of three out of three recessions by putting more weight on S&P500 return information
- Disagreement is mainly driven by the different weight agents put on public information. This may explain the current Fed official communication that despite monetary policy tightening, financial conditions appear less tight than expected

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