The Information Content of Trump Tweets and Currency Market

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Motivation: Why do Trump Tweets matter?

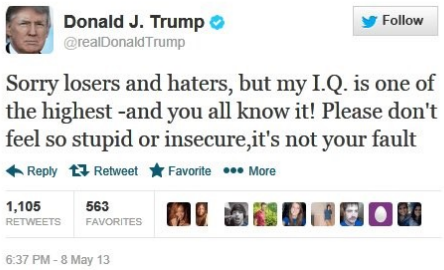
- Main channel of communication to the public
- Record number of Tweets per day so far: **142**
- **79 million** followers as of October 2020
- Permanently **banned** on 8th January 2021 following U.S. Capitol riot

Trump Tweets and Financial Markets

- Academic literature
  - Textual analysis of Trump Tweets: Clarke and Grieve (2019), Ross and Caldwell (2020) but mostly focus on sentiment
  - Trump Tweets and **Stock markets**: Ge et al. (2018), Born et al. (2017), Juma'h and Alnsour (2018)
  - Trump Tweets and **Federal Funds rate**: Bianchi et al. (2019)
  - Trump Tweets and **FX markets**: Colonescu et al. (2018), Benton and Philips (2018) but only focus on a single pair of currencies
- Practitioner research
  - Bank of America study finds that days with more Tweets are negatively linked with **Dow Index returns**
  - JP Morgan's 'Volfefe' Index can explain a significant movement in the **interest rates**

Overview

- **Research questions**
  - What is the information content of Trump Tweets?



  - How do Trump Tweets influence FX markets, in terms of trading volume, volatility, liquidity, and returns?

Overview

- We implement two methods of textual analysis to identify Tweets relevant for the FX markets (dictionary and BTM)
  - The **first paper** in Finance literature to apply **Biterm Topic Model** to uncover content of Tweets
- Our empirical findings suggest that those Tweets **reduce** FX trading volume, volatility, bid-ask spread, and are associated with **U.S. Dollar appreciation**
  - **Among one of the first papers** to benefit from **CLS Order Flow data** provided by Quandl (Gargano et al. 2019, Ranaldo and Somogyi 2019)
- Our empirical findings are based on our theoretical model with Trump Tweets acting as a **public signal** intepreted by all speculative traders

Model predictions

- A model of heterogeneous speculators in FX market and the Trump tweet as a public signal.
- Two types of speculators: (rational) Bayesian investors who update their prior based on the information content of Trump tweet, and (irrational) Trump followers who fully adopt Trump Tweet
- Model predictions:
  - A rise in the share of Trump followers leads to a decline in investor disagreement, and in turn a decline in the volume of trading
  - Trump tweets lead to a decline in exchange rate volatility if the tweet is more informative than the private signal
  - Trump tweets induce a bias in spot returns

Trump Tweets

Distribution of all Tweets from @realdonaldtrump account (17,865 Tweets)

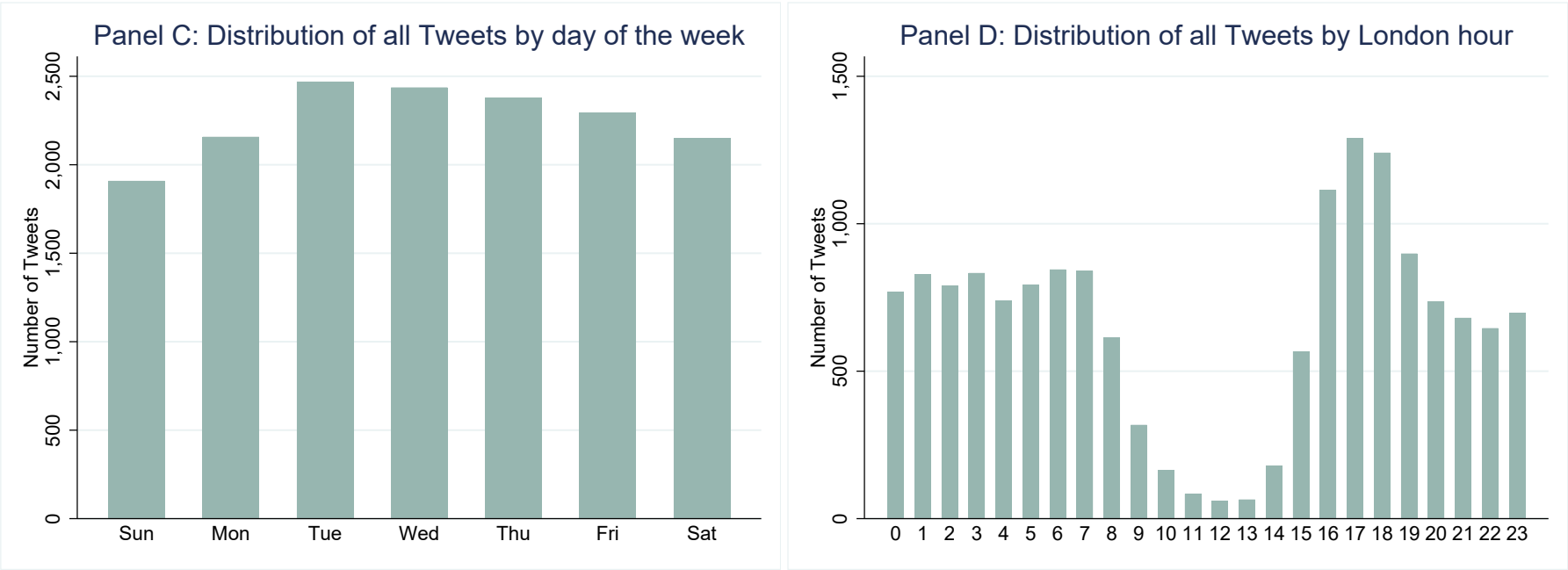


Figure: Distribution of all Trump Tweets from 16th June 2015 to 20th August 2019.

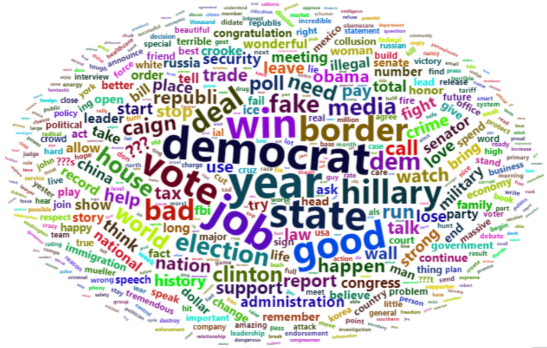
Method 1: Dictionary-based approach

- Rely on **Policy Related Dictionary** by Baker et al. (2019) to identify Tweets about Macroeconomics outlook, Trade policy, and FX
  - **Macroeconomics outlook**: gold, silver, economic growth, recession, business confidence, etc...
  - **Trade policy**: tariff, import duty, trade quota, TransPacific Partnership, etc...
  - **Exchange Rate**: exchange rate, currency crisis, currency manipulation, etc...
- Manually read these Tweets to remove false positives

Method 2: Bi-term topic model (BTM) approach

- Implement **BTM model** developed by Yan et al. (2013) to discover the topic of our corpus
- Specifically designed for corpus of **short texts**, outperforming conventional methods such as LDA or LSA
- **Key intuition**: The corpus consist of a mixture of topics, and each biterm is drawn from a specific topic
- Two sets of **input** required:
  - Corpus: Trump Tweets (after various text - cleaning steps)
  - Number of topics: 9
- Two sets of **output** generated:
  - Top keywords and their distribution for each topic
  - Probability of the topic given the biterms

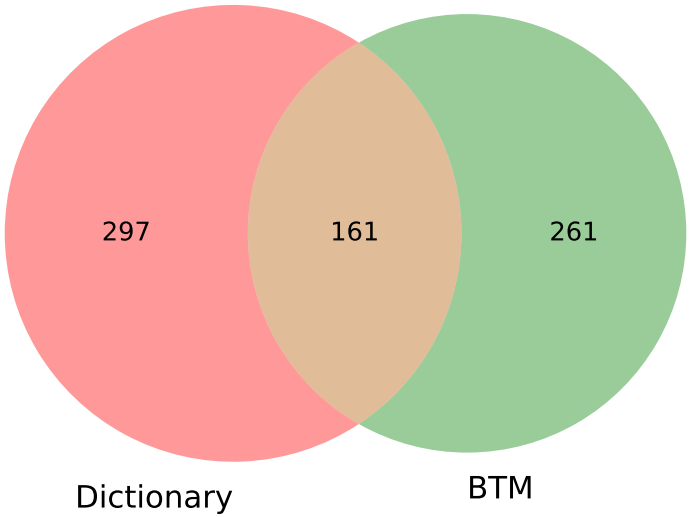
BTM Output 1: Top keywords for each topic



BTM Output 2: Topic distribution for each Tweet

- **Probability** of the topic for each Tweet: ($\hat{\theta}_1$, $\hat{\theta}_2$, $\hat{\theta}_3$, $\hat{\theta}_4$, $\hat{\theta}_5$, $\hat{\theta}_6$, $\hat{\theta}_7$, $\hat{\theta}_8$, $\hat{\theta}_9$)
- Choose Tweets with probability associated with **Trade** and **Macroeconomics** topics being at least 30%
- Manually read these Tweets to remove false positives

Tweets relevant for FX markets



- *"Somebody please inform Jay-Z that because of my policies, Black Unemployment has just been reported to be at the LOWEST RATE EVER RECORDED!"*
- *"Build your products in the United States and there are no tariffs"*

Currency Data

- **Sample**: AUDUSD, EURUSD, GBPUSD, NZDUSD, USDCAD, USDCHF, USDDKK, USDHKD, USDHUF, USDILS, USDJPY, USDMXN, USDNOK, USDSEK, USDSGD, USDZAR.
- **CLS FX Order Flow Dataset** provided by Quandl:
  - Spot FX order flow aggregated and delivered at **hourly** level
  - Customer groups include price taker **banks (BA), corporates(CO), funds (FD), non-bank financial firms (NB), total buy-side and sell-side**
- High frequency data for **indicative quotes** from **Thomson Reuters** to construct **hourly volatility**, **hourly bid-ask spreads**, and **hourly returns**

Panel regressions

- **Fixed-effects panel regressions** with hourly data:

$$x_{i,t} = \alpha_i + \beta_1 Tweet_t + \beta_2 Z_t + d_t + h_t + \epsilon_{i,t} \quad (1)$$

$x_{i,t}$: hourly volume, hourly volatility, hourly bid-ask spreads, hourly returns

$Tweet_t$: dummy variable, which is equal to 1 if there is a Tweet about Trade, or Macroeconomics during that hour

Z_t: Presidency dummy, FOMC dummy, VIX, TED Spread

d_t: day-of-the-week dummies

h_t: hour-of-the-day dummies

Tweets and Trading Volume

- Test of Prediction 1

Dependent variable: Trading Volume between Sell Side and Buy Side					
	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.643***	-0.708***	-0.709***	-0.710***	-0.712***
	[-4.10]	[-4.09]	[-4.09]	[-4.15]	[-4.24]
Presidency dummy		0.293***	0.293***	0.353***	0.343***
		[3.22]	[3.22]	[3.45]	[3.42]
FOMC dummy			0.188**	0.202**	0.204***
			[2.15]	[2.38]	[2.43]
VIX				0.023***	0.022***
				[3.66]	[3.55]
TED Spread					-0.301**
					[-2.40]
Obs	367,333	367,333	367,333	367,333	367,333
R^2	4.59%	4.66%	4.66%	4.77%	4.77%

Tweets and Trading Volume by agent

- Test of Prediction 1 for different market participants

	Panel A. Dependent variable: Bank - Bank Trading Volume					*Panel B. Dependent variable*: Bank - Fund Volume				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.707***	-0.766***	-0.766***	-0.765***	-0.768***	-0.621***	-0.776***	-0.776***	-0.801***	-0.835***
	[-3.68]	[-3.71]	[-3.71]	[-3.73]	[-3.79]	[-3.64]	[-5.05]	[-5.05]	[-5.47]	[-5.72]
Presidency dummy		0.257***	0.257***	0.329***	0.321***		0.671***	0.671***	0.750**	0.747***
		[3.22]	[3.22]	[3.46]	[3.46]		[5.05]	[5.05]	[5.49]	[5.55]
FOMC dummy			0.068	0.084*	0.086*			0.209	0.217	0.215
			[1.41]	[1.77]	[1.82]			[0.97]	[1.03]	[1.04]
VIX				0.026***	0.024***				0.033***	0.031***
				[3.50]	[3.42]				[5.97]	[6.08]
TED Spread					-0.273**					0.043
					[-2.00]					[0.11]
Obs	310,888	310,888	310,888	307,671	302,559	291,541	291,541	291,541	288,518	283,839
R^2	4.82%	4.84%	4.84%	4.94%	4.94%	22.07%	22.24%	22.24%	22.47%	22.55%

Tweets and Trading Volume by agent (continued)

	Panel C. Dependent variable: Bank - Non-Bank Trading Volume					*Panel D. Dependent variable*: Bank - Corporate Volume				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.412***	-0.862***	-0.862***	-0.865***	-0.867***	0.353**	0.177	0.177	0.137	0.104
	[-3.05]	[-6.62]	[-6.62]	[-6.94]	[-7.05]	[2.19]	[1.41]	[1.41]	[1.12]	[0.85]
Presidency dummy		2.024***	2.024***	2.109***	2.076***		0.897***	0.897***	1.064***	0.984***
		[6.06]	[6.06]	[6.28]	[6.18]		[3.14]	[3.14]	[3.25]	[3.03]
FOMC dummy			0.195	0.212	0.215			-0.164	-0.128	-0.120
			[0.77]	[0.85]	[0.86]			[-0.20]	[-0.16]	[-0.15]
VIX				0.035***	0.035***				0.070***	0.069***
				[5.11]	[5.03]				[3.49]	[3.45]
TED Spread					-0.541**					-1.83***
					[-2.02]					[-2.53]
Obs	300,093	300,093	300,093	297,023	292,150	103,508	103,508	103,508	102,492	100,883
R^2	2.33%	4.29%	4.29%	4.32%	4.28%	0.95%	1.14%	1.14%	1.24%	1.30%

Tweets and Hourly Volatility

- Test of Prediction 2

Dependent variable: Realised Volatility					
	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.006***	-0.003***	-0.003***	-0.003***	-0.003***
	[-5.07]	[-2.77]	[-2.75]	[-3.60]	[-2.90]
Presidency dummy		-0.014***	-0.014***	-0.012***	-0.011***
		[-7.05]	[-7.05]	[-6.38]	[-5.93]
FOMC dummy			0.070***	0.070***	0.070***
			[8.82]	[8.82]	[8.81]
VIX				0.001***	0.001***
				[8.39]	[10.99]
TED Spread					0.017***
					[3.49]
Obs	397,708	397,708	397,708	393,251	387,708
R^2	6.17%	7.22%	7.38%	7.64%	7.77%

Tweets and Hourly Bid-ask Spreads

Dependent variable: Bid-Ask Spreads					
	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.372***	-0.137***	-0.137***	-0.148***	-0.144***
	[-3.11]	[-2.62]	[-2.62]	[-2.75]	[-2.72]
Presidency dummy		-1.022***	-1.022***	-1.012***	-1.010***
		[-2.79]	[-2.79]	[-2.89]	[-2.77]
FOMC dummy			0.261*	0.266*	0.260*
			[1.74]	[1.78]	[1.77]
VIX				0.003	0.003
				[0.45]	[0.47]
TED Spread					0.009
					[0.13]
Obs	382,894	382,894	382,894	378,715	372,638
R^2	0.62%	1.86%	1.86%	1.85%	1.85%

Tweets and Hourly Returns

- Test of Prediction 3

Dependent variable: Returns					
	(1)	(2)	(3)	(4)	(5)
Tweet hour	0.005***	0.005***	0.004***	0.005***	0.005***
	[4.67]	[4.64]	[4.61]	[4.65]	[4.78]
Presidency dummy		-0.000	-0.000	0.000	0.000
		[-0.26]	[-0.24]	[1.26]	[0.60]
FOMC dummy			-0.023***	-0.023***	-0.023***
			[-4.44]	[-4.42]	[-4.42]
VIX				0.000*	0.000
				[1.64]	[1.50]
TED Spread					-0.001
					[-0.91]
Obs	376,850	376,850	376,850	372,534	366,474
R^2	0.07%	0.07%	0.07%	0.07%	0.07%

Tweets and Hourly Returns

Panel A: Trade Tweet

Dependent variable: Returns

	(1)	(2)	(3)	(4)	(5)
Trade Tweet	0.002*	0.002*	0.002*	0.002	0.002*
	[1.77]	[1.73]	[1.70]	[1.63]	[1.72]
Presidency dummy		-0.000	-0.000	0.000	0.000
		[-0.05]	[-0.06]	[1.41]	[0.77]
FOMC dummy			-0.023***	-0.023***	-0.023***
			[-4.44]	[-4.43]	[-4.42]
VIX				0.000*	0.000
				[1.65]	[1.51]
TED Spread					-0.001
					[-0.96]
Obs	376,850	376,850	376,850	372,534	366,474
R^2	0.06%	0.06%	0.07%	0.07%	0.07%

Panel B: Macro Tweet

Dependent variable: Returns

	(1)	(2)	(3)	(4)	(5)
Macro Tweet	0.005***	0.005***	0.005***	0.005***	0.005***
	[4.35]	[4.38]	[4.38]	[4.27]	[4.42]
Presidency dummy		-0.000	-0.000	0.000	0.000
		[-0.28]	[-0.29]	[1.28]	[0.61]
FOMC dummy			-0.023***	-0.023***	-0.023***
			[-4.46]	[-4.44]	[-4.44]
VIX				0.000*	0.000
				[1.68]	[1.54]
TED Spread					-0.001
					[-0.78]
Obs	376,850	376,850	376,850	372,534	366,474
R^2	0.07%	0.07%	0.07%	0.07%	0.00%

Tweets and Hourly Returns

- Sentiment Analysis

Panel A: Positive Tweet

Dependent variable: Returns

	(1)	(2)	(3)	(4)	(5)
Positive Tweet	0.005***	0.005***	0.005***	0.005***	0.006***
	[4.41]	[4.30]	[4.28]	[4.67]	[5.06]
Presidency dummy		-0.000	-0.000	0.000	0.000
		[-0.30]	[-0.30]	[1.15]	[0.51]
FOMC dummy			-0.023***	-0.023***	-0.023***
			[-4.44]	[-4.42]	[-4.42]
VIX				0.000*	0.000
				[1.65]	[1.51]
TED Spread					-0.001
					[-0.82]
Obs	376,850	376,850	376,850	372,534	366,474
R^2	0.07%	0.07%	0.07%	0.07%	0.00%

Panel B: Negative Tweet

Dependent variable: Returns

	(1)	(2)	(3)	(4)	(5)
Negative Tweet	-0.005***	-0.005***	-0.005***	-0.007***	-0.008***
	[-2.79]	[-2.77]	[-2.78]	[-4.15]	[-4.91]
Presidency dummy		0.000	0.000	0.001	0.000
		[0.09]	[0.08]	[1.63]	[0.98]
FOMC dummy			-0.023***	-0.023***	-0.023***
			[-4.46]	[-4.45]	[-4.44]
VIX				0.000*	0.000
				[1.70]	[1.56]
TED Spread					-0.001
					[-1.04]
Obs	376,850	376,850	376,850	372,534	366,474
R^2	0.06%	0.06%	0.07%	0.07%	0.07%

Tweets and Options Moneyness

- Moneyness is a proxy for disagreeement

Dependent variable: FX Option Moneyness					
	(1)	(2)	(3)	(4)	(5)
Tweet hour	-0.142**	-0.148**	-0.148**	-0.146**	-0.139**
	[-2.41]	[-2.38]	[-2.38]	[-2.36]	[-2.15]
Presidency dummy		0.067	0.067	0.060	-0.008
		[1.10]	[1.10]	[1.04]	[-0.28]
FOMC dummy			-0.019	-0.179	-0.022
			[-0.26]	[-0.24]	[-0.28]
VIX				-0.003	-0.003
				[-0.62]	[-0.80]
TED Spread					-0.725*
					[-1.71]
Obs	9,855	9,855	9,855	9,541	9,378
R^2	0.10%	0.09%	0.08%	0.02%	0.00%

Tweets and Macro Announcements

Dependent variable: FX market characteristics				
	(1) Volume	(2) Volatility	(3) Bid-Ask Spread	(4) Returns
Tweet hour	-0.752***	-0.003***	-0.142***	0.005***
	[-4.66]	[-2.94]	[-2.70]	[3.70]
Presidency	0.368***	-0.012***	-0.996***	0.000
	[3.54]	[-6.15]	[-2.80]	[1.47]
FOMC	0.251***	0.070***	0.264*	-0.023***
	[3.19]	[8.81]	[1.79]	[-4.75]
VIX	0.021***	0.001***	0.004	0.000*
	[3.69]	[8.78]	[0.53]	[1.81]
TED Spread	-0.286**	0.017***	0.133	-0.000
	[-1.96]	[3.62]	[0.20]	[-0.32]
Macro Announcements	0.108***	0.001	-0.128	-0.003***
	[4.65]	[1.11]	[-0.98]	[-5.37]
Country FE	Yes	Yes	Yes	Yes
Hour FE	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes
Obs	379,188	387,074	372,638	390,806
R^2	4.80%	7.77%	1.86%	0.07%

Conclusions

In this paper, we

- implement textual analysis to identify Trump Tweets relevant for the FX markets
- show empirical evidence that these Tweets reduce FX trading volume, volatility, bid-ask spreads and associated with U.S. Dollar appreciation in line with theoretical predictions

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