

# Social Media Analytics on Financial Information and Misinformation

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**Firm tweets**

**“Discretionary Dissemination on Twitter” (CAR 2024)**

**With Wenli Huang and Hai Lu**

# Questions

- How do firms use Twitter for financial dissemination?

## 💡 Hypothesis

The likelihood of posting financial tweets increases with the materiality of accounting news events, **irrespective of the direction of the news** (positive or negative).

Firms post *financial tweets* more often around more material accounting news

- This is irrespective of the direction of the news (positive or negative)
- A loose test of theory: Hummel, Morgan, and Stocken (2024 RAND)

# Example firm financial tweets

Goldman Sachs 

@GoldmanSachs · [Follow](#)



GS reports 2014 net rev of \$34.53bn, net earnings of \$8.48bn, & 11.2% ROE; 4Q net rev of \$7.69bn, net earnings of \$2.17bn and 11.1% ROE

8:37 PM · Jan 16, 2015



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The Boeing Company 

@Boeing · [Follow](#)



Boeing reports strong third-quarter results; raises revenue, EPS and cash flow guidance: [bit.ly/1PzXWKg](http://bit.ly/1PzXWKg)

8:17 PM · Oct 21, 2015

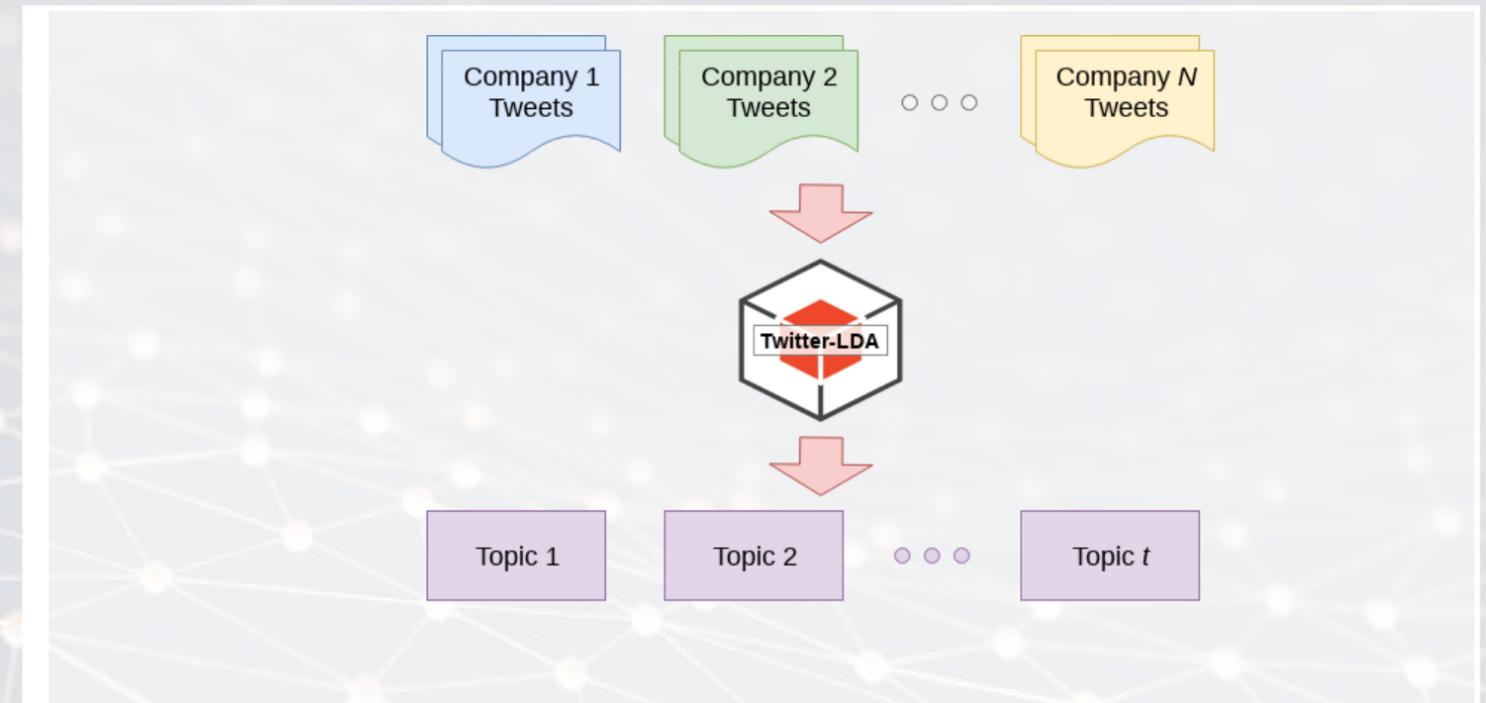


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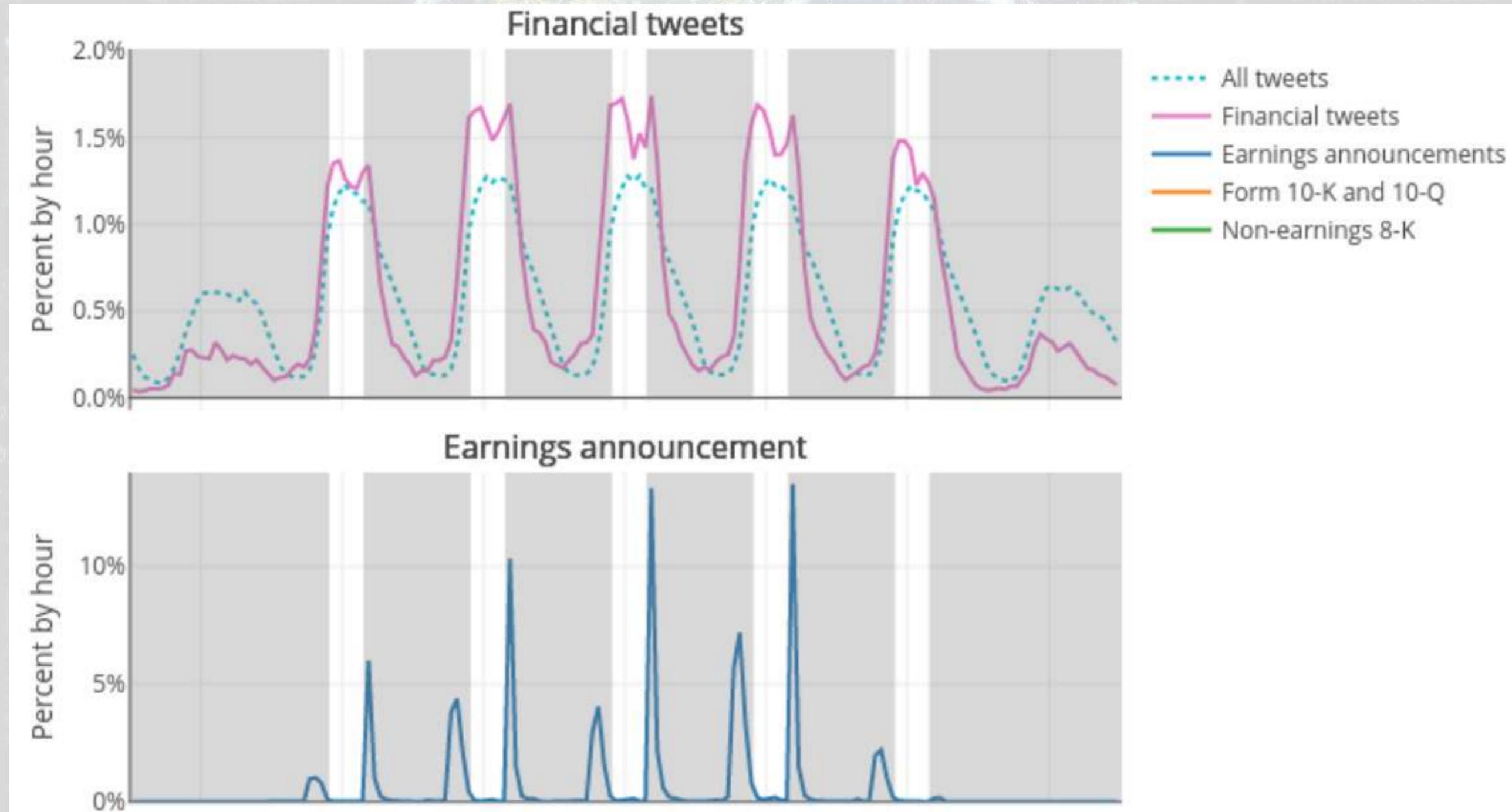
# Classifying tweets

- Classify using Twitter-LDA
- Identify 60 topics
  - 1 financial topic
  - 42 nonfinancial topics
    - Business, conferences, marketing, and support
  - 17 other topics

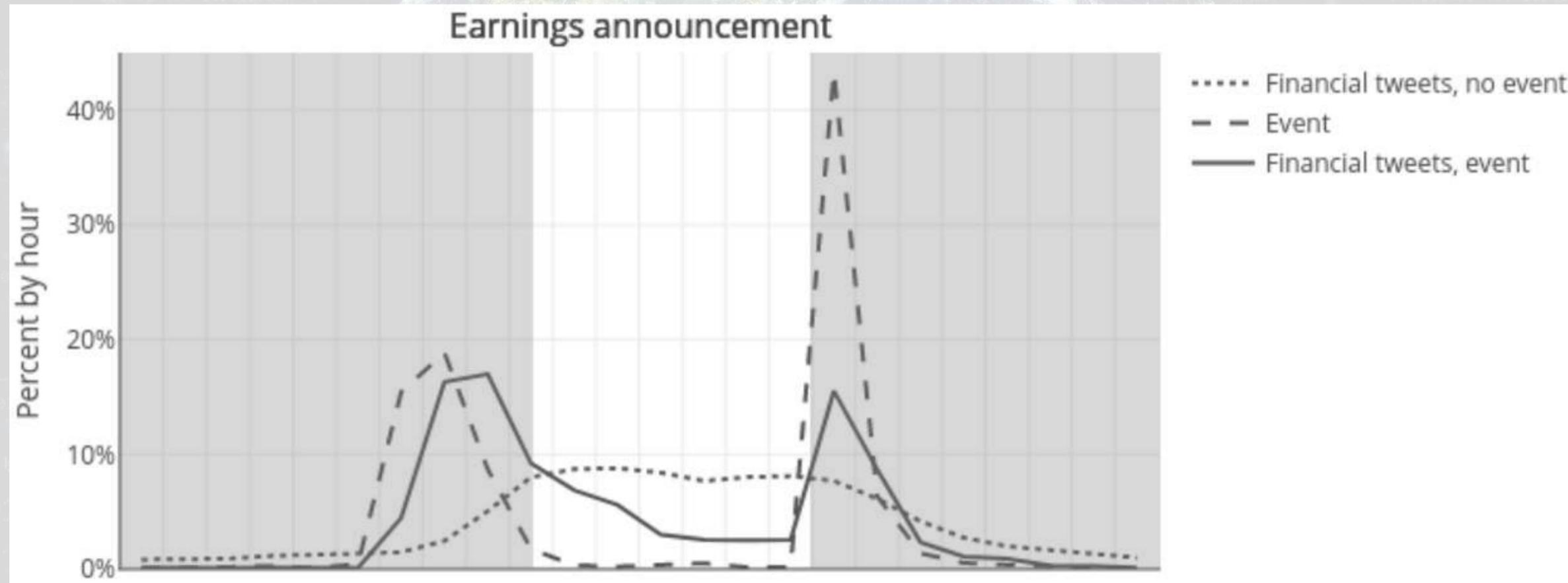


Number	Topic	Top_words
23	Financial	market, growth, markets, trading, earnings, global, report, quarter, results, energy
2	Nonfinancial: Marketing	#shareacoke, make, #tastethefeeling, gifs, reply, mistletoe, happy, tweets, #makeithappy, hashtag
12	Other	el, paso, police, trump, obama, man, city, donald, news, york

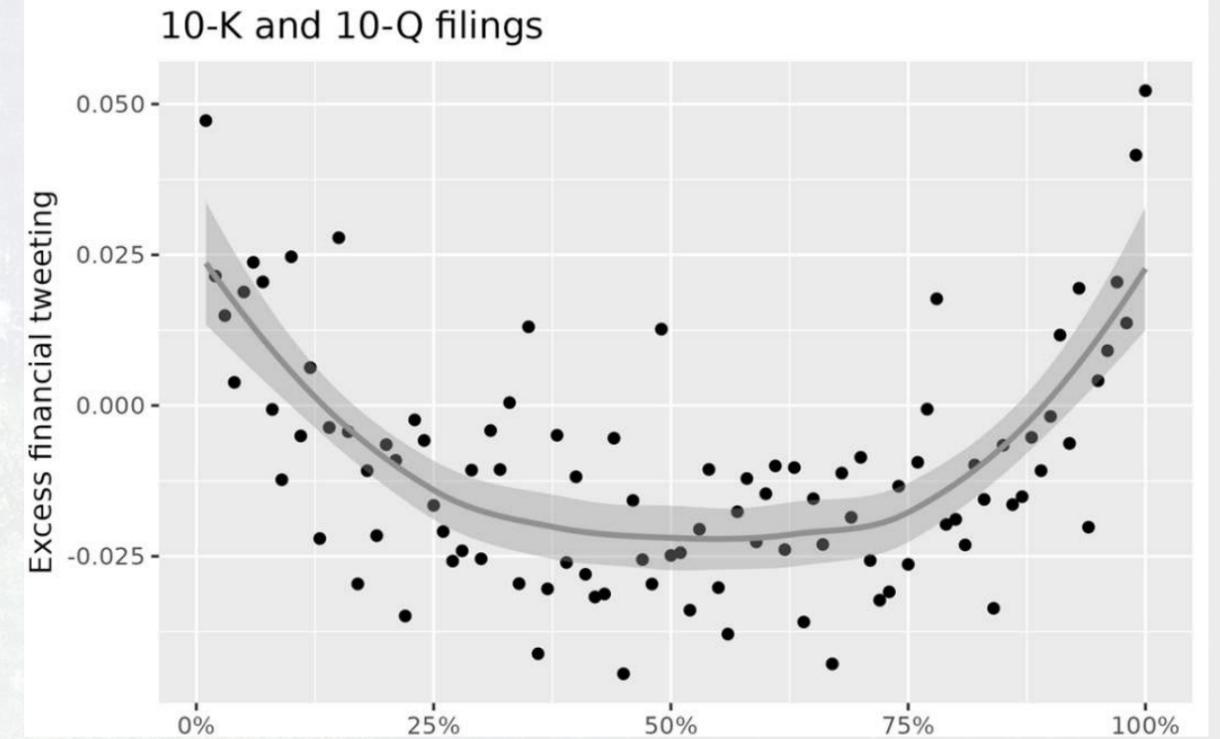
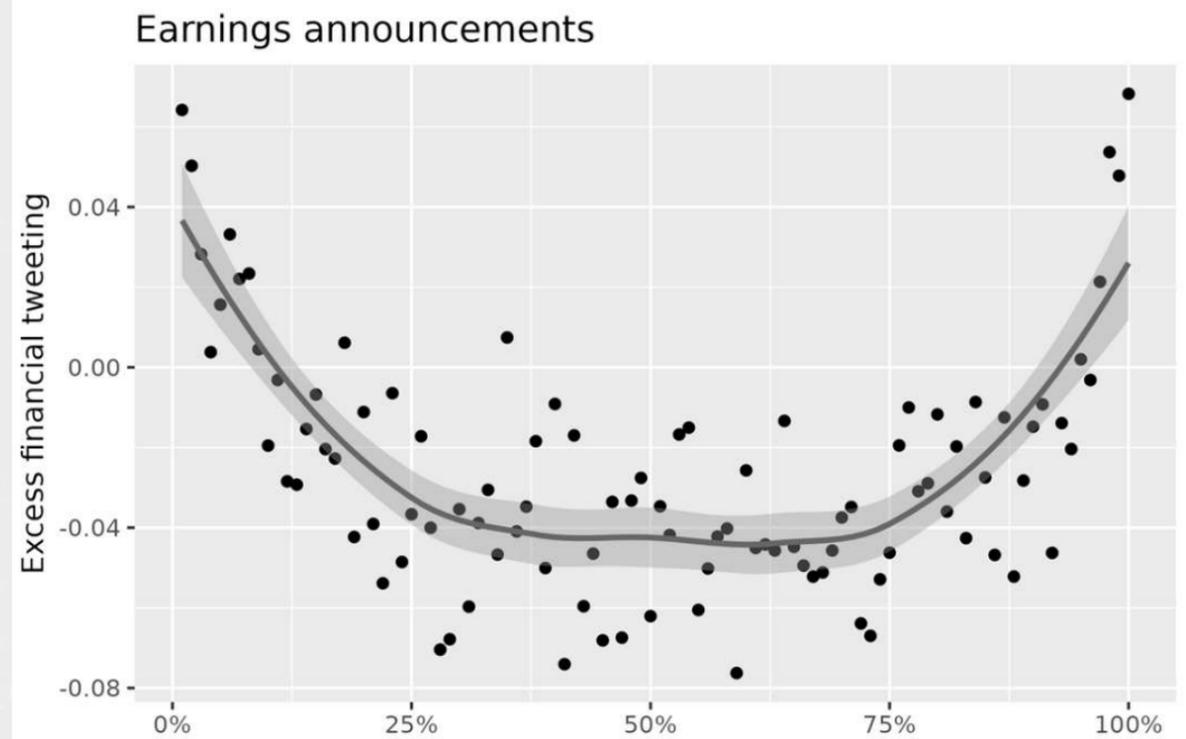
# Tweeting behavior intraday



# Financial tweets and Financial events



# Financial tweets and event direction





**CEO and CFO tweets**

**“Executive tweets”**

**With Wenli Huang and Hai Lu**

# Question 1

- Does the market react to executives' posts on Twitter
  - After controlling for firm disclosure on Twitter
- If the market reacts, why do they react?

## 💡 Mechanisms

1. *New information*: Executives post new information and the market responds to this
2. *Perceived credibility*: The identity of the account being a person, as opposed to the firm, drives the effect
  - Derived from social identity theory
  - Experimental and survey evidence is consistent with this

Only to the most investor-relevant tweets see a reaction

- Modest support for the *new information* mechanism
- Stronger support for *perceived credibility* mechanism

# Example financial exec tweets (Business)

Omar Ishrak

@OmarIshrak · [Follow](#)



Continuing to execute in both our product & SG&A cost reduction initiatives will provide consistent EPS leverage [#MDTEarnings](#)

7:05 AM · Feb 20, 2013



2 Reply Copy link

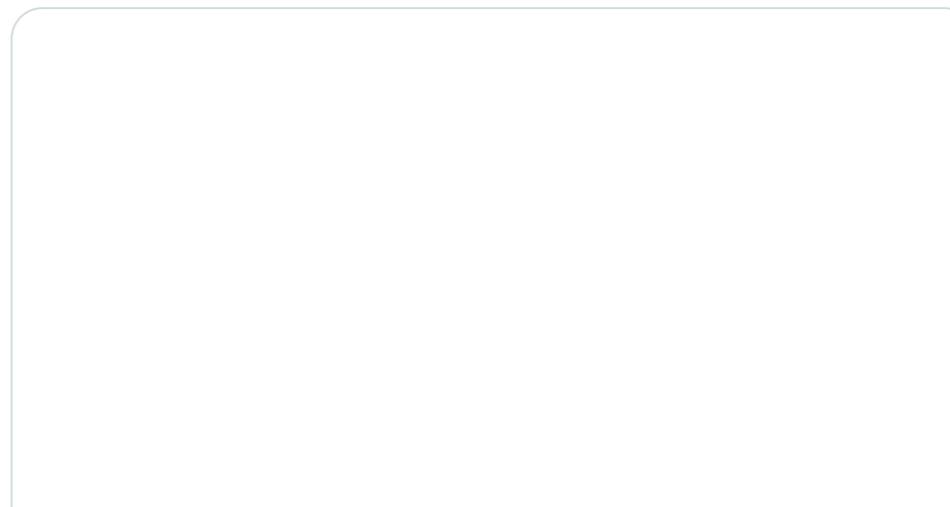
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Matt Desch

@IridiumBoss · [Follow](#)



Good summary of our recent quarterly earnings call: [satellitetoday.com/telecom/2014/0...](http://satellitetoday.com/telecom/2014/0...)



satellitetoday.com

Iridium Sees Major M2M Growth, Keeps Pace with Iridium NEXT

Iridium has signed a major contract with a prominent Original Equipment Manufacturer (OEM) for use of its satellite services. Mat...

1:08 AM · Aug 3, 2014



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# Example non-financial exec tweets

Mark T. Bertolini

@mtbert · [Follow](#)



Arriving in Atlanta. A day meeting with customers is better than any day in the office. But I do love all the folks back in Hartford too :o)

12:12 AM · Feb 28, 2012



Reply



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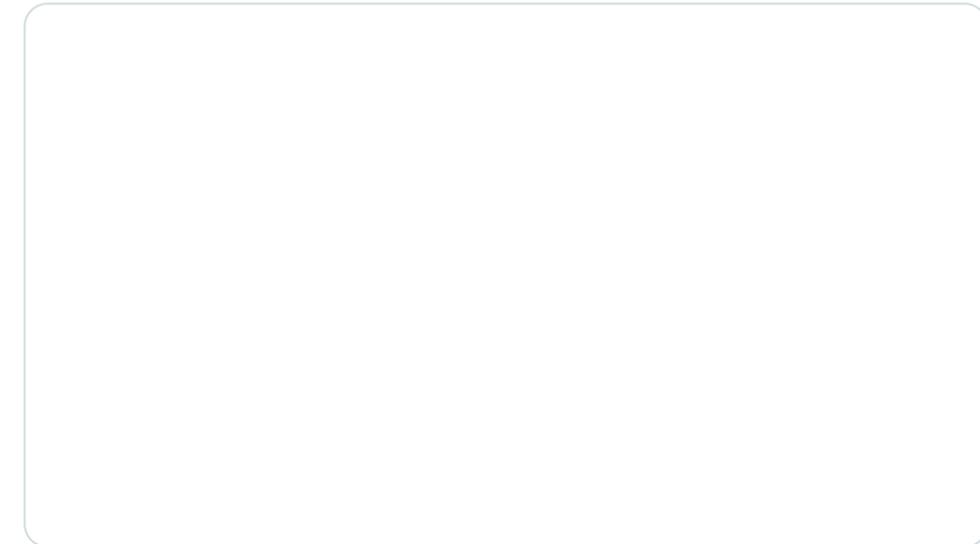
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Carl Bass

@carlbass · [Follow](#)



Another great day of spring skiing in the Alps



12:59 AM · Apr 11, 2014



4



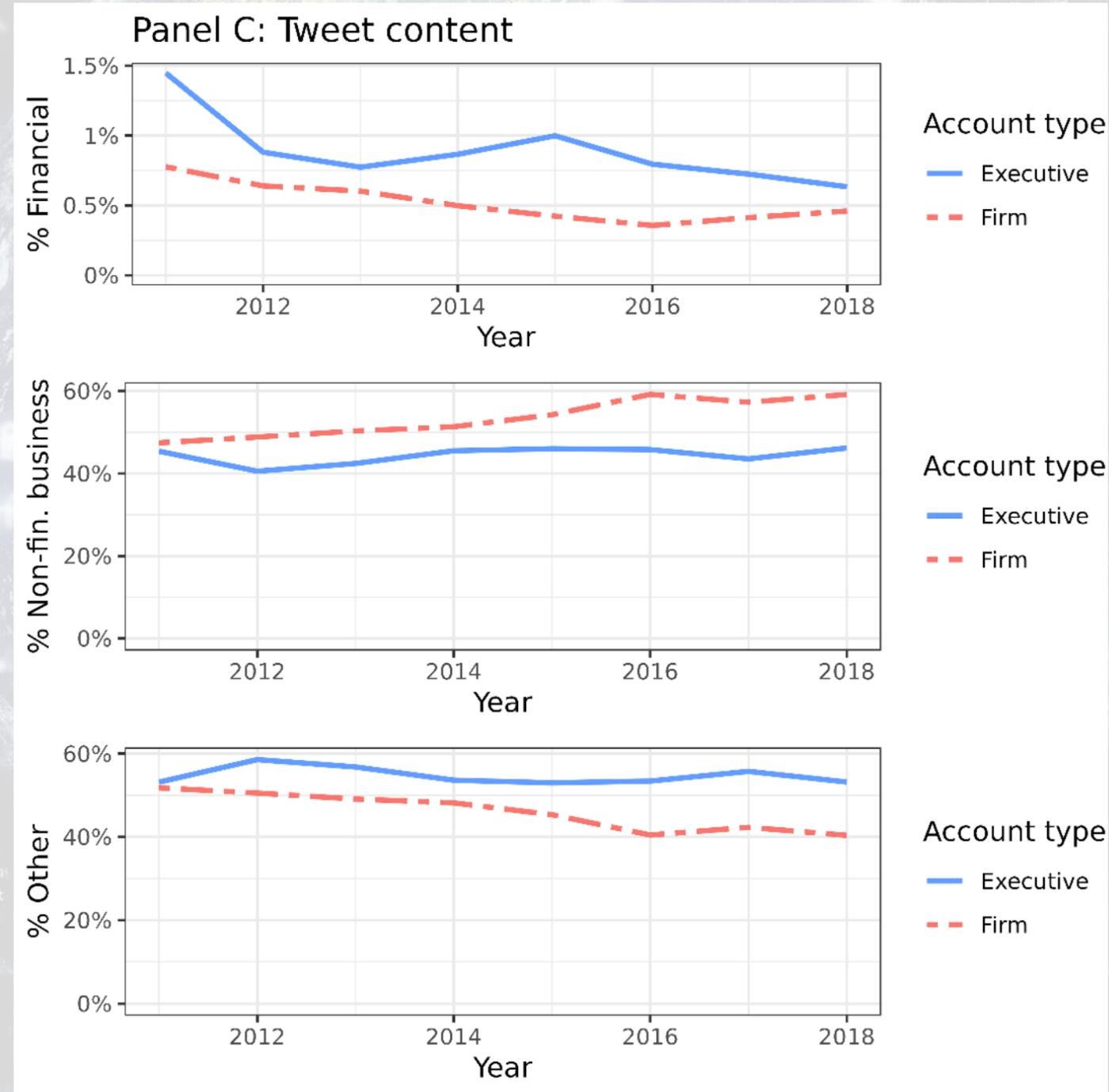
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# Tweet content over time



# Executives Drive Stock Returns

Variable	$ MMR_t $	$MMR_t$	$Abn Vol_t$	$Abn Retail_t$	$Retail BSI_t$
Fin tweets, Exec	0.004*** (4.65)	0.002* (1.88)	0.416*** (4.77)	0.031** (2.20)	0.012** (1.99)
Non-Fin tweets, Exec	0.000 (1.00)	-0.000 (-0.96)	-0.002 (-0.84)	0.002 (1.29)	0.001 (1.31)
Other tweets, Exec	-0.000*** (-4.19)	-0.000 (-0.38)	0.000 (0.41)	-0.000 (-0.30)	-0.001* (-1.70)
Firm tweet measures	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Firm, Exec, Year, and Month FE	Yes	Yes	Yes	Yes	Yes

## **i** What does this tell us?

1. Most executive tweets don't impact markets: ~99% of all tweets are non-financial business or "other"
2. Financial tweets appear to be investor relevant

# Corroborating evidence

## Tweet sentiment

Variable	$MMR_t$	$Retail BSI_t$
Fin tweets, Exec		
Non-neg	0.002** (1.87)	0.013** (2.18)
Negative	-0.001 (-0.23)	0.002 (0.09)
All controls	Yes	Yes
Full FEs	Yes	Yes

## Intraday posting time

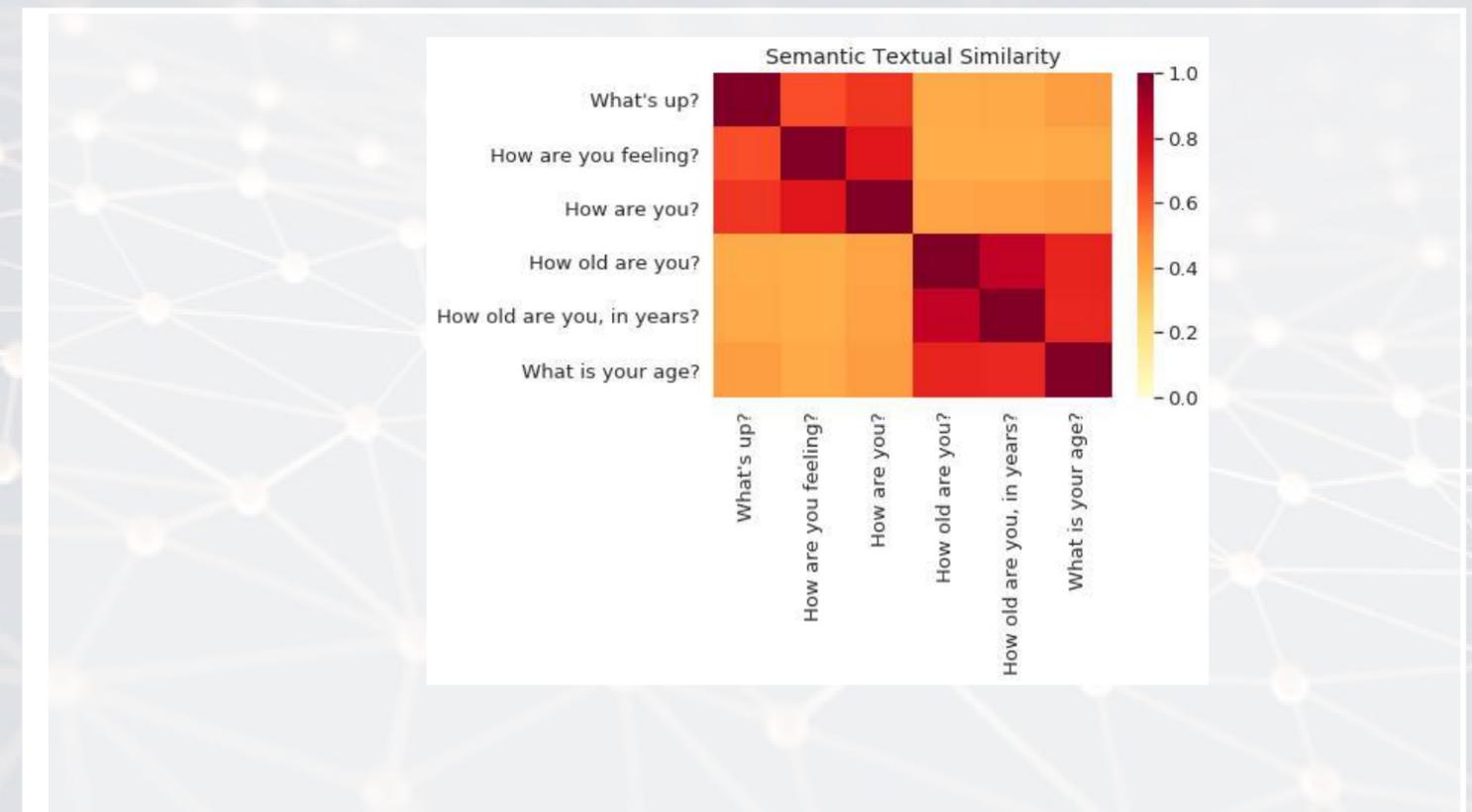
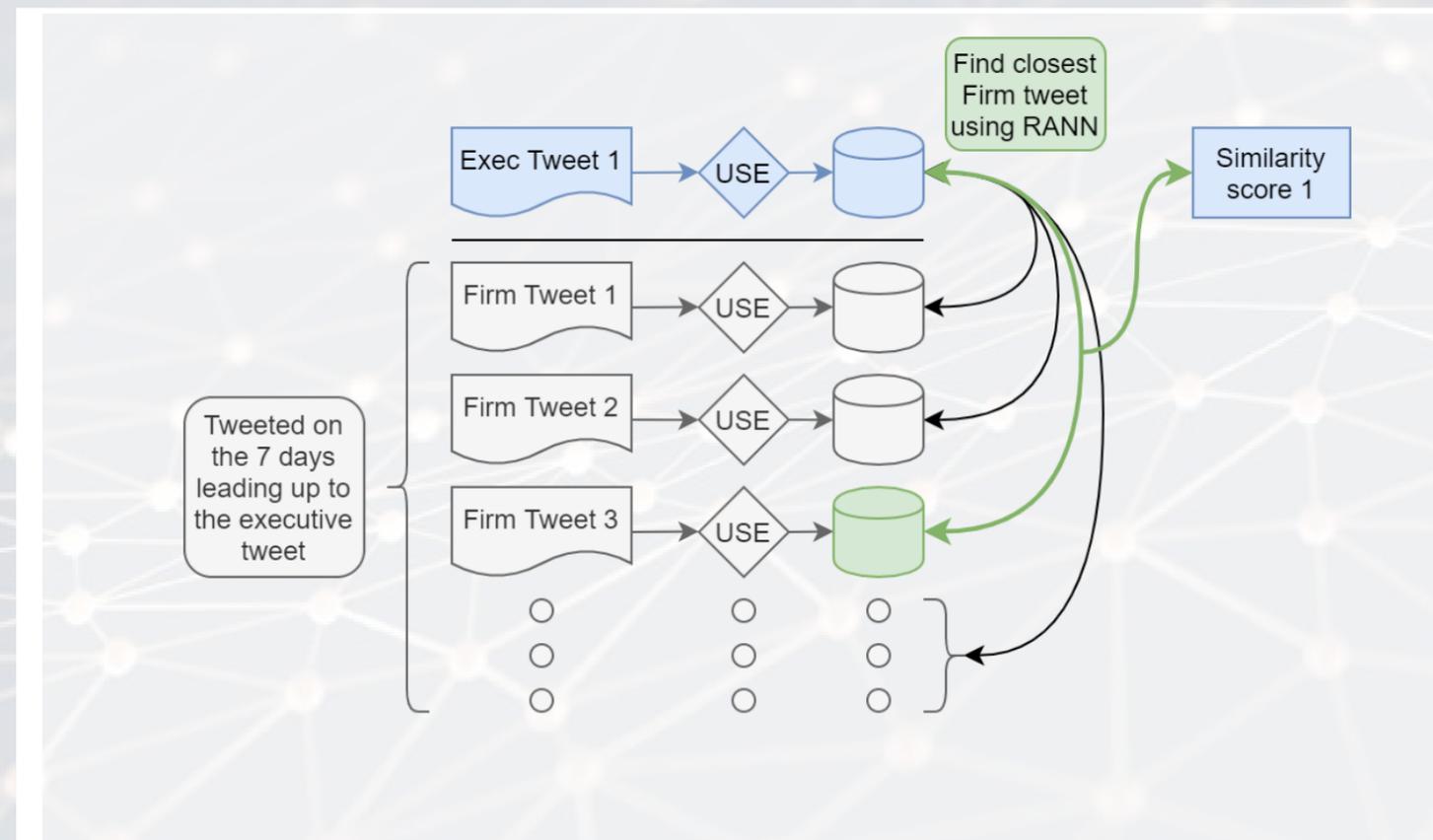
Variable	$MMR_t$	$Abn Vol_t$
Fin tweets, Exec		
Before trade	0.004*** (3.98)	0.492*** (5.09)
During trade	0.004*** (2.56)	0.258*** (2.71)
All controls	Yes	Yes
Full FEs	Yes	Yes

### **i** What does this tell us?

1. The signed return result may be due to the greater reaction to non-negative tweets
2. Reaction to tweets posted before trading rules out endogeneity of executives posting in response to stock movement

# Methodology: Disentangling mechanisms

We identify how *content-wise* similar each exec tweet is to corresponding firm tweets via **Universal Sentence Encoder (USE)**.



USE is a neural network method that relies on word **meaning** and word **order** to determine sentence meanings. It does not rely on word choice.

# Methodology: Disentangling mechanisms

- Three cases to consider for executive tweets:
  1. Not matched to a preceding firm tweet – most likely to have new information
    - Reaction to these tweets is consistent with the *new information* mechanism
  2. Preceded by firm tweets that are not similar
    - Reaction to these tweets is consistent with the *new information* mechanism
  3. Preceded by firm tweets that are similar – least likely to have new information
    - Reaction to these tweets is consistent with the *perceived credibility* mechanism

## 💡 Empirical approach

1. *New information*: Test the effect of unmatched tweets
2. *Perceived credibility*: Within matched tweets, examine how similarity affects market reaction

# Market Reaction Mechanisms

## New information

Variable	$MMR_t$	$Retail BSI_t$
Unmatched exec fin tweets	0.003* (1.86)	0.029** (2.28)
Matched exec fin tweets	0.004*** (4.72)	0.010* (1.77)
All controls	Yes	Yes
Full FEs	Yes	Yes

## Perceived credibility

Variable	$MMR_t$	$Abn Vol_t$
Fin tweets, Exec × Similarity	0.021** (2.56)	2.205*** (5.55)
Main effects	Yes	Yes
All controls	Yes	Yes
Full FEs	Yes	Yes

### **i** What does this tell us?

- *New information*: Tweets that are most likely to have new information lead to some market reaction
- *Perceived credibility*: Tweets that are more likely to repeat existing information lead to market reaction

**What about misinformation?**

**“Misinformation Regulations: Early Evidence on Corporate Social Media Strategy” (RAST, Forth)**

**with Yun Lou, Samuel Tan, and Liandong Zhang**

# Questions

- How do misinformation regulations affect corporate dissemination on social media?

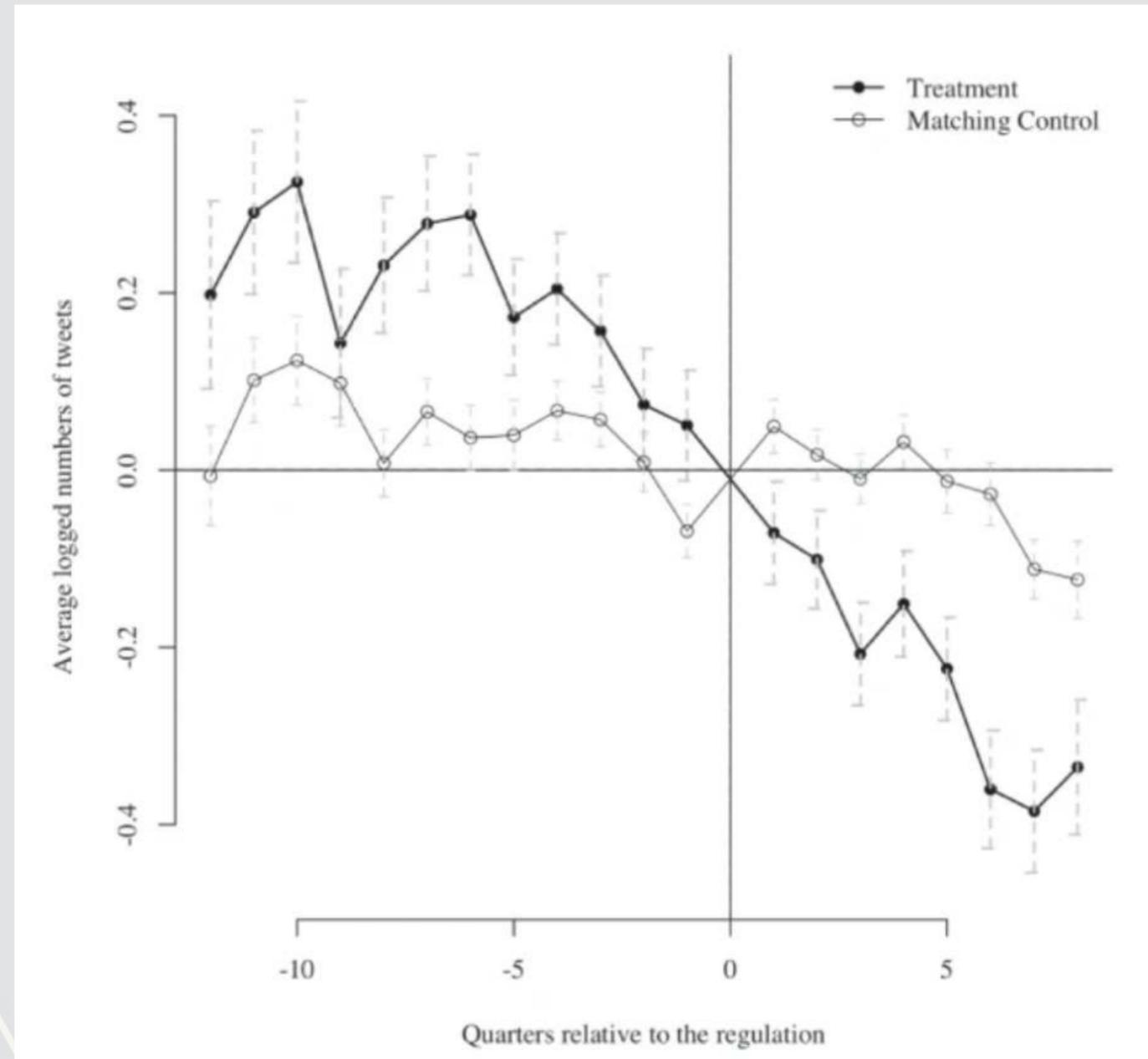
## Hypothesis

- Defensive tweets: Companies will decrease their use of social media after misinformation regulations are implemented

We find results consistent with lessening of defensive behavior

- More pronounced for countries with:
  - Higher social media usage
  - Greater investor protections
- More pronounced for firms that are less transparent
- Stronger for regulations that have criminal penalties or that focus on broader education of the population

# Main result



# Defensive tweets

“There have been rumours that DBS’ digibanking service disruption is linked to the sale of treasury bonds by Myanmar’s National Unity Government. There is no truth to this. DBS has not sold any such bonds.”  
— DBS, 2021

Variable	<i>Defensive tweets</i>	<i>Industry tweets</i>
Treat × Post	−5.140*** (0.887)	0.631*** (0.487)
Controls	Yes	Yes
Quarter, Regulation, Country FEs	Yes	Yes

## **i** What does this tell us?

- This test provides direct evidence that firms need to be less defensive after misinformation regulations are implemented

# Pushing econometrics with DoubleML

- Our main test design is pretty standard: Stacked DiD
  - Stacked: Construct individual panels around each treatment
  - DiD: Compare *pre* vs *post* event periods
- The above assumes:
  1. Treatment is exogenous to control variables
  2. Controls have a linear effect on outcomes

## 💡 Introducing DoubleML

Two stage non-parametric estimation of average treatment effects

1. Models endogeneity of the treatment in a non-parametric manner
2. Non-parametric models controls

• **Thanks!**

• **Questions?**

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# Packages used for these slides

- `downlit`

- `ggplot2`

- `ggthemes`

- `gridExtra`

- `kableExtra`

- `knitr`

- `quarto`

- `revealjs`

- `tidyverse`

# References

- Crowley, Richard M., Wenli Huang, and Hai Lu. “Discretionary dissemination on Twitter.” *Contemporary Accounting Research* 41, no. 4 (2024): 2454-2487.
- Crowley, Richard M., Wenli Huang, and Hai Lu. “Executive tweets.” (2025).
- Hummel, Patrick, John Morgan, and Phillip C. Stocken. “Voluntary disclosure of verifiable information with general preferences and information endowment uncertainty.” *The RAND Journal of Economics* 55, no. 4 (2024): 519-549.
- Crowley, Richard M., Yun Lou, Samuel T. Tan, and Liandong Zhang. “Misinformation regulations: Early evidence on corporate social media strategy.” *Review of Accounting Studies* (Forthcoming).

